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Agram... Kroätische Archäologische Gesellschaft.
Budapest... Magyar Tudományos Akademia.
— Magyar Nemzeti Néprajzi Ostálya.
Cracow... Akademija Umiejetnósci.
Sarajevo... Landesmuseum (Wissenschaftliche Mittheilungen aus Bosnien).
Vienna... Anthropologische Gesellschaft.
— K. Akademie der Wissenschaften.

Belgium.

Brussels... Académie Royale des Sciences.
— Instituts Solvay.
— Société d'Anthropologie de Bruxelles.
— Société d'Archéologie de Bruxelles.

Denmark.

Copenhagen... Société des Antiquaires du Nord.

France.

Lyons... Société d'Anthropologie de Lyon.
Paris... L'Anthropologie.
— École d'Anthropologie.
Paris...Revue de l'Histoire des Religions.
— Soc. des Americanistes.
— Société d'Anthropologie.
— Année Sociologique.

Germany.

Berlin... Berliner Gesellschaft für Anthropologie, Ethnologie, und Urgeschichte.
— K. Museum für Völkerkunde.
— Seminar für Orientalische Sprachen.
Brunswick ... Zentralblatt für Anthropologie, etc.
Giessen... Hessische Blätter.
Gotha... Petermann's Mittheilungen.
Halle-a-d-Saale... Kaiserliche Leopoldina Carolina Akademie der Deutschen Naturforscher.
— Deutsche Morgenländische Gesellschaft.
Kiel... Anthropologischer Verein für Schleswig-Holstein.
Leipzig... Archiv für Religionswissenschaft.
— Archiv für Rassen und Gesellschaft Biologie.

Leipzig... Verein für Erdkunde.
Munich... Deutsche Gesellschaft für Anthropologie, Ethnologie, und Urgeschichte.
Stuttgart... Zeitschrift für Morphologie und Anthropologie.

GREECE.

Athens... Ephemeris Archaiologikè.
— Annual of the British School of Archæology.

ITALY.

Florence... Società Italiana di Antropologia, Etnologia, e Psicologia Comparata.
Rome... Accademia dei Lincei.
— Bullettino di Paletnologia Italiana.
— Società Romana di Antropologia.
Turin... Archivio di Psichiatria.

NETHERLANDS.

Amsterdam... Koninklijke Akademie van Wetenschappen.
Leiden... Internationales Archiv für Ethnographie.
The Hague... Koninklijk Instituut voor de Taal-, Land-, en Volkenkunde van Nederlandsch Indië.

PORTUGAL.

Lisbon... Portugal em Africa.
Porto... Portugalia.

RUSSIA.

Dorpat...Publications of the University.
Helsingfors... Suomen Muinaismuistoyhdistyksen Arkakauskirja (Journal of the Finnish Archæological Society).
Moscow... Imper. Obshchestvo Lubitelei Iestestvoznania, Antropologii, i Etnografii.
St. Petersburg... Imper. Akademia Nauk.

SWEDEN.

Stockholm... Academy of Antiquities, National Museum.
— Nordiska Museet.
— Ymer.

SWITZERLAND.

Neuchâtel ... Soc. Neuchateloise de Géographie.
Zurich... Musée National Suisse.

AFRICA.

Cape Town... S. African Philosophical Society.

AMERICA.

ARGENTINE.

La Plata ... Museum.

BRAZIL.

Rio de Janeiro... Museu Nacional.

CANADA.

Montreal... Royal Society of Canada.
Toronto... Canadian Institute.

UNITED STATES.

Berkeley, Cal.... University of California.
Cambridge, Mass.... Peabody Museum, Science.
Chicago... American Antiquarian.
— Field Museum.
New York... American Museum of Natural History.
Philadelphia... Free Museum of Science and Art (University of Philadelphia, Department of Archæology.)
Washington... American Anthropologist.
— Bureau of Ethnology.
— Smithsonian Institution.
— United States Geological Survey.
— United States National Museum.
Worcester, Mass.... American Journal of Psychology.

ASIA.

CHINA.

Shanghai... Royal Asiatic Society (China branch).

INDIA.

Bombay... Anthropological Society.
— Indian Antiquary.

Calcutta... Bengal Asiatic Society.
Colombo... Royal Asiatic Society (Ceylon branch).
Simla...Archæological Reports.

JAPAN.

Tokio... Asiatic Society of Japan.
— Tokio-Daigaku (Imperial University).

JAVA.

Batavia... Bataviaasche Genootschap van Kunsten en Wetenschappen.

PHILIPPINE ISLANDS.

Manila...Ethnological Survey of the Philippine Islands.

STRAITS SETTLEMENTS.

Singapore... Royal Asiatic Society (Straits Branch).

AUSTRALIA AND PACIFIC.

Honolulu... Bernice Pauahi Bishop Museum.
Melbourne... Royal Society of Victoria.
New Plymouth, N.Z... Polynesian Society.
Sydney... Australian Museum
— Australasian Association for the Advancement of Science.
— Royal Society of New South Wales.

PUBLICATIONS RECEIVED IN EXCHANGE FOR "*MAN.*"

ENGLAND.

Colchester...Transactions of the Essex Archæological Society.
Hull... The Naturalist.
Liverpool..Institute of Tropical Research.
London... Church Missionary Review.
— Climate.
— Journal of the East India Association.
— Lancet.
— Reliquary and Illustrated Archæologist.
— Saga-Book of the Viking Club.
— South American Missionary Society.

ARGENTINE.

La Plata ... Museum.

AUSTRO-HUNGARY.

Budapest ... Magyar Nemzeti Museum.
Mödling ... Anthropos.
Uh. Hradiště... Pravěk.

BELGIUM.

Brussels... Bulletin de la Société d'Études Coloniales.
– Bull. de la Soc. Géographie.
— Instituts Solvay.
— Missions Belges.
Ghent... Volkskunde.

FRANCE.

Dax... Société de Borda.
Paris... Revue des Traditions Populaires.
— Melusine.
— L'Homme Préhistorique.
— La Revue Préhistorique.

GERMANY.

Brunswick... Globus.
Danzig... West Preussiches Provincial-Museum.
Dresden... Bericht des Vereins für Erdkunde.
Giessen...Hessische Blätter.
Guben... Niederlauzitzer Mittheilungen.
Munich... Korrespondenzblatt.
— Geographische Gesellschaft.
— Prähistorische Blätter.
Nürnberg... Bericht der Natur-historischen Gesellschaft.

INDIA.

Simla...Archæological Reports.

ITALY.

Como... Rivista Archeologica della Provincia de Como.
Palermo... La Scienza Sociale.
Rome... Rivista Italiana di Sociologia.

NATAL.

Pietermaritzburg ... Museum.

NEW SOUTH WALES.

Sydney... Science of Man.

OCEANIA.

Fiji... Na Mata.
Samoa... O le Sulu.

PORTUGAL.

Lisbon... Archeologo Português.
Serpa... A Tradição.

RHODESIA.

Bulawayo... Proceedings of the Rhodesian Scientific Association.

RUSSIA.

St. Petersburg... Zhivaya Starina.

SWITZERLAND.

Zürich... Schweizerisches Archiv für Volkskunde.

UNITED STATES.

Boston... American Journal of Archæology.
Chicago... Open Court.
New York ... American Museum of Natural History.
— Popular Science Monthly.
— Science.
Philadelphia... Proceedings of American Philosophical Society.
Washington ... Bureau of American Ethnology.
— Records of the Past.

Harrison and Sons, Printers in Ordinary to His Majesty, St. Martin's Lane.

JOURNAL

OF THE

ANTHROPOLOGICAL INSTITUTE

OF GREAT-BRITAIN AND IRELAND.

ANNUAL GENERAL MEETING.

JANUARY 23RD, 1906.

Prof. W. GOWLAND, F.S.A., *President, in the Chair.*

The Minutes of the last Annual General Meeting were read and confirmed.

The PRESIDENT appointed as Scrutineers, Mr. T. V. HOLMES and Dr. W. WRIGHT, and declared the ballot open.

The SECRETARY read the Report of the Council for 1905 (p. 2).

The TREASURER presented his Report for 1905 (p. 6).

The Reports were adopted unanimously.

The PRESIDENT delivered his annual address (p. 11).

Mr. F. W. RUDLER, Vice-President, proposed a hearty vote of thanks to the President for his address, and requested him, in the name of the Institute, to allow it to be printed in the *Journal*.

Mr. LONGWORTH DAMES seconded, and the vote was carried by acclamation.

The SCRUTINEERS handed in their Report, and the following were declared duly elected as Officers and Council for the year 1906–7:—

President.—Prof. W. Gowland, F.S.A.

Vice-Presidents.

Sir R. B. Martin, Bart. | A. L. Lewis, Esq., F.C.A.
Sir H. H. Johnston, G.C.M.G., K.C.B.

Hon. Secretary.—T. A. Joyce, Esq., M.A.

Hon. Treasurer.—J. Gray, Esq., B.Sc.

Council.

W. Crooke, Esq., B.A.
Prof. D. J. Cunningham, D.C.L., F.R.S.
O. M. Dalton, Esq., M.A., F.S.A.
W. L. H. Duckworth, Esq., M.D., Sc.D.
J. Edge-Partington, Esq.
A. J. Evans, Esq., M.A., Litt.D., F.R.S.
J. G. Garson, Esq., M.D.
E. S. Hartland, Esq., F.S.A.
A. Keith, Esq., M.D.
R. H. Pye, Esq.
D. Randall-MacIver, Esq., M.A., D.Sc.
Professor W. M. F. Petrie, D.C.L., F.R.S.
A. S. Quick, Esq.
Prof. W. Ridgeway, M.A., F.B.A.
W. H. R. Rivers, Esq., M.D.
F. C. Shrubsall, Esq., M.D.
W. W. Skeat, Esq., M.A.
C. G. Seligmann, Esq., M.B.
Sir R. C. Temple, Bart., C.I.E.
N. W. Thomas, Esq., M.A.

A vote of thanks to the outgoing members of Council, and to the Treasurer and Secretary, was moved by Mr. Randall-MacIver, seconded by Mr. Lewis, and carried unanimously. The Treasurer briefly replied.

A vote of thanks to the Scrutineers was passed on the motion of the President, seconded by the Secretary.

REPORT OF THE COUNCIL FOR 1905.

The Council is able to report another year of substantial progress, the number of new Fellows being only one less than the record established in 1904.

Below, in tabular form, are shown the numerical gains and losses of the Institute:—

	Honorary Fellows.	Corresponding Fellows.	Local Correspondents.	Ordinary Members.		Total Ordinary	Total Membership.
				Compounding.	Subscribing		
1 Jan., 1905 ...	44	9	28	78	283	361	442
Less	−2	−1		−3	−31	−34	−37
Since elected ...	+2		+2		+35	+35	+39
Since transferred	+1			−1		−1	
1 Jan., 1906 ...	45	8	30	74	287	361	444

It will be noticed that the number of resignations this year is unusually large. This is due to the fact that the Council has felt it necessary to take a somewhat firmer attitude with regard to members in arrears of subscription. The result has been that a large sum of money, owing to the Institute, has been collected, and that a certain number of Fellows have either resigned or had their names removed from the list of members. The Council feel that the resignation or removal of non-subscribing members is not in any way contrary to the interests of the Institute.

The following gentlemen have been elected Honorary Fellows of the Institute, in recognition of their services to Anthropology:—Professor Frederick Starr, of Chicago University; Professor Karl von den Steinen, of the Museum für Völkerkunde, Berlin; and Professor S. Tsuboi, of the Imperial University, Tokyo.

Among the losses which the Institute has suffered through death may be mentioned the names of Professor Adolf Bastian and Dr. K. H. Stolpe, Honorary Fellows; Professor Bonsdorff, a Corresponding Fellow; Mr. J. R. Browne, Professor G. B. Howes, Sir Hugh Low, Mr. F. D. Mocatta, Mr. A. Sanders, and the Earl of Southesk, Ordinary Fellows.

The loss which Anthropology has suffered in Professor Bastian, whose death occurred on February 3rd at Port of Spain, has already been noticed at length in *Man* (1905, 76), but the Council wish once more to pay a tribute to the memory of this great traveller, whose energy in furthering the study of Anthropology must ever command the admiration of Fellows of the Institute.

Dr. K. Hjalmar Stolpe, who died on January 27th, aged 64, has also been noticed in *Man* (1905, 30). His work, in the spheres of archæology and ethnography, will always have permanent value for students of those sciences.

Professor G. B. Howes (*Man*, 1905, 22), who died in February, had been a member of the Institute since 1887, and had served on the Council and as Vice-President.

Sir Hugh Low, G.C.M.G., who had seen service in Labuan and Perak, and who succeeded to the Residency on Mr. Birch's murder, was the author of "Sarawak and its Inhabitants." His death, which occurred in April, will be universally regretted. He was elected a Fellow of the Institute in 1891.

In Mr. A. Sanders and Mr. J. R. Browne the Institute has to regret two of its oldest Fellows, since they became members of the Anthropological Society in 1864. The former also contributed papers to the *Journal* of the Society and later to the *Journal* of the Institute.

Students of Anthropology have also learnt with sincere regret of the deaths of the following travellers and scientists, who have made many valuable contributions to the study of barbarous and primitive tribes.

Washington Matthews, one of the leading American philologists and ethnographers, died in April. Numerous monographs in the *Journal of American Folk Lore*, the *American Antiquarian*, and the *Reports of the Bureau of Ethnology* are the result of his life's work among the Indians of the Western States of America.

Hermann von Wissmann, one of the most notable of African explorers, died in June, after a life of continual activity in the dark continent. As regards Anthropology his name is chiefly connected with the expedition which he conducted through the unexplored watershed of the Kasai.

P. Savorgnan de Brazza, another celebrated African explorer, justly celebrated for his work in the French Congo, died in September. His works, though chiefly geographical, are not without interest for Anthropologists.

P. M. Lessar, whose explorations in the neighbourhood of the Caspian Sea and the Oxus are known to all geographers, in the midst of his geographical work found time to collect much information of ethnographical interest, which is to be found in the "Isvestia" of the Russian Geographical Society, 1882–1884.

The loss of Elisée Reclus will again be felt most seriously by Geographers. Ethnology, however, was not without a place in the wide sphere of his activity, as his work "Les Primitifs," which first appeared in 1885, bears ample witness.

Girard de Rialle, linguist and anthropologist, died at the end of 1904. The range of his interests was unusually wide, and included the study of American and Oriental languages, Tunisian Archæology and Physical Anthropology.

The death of Ferdinand, Freiherr von Richthofen, another celebrated explorer, noted chiefly for his work in Asia, also calls for mention; nor would the Council wish to leave unnoticed the names of Julius Oppert, the eminent Oriental scholar, and Coppelani, author of a work on Religious Brotherhoods of Islam in Africa.

Meetings.

During the year ending December 31st, 1905, eleven ordinary meetings were held, in addition to one special meeting, the Huxley Memorial Lecture. At these twelve papers were read, six dealing with ethnographical subjects and six with archæological, and five exhibitions of specimens were made. The Council are pleased to record a continuance of the good average attendance characteristic of last year.

Huxley Memorial Lecture.

The sixth Huxley Memorial Lecture was delivered on October 31st, 1905, in the lecture hall of the Society of Arts, by Dr. John Beddoe, M.D., LL.D., F.R.S., ex-President of the Institute. The lecture was entitled "Colour and Race," and the lecturer made use of many diagrams to illustrate his remarks. The proceedings were concluded by the presentation to the lecturer of the Institute's Huxley Memorial Medal.

Publications.

This year has seen the publication of two half-yearly parts of the *Journal*, viz., Vol. XXXIV, 2 (July—December, 1904) and Vol. XXXV, 1 (January—June, 1905). The sales of the former have amounted to 86 copies, a slight decrease on those of the corresponding number issued in 1904, but a considerable excess over those of 1903. Of the latter, however, although it was issued considerably later in the year, the sales amount to considerably more than those of the corresponding number of 1904, amounting in all to 70 copies. In consequence of this the Council considers it proved that the increase in price has not had any detrimental effect on the sales.

In respect to *Man*, the usual twelve monthly parts have been issued, and the Council has every reason to congratulate the Institute upon the resolution adopted last year. The number of subscriptions actually received from Fellows has amounted to 156 as against 33 in 1904. Those received from non-Fellows also show a considerable increase, thus testifying to the value of *Man* as a means of spreading a general knowledge of Anthropology. The actual figures are 87 as against 57 in 1904, the former figure representing the greatest number of outside subscriptions received since the first year of the publication of *Man*. The office sales also show an increase.

The question of the income derived by the Institute by the sale of *Man* is fully discussed in the Treasurer's Report, and the Council recommend that the present system of subscription be continued in force for another year.

A report of the papers read and the speeches delivered upon Physical Deterioration before Section H of the British Association at Cambridge in 1904 has been published in the form of Occasional Papers, No. 2, at the price of 2*s.* 6*d.*

Library.

The accessions to the Library show, on the whole, a decrease on those received in 1904. This decrease, however, relates solely to pamphlets and authors' short copy. The total number of books presented by publishers and authors is, in fact, larger than for 1904. The binding of current periodicals received increased attention; the catalogue has been revised and the consultation of it by members thereby greatly facilitated. The number of periodicals received in exchange for the *Journal* and *Man* has been increased by six units, five foreign and one British.

External.

The memorial on the subject of Physical Deterioration, prepared by the Council of 1904, was submitted and duly acknowledged.

A Select Committee appointed by the Council have been carrying out investigations on the six Pygmies from the Ituri forest brought to London by Mr. J. Harrison. Their report to the Council is at present in preparation. This committee consisted of Sir H. H. Johnston, chairman, Dr. A. Keith, Dr. Murray-Leslie, Dr. Rivers, Professor Thomson, and the Officers of the Institute, Professor W. Gowland, Mr. J. Gray and Mr. T. A. Joyce.

ANTHROPOLOGICAL INSTITUTE OF

Receipts and Payments

RECEIPTS.	£ s. d.	£ s. d.	£ s. d.
Balances in hand, January 1st, 1905 :—			
Cash in Bank	118 3 0		
Petty Cash	4 8 4		
		122 12 0	
Less Balances owed as per 1904 Account :—			
Library Fund	13 16 1		
"Notes and Queries"	42 10 2		
		56 6 3	
			66 5 9
Subscriptions :—			
Ordinary		476 14 0	
Arrears		63 8 0	
Advance		35 14 0	
			575 16 0
Sale of Journals		138 17 4	
Sale of Huxley Lectures		9 3	
			139 6 7
"Man"			127 13 9
Advertisements in *Journal* and *Man*			4 8 8
Dividends			9 19 8
Library Fund :—			
Balance, January 1st, 1905	13 16 1		
Grant	10 0 0		
		23 16 1	
Less Binding and Books	3 15 8		
Petty Cash	2 17 1		
		6 12 9	
			17 3 4
"Notes and Queries" :—			
Balance		42 10 2	
Received, 1905		9 4 3	
			51 14 5
Hobley's "Uganda"			29 12 1
"Physical Deterioration"			4 7 6
Sundries			1 14 6
			£1,028 2 3

January 16*th*, 1906.

GREAT BRITAIN AND IRELAND.

for the Year 1905.

PAYMENTS.	£ s. d.	£ s. d.
Rent		135 0 0
Journal	299 13 2	
Less refund	19 17 0	
		279 16 2
Advertising		4 1 8
"Man"		165 19 1
Salaries		106 8 0
Housekeeper		25 7 6
Stamps and Parcels		52 9 9
Printing and Stationery		23 1 2
Lantern		1 11 2
Huxley Medal and Lecture		10 18 6
Grant to Library		10 0 0
Hobley's "Uganda":—		
Balance (as per contra)	29 12 1	
Received 1905	15 6	
		28 16 7
Insurance		1 10 0
Travelling Expenses		2 2 9½
Sundries		27 19 1½
Balance at Bank		122 8 6
Cash in Hand		29 6 6
Petty Cash		1 5 9
		£1,028 2 3

Examined and found correct,

(Signed) RANDALL H. PYE, F. W. RUDLER, } *Auditors.*

TREASURER'S REPORT FOR THE YEAR 1905.

On the 31st December, 1905, the assets of the Institute were as follows:—

	£ s. d.	£ s. d.
Assets (not immediately realisable):—		
Books in Library, Publications, Furniture as per estimate of 1903 ...		855 0 0
Realisable Assets:—		
£300 Metropolitan Consolidated 3½ per cent. Stock, present value	312 0 0	
Arrears of subscriptions, £86 2s. 0*d*. valued at	25 0 0	
Balance at Bank	122 8 6	
Cash in Hand	29 6 6	
Petty Cash	1 5 9	
		490 0 9
Total Assets		£1,345 0 9

Against which there were liabilities:—

	£ s. d.	
Anthropological *Notes and Queries* ...	51 14 5	
Library Fund	23 16 1	
Harrison's account for *Journal*	122 18 5	
		198 8 11
Leaving a surplus, if all our property were realised, of		£1,146 11 10

Considering only our immediately realisable assets—

	£ s. d.
these amount to	490 0 9
less	198 8 11
that is	291 11 10

The state of ideal solvency also implies, as explained in my last report, the following additional liabilities:

	£ s. d.
Journal (1905)	250 0 0
Man (November and December, 1905)	25 0 0
Unexpended life subscriptions	366 0 0
Total	£641 0 0
Our immediately available Reserve Fund is	291 11 10
Leaving a deficit in our Reserve Fund of	349 8 2

The Financial Position of the Institute.

I am glad to be able to report that the measures recommended by the Council and adopted at the last General Meeting have been completely successful. As you will see from my last Report, the balance in hand at the end of 1904 was £50 short of the amount required to pay all the accounts that had been presented; and it was estimated that if we continued the same course, we should probably have a deficit of £160 at the end of 1905. To make our income meet our expenditure, it was proposed to ask members to pay for their copies of *Man* and to reduce the expenditure on the *Journal* and *Man* to £400. These measures, if successful in making our income equal to our expenditure, would leave us at the end of 1905 with the debt of £50 carried on from 1904.

As a matter of fact, our position is now so satisfactory that our income has been sufficient, not only to meet our expenditure, but to pay off our debt of £50 and leave a small surplus of about £18 on the assumption that all accounts are paid to the same extent as at the end of 1904.

Our immediately realisable assets have been increased by £35 odd, and the deficit in our Reserve Fund has been reduced by £111 odd.

This satisfactory result has been obtained chiefly by an increase of receipts of about £90 from *Man*, £33 from the *Journal*, £23 from ordinary current subscriptions, and £38 from arrears of subscriptions.

The increase from ordinary current subscriptions is considerably less than the estimate, namely, £40, made at the last meeting. This is due to the fact that fifteen members have failed to pay last year's subscription, and ten members are two years in arrears.

The considerable increase in the amount collected from members who were in arrears with their subscriptions is mainly due to the fact that special and somewhat drastic means, with the sanction of the Council, have been employed, in the case of members more than two years in arrears, to remind them of their duty to the Institute.

A considerable number of members in arrears who appeared to be hopeless as a source of income to the Institute have been struck off the list of Fellows, or suspended from all the privileges of the Institute. This makes our net increase of membership this year very small, though the gross accession amounted to about thirty-five Ordinary members, which, if not numerically quite equal to the record of last year, is, from the financial point of view, rather better.

In my opinion we have to thank the increased public interest in Anthropology for our increasing membership, and if this continues as it has been for the past two or three years, there need be no anxiety in the future about the financial position of the Institute, and we may hope that many departments of the Institute's activity, which now suffer for want of funds, will soon be supplied with the necessary sinews of war. The Institute has been rescued from its critical financial condition by the payments for *Man*, and the maintenance and improvement of this satisfactory condition depends on the support which Fellows continue to lend by subscribing for that valuable periodical.

J. GRAY, *Hon. Treasurer.*

PRESIDENTIAL ADDRESS.

COPPER AND ITS ALLOYS IN PREHISTORIC TIMES.

By W. Gowland, F.I.C., F.S.A.,
Professor of Metallurgy at the Royal School of Mines.

[With Plates I–III.]

In that remote age when man was unacquainted with metals, and his implements and weapons were fashioned of wood, of stone, and of bone, he has been regarded as a mere savage, scarcely, if at all, removed in intelligence from the wild animals with which he had to contend; and although this may perhaps be near the truth as regards the man of early palæolithic times, it is hardly a fair designation for the man of the later stages of the neolithic period, notwithstanding that even he had made but little advance in what are termed the civilised arts.

The remains of the dwellings of neolithic man show us that his domestic surroundings were of the rudest character, whilst his tools and weapons afford additional evidence of his primitive life. Yet he had discovered what were the best natural materials for the manufacture of his implements and the best means of fashioning them for his varied needs. Further, he displays considerable ingenuity in devising the forms which were best fitted for performing the work required of them. A notable example of this is seen in his primitive axe, the shape of which still survives in the modern American axe, modified, it is true, owing to the physical properties of the material of which it is made, but with its essential character practically unchanged.

Moreover, we have evidence, especially in the remains of the pile-dwellings of the Swiss lakes, that neolithic man was not solely dependent for his food on the spoils of the chase, but that he possessed a few domestic animals, cultivated cereals, and was acquainted with the arts of weaving and the manufacture of pottery.

Such were the men who were the first rude metallurgists. It is difficult, in fact impossible with our present knowledge, to form even an approximate estimate of the vast duration of the period during which man was acquainted only with wood, bone, or stone and the like, for the fabrication of his weapons and implements; but it is clearly evident from the abundance of the remains which have been unearthed that during a period to be measured only by many centuries he had reached and maintained the highest development of that civilisation which was possible with such imperfect appliances. No further advance could be made until some new material was available for the manufacture of others which would not only satisfy more perfectly the present needs of the individual and tribe, but facilitate their expansion and create new ones.

With the discovery and application of metals, we have a great, if not the greatest, turning point in the history of human development, the first birth of the germs of that civilisation and culture to which after a long sequence of events and of a retarded evolution we have attained at the present day.

A question often asked is, What metal was first discovered by early man? To this the reply must be: that the order in which the metals were discovered was not the same for every region.

FIG. 1.—MASS OF NATIVE COPPER FOUND IN ANCIENT WORKINGS, LAKE SUPERIOR DISTRICT.

(Reproduced by permission, from T. Richards' "Copper Mines of Lake Superior," p. 97.)

Metals and metallic ores, even those of most common occurrence, are very capriciously distributed in the world; in a given locality one or more may be abundant, others may be absent altogether, and in such locality the former only could be utilised.

Further, it is extremely probable, if not absolutely certain, that the metals which occur native, *i.e.*, those which occur as metals in nature, must have been the first known to the men inhabiting the localities in which they occurred.

The metals so occurring most frequently are gold and copper, less frequently silver and iron, whilst the others are so rare that they can be disregarded.

Of these four, gold is more widely distributed than the others, although never in such abundance as copper. It is found in the sands and gravels of rivers, usually in small flakes and particles, but occasionally in lumps or nuggets of considerable size. According to Strabo (*c.* 146) masses weighing half a pound were occasionally found in the sands of the Turdetanian rivers. No large masses, however, either rude as found, or artificially worked, have come down to us either from prehistoric or classical times. In our own days the occurrence of large nuggets has been confined to the alluvial gravels of Australia.

Gold, owing to its colour and weight, cannot have escaped the observation of early man, and being so widely distributed, it must have been the first metal to be known in many regions. It is, however, one of the most worthless of the metals for the practical purposes of life.

In fine particles it could not be applied to any use by men of the stone age, as they would be unacquainted with the art of melting, by which alone these particles could be converted into lumps; whilst that already in lumps, although capable of being fashioned by simple hammering into many forms, yet these, on account of the softness of the metal, could have no useful applications except as personal ornaments.

Hence gold, even if it had been much more abundant, could never have played any part, or at the most a very minor one, in the development of culture in neolithic times.

Unlike gold, copper is found in the metallic state in few localities but in greater abundance. The chief of these are the Lake Superior district, Chili, Yunnan (China), Bolivia, Burra Burra (Australia), and Cornwall. In the three first named, notably in the Lake Superior district, it occurs in large quantities, and has been mined from very early times; hence it was the first metal to be known and used by the men of these regions. In the Lake Superior district it is found in masses frequently of enormous size. That shown in Fig. 1 weighs three tons. It was taken from an ancient pit 16½ feet deep and exhibits the marks of stone hammers or axes. Another mass, measuring 10 feet by 3 feet by 2 feet and weighing over six tons, was found along with numerous stone hammers. It had been pounded with these until every projecting part had been broken off.

Many axes, lance heads and other objects of a remote age, all fashioned from the native copper by simple hammering, have been unearthed from time to time in this district.[1] Examples of these are given in Fig. 2; yet it must be borne in mind that, although the early men there were acquainted with and used the metal, they never discovered the art of melting and casting it, but fashioned the pieces, which they had detached from the large blocks, into implements in the same manner as they had been accustomed to deal with stone, so that they never advanced beyond the stage of culture associated with that material.

Silver is of rarer occurrence in the native state than either gold or copper, and

[1] *Ancient Monuments of the Mississippi Valley*, Squier and Davis, pp. 197, 199 and 201.

when found is usually in thin leaf-like or wire-like forms. At Kongsberg, in Norway, it is true, large masses weighing from 60 to 1,500 pounds have been taken out of the mines; but this is quite exceptional. Hence the use of the metal in prehistoric times even for personal ornaments is rare and of little importance. Had it, however, been found in abundance, weapons and implements, in no way inferior to those of copper or mild bronze, could have been made of it without difficulty.

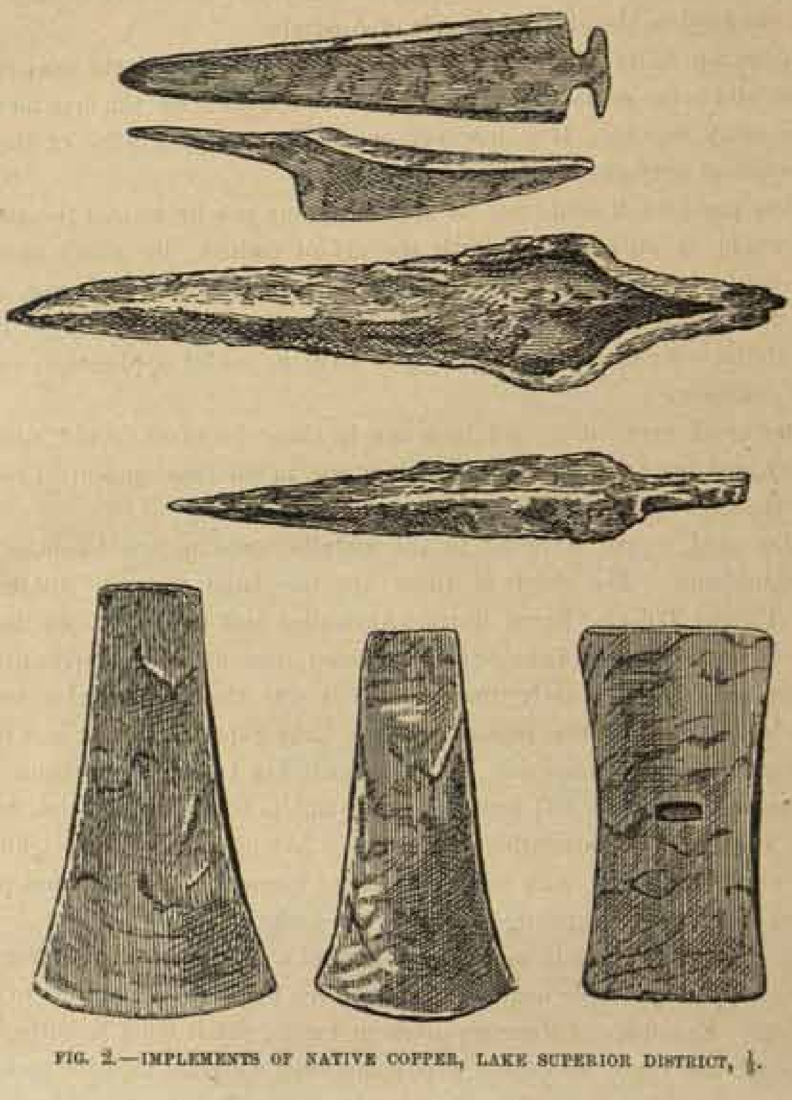


FIG. 2.—IMPLEMENTS OF NATIVE COPPER, LAKE SUPERIOR DISTRICT, ½.

Iron, as metal of extra-terrestrial origin, is found in the form of meteorites (siderites) in several parts of the world, but its occurrence is by no means common. In Greenland, at Ovifak, there are immense blocks which were once regarded as siderites, but recent investigations have shown that they differ from them in some important characters, and must be considered to be of terrestrial origin. This iron has long been used by the Esquimaux for the manufacture of implements and weapons, and it was, in fact, the first metal known to them.

We have now dealt with the discovery of metals in the metallic state in nature, but their comparative rare occurrence and limited distribution in this form were insufficient to affect to any great extent and in but limited areas the old stone age culture.

So that it was not until primitive man had discovered and practised for a considerable period the art of extracting metals from their ores that he was able to discard even partially his ruder implements of stone.

With this discovery a new and more advanced period was called into existence in which human culture was revolutionised, and progress beyond the wildest dreams of primitive man rendered possible. New wants were created and new impulses were developed, and, as time passed on, the rude barbarism of his ancestors was gradually left behind.

Great as have been the results in recent times of the discoveries of the properties of steam and electricity and of their application to the practical purposes

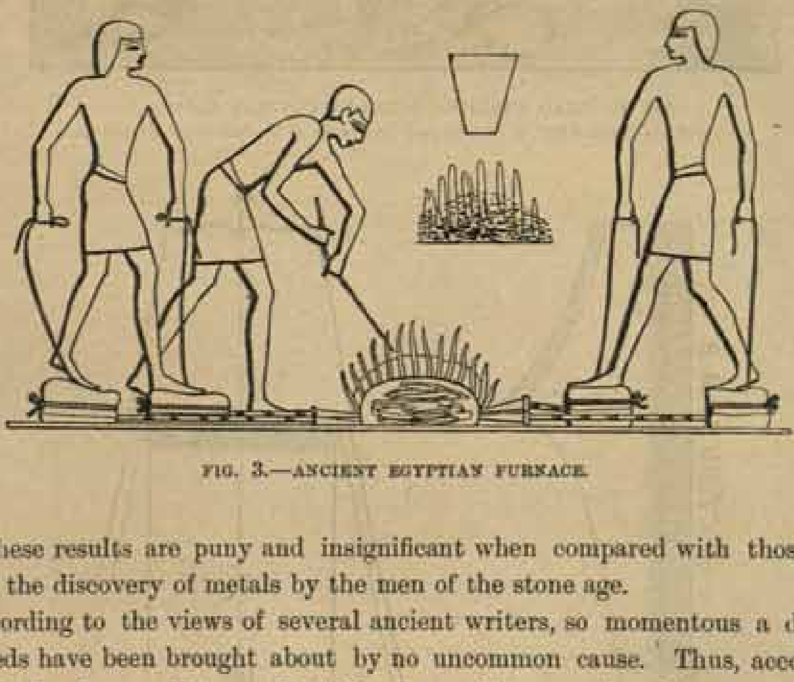


FIG. 3.—ANCIENT EGYPTIAN FURNACE.

of life, these results are puny and insignificant when compared with those which followed the discovery of metals by the men of the stone age.

According to the views of several ancient writers, so momentous a discovery must needs have been brought about by no uncommon cause. Thus, according to Lucretius' *De Rerum Naturæ*, V. 1250, f., a mighty conflagration consumed the forests which covered metalliferous ground, reducing the ores which outcropped at the surface to the metallic state, and thus bringing metal first to the notice of man. Poseidonius, in Strabo, *c.* 147, has a similar tale concerning the discovery of gold and silver in Spain. These statements may perhaps be true, so far as regards the discovery in later times of veins of ore which would necessarily be exposed to view when the ground was thus laid bare, but there are no grounds whatever for the inference that the discovery of the art of smelting ores for the extraction of their metals originated in this way.

That discovery had no such poetic birth, but was brought about in a more

FIG 4.—LEAD SMELTING FURNACE, CENTRAL BOLIVIA.
(*From Archæologia, LVII, p. 361, by kind permission of the Society of Antiquaries.*)

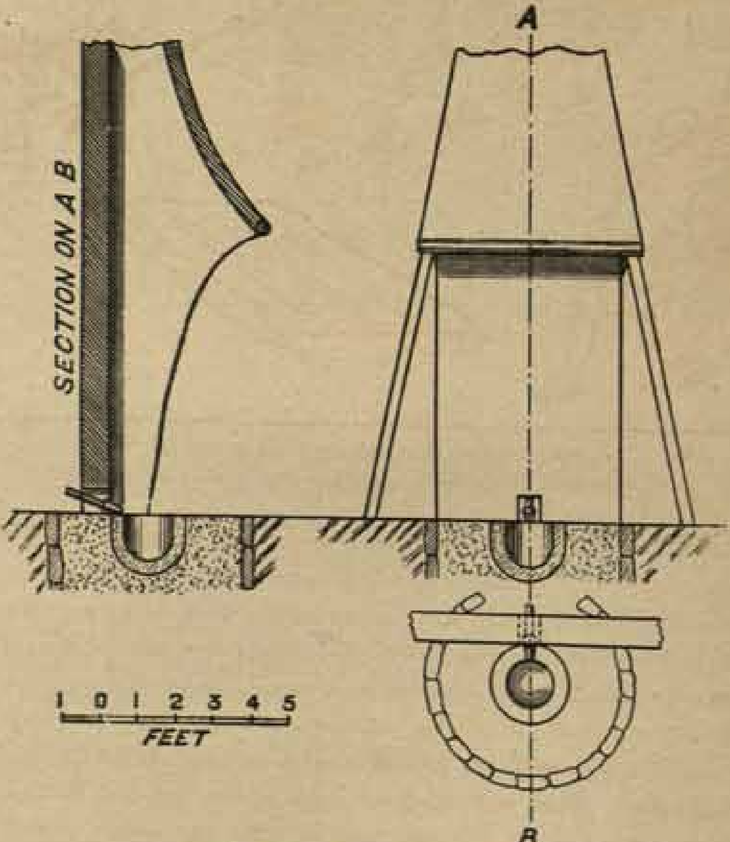


FIG. 5.—JAPANESE SMELTING FURNACE.
(*From Archæologia, LVI, p. 277, by kind permission of the Society of Antiquaries.*)

commonplace and humbler way. It had its origin in the camp fires of the neolithic age.

Pieces of ore, either of copper, tin, lead, or even iron, which occurred among the ring of stones enclosing the fire, or which accidentally were embedded in its embers, would become reduced to metal.

The cakes or lumps so produced would naturally attract the attention of primitive man, and if he attempted to fashion them, as he was accustomed in making his implements of stone, he would then become acquainted with their curious properties of malleability and toughness, wanting in his customary materials, and so be led to apply them to practical use.

FIG. 6.—JAPANESE SMELTING OPERATIONS.
(From Archæologia, LVII, p. 280, by kind permission of the Society of Antiquaries.)

The camp fire was, I hold, the first metallurgical furnace, and from it, by successive modifications, the huge and complicated furnaces of the present day were gradually evolved. The first stages in this evolution were easily reached; a shallow cavity would be formed in the hearth of the fire for the reception of the molten metal. Next, in order to obtain larger quantities of metal, the cavity would be deepened or a low wall of rude stones would be built around it, the fire being thus increased in size. Furnaces of precisely this primitive form survived in Derbyshire up to the seventeenth century. They were built in high places, exposed to the wind, the air forced by a breeze through the apertures between the stones giving rise to a sufficiently high temperature for the reduction of the metal, and no artificial blast was needed.

In this connection it may be mentioned that the utilisation of the wind in the smelting of lead ore may still be seen in actual practice at the present day in Central Bolivia, in the furnaces shown in Fig. 4.

That the furnace in use in ancient Egypt was but a slight modification of the camp fire is well seen in Fig. 3, which is reproduced from a wall painting at Thebes.

In Japan, for smelting copper, tin, and lead, the furnace which was in universal use in 1868 and is still largely employed, is as simple and rude both in shape and construction as that of prehistoric man. (Figs. 5 and 6.)

It is simply a hemispherical cavity in the ground without enclosing walls of any kind, but is worked with an artificial blast of air.

In East Africa the same primitive furnace, merely a hole in the ground, is in use for the extraction of iron from its ores.

Then as regards the metallic ores which were within the reach of prehistoric man, they were undoubtedly those which occur at the surface of the ground, *i.e.*, where a mineral vein outcrops or is exposed. Now the ores which occur in this part of a vein are as a rule oxides and carbonates, which of all ores are the most easily reducible to metal, and from all these the metal can be obtained without any difficulty whatever by treating them in the primitive "hole in the ground" furnaces we have just considered.

So that when once the discovery was made that, simply by heating stones of a certain colour and weight, metal could be obtained, and when the possible applications of the metal to useful purposes were also discovered, there would be, it is certain, a large production in the localities where these stones or ores occurred. Hence the vast amount of prehistoric metal objects which have been unearthed is by no means surprising.

The localities where these oxide and carbonate ores occurred must have been the centres whence the metal or metals were supplied to others, but it does not necessarily follow that in them, or even near them, the largest number of metal objects were always made, or should always be found, for the crude metal, more especially in later times, would often be merely an object of barter and would be worked into useful forms in more or less distant places.

Copper.

The metallurgy of copper is of the first importance to us on account of the prominent part it and its very variable alloy, bronze, have played in the life and culture of primitive man. The lumps of the metal which from time to time have been found in founder's hoards afford valuable indications of the dimensions and shape of the smelting furnaces in which they were produced. They are generally fragments of a rude plano-convex mass of crude metal about 8 inches to 10 inches in diameter and about 1½ inches thick at the thickest part. This shows conclusively that the furnace was simply a small, shallow hole in the ground about 10 inches to 12 inches in diameter, and that even in palstave and socketed celt times the smelting operations were carried on on a very small scale.

The operation of smelting was conducted as follows: The shallow cavity of the furnace was first filled with charcoal, and when this was burning freely a layer of ore was spread over it, then a layer of charcoal, then a layer of ore, and so on until a conical heap of ore and charcoal was formed in and above the furnace as in Fig. 6. The fire was urged either by the wind, or possibly by some rude kind of bellows. The ore was gradually reduced to metal, and the charcoal consumed, until after about an hour or less a mass of molten metal covered by slag and unburnt charcoal remained. The slag and unburnt charcoal were first removed by a wooden rake. The copper, which was never run out of the furnace, was allowed to solidify, and at the moment of solidification the cake was rapidly pulled out from the furnace cavity and broken up into lumps on a large stone embedded in the ground. This method of removing the metal survives at the present time in Korea.

Now, in the smelting operation as thus conducted, any impurities in the ore, such as tin, arsenic, antimony, or lead, would also be reduced and would enter into the copper in greater or less proportion according to the amounts of these impurities present, and would form an alloy with it. All these impurities are frequent, and in some localities invariably present, in copper ores. It is to these causes, as I have already pointed out,[1] that the presence of small quantities of tin, antimony, arsenic and lead in celts and other weapons and implements of the bronze age is due and not to the intentional addition of these metals. And I am of the opinion that bronze was made in some localities directly from a copper ore containing tin, or from a mixture of copper ore and tin stone, long before it was prepared by melting together copper and tin stone or copper and metallic tin. In fact, bronze had its origin in the simple smelting of an ore in which copper ore and tin ore were naturally associated.

In Cornwall large quantities of copper ores containing cassiterite (tin binoxide) have always been produced. They were and are called "tinny" ores, and when smelted the copper obtained always contained tin and was inferior in certain physical properties to copper not so contaminated. To such an extent did this occur in the early part of last century that a special process, "the best selecting process," was devised in order to prevent the tin from passing into the metallic copper. These ores were pyritic, consisting of iron and copper pyrites mixed with binoxide of tin; but when oxidised ores, viz., those consisting of copper oxides or carbonates, mixed with the same oxide, are smelted, a much larger proportion of tin passes into the copper.

As it had been stated by several Continental archæologists that when a copper ore containing tin ore is smelted, the tin does not enter into combination with the copper but passes into the slag, I made several experiments some years ago in order to ascertain how they had been misled. In every experiment an alloy

[1] *Archæologia*, vol. lvi, p. 283 (1899).

of copper rich in tin was produced.[1] These experiments were made in crucibles, and on a small scale; hence, in order to demonstrate conclusively that similar alloys would be produced under the conditions which were available to prehistoric man, a furnace of the simplest primitive form, merely a hole in the

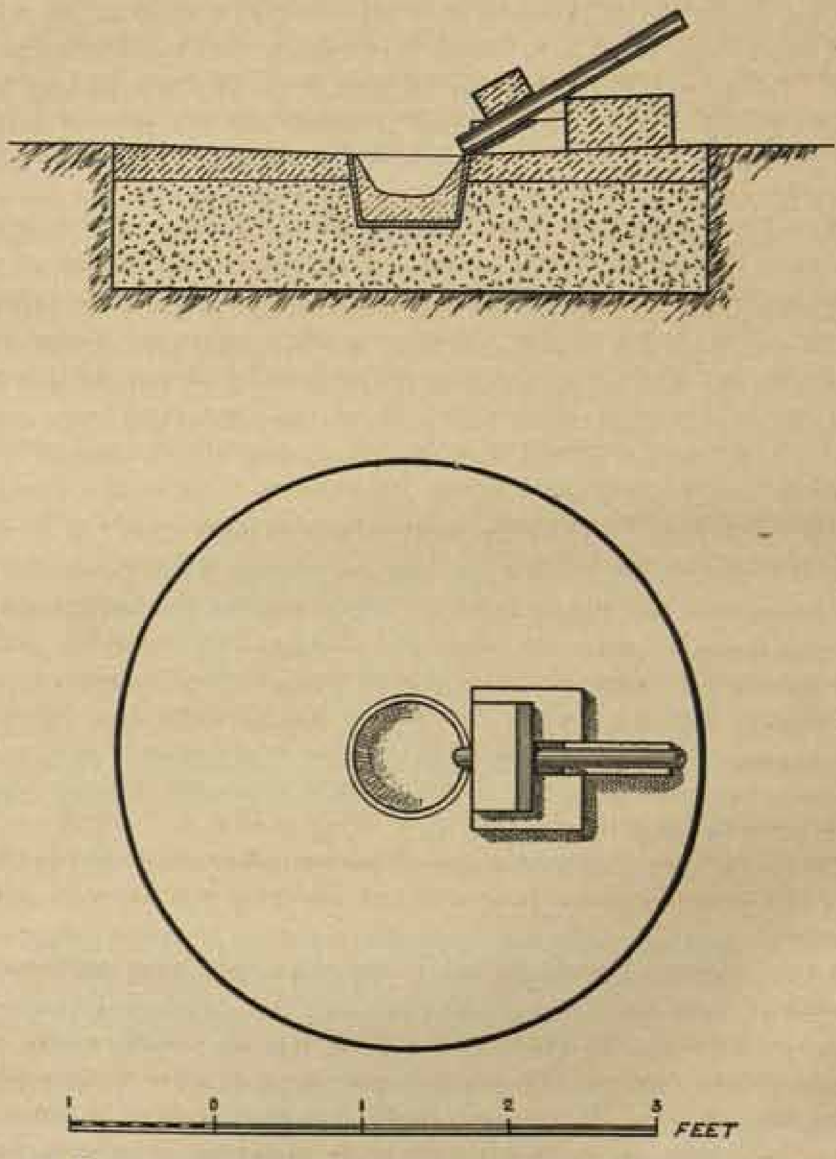


FIG. 7.—PRIMITIVE FURNACE CONSTRUCTED AT THE ROYAL SCHOOL OF MINES.

ground, was constructed in my laboratory for practical metallurgical work at the Royal School of Mines. (Fig. 7.) The fuel used was charcoal.

A mixture of copper ore (green carbonate) and tin stone was smelted in it, and

[1] *Proc. Soc. Antiq.*, 2nd Series, vol. xvi, p. 333.

a copper-tin alloy, a bronze containing 22·0 per cent. of tin, was obtained.[1] (See Appendix for details.)

This experiment proves indisputably that when a copper ore containing tin ore was smelted by primitive man, a bronze consisting of copper and tin was obtained; and affords a complete refutation of the statements that such ores will only yield copper and not a copper-tin alloy. It shows, further, that these statements are not based on any experimental work, but have been erroneously deduced from the methods of smelting in use at the present time, which differ *in toto* from those which were practised, and in fact alone possible, in the earliest days of metallurgy.

What I have already said about the presence of tin is also true of antimony. According to Hampel[2] an alloy of copper and antimony preceded that of copper and tin in Hungary, where the copper ores contained considerable amounts of antimony. Now, antimony has a hardening effect on copper similar to that produced by tin; hence we have weapons, even of late date in the Bronze Age, in that country containing antimony and only small proportions of tin. A notable example of a copper antimony alloy is seen in a socketed celt analysed by Dr. Otto Helm.[3] It was found near Elbing, but, according to Helm, like several other implements dug up in West Prussia, had come from Hungary in exchange for amber.[4]

Its composition is as follows:—

Copper	... 91·12 per cent.		Silver	... 0·45 per cent.	
Antimony	... 4·48	„	Lead	... 1·63	„
Tin	... 0·78	„	Iron	... 0·49	„
Nickel	... 0·61	„	Sulphur	... 0·12	„
Arsenic	... 0·32	„			

The complex composition of this celt is also of interest, as it affords conclusive evidence of the origin of the metal from an impure copper ore, for it is impossible that the various metals present besides copper could have been added as metals or intentionally.

In this connection I would ask for your attention to a brief consideration of the so-called Copper Age.

In some localities, pure copper as found native, or in a more or less impure form just as it was smelted from its ores, was the first metal to be applied to practical uses by neolithic man, and implements were made of it before they were made of bronze. This was solely due to the nature of the mineral deposits that occurred in those localities, which were either native copper or ores in which tin ore or other ores were altogether absent or present in but very small quantities.

Thus in America a considerable number of implements and objects of native

[1] A specimen of the alloy is in the British Museum.

[2] *Zeitschrift für Ethnologie*, 1896, p. 83.

[3] *Verhn. Berliner. Ges. A. E. und V.*, 1897, p. 123 *et seq.*

[4] *Zeitschrift für Ethnologie*, 1895, p. 1 *et seq.*

unmelted copper, and in Ireland and Cyprus of copper smelted from ores, have been unearthed.

This, however, as we shall see later, cannot be accepted as evidence of a universal Copper Age preceding the Bronze Age in the world, or even in Europe.

It is true that copper implements have been found in other localities and in many parts of Europe, yet their numbers are immeasurably small when compared with the vast number of those of stone occurring in the same places. Moreover, the puny and insignificant character of most is in marked contrast with the larger and more useful forms in stone. Primitive man can, in fact, only have used them as adjuncts to his more generally efficient weapons and implements of the latter material.

Again, no special typical form of implement in copper has yet been found; all are either copies of stone forms, or when made during the Bronze Age—and of these there are many—of forms of that period.

The manufacture of a stone celt was a laborious operation compared with the casting and hammering of one of metal; hence, when metal was first discovered, it would on that account be employed for certain implements, and not because the implements so made were more effective than those of stone. In fact, most of the flat simple copper celts, insignificant in size and weight, which were first made in certain countries are singularly inefficient for any practical purpose except for the skinning of animals.

In the so-called Copper Age, practically all the important weapons and implements, whether for fighting or domestic use, were undoubtedly of stone, those of Cyprus only being excepted, where they continued to be made of copper during the Bronze Age, and in Bronze Age forms, owing to scarcity of tin.

Until the Bronze Age, in fact, we really have no fighting weapons of metal which can be compared in efficiency with the old stone weapons of neolithic man.

We may therefore conclude, with some reason, that the time during which man was acquainted with and made use of copper, was of very short duration, and represents merely a stage of transition from stone to bronze.

Further, by no means all copper celts or implements belong to that time; many, even those of simple forms, belong to the true Bronze Age. In this connection there is an important fact, well known to metallurgists but sometimes overlooked by archæologists, which cannot be disregarded, *i.e.*, that copper objects can *only* be cast in simple forms in an open mould. In a closed mould such as was necessary for palstaves or socketed celts and the like, copper cannot be satisfactorily used, as when so cast the implement or object would generally be full of cavities and worthless for any practical purpose.

Hence it is that only flat celts and knife or dagger blades of simple forms could be made of copper.

For many minor purposes, even during the Bronze Age, a simple celt of copper would be as useful as one of bronze, and the former metal being always the cheaper, many were then made, notably those with long curved edges and side flanges. From this it follows that simplicity of form alone, as regards copper implements, is not an indication of age.

Scarcity or the costliness of tin was also sometimes a reason for the use of copper, or of copper with but little tin.

A good example of this is seen in Fig. 8, representing an axe which was found near Segeberg together with two armlets.[1] The axe contains only 1·25 per cent. of tin, whilst the armlets contain respectively 5·83 and 6·35 per cent.

In England but few copper celts have been found, and their scarcity is due, in my opinion, to the common occurrence of mixed copper and tin ores in Cornwall, by the smelting of which bronze and not simply copper would result.

In Plate I, Figs. 1–5, are represented five copper celts, now in the British Museum, only two of which were found in England, the others probably in Ireland.

In order to ascertain their exact composition, I made an analysis of each and obtained the results given in Table I.

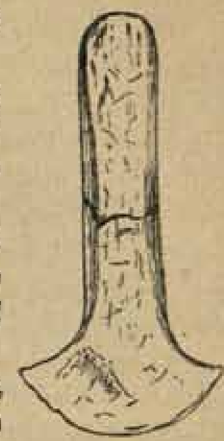


FIG. 8.—CELT FOUND NEAR SEGEBERG, SCHLESWIG-HOLSTEIN, ½.

TABLE I.

Copper Celts. British Museum. Analyses by Professor W. Gowland.

Locality.	Copper.	Tin.	Lead.	Iron.	Nickel.	Arsenic.	Antimony.	Silver.	Sulphur.	Weight in ozs. Troy.	
1. Ireland ? ...	98·95	·17	Tr.	·20	Tr.	Tr.		·35	Tr.	12 ozs.	405 grains.
2. Durham	98·67	·05	·07	·14	Tr.	·77		·12	Tr.	23 „	166 „
3. Ireland ? ...	98·22	·12	Tr.	·17	Nil	1·04	Nil	·16	Tr.	17 „	5 „
4. Chapel Fields, St. Margarets	97·98	·04	Tr.	·16	Tr.	1·45		·29	Tr.	8 „	380 „
5. Ireland ? ...	96·90	·08	·06	·30	Tr.	2·17		·21	Tr.	26 „	351 „

No. 5 is of special interest owing to the somewhat large percentage of arsenic present. This impurity was also found in several Irish celts analysed by Mr. J. N. Pollok for Mr. Coffey's paper on "Irish Copper Celts."[2] It is present in all copper obtained by smelting, but usually only in very small quantities.

In support of my contention that there was no distinct period of culture to which the term "Copper Age" can be legitimately applied, I will now ask for your attention to the accompanying illustrations of some of the implements which have

[1] *Vorgeschichtliche Bronzen Schleswig-Holsteins*, Otto Kröhnke Fig. 34.
[2] *Jour. Anthrop. Inst.*, vol. xxxi, pp. 265, 279.

been cited as evidence of such an age. In Fig. 9 (reproduced by permission of Mr. Coffey from his paper cited above[1]) are represented "three copper celts, a copper halberd, and a short blade of somewhat similar form, found in 1892, near Birr, King's Co." The uppermost celt, the halberd, and the short blade were found together.

The celt has side flanges, the short blade rivet-holes, and the halberd rivet-holes and rivets, and a mid-rib; and I think all will agree with me that they are undoubtedly Bronze Age forms. The rivets indicate a familiarity with the working of metal which can have been acquired only after lengthened practical experience of its properties, and long subsequently to its first application in neolithic times. The art of riveting was, indeed, not invented until late in the Bronze Age.

In Plate XXXI in the same paper we have three copper celts, and a knife from a find in a bog near Kilbannon, co. Galway, all also of Bronze Age type, the celts having long curved edges and side flanges.

That simple flat celts were made of bronze during the Bronze Age, some contemporaneously with more advanced forms, is proved by many examples.

Of the four given in Fig. 10, No. 1,[2] contains 3·89 per cent of tin; No. 2,[2] 6·95 per cent. of tin and 1·19 per cent. of antimony. The others have not been analysed, but are undoubtedly of hard bronze. No. 3[3] is coated with tin and was found together with a bronze dagger 11 inches long, with four rivet-holes.

Some typical examples of flat bronze celts in the British Museum are shown in Plate I, Figs. 6, 7, 8, 9, 11. Each of these I have analysed, and their composition is given in the following table:—

TABLE II.—Bronze Flat Celts. British Museum.

Locality.	Copper.	Tin.	Lead.	Iron.	Nickel.	Arsenic.	Antimony.	Silver.	Sulphur.	Weight in ozs. Troy.
6. Taxley Fen, Huntingdonshire	89·72	8·99	Tr.	·16	·11	·68	·15	·09	Nil	ozs. grains. 8 312
7. Yorkshire (Butterwick) ...	87·97	10·74	Tr.	·10	·06	·56	·15	·16		6 426
8. Cambridgeshire	87·41	11·04	Tr.	1·22	·11	Tr.	Nil	Tr.		11 350
9. Plumpton Plain, nr. Lewes	86·79	11·34	Tr.	·14	·37	·78	·31	·17	{Manganese trace}	7 187
10. Ireland (Fig. 11 in text).	86·20	12·52	Tr.	·19	Nil	·68	·26	·21		39 246
11. Nr. York ...	85·83	11·73	1·21	·10	·14	Nil	Nil	Tr.		29 191

[1] *Jour. Anthrop. Inst.*, xxxi, pp. 256–279, Plate XXXIII.
[2] Kröhnke, *op. cit.*, Figs. 3 and 4.
[3] *Catalogue of the Museum of National Antiquities of Scotland*, p. 128.

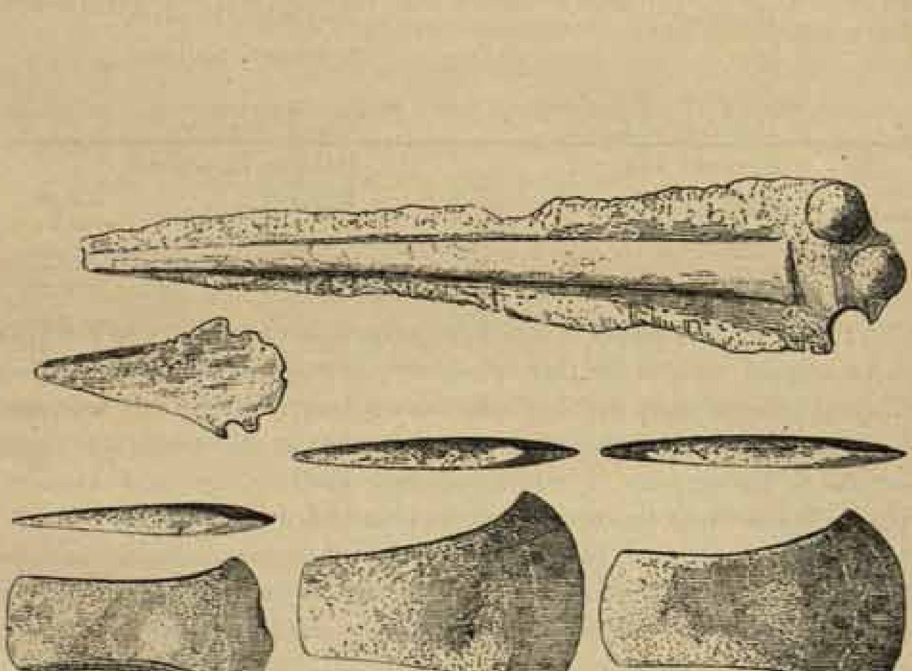


FIG. 9.—COPPER CELTS, HALBERD AND DAGGER.

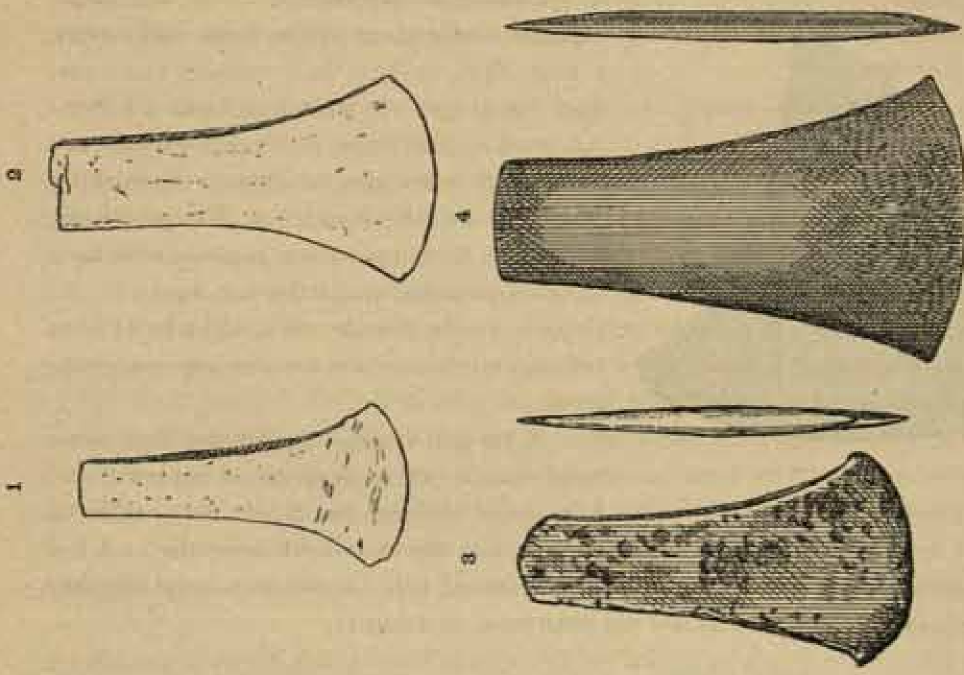


FIG. 10.—BRONZE FLAT CELTS, ½.

1 and 2. Schleswig-Holstein. 3. Morayshire. 4. Dumfriesshire.[1]

[1] Evans, *Ancient Bronze Implements*, p. 56, Fig. 19.

The percentage of tin ranges from 8·99 to 12·5 per cent. The smallest (No. 7) was taken by Canon Greenwell from a barrow in Yorkshire at Butterwick. It is of considerable importance, as it was found together with a small bronze knife and dagger, a flint knife, a long flint scraper, and some flint chippings. If there had been a Copper Age in England, then the knife, dagger, and axe should have been of copper. In fact, Dr. Much in *Die Kupferzeit in Europas*, being misled by its simple form, assumes it to be of copper and actually adduces it as evidence of a Copper Age in Britain. Unfortunately for his argument, it consists of true bronze containing 10·68 per cent. of tin.

FIG. 11.—BRONZE FLAT AXE. BRITISH MUSEUM.

There still remains for our consideration a large number of implements of copper which have been claimed by Much and others as evidences of the so-called Copper Age. A few selected examples will, I think, prove conclusively that there are not the slightest grounds for such claims. They are illustrated in Plate II.

1. Hammer axe	Rossitz, Moravia.
2. Hammer...	Boskowitz, Moravia.
3. Axe	Komarow, Galicia.
4. Weapon, Russia.	
5. Hammer pick	Carow, Saxony.
6. Hammer axe	Dahlem, Hanover.
7. Axe	Kujavia.
8. "	Hungary.
9. Hammer axe	Schonen.

From their advanced shapes it will, I feel certain, be admitted that they are not Stone Age types; neither can they belong even to the early Bronze Age. They are, in my opinion, Bronze Age implements of a comparatively late date, and indicate either that tin was scarce when they were made, or that copper was found to be suitable for the purpose for which they were used, just as copper hammers are in use for special work by engineers at the present day.

The question now arises, Is the period during which primitive man, in some localities, in passing from the use of stone to the use of bronze, employed copper implements as minor accessories to his more important implements of stone, worthy of being styled the Copper Age?

When we speak of the Palæolithic Age, or the Neolithic or Bronze Ages, we do not mean merely periods of time, but special stages of culture with definite characteristics. The so-called Copper Age possesses no characteristics which are not common to the Neolithic Age, except the imitations and limited use of stone forms in metal, and, in my opinion, is not entitled to be so called. It is, rather, merely a period of transition than a distinct age, and the majority of its most efficient weapons for fighting or the chase, and its most useful implements for domestic use, were not of copper but of stone.

We will now proceed to the consideration of the alloys, accidental and intentional, which were employed in prehistoric times. We will first consider the alloys which were the accidental result of smelting impure ores. In this category may be placed all those which contain less than about 1–2 per cent. of tin, although in exceptional cases a much larger percentage of tin may be accidental, as, for example, when the metal was obtained by smelting a copper ore rich in tin ore.

Now, the presence of as little as 1–2 per cent. of *tin* has a marked effect on copper, especially on copper of the nature of that produced in primitive furnaces. In the first place, it confers a certain amount of hardness, not very great, but decidedly perceptible, which can be greatly intensified by hammering. Secondly, it facilitates the production of sound castings with copper even when impure, which otherwise would be vesicular and useless.

Hence certain copper ores, viz., those containing even small quantities of tin, would be used in preference to others for the extraction of metal for the manufacture of implements.

Examples of copper containing tin as produced by modern smelting processes from sulphide ores are given in Table III, Nos. 1–4; but, as has already been indicated, modern smelting methods of these ores containing tin, unlike the rude methods of smelting oxidised ores practised by primitive man, do not yield copper containing much tin; hence rarely much more than 2 per cent. is present.

No. 4 had been subjected to the process of refining by which the percentage of tin originally present must have been greatly reduced.

The small proportion of tin present in some implements has been supposed by several archæologists to be due to the oxidation or volatilisation of the metal in a richer alloy by remelting, as in recasting worn or broken articles. Loss by oxidation or volatilisation, however, is entirely governed by the conditions under which the remelting takes place, and there can be no fixed rule regarding it. Its amount depends in the first case on the extent to which the surface of the metal has been exposed to the air during melting and when molten; and in the second case, on the temperature to which the alloy has been raised.

In the rude furnaces of prehistoric times, where the metal was melted in clay vessels over which the fuel, charcoal, was piled, its surface would be but little exposed to the air; moreover, the temperature of the fire would not be excessive, so that there would not be much loss of tin in remelting, and the low percentages present in poor tin bronzes are not caused by this operation.

We will now proceed to the consideration of the metals other than tin which are occasional constituents of the bronzes of the Bronze Age.

TABLE III.—METALLIC IMPURITIES IN MODERN CRUDE COPPER.

	Localities.	Copper.	Lead.	Tin.	Arsenic.	Antimony.	Nickel.	Iron.	Silver.	Zinc.	Analyst.
	COPPER CONTAINING TIN.										
1	Wales	89·4	—	1·3	—	—	—	2·0	—	—	Napier.
				Tin and Antimony.							
2	"	95·6	—	2·1	—	—	—	0·3	—	—	"
3	"	86·5	—	0·7	1·8	—	—	—	—	—	
4	Norway...	99·61	—	0·27	—	—	—	—	0·02	—	Genth.
	COPPER CONTAINING LEAD.										
5	Japan	—	4·16	—	—	—	—	—	—	—	Gowland.
6	"	—	8·40	—	—	—	—	—	—	—	"
7	"	58·87	39·28	—	Trace	Nil	—	0·08	0·185	—	"
	COPPER CONTAINING ARSENIC.										
8	Manilla	—	—	—	1·24	—	—	—	—	—	"
9	Freiberg	69·50	6·00	—	3·50	—	8·30	6·70	0·50	2·00	Lampadius.
10	Halsbrück	49·50	42·66	—	3·00	—	Cobalt 1·30	2·07	0·41	0·37	Leschner.
	COPPER CONTAINING NICKEL.										
11	Riechelsdorf	83·00	—	—	—	—	12·10	0·8	—	—	Wille.
12	Mansfeld	89·13	0·97	—	—	—	3·98	4·23	—	—	Hoffmann.
13	Halsbrück	—	19·30	—	1·85	1·01	3·20	1·51	1·39	0·98	Lampadius.
	COPPER CONTAINING ANTIMONY.										
14	Tajowa, Hungary	80·01	10·06	—	—	8·10	—	1·40	0·24	—	
15	" "	86·60	—	—	—	5·30	—	—	0·25	—	
	COPPER CONTAINING ZINC.										
16	Mansfeld	92·60	1·43	—	—	—	0·18	2·18	0·18	2·18	
17	Chessy	93·10	—	—	—	—	—	3·97	—	2·00	Berthier.
18	Egypt (New Race)	98·60	—	0·38	—	—	—	—	—	1·55	

TABLE IV.—COPPER AND BRONZE IMPLEMENTS, ETC., CONTAINING VARIOUS METALS BESIDES TIN.

	Description.	Copper.	Lead.	Tin.	Arsenic.	Antimony.	Nickel.	Iron.	Silver.	Zinc.	Analyst.
Lead, etc. ...	1. Sickle. Switzerland	95·16	2·18	0·68	—	1·45	0·32	0·14	0·07	—	Fellenberg.
	2. Sword. Ireland	83·50	8·35	5·15	—	—	—	3·00	—	—	Davy.
	3. Socketed celts. Brittany ...	—	28·5 to 32·5	Trace to 1·50	—	—	—	—	—	—	Peligot.
	4. Flanged celt. Switzerland ...	89·49	8·88	0·18	—	1·07	0·25	0·13	—	—	Fellenberg.
	5. Small ingot. Murcia, Spain ...	29·87	20·84	36·21	—	—	—	—	—	—	Claes.
Arsenic ...	6. Flat celt. Ireland	96·99	0·06	0·08	2·17	—	Trace	0·30	0·21	—	Gowland.
	7. " " "	97·17	0·17	0·27	1·86	—	Nil	Nil	0·11	Nil	Pollok.
	8. Hatchet. Kahun...	93·26	—	0·52	3·90	0·16	—	0·21	—	—	Gladstone.
	9. Knife. Below statue of Rameses II.	97·12	—	0·24	2·29	—	—	0·43	—	—	Percy.
Nickel, etc. ...	10. Flanged celt. Schleswig... ...	92·79	—	1·47	—	0·85	3·70	0·22	1·98	—	Kröhnke.
	11. Wire armlet. Switzerland ...	85·21	4·53	6·09	—	—	4·17	—	—	—	Fellenberg.
	12. Hatchet. Thun	88·97	—	8·05	—	—	2·21	0·41	0·36	—	"
Antimony, etc.	13. Socketed celt. Elbing	91·12	1·63	0·78	0·32	4·48	0·61	0·49	—	—	Helm.
	14. Small rod. Nineveh	88·03	3·28	0·11	0·60	3·92	—	4·06	—	—	Fellenberg.
	15. Lance head. Kapuvar	92·14	—	2·16	1·57	2·96	Nickel and Cobalt 0·36	—	0·75	—	Hampel.
Zinc	16. Palstave. Middle Franconia ...	93·80	Trace	Trace	—	—	0·32	0·88	—	5·00	Bibra.
	17. Hook. Early Iron Age. Strassburg	88·37	0·31	1·46	—	—	—	0·19	0·07	9·60	Fellenberg.
	18. Bar. Bronze Age. Sweden ...	87·11	—	8·35	—	—	—	0·34	—	4·31	
	19. " (New Race.) Egypt ...	98·60	—	0·38	—	—	—	—	—	1·55	

Lead.

On referring to Table III, it will be seen that lead is sometimes present in large amounts even in the copper produced in our own times.

It is found in small quantities in nearly all bronze implements, sometimes in large percentages; and in all cases, with scarcely any exceptions, its presence is due to the use of impure copper in their manufacture, or to the smelting of a mixture of copper, lead, or tin ores.

Lead, in small quantities, has an effect similar to that of tin in promoting soundness in the castings, but to a less extent. Unlike it, however, it has a tendency to produce softness rather than hardness in the metal, and, when much is present, weakness and brittleness. It cannot be used with advantage to replace tin or even supplement it in any implement intended for practical use. On the other hand, when present in certain proportions (4–10 per cent.) it has some advantages: it increases greatly the fluidity of the alloys when molten, and enables them to be cast more easily and into thinner forms than true bronze. These alloys were therefore specially suitable for making scabbards, ornaments, and the like.

In Table IV are four examples of its occurrence in bronze implements, and one as an ingot.

The socketed celts (No. 3) found in Brittany containing such large percentages of lead would be most unserviceable weapons and can only have been intended for burial.

It is difficult to conjecture why the sword (No. 2) should contain nearly 9 per cent. of lead. It could not have been used as a fighting weapon, and it also may have been merely an appurtenance of sepulture.

The small ingot (No. 5) affords us an excellent example of the result of smelting a complex ore or a mixture of ores.

Arsenic.

This metal is universally present, although generally in only small amounts, in all copper in whatever locality it may have been produced by smelting ores.

Its effect in small quantities, about 0·25 to 0·5 per cent., is to increase the ductility without appreciably affecting the hardness of copper. In larger proportions, say from 2 to 3 per cent., it imparts hardness but to a much less extent than tin or antimony, and causes brittleness, yet tends to promote soundness in castings. It occasionally forms, as we have already seen, an important constituent of prehistoric implements, and its presence in them is undoubtedly the result of smelting impure copper ores containing it and not to the intentional addition of the metal to copper. See Table IV, Nos. 6 to 9. In Table III, Nos. 8, 9, 10, and 13 it will be seen that it is often found in ordinary copper in as large or even larger quantities than in copper implements.

NICKEL

is a frequent constituent of both copper and bronze implements and objects. It has a hardening effect on copper, less than tin or antimony, but does not cause brittleness like the latter metal, and the copper containing it gives sound castings well adapted for practical purposes. The presence of nickel in bronze or copper implements indisputably proves that the metal of which they consist, or at least the copper, was made direct from ores containing it, as nickel was certainly never obtained as a separate metal until recent times (*c.* eighteenth century). Three characteristic examples of implements, etc., in which it is present, are given in Table IV, Nos. 10 to 12. Examples of its occurrence in ordinary copper will be found in Table III, Nos. 9 and 11 to 13.

In China, I may add, an alloy of copper and nickel containing from 9 to 16 per cent. of nickel has been in use for many centuries yet the metal itself was quite unknown.

ANTIMONY.

This metal is frequently present in copper and bronze implements, and in those of Hungarian origin sometimes in considerable amounts. In Transylvania antimony ores are of common occurrence in association with copper ores and in that region remains of early mining operations are found.

The effect of antimony on copper is to harden it more than arsenic but less than tin and at the same time to impart brittleness. Examples of its occurrence in implements, etc., are given in Table IV, Nos. 1, 4, and 13 to 15, and in ordinary modern copper in Table III, Nos. 13 to 15.

These early antimonial alloys are of special interest as a metal, resembling bronze, but not containing tin, was obtained by smelting either copper ores containing antimony ores or copper ores to which antimony ores were added in varying proportions, in order to obtain the required physical characters. Implements of this alloy, according to Helm, were produced in Hungary before those of true bronze, and even when true bronze containing tin was made, the antimony ore was still employed together with tin to economise this metal, which was probably costly or difficult to procure in sufficient quantities.

ZINC,

which was quite unknown in Europe as a distinct metal until mediæval times, is an occasional constituent of implements of the Bronze Age, generally being present in small amounts ranging from 1 to 5 per cent. It also occurs in a specimen of copper of the date of the "New Race" in Egypt, found by Petrie and Quibell in their excavations at Naquada and Ballas. This contains 1·55 per cent. of zinc and ·38 per cent. tin.

A hook of the early Iron Age found at Hagenow, which was analysed by Fellenberg, has 9·63 per cent. with 1·46 per cent. tin. (See Table IV, Nos. 16 to 19.) For modern copper containing zinc see Table III, Nos. 9, 16 and 17.

True copper-zinc alloys do not, however, appear to have been made until Roman times, when we find several issues of coins of yellow brass.

The hardening effect of zinc on copper is much less than that of tin or nickel, but a small quantity, even 1 per cent., enables copper to be cast in closed moulds.

I have arranged these series of analyses of copper, and copper and some bronze implements, in order to prove, more definitely than has yet been done, that the metals that are often present in addition to copper have not been intentionally added, but are the result of smelting impure copper ores in which they occurred. I think it will be admitted by all that it is impossible that all these metals should have been known as distinct metals to men of the early Metal Age. At the very most their ores only may have been known, and in somewhat later times, when experience had shown that the addition of certain of them to copper ore yielded a metal possessing more useful properties than the copper ore alone, then these additions were made. Yet I hold that artificial mixtures of ores could not possibly have been used at that early period when man first became acquainted with metals; hence as regards the earliest implements, whatever their composition may be, the metal of which they consist was obtained by smelting impure copper ore just as it was found in nature and without any artificial admixture, and therefore that the presence of the metals other than copper in these implements is purely accidental.

As I have already pointed out, when a copper ore containing the ores of any or all of these metals was smelted in the rude furnaces, which must have been used by primitive man, they would be reduced and would alloy, in greater or less proportions according to the amounts present, with the copper which was produced. Hence the varying composition of all copper and most bronze implements. Sometimes, but rarely, these elements, as arsenic and antimony, are characteristic of certain localities, and when this is so it is possible to trace to them the implements which have been found in distant places.

The term "copper" should hence be applied to all implements which contain 96 per cent. of copper and upwards, the remainder, 4 per cent. or less, being an assemblage in various proportions of two or more other metals, with occasionally sulphur; a few containing about 2 or more per cent. of tin to be excepted. All are of simple flat forms or forms which can be cast in an open mould for the reasons I have already stated. The purest copper implement, so far as I can ascertain, which has been made of metal obtained by smelting ores, is an Irish copper celt analysed by Mr. Pollok for Mr. George Coffey.[1] It has the following composition:—

Copper 99·44, tin 0·06, antimony 0·01, arsenic 0·28, nickel 0·12, silver trace, iron, 0·08.

Another, the analysis of which is given in the same table, contains 99·78 per

[1] *Jour. Anthrop. Inst.*, vol. xxxi, p. 267.

cent. of copper, but this must have been made of native copper, as it is quite impossible that copper of such a high degree of purity could have been produced from any ore by any process by early man. In fact, it would be difficult to produce it from ores at the present day by any furnace process.

We will now proceed to the consideration of the implements, etc., that contain not less than 2 or 3 per cent. of tin, and to which the term bronze may be applied. The term should be confined to alloys of copper and tin, containing not less than the above proportions of tin, and in which zinc and other metals are absent or are present in but small amounts.

It has been stated by some archæologists that the men who made implements and weapons of bronze in the Bronze Age aimed in their manufacture to obtain an alloy of copper and tin in the proportions of copper 9, tin 1, and that the reason for this was, that that was the alloy which was best adapted for the purpose. That both statements hardly represent the actual facts I will now endeavour to show.

I have carefully compared the analyses of implements and weapons which have been published with the following results:—

In fifty-seven analyses of flat axes the percentage of tin ranges from 3·0 to 13·1. In twenty-five examples only do the proportions range from 8 to 11 per cent. In six the tin exceeds 11, and in twenty-six is less than 8 per cent.

In palstaves, there is great diversity in the proportions of tin. In nine examples, two contain 9·2 and 10·9 per cent. respectively, whilst in five the amounts range from 4·3 to 6·1, and two have 18·3 per cent. each.

In six analyses of socketed celts the tin ranges from 4·6 to 13·1, two only having 10·9 and 11 per cent. respectively.

In daggers there is greater uniformity. In four examples one contains 7·3, but the others range from 11·4 to 14·2 per cent. in their content of tin.

In spear or lance-heads there is also less divergence. In six examples, one only has 6·6, the others ranging from 11·3 to 15·7 per cent.

In swords, where the greatest uniformity in composition would be expected, as they represent the highest development of the Bronze Age, we find singular irregularity. In thirty-three examples the variation extends from 4·0 to 15·8 per cent. of tin. In fourteen it ranges from 8 to 11, in twelve from 12 to 18, the remaining seven having each less than 8·6 per cent. In my opinion the sole aim of the Bronze Age founders was to produce an alloy which should possess the required hardness without brittleness. They had to deal with both impure copper and tin, or with impure ores of these metals, and as the impurities often present must have affected seriously this property, definite mixtures of either metals or ores, could not be usefully adopted. In order to ascertain that the alloy they had obtained possessed the necessary hardness and was not brittle, physical tests only could have been applied, and if these were not satisfactory, the implements or weapons would be remelted with the addition of one or other of the metals or ores and be recast. This would doubtless be repeated until a satisfactory result was obtained.

As regards the proportions of 9 copper to 1 tin being the best for bronze intended for the manufacture of the implements and tools of the Bronze Age, it will be evident, if we consider the different uses to which they were put, that no single alloy could be equally suitable for all. For certain uses, as for the skinning of animals, an implement might be made of any alloy or even of unmixed copper and be perfectly serviceable. On the other hand for a sword or dagger certain physical properties are essential that are not needed for an axe. For most purposes for which the latter was used a bronze containing only 10 per cent. of tin or somewhat less would be satisfactory, but for the former a higher percentage, about 12·5, or say, from 11 to 14, would be required in order to ensure the maximum rigidity combined with the requisite hardness. In daggers, lance-heads, and swords, these proportions appear to have been frequently attained, and for this the men of the later Bronze Age are worthy of great credit as metallurgists and workers in metal.

We will now pass on to a brief consideration of the methods followed by prehistoric man for the manufacture of his weapons and implements.

Practically all copper celts were cast in open moulds. If any were cast in closed moulds they would be more or less vesicular and generally worthless except when the copper contained arsenic, tin, antimony, zinc, or nickel in not less proportions than 1 per cent., or excess of cuprous oxide. In casting them, the metal, from the smelting operation, so far as can be ascertained from the remains of appliances which have been found, was remelted in crucibles, and was poured from them into the moulds which were of clay or stone, perhaps occasionally of sand, but of the last there is no definite evidence. The metal was not ladled from the smelting furnace, as the small crucibles with rude handles, which have been supposed by some archæologists to be ladles, show no signs of having been exposed to a high temperature both on the inside and the outside, as would have been the case had they been so used, the interior and the upper edges alone exhibit marks of such exposure. The reason for this will be seen later.

Implements and weapons of bronze, unlike those of copper, were practically always cast in closed moulds. The method of melting the metal in each case was as follows:—The furnace or hearth was merely a shallow depression in the ground. The crucibles were made of clay, which in some cases was mixed with quartz fragments to render it more refractory. They were set in the ashes at the bottom of the hearth in such a manner that their sides and bottoms were thoroughly protected from the intense heat of the fire, their upper edges and interior only being exposed. This was necessary on account of the fusible character of the clay of which they were made.

The fuel used was charcoal.

After a crucible had been placed as described above and been charged with copper, copper and tin, or copper and tin ore, the fire was made up by placing charcoal over it so as to form a low conical pile. The temperature necessary for melting the metal was obtained either by the wind alone or in some cases probably by an artificial blast of air. When the contents of the crucible had melted, the fire was raked away, the crucible was removed from the furnace and the metal poured into a mould.

In consequence of this mode of heating, the lower parts of the crucible will, it is evident, bear but little traces of the action of a high temperature, whilst the upper edges and interior may exhibit a fused or semifused structure, and this is precisely what we find in all early crucibles.

Here it may be pointed out that metallic tin, although known in the Bronze Age, was not necessary for the manufacture of bronze, as when tin ore only is melted with charcoal and copper excellent bronze is obtained. In this connection it is worthy of note that the metal tin has never been found in founders' hoards which were the stock-in-trade of the prehistoric founder.

Hence I am of the opinion that the ore and not the metal must have been used. It is true that no ore has been found with the lumps of copper and broken pieces of implements of which these hoards consist, but it must be remembered that the ore is simply a brown powder which would certainly be overlooked by the persons by whom the hoards were discovered.

A specimen of bronze made in my laboratory in this primitive way was exhibited, also the materials used in making it.

Some of the most important types of crucibles are illustrated in Plate III.

The clay vessel, Fig. 1, was found among the *débris* of pile dwellings on Laibach Moor (Carniola). It is said to be a crucible and may have been so used, but I think this is open to doubt.

Fig. 2 is a form of somewhat wide distribution in the remains representing the early Bronze Age in the pile dwellings of Switzerland, the Danubian basin, and Ireland. It consists of a shallow cup, from which projects a handle, sometimes, as in this specimen furnished with a socket for the insertion of a stick, by which it was removed from the fire and its contents poured into a mould. It was found in the remains of the pile dwellings of the Mondsee (Upper Austria).

Fig. 3. A shallow oval dish, which is of much rarer occurrence than the last. It was found in the Mondsee. It is difficult to speak with certainty about the use of these vessels. They can hardly have been used for making castings, as they could not be held by tongs, or by any means known to me, for pouring their contents into a mould. It is, however, just possible that they were employed in a rude refining process by which part of the impurities in the crude copper obtained by smelting were removed by allowing the air to act on the surface of the metal; or, it may be, they are the vessels in which the founder first made his alloy in order to test its properties before making the actual casting of a weapon.

The specimen shown in Fig. 4 was obtained from the remains of a crannog in Lough Mourne, Antrim.

Figs. 5, 6, 7, 8, and 9[1] represent crucibles found at Dunadd (Argyll) along with

[1] Reproduced from Dr. Anderson's paper, "Excavations of Forts on the Poltalloch Estate (Argyll)," *Proceedings of the Society of Antiquaries of Scotland*, 1905, p. 314.

iron spear-heads and other iron objects. The crucibles with handles are of special interest, as they are of a similar type to those from the Mondsee and Antrim.

The crucible of dish-like form, Figs. 10 and 11,[1] now in the British Museum, is of an early period. Several of these were discovered by the brothers Siret, together with copper and bronze implements and stone moulds, etc., in their explorations in Murcia and Almeria, in the south-east of Spain.

Its upper edges and interior alone show signs of exposure to an intense heat, so that in it also the metal was melted in the manner described above.

The very small capacity of many of these crucibles is worthy of note. Few can have held more metal than would suffice for the casting of a single axe.

Perhaps as interesting relics of early metallurgy as the crucibles are the moulds by which primitive man copied the forms of his stone axes and other objects in copper and bronze.

Those used by the earliest workers in metal were of clay or stone; moulds of sand or loam were undoubtedly of later times, as there are considerable mechanical difficulties in preparing them so that they may be suitable for casting copper, whereas the production of clay and stone moulds would present no difficulties to men who had already acquired considerable skill in the manufacture of pottery and were experts in the working of stone. As moulds of the first-mentioned material, clay are of a less enduring nature than those of stone, but few have been preserved, although they were doubtless employed in the very earliest times. In almost all the regions of Europe occupied by men of the early Metal Age moulds of stone have been found.

FIG. 12.—STONE MOULD FOUND AT EL ARGAR. BRITISH MUSEUM.
(From Archæologia, LVI, p. 293, by kind permission of the Society of Antiquaries.)

The earliest are of the class known as open moulds, viz., those which consist merely of cavities of the outline and depth corresponding with the form and size necessary for the object to be cast, hollowed in the surface of the stone, which was simply filled with the metal.

Of these Fig. 12 is a characteristic example. It was found, together with others and the crucible, Plate III, Figs. 10 and 11, at El Argar, and is intended for the casting of a flat axe about 5·5 inches long, with a cutting edge of 3 inches.

Those open moulds continued long in use, as it is only in moulds of this kind that sound castings of copper could be made. A flat celt is hence the only form of axe which can be cast of pure copper.

The moulds of the Bronze Age used for palstaves, socketed celts, and similar weapons, resemble more or less closely the clay moulds of our own times.

[1] Siret, *Les premiers Ages du Métal dans le Sud-est de l'Espagne*, pl. 27.

In casting swords and daggers of bronze, the clay moulds must have been heated to dull redness at the time when the metal was poured in, a method of casting which is still practised in Japan, as by no other means could such perfect castings of their thin blades have been obtained.

The casting appears in some cases, especially in the early forms of celts, to have been hammered at the cutting edges only, these, being subsequently ground. It is to this hammering, and to it only, that the hardness of the cutting edges of both copper and bronze weapons is due.

The later forms of celts, however, have not only been hammered at their cutting edges, but commonly also on their narrow sides, by which flanges more or less pronounced have been raised. Much has been written about the so-called lost art of tempering bronze said to have been practised by the men of the Bronze Age, by which the cutting edges of their weapons and implements were hardened. The hardness is also said to be greater than can be given to bronze at the present day.

I should like to correct this error, as it can only have arisen owing to its authors never having made any suitable comparative practical tests of the hardness of bronze. Had they done so, they would have found that the ordinary bronze of to-day can be made as hard as any, in fact, harder than most, of prehistoric times, by simple hammering alone.

In conclusion, I would ask for your attention to the practice in the late Bronze and early Iron Ages of using bronze instead of copper for several purposes for which the latter metal is more suitable than the former, as, for example, the manufacture of cauldrons and other vessels, etc., consisting of thin sheets of metal. But if we consider the peculiar properties of copper as regards toughness, the reason is obvious. Tough or ductile copper, *i.e.*, copper which will bear hammering or beating out into thin sheets or hollow vessels must contain a certain definite amount of cuprous oxide, neither more nor less. If the oxide is present in other proportions the copper will not be tough but brittle. In the primitive furnaces of these early times this definite amount could not be ensured, and, as a rule, an excess would be present and the metal would be brittle. On the other hand, the same copper, if alloyed with tin, would yield a malleable alloy which could be readily fashioned into vessels of any form, and therefore it was used instead of copper.

Appendix.

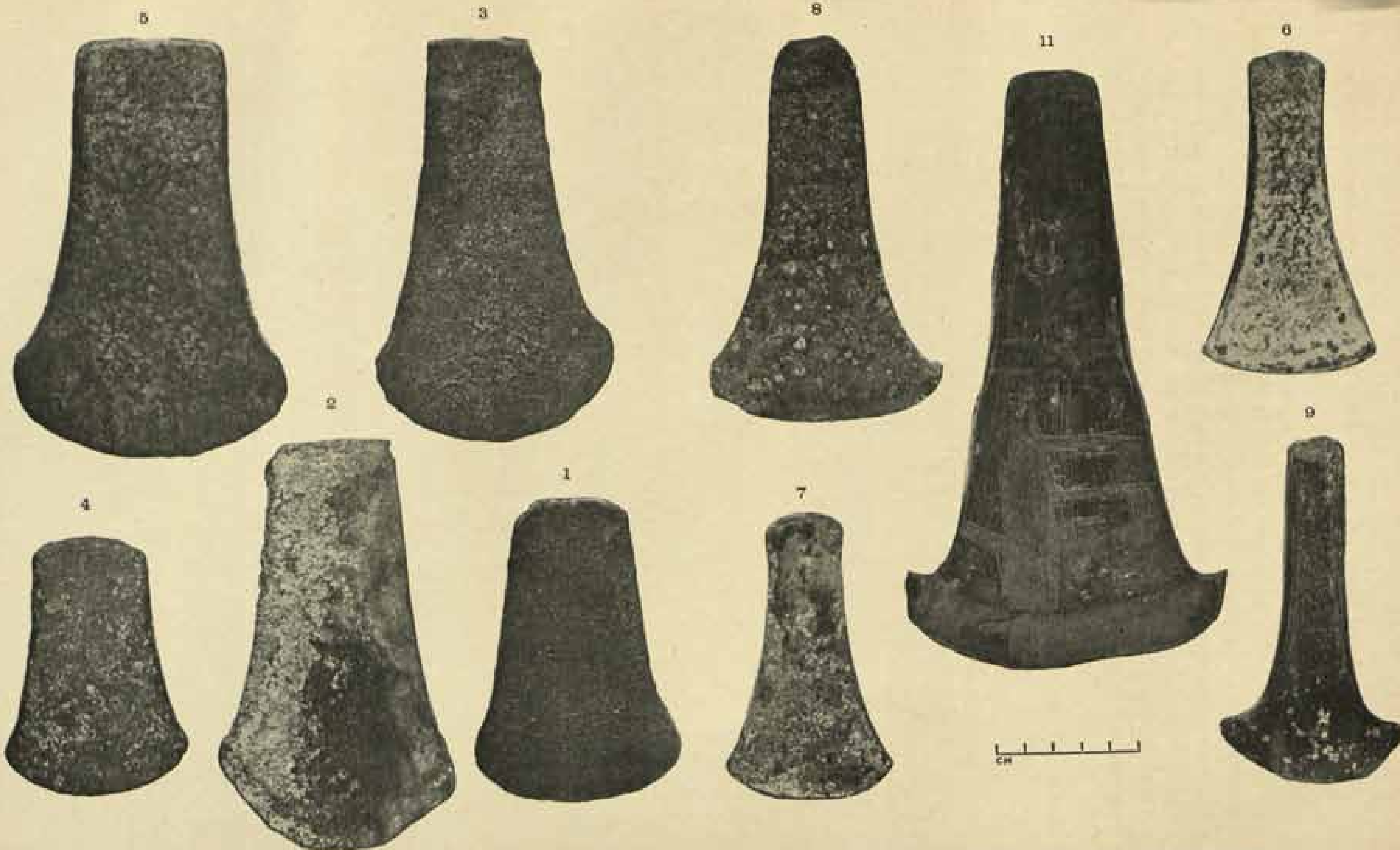
Experimental smelting of mixed copper and tin ore in the primitive furnace (Fig. 7).

The charge consisted of :—

Copper ore (copper carbonate) containing 30 per cent. copper...	15	lbs.
Tin ore (cassiterite) containing 70 per cent. tin... ...	10	„
Limestone	7½	„
Charcoal	10	„

The charcoal and limestone were coarsely ground and mixed with the ores.

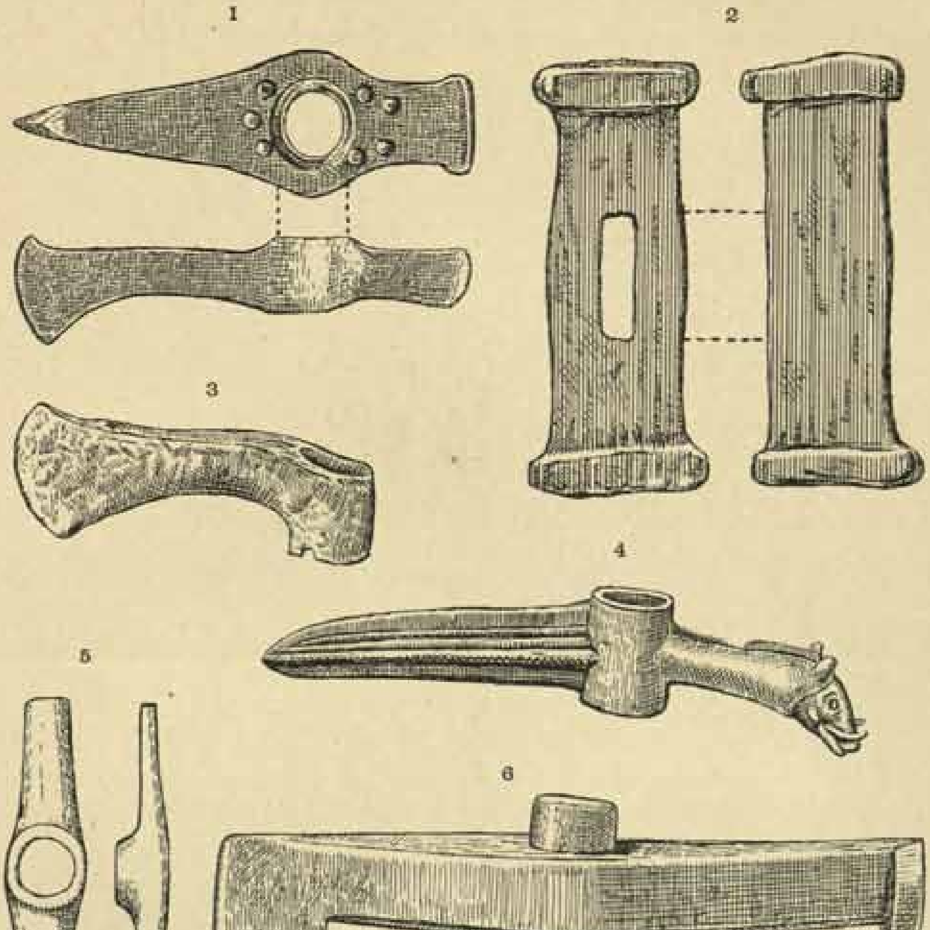
The furnace cavity was filled with charcoal, which was also piled above it to a height of about 2 or 3 inches. When the charcoal was well alight a layer of the charge was spread over its surface, then another layer of charcoal, then alternate layers of the charge and of charcoal were added so as to form a conical heap. A gentle blast was then started through a one-inch blast pipe, and when the charge began to sink down into the furnace cavity it was slightly increased. When the whole of the charge and fuel had sunk down into the furnace the blast was stopped, the slag and remaining fuel removed, and the metal allowed to solidify. The metal was analysed and found to contain 22·0 per cent. of tin. A specimen of the metal was exhibited.



FIGS. 1–5.—COPPER CELTS, BRITISH MUSEUM.

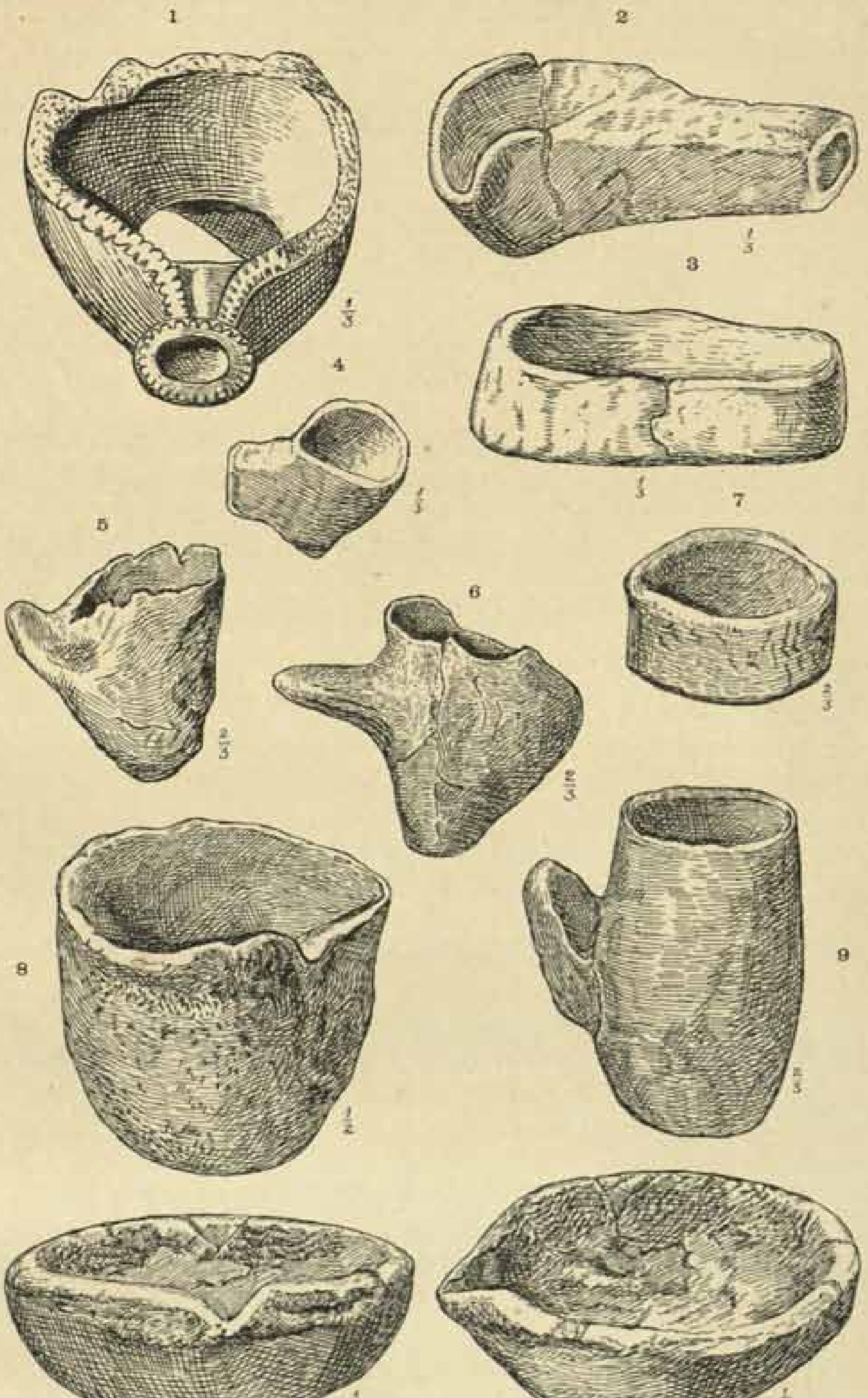
FIGS. 6–11.—BRONZE FLAT CELTS, BRITISH MUSEUM

COPPER AND ITS ALLOYS IN PREHISTORIC TIMES



IMPLEMENTS CLAIMED AS EVIDENCE OF "COPPER AGE." $\frac{1}{2}$.

COPPER AND ITS ALLOYS IN PREHISTORIC TIMES.



TYPICAL CRUCIBLES.

COPPER AND ITS ALLOYS IN PREHISTORIC TIMES.

NOTES ON THE ETHNOGRAPHY OF THE BA-YAKA.

WITH SUPPLEMENTARY NOTE TO "NOTES ON THE ETHNOGRAPHY OF THE BA-MBALA," vol. xxxv, p. 398.

BY E. TORDAY AND T. A. JOYCE, M.A.

[WITH PLATES IV AND V.]

THE Ba-Yaka are a Bantu people inhabiting a somewhat ill-defined territory between the rivers Kwango and Inzia in the Kasai district of the Congo Free State. The men are rather short, but generally well built and good-looking, and some of the women are even pretty.

Apart from the fact that the tribes inhabiting this region are practically unknown, considerable interest attaches to the Ba-Yaka as a people who appear to be distinctly progressive. Situated to the south and south-west of the Ba-Mbala,[1] they are gradually encroaching upon the territory of the latter, whose exceedingly loose system of social organisation, under a number of practically independent village chiefs, renders them incapable of anything like organised resistance. Moreover they are industrious, and skill in handicraft is respected, and since they exhibit no dislike to Europeans it is possible that they may have a future before them. In point of numbers they appear to be slowly increasing, and while extending northward they are retaining their old territory.

The present paper deals with the most north-easterly branch of the people the advance-guard of the movement in this direction; which movement, according to the native account, was the result of a war between rival chiefs.

From their culture, which exhibits most of the characteristics distinctive of the primitive West African type, they seem to be connected with the tribes on their southern borders; but until more is known of the population of this quarter of Africa the question of racial affinities must be left in abeyance.

Their social organisation is interesting and in many points purely patriarchal; agricultural produce belongs to the head of the family (TRADE AND PROPERTY, p. 44); the village chief is responsible for the payment of fines incurred by his subjects (MORALITY AND JUSTICE, p. 47), and, when a woman is given in marriage, receives a goat from her father. The marriage price is paid to the father of the woman; and the death of a wife without having given birth to a daughter is considered so much to the detriment of the husband that the money he paid for her is refunded (SOCIAL ORGANISATION, p. 45).

At the same time, the tie between a woman and her own village is by no means dissolved by marriage; on the birth of her child, her chief must make a present to her husband, and the child itself, as soon as it can walk, is sent to its

[1] See Torday and Joyce, "Notes on the Ethnography of the Ba-Mbala," *Journ. Anthr. Inst.*, vol. xxxv, p. 398, with map.

mother's village to which it legally belongs and from which the father cannot even purchase it (SOCIAL ORGANISATION, p. 45).

Nevertheless, a man's heir is his eldest brother, and not, as might be expected under the circumstances, his sister's son, who only becomes his heir in default of brothers (TRADE AND PROPERTY, p. 44). Moreover, in connection with certain food tabus a mysterious connection appears to exist between a man and his son until the latter arrives at puberty. (FOOD, p. 42.)

Thus the social system is an interesting mixture, patriarchal in the main, but exhibiting peculiarities which may be survivals of an early matriarchal organisation.

Certain facts almost point to a system of clanship; it is seen that the children belong to the "village" of the mother, and it further appears that the villages are small and disposed in groups, the units of the group being situated so close one to the other that it is difficult for a traveller to tell where one begins and the other ends (HABITATIONS, p. 43); besides this the inhabitants of the same "village" regard each other as akin, and admit none save blood-relations as members. It may be that the term "village" should be applied to the whole local group, and that the "village" chiefs should more properly be termed clan chiefs.

Another point worthy of notice is the following:—Certain of the rules governing Ba-Yaka society are instrumental in securing national purity. In the first place the Ba-Yaka, though gradually extending their territory, do not mingle with the tribes they supplant; they either enslave them or drive them out. Furthermore a free man is not only restricted in his choice of a wife to women of his own class, but is not permitted by public opinion to keep slave concubines (SOCIAL ORGANISATION, p. 45). The barrier between slave and freeman is extremely well-defined, and no slave can obtain freedom except in the very rare case of his master dying without heirs. (TRADE AND PROPERTY, p. 44.)

Thus the Ba-Yaka are ostensibly a people who must have preserved their racial purity, at any rate for some time and are, consequently, all the more worthy of study.

Though the Ba-Yaka are in close touch with the Ba-Mbala, they seem to resemble them but slightly except in so far as the culture of both tribes is of the primitive West African type. It is true that they confess to have received their knowledge of iron working from their northern neighbours (CRAFTS, p. 43), but they seem indebted to them for very little else. It may be useful to sum up the chief points in which the two differ.

Ba-Yaka.	Ba-Mbala.
Circumcision practised.	No circumcision.
Scars and tattooing exceptional.	Scars and tattooing practically universal.
Contracted burial.	Extended burial.
Government by feudal chiefs.	Government by independent petty chiefs.
Inheritance by eldest brother.	Inheritance by sister's son.
No slave concubines.	Slave concubines.
Virginity of bride essential.	Virginity of bride unessential.

Ba-Yaka.	Ba-Mbala.
Cannibalism abhorred.	Cannibalism of daily occurrence.
Slaves treated with cruelty.	Slaves treated with kindness.
Drunkenness condemned.	Drunkenness admired.
Cripples preserved and cared for.	Cripples buried alive.
Wars of occupation.	No wars of occupation.

In collecting the following details concerning the Ba-Yaka, use was made of the African *questionnaire* issued by the Ethnographical Department of the British Museum.

ORNAMENTS AND CLOTHING.

The head is usually shaved so as to leave three ridges of hair running longitudinally from front to back; these are plaited, and anointed liberally with oil and soot. From the centre of the forehead, along the temples, and down behind each ear, runs a tress of hair plaited with grass. The beard is allowed to grow, but the moustache is shaved. The Ba-Yaka paint their chests red with powdered *Tukula*-wood, their object being, confessedly, to increase beauty; the dead are similarly painted before burial. As a general rule, neither scarification nor tattooing is practised, though exceptional cases are found.

The teeth (incisors) are sometimes knocked out, or cut to a V-shaped point; this operation, which is supposed to improve the appearance, must not be performed in the village, but the patient must retire into the bush. Headache and swollen mouth often supervene, sometimes lasting for weeks. Women tie down the breasts in order to lengthen them. Necklets of European beads and monkey-teeth, large anklets of brass, and a large number of brass and copper armlets, are worn; the last cannot be removed without bending them. The ornaments of all classes are the same, with the exception that a man who has killed an enemy wears an iron bracelet. At dances women ornament their hair with beads, and men fasten skins to the front of their girdles.

The chief garment is a loincloth of palm-fibre (*Pussu*), supported by a straw girdle, and made in one piece; it is often dyed with *Tukula*-wood, and the border is turned up and sewn with native-made iron needles and palm-fibre thread. As with the Ba-Mbala, and also the Ba-Luba, the cloth passes below the buttocks at the back, leaving them bare. A covering for the head, consisting of a piece of cloth, is often worn by old men only. As a protection against rain, a goatskin is worn, covering the head and falling down the back.

Some idea of the native ideal of beauty can be formed from the fact that in the case of their great fetish the nose, cheek-bones and chin are greatly exaggerated.

FOOD.

Almost any flesh (except that of dogs), fish, locusts, worms, etc., are eaten by the Ba-Yaka, though fowls and eggs, as is commonly the case among tribes of this neighbourhood, or indeed any food cooked in a pot which has been previously used to cook a fowl, are forbidden to women (for the results supposed to follow the breaking of this tabu see under Religion, p. 51.) Even men must observe certain restrictions with regard to the eating of fowls; if the bird is a hen it may be shared by several, but a cock must be eaten by one man alone or illness results; he may however give some to his son if not yet circumcised. This fact is particularly interesting since it seems to show that a male child before circumcision is not supposed to possess an individuality apart from the father, although it is regarded as belonging to the village of the mother (see Social Life, p. 45). Blood is eaten cooked, but milk is not used as food. Bread is made from manioc. Palm-oil is found, but it is very rare; red and black pepper are used as spices. Salt is considered a stimulant; two kinds are found, the first, of native manufacture, is prepared from the ashes of water-plants, and is called *Mokindu*, the second is imported, and is termed *Mongwa*; it is preferred in crystalline form. They know nothing of imported salt beyond the fact that "it is made by the white man." Salt water is also drunk. Geophagy is unknown. All food is cooked, except in times of famine, when manioc is eaten raw. The preservation of meat is not understood. Palm-wine is found, and is called *Makana, Pussu, Sende, Samba,* according to the species of palm from which it is made. The chief meals are taken in the morning and evening; but the natives often eat during the day; leaves are used as platters; the host drinks first and the guest after him; otherwise no ceremonies are observed and no implements used.

Cannibalism is never found, and is regarded as something quite abhorrent.

Tobacco is used, when green, as snuff, or, when dried, for smoking; if there is no tobacco, dry leaves are smoked instead. The ordinary pattern of pipe consists of a clay bowl with a bamboo stem; it is passed from hand to hand, and the smoke is inhaled in great quantities; no hemp-smoking is found among the Ba-Yaka.

Hunting takes place in the dry season, when the villages combine and the game is driven by setting fire to the grass; the spoil belongs to the slayer, but, as a matter of fact, all partake of it. The hunting-grounds are private property, and the owner receives a leg of each head of game. No superstitious ceremonies appear to be observed in connection with hunting. As for the game, antelopes are rare, and rats are "hunted" at all times and by everyone. The chief weapon is the bow; the arrows have points of tough wood hardened in the fire (in war iron points are used: see War, p. 49). These points are barbed and fastened to a palm-rib shaft by means of gum and lashings, the shafts are nocked and feathered; the feathers being fastened by gum and binding. One pattern of arrow possesses four points. (Plate V, Figs. 1 and 3). Fish are caught by means of baskets (Plate V, Fig. 4), and are eaten fresh, but the Ba-Yaka are very poor fishermen. No poison is used in fishing.

Fire is obtained by means of flint and steel, the latter imported; the tinder is obtained from the palm-tree; there seem to be no particular superstitions connected with fire.

Agriculture.

The cultivation of the soil is carried out by women, whose sole implement is the hoe. Manioc, maize, ground-nuts and tobacco are the crops grown; sowing takes place in the rainy season, and the same ground is used for several years in succession. The produce belongs to the head of the family; fetishes are placed in the plantations to guard them from the depredations of thieves.

HABITATIONS.

The huts are rectangular, constructed of straw, and are divided into two compartments; the doorway, which is about 175 cm. high, reaches down to the ground (and therefore differs widely from the peculiar doorway of the Ba-Mbala huts),[1] but there is a permanent "threshold" of wooden blocks 50 cm. high fixed across the entrance. The door is made of palm-leaf ribs fastened together by means of wooden pegs, and slides between two wooden posts fixed to support it. In every hut there is a corner where the house-fetish is put, and there weapons and cloth are stored in order that they may be protected from thieves. The huts of a village are scattered and not arranged in any order, though they are usually, but not always, built with the major axis running north-south; the door may face in either direction. The villages themselves are small, often consisting of not more than two or three huts, they are usually built in groups so close that it is difficult for a traveller to tell where one ends and the next begins. The village is swept each morning by the chief, but the general work of scavenging is performed by the pigs and dogs. Every married woman has a separate hut where she lives with her children, and the husband moves from one to the other; unmarried men live together, several in a hut. Sometimes in front of a hut is seen a semicircle of sticks planted in the ground and connected by strings from which other strings are hanging. This is an indication that a son of the owner has recently been circumcised and is living in the bush until his wound has healed. Hut-building is not accompanied by any ceremonies. Cattle live in a semi-wild state, and have no accommodation prepared for them.

CRAFTS.

The weaving of palm-cloth is performed by men; string is made of twisted *Pussu*; skins are simply dried.

Baskets are made of straw, a small pattern, rather like a diminutive case-bottle with a cylindrical cover, being used to contain the small shells, *Olivella nana* (*Djimbu*), which are employed as currency (Plate V, Fig. 2).

Pottery is made by women, and, since clay is rare, the material consists mainly of old sherds powdered; it is neither painted nor glazed. When a man dies, all his pots are broken and left on his grave.

Gourds are used as substitutes for pots.

Wooden utensils are also used, some of the drinking vessels being particularly graceful (Plate IV, Fig. 2). The carving of wooden fetishes is only practised by a very few who are considered magicians.

Metallurgy, according to their own account, they have learnt from the

[1] Torday and Joyce, *loc. cit.*, p. 407.

Ba-Mbala, who, in their turn, claim to have received the art from the Ba-Huana still further north. Smelting, however, is unknown. In working iron the double bellows is used; each air-chamber, with the tube which leads from it, is made from a separate block of wood, and the expulsion of the air is effected by manipulating a skin membrane. The extremities of the tubes rest in a common clay nozzle, through which the blast is directed into the charcoal fire. The smiths do not appear to form a particular caste, but the trade is hereditary. Labour is not regarded as degrading, and skill in handicraft is respected. No stone implements are found, and the Ba-Yaka do not appear to have heard of them.

TRADE AND PROPERTY.

The chief currency is the small shell, *djimbu* (*Olivella nana*), which is the usual medium of exchange throughout this region of Africa. Comparative values are as follows: a male slave = 30,000 *djimbu*; a female slave = 20,000; a goat = 2,000; a hoe blade = 300; a fowl = 100.[1] The chief article of export is rubber, and the principal import cattle; the trading is carried on by men, except in the case of eatables, which are sold by women. Markets for the sale of the latter are held every fourth day, but are not important. In the case of debt, the wares of traders belonging to the same tribe as the defaulter are liable to be seized.

The only individuals who are capable of possessing property are free adult males: joint ownership is unknown. Plantation produce belongs to the head of the family; there is no property in water, either as regards the individual or community. A debtor, however small the amount he owes, can be seized as a slave, and a man's debts are inherited by his heir, even if there is no property out of which they can be discharged.

Property, including wives and slaves, cannot be bequeathed by will, but is inherited, in the first instance, by the eldest brother, in default, by the eldest son of the eldest sister. If the deceased leaves no heir, his wives and goods pass into the possession of one of his slaves, who thus becomes a free man. Women cannot inherit.

GOVERNMENT.

The Ba-Yaka are ruled by one great chief called Muri Kongo, who considers them all his slaves; on entering his presence all prostrate themselves and beat their breasts. His power is absolute, and he is not assisted in the work of government by a council, though each village is administered by a petty chief, who is succeeded by his heir. The taxes due to the supreme chief are collected by the great man in person, who goes the round of the villages. Succession to the "crown" follows the same rules as inheritance; women cannot succeed, but minors can, though in the latter case the father, or even the mother, acts as guardian.

[1] It is interesting to compare these prices with those current among the Ba-Mbala. Among the latter a male slave = 10,000 *djimbu*, a female slave = 15,000—20,000, a goat = 800, a hoe-blade = 300, a fowl = 100. Torday and Joyce, *loc. cit.*, p. 408.

SOCIAL ORGANISATION.

Kinship.—A child belongs to the village of his maternal uncle; no others save blood relations are admitted as members of the village community; if a man or woman begs to be received, or even asks for food, he or she is immediately seized and sold as a slave, and the proceeds divided amongst the members of the village. The inhabitants of a village regard themselves as akin; this and the preceding facts, together with the statement that "villages" lie so close together that it is difficult to distinguish one from another, almost point to a system of clanship within the local group. Relationship on the female side is considered closer than that on the male side.

Marriage is the result of purchase, and the price, usually 10,000 *djimbu*, is paid to the father of the bride, who, however, must present his chief with a goat. The woman follows her husband, who can claim absolute power over her. Polygyny is the general rule, and the number of wives possessed by one individual is conditioned solely by the length of his purse; monogamy, still more celibacy, is merely the result of slender resources. Polyandry is unknown, but in cases where no child results from the union a man will introduce his brother to his wife; this takes place in the greatest secrecy. All the wives have equal rights, and each lives in a separate hut with her young children. All marriage, or even cohabitation, must be between members of the same class, that is to say, a free man may only marry a free woman, and a slave man a slave woman. Marriage between children of the same mother is prohibited; between children of the same father by different mothers it occurs, but is considered unseemly; a man cannot marry one of his father's wives.

Intercourse takes place immediately after the purchase, and virginity on the part of the woman is considered essential, in fact, if she is found not to be a virgin she can be repudiated. The consent of the woman is regarded as absolutely necessary. A man can divorce his wife at will, and, unless she has been guilty of adultery, she may marry again, but if she does her second husband must pay compensation to the first. The latter practice affords another point of difference with the Ba-Mbala, among whom *divorcées* are not only prohibited from marrying again, but are not even allowed to have intercourse with a man. If the woman dies before giving birth to a girl, the marriage-price is repaid. Widows return to their families, but if they remarry the price must be paid to the heir of the first husband. There is no lending of wives.

Children.—At the birth of a child the mother must remain in the hut until the umbilical cord has dried off; then the father kills a fowl and sprinkles some of the blood on the house-god; the fowl is afterwards eaten. The chief of the woman's village, if the child is a boy, presents the husband with ten fowls, if it is a girl with twenty fowls, and as soon as it can walk it is sent to his village, to which it legally belongs, and from which the father cannot even purchase it. The father may neither kill his child nor sell it as a slave, and, as a matter of fact, men seem to be very fond of their children, indeed, in most villages the care of the children seems to be undertaken by the men. As long as a child is "in arms" (about a year), both it and the father must abstain from washing.

Initiation.—Boys are initiated by an old woman, girls by an old man; both these old people must be past the period of fertility. The boys are circumcised at puberty, the operator being an old man. The part removed is put on the great fetish, and the name of the patient is changed; his old name must not be used again, or it is supposed that he would become sterile. After circumcision the boys are considered unclean, and are secluded in the bush until their wounds have healed. During this time they wear grass skirts, do no work and may not enter a village. In front of the house of each a row of stakes is driven into the ground and these are connected by strings from which hang strips of *pussu*. The reason given for circumcision, which is called *mushishi*, is that the boys may become "strong."

Slavery is universal, and the slaves form about 50 per cent. of the total population; they receive very little consideration, are regarded as so many cattle, and are often ill-treated. In this respect the Ba-Yaka form a striking contrast with their northern neighbours the Ba-Mbala, among whom the slaves seem the most contented section of the population.[1] A slave can only marry a slave; more than this, a free man would scorn to take a slave woman as concubine; the child of a slave is equally a slave, and belongs to the owner of the mother. Besides those born to slavery, debtors and prisoners of war are enslaved; slaves (except in the case of the owner dying without heir mentioned above) cannot possess property, and therefore have no chance of redeeming themselves; the owner is responsible for the debts of his slaves.

PSYCHOLOGY.

Children learn simply by imitating their elders; when young, they are precocious, but, as is usually the case among negroes, after puberty their mental powers seem incapable of further improvement. Their memory is feeble, and they are not good at arithmetic.[2]

The numerals are as follows:—

1. Mo.	6. Syamon.	11. Kuminamo.
2. Vil.	7. Nitseme.	100. Kama.
3. Tat.	8. Nan.	1,000. Funda.
4. Ia.	9. Voa.	10,000. Tsuku.
5. Tan.	10. Kum.	

Small sums are reckoned on the fingers, larger amounts by means of small sticks.

Each man works for himself, labour is not regarded as in any way degrading, and skill in handicraft is respected.

They are very good trackers, and cases of idiocy or insanity do not appear to occur.[3]

[1] Torday and Joyce, *loc. cit.*, p. 411.

[2] "I have found that they can generally add up to ten, but subtraction seems beyond them."

[3] "I have seen no idiots or madmen."

The question of time may be mentioned here; the year has two seasons, the dry, *Kishua*, and the rainy, *Vula*, and is composed of lunar months, *Gondo*, each consisting of weeks of four days; the last-named bear the following names: *Bujuka*, *Tek*, *Gun*, *Pungu* (market day). The time of day is reckoned from the position of the sun. The span between the out-stretched arms is the chief unit of measurement.

AMUSEMENTS.

Music.—It is difficult to write exhaustively of their music, since they do not sing when marching with a European; but they are fond of music and sing well in unison. Their voices are mainly soprano and tenor, but good baritones and basses are found; they use the chest voice. Singing is usually unaccompanied, but sometimes the friction-drum (German *reibtrommel*) (Plate IV, Fig. 3) is played. This consists of a wooden cylinder, one end of which is closed by means of a membrane of hide from which the hair has been removed. This membrane is fastened to the body of the instrument by means of small wooden pegs, and through the centre is passed a stick, secured by two transverse wooden pins, one on each side of the membrane, about 10 cm. apart. A handful of wet leaves is taken in the hand, and slid up and down the stick, which is grasped firmly inside the cylinder, producing a note like that of a double-bass. It is interesting to find this rather specialised form of instrument, which has so limited a distribution in Africa, among a people as primitive as the Ba-Yaka. Wooden gongs are used for signalling, and also for accompanying the dances, which are not, however, performed in the presence of strangers. Their airs are usually solemn.

Gambling.—The Ba-Yaka appear to be particularly addicted to this form of pastime,[1] for which they use a basket and a number of small (? wooden) discs, plano-convex in shape. If the discs are thrown so that an uneven number fall with the flat side upwards, the thrower wins. The natives get very excited during the game, and scream and shout, but never seem to quarrel. Some indulge in little "tricks," by which they think they can secure good luck for themselves, such as passing the arm rapidly under the falling discs when their adversaries throw; many shout insults at the discs when they lose.

Some chiefs forbid gambling in their villages; an indication of such a prohibition is afforded by a small palm-leaf fastened to a tree in the middle of the village.

MORALITY AND JUSTICE.

Wrongs against property (including wives) and life are punishable crimes; adultery is a personal injury. Cheating, marriage with a sister by the same father, ill-treatment of slaves, are visited merely with public reprobation. In these matters no distinction is made between tribesmen and aliens. Theft committed in the house is supposed to be punished by the family god, while the plantations are under the care of special fetishes. Hospitality, limited to shelter, is accorded to

[1] "They are the worst gamblers I ever met."

every one. Lying is considered a wrong to the person to whom the lie is told, and cowardice meets with public disapproval, but nothing more.

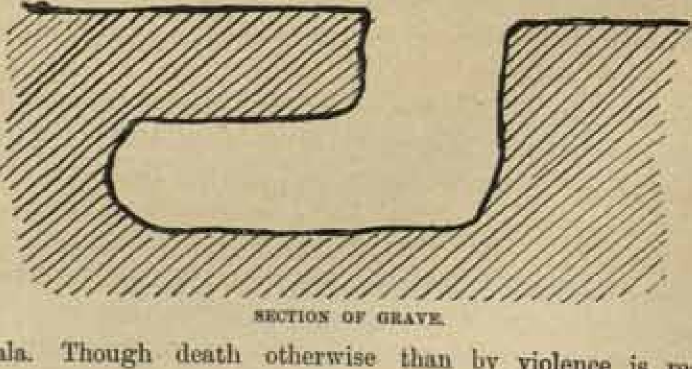
Sexual intercourse is forbidden to the unmarried; should it occur, the man must pay a fine to the father of the girl, the latter is not punished, but it must be remembered that great stress is laid upon the virginity of a bride. Masturbation, often practised in society, is common among boys, but paederasty, bestiality, and similar vices are unknown.

Drunkenness, which seems to occur only among men, is considered disgraceful, and a drunkard who makes himself objectionable runs the risk of a good thrashing.

Justice is administered by assemblies, called *Milonga*, in which all the neighbouring villages take part, and the decision of the case lies with the spectators.[1] Punishment consists in fines, in fact the only crime which does not admit of compensation is treason against the high chief, this is punishable with death; even treason against the petty chief can be compensated by payment. Homicide in self-defence is no crime; in cases of murder, the fine is paid to the heir of the deceased; blood-revenge is also found, the right of vengeance lying with the heir (*see* Property, p. 44); drunkenness is not admitted as an excuse. In cases of accidental homicide, the fine is less than for murder. Magicians are exempt from justice and cannot be fined, but an offence against a magician is heavily punished, and the fine is paid to the fetish (and, of course, appropriated by the magician). There is no right of pardon, and chiefs are responsible for the payment of fines incurred by their subjects. Every crime is a personal offence except murder, which is regarded as an offence against the whole tribe, in spite of the fact that the right of revenge attaches to an individual.

Poison Ordeal.

The poison ordeal, which as an institution is characteristic of West African culture, is found also among the Ba-Yaka; though it is not so frequent as among



SECTION OF GRAVE.

the Ba-Mbala. Though death otherwise than by violence is recognised as "natural" by the natives, certain cases, invariably where a chief is concerned, are referred to the malign influence of the evil spirit *Moloki* (Religion, p. 50), acting through the agency of some old man or woman whom he is supposed to have

[1] Compare Torday and Joyce, *loc. cit.*, p. 414.

possessed. The individual suspected is forthwith subjected to the poison ordeal. The poison administered, called *Putu*, consists of the bark of *Erythrophloeum guiniense*; if it causes vomiting on the part of the accused, he is considered innocent of the charge, but if the dose proves fatal, or if it has no effect, his guilt is regarded as established. In the last case a grave of a peculiar pattern (see p. 48) is dug for him; he then sits down hard by and eats and drinks as much as he wishes, after which he enters the grave, usually of his own accord, and is buried alive.

WAR.

Every adult (*i.e.*, circumcised) male is a warrior, and the men of each village are led by their petty chief; the women hide. When an expedition is on foot the warriors are summoned by the beating of a gong and the following ceremony takes place: the wife of the chief, liberally adorned with red paint, stands in the middle of the village with her legs wide apart; and each man must shoot an arrow between them. If the arrow passes through, the omen is good, but if it falls to the ground between her feet the omen is bad, and the unsuccessful marksman must remain at home. In this way a coward can always avoid military service. The fact that the Ba-Yaka have won by conquest the territory which they now hold would seem to show that they are, on the whole, courageous, but there are many cowards among them, who slink away during a fight. The old men are said to be the bravest.

Practically the only weapons used are the bow and arrow, though a few swords have been obtained from other tribes; the bow is made from a flat piece of *Mopelenge* wood (a kind of maple), about 150 cm. long, and from 5 to 10 cm. broad, tapering to about 1 cm. at the ends; the cord is of bamboo. The arrows have iron socketed heads and are nocked and feathered (for hunting, arrows with wooden points are used: see FOOD, p. 42). At short distances (up to 30 feet), they shoot with great accuracy, but at longer ranges they are not very successful. Women do not use weapons. Shields are not found. A fight is usually prefaced by mutual objurgation, but ambushes and night attacks on villages are common, and, indeed, form an essential part of native tactics; consequently in war-time sentries are posted in the grass around a village.

Prisoners are sold as slaves, and, if wounded, are healed first; however, the Ba-Yaka do not amalgamate with the tribes they conquer, but drive them from the country. If a man on the Ba-Yaka side is killed, the arrow which caused his death must not be broken; it is cut out and stuck in the centre of the roof of his brother's hut.

Alliances are frequently contracted between chiefs, and peace is made in the following manner: the chiefs of the two tribes meet and eat a cake made of flour in which have been put some of their nail-parings; a fowl is then killed, wrapped in leaves and buried. It is believed that he who breaks the truce will die.

Wars are frequent, and arise principally from charges of theft or adultery, etc., but they do not seem to have any appreciable effect upon the increase of the population.

SICKNESS, DEATH AND BURIAL.

In cases of sickness a charm, usually consisting of a goat's bone, is obtained from the magician and bound to the diseased part. Cupping is practised by means of a portion of a gourd from which the air is exhausted by suction through a small hole, and the latter is closed with a plug of wax. The gourd is usually applied over small incisions made immediately in front of the ear, and is allowed to operate for half-an-hour at a time. They are very skilful in removing arrows from wounds.[1]

Elephantiasis appears to be unknown; they are acquainted, however, with syphilis, though it does not exist among them; they call it the "disease of the Ba-Mbala." They say that they feel the heart by means of the pulse. Strangely enough the blind are regarded as objects of pity, while the deaf are ridiculed.

Natural death by illness is accepted as a fact, though illness is sometimes attributed to witchcraft. (See POISON ORDEAL, p. 48.) Relatives and friends surround the dying man, but only the nearest relations attend the funeral. The corpse is painted red, and arranged in a sitting posture with the knees under the chin and the hands clasped round the shins; it is placed in this position in the grave, and food (fowls, palm-wine, etc.) is laid at its side; the earth is then filled in, and a small straw shelter erected on the grave. The clothes of the dead are buried with him, and all his pots are broken and the fragments thrown on the grave. No weapons must be buried with the dead; if by any chance this should occur, the ghost of the deceased visits the heir three nights in succession, and, on the fourth night, kills him. The same form of burial is adopted for both sexes and all ranks, with the exception of persons supposed to be possessed by the evil spirit *Moloki*. (See RELIGION, p. 51.) There is no exhumation of the corpse. The deceased is lamented by his wives and sisters; if he is a chief, by all the women of the village.

The widows, whilst in mourning, are painted red and are not allowed by custom to plait their hair.

RELIGION.

The soul is called *Doshi*; it leaves the body at death and visits the living in dreams. It inspires them with evil thoughts, and reproaches them if the grave is neglected; it is even supposed to cause the death of the heir if a weapon has by any chance been deposited in the grave as stated in the preceding section. The soul of a man who has been in his lifetime the fortunate possessor of many fetishes is transferred to the body of a large animal. A man who has been killed in battle is supposed to send his soul to avenge his death on the

[1] "I cannot omit to mention in this connection an almost incredible piece of surgery, to which, nevertheless, a whole village bore witness; it was said that a certain man, who was pointed out to me, had had an artery severed by an arrow, and that an old man had tied it with fine copper wire."

person of the man who killed him; the latter, however, can escape the vengeance of the dead by wearing the red tail-feathers of the parrot in his hair, and painting his forehead red. Big animals have souls but inanimate objects have none. Souls fly about in the air.

The Ba-Yaka believe in the existence of a malign spirit called, as among the Ba-Mbala, *Moloki*; and in the night it is a common thing to hear natives running about and shouting insults to *Moloki*, who has made them ill or caused the death of a relation. This *Moloki* is supposed often to possess some old man or woman, who is then regarded as the cause of sickness or death and is compelled to submit to the poison ordeal. (See POISON ORDEAL, p. 48.) The death of a chief is always attributed to *Moloki*.

The chief is the principal magician, but any man who possesses many fetishes with the requisite *kissi* (a magical compound of clay, etc., in which the fetish power is supposed to reside), can become one. Important fetishes are kept in a special hut, but may be seen on payment of a fee to the magician. An interesting fetish collected is the wooden figure of a badger (Plate IV, Fig. 1), which the magician uses in the following way: he takes the fetish into the bush and puts certain *kissi* into holes in its ears, sits down with his chin on his knees and awaits developments. The animal comes to life, runs to the village and steals anything which his master desires, *djimbu*, fowls, etc., and returns to him with the booty. The victims hear the thief, but can neither see nor catch it, nor can they procure the restitution of their goods or have the magician fined for the depredations of his familiar.

Human sacrifice is not found, but animals are slaughtered before the fetish, and the latter sprinkled with their blood; the animal is afterwards eaten.

The breaking of a food-tabu is believed in some cases to be visited by supernatural punishment. For instance, if a woman eats an egg she is supposed to become mad, tear off her clothes and run away into the bush. When found she is caught and fastened to the *taka*, a log with a fork at one end in which the neck of a prisoner is secured, and brought to the magician. He knocks three times on the *taka*, and the woman faints; he then pours water on her face, and the spell is broken. If a man eats dog he is supposed to fall ill; and if more than one man partakes of a cock the result is similar.

REPRODUCTION.

Females are permitted to have intercourse at a very early age, even before menstruation; males after circumcision. During pregnancy the husband must abstain from his wife, and also during the period for which the child is suckled (about a year). Accouchements, which appear to be easy, take place in a sitting position; all the married women of the village assist. Children are suckled by the mother alone, and are very well treated; even cripples, etc., are preserved and well cared for. On the average a woman bears three children; families of more than four are rare. The kola nut is considered an aphrodisiac; no means are taken to prevent conception, and abortion is unknown.

MISCELLANEOUS.

As a tribe they are not particularly cleanly; no soap or equivalent article is in use, though tooth-brushes are utilised. Male adults can swim, in dog-fashion; but there are no navigable rivers in this part of the country. In general they use no form of salutation.

FOLKLORE.

In conclusion may be appended a Ba-Yaka legend. The story is related by a single individual, the audience joining in the chorus. In explanation it should be said that the word *kongo* means "hunt," *ayeye* is merely an exclamation, and the spoken *bekelek bekelek bugumun* is supposed to imitate the sound made by falling wood.

One day, a long time ago, a monkey, in his rambles among the branches of the trees, wandered farther from his home than was his custom. At last he arrived at a place in the forest where he had never been before; and what did he see there?

Chorus.

(*Spoken in a low voice very fast*)—

Bekelek bekelek bugumun, bekelek bekelek bugumun, bekelek bekelek bugumun.

Home he ran and said to the other monkeys: "Oh my brothers, I have seen something horrible! I was in a part of the forest where I saw tree falling after tree, and although I looked about in every direction I could not discover what made them fall like that." "Small trees?" asked the other monkeys. "No," replied the first, "big ones, the biggest in the forest." The monkeys were greatly surprised. "Are you sure that you saw no one felling them?" "Certainly, there was no one there and the trees were falling, falling, falling."

(*Chorus.*)

The monkeys, unable to understand how this was possible, went to see the jackal, who had the reputation of being very sly. "I'll go and see," said the jackal. So he went, and there he too saw the trees falling, falling, falling, but could discover no cause why they should fall like that. So back he went to the monkeys and said, "I could see nobody who made them do so, but I saw the trees falling, falling, falling."

(*Chorus.*)

Then said the jackal, "Let us go to the leopard, he might be able to discover the explanation." So they went and told their story to that cunning animal. "I'll go and see," said the leopard. So he went, and there he too saw the trees falling, falling, falling, but could discover no cause why they should fall like that. So back he went to the monkeys and the jackal and said, "I could see nobody who made them do so, but I saw the trees falling, falling, falling."

(*Chorus.*)

Then said the leopard, "Let us go to the lion; that mighty animal is sure to be able to advise us." So they all went and told their story to the mighty lion. "I'll go and see," said the lion. So off he went, and saw the trees falling, falling, falling, but could not discover what made them fall like that. So back he went to the other animals, and said, "I could see nobody who made them do so, but I saw the trees falling, falling, falling."

(*Chorus.*)

Then said the lion, "Let us go to the wise elephant; he is the wisest of all the animals, and he will certainly be able to discover what makes the trees fall." So they went to the elephant and related their story. "I'll go and see," said the elephant. But he was no more successful than the others, and when he returned he said, "I have looked to the right, to the left, behind me, before me, but could see no one who might be the cause why all the trees were falling, falling, falling."

(*Chorus.*)

All the animals were very unhappy. "What shall we do," said they, "if all the forest is destroyed?" Then up spoke the cat who had just arrived, "Let me go and see what is happening, perhaps I shall be able to discover what is the matter." All the animals laughed at the cat. "What!" said they; "the sly jackal, the cunning leopard, the mighty lion, the wise elephant all have failed; do you think that you, a cat, will be successful?" "Only let me go," said the cat, "at least no harm can come of it." So off he went, and soon returned with a rat in his mouth. So the cat was the saviour of the forest, for the trees did not fall any more.

(*Chorus.*)

Language.

A peculiarity of the Ba-Yaka appears in the intonation of their speech; they speak rather slowly and in a peculiar sing-song which renders their nationality easily recognizable even though they may be speaking another tongue.

The language appears to possess a fairly well-defined grammar, and bears a certain resemblance to the Kongo tongue.

Below is given a short vocabulary.

Vocabulary.

Personal Appellations.

Ancestor	*Kake.*
Brother	*Makyani.*
Chief	*M'pfum.*
Child	*Moane.*
Cousin	*Kisoni.*
Father	*Tata.*
„ -in-law	*Buko.*
Infant	*Moana Kunda.*
Magician	*Doji.*
Man	*Mutu.*
Men	*Batu.*
Mother	*Mama.*
„ -in-law	*Buko.*
Rebel	*Yumana.*
Sister	*Pangi.*
Slave	*Mohika.*
Thief	*Muifi.*
Uncle (maternal)	*Gokash.*
„ (paternal)	„
Virgin	*Peni.*
Woman	*Mokento.*

The Body.

Anus	*Moshinji.*
Bone	*Kikuri.*
Buttock	*Matako.*
Calf	*Mafunda.* / *Mai.*
Chest	*Tuli.*
Circumcision	*Mushishi.*
Clitoris	*Peni.*
Ear	*Matwoi.*
Eye	*Disu.*
Eyebrow	*Chinchala.*
Eyelashes	*Kongi.*
Fæces	*Tufi.*
Fingers	*Milembo.*
Foot	*Mitambi.*
Forehead	*Bunzu.*
Gleet	*Bumbi.*
Hair (on body)	*Mika.*
Hair (of head)	*Gokosi.*
Hand	*Mikuri.*
Hand (hollow of the)	*Banzala Kok.*
Head	*Mutwa.*
Heart	*Bundu.*
Hunger	*N'zala.*
Jaw	*Lowanga.*
Leg	*Malu.*
Liver	*Masafu.*
Mouth	*Kanu.*
Navel	*Mukuma.*
Nose	*Bombo.*
Penis	*Makato.*
Pulse	*Mikashi.*
Ribs	*Banji.*
Shoulder	*Kipanga.*
Skin	*Mukanda.*
Syphilis	*Bimbutu.*

Testicle ... ... *Tsumu.*
Thigh ... ... *Mokob.*
Thirst ... ... *Puis.*

Tongue ... ... *Lilimi.*
Tooth ... ... *Men.*
Vagina ... ... *Murintyi.*

Weapons, Utensils and the House.

Arrow ... ... *Misungu.*
" (with iron point) *Punza.*
" (" wooden pt.) *Matomo.*
" (" 4 points)... *Tsali.*
Bag ... ... *Mogoti.*
Basket (rectangular) *Makolo.*
" (round) ... *Kimbendi.*
Basket-cover ... *Bangu.*
Bead ... ... *Misanga.*
Beam ... ... *Mobangu.*
Belt ... ... *Moponde.*
Bottle ... ... *Bungu.*
Bow ... ... *Bota.*
" -string... ... *Lukand.*
Cage ... ... *Ngunzu.*
Cloth (European) ... *Masuni.*
" (native) ... *Pushi.*
Door ... ... *Kiavule.*
Fork (for securing prisoners). *Taka.*
Gong... ... ... *Mon.*

Granary ... ... *Tangi.*
Head-cloth ... ... *Yepi.*
Hoe ... ... *Tsongu.*
House ... ... *Nzo.*
Knife ... ... *Bel.*
Mortar ... ... *Mushi.*
Needle ... ... *Dongo.*
Pipe (w. bamboo stem) *Fama.*
" (w. clay bowl) ... *Kinzu.*
" (w. gourd stem) *Misaka.*
Pot ... ... *Kigangu.*
Roof ... ... *Mudilu.*
Sieve ... ... *Moswalu.*
Snare (for birds) ... *M'tamu.*
String ... ... *Singa.*
" (native) ... *Tete.*
Thatch ... ... *Moango.*
Thread ... ... *Lulchin.*
Village ... ... *Kurihata.*
Wood (f. building) ... *Makund.*
" (small pieces)... *Jil.*

The Animal World.

Animal ... ... *Dzao.*
Ant ... ... *Gwenya.*
Antelope ... ... *Bambi.*
Bat ... ... *Gonzu.*
Bird ... ... *Nyuni.*
Blackbird ... ... *Kanyi.*
Buffalo ... ... *Baoa.*
Chameleon ... ... *Lungwenia.*
Dog ... ... *Mboa.*
Eagle ... ... *Lubamba.*
Egg ... ... *Maki.*
Elephant ... ... *Nzao.*
Falcon ... ... *Endembila.*
Feather ... .. *Tsala.*
Fish ... ... *Bizi na mamba.*

Fowl ... ... *Koke.*
Frog ... ... *Kiula.*
Goat ... ... *Kombo.*
Grasshopper ... { *Pasu.* / *Mayoyo.* }
Guinea fowl ... ... *Kanga.*
Hippopotamus ... *Gufu.*
Horn... ... ... *Kibongwe.*
Kite ... ... *Yimbi.*
Leopard ... ... *Tami.*
Louse ... .. *Tchini.*
Milk ... ... *Mayene.*
Monkey ... ... *Kima.*
Parrot ... ... *Kusum Bongi.*
Partridge ... ... *Gwali.*

Pig	... *Gulu*
Pigeon ...	... *Yembi.*
„ (green)	... *Gundun.*
Rat	... *Puk.*
Snake ...	... *Nyoka.*
Tail	... *Mukila.*

Vegetable World.

Allspice ...	... *Bidi.*
Banana ...	... *Titipi.*
Bush	... *Moango.*
Forest ...	... *Mishitu.*
Gourd ...	... *Mundele.*
Ground-nut ...	... *Guba.*
Maize ...	... *Masis.*
Manioc ...	... *Mitombi.*
Maple ...	... *Mopelenge.*
Mushroom ...	... *Boko.*
Palm-nut ...	... *M'ba.*
„ -tree ...	... *Gazi.*
„ -wine ...	... *Makana* (also *Pussa*, *Sende* and *Sampa*).
Pepper ...	... *Kefu.*
Pineapple ...	... *Biba.*
Plantain ...	... *Matwash.*
Tobacco ...	... *Fuma.*
Wood ...	... *Miti.*

Time, the Elements and Geography.

Air	... *Funji.*
Clay	... *Pemba.*
Day	... *Bilumbu.*
„ after to-morrow...	*N'zundu.*
„ before yesterday	*Buzuka.*
Days of the week	*Bujuka.* *Tek.* *Gun.* *Pungu* (market day).
Earth ...	... *Mav.*
Evening ...	... *Mokole.*
Fire	... *Bao.*
Iron	... *Don.*
Lightning ...	... *Dzaji.*
March ...	... *Toba.*
Month ...	... *Gondo.*
Moon ...	... *Gondo.*
Mountain ...	... *Monga.*
Night ...	... *Pipa.*
Plain ...	... *Sengu.*
Rain	... *Vula.*
Rainbow ...	... *Kongol.*
Road ...	... *Jila.*
Salt (native)	.. *Mokindu.*
Salt (imported)	... *Mongwa.*
Sand	*Toba.* *Mavu.*
Season (dry)...	.. *Kishua.*
„ (rainy)	... *Vula.*
Soon	... *Kibungi.*
Star	... *Monien.*
Stone ...	... *Mamany.*
Stream ...	... *Mokeri.*
Sun	... *Tango.*
To-day ...	... *Moana.*
To-morrow ...	... *Bazi.*
Water ...	... *Mamba.*
Week ...	... *Pungu.*
Wind ...	... *Funji.*
Yesterday ...	... *Baji.*

Verbs.

Be	... *Kela.*
Bear (a child)	... *Kubuta.*
Beat	... *Kubula.*
Beat down ...	... *Kubuis.*
Bind	... *Kokasa.*
Boil	... *Kulamba.*

Bring	*Kubonga.*
Call	*Kianga.*
Capture	*Niambula.*
Carry	*Kunata.*
Castrate	*Kotokomb.*
Choose	*Kosola.*
Come	*Kuyaka.*
Crush	*Kukuba.*
Cry	*Kwakala.*
Cut	*Kubukula.*
Discuss	*Coza Milongo.*
Dispute	*Kunuana.*
Divide	*Kukaba.*
Draw (bow)	*Kuta.*
Drink	*Kuny.*
Eat	*Kulya.*
Enter	*Kokota.*
Flee	*Utin.*
Fly away	*Kufurmuka.*
Forget	*Kuyimbila.*
Give	*Kupeka.*
Go	*Kwenda.*
Have	*Tsao.*
Hunt	*Kukong.*
Impregnate	*Kuhukana.*
Jump	*Kuswa.*
Kill	*Kuhonda.*
Know	*Kuntsai.*
Laugh	*Kushika.*
Lie	*Bokanvu.*
Lie down	*Kunyimba.*
Listen	*Kuyuka.*
Love	*Kuzola.*
Mad, be	*Lao.*
Mock	*Viako.*
Pay	*Nisim Bika.*
Pick up	*Kutongona.*
Pursue	*Kuluna.*
Remain	*Kusumunda.*
Return	*Kutufuka.*
Ride	*Kunena.*
Run	*Swangalaka.*
Say	*Kuyakula.*
See	*Kuona.*
Send	*Kuvitusa.*
Sew	*Kutsuma.*
Sit down	*Kusikuka.*
Sleep	*Kunyimba.*
Smell	*Kisulu.*
Speak	*Kwakula.*
Strike	*Kubeta.*
Swim	*Kokasa.*
Take	*Mata.*
Throw	*Kubilisa.*
Urinate	*Kutalima.*
Vomit	*Koluka.*
Wait	*Kudimba.*
Walk	*Kwenda.*
Wish	*Kusuluka.*
Work	*Tudimi.*
Wound	*Kula.*

Pronouns, Adjectives and Adverbs.

Above	*Yulu.*
All	*Boso.*
Beautiful	*Kitoki.*
Below	*Kumashin.*
Between the two	*Kateta Gana.*
Big	*Wombata.*
Bitter	*Kitsinga.*
Black	*Kapindi.*
Castrated	*Tong.*
Cold	*Tyoshi.*
Dirty	*Kombi.*
Far	*Kian.*
Fat	*Maji.*
Fierce	*Kabu.*
Good	*Pim.*
He	*Yandi.*
Here	*Haa.*
How much	*M'kwe.*
I	*Mene.*
Ill	*Pashi.*

Immediately...	... *Tangari.*
Little ...	... *Kiakunda.*
Long	... *Klaha.*
Male	... *Kakala.*
Much ...	... *Vula.*
No	... *Lo.*
Old	... *Nuta.*
Quickly ...	... *Tsinu.*
Red	... *Kubabala.*
Satisfied ...	... *Kutambusa.*
Slowly ...	... *Lokoy Lokoy.*
Small ...	... *Tchitchi.*
Sterile (female)	... *Mish Kisita.*
Sterile (male)	... *Mokobo.*
Strong ...	... *Fuku.*
There ...	... *Kuna.*
They	... *Bao.*
Thou	... *Gei.*
Tired... ...	... *Kulema.*
We	... *Betu.*
Where ...	... *Ki.*
White ...	... *Pemba.*
Wicked ...	... *Kabu.*
Yes	... *Ey.*
You	... *Ben.*
Young ...	... *Moleki.*

Numbers.

One	{ *Mo.* / *Moshi.*
Two	{ *Vil.* / *Bole.*
Three ...	{ *Tat.* / *Matatu.*
Four	{ *Ia.* / *Waia.*
Five	{ *Tan.* / *Mitano.*
Six	{ *Siamon.* / *Masambanu.*
Seven ...	{ *Nitseme.* / *Samboadi.*
Eight ...	{ *Nan.* / *Kinan.*
Nine	{ *Voa.* / *Kivoa.*
Ten	... *Kum.*
Eleven ...	... *Kuminundo.*
Twenty ...	... *Makumimole.*
Thirty ...	.. *Makuma ta*[illegible]*u.*
Hundred ...	... *Kama.*
Thousand ...	... *Funa.*
Ten thousand	... *Tsuk*[illegible]*u.*
How much ...	... *M'k*[illegible]*we.*

Miscellaneous.

Bewitchment	... *Konji.*
Brass rod (currency)	{ *Kunga.* / *Monengo.*
Dance ...	... *Makino.*
Evil spirit ...	... *Moloki.*
Fear	... *Bom.*
Fetish ...	... *Mikissi.*
„ great ...	... *Kikunga.*
„ small ...	... *Hemba.*
Flesh (human)	... *Misuni.*
Hunt... ...	... *Kongo.*
Magician ...	... *Doji.*
Palaver ...	... *M*[illegible]*ilonga.*
Plait	... *T*[illegible]*angi.*
Plunder (*i.e.*, the share to which each village has a right).	[illegible]*iongo.*
Present ...	... *Mo*[illegible]*wala.*
Salutation ...	... *Moyo.*
Skirmish ...	... *Kutan*[illegible]
Sleep... ...	... *Kilu.*
Song	... *Mokunga.*
Soul	... *Doshi.*
War	... *N'jita.*

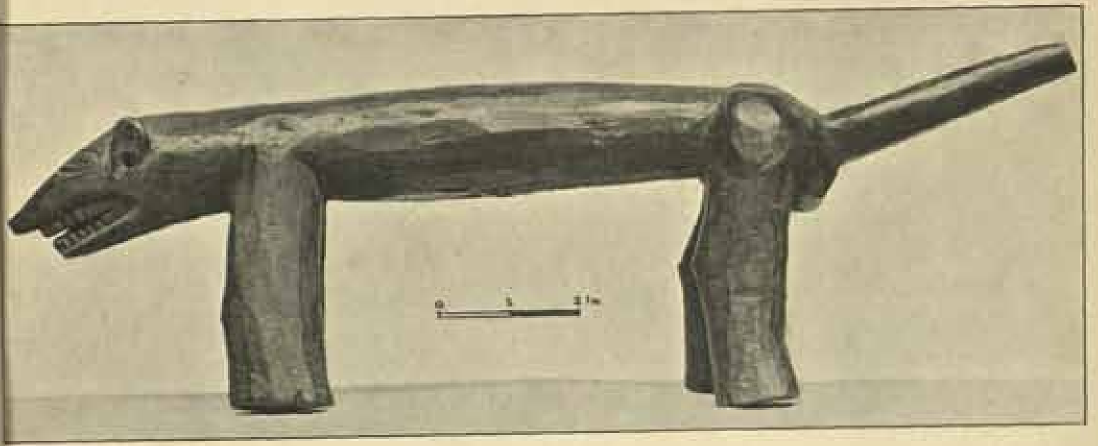


FIG. 1.—WOODEN FETISH. L. 40·0 CM. (p. 51)

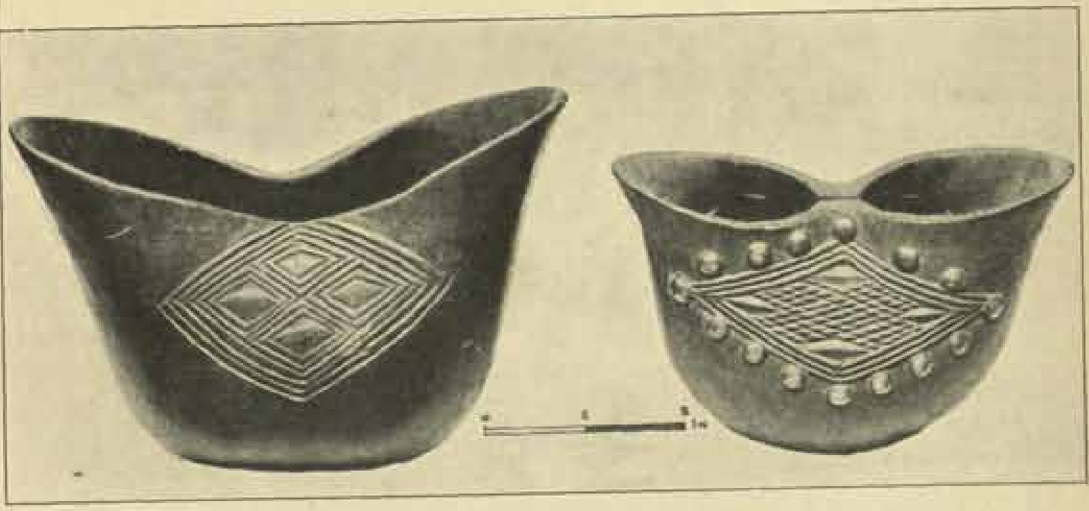


FIG. 2.—WOODEN DRINKING VESSELS. W. 14·3 AND 11·8 CM. (p. 43).

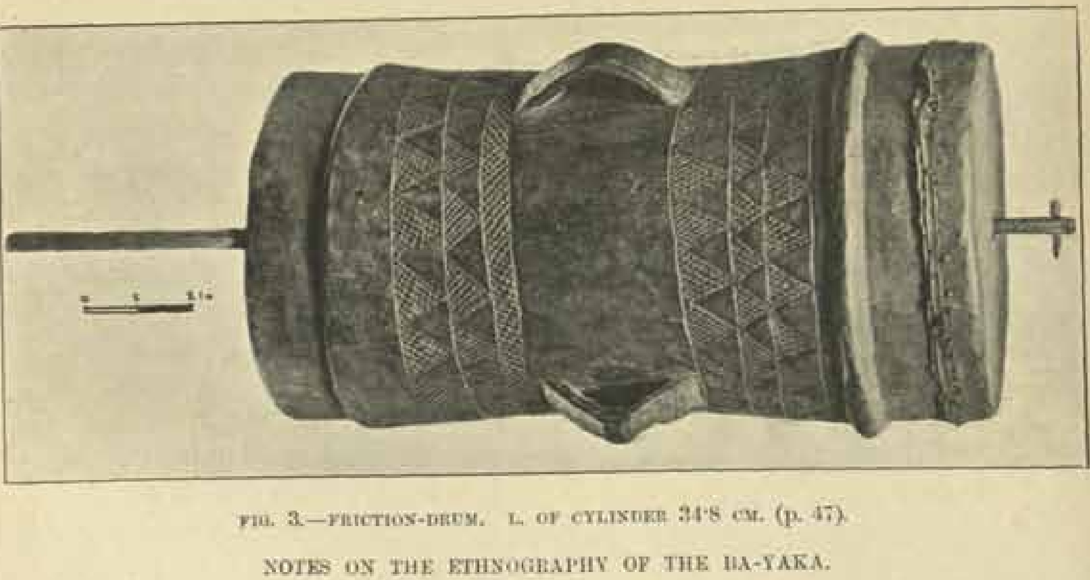


FIG. 3.—FRICTION-DRUM. L. OF CYLINDER 34·8 CM. (p. 47).

NOTES ON THE ETHNOGRAPHY OF THE BA-YAKA.

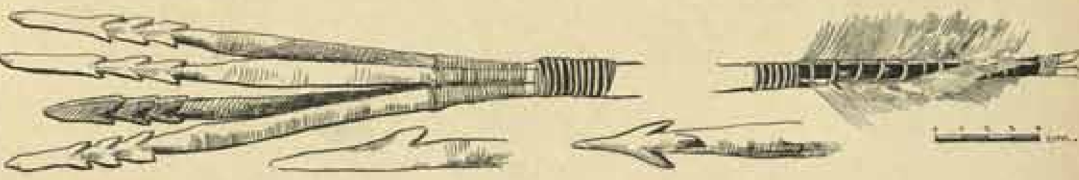


FIG. 1.—HUNTING ARROWS (pp. 42, 49).

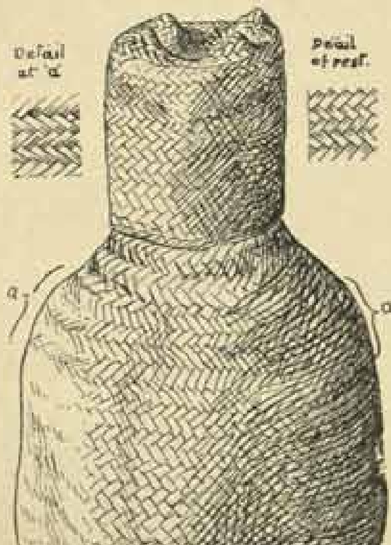


FIG. 2.—BASKET FOR CURRENCY SHELLS (p. 43).

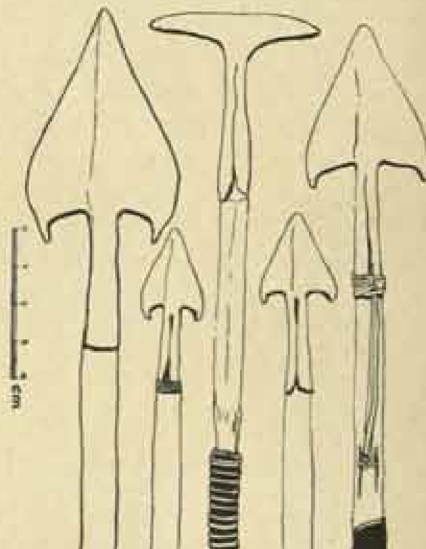


FIG. 3.—WAR ARROWS (p. 49).

FIG. 4.—FISH TRAP (p. 42).

NOTES ON THE ETHNOGRAPHY OF THE BA-YAKA

Supplementary Note to "Notes on the Ethnography of the Ba-Mbala." *Journ. Anthrop. Inst.*, xxxv, p. 398.

Since the publication of the above paper a few more details have come to light concerning the peculiar *Muri* caste who may not eat human flesh found among this people. It appears that they are in some way connected with hunting; for instance, when a man has killed game he must offer part of it as a present to the *Muri*. Should he omit to do so it is believed that he will in future be unsuccessful in hunting. It will be remembered that in the Ba-Mbala paper it was hinted that this *Muri* sect might possibly be connected with the revolution against cannibalism which took place in Angola three centuries ago. The connection of the *Muri* with hunting is at least a strange coincidence. The band of conspirators against the cannibalistic domination of the Jaga veiled their revolutionary designs under the pretence that they were a society of buffalo-hunters (Empacaceiros, Pakassero; Mpakasa=a buffalo),[1] and subject to a magical tabu as regards human flesh.

No such class could maintain its organisation for long in the country at present inhabited by the Ba-Mbala, where all game is extremely rare, but would tend rapidly to decay until it became a mere survival.

Another piece of additional information concerning the *Muri* is the following:— If a *Muri* has no sisters, or his sisters no sons, he buys and adopts a slave to whom when he dies he leaves his insignia. The slave in consequence becomes a free man and a *Muri*.

[1] See Ladislaus Magyar, *Reisen in Süd Afrika*, trans. by J. Hunfalvy, p. 267.

MATERIALS FOR A STUDY OF TATU IN BORNEO.

BY CHARLES HOSE, SC.D., AND R. SHELFORD, M.A., F.L.S.

[WITH PLATES VI–XIII.]

THE great diversity of tribes in Borneo involves, in a study of their tatu and tatuing methods, a good deal of research and much travel if first hand information on the subject is to be obtained. Between us we have covered considerable area in Borneo and have closely cross-questioned members of nearly every tribe inhabiting Sarawak on their tatu, but we cannot claim to have exhausted the subject by any means; there are many tribes in the interior of Dutch Borneo and in British North Borneo whom we have not visited and concerning whom our knowledge is of the scantiest. Our object in preparing this paper has been to place on record all our own observations, the result of some years' work, and to summarise briefly all that has been written on the same subject by other authors. We must leave it to future workers to fill in the blanks still left in our knowledge and to produce a complete monograph of Bornean tatu, only pointing out that if the work is to be done " 'twere well it were done quickly."

As we shall have occasion to show later on, there are tribes now existing who have already given up the practice of tatu, there are others who are renouncing their old designs in favour of those formerly peculiar to the Kayans only; whilst finally, though the native tribes of Borneo run small risk of extermination at the hands of the European rulers of the island, there is no doubt but that the dominant and aggressive Sea Dayak is a ruthless destroyer of tribes, which, owing to an inherent and fatal weakness are already tottering to the verge of extinction. It is at least unfortunate that under the ægis of European protection such weakly tribes soon lose all originality in their art and are fain to copy the art and culture of tribes that they cannot fail to regard as more successful in the struggle for life than themselves. At the end of the paper we give a bibliography of Bornean tatu and would draw special attention to the works of Dr. A. W. Nieuwenhuis, since we have found his accounts of tatu most accurate and helpful. It is, however, a pity that Dutch authors still persist in misusing the term Dayak; Dr. Nieuwenhuis is far too competent an ethnologist to think of confusing such different tribes as the Sea Dayaks (or Iban of Dr. Haddon) with Kenyahs or Kayans, yet even he writes of the "Baritu Dayaks," the "Ulu Ajar Dayaks" of the Mandai River, and occasionally of "Kayan Dayaks."

It is perhaps advisable to give at the outset of this paper the briefest possible sketch of our theory of classification of the Borneans. The people whom we regard as the first immigrants to Borneo we term Kalamantan, typically a dolichocephalic race of Indonesians; at present they form a number of tribes and we suppose that they slowly filtered into Borneo in the remote past from various sources, but principally from the continent of Asia. When the country was occupied by the Kalamantan, there followed an immigration of Kenyahs, who mixed to a large extent with their Indonesian predecessors, so that at the present day it is a matter of the greatest difficulty to determine whether certain tribes are Kalamantan or Kenyah; to obviate the difficulty we term such tribes Kenyah-Kalamantan. It is not probable that the Kenyahs arrived all at once but rather it is likely that their immigration was spread over a considerable period of years, the main lines of invasion running up the principal rivers of eastern and south-eastern Borneo.

At some period—say one hundred years—after the last of the Kenyah immigrations, there followed up the same rivers the Kayan race, who are characterised by a low brachycephaly. By this time the Kalamantan tribes, which had not amalgamated with the Kenyahs, had been driven towards the head waters of the main rivers and the new pressure from without forced them still further inland. The Kenyah fared better at the hands of the new arrivals and intermarriage doubtless frequently occurred, with the result that many Kenyah tribes of to-day are, superficially at any rate, extremely like the Kayans. These Kenyahs and the Kayans we bracket together under a third heading—Kenyah-Kayan. The wave of immigration still continuing to flow in from the east, the Kenyahs and Kayans swept over the great watershed of Borneo between Sarawak and Dutch Borneo and down the Rejang and Baram Rivers of Sarawak. Last of all came the Sea Dayak, a brachycephalic Malayan; advancing up the Kapuas from the south-west he drove all before him and overflowed into the Batang Lupar and adjacent rivers of Sarawak, where to this day he remains in great force. Within quite recent years the Sea Dayaks have migrated also from the Batang Lupar *up* the Rejang and the Baram Rivers driving back the Kenyahs and Kayans who had moved *down* into those districts from the interior. At the present day the following features in the distribution of the tribes are salient:—In British North Borneo and in the extreme west of Sarawak the tribes are without exception Kalamantan; in these two parts of the island there are no great rivers, and this geographical feature seems to have afforded shelter to the present inhabitants of these areas, for the great waves of immigration must have flowed up the great rivers of Borneo, not up the small ones. The other Kalamantan tribes are scattered throughout the rest of Borneo, but for the most part are situated in the interior highlands watered by the upper tributaries of the large rivers; the Kalamantans nearer the coast and on the coast, such as the Milanos, are, to use a geological term, outliers that still stand up clear from the surrounding strata of a later age. Such are the Sru, the only Kalamantans in the Sea Dayak head-quarters, the Tanjong of the Rejang river, the Narom and Miri from near the mouth of the Baram river, and many others which could be cited.[1]

[1] No doubt some of these tribes have been driven over the watershed of Borneo and down the Sarawak rivers by the Kenyah-Kayan advance.

Between the interior highlands occupied by the Kalamantans and the sea, lie the Kenyah and the Kayan tribes, the former as a rule nearer the head waters than the latter, but these tribes in turn have been pushed up-country in the Baram and Rejang Rivers and to a certain extent in the Kapuas river by the Sea Dayak. It is not so long ago that there were no Sea Dayaks in the Rejang and Baram, but now in the former river there are none but Sea Dayaks for 150 miles and more from the river mouth, whilst in the latter the Sea Dayak is encroaching more and more upon the Kayan-Kenyah domains.

The following table expresses our ideas of classification more succinctly :—

I. Kalamantan	Typically dolichocephalic Indonesians.	N.E. Borneo, W. Borneo, interior highlands, "outliers."
II. Kenyah-Kalamantan	Dolichocephalic and low brachycephalic.	Interior highlands of Central Borneo.
III. Kenyahs and Kayans	Low brachycephalic	Mid regions between coast and highlands, secondarily driven back in Rejang and Baram rivers towards highlands.
IV. Sea Dayaks	Brachycephalic Proto-Malays	Batang Lupar, Saribas etc., Rejang, Baram, Kapuas (lower reaches and near Sarawak frontier).
V. Malays	Brachycephalic	Coasts and towns.

Other systems of classification have been published by Dr. A. C. Haddon[1] and by Dr. J. H. F. Kohlbrügge and Dr. A. Nieuwenhuis.[2] Dr. Nieuwenhuis has also communicated to us by letter his later views on the subject. It is of interest to find that the systems coincide to a great extent, such differences as occur being differences of minor importance. The following table illustrates this :—

Hose and Shelford.	Haddon.	Kohlbrügge.	Nieuwenhuis (1903).	Nieuwenhuis (1905).
	Punan ...	—	Punan, Bekatan ...	—
Kalamantan	Kalamantan	Ot Danum, Ulu Ajar.	Ot Danum, Ulu Ajar.	Ot Danum, Ulu Ajar, etc.
Kenyah-Kalamantan	—	—	—	—
Kenyah and Kayan ...	Kenyah Kayan.	Kayan and Punan.	Bahau-Kayan ...	Bahau-Kayan.
Sea Dayak	Sea Dayak (Iban.)	—	—	Sarawak Dayaks of Batang Lupar and other rivers.
Malay	Malay ...	Malay ...	Malay	Malay.

[1] *Arch. per l'Anthropol. l'Etnol.*, vol. xxxi, 1901.

[2] *Mitt. Niederl. Reichsmus. f. Völkerkunde*, Ser. 2, No. 5, 1903.

The Punan we consider to be Kalamantans in spite of a low brachycephalic element amongst them; after all, only thirty-five individuals have been measured and it is quite likely that further measurements would show a much more pronounced dolichocephalic element. Dr. Kohlbrügge compares the Punan and Kayans to the Javanese, the Ulu Ajar to the dolichocephalic Indonesians of the mountain regions of Java (Tenggerese); whilst Dr. Nieuwenhuis places the former in a class distinct from the Kayans on ethnographical grounds. The Ot Danum and Ulu Ajar are merely Kalamantans of a certain area. As no Sea Dayaks were measured by Dr. Nieuwenhuis during the course of his travels, they do not enter into his scheme of classification of 1903, nor into that of Dr. Kohlbrügge, who studied only the actual measurements taken by the Dutch savant. In brief, all the five schemes recognise a dolichocephalic race of Indonesians, a brachycephalic race of Malayans or Proto-Malays, and intermediate tribes, over whose exact position we must continue to argue until further material for study is to hand.

The practice of tatu is so widely spread throughout Borneo that it seems simpler to give a list of the tribes that do not tatu, than of those who do. We can divide such a list into two sections: the first including those tribes that originally did not tatu, though nowadays many individuals are met with whose bodies are decorated with designs copied from neighbouring tribes; the second including the tribes that have given up the practice of tatu owing to contact with Muhammadan and other influences.

A. 1. Punan.
2. Maloh.
3. Land Dayak.

B. 4. Milano (Muhammadans).
5. Miri.
6. Dali.
7. Narom.
8. Sigalang } (down-river tribes of Ukit stock).
9. Siduan
10. Tutong.
11. Balait.
12. Bekiau (traces of a former practice of tatu occasionally found).
13. Bisaya.
14. Kadayans (Muhammadans).

The patterns once employed by the tribes included in the second section of this list are lost beyond recall, and most of the tribes have adopted Malay dress and to some extent Malay customs. The Land Dayaks display absolute ignorance of tatu, and aver that they never indulged in the practice; Maloh and Punan men ornamented with Kayan tatu designs we have often encountered, but they have no designs of their own and attach no special significance to their borrowed designs.[1]

We may note here that the ornamentation of the body by means of raised scars and keloids is not known in Borneo. Both men and women of several tribes will test their bravery and indifference to pain by setting fire to a row of small pieces of tinder placed along the forearm, and the scars caused by these burns are often permanent, but should not be mistaken for decorative designs. Carl Bock (2, Plate 16)[2] figures some Punan women with rows of keloids on the forearms, but states (p. 71) that these are due to a form of vaccination practised by these people.

The Kayans are, with one or two exceptions, the most tatued race in Borneo, and perhaps the best tatued from an artistic point of view; the designs used in the tatu of the men have been widely imitated and much ceremonial is connected with the tatu of the women, an account of which we give below. Generally speaking, the true Kalamantan designs are quite simple, and it is noteworthy that although the Kenyah tribes most nearly akin to Kayan tribes have borrowed the Kayan tatu patterns, the majority of Kenyah-Kalamantan tribes employ quite simple designs, whilst the primitive Kenyahs of the Batang Kayan River hardly tatu at all. A remarkable exception to the general simplicity of the Kalamantan patterns is furnished by the Ukits, Bakatan, and Biadjau, who tatu very extensively in the most complex designs; the Long Utan, an extinct tribe, probably of Kalamantan stock, also used highly decorative and complex designs. Since so many tribes owe much of their knowledge of tatu and the majority of their designs to the Kayans, it will be well to commence with an account of the art of tatu as practised by these people.

i. *Kayan tatu.*

Dr. Nieuwenhuis [9, p. 450] agrees with us in stating that amongst these people, the men tatu chiefly for ornament, and that no special significance is attached to the majority of designs employed; nor is there any particular ceremonial or tatu connected with the process of tatuing the male sex. There is no fixed time of life at which a man can be tatued, but in most cases the practice is begun early in boyhood. Nieuwenhuis [9, p. 456] remarks that the chiefs of the Mendalam Kayans scarcely tatu at all.

Amongst the Sarawak Kayans, if a man has taken the head of an enemy he can have the backs of his hands and fingers covered with tatu (Plate XI, Fig. 1), but if he has only had a share in the slaughter, one finger only, and that generally the thumb, can be tatued. On the Mendalam River, the Kayan braves are tatued on the left thumb only, not on the carpals and backs of the fingers, and the thigh pattern is also reserved for head-taking heroes [9, p. 456].

[1] Nieuwenhuis also notes (9, p. 451) that men in the course of their travels amongst other tribes permit themselves to be tatued with the patterns in vogue with their hosts.

[2] These figures refer to the bibliography given on p. 88.

Of the origin of tatu the Kayans relate the following story:—Long ago when the plumage of birds was dull and sober, the coucal (*Centropus sinensis*) and the argus pheasant (*Argusianus grayi*) agreed to tatu each other; the coucal began on the pheasant first, and succeeded admirably as the plumage of the pheasant bears witness at the present day; the pheasant then tried his hand on the coucal, but being a stupid bird he was soon in difficulties, and, observing that he would fail miserably to complete the task, he took the black dye and, having smeared it all over his friend, told him to sit in a bowl of *samak* tan, and, when the coucal did as he was told, flew off remarking that the country was full of enemies, and, therefore, he could not stop; and that is why the coucal to this day has a black head and neck with a tan-coloured body. Nieuwenhuis [9, p. 456] relates substantially the same story, the crow (*Corone macrorhyndyus*), however, being substituted for the coucal and the incident of the bowl of *samak* tan omitted.

Kayan men have isolated designs tatued on the following parts of the body:—The outside of the wrist, the flexor surface of the forearm, high up on the outside of the thigh, on the breasts and on the points of the shoulders, and, as already stated, in the case of warriors on the backs of the hands and fingers. It is not an invariable rule, however, that a man should be tatued on all these parts of the body. The design tatued on the wrists (Plate IX, Figs. 8–10) is termed *lukut, i.e.*, an antique bead much valued by Kayans, and the significance of the designs is of some interest. When a man is ill, it is supposed that his soul has escaped from his body, and when he recovers it is supposed that his soul has returned to him; to prevent its departure on some future occasion the man will "tie it in" by fastening round his wrist a piece of string on which is threaded a *lukut*[1] or antique bead, some magic apparently being considered to reside in the bead. However, the string can get broken and the bead lost, wherefore it seems safer to tatu a representation of the bead on the part of the wrists which it would cover if actually worn. It is of interest also to note that the *lukut* from having been a charm to prevent the second escape of the soul has come to be regarded as a charm to ward off all disease, and the same applies to its tatued representation.

A design just below the biceps of a Punan tatued in the Kayan manner is shown on Plate XII, Fig. 10, and I was informed by the Punan that this also was a *lukut*, an excellent example of the indifference paid to the significance of design by people with whom such design is not indigenous.

On the forearm and thigh the *udoh asu* or dog pattern is tatued, and four typical examples are shown on Plate X, Figs. 1, 2, 5, 6. Nieuwenhuis has figured a series of these designs [9, Plate 82][2] showing a transition from a very elongate animal form to a rosette form; we have never met with the first amongst Sarawak

[1] The Sea Dayaks often employ for the same reason a carpal bone of the mouse-deer (*Tragulus*).

[2] See also Haddon (4, Fig. 2), and Nieuwenhuis (8, Plates XXV and XXVI); the designs figured in the latter work are not very easy to interpret, the lower of the two rosette figures looks as if it was derived from four heads of dogs fused together. See also Ling Roth (7, p. 85).

Kayans, but it is a characteristic thigh design amongst the Mendalam Kayans; the forms numbered *b* and *c* are unusual in Sarawak. Of the four examples here given—and it may be noted that these met with the high approval of expert tatu artists—Figs. 1, 2 and 5, may be considered as intermediate between Nieuwenhuis' very elongate example *f* and the truncated form *e* which is supposed to represent the head only of a dog. Fig. 2 is characteristic of the Uma Balubo Kayans, and is remarkable in that teeth are shown in both jaws; whilst, both in this example and in Fig. 5, the eye is represented as a disc, in Figs. 1 and 6 the eye is assuming a rosette-like appearance, which rosette, as Nieuwenhuis' series shows, is destined in some cases to increase in size until it swallows up the rest of the design. Fig. 6 may be compared with Nieuwenhuis, Fig. *e*, as it evidently represents little more than the head of a dog. Although a single figure of the dog is the most usual form of tatu, we have met with an example of a double figure; it is shown in Fig. 7; it will be observed that one of the dogs is reversed and the tails of the two figures interlock. Fig. 8 represents a dog with pups, *tuang nganak;* A is supposed to be the young one.

FIG. 1.

The dog design figures very prominently in Kayan art, and the fact that the dog is regarded by these people and also by the Kenyahs with a certain degree of veneration may account for its general representation. The design has been copied by a whole host of tribes, with accompanying degradation and change of name.

On the deltoid region of the shoulders and on the breasts, a rosette or a star design is found (text, Figs. 1 and 2). As already stated, it seems in the highest degree probable that the rosette is derived from the eye in the dog pattern, and it is consequently of some interest to find that the name now given to the rosette pattern is that of the fruit of a plant, which was introduced into Borneo certainly within the last fifty or sixty years. The plant is *Plukenetia corniculata*, one of the Euphorbiacae, and it is cultivated as a vegetable; its Kayan name is *jalaut*. We have here a good example of the gradual degradation of a design leading to a loss of its original significance and even of its name, another name, which originated probably from some fancied resemblance between pattern and object, being applied at a subsequent date. *Ipa olim, i.e.*, open fruit of a species of *Mangifera*, is another name occasionally applied to the rosette pattern, but *jalaut* is in more general use (*cf.* Plate X, Fig. 4, Plate XI, Fig. 7 and Plate XII, Fig. 9).

FIG. 2.

On Plate XI, Fig. 1, is shown the hand of a Skapan tatued in the Kayan

[1] *Cf.* Hose and McDougall, *Journ. Anth. Inst.*, vol. xxxi, 1901, p. 187.

manner by a Kayan; the figures on the phalanges are known as *tegulun*,[1] representations of human figures or as *silong*, faces, and they are evidently anthropomorphic derivatives. The triangles on the carpal knuckles are termed *song irang*, shoots of bamboo, and the zig-zag lines are *ikor*, lines.

Kayan women are tatued in complicated serial[2] designs over the whole forearm, the backs of the hands, over the whole of the thighs and to below the knees, and on the metatarsal surfaces of the feet. The tatuing of a Kayan girl is a serious operation, not only because of the considerable amount of pain caused, but also on account of the elaborate ceremonial attached to this form of body ornamentation. The process is a long one, lasting sometimes as much as four years, since only a small piece can be done at a sitting and several long intervals elapse between the various stages of the work. A girl when about ten years old will probably have had her fingers and the upper part of her feet tatued, and about a year later her forearms should have been completed; the thighs are partially tatued during the next year, and in the third or fourth year from the commencement the whole operation should have been accomplished.

A woman endeavours to have her tatu finished before she becomes pregnant, as it is considered immodest to be tatued after she has become a mother. If a woman has a severe illness after any portion of her body has been tatued, the work is not continued for some little time; moreover, according to Nieuwenhuis (9, p. 453), a woman cannot be tatued during seed time nor if a dead person is lying unburied in the house, since it is *pemali* to let blood during these occasions; bad dreams, such as a dream of floods, foretelling much blood letting, will also interrupt the work. A tatued woman may not eat the flesh of the monitor lizard or *kavok* (*Varanus spp.*) nor the scaly manis or *ān* (*Manis javanica*), and if she happens to have a husband he also is included in the tabu until the pair have a male and a female child. If they have a daughter only they may not eat the flesh of the monitor until their child has been tatued; if they have a son only they cannot eat the monitor until they become grandparents. Should a girl have brothers, but no sisters, some of her tatu lines must not be joined together, but if she has brothers and sisters, or sisters only, all the lines can be joined.

Tatu amongst Kayan women is universal, they believe that the designs act as torches in the next world, and that without these to light them they would remain for ever in total darkness; one woman told Dr. Nieuwenhuis that after death she would be recognised by the impregnation of her bones with the tatu pigment; as

[1] In ancient days when a great Kayan or Kalamantan chief built a new house, the first post of it was driven through the body of a slave; this sacrifice to a tutelary deity is no longer offered, but a human figure is frequently carved on the post of a house and may be a relic of the old custom; the figure is called *tegulun*. Sea Dayak anthropomorphs are termed *engkramba* and appear in cloths and bead-work designs, also in carvings on boundary marks, witch doctor's baskets, etc.

[2] We apply the term *serial* to those designs in which the units of the pattern are repeated, or in which the units follow each other in serial order; the *udoh asu* on a Kayan man's thigh is an *isolated* design, but the design on his hands is a *serial* design.

amongst the Kayans the bones of a deceased person are placed some time after death in a grave, Dr. Nieuwenhuis' informant evidently imagined that her tatu would obviate all risk of the confusion of her remains with another's. The operation of tatuing is performed by women, never by men, and it is always the women who are the experts on the significance and quality of tatu designs, though the men actually carve the designs on the tatu blocks. Nieuwenhuis states (9, p. 452) that the office of tatuer is to a certain extent hereditary and that the artists, like smiths and carvers, are under the protection of a tutelary spirit, who must be propitiated with sacrifices before each operation. As long as the children of the artist are of tender age, she is debarred from the practice of her profession. The greater the number of sacrifices offered, or in other words the greater the experience of the artist, the higher is the fee demanded. She is also debarred from eating certain food. It is supposed that if an artist disregard the prohibitions imposed upon her profession, the designs that she tatus will not appear clearly, and she herself may sicken and die. Sometimes women become tatu artists in order to get cured of a sickness; the priestess, who in Kayan houses is a healer of the sick, as a last resort may advise her patient to place herself under the care of Apu Lagan, the tutelary spirit of tatu artists, by actually becoming a tatu artist.

The tools used by a tatu artist are simple,[1] consisting of two or three prickers, *ulang* or *ulang brang*, and an iron striker, *tukun* or *pepak*, which are kept in a wooden case, *bungan*. The prickers are wooden rods with a short pointed head projecting at right angles at one end; to the point of the head is attached a lump of resin in which are embedded three or four short needles, their points alone projecting from the resinous mass. The striker is merely a short iron rod, half of which is covered with a string lashing. The pigment is a mixture of soot, water, and sugar-cane juice, and it is kept in a double shallow cup of wood, *uit ulang*; it is supposed that the best soot is obtained from the bottom of a metal cooking pot, but that derived from burning resin or dammar is also used. The tatu designs are carved in high relief on blocks of wood, *kelingé*,[2] which are smeared with the ink and then pressed on the part to be tatued, leaving an impression of the designs. As will be seen later the designs tatued on women are in longitudinal rows or transverse bands, and the divisions between the rows or bands are marked by one or more zigzag lines termed *ikor*.

The subject who is to be tatued lies on the floor, the artist and an assistant squatting on either side of her[3]; the artist first dips a piece of fibre from the sugar palm (*Arenga saccharifera*) into the pigment and, pressing this on to the limb to be tatued, plots out the arrangement of the rows or bands of the design; along these straight lines the artist tatus the rows of *ikor*, then taking a tatu block carved with the required design, she smears it with pigment and presses it on to the limb

[1] *Cf.* Ling Roth (7, p. 34) and Nieuwenhuis (9, Plate 32).
[2] The Sea Dayak word *telingai* or *kelingai* has the same meaning.
[3] Furness (3, Plate, p. 152), Nieuwenhuis (9, Plate 77).

between two rows of *ikor*. The tatuer or her assistant stretches with her feet the skin of the part to be tatued, and, dipping a pricker into the pigment, taps its handle with the striker as she works along a line, driving the needle points into the skin. The operation is painful, and the subject can rarely restrain her cries of anguish, but the artist is always quite unmoved by such demonstrations of woe, and proceeds methodically with her task. As no antiseptic precautions are ever taken, a newly tatued part often ulcerates, much to the detriment of the tatu, but taking all things into consideration it is wonderful how seldom one meets with a tatu pattern spoilt by scar tissue.

It is considered bad luck to draw the blood of a friend (*pesu daha*) and therefore, when first blood is drawn in tatuing, it is customary to give a small present to the artist; the present takes the form of four antique beads or some object worth about one dollar and is termed *lasat mata*, for it is supposed that if it were omitted the artist would go blind and some misfortune would happen to the parents and relations of the girl undergoing the operation of tatu.

When the half of one *ikor* has been completed the tatuer stops and asks for *selivit*; this is a present of a few beads, well-to-do people paying eight yellow beads of the variety known as *lavang*, valued at one dollar apiece, whilst poor people give two beads. It is supposed that if *selivit* was not paid the artist would be worried by the dogs and fowls that always roam about a Kayan house, so that the work would not be satisfactorily done; however, to make assurance doubly sure, a curtain is hung round the operator and her subject to keep off unwelcome intruders. After *selivit* has been paid a cigarette is smoked, and then work recommences in earnest, there being no further interruptions for the rest of the day except for the purpose of taking food. The food of the artist must be cooked and brought to her, as she must not stop to do other work than tatuing, and her tools are only laid aside for a few minutes whilst she consumes a hurried meal. Fowls and pigs are killed for the artist by the parents of the girl who is being tatued. The fees paid to the artist are more or less fixed; for the forearms a gong, *tawak*, worth from eight to twenty dollars, according to the workmanship required, is paid; for the thighs a large *tawak* is paid, worth as much as sixty dollars if the very best workmanship is demanded, from six to twenty dollars if only inferior workmanship is required.[1] For tatuing the fingers the operator receives a *parang* or short sword, known as *kam hing*. Nieuwenhuis (8, p. 236) states that it is supposed that the artist will die within a year if her charges are excessive, but we have not met with this belief amongst the Kayans of the Rejang and Baram Rivers.

The knee-cap is the last part to be tatued, and before this is touched the artist must be paid; as this part of the design is the keystone, as it were, of the whole, the required fee is always forthcoming. A narrow strip down the back of

[1] The prices in the Baram River are much higher than in the Mendalam, where a gong can only be demanded by an artist of twenty years' experience; less experienced artists have to be content with beads and cloth (9, p. 452).

the thigh is always left untatued; it is supposed that mortification of the legs would ensue if this strip was not left open.

The time at which to begin tatuing a girl is about the ninth day after new moon, this lunar phase being known as *butit halap*, the belly of the *halap* fish (*Barbus bramoides*); as the skin of the girl being tatued quickly becomes very tender, it is often necessary to stop work for a few days, but it is a matter of indifference at what lunar phase work recommences, so long as it was originally begun at *butit halap*.

A Kayan chief of the Mendalam River informed Dr. Nieuwenhuis [9, p. 455] that in his youth only the wives and daughters of chiefs were permitted the thigh tatu, women of lower rank had to be content with tatu of the lower part of the shin, the ankles and feet. The designs were in the form of quadrangular blotches divided by narrow untatued lines, and were known as *tedak danau*, lake tatu. The quadrangles were twelve in number, divided from each other by four longitudinal and two transverse untatued lines, 6 millimetres broad, two of the longitudinal lines running down each side of the front of the leg, and two down each side of the calf, approximately equidistant; the forearm was tatued in the same style. This manner of tatu is obsolete now, and Dr. Nieuwenhuis was fortunate in finding one very old woman so tatued.

Nowadays the class restrictions as regards tatu are not so closely observed, but it is still possible to distinguish between the designs of a chief's daughter, an ordinary free-woman and a slave, by the number of lines composing the figures of the designs, the fewer these lines, the lower being the rank of the woman. Moreover the designs of the lower-class women are not nearly so complex as those of the higher-class, and they are generally tatued free-hand.

A very typical design for the forearm of a woman of high rank is shown on Plate X, Fig. 3; it is taken from a Kayan of the Uma Pliau sub-tribe dwelling on the Baram River, and may be compared with the somewhat similar designs of the Mendalam River Kayans figured by Nieuwenhuis [9, Plate 85] one of which is a design for a chief's daughter, the other for a slave. The zigzag lines bounding the pattern on both surfaces of the forearm are the *ikor*, *i.e.*, lines, and these, as already stated, are marked out with a piece of fibre dipped in the tatu ink before the rest of the pattern is impressed by a wood-block or *klingé*. Taking the flexor surface of the forearm first, the units of the design are:—three bands of concentric circles (A A A) termed *beliling bulan* or full moons; a triangle (B), each limb formed by several parallel lines, *dulang harok*, the bows of a boat; spirals (C C) *ulu tinggang*, the head of the hornbill. On the supinator surface *beliling bulan* and *ulu tinggang* occur again, but instead of *dulang harok*, there are two other elements, a bold transverse zigzag known as *daun wi* (D) bamboo leaves, and at the proximal end of the pattern an interlacing design, *tushun tuva* (E) bundles of tuba root (*Derris elliptica*). The juice obtained by pounding up with water the tuba root is used for stupefying fish, which are then speared; tuba-fishing is a popular sport amongst all Borneans, and bundles of the dried root are to be found in most houses, kept in readiness for the next occasion. Furness

[3, p. 150] suggests that as tuba-fishing is a feminine sport, this may account for the tuba-root design in female tatu, but the suggestion is too wild for serious consideration; we give reasons for another origin of the design below (p. 75). The fingers are very simply tatued with a zigzag on the carpal knuckles and transverse lines across the joints; the thumb is decorated in a slightly different way. In Dr. Nieuwenhuis' designs cited above, we find much the same elements; in one of them the *beliling bulan* are more numerous and more closely set together, so that the concentric circles of one set have run into those of the next adjoining, the *tushun tuva* pattern is termed *poesoeng*, evidently the same as *tushun*, the spirals are much degraded in one example and are called *krowit*, or hooks, whilst in the more elaborate example they are known as *manok wak*, or eyes of the *Scops* owl; the *pedjako* pattern is an addition, but the meaning of the word is not known; the pattern on the fingers is much more complex than in the Uma Pliau example, and is perhaps a degraded hornbill design. Furness [3, Plate, pp. 148 and 150] figures the arms of Kenyah women of the Baram River; the tatu designs are practically the same as with the Uma Pliau, and are evidently direct copies.

Nieuwenhuis [8, Plate XXIV] figures the hand of a low-class woman tatued with triangular and quadrangular blotches, and with some rude designs that appear to have been worked in free-hand.

On Plate X, Fig. 1, is shown the design on the forearm of a high-class woman of the Uma Lekan Kayans of the Batang Kayan River, Dutch Borneo; in our opinion these elegant designs are quite in the front rank of the tatu designs of the world. In spite of the elaboration, it is quite possible to distinguish in these, the same elements as in the Uma Pliau specimen, viz.: *beliling bulan*, *ulu tinggang*, *daun wi* and *tushun tuva*, but the *dulang harok* is absent.

Nieuwenhuis [9, Plate 93, b] figures the arm-tatu (supinator surface only) of a Kayan woman of the Blu-u River, a tributary of the Upper Mahakkam; the main design is evidently a hornbill derivative, the knuckles are tatued with quadrangular and rectangular blotches. The hornbill plays an important part in the decorative art of the Long Glat, a Kenyah-Kelamantan tribe of the Mahakkam River, and we suspect that, if these Blu-u Kayans are of true Kayan stock, they have borrowed the hornbill design from their neighbours.

With regard to the thigh patterns, it is usual to find the back of the thigh occupied with two strips of an intersecting line design, or some modification thereof; the simplest form is shown on Plate VIII, Fig 1; it is known as *ida telo*, the three-line pattern, and is used by slaves; a more elaborate example from the Rejang River is shown in Fig. 3, and is used both by slaves and free-women. Plate VIII, Fig. 2, and Plate IX, Fig. 6, are termed *ida pat*, the four-line pattern and are for free-women, not for slaves. The latter figure is a combination of *ida pat* and *ida telo*. The wives and daughters of chiefs would employ similar designs with the addition of another line, when they are termed *ida lima*, the five-line pattern, or else a design known as *ida tuang*, the underside pattern, two examples of which are given on Plate IX, Figs. 1 and 2. If these two latter designs are compared with the hornbill design of the Long Glat, a figure of which, taken from Nieuwenhuis [9, Plate 86] is given (Plate IX, Fig. 3) a certain similarity in the *motif* of the designs can be recognised. It must be remembered that the Long Glat design is tatued in rows down the front and sides of the thigh, whilst these Kayan designs have been modified to form more or less of a sinuous line design for the back of the thigh; or, in other words, the hornbill elements in the Long Glat design, though they are serially repeated, are quite separate and distinct one from the other, whilst in the Kayan designs the hornbill elements are fused and modified to produce the sinuous line pattern that in one form or another is generally employed for the decoration of the back of the thigh. In this connection Plate IX, Fig. 5, is instructive; it is taken from a tatu-block which, together with those from which Figs. 1 and 2 are taken, was collected many years ago by Mr. Brooke Low, amongst the Kayans of the Upper Rejang; it also appears to be a hornbill derivative, and no doubt was used for the tatu of the front of a woman's thigh,[1] being serially repeated in three or four rows as with the Long Glat. Yet it was unknown as a tatu design to some Kayans of the Baram River to whom it was shown recently; they informed us that the name of the design was *tuang buvong asu*, pattern of dog without tail, and they stated that a somewhat similar design was engraved by them on sword blades. Plate IX, Fig. 4, is taken from a tatu-block of uncertain origin, and the same name was also applied to this by the Baram Kayans, though with some hesitation and uncertainty; the hornbill *motif* is here quite obvious.

Though apparently obsolete in Sarawak, the hornbill design is still to be found amongst the Uma Lekan[2] of the Batang Kayan. Nieuwenhuis [9, Plate 96] figures a fine example of thigh tatu from these people, in which the front of the thigh is covered with four rows of a figure almost the same as Fig. 5, and the back of the thigh is covered not with a line design, but with another modification of the hornbill design. Nieuwenhuis considers this to be a dog *motif*, but, whilst we would not be positive about the figures on the back of the thigh, we feel sure that those on the front are modified hornbill *motifs*. We have here, perhaps, an example of an animal *motif* being modified into another animal form, with a consequent change of name.

Dr. Nieuwenhuis is very positive that the hornbill element is a characteristic

[1] The wooden block is carefully cut square and the design occupies the whole of one surface; this is characteristic of the blocks of female designs, whereas designs for male tatu are carved on very roughly shaped blocks and do not always occupy the whole of one surface. Since the female designs have to be serially repeated it is important that the blocks should be of the exact required size, otherwise the projecting parts of the uncarved wood would render the exact juxtaposition of the serially repeated impressions very difficult, whilst the isolated male designs can be impressed on the skin in a more or less haphazard way.

[2] Nieuwenhuis regards these people as Kenyahs; one of us, as a result of a long acquaintance with the tribe, is positive that they are Kayans. The method of the thigh tatu is quite diagnostic, no Kenyah tribes tatu in this manner on the thighs. Uma Lekan women like all other Kayans must have their tatu completed before marriage.

feature of Long Glat decorative art, and equally positive that the Kayans have borrowed some of their designs from the Long Glat[1]; it seems then likely that the Kayans whilst owing some of their tatu designs to the Long Glat, have not merely slavishly copied them, but have modified them; thus the Long Glat hornbill *motif* has been changed by the Kayans into a semblance of the most important *motif* in Kayan art, the dog, and with the change in form, has gone a change in name, so that to-day the Baram and Uma Lekan Kayans term a design springing from a hornbill *motif*, *buvong asu*, or tailless dog. On Plate 97 of the above cited work is figured another form of thigh tatu, the front of the thigh being covered with a scroll design, the back of the thigh with a form of *ida tuang*, in which it is just possible to distinguish the hornbill heads, that have here become separated from the lines, lying in the spaces formed by the diverging of the lines; the modification is an interesting one, and we reproduce part of Nieuwenhuis' figure to illustrate it (Plate IX, Fig. 11). These two thigh patterns are peculiar in that on the outside they extend right up on to the buttock; the different bands of the pattern are separated by rows of *ikor*, as is almost universal in Kayan tatu; the knee-cap pattern is very remarkable and quite different from the Mendalam Kayan type.

We have stated that an interlacing line design is generally employed for the back of the thigh; we figure, however, a remarkable exception from the Baloi River (Plate X, Fig. 5); this is known as *kalong kowit*, hook pattern; A is a representation of an antique bead, *balalat lukut*, B is known as *kowit*, hooks.

Between the two strips of line design at the back of the thigh runs a narrow line of untatued skin, the supposed object of which has been described above.

The front and sides of the thigh in high-class women will be covered with three or more strips of pattern such as are shown on Plate VIII, Figs. 4 and 5; in the latter *tushun tuva*, *dulang harok*, *ulu tinggang* and *beliling bulan* can again be recognised; the *ulu tinggang* in this example are less conventionalised than in the spirals of the forearm pattern, and a spiral form of *tushun tuva* is shown in addition to the angular form. The other example exhibits *ida lima*, *tushun tuva jalaut*, *kowit* (the interlocking spirals) and *ulu tinggang*. All these strips of pattern are separated by the *ikor*. The knee-cap is the last part of the leg to be tatued and the design covering it is called the *kalong nang*, the important pattern, a good example of which is shown in text, Fig. 4; Fig. 6 represents the design on the front and sides of the thigh of an Uma Semuka Kayan of the slave class, which also is termed *tushun tuva*.

The admirable Uma Lekan patterns (Plate X, Fig. 2) represent on the back of the thigh (AA) *beliling bulan*, on the front and sides (BB) *silong*, faces or *silong lejau*, tigers' faces; the latter is evidently an anthropomorph; the knee-cap design is

[1] He states (9, p. 462) that the Kayan women borrow tatu-blocks (*klingé tedak*) from the Long Glat, although the men of their own tribe can carve admirably; and again (p. 460), a chief's daughter wishing to have her legs tatued with a hornbill design, induced her father to fetch a tatu-block from the Long Glat.

particularly worthy of notice.[1] Nieuwenhuis [9, Plate 83, and 8, Plate XXVII] figures the thigh tatu of a Mendalam woman of the *panjin* or free-woman class; the back of the thigh is occupied by two strips of the four-line pattern, here termed *ketong pat*, and a somewhat crude anthropomorphic design, known as *kohong kelunan*, human head, covers the front and sides of the thigh (text, Fig. 3); the centre of the knee-cap is occupied by a very similar anthropomorph, known however as

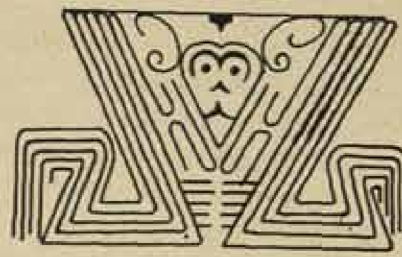


FIG. 3.

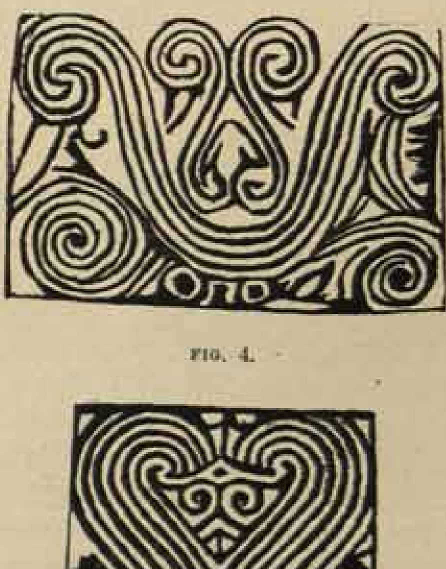


FIG. 4.

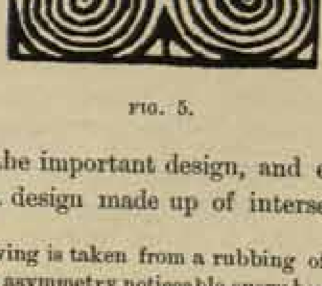


FIG. 5.

FIG. 6.

nang klinge, the important design, and extending in a semicircle round the upper part of it is a design made up of intersecting zigzags and known as *kalong nyipa*,

[1] The drawing is taken from a rubbing of a model carved by an Uma Lekan; this will account for the asymmetry noticeable every here and there throughout the design. A print from an actual tatu-block is shown in Plate IX, Fig. 7; this would be repeated serially in rows down the front, and sides of the thigh, so that absolute uniformity would be attained; the carver of the model, which was about one-sixth life size, has not been able to keep the elements of his design quite uniform.

the snake design; below the knee-cap is a transverse band of hour-glass shaped figures termed *pedjako*. Nieuwenhuis also figures [9, Plate 84] the thigh pattern of a chief's daughter from the same river; this only differs from the preceding example in the greater elaboration of the *kohong kelunan*; the back of the thigh is covered by a form of the *ida pat* pattern not by the *ida lima* pattern. Some of the tatu-blocks employed by the Mendalam Kayan women are figured in the same works [9, Plate 82, and 8, Plate XXVIII].

A comparison of the text figures here given lends strong support to the supposition that the tuba-root pattern is merely a degraded anthropomorph. Fig. 3 is a recognisable anthropomorph such as is tatued in rows on the thigh, and some such name as *tegulun, sihong* or *kohong* is applied to it. Fig. 4 is a knee-cap design, evidently anthropomorphic in nature, but termed *nang klinge*, the important design, since it is the last part of all to be tatued. Fig. 5 is termed *tushun tuva*, but a distinct face is visible in the centre of the pattern; the general similarity between this last design and the examples of *tushun tuva* shown in the designs on Plate VIII, Figs. 4 and 5, is quite obvious; thelower of the two *tushun tuva* designs in Fig. 5, Plate VIII, is composed of angular lines, thus reverting to the angularity of the lines in text, Fig. 3; at E, Fig. 3, Plate X, the lines are partly angular, partly curved and the bilateral symmetry is entirely lost; finally in text, Fig. 6, the relationship of the *tushun tuva* design to an anthropomorph is entirely lost.

A typical form of tatu on the foot of a low-class woman is shown on Plate VIII, Fig. 6; a chief's daughter would have some modification of the principal element of the thigh design tatued on this part.

The pattern shown on the thigh of a Kayan woman in the frontispiece of Dr. Furness's work [3] is unknown to us; the picture is suspiciously like a reproduction of a "touched-up" photo.

ii. *Kenyah tatu.*

The majority of the Sarawak Kenyahs are closely allied to the Kayans and their tatu may be considered separately from that of the Kenyah-Kalamantan tribes whose tatu is much more original in design.

The men of such Kenyah tribes as the Leppu Jengan, Leppu Tau, Leppu Apong, etc., are tatued in the Kayan manner, that is, with some form of dog design on the forearms and thighs and with rosettes or stars on the shoulders and breasts. The dog design is usually known as *usang urang*, the prawn pattern; the teeth of the dog are held to represent the notched border of the prominent rostrum characteristic of the prawns of the genus *Palæmon*, that occur so plentifully in the fresh-water streams of Borneo. An extreme modification of the dog design to form a prawn is shown in Plate VII, Fig. 9; Plate VI, Fig. 4, is a dog design and is so termed. Plate VI, Fig. 10, is known as *toyu*, a crab; A is the mouth, *ba*; B the claw, *katip*; C the back, *likut*; D the tail, *ikong*. Plate VI, Fig. 9, is termed *lipan katip*, claws of the centipede (?). Text, Fig. 7, is *kowit*, hook pattern. All these are tatued on the flexor surface of the forearm or on the outside of the thigh.[1] An example of a star design termed *usong dian*, durian pattern is shown in Plate XI, Fig. 7. The women of these tribes tatu in the same way and employ the same designs as the Kayans except that they never tatu on the thighs (*cf.* Furness [3 p. 150 Plate]). Amongst the Baram Kenyahs there appears to be no ceremonial connected with the process of tatuing.

FIG. 7.

iii. *Kenyah Kalamantan tatu.*

Amongst this rather heterogeneous assemblage of tribes considerable diversity of tatu design is found. As a general rule the men are scarcely ever tatued, but when they are it is in the Kayan manner. The Peng or Pnihing once had an elaborate system of male tatu, but it is almost obsolete now, and the only example that we have met is shown on Plate XI, Fig. 2. This represents the arm of a Peng man, a drawing of which was made by Dr. H. Hiller, of Philadelphia; unfortunately we have no information as to the significance of the design. The only other Peng design that we are acquainted with is a large disc tatued on the calf of the leg. Dr. Nieuwenhuis states that Peng women are tatued with isolated dog designs on the arms and legs like the men of Kayan tribes [9, p. 461].

The women of the Leppu Lutong, a nearly extinct tribe of the Pata River, Baram district, exhibit a very primitive style of tatu on the arms and hands Plate XI, Fig. 4); a broad band encircles the middle of the forearm and a narrow band an inch or so distant of this also surrounds the arm; from this narrow band there run over the metacarpals to the base of the fingers eight narrow lines, the outermost on the radial side bifurcating; the design is known as *betik allè* or line pattern. No other part of the body is tatued.

Nieuwenhuis figures [9, Plate 95] a somewhat similar design employed by the Uma Tow women of the Batang Kayan; but in this case, instead of eight longitudinal lines stopping short at the knuckles, there are five broad bands running to the finger nails, interrupted at the knuckles by a 2 cm.-broad strip of untatued skin. Moreover with these people the front and sides of the thigh and the shin are tatued with primitive looking designs made up of series of short transverse lines, curved lines, and broad bands; the names of the designs are not given; these designs are said to be characteristic of the slave-class, the higher-class women copying the more elaborate designs of the Uma Lekan.

Amongst the Batang Kayan Kenyahs tatuing can not be executed in the communal house, but only in a hut built for the purpose. The males of the family, to

[1] For other examples of modified *aso* designs employed by Kenyah tribes, see E. B. Haddon (4, pp. 117, 118).

which the girl undergoing the operation belongs, must dress in bark-cloth and are confined to the house until the tatu is completed; should any of the male members be travelling in other parts of the island, tatu cannot be commenced until they return. Amongst the Uma Tow the daughter of a chief must be tatued before any of the other females of the house; should the chief's daughter (or daughters) die before she has been tatued all the other women of the house are debarred from this embellishment. (Nieuwenhuis [9, pp. 453, 454].)

Nieuwenhuis in his great work on Borneo, which we have cited so often, gives a good account of the tatu of the Long Glat. According to this authority, girls when only eight years old have the backs of the fingers tatued, at the commencement of menstruation the tatu of the fingers is completed, and in the course of the following year the tatu is carried over the backs of the hand to the wrist; the feet are tatued synchronously with the hands. At the age of eighteen to twenty the front of the thigh is tatued and later on in life the back of the thigh; unlike the Kayans it is not necessary that the tatu of the thighs should be finished before child-bearing. A Long Glat woman on each day that she is tatued must kill a black fowl as food for the artist. They believe that after death the completely tatued women will be allowed to bathe in the mythical river Telang Julan and that consequently they will be able to pick up the pearls that are found in its bed; incompletely tatued women can only stand on the river-bank, whilst the untatued will not be allowed to approach its shores at all. This belief appears to be universal amongst the Kenyah Kalamantan of the Upper Mahakkam and Batang Kayan. On Plate 86 of Nieuwenhuis' book [9] is figured the thigh tatu of a Long Glat woman; the front of the thigh is occupied with two rows of the hornbill *motif* to which reference has already been made. The sides of the thigh are tatued with a beautiful design of circles and scrolls termed *kĕrip kwe*, flight feathers of the Argus pheasant, and on the back of the thigh is a scroll design borrowed from the decoration of a grave and known as *kalong song sepit*.[1] The knee is left untatued. Some other examples of the *kĕrip kwe* design are given on Plate 90, and of the *song sepit* on Plate 91; some of the *song sepit* designs recall the *kalong kowit* designs of the Baloi Kayans. Instead of a hornbill *motif*, a dog's head *motif* is sometimes tatued on the thigh, an example of which is figured on Plate 87, Fig. *a*; it appears to be a composition of four heads and in appearance is not unlike Uma Lekan *silong lejau*, figured by us. In the Long Glat thigh-tatu the bands of pattern are not separated by lines of *ikor*, as with the Kayans. Round the ankles the Long Glat tatu sixteen lines, 3 mm. broad, known as *tedak aking*; the foot is tatued much after the manner shown in our Fig. 6, Plate XIII. The supinator surface of the forearm and the backs of the hands are also tatued but the design does not extend so far up the arm as with the Kayans [9, Plate 92]; the forearm design is made up of a hornbill *motif*, but that shown in Fig. *a* of the plate is termed *betik kule*, leopard pattern, and is supposed to be a representation of the spots on the leopard's skin; it is stated to be taken from a

[1] The names of the designs are given in Kayan.

Long Tepai tatu-block; the knuckles are tatued with a double row of wedges, the finger joints with quadrangles.

The Uma Luhat seem to have borrowed their tatu and designs very largely if not entirely from the Long Glat; with them the back of the thigh is tatued before the front, which is exceptional. Half of the knee is tatued. Their designs are modifications of the hornbill and dog's head designs of the Long Glat. Nieuwenhuis figures several examples [9, Plate 87, Fig. *b*, Plate 88, Plate 89, Plate 93, Fig. *a*, Plate 94], which should be consulted as they are of the greatest interest.

The Long Wai seem to tatu in much the same way as the Uma Luhat [2, Plate, p. 189 and 7, p. 91].

iv. *Kalamantan tatu.*

A number of tribes have adopted more or less the tatu of the Kayans. Thus the men of the following Sarawak tribes, Sibops, Lirongs, Tanjongs, Long Kiputs, Barawans, and Kanowits are often, though not universally, tatued like Kayans. The shoulder pattern of the Barawans is distinctive, in that the rosette nearly always bears a scroll attached to it, a relic of the dog *motif*, from which the design is derived (Plate VIII, Fig. 6.) E. B. Haddon [4, Fig. 17] figures another form of the dog *motif*, which is tatued on the thigh or forearm, and Ling Roth [7, p. 86] figures three rosette designs for the breast; we figure two modifications of the dog design on Plate VII, Figs. 7 and 8. The women of these tribes very rarely tatu; we have seen a Tanjong woman with a circle of star-shaped figures round her wrist and one on the thumb. The Tring women of Dutch Borneo are tatued on the hands and thighs like Kayans; Carl Bock [2, Plate, p. 187] gives some poor figures of them. In our opinion all of these tribes owe their tatu entirely to foreign influences; for we have failed to find a single example of an original design; the practice is by no means universal, and great catholicity of taste is shown by those who do tatu. The men, moreover, do not tatu as a sign of bravery in battle or adventure, but merely from a desire to copy the more warlike Kayan.

We shall now treat of those tribes that have a distinctive and original tatu, but it is well to bear in mind, that amongst many of these people also the Kayan designs are coming into vogue more and more, ousting the old designs. No tatu-blocks are employed for the indigenous patterns, all the work being done free-hand.

(*a*) *Uma Long.*—The Uma Long women of the Batang Kayan exhibit the most primitive form of tatu known in Borneo. It differs from every other form in that the tatued surface of the skin is not covered uniformly with the ink, but the design, such as it is, is merely stippled into the skin, producing an appearance of close-set irregular dots. Two aspects of the forearm of an Uma Long woman are shown on Plate XII, Fig. 5. No other part of the body is tatued, and the practice is confined to the female sex.

(*b*) *Dusun.*—The men only tatu. The design is simple, consisting of a band, two inches broad, curving from each shoulder and meeting its fellow on the stomach thence each band diverges to the hip and there ends; from the shoulder each band runs down the upper arm on its exterior aspect; the flexor surface of the forearm is decorated with short transverse stripes, and, according to one authority, each stripe marks an enemy slain [7, p. 90]. This form of tatu is found chiefly amongst the Idaan group of Dusuns; according to Whitehead [11, p. 106] the Dusuns living on the slopes of Mount Kina Balu tatu no more than the parallel transverse stripes on the forearm, but in this case no reference is made to the significance of the stripes as a head-tally. The Dusun women apparently do not tatu.

(*c*) *Murut.*—The Muruts of the Trusan River, North Sarawak, tatu very little; the men occasionally have a small scroll design just above the knee-cap and a simple circle on the breast; the women have fine lines tatued from the knuckles to the elbows [7, p. 93]. The Muruts of British North Borneo appear to be more generally tatued; the men are tatued like Dusuns, though, according to Hatton, they have three parallel stripes running from the shoulders to the wrists and no transverse lines on the forearm.[1] Whitehead [11, p. 76] figures a Murut woman of the Lawas river tatued on the arms from the biceps to the knuckles with numerous fine longitudinal lines; a band of zigzag design encircles the arm just above the commencement of the longitudinal lines. The design on a man of the same tribe is given on page 73 [11], it resembles "a three-legged dog with a crocodile's head, one leg being turned over the back as if the animal was going to scratch its ear." The part of the body on which the design was tatued is not specified and the sketch is rather inadequate, so that it is impossible to tell for certain whether the design was tatued in outline only or whether the outline was filled in uniformly; our impression is that the outline only was tatued on this individual and that it was employed either as an experiment or from idle amusement. Zoomorphs are conspicuous by their absence from all forms of decorative art amongst the Lawas Muruts, and the particular zoomorph noted here gives every evidence of an unpractised hand.

St. John states [7, p. 92] that the Muruts of the Adang River, a tributary of the Limbang, are tatued about the arms and legs, but he gives no details.

(*d*) *Kalabit.*—This tribe dwelling in the watershed of the Limbang and Baram Rivers are closely akin to Muruts, but their tatu is very different. The men tatu but rarely, and then with stripes down the arms. The women, however, are decorated with most striking geometrical designs, shown on Plate XII, Figs. 1–4. On the forearm are tatued eight bold zigzag bands, one-eighth of an inch broad, which do not completely encircle the arm, but stop short of joining at points on the ulnar side of the middle line on the flexor surface. The series of lines is known as *betik tisu*, the hand pattern. In some cases two short transverse lines, called *tipalang*, cross-lines, spring from the most distal zigzag at the point where it touches the back of the wrist on the radial side; in other cases these lines are tatued across the

[1] The same author states that "a sometime headman of Senendan had two square tattoo marks on his back. This was because he ran away in a fight, and showed his back to the enemy." The reason here given for the tatu marks is beyond belief.

middle of the back of the wrist and two lozenges are tatued on the metacarpals; these are known as *teparat itu* (Plate XII, Fig. 1). The legs are tatued on the back of the thigh, on the shin, and sometimes on the knee-cap. The designs can best be explained by a reference to Plate XII, Figs. 2 to 4; the part of the design marked A is termed *betik buah*, fruit pattern; B, *betik lawa*, trunk pattern; and C, *betik lulud*, shin pattern. In Fig. 4, A and C are as before; D is *betik karawin*; E, *ujat batu*, hill-tops; F, *betik kalang* (Fig. 3).

Kalabit women are tatued when they are sixteen years old, whether they are married or unmarried, and the operation does not extend over a number of years as with the Long Glat and Kayans, nor is any elaborate ceremonial connected with the process.

(*e*) *Long Utan.*—An extinct tribe, once dwelling on the Tinjar River, an affluent of the Baram. We owe our knowledge of their tatu to an aged Kalamantan, who was well acquainted with the tribe before their disappearance; at our behest he carved on some wooden models of arms and legs the tatu designs of these people, but he was unable to supply any information of the names or significance of the designs. The men of the tribe apparently did not tatu, so that the designs reproduced on Plate XI, Figs. 5, 6, are those of the women. The essential features of the designs are spirals and portions of intersecting circles; the intersecting circles are frequently to be met with in the decorative art of Kenyahs, *e.g.*, on the back of sword-handles, round the top of posts, on carved bamboos, etc., and in these cases the design is supposed to be a representation of the open fruit of a species of mango, *Mangifera sp.* It is not improbable that the design had the same significance amongst the Long Utan, for we have met with one or two representations of the same fruit amongst other Kalamantan tribes.

(*f*) *Biajau.*—The Dutch author C. den Hamer [5, p. 451] includes under this heading the tribes living in the districts watered by the rivers Murung, Kahayan, Katingan and Mentaja of South-west Borneo. Under this very elastic heading he would include the Ot Danum, Siang, and Ulu Ajar of Nieuwenhuis, but we treat of these in the next section. The ethnology of the Barito, Kahayan and Katingan river-basins sadly needs further investigation; nothing of importance has been published on this region since the appearance of Schwaner's book on Borneo more than fifty years ago. We know really very little of the distribution or constitution of the tribes dwelling in these districts and Schwaner's account of their tatu is very meagre. Such as it is, it is given here, extracted from Ling Roth's *Translation of Schwaner's Ethnographical Notes* [7, pp. cxci. cxciv.]. The men of Pulu Petak, the right-hand lower branch of the Barito or Banjermassin River, tatu the upper part of the body, the arms and calves of legs with elegant interlacing designs and scrolls. The people of the Murung River are said to be most beautifully tatued, both men and women; this river is really the upper part of the Barito, and according to Hamer is inhabited by the Biajau (*vide postea*), who appear to be distinct from the Ngaju of Schwaner, inhabiting the lower courses of the Barito and Kapuas Rivers. The men of the lower left-hand branch of the

Barito and of the mid-course of that river are often not tatued at all, but such tatu as was extant in 1850 was highly significant according to Schwaner's account; thus, a figure composed of two spiral lines interlacing each other and with stars at the extremities tatued on the shoulder signified that the man had taken several heads; two lines meeting each other at an acute angle behind the finger nails signified dexterity in wood-carving; a star on the temple was a sign of happiness in love. We have no reason to consider this information inaccurate, but we do consider it lamentable that more details concerning the most interesting forms of tatu in Borneo were not obtained, for it is only too probable that such information cannot be acquired now. The women of this tribe do not tatu. In the upper Teweh River, an upper tributary of the Barito, the men are tatued a good deal, especially on parts of the face, such as the forehead, the cheeks, the upper lip. The only figures that Schwaner gives are reproduced by Ling Roth [7, p. 93], they represent two Ngajus; the tatu designs are drawn on too small a scale to be of much interest and in any case we have no information concerning them. The two figures of 'Tatued Dyaks' (? Kyans) (after Professor Veth)," on p. 95 of the above-cited work cannot be referred to any tribe known to us.

Hamer in his paper [5] gives a detailed account of Biajau tatu, but unfortunately without any illustrations; as abstracts of the paper have already been given by Ling Roth [7, pp. 93, 94] and by Hein [6, pp. 143–147], we will pass on to the next section.

(*g*) *Ot-Danum, Ulu Ajar and Siang* (Kapuas River tributaries).—Concerning these tribes Nieuwenhuis says but little [9, p. 452], merely noting that the men are first tatued with discs on the calf and in the hollow of the knee and later over the arms, torso and throat, whilst the women tatu the hands, knees and shins. Two colours, red and blue, are used, and the designs are tatued free-hand, the instrument employed being a piece of copper or brass about four inches long and half-an-inch broad, with one end bent down at a right-angle and sharpened to a point; sometimes thread is wound round the end of the instrument just above the point, to regulate the depth of its penetration; two specimens in the Leyden Museum are figured by Ling Roth [7, p. 85]. Hamer [5] says that the Ot-Danum women are tatued down the shin to the tarsus with two parallel lines, joined by numerous cross-lines, a modification of the Uma Tow design for the same part of the limb. On the thigh is tatued a design termed *soeworoe*, said to resemble a neck ornament. A disc tatued on the calf of the leg is termed *boentoer*, and from it to the heel runs a barbed line called *ikoeh bajan*, tail of the monitor lizard; curiously enough, though this is the general name of the design, it is on the right leg also termed *bararek*, on the left *dandoe tjatjah*. Warriors are tatued on the elbow-joint with a *dandoe tjatjah* and a cross called *sara pang mata andau*.

A Maloh who had lived for many years amongst these people gave us the following information about their tatu. There is with these people a great difference between the tatu of the high class and that of the low class individuals:

amongst the former the designs are both extensive and complicated, too complicated for our informant to describe with any degree of accuracy, but they seem to be much the same as those described by Hamer. The low-class people have to be content with simpler designs; the men are tatued on the breast and stomach with two curved lines ending in curls, and on the outside of each arm with two lines also ending in curls (Plate XII, Fig. 6); on the outside of the thigh a rather remarkable design, shown on Plate XII, Fig. 7, is tatued; it is termed *linsat*, the flying squirrel, *Pteromys nitidus*, and on the back of the calf is tatued a disc termed *kalong baboi*, the pig pattern. The women are tatued as described by Hamer down the front of the shin with two parallel lines connected by transverse cross-bars; according to our informant the design was supposed to represent a flat fish, such as a sole. (Plate XII, Fig. 8.)

Of these people, as of so many others, the melancholy tale of disappearance of tatu amongst the present generation and replacement of indigenous by Kayan designs was told, and it seems only too likely that within the next decade or two none will be left to illustrate a once flourishing and beautiful art.

Schwaner can add nothing to the facts that we have collected, except the statement that "the *bilians* (priestesses) have brought the art of tatuing to the present degree of perfection through learning the description of the pretty tatued bodies of the [mythical] Sangsangs."

(*h*) *Kahayan.*—Our figure (Plate XI, Fig. 3), and Plate 81 of Dr. Nieuwenhuis' book [9], is the extent of our knowledge of the tatu of the inhabitants of the Kahayan River. The latter illustration shows a man tatued with a characteristic check pattern over the torso, stomach and arms, but there is no reference to the plate in the text. Our figure is copied from a drawing by Dr. H. Hiller, of Philadelphia.

(*i*) *Bakatan and Ukit.*—As Nieuwenhuis has pointed out [9, p. 451], the tatu of these tribes is distinctive, inasmuch as most of the designs are left in the natural colour of the skin against a background of tatu; that is to say in the phraseology of the photographer, whilst the tatu designs of Kayans, Kenyahs, etc., are *positives*, those of the Bakatans are *negatives*. The men were formerly most extensively tatued, and we figure the principal designs (Plate XIII), most of which were drawn from a Bakatan of the Rejang River. The chest is covered with a bold scroll design known as *gĕrowit*, hooks (Kayan, *kowit*) (Figs. 1, 2); across the back and shoulder blades stretches a double row of circles, *kanak*, with small hooks interposed (Fig. 9); on the side of the shoulder a pattern known as *akih*, the lizard, *Ptychozoon homalocephalum* (Fam. Geckonidæ), is tatued (Figs. 3, 4); this lizard is used as a haruspex by the Bakatan. Circles are tatued on the biceps, on the back of the thigh and on the calf of the leg; a modification of the scroll design of the chest occurs on the flexor surface of the forearm. Another form of pattern for the calf of the leg is shown in text Fig. 9, it is termed *selong bowang*, the horse-mango, *Mangifera sp.*, the same fruit as that termed by Kayans *ipa olim* and of which a representation forms the chief element in the Long Utan tatu. A series of short lines is tatued on the jaw and is termed *ja*, lines, or *kilang*, sword-pattern, and a *gerowit* design occurs under the jaw; the pattern on the throat is known also as *gerowit* (Fig. 10). On the forehead is sometimes tatued a star or rosette pattern called *lukut*, antique bead, and it appears that this is of the nature of a recognition mark. In jungle warfare, where a stealthy descent on an unprepared enemy constitutes the main principle of tactics, it not unfrequently happens that one body of the attacking force unwittingly stalks another, and the results might be disastrous if there was not some means of distinguishing friend from foe when at close quarters.[1] Kenyahs when on the warpath frequently tie a

FIG. 8.

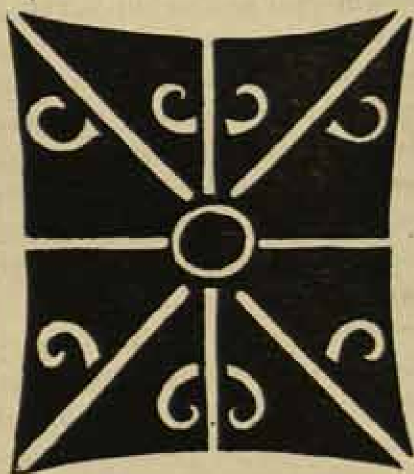


FIG. 9.

band of plaited palm fibre round the wrist for the same object. The tatu of the backs of the hands is avowedly copied from the Kayans, but has a different name applied to it—*kukum*. The metatarsus is tatued with broad bars, *iwa*, very like the foot tatu of Kayan women of the slave or of the middle class; lines known as *jango* encircle the ankle.

Tatuing is forbidden in the house; it can only be performed on the warpath, and consequently men only are the tatu artists. The covering of the body with

[1] As an instance of a quite opposite effect produced by a mark on the forehead, we may note here, that some Madang, who had crossed over from the Baram to the Rejang on a visit, appeared each with a cross marked in charcoal on his forehead; they supposed that by this means they were disguised beyond all recognition by evil spirits. The belief that such a trivial alteration of appearance is sufficient disguise is probably held by most tribes; Tama Bulan, a Kenyah chief when on a visit to Kuching, discarded the leopard's teeth, which when at home he wore through the upper part of his ears, and the reason that he alleged was the same as that given by the Madang. These people believe not only that evil spirits may do them harm whilst they are on their travels, but also that, being encountered far from their homes, the spirits will take advantage of their absence to work some harm to their wives children, or property.

designs is a gradual process, and it is only the most seasoned and experienced warriors who exhibit on their persons all the different designs that we have just detailed; the tatu of the legs and feet is the last to be completed, and the lines round the ankles are denied to all but the bravest veterans.

All that has been written above applies equally well to the Ukits, or at least once did apply, for now the Ukits have to a great extent adopted the tatu of the Kayan, and it is only occasionally that an old man tatued in the original Ukit manner is met. We give a figure of a design on the back of the thigh of such a relic of better days. (Plate XIII, Fig. 5.)

The Bakatan and Ukit women tatu very little, only the forearm, on the metacarpals and on the back of the wrist; characteristic designs for these parts are shown in text Fig. 8, and Plate XIII, Figs. 7, 8; the central part of the forearm design is an anthropomorphic derivative, judging by the name *tegulun*; the lines are termed *kilang*, and *kanak* and *gerowit* are also conspicuous; *gerowit* is also the name of the design for the metacarpals; the two stars joined by a line on the wrist are termed *lukut*, and it is possible that their significance is the same as that of the Kayan *lukut* tatued in the same place by men, but we have no evidence that this is the case.

Nieuwenhuis figures [9, Plate 80] a Bakatan tatued on the chest in the typical manner.

The only other designs, apparently of Kalamantan origin, are those figured by Ling Roth [7, p. 87]. Three of these are after drawings by Rev. W. Crossland, and are labelled "tatu marks on arm of Kapuas Kayan captive woman." The designs are certainly not of Kayan origin, nor are there any Kayans resident in the Kapuas River; the woman had in all probability been brought captive to Sarawak, where Mr. Crossland saw her, either by Kayans or Sea Dayaks, and it is certainly unfortunate that exact information concerning the tribe to which she belonged was not obtained; the designs, if accurately copied, are so extremely unlike all that are known to us that we are not able to hazard even a guess at their provenance or meaning. The other design figured on the same page is copied from Carl Bock; it occurred on the shoulder of a Punan and is said by Mr. Crossland to be commonly used by the Sea Dayaks of the Undup. We met with a similar example of it (Plate VIII, Fig. 7) on an Ukit tatued in the Kayan manner, but could get no information concerning it, and suppose that it is not an Ukit design. Hein [6, Fig. 90] figures the same design, and Nieuwenhuis [8, p. 240] alludes to a similar. We may note here that the designs figured on page 89 of Ling Roth's book [7] as tatu designs are in our opinion most certainly not tatu designs. They were collected by Dr. Wienecke in Dutch Borneo, and appear to be nothing but drawings by a native artist of such objects in daily use as hats, seat-mats, baby-slings, and so on. We communicated with Dr. J. D. E. Schmeltz of the Leyden Museum, where these "tatu" marks are deposited, and learnt from him that they are indeed actual drawings on paper; there are ninety-two of them, apparently all are different isolated designs, and they are evidently the work of one artist. There is not a tribe in Borneo which can show such a variety of tatu design, and indeed we doubt if ninety-two distinct isolated tatu designs could be found throughout all the length and breadth of the island. Moreover, as can be seen by reference to the cited work, the designs are of a most complicated nature, not figures with the out-lines merely filled in, as in all tatu designs known to us, but with the details drawn in fine lines and cross-hatching, which in tatu would be utterly lost unless executed on a very large scale.[1]

v. *Sea Dayak tatu.*

The Sea Dayaks at the present day are, as far as the men are concerned, the most extensively tatued tribe in Borneo, with the exception of the Bakatans, Ukits, Kahayans and Biajau; nevertheless, from a long-continued and close study of their tatu, we are forced to the conclusion that the practice and the designs have been entirely borrowed from other tribes, but chiefly from the Kayans. For some time we believed that there were two characteristically Sea Dayak designs, namely, that which is tatued on the throat (text, Figs. 11–13) and that on the wrist (Plate XIII, Fig. 7), but when later we studied Bakatan tatu we met with the former in the *gerowit* pattern on the throat of men and the latter in the *lukut* design on the wrist of the women. A Sea Dayak youth will simply plaster himself, so to speak, with numerous isolated designs; we have counted as many as five of the *asu* design on one thigh alone; the same design appears two or three times on the arms, and even on the breast, though this part of the body as well as the shoulders is more usually decorated with several stars and rosettes. The backs of the hands are tatued, quite irrespective of bravery or experience in warfare, in fact we have frequently had occasion to note that a man with tatued hands is a wastrel or a conceited braggart, of no account with Europeans or with his own people. This wild and irresponsible system of tatu has been accompanied by an inevitable degradation of the designs. There is a considerable body of evidence to show that the Sea Dayaks have borrowed much in their arts and crafts from tribes more early established in Borneo, but it must be confessed that in their decorative art they have as a rule improved upon their models; their bamboo carvings and their woven cloth are indeed "things of beauty," and if there is not much true originality in their work, it can still be said that they are the most artistic people in Borneo. An exception, however, must be made in the case of their tatu, for here we see, not an intelligent elaboration of the model, but a simplification and degradation or at best an elaboration without significance. Figs. 1–6, Plate VII, are examples of the Sea Dayaks *tuang asu* or dog design. With the exception of text, Fig. 10, which is a good copy of a Kayan model, the figures show the dog design run mad, and it is idle to attempt to interpret

[1] Dr. Schmeltz has kindly furnished us with an advance sheet of his forthcoming catalogue of the Borneo collection in the Leyden Museum; he catalogues these drawings as tatu marks, but in a footnote records our opinion of them made by letter. Dr. Nieuwenhuis apparently adheres to the belief that they really are tatu marks.

them, since in every case the artists have given their individual fancies free play. When the profession of the tatu-artist is hereditary and when the practice has for its object the embellishment of definite parts of the body for definite reasons, we naturally find a constancy of design, or, if there are varieties, there is a purpose in

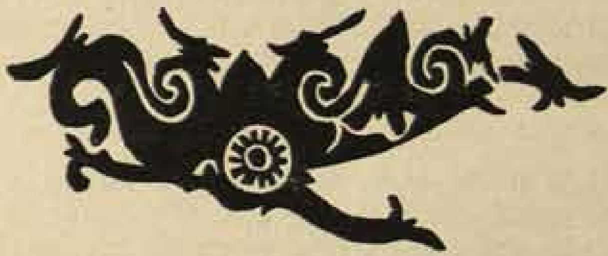
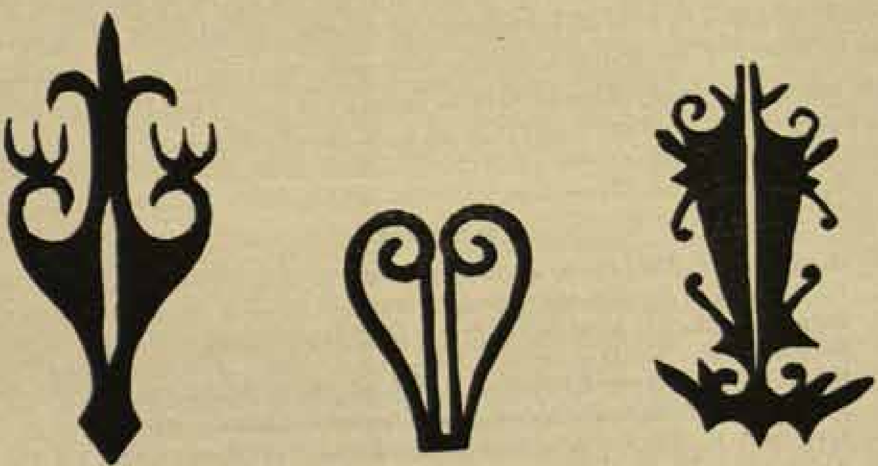


FIG. 10.

them, in the sense that the variations can be traced to pre-existing forms and do not depart from the original so widely that their significance is altogether lost. With the borrowing of exogenous designs arises such an alteration in their form, that the original names and significance are lost; the Kayan modification of the hornbill design of the Long Glat to a dog design is a case in point. But when the very practice of tatu has no special meaning, when the tatu artist may be any member of the tribe, and where no original tatu design is to be found in the tribe, then the borrowed practice and the borrowed designs, unbound by any sort of tradition, run complete riot and any sort of fanciful name is applied to the degraded designs. Amongst the Kenyah tribes the modification and degradation of the dog design has not proceeded so far as amongst the Sea Dayaks, and this may be explained for by their more restrained practice of tatu and by the constant intercourse between them and the Kayans, so that they always have good models before them. Plate VI, Fig. 3, illustrates the extreme limit of degradation of the dog design amongst Sea Dayaks; it is termed *kala*, scorpion,[1] and it is noteworthy that the representation of the chelæ and anterior end of the scorpion (A) was originally the posterior end of the dog, and the hooked ends of the posterior processes of this scorpion design (B) instead of facing one another as they did when they represented the open jaws of the dog now look the same way; the rosette-like eye of the dog still persists, but of course it has no significance in the scorpion. A curious modification of this eye is seen in another Sea Dayak scorpion design figured by E. B. Haddon [4, Fig. 19]. Furness [3, p. 142] figures a couple of scorpion designs, but neither are quite as debased as that which we figure here. Furness also figures a scroll design, not unlike a Bakatan

[1] Mr. E. B. Haddon (4, p. 124) writes: "The tattoo design used by the Kayans and Kenyahs . . . has been copied and adopted by the Ibans in the same way as the Kalamantans have done, the main difference being, that the Ibans call the design a scorpion. *For this reason the pattern tends to become more and more like the scorpion* . . ." The italics are ours. Is not this "putting the cart before the horse?" It is only when the design resembles a scorpion that the term *scorpion* is applied to it; all other modifications, even though tending towards the scorpion, are called *dog*.

design, tatued on the forearm, and termed *taia gasieng*, the thread of the spinning wheel; a similar one figured by Ling Roth [7, p. 88] is termed *trong*, the egg plant. On the breast and shoulders some form of rosette or star design is tatued in considerable profusion; the designs are known variously as *bunga trong*, the egg plant flower, *tandan buah*, bunches of fruit, *lukut*, an antique bead, *ringgit salilang*. A four-pointed star, such as that shown in text, Fig. 1, is termed *buah andu*, fruit of *Plukenetia corniculata*; since this fruit is quadrate in shape with pointed angles it is evident that the name has been applied to the pattern because of its resemblance to the fruit. Furness figures examples of these designs and also Ling Roth [7, p. 88]. We figure (text, Figs. 11–13) three designs for the throat known sometimes as *katak*, frogs, sometimes as *tali gasieng*, thread of the spinning wheel, and no doubt other meaningless names are applied to them. Two of the figures (Figs. 11, 12) are evidently modifications of the Bakatan *gerowit*



FIGS. 11, 12, 13.

design, but here they are represented with the tatu pigment, whilst with the Bakatans the design is in the natural colour of the skin against a background of pigment, *i.e.*, the Dayak design is the positive of the Bakatan negative. Furness figures two examples of the throat design, one with a transverse row of stars cutting across it; the same authority also figures a design for the ribs known as *tali sabit*, waist chains, consisting of two stars joined by a double zigzag line. The same design is sometimes tatued on the wrist when it is known as *lukut*, antique bead; it is also tatued on the throat [7, p. 88] and attention has already been drawn to the probable derivations of this design also from a Bakatan model.

It is only very seldom that Sea Dayak women tatu and then only in small circles on the breasts [7, p. 83] and on the calves of the legs.

As a conclusion to the foregoing account of Bornean tatu we add a table which summarises in the briefest possible manner all our information; its chief use perhaps will lie in showing in a graphic manner the blanks in our knowledge that still remain.

From a study of their tatu Dr. Nieuwenhuis [9, p. 451] divides the people of Borneo into three main groups :—

1. Group of Bahau, Kenya and Punan.
2. Groups of Bukat and Bakatan.
3. Group of Barito and Melawi tribes, and Ulu Ajar of the Mandai River.

From what we have written it will be understood on what principles this classification is based and, as far as it goes, it is correct enough, except for the inclusion of the Punan in the first group, but it is not sufficiently comprehensive in the light of the further information that we have unearthed. We do not consider that tatu can ever be of much value in clearing up racial problems, seeing how much evidence there is of interchange of designs and rejection of indigenous designs in favour of something newer; consequently we refrain from drawing up another scheme of classification of tatu in Borneo; at best it would be little more than a re-enumeration of the forms that we have already described in more or less detail.

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Brief references to tatu will also be found in the writings of Burns, Brooke Low, MacDougall, De Crespigny, Hatton, St. John, Witti and others, but notices of all these will be found in Mr. Ling Roth's volumes.

Explanation of Plates.

Plate VI.

Fig. 1.—Kayan dog design (*udoh asu*) for thighs of men. From a tatu-block in the Sarawak Museum. (No. 1054·104.)

Fig. 2.—Uma Balubo Kayan dog design. From a tatu-block in the Sarawak Museum. (No. 1054·90.)

Fig. 3.—Sea-Dayak scorpion design (*Kelingai Kala*) for thigh, arm, or breast of men. From a tatu-block in the Sarawak Museum. (No. 1054·99.)

Fig. 4.—Kenyah dog design, copied from a Kayan model. From a tatu-block in the Sarawak Museum. (No. 1054·108.)

Fig. 5.—Kayan dog design. From a tatu-block in the Sarawak Museum. (No. 1054·106.)

Fig. 6.—Kayan dog design. From a tatu-block in the Sarawak Museum. (No. 1054·88.)

Fig. 7.—Kayan double dog design for outside of thigh of man. From a tatu-block in the Sarawak Museum. (No. 1054·31.)

Fig. 8.—Kayan designs of dog with pups (*tuang nganak*). A=pup. For thigh of man. From a tatu-block in Sarawak Museum. (No. 1054·57.)

Fig. 9.—Kenyah claws of centipede (?) design (*lipan katip*), for breast or shoulder of man. From a tatu-block in the Sarawak Museum. (No. 1054·20.)

Fig. 10.—Kenyah crab design (*toyu*), A=mouth (*ba*), B=claw (*katip*), C=back (*likut*), D=tail (*ikong*). From a tatu-block in the Sarawak Museum. (No. 1054·71.)

PLATE VII.

Fig. 1.—Sea-Dayak modification of the dog design. From a tatu-block in the Sarawak Museum. (No. 1054·102.)

Fig. 2.— " " " From a tatu-block in the Sarawak Museum. (No. 1054·101.)

Fig. 3.— " " " From a tatu-block in the Sarawak Museum. (No. 1054·67.)

Fig. 4.— " " " From a tatu-block in the Sarawak Museum (No. 1054·109.)

Fig. 5.— " " " From a tatu-block in the Sarawak Museum. (No. 1054·70.)

Fig. 6.— " " " But known as "scorpion" (*kala*) pattern. From a tatu-block in the Sarawak Museum. (No. 1054·69.)

Fig. 7.—Barawan and Kenyah modification of the dog design, known as "hook" (*kowit*) pattern. From a tatu-block in the Sarawak Museum. (No. 1054·63.)

Fig. 8.— " " " From a tatu-block in the Sarawak Museum. (No. 1054·75).

Fig. 9.—Kenyah modification of the dog design, but known as the "prawn" (*urang*) pattern. From a tatu-block in the Sarawak Museum. (No. 1054·89.)

PLATE VIII.

Fig. 1.—Kayan three-line pattern (*ida telo*) for back of thigh of woman of slave class. From a tatu-block in the Sarawak Museum. (No. 166a Brooke Low Coll.)

Fig. 2.—Kayan four-line pattern (*ida pat*) for back of thigh of woman of middle class. From a tatu-block in the Sarawak Museum. (No. 1434.)

Fig. 3.—Kayan (Rejang R.) three-line pattern (*ida telo*) for back of thigh of women of upper and middle classes. From a tatu-block in the Sarawak Museum. (No. 1054·2.)

Fig. 4.—Kayan (Uma Pliau) design for front and sides of thigh of high class women. A = *tushun tura*, tuba root, B = *jalaut*, fruit of *Plukenetia corniculata*, D = *kowit*, interlocking hooks. From a tatu-block in coll. C. Hose.

Fig. 5.—Kayan design for front of thigh of woman of high class. A=*tushun tura*, B=*dulang harok*, bows of a boat, C=*ulu tinggang*, hornbill's head, D=*beliling bulan*, full moons. From a tatu-block in the Sarawak Museum. (No. 1432.)

Fig. 6.—Barawan design for the shoulder or breast of men. From a drawing.

Fig. 7.—Design of uncertain origin, on the calf of the leg of an Ukit man.

PLATE IX.

Fig. 1.—Kayan (Rejang R.) design known as *ida tuang* or *ida lima* for back of thigh of women of high rank. Note the hornbill heads at the top of the design. From a tatu-block in the Sarawak Museum. (No. 166*d* Brooke Low coll.)

Fig. 2.—Kayan (Rejang R.) design: compare with Figs. 5 and 11. From a tatu-block in the Sarawak Museum. (No. 166*c* Brooke Low coll.)

Fig. 3.—Long Glat hornbill design (after Nieuwenhuis). This is tatued in rows down the front and sides of the thigh.

Fig. 4.—Kayan (?) hornbill design, known, however, as the "dog without a tail" (*tuang burong asu.*) From a tatu-block in the Sarawak Museum. (No. 1054·8.)

Fig. 5.—Kayan (Rejang R.) tatu design known as "dog without a tail" (*tuang burong asu*) pattern, for front and sides of thigh of women of high rank. From a tatu-block in the Sarawak Museum. (No. 166*g* Brooke Low coll.)

Fig. 6.—Kayan three-line and four-line design (*ida telo* and *ida pat*) for back of thigh of women of low class. From a tatu-block in the Sarawak Museum. (No. 1435.)

Fig. 7.—Uma Lekan Kayan anthropomorphic design (*sihong*), tatued in rows down front and sides of thigh.

Fig. 8.—Kayan bead (*lukut*) design, tatued on the wrist of men.

Fig. 9.— " " "

Fig. 10.— " " " From a tatu-block in the Sarawak Museum. (No. 1054·62.)

Fig. 11.—Portion of Uma Lekan Kayan design for back of thigh of women of high rank (after Nieuwenhuis).

Plate X.

Fig. 1.—Tatu design on the forearm of an Uma Lekan Kayan woman of high rank. From a rubbing of a carved wooden model in the Sarawak Museum. (No. 1398.)

Fig. 2.—Tatu-design on the thigh of an Uma Lekan Kayan woman of high rank. From a rubbing of a carved wooden model in the Sarawak Museum. (No. 1398.)

Fig. 3.—Tatu design on the forearm of an Uma Plian Kayan woman of high rank. A=*beliling bulan*, full moons; B=*dulang harok*, bows of a boat; C=*kowit*, hooks; D=*daun wi*, leaves of bamboo; E=*tushun tuva*, bundles of tuba root. From a carved wooden model in the Sarawak Museum. (No. 1431.)

Fig. 4.—Kenyah design, representing the open fruit of a species of mango (*ipa olim*) tatued on breasts or shoulders of men. From a tatu-block in the Sarawak Museum. (No. 1054·14.)

Fig. 5.—Kayan (Baloi R.) *kalong kowit* or hook design for back of thigh of woman of high rank. From a tatu-block in the Sarawak Museum. (No. 1054·54.)

Plate XI.

Fig. 1.—Design on the hand of a Skapan chief tatued in the Kayan manner. From a drawing.

Fig. 2.—Design on the arm of a Peng man. From a drawing by Dr. H. Hiller of Philadelphia.

Fig. 3.—Design on the arm of a Kahayan man. From a drawing by Dr. H. Hiller of Philadelphia.

Fig. 4.—Design on the forearm of a Leppu Lutong woman. From a drawing.

Fig. 5.—Design on the forearm of a Long Utan woman. From a rubbing of a carved model in the Sarawak Museum. (No. 1430.)

Fig. 6.—Design on the thigh of a Long Utan woman. From a rubbing of a carved model in the Sarawak Museum. (No. 1426.)

Fig. 7.—Kenyah design, representing the *durian* fruit (*usong dian*) tatued on the breasts or shoulders of men. From a tatu-block in the Sarawak Museum. (No. 1054·17.)

Plate XII.

Fig. 1.—Tatu design on the forearm of a Kalabit woman. From a drawing.

Fig. 2.—Tatu design on front of leg of a Kalabit woman, C=*betik lulud*, shin pattern. From a photograph.

Fig. 3.—Tatu design on back of leg of a Kalabit woman, A=*betik buah*, fruit pattern; B=*betik lawa*, trunk pattern. From a drawing.

TABLE, SHOWING THE FORMS OF TATU PRACTISED BY THE TRIBES OF BORNEO.

			Character of designs.	Part of body tatued.	Ceremonial.	Object of tatu.
	Kayan	♂	Isolated designs, representing the dog, a bead, rosettes and stars. Serial designs on hands.	Inside of forearm, outside of thigh, breasts, wrist and points of shoulders. Back of hand sometimes.	None	Sign of bravery in some forms, to ward off illness in others.
	Kayan	♀	Serial designs of complex nature, geometrical, anthropo- and zoomorphic.	The whole forearm, back of hand, the whole thigh, the metatarsal surface of the foot.	Very elaborate.	Chiefly for ornament, for use after death, for cure of illness.
	Kenyah	♂	As amongst Kayans, with some degradation of design and alteration of name.	Same as with Kayans	None	Sign of bravery in some cases. Chiefly for ornament.
	Kenyah	♀	As amongst Kayans	The whole forearm, back of hand, metatarsal surface of foot.	None	Ornament.
Kenyah-Kalamantan.	Peng	♂	Geometrical serial designs, discs, ? isolated designs.	Arm from shoulder to wrist; calf of leg.	?	? Ornament.
Kenyah-Kalamantan.	Peng	♀	Designs employed by Kayan ♂ ♂	Forearms and legs	?	? Ornament.
Kenyah-Kalamantan.	Leppu Lutong	♀	Simple geometrical design.	Forearm and back of hand.	?	?
Kenyah-Kalamantan.	Uma Tow	♂	? ? same as Kayan designs	?	?	?
Kenyah-Kalamantan.	Uma Tow	♀	Simple geometrical designs (low class ♀ ♀) anthropomorphic designs, copied from other tribes (high-class ♀ ♀).	Forearm and back of hand, front and sides of the thigh and the shin.	Some	?
Kenyah-Kalamantan.	Long Glat and Uma Luhat.	♂	? not at all			?
Kenyah-Kalamantan.	Long Glat and Uma Luhat.	♀	Complicated serial designs, chiefly of zoomorphic *motif*.	As with Kayan ♀ ♀, but also with lines round the ankles. Tatu of forearms not so extensive.		Chiefly for ornament, for use in the next world.
Kalamantan.	Uma Long	♀	Simple geometrical design ("stippled").	Forearm and back of hand	?	?
Kalamantan.	Dusun	♂	Lines.	Stomach, breast, arm	None	Partly as a tally of enemies slain.
Kalamantan.	Murut	♂	Scroll design and circles	Above the knee-cap; on the breast (Practice obsolescent).	None	?
Kalamantan.	Murut	♀	Parallel lines	Arm and back of hand	? None	? Ornament.
Kalamantan.	Kalabit	♂	As with Dusuns	As with Dusuns	?	?
Kalamantan.	Kalabit	♀	Zigzags and chevrons	Forearms, the lower part of the leg	Very little	?
Kalamantan.	Long Utan	♀	Complicated serial geometrical designs	As with Long Glat	?	?
Kalamantan.	Biajau	♂	Complicated serial geometrical designs, scrolls, zoomorphs, etc.	Almost the whole body including the face amongst some of the sub-tribes.	?	With some sub-tribes to signify success in war and love, manual dexterity, etc.
Kalamantan.	Biajau	♀	? ?	? ? as with Long Glat	?	?
Kalamantan.	Ot-Danum Ulu Ajar, etc.	♂	Curved lines, discs and simple geometrical designs.	On breast, stomach, outside of arms and thighs, calf of leg.	? None	In some cases a sign of bravery.
Kalamantan.	Ot-Danum Ulu Ajar, etc.	♀	Simple designs like those of the Uma Tow Kenyahs (low class ♀ ♀). High class ♀ ♀ like Long Glat?	Shin, thigh and calf of leg.	?	?
Kalamantan.	Kahayan	♂	Chequer design	On breast, stomach, throat, arms.	?	?
Kalamantan.	Bakatan and Ukit	♂	Chiefly scroll and circle designs. Nearly all represented in "negative."	Jaws, throat, breast, back, shoulders, forearms, thighs, calf of leg, ankles, feet and backs of hands.	Obsolete	Sign of bravery and experience in war, symbol of maturity.
Kalamantan.	Bakatan and Ukit	♀	Anthropomorphic, lines, representation of a bead.	Forearm, wrist, metacarpals	None	Ornament.
	Sea-Dayak	♂	Degraded Kayan and Bakatan designs	Almost every part of the body, except the face.	None	Ornament.
	Sea-Dayak	♀	Small circles	Breasts and calves of legs	None	Ornament.

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MATERIALS FOR THE STUDY OF TUTU IN BORNEO.

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MATERIALS FOR THE STUDY OF TUTU IN BORNEO.

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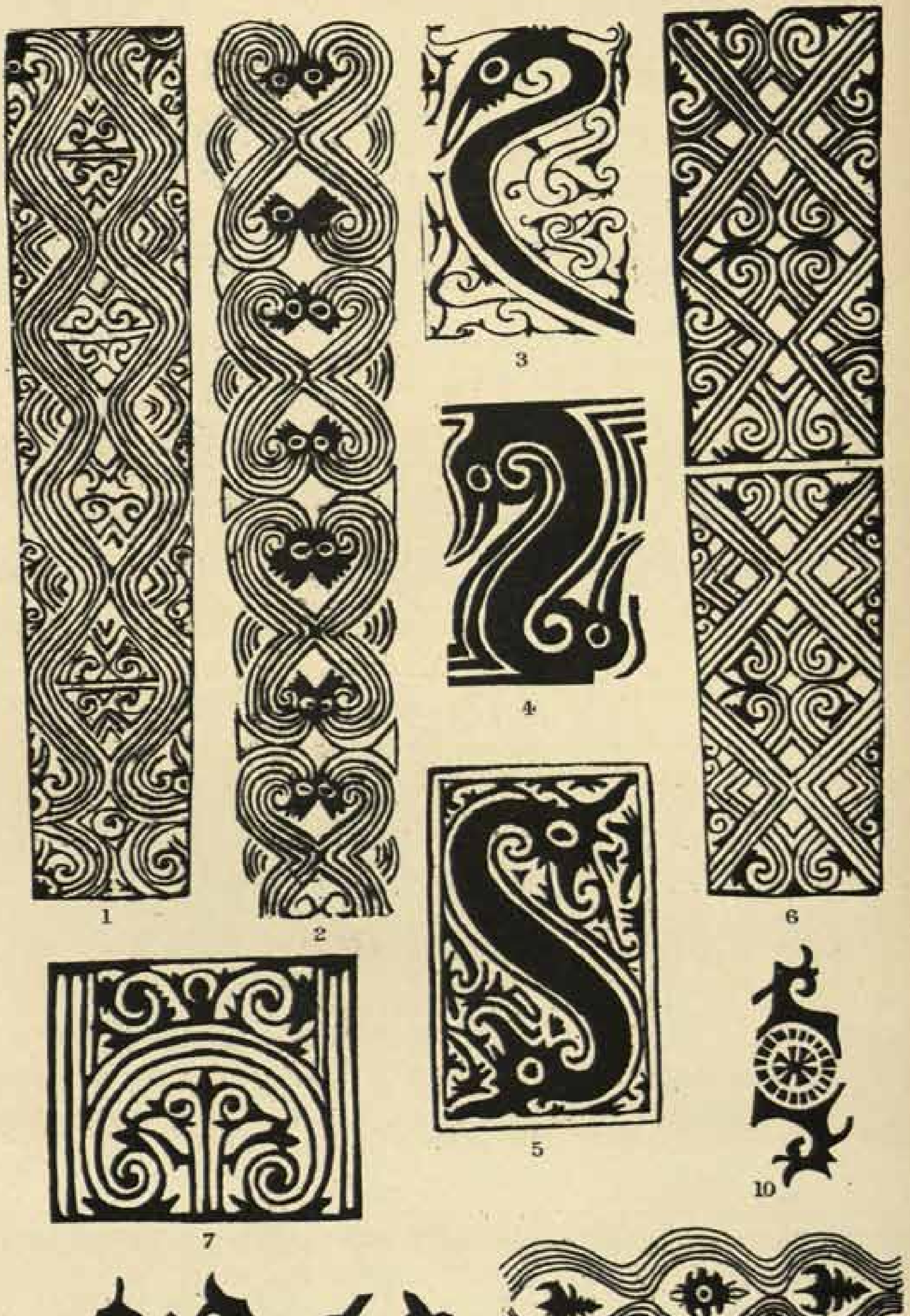
MATERIALS FOR THE STUDY OF TUTU IN BORNEO.



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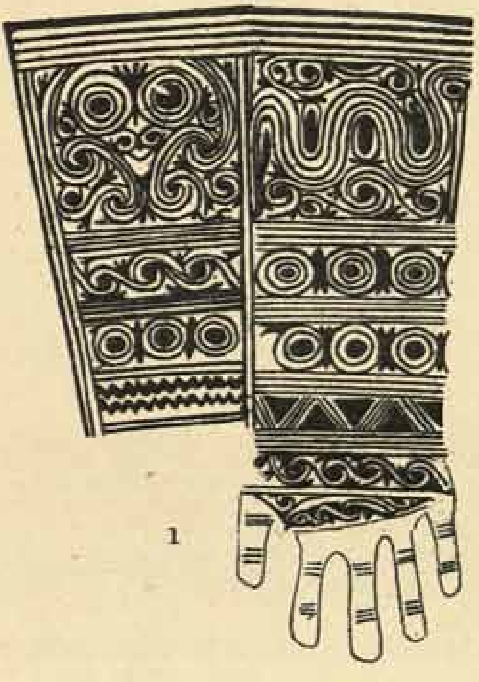

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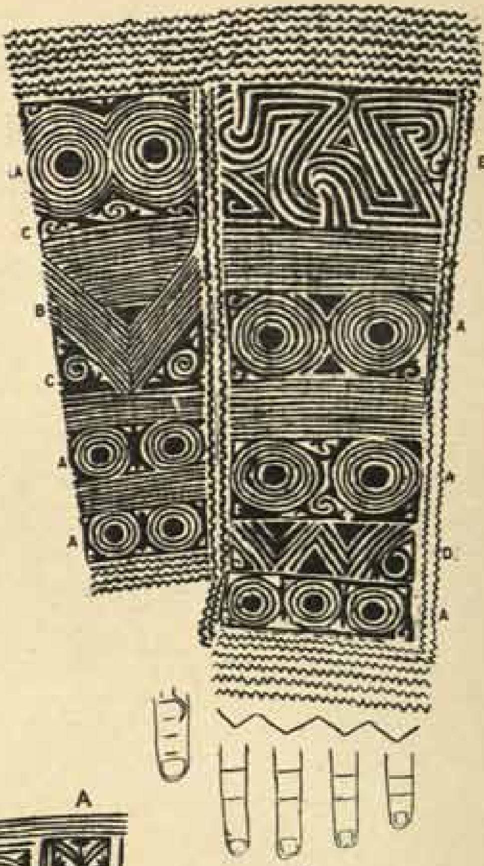

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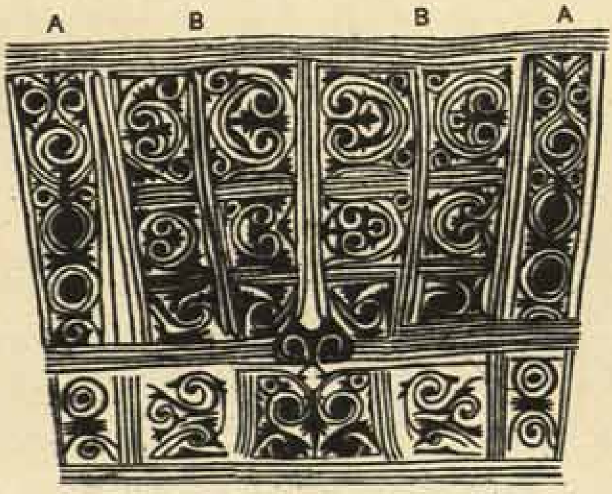

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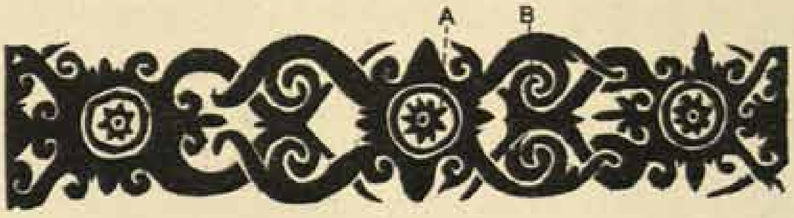

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MATERIALS FOR THE STUDY OF TUTU IN BORNEO.

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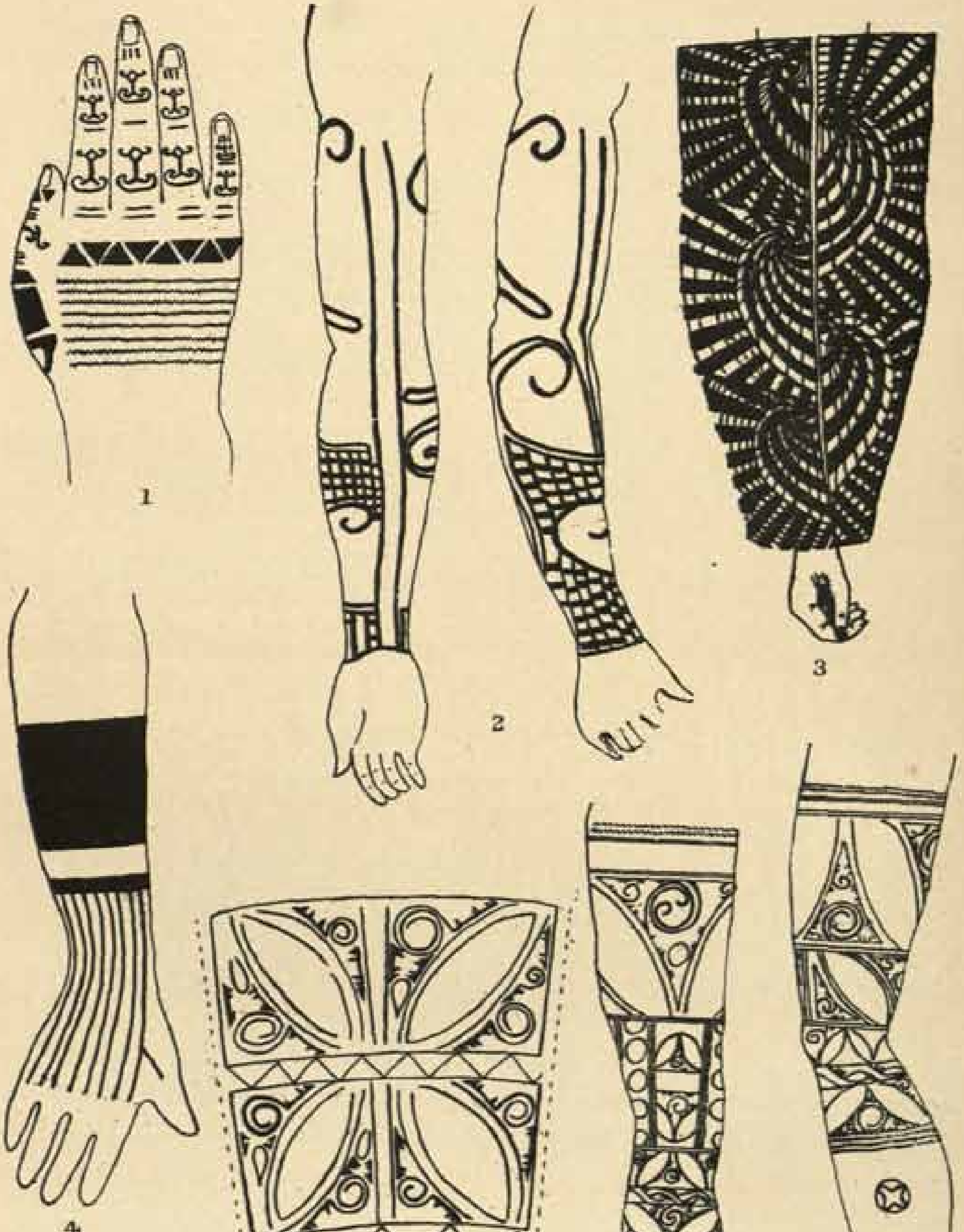

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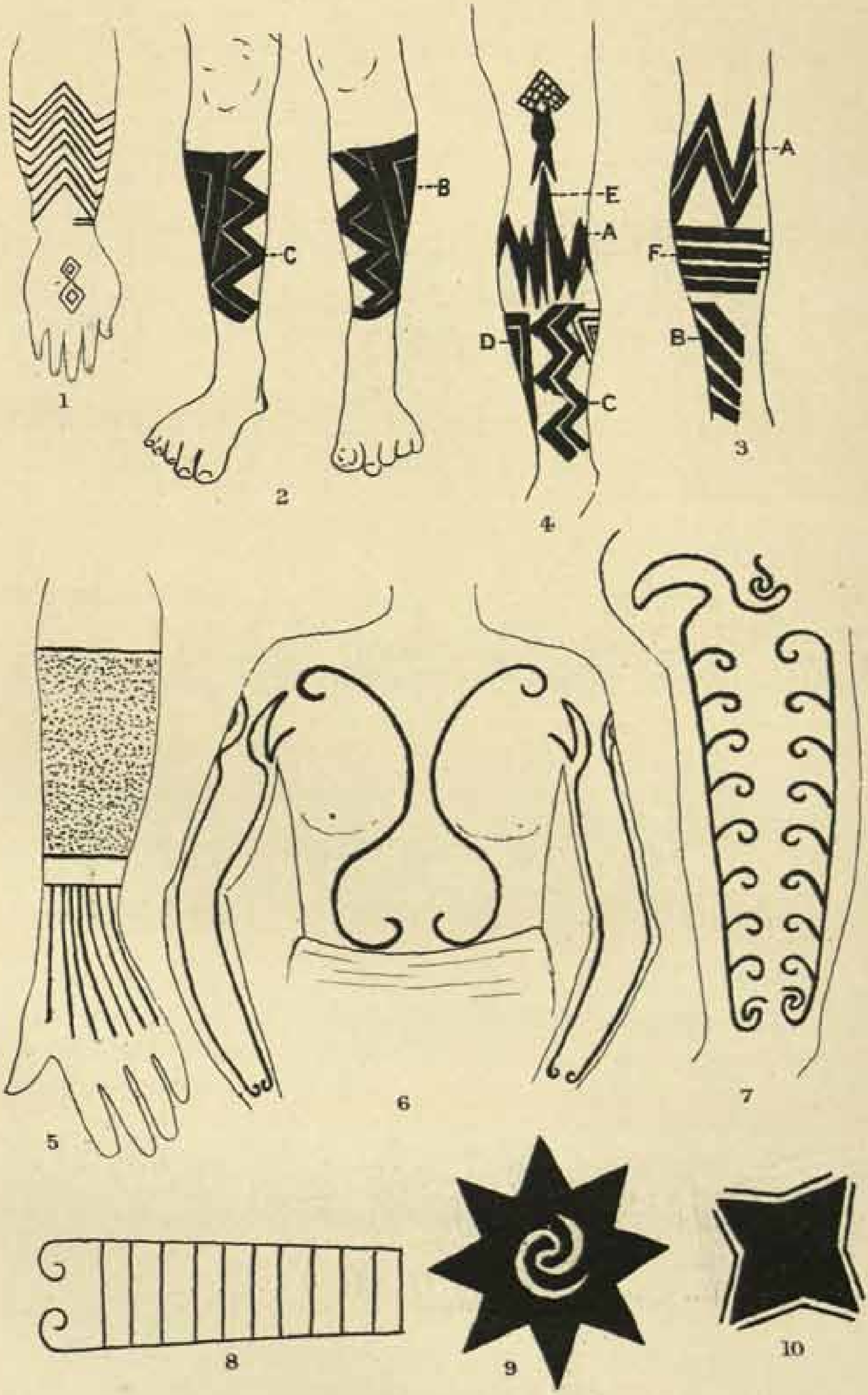

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MATERIALS FOR THE STUDY OF TUTU IN BORNEO.

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MATERIALS FOR THE STUDY OF TUTU IN BORNEO.

Fig. 4—Tatu design on front of leg of the same Kalabit woman, D=*betik karawin*, E=*ujat batu*, hill-tops. From a drawing.

Fig. 5.—Tatu design on the forearm of an Uma Long woman. From a drawing.

Fig. 6.—Tatu design on arms and torso of a Biajan man of low class. From a drawing by a Maloh.

Fig. 7.—Tatu design on leg of Biajau man of low class. From a drawing by a Maloh.

Fig. 8.—Tatu design on shin of Biajau woman of low class. From a drawing by a Maloh.

Fig. 9.—Kajaman (?) design representing the fruit of *Plukenetia corniculata* (*jalaut*) tatued on the breasts or shoulders of men. From a tatu-block in the Sarawak Museum. (No. 1054·21.)

Fig. 10.—Tatu design on the biceps of an Ukit man, said to represent a bead (*lukut*). From a drawing.

PLATE XIII.

Fig. 1.—Design (*gerowit*, hooks) tatued on the breast of a Bakatan man. From a tatu-block in the collection of H.H. the Rajah of Sarawak.

Fig. 2.— " " " "

Fig. 3.—Design (*akih*, tree gecko) tatued on the shoulder of a Bakatan man. From a drawing.

Fig. 4.— " " " "

Fig. 5.—Design tatued on the calf of the leg of an Ukit. From a photograph.

Fig. 6.—Tatu design on the foot of a Kayan woman of low class. From a drawing.

Fig. 7.—Design representing an antique bead (*lukut*) tatued on the wrist of a Bakatan girl. From a drawing.

Fig. 8.—Design (*gerowit*) tatued on the metacarpals of a Bakatan girl. From a drawing.

Fig. 9.—Design (*kanak*, circles) on the back of a Bakatan man. From a tatu-block.

Fig. 10.—Design (*gerowit*) tatued on the throat of a Bakatan man. From a photograph.

THE "GENNA" AMONGST THE TRIBES OF ASSAM.

By T. C. Hodson.

The tribes inhabiting the hills of Assam belong for the most part to the group to which, on purely linguistic grounds, the name Tibeto-Burman has been given. Here and there are small patches of the Tai race, Shans, who are akin to the peoples of Cochin China, Cambodia, and Siam. The origin of these small groups is well known and is of little interest, except to the historian tracing the movement from east to west which is closely connected with the course of events in the Chinese empire.

But the Khasias, who form a compact group surrounded by Tibeto-Burman tribes, are ethnically related to tribes many hundreds of miles away, and the circumstances of their settlement in their present position are still shrouded in mystery. I do not propose to attempt to describe the Khasias although I lived among them for a year and made some study of their customs. I propose to concentrate my attention on the Tibeto-Burman tribes.

A group of tribes which is headed by a people of such remarkable development as the Meitheis, better known as the Manipuris, can hardly be called primitive. Even the least advanced are well acquainted with the use of iron implements. All weave cloths, although there is a tendency in one sub-group to make weaving a specialised industry. They are still in the industrial era which immediately precedes that of specialisation of industries. The group presents a wonderful scale ranging from people who are still migratory to people who have written histories five centuries old.

First, as regards social organisation. On one hand we have tribes which are settled in permanent villages, divided into exogamous groups without any secular or civil head; we have tribes, also permanent, so far as their village sites are concerned, but shifting their cultivation year by year in strict accordance with a definite scheme while preserving a memory of the time when they moved their fields by chance, in a ceremony intended to determine by magical rites the proper site for the new cultivation. Again there are tribes which move their fields and their villages, not year by year, but once in every three or four years. Curiously enough these last, while organised in exogamous subdivisions, are united under a secular chief who has lost nearly all his religious functions and whose titles (if philology be not too utterly discredited) mean "founder of the village," *in-pi-pu*, and "rich in cattle," *hao-sa*. Among the Meitheis the kingship possesses civil attributes, in extent only equalled by the importance of the religious authority which is attached to the royal office in spite of the veneer of Hinduism which has spread over the country of Manipur since the beginning of the eighteenth century. The common feature of these tribes is their organisation into exogamous subdivisions which are reputed to be descended from brothers, whose children intermarried and formed these groups. Now I may remark that if this legend were true it would appear to describe a time when the subdivisions were not exogamous. The unit is undoubtedly the exogamous subdivision, although for our purposes the village or local collection of exogamous subdivisions may be taken as the unit. Only among the Meithei, who from centuries of life in a broad comfortable valley have evolved a social and political organisation of great complexity, do we find anything resembling tribal or national feeling. Village fights with village, exogamous subdivision fights with its immediate neighbour, but there is practically no tribal combination among the hill people.

It is noteworthy that in the permanently settled villages we find the customs much more carefully preserved than in the migratory tribes and more elaborately observed in the bigger villages than in the small. But, allowing for differences due to divergent development, these tribes, who occupy an enormous area of hill country, are very much of a muchness, whether one talks of a tribe far north where the gentle slopes of the hills permit the use of irrigated fields, even at so great an altitude as nine thousand feet, or of a tribe which has to live as best it can on the scanty produce of the steep sides of the low hills. The essence of their religious rites, of their psychology, of their philosophy of life is a simple logic developed by intense particularism. But the cardinal fault of their philosophy is that it is too logical on too slender a collection of facts. They are scientists who tire too rapidly to record the results of their experiments. They are particularists, because, unaccustomed from their mode of life to grasp the essential unity of a group of things, they give but little consideration to points of identity, concentrating all their attention on the differentia of phenomena.

In proof of this habit of particularism, I point to a very curious feature of the languages of these tribes. They possess an extensive vocabulary because they have different names for objects which we are in the habit of combining in a class. I may be permitted the comment that animism, the religious plane which is characterised by a general dispersal of supernatural authority and power among a host of spirits, is thus in correspondence with a general level of the industrial activity as well as with the mental state of the people as indicated by the state of their language. Where everything is handmade, where such mechanical appliances as exist are only of the crudest and most simple form, we find the greatest variety in the simplest productions.

The connotation of the word tabu is familiar, and my theme is to describe the occurrence among the Tibeto-Burman tribes of the same range of ideas which has been so highly developed by the Polynesian races. I propose to set forth in some sort of order the various events which necessitate general or communal as contrasted with private or individual tabus, then to attempt to classify other tabus, and, if possible, to submit material from which it will be possible to extract the main ideas underlying the tabu rites as practised by the people I describe.

Communal tabus are observed by the whole village, which consists of several exogamous subdivisions, and are all automatic in the sense that while some are of regular occurrence, others follow necessarily after the occurrence of some event. Those which are of regular occurrence are for the most part connected with the crops. Even where irrigated terraces are made, the rice plant is much affected by deficiencies of rain and excess of sun. Before the crop is sown, the village is tabu or genna. The gates are closed and the friend without has to stay outside, while the stranger that is within the gates remains till all is ended. The festival is marked among some tribes by an outburst of licentiousness for, so long as the crops remain ungarnered, the slightest incontinence might ruin all.[1]

An omen of the prosperity of the crops is taken by a mock contest, the girls pulling against the men. In some villages the gennas last for ten days, but the tenth day is the crowning day of all. The men cook, and eat apart from the women during this time, and the food tabus are strictly enforced. From the conclusion of the initial crop genna to the commencement of the genna which ushers in the harvest time, all trade, all fishing, all hunting, all cutting grass and felling trees is forbidden. Those tribes which specialise in cloth-weaving, salt-making or pottery making, are forbidden the exercise of these minor but valuable industries. Drums and bugles are silent all the while.

Perhaps the idea is that men must not give up their time and attention to these things, but instead must concentrate all their energy and strength on the crops. These tabus are not intended, perhaps, to afford of set purpose a much needed close time to the game, but they have that effect. Again the thatching grass and timber are much too raw for use in house building. Digressing for one moment I would here mention a case of a tabu idea which is connected with the specialised industry of cloth-weaving as practised by a small group of villages among a largish tribe. It must be remembered that the art of weaving is practised by all, but has in this small group of villages reached a considerable excellence.

A woman whom I knew had come from a cloth-weaving village, was settled with her husband in an outlying village where I saw her. I asked her if she had woven any cloths recently, and she told me her husband's village people forbade her weaving because it was genna to them. I was well aware that by discouraging the marriage of their girls outside the group of cloth-weaving villages, they were fast making themselves a close corporation in enjoyment of a valuable monopoly.

I was not prepared to find others quite so ready to accept this monopoly without question. This has to my mind some bearing on the question of the

[1] Frazer says the period of licence which precedes the crop festivals—Saturnalia—is intended to stimulate the fecundity of the crops—*Lect. Hist. Kingship*, p. 268.

origins of caste. Race, religion, political power, have been and still are factors in the growth of caste. We know that casté is partly occupational in its origin, but this incident illustrates how the sanctity of an industrial monopoly comes to be recognised by others. I asked the headman why they forbade the woman to weave cloths, and he told me they all feared something terrible would happen to them if they allowed her to make cloths. There is also the fear of the magic of the craftsmen being directed against them, for in these tribes the villages which have a special industry are regarded as possessing remarkable powers which they claim, and which others believe to have been taught them by some divine being.

Between the initial crop genna and the harvest-home, some tribes interpose a genna day which depends on the appearance of the first blade of rice. All celebrate the commencement of the gathering of the crops by a genna, which lasts at least two days. It is mainly a repetition of the initial genna and, just as the first seed was sown by the *gennabura*, the religious head of the village, so he is obliged to cut the first ear of rice before anyone else may begin. In some villages the fields of the *gennabura* must be completely cleared before anyone else touches his own. In some villages it is usual to have a genna as soon as all the fields are clear, when the village fences are put in order, and at night the omens for the coming year are observed. This genna is followed by one when they wash their daos and other agricultural implements in a running stream to refresh them, and probably also to clear them of any evil influences which may have been attached to them, and which might hinder them in hunting. Later on there is a genna at which, in one tribe, the men hurl their pointed bamboo sticks at an effigy of a man made out of the stem of a plaintain tree. If a man is skilful enough to hit it on the head, he will kill an enemy soon, while if he hits the figure in the belly, he will get plenty of food. The end of this genna is marked by the taking of the omens by the religious heads of the subdivisions. Two men are engaged, and both of them are clothed in quite new garments, and in order to preserve them from any dangerous contagion, they have both abstained from intercourse with their wives for two nights. They sit opposite one another and hold a split bamboo gingerly by the end. By-and-by the bamboo moves, and thus indicates the direction in which it is necessary they should cultivate. This ceremony is not of practical value, for the direction is fixed by a regular rota, and is not to my knowledge performed by those villages which have permanent fields. Tribes which use the root of wild ginger in making their rice beer generally celebrate the first brew with a genna, but where rice alone is used in the mash no such ceremony is found to occur.

Such are the regular crop gennas. Whenever it is necessary to have a rain compelling ceremony, the village is genna, for the rite is performed by the headman on behalf of the whole community. One group cuts a pig up into eleven portions and the women make eleven rice cakes. The village headman with five men and five women goes outside the village, and there places the offering on one of the memorial stones. In a sub-section of this group, the headman goes down to the river and selects eleven water-worn pebbles which he wraps in river weed and puts on a stone. Some groups form a procession which goes to the nearest pool and then they all dip their shields in the water and carry what water they can to the nearest fields. Others drown a pig in the nearest pool, having first tied its feet together. I once noticed some bits of fish lying about on the village dam and asked why they were put there. I learnt that there had been a water or rain ceremony. It was usual to kill a fish and scatter the bits about, at the same time informing the deities that the fish were all dying, and that rain was necessary. A similar method of attracting the attention of the rain power is common in Manipur, where a solemn procession of boats, headed by the great racing boat of the Raja, is formed. The boats are dragged along the mud of the moat and the Raja asks for rain. In Manipur again, there is an established ceremony which consists of a procession to the top of Nongmaiching, a lofty hill to the east of the capital, where is a stone which native fancy likens to an umbrella. The Raja fetches water from a spring below, and sprinkles it over the stone.[1]

One small group believes that rain will fall if the headman keeps lifting a crab out of a pot by a thread for a sufficiently large number of times. In one village I was told that when rain was wanted, the headman takes a burning brand from the fire and places it on the grave of a man who has died of burns, then quenches it with water and calls for rain.

It is clear that we cannot have a magical ceremony performed on behalf of the whole community, unless accompanied by a general genna.

Phenomena such as earthquakes and eclipses, or the destruction of a village by fire, occasion general gennas. The interest of the village in such phenomena is indisputable, but we also find general gennas occasioned by the death of a man from wounds inflicted by an enemy or by a wild animal, by the death of a man from snakebite or from cholera or smallpox, or by the death of a woman in childbirth. If it is known that epidemic sickness is about, a general genna is proclaimed, and a rite which generally consists of the sacrifice of some animal, is performed by the headman.

There only remains one general genna, that for the purpose of finally laying to rest the ghosts of all who have died within the year. This takes place in the cold weather after the crops have been reaped. In one village where I witnessed the proceedings, the young men donned their best and gayest headgear on this occasion and formed a procession outside the village. As soon as the women inside the village saw the men approaching they began to bewail the dead over the graves which were situated in front of the houses in the village. The women then placed two lighted torches on the graves and, as the procession passed the house, extinguished one torch by water from a bamboo vessel and flung the second torch away behind the house. The procession then went on outside the village where

[1] See *J.A.I.*, 1901, vol. xxxi, p. 303.

the young men engaged in wrestling matches and long jumps until sunset, when all gathered inside the village and spent the evening feasting and drinking. At the time of burial special precautions are taken to lay the ghosts of those whose death has been such as to necessitate a general genna.

Now as to the gennas which we may provisionally regard as extending to individuals only. We have regular gennas at childbirth, name giving, ear-piercing, haircutting, marriage, which are as inevitable as the crop gennas. The genna at birth varies not only according to the sex of the child but in some groups according to the number of children, being always most extended for the firstborn. Naturally the poor mother and the child are particularly exposed to the malice of the evil spirits at the hour of birth. The shedding of blood at birth is regarded as dangerous to all who are in the house, and in exogamous communities it must be remembered that the woman, whose blood is shed, is by birth a member of another sub-section. Hence the marriage prohibition mentioned below. I also think that this has something to do with the custom of *couvade*. The birth genna is closely associated with the worship of the *imung lai* or household deity and is intended to exclude all outside influences. The importance of the name to an individual is a subject on which so much has been written that it is unnecessary for me to discuss it, but the various groups have their own system of giving names to the children. All of these varying methods are instinct with one desire, to find a name which shall bring good fortune. Some leave it to the child to determine its own name, propounding name after name to the howling infant and then when its cries cease, giving it the name last spoken to it. They are quite ready to reinforce this method by recourse to omens or to dreams. In one group the name is given in accordance with fixed principles dependent on the sex and the priority of the child. Nicknames are freely given to eke out the exiguous stock of official names, but each individual has a private name which may not be revealed. If anyone should allow his private name to be known, the whole village is genna for two days and a feast is provided by the offender. Ear-piercing is in one group the occasion of a general genna and is performed on the young children at a set period of the year. The first hair-cutting is an occasion when the child is in some danger unless secluded from the baneful influence. Marriage has a curious prohibition attached to it. In some groups the young couple are forbidden to come together until they have slept under the same roof at least three nights without intercourse. This prohibition is relaxed in the case of the marriage of widows.

The next class of prohibition which I propose to describe is concerned with the food eaten by men and women, especially women at certain periods. We meet with certain general gennas or tabus which are observed by a large group of villages, as in the Maram group no one eats pork, a prohibition which is connected with a curious myth of the origin of the village. The Tangkhuls neither rear nor keep goats, believing that if they did they would go mad or die prematurely. Women who are expectant mothers, are denied many articles of food for fear of harm coming to the unborn child. After the child is born, special food is prescribed for the mother and almost the first food taken by the child is some rice which the father chews and puts in the infant's mouth as a sign that he accepts the paternity of the child. Young unmarried girls are not allowed to taste the flesh of the male of any animal or of female animals which have been killed while with young. The penalty for eating the flesh of a cat is loss of speech, while those who infringe a special rule forbidding the flesh of a dog are believed to die of boils. Again the flesh of animals which have been killed as offerings are, as a rule, forbidden to those who make, or on whose behalf the headman or maiba makes, the sacrifice.

The food gennas which surround the headman, who in many groups is almost entirely without direct authority in secular matters, are elaborate and are designed to protect the man who acts on behalf of the whole subdivision or village on the occasions of general gennas, from any accident which might impair his power. And the prohibitions also extend to his wife. They may not eat buffalo, pork, dog, fowl, or tomatoes. Chastity is required from the headman, who must at all times be content to be the husband of one wife, and who is required to separate himself from even that one on the eve of a general genna. And in one interesting group, which has in the past been troubled by schismatics, the headman may not eat in a strange village nor, whatever the provocation, may he utter a word of abuse. It seems that they hold that violation of any one of these gennas by the headman would bring misfortune on the whole village. The headman has many privileges, and customary rights to the best parts of deer killed in the jungle, to help in his cultivation, and to the first sample of the new brew of beer, and he is also allowed to wear certain special cloths. Others may obtain this privilege but at a great price, for they must erect a stone, a performance which entails considerable expense. The individual who desires this fame, has to cause the people to be genna and has to feed them during the time the prohibition is in force. If the supplies give out, the genna is at an end, for it is without the sanction of the proper authority and may be broken without fear of penalty. I made careful enquiry into the gennas attaching to the erection of stone monuments when investigating a remarkable collection of monoliths in Manipur in a remote village in the hills. A day is fixed by the man who wishes to set up a stone and he sleeps apart from his wife on the eve of the appointed day. He eats some ginger root and drinks some rice beer, but has no other food. He visits a spot where there are stones and selects one from which he cuts a bit. He takes no more food that day or night but has the bit of stone under his head at night. If his dreams portend good luck, he decides to bring the stone up. From this time to the date of the final erection of the stone, he is only allowed to eat ginger and to drink rice beer and for the remainder of his life is forbidden to eat fowls. When the stone is ready, the man gives the whole village a feast, providing rice, salt, beer, and several kinds of meat for three or four days. The villagers do not use their bamboo cups or bowls to drink from but make cups from leaves. The stone is then dragged into position, and from the day when it is erected to the anniversary of the event the man is kept apart from his wife. For the rest of his life the man is entitled to wear the headman's robe and must observe the same food gennas as the headman, always drinking from a leaf cup, not from a gourd bowl, or if he owns a buffalo drinking-horn he must for ever lay it aside. He must not kill any animal he may see while on the way to select a stone or while the stone is being hauled into position. It is believed that the fall of a stone portends the ruin of the descendants of the man who erected it.

Other gennas are occasioned by the birth or death of animals within the house. As a rule the inmates are genna for one day only, but in one village I was told that the genna for the birth of a calf was five days. The death of a cat in a house also gives rise to a tabu on the people of the house for two days, on the second of which the animal is buried by the old women of the village. No other animal is treated with such ceremony and the reason of it is connected with the belief which associates cats with magic. When two villages are about to swear an oath of perpetual peace, they place a cat inside a basket and the two headmen take hold of the basket at either end and then hack the cat in pieces. Both take care to make the first cut at the same moment for the efficacy of the oath depends on the guilt of the slaughter of the cat being shared equally until one or other commits a breach of the oath, when the whole of the guilt attaches itself to the offender. Dr. Farnell questions the use of the term guilt in this matter. The ceremony is intended, no doubt, to make the two villages one by means of the communion in the blood, or, since the blood is often regarded as the soul itself, by means of the communion in the soul of the cat which is a special animal—a god in fact. It is not exactly an oath, for the penalty of a false oath as to what has happened in the past is generally settled by the formula of the oath itself. The ordeal again fails to provide a complete analogue. I still think that there is a trace of an idea of guilt in the ceremony because the necessary and implied correlation of guilt and innocence exists.

Sacrifice is one of the means employed by the people in the treatment of sickness, and is intended to tempt the evil spirit to leave his human host. The treatment of sickness always requires a genna for at least the family of the sick man. The difficulty is to diagnose the spirit which is causing the sickness. In one group it is usual to name all the tribes to the man and the evil spirit will make some sign to the operator when the name of the tribe, to which it belongs, is mentioned. This is a case where I think there is a confusion of ideas. The belief in the ability of men to cause sickness and death by magic is universal, and the evil spirit is held to have been projected by some member of a hostile tribe. There is one class of spirits which in an especial degree is believed to possess the power of causing sickness, the spirit of those who die a violent death, such as those I have enumerated above. They are buried with special rites and are believed to reside in a special heaven of their own.

In another group I have witnessed a magical ceremony, intended to cure a man who had severe fever. After taking the omens by splitting a leaf, the doctor worked himself up into a state of excitement and made a sudden dart on to the patient from whose side he extracted a small piece of stone. He bit the place and then declared that he had expelled the spirit which was causing the sickness. I could not see how he secreted the stone, as he was nearly naked. Among another group which is migratory, I have noticed a curious ceremony for the purpose of ridding a sufferer of the spirit by which he was possessed. Outside the village, a small place was fenced off and near it a platform erected, on which a cock was killed. Inside the fence were six or seven small clay balls, and the ends of the sticks of the fence were tipped by pieces of cotton wool. These people think that the omens of sickness are best taken by breaking eggs, and after the ceremony they hang a string of empty eggshells outside the door, perhaps to show the spirits that they have done all that is necessary.

Warriors, both before and after a raid, are subject to gennas of an interesting nature. They may not cohabit with their wives, and may not eat food cooked by a woman. Indeed, so strong is the genna against any intercourse with women, that on one occasion a woman, the wife of the headman, who was quite ignorant of the fact that her husband was returning with the party of warriors to lay the heads before the war stone, spoke to him. He was under the same genna disability as the warriors, and I was told that, when she learnt the awful thing she had done, she sickened and died. The war stone is sometimes a heap of stones outside the village, and in one case is a mass of conglomerate about seven inches thick, which is kept by the headman and which was shown to me as a great favour.

Origins of Gennas.

The origin of the genna system is bound up with the origins of magic and religion. The development of the communal gennas is associated with the growth of communal feeling which is exemplified in many directions. Among the Meitheis, who have made the greatest progress in material civilisation, we find examples of the way in which gennas may be originated. If a man falls from a tree and is killed, the headman of the clan declares that particular tree to be genna to the members of the clan. Cases of this are known to have occurred quite recently. It is clear that the fiat of the headman could have no validity unless it were in accord with the mental level of the clan that they should recognise that that tree had some special danger for it, and that this danger could be avoided by placing the tree under ban. The communal feeling is primarily associated with blood relationship, and I have said that the exogamous subdivisions of a hill village are believed to have descended from a small group of brothers. I have provisionally applied the adjective individual to certain gennas which were distinguishable from the communal gennas by the fact that they are only observed by the members of one household. I regard these as in reality communal for there is no genna which is limited to one individual only. The tie which binds the members of a household together is the tie of blood, and although the consanguinity of the members of a household is more apparent than the relationship of the members of the several subdivisions, the tie is yet the same.

The head of a household performs certain magical functions and the gennas, classed as individual, demand the same atmosphere of exaltation as the communal gennas. The hierophant in both must be prepared for the rite of which the genna is, as it were, the opening scene, and the effect of gennas is certainly to produce in those engaged in them a tension which is of great psychological interest.

Individual gennas are probably the origin of the communal gennas, because the state of things where every man is his own priest and magician precedes the era of differentiation of functions which bestows on the headman his special privileges and authorises his special tabus. As cases arose where the householders ordinary magic was seen to fail, there arose a need for stronger magic, and with the need the man, who possessed or claimed to possess superior magic, rose into authority. Both in the permanently settled and in the migratory groups, everyone still takes part in the magical ceremonies, the headman is but *primus inter pares*. Even where, as among the Meitheis, the kingship has been developed on its civil rather than on its religious side, no magical ceremonies of the first order can be performed without the co-operation of the king, but since *salus populi suprema lex*, the people participate in the ceremony and the autocrat, the *ningthou*, the almost divine man who does the thing he wills, is in such moments a constitutional monarch, the servant of his people.

Gennas and Magic and Religion.

We have among these groups two classes of supernatural beings, a creator who is in most cases held to have lost all interest in man and his doings, but whose sons are active deities, lords of the after-world, judges of the dead—and there are countless spirits, household spirits, spirits of the trees, of the rivers, of the pools, of the mountain passes. Man cannot propitiate the higher gods; he can influence, he can placate, he can bend to his will the lower spirits. Such worship as there is, is worship of the higher gods, but the lower spirits are the object of man's magic. I know it is not easy to distinguish between religion and magic, but notwithstanding the objections to which it may be open, the standard laid down by Sir Alfred Lyall[1] will serve my purpose well enough. According to my reading of the definition: religion implies the recognition by man of his inferiority to and dependence on the supernatural powers, while magic is the sense in man of his ability to control and constrain to his will these powers. Prayer is religious, sacrifice is religious, but they may easily degenerate into magical rites. Gennas, as I regard them, are either ancillary to rites which may be either religious or magical, or gennas may be the essence of the rite. In deciding, whether any genna of the first kind is attached to a religious or to a magical rite, I look in the first instance to the purpose of the rite, and then to the sanctions which validate the rite.

The communal gennas for the crops are magical in my opinion, because (1) the purpose of the rite is to protect the crops from harm by removing from the spirits

[1] *Asiatic Studies*, vol. i, p. 102.

all legitimate opportunity for harm; (2) the obvious purpose is to cause all the strength of the village to be conserved, thus by sympathy ensuring the conservation of the strength of the rice; and (3) the sanction of the rite is derived from the belief that the rice has a soul or spirit, which is affected by the doings of the cultivator, and the belief that the soul of the rice is exposed to injury by spirits if an occasion is afforded them.[1] The gennas all seem to me to lack spontaneity, that is they follow automatically on certain events, and I think it is difficult to find one which is decisively and entirely religious. The headman is bound to declare a genna when a man is killed by an enemy, and the ceremony therefore lacks an element which should be present in a religious rite.

I have referred to the atmosphere of exaltation, which gennas produce, and I need hardly mention that, though the means differ, this state of excitement and anticipation is a notable feature of the "mysteries" of the classical past, and of primitive peoples of to-day. So, too, the association of the mysteries with certain prohibitions which are of a practical nature as those which, in the case of the people I have described, give a close-time to the game, or which surround the headmen with sacred attributes, finds its parallel in the lessons which are taught to the young initiate as he is gradually made perfect in tribal lore.

Many gennas, communal and individual, are protective. We know, for instance, that the destruction of a village by fire is not from a materialistic point of view a very serious calamity. A village is soon rebuilt, the jungle is close at hand, and provides all that is necessary, but such an occurrence shows the people that spirits inimical to the village are about and active. In so far as the genna is intended to mitigate the displeasure of the spirits, I should regard it as religious, but, since the general belief is that the performance of the rite prevents the spirits from doing further damage, the genna is magical. Many of the individual gennas are clearly magical. Those connected with sickness are magical, for the theory of sickness is that all illness is due to possession by some spirit. Even the cases where the genna is preliminary to a sacrifice are instances of magic where the sacrifice is not intended to propitiate the spirit, but to lure him from the body of the patient. I am quite prepared to admit that these cases are on the border line between religion and magic, because the control of the operating priest or magician is to be regarded as rather less complete than in the cases where the spirit is held to have no option but to obey. Individual gennas such as those at birth, name giving, marriage, are certainly magical and intended to afford protection against harm from spirits who at those moments are specially active.

It is possible in nearly all instances of adjective or ancillary gennas to avert the consequences of a violation of the rite and to place the community in a position of safety by repeating the genna at the expense of the offender. Thus for

[1] There may also be a practical end in view, for, in the settled groups where the gennas are longest and most numerous, the cultivation which, of course, profits by constant attention, is intensive, while the cultivation of the migratory groups is extensive and their genna system is restricted.

an example, if a man by some misfeasance spoilt the initial crop genna, he might straighten matters out by providing a village feast and having the ceremony repeated. If, however, a man beat a drum or blew a bugle while the crops were in the ground or unharvested, not only would his own crops fail but the crops of the whole village would suffer, if not then, at any rate in the near future. The sanction which gives validity to other gennas is not so obvious, not that this in any degree impairs the validity imparted, for *omne ignotum pro magnifico*. The sanctions which are found to be the source of the strength of the gennas protecting the headman are interesting, for they show that the community has an especial interest in his safety and in his observance of these rules. If he were to break them either accidentally or of set purpose, some dreadful calamity would happen. There has never been an instance of a violation of any of his tabus, so that the exact nature of the penalty is still unascertained.

It will have been observed that the negative aspect of the gennas is prominent. Most, if not all of them, prohibit some act which may at other times or by other persons be performed with immunity from bad results. Positive gennas which enjoin the performance of acts, under penalty, are rare, but, as some at least of the gennas are in effect legislative, the form they assume is worthy of note.

I see in these genna customs the foundation of all communal life, for the primary lesson they teach, whether directly or indirectly, is that harm to one is harm to all, and that the strength of all is greater than the strength of one. They give force to social and industrial legislation and, by creating an artificial atmosphere of exaltation, they stimulate the feelings of mystery and awe which are at the bottom of a good deal of what is popularly called religion. When danger threatens man, his desire to live prompts him to plot means whereby he may avoid the danger. Thus when events indicate that "the electric current is on the rails," none dare move across or into the danger zone unless duly insulated by a genna. When a man inherits or arrogates to himself the high privileges attaching to the headship of one of these clans, he is placed on an eminence of danger. On him will fall the first discharge of supernatural activity. Therefore he protects himself by all this ritual of genna. The spirit host cannot touch him, for he is conscious that he is *integer vitae scelerisque purus*.

NOTES ON A COLLECTION OF ANCIENT ESKIMO SKULLS.

By J. Brierley, B.A., F.R.G.S., with an Explanatory Note by F. G. Parsons.

On August 1st, 1905, I sailed from Copenhagen on board s.s. *Hans Egede* belonging to "Deu Kongelige Gisalandske Handel" of Copenhagen. On August 9th we made Cape Farewell, and early on the morning of Saturday, August 12th, arrived at Godthaab, the capital of South Greenland. There I was not fortunate enough to obtain any skulls, though, had I arrived a few weeks earlier, I could have obtained a good number, as the old graveyard had only lately been dug up and the remains there transferred to the present site. However, since Godthaab has been the site of a Danish colony for nearly 300 years and the Eskimo there are of a very impure type, I could not have been certain that the skulls I might have procured were not Danish, or at any rate half-breeds. From Godthaab I proceeded north to Holstensborg. A couple of miles from that place there are the remains of an old Eskimo settlement, uninhabited since 1857, in which year a pestilence of small-pox annihilated the inhabitants. From tombs near that site I obtained seven specimens. The tombs are situated on a hill on King Frederick VII. Island in Holstensborg Fiord. From Holstensborg we sailed to Egedesminde, where I found plenty of remains, but, owing to the damp situation of the tombs, they were quite worthless as specimens. On August 18th we arrived at the colony of Christianshaab. There I visited the site of the former Eskimo settlement whence the inhabitants removed to the present Christianshaab on the founding of the colony by the Danes in 1734 A.D. There I found five skulls (Nos. 8–12). Some distance out in Disco Bay, on the rocky island of Rybeholm, I came across an isolated Eskimo grave, from which I took one skull (No. 13). From Christianshaab I proceeded to Umanak. The colony there is of recent date, and there are no old Eskimo tombs in the immediate neighbourhood. However, I made one of an expedition proceeding up Umanak Fiord to the settlement of Ikerasak. On our journey up the fiord we stopped for rest and to make a meal at the uninhabited island of Storoer, where quite by chance I found skull No. 14 in a grave which had contained two corpses. The other skull was in a crumbling state. At Ikerasak, which is, and always has been, inhabited only by Eskimos, I found the last three specimens in my collection from graves which date from before the time of the conversion of the Greenlanders to Christianity.

To save myself as far as possible from taking skulls of Europeans in mistake for Eskimo, I always on arrival at a colony consulted the Danish Governor, who, with the aid of the colony's records and archives, gave me all the information he could concerning the burial places of the heathen Eskimo before the arrival of the Danish colonists. I acted on his advice and with his permission. The method of burial employed consisted of laying the corpse, fully dressed, upon the bare rock and placing over it a rough cairn of large flat stones as a protection against the depredations of bears, foxes, or dogs. With the sole exception of Egedesminde, the sites were remarkably dry—the rainfall in the summer in Greenland is very small—and always, as far as I can remember, faced south. In some cases the skins in which the corpses were clothed still preserved their hair. As a proof that decay is very slow in that climate, I may state that I heard, on good authority, instances of the corpses of Roman Catholic priests buried not later than the fifteenth century at Frederiksdal, South Greenland, and unearthed a few years ago, still showing their cowls practically undecayed.

No. 1. *Probably a female over thirty years of age.*

Norma verticalis.—Phænozygous. Sutures moderately simple. Parietal eminences well marked. No parietal foramina. Sagittal suture open externally, closed internally.

Norma lateralis.—Spheno-maxillary fissure moderate. One malar foramen on left, 6 mm. from orbital margin, none on right. Lower border of malar straight. Mastoid processes very small. Pterion H-shaped. Alisquamous suture straight. Length of zygomatic process of temporal 4·9 cm. from middle root to anterior end of zygomatico-malar suture. External pterygoid plates 15 mm. broad.

Norma facialis.—Scapho-cephalic. Supraciliary eminences not prominent. Supra-orbital foramen on right, broad notch on left. Long axis of orbital margin distinctly down and out. Infra-orbital foramen 6 mm. below orbital margin on left, 7 mm. on right. Exceedingly narrow nasal bones. Base of apertura pyriformis, W-shaped.

Norma basilaris.—Only two teeth (first molars), which though worn, are very good. The sockets for the rest are perfect. Very long foramen ovale. Anterior condylar foramen double internally on both sides. Basi-occipital very flat. Eustachian process of petrous bone present. Foramen magnum asymmetrical.

Norma occipitalis.—Lambdoid suture well serrated. Small mastoid foramina both sides. Contour of skull, a pentagon.

No. 2. *Male over thirty years of age.*

Norma verticalis.—Phænozygous. Sutures obliterated internally but not externally. Right parietal foramen double, left single. Sagittal suture becoming obliterated anteriorly on its cranial aspect.

Norma lateralis.—Orbital process of malar very wide. Marginal tubercle of malar well marked on right, slight on left. One malar foramen on both sides, 8 mm. from orbital margin. Lower border of malar straight. Mastoid processes small. Length of zygomatic process of temporal 5·1 cm. from middle root to anterior end of zygomatico-malar suture. Lower margin of external auditory meatus thick and rough. External pterygoid plates 16 mm. broad.

Norma facialis.—Scapho-cephalic. Supraciliary eminences fairly prominent. Two supra-orbital foramina on left, single notch on right. Long axis of orbital margin down and out. Double infra-orbital foramina on both sides 7 mm. below orbital margin. A suture runs down to this foramen from margin of orbit on left side. Base of apertura pyriformis, W-shaped. Considerable plagiocephaly.

Norma basilaris.—Three teeth which are worn but sound. All the sockets for the rest are perfect. Large anterior condylar foramina. Posterior condylar foramen present on left. Basi-occipital rounded. Eustachian process of petrous bone present.

Norma occipitalis.—Lambdoid suture well serrated. Small mastoid foramina on both sides. Contour of skull, a pentagon.

No. 3. *Male, probably over forty years of age.*

Norma verticalis.—Phænozygous. Sutures partly obliterated externally, completely internally and moderately simple. Parietal foramen present on right. Parietal eminences well marked.

Norma lateralis.—Spheno-maxillary fissure large. Orbital process of malar very wide. Marginal tubercle of malar slight. Malar foramen on left 7 mm. from orbital margin. Pterion had been H-shaped. Alisquamous suture straight on right, convex on left. Mastoid processes moderate. Zygomatic process of temporal 5·1 cm. from middle root to anterior end of zygomatico-malar suture. External pterygoid plates 15 mm. broad.

Norma facialis.—Distinctly scapho-cephalic. Supraciliary eminences not prominent. Supra-orbital notch larger on left than on right. Long axis of orbital margin slightly down and out. Infra-orbital foramen 9 mm. below orbital margin on both sides. On the right there is a second small foramen at the junction of the inner $\frac{1}{3}$ with outer $\frac{2}{3}$ of lower margin of orbit and 6 mm. from it. No infra-orbital fissure.

Norma basilaris.—Teeth, premolar and molar, worn and stained but very good. Perfect alveoli for incisors and canines. Marked median antero posterior elevation of palate. Right jugular foramen much larger than left. Posterior condylar foramen on right. Basi-occipital broad and flat. Foramen magnum asymmetrical. Eustachian process of petrous bone present. Articular facet on basi-occipital.

Norma occipitalis.—Lambdoid suture beginning to close externally about its middle on each side and well serrated. Mastoid foramen large on right, small on left. Contour of skull, a pentagon.

No. 4. *Male, probably between thirty and forty years of age.*

Norma verticalis.—Phænozygous. Sutures patent externally; the coronal is very simple and is closing internally, sagittal more serrated and patent both internally and externally. Parietal foramen on left. Parietal eminences well marked.

Norma lateralis.—Malar bone very thick. Marginal tubercle of malar well marked. No malar foramina. Lower border of malar straight. Pterion H-shaped. Alisquamous suture straight. Mastoid processes small. Marked occipital bulging below lambda. Zygomatic process of temporal 4·9 cm. from middle root to anterior end of zygomatico-malar suture.

Norma facialis.—Scapho-cephalic, but not markedly so. Supraciliary eminences moderately prominent. Double supra-orbital foramen on left, single on right. Small foramina present on both sides in frontal bone, on right 1·1 cm. above orbital margin and 1 cm. from mid-line, on left 1·1 cm. above orbital margin and ·9 cm. from mid-line. Long axis of orbital margin down and out. Infra-orbital foramina large, with suture present on both sides 1 cm. below orbital margin on left, 8 mm. on right. Nasal bones very slight. Base of apertura pyriformis narrow and V-shaped.

Norma basilaris.—Canine, premolar and molar teeth very sound but moderately worn. Perfect alveoli for incisors. Right jugular foramen much larger than left. Small carotid canal. Posterior condylar foramina present on both sides. Basi-occipital broad and flat. Eustachian process of petrous bone present but feebly marked.

Norma occipitalis.—Lambdoid suture patent and well serrated. No mastoid foramina. Contour of skull, a pentagon.

No. 5. *Male, probably between thirty and forty years of age.*

Norma verticalis.—Phænozygous. Sutures simple, coronal and anterior half of sagittal obliterated internally and for an inch at bregma externally. Parietal foramina present on both sides. Parietal eminences well marked.

Norma lateralis.—Orbital process of malar wide. Marginal tubercle of malar slight. No malar foramina. Lower border of malar straight. Mastoid processes moderate. Zygomatic process of temporal 5·3 cm. from middle root to anterior end of zygomatico-malar suture. Lower margin of external auditory meatus moderately thickened. External pterygoid plate 20 mm. broad.

Norma facialis.—Very scapho-cephalic. Supraciliary eminences fairly prominent. Supra-orbital foramina on both sides. Long axis of orbital margin nearly horizontal. No infra-orbital suture. Infra-orbital foramen 1 cm. below orbital margin on left, 1·1 cm. on right. Base of apertura pyriformis W-shaped.

Norma basilaris.—Teeth, three molars on left, one on right, sound and good. Median antero-posterior elevation of palate. Alveoli of other teeth perfect. Right jugular foramen larger than left. Carotid canal moderate. Condyles large and distinctly convex. Large foramina ovalia. Posterior condylar foramen present on right. Basi-occipital broad and flat. Foramen magnum asymmetrical.

Norma occipitalis.—Lambdoid suture open and very simple. No mastoid foramina. Contour of skull, a pentagon.

No. 6. *Male, probably between twenty and thirty years of age.*

Very imperfect.

Norma verticalis.—Phænozygous. Sutures all patent externally and internally and moderately serrated. No parietal foramina. Parietal eminences well marked. Skull looks constricted at coronal suture.

Norma lateralis.—Marginal tubercle of malar moderately marked. Two malar foramina on left 7 mm. from orbital margin, three on right arranged concentrically to orbital margin. Lower border of malar straight. Pterion H-shaped. Very small mastoid processes. Occipital bulging below lambda. Zygomatic process of temporal 5 cm. from middle root to anterior end of zygomatico-malar suture. Alisquamous suture straight. External pterygoid plates broken. Lower margin of external auditory meatus moderately thickened.

Norma facialis.—Very scapho-cephalic. Supraciliary eminences prominent. Supra orbital foramen single on right, double on left. The whole of the facial aspect of the skull is destroyed.

Norma basilaris.—Posterior condylar foramen on left only. Basi-occipital broad and flat. Slight articular facet on basi-occipital.

Norma occipitalis.—Lambdoid suture patent and very simple. No mastoid foramina. Contour of skull, a pentagon.

No. 7. *Male, probably between twenty and thirty years of age.*

Norma verticalis.—Phænozygous. Sutures open both externally and internally and moderately simple. Parietal eminences well marked. No parietal foramen.

Norma lateralis.—Spheno-maxillary fissure very large. Marginal tubercle well marked on right, not on left. Two malar foramina on right 8 mm. from orbital margin and parallel with it. One on left 6 mm. from it. Lower border of malar straight. Pterion H-shaped. Mastoid processes moderate. Zygomatic process of temporal 4·6 cm. from middle root to anterior end of zygomatico malar suture. Alisquamous suture moderately straight. Lower margin of external auditory meatus thickened. External pterygoid plates 14 mm. broad.

Norma facialis.—Scapho-cephalic. Supraciliary eminences not well marked. Long axis of orbital margin slightly down and out. Infra-orbital foramen 9 mm. below orbital margin. Base of apertura pyriformis W-shaped. Infra-orbital suture closed, but there is a suture internal to where it should be running down parallel to the margin of the nasal aperture and ending in a foramen situated 12 mm. above and internal to the infra-orbital foramen.

Norma basilaris.—No teeth. Sockets all good. Remains of pre-maxillo-maxillary suture. Median antero-posterior elevation of palate. Basi-occipital broad and flat. Eustachian process present on both sides.

Norma occipitalis.—Posterior condylar foramen on right only. No mastoid foramen on either side.

No. 8. *Male, probably of considerable age.*

Right side of face very imperfect.

Norma verticalis.—Phænozygous. Sutures open externally, closed internally, and well serrated. Right parietal foramen present. Parietal eminences well marked.

Norma lateralis.—Marginal tubercle of malar slight. Lower border of malar and zygoma curved. Long mastoid processes. Alisquamous suture convex forward. Zygomatic process of temporal 4·4 cm. from middle root to anterior end of zygomatico-malar suture. Lower margin of external auditory meatus not at all thickened.

Norma facialis.—Not scapho-cephalic. Supraciliary eminences very prominent. Large supra-orbital notch on left. Long axis of orbital margin distinctly down and out. Infra-orbital foramen on left 6 mm. below orbital margin. No infra-orbital foramen.

Norma basilaris.—Subject was edentulous when he died. Right jugular foramen much larger than left. No posterior condylar foramen. Very long styloid processes. Basi-occipital not so flat as in the other skulls. Pharyingeal spine well marked. Condyles large and very convex. No Eustachian processes.

Norma occipitalis.—Lambdoid suture well serrated. Mastoid foramen on both sides. Contour of skull a circle flattened below.

Note.—It is of interest to notice that this skull is markedly brachy-cephalic as well as not scapho-cephalic. It probably is not an Eskimo skull at all.

No. 9. *Male, probably between twenty and thirty years of age.*

Norma verticalis.—Phænozygous. Sutures open internally and externally and well serrated. To frontal bone the dried scalp with some hair is still adherent. Right parietal foramen present.

Norma lateralis.—Spheno-maxillary fissure large. Very massive malar bones with very wide orbital processes. On right, two malar foramina parallel to orbital margin and 6 mm. from it. On left, single foramen 7 mm. from orbital margin. Lower border of malar not so straight as in most of the others. Pterion H-shaped. Large mastoid processes. Alisquamous suture convex anteriorly. Zygomatic process of temporal 5·4 cm. from middle root to anterior end of zygomatico-malar suture. External pterygoid plates 10 mm. broad. Lower margin of external auditory meatus not specially thickened.

Norma facialis.—Scapho-cephalic. Supraciliary eminences prominent. Long axis of orbital margin distinctly down and out. Infra-orbital foramina very large, left 1·1 cm., right 1 cm. below orbital margin. Infra-orbital suture present on left, not on right. Base of apertura pyriformis very horizontal and flat.

Norma basilaris.—Five teeth, four molars and one premolar, sound and good but worn. Sockets for the others perfect. Posterior condylar foramina present on both sides. Basi-occipital moderately broad and flat. Foramen magnum asymmetrical.

Norma occipitalis.—Lambdoid suture open and moderately serrated. Very marked external occipital protuberance. Mastoid foramina present on both sides Contour of skull, a pentagon.

No. 10. *A child about ten years old.*

Norma verticalis.—Cryptozygous. Sutures open externally and internally and moderately serrated. No parietal foramen.

Norma lateralis.—Temporal bulging of frontal below temporal ridge. Marginal tubercle of malar well marked. On right there is a malar foramen 7 mm. from orbital margin. On left two very small ones. Lower border of malar straight. Pterion H-shaped. Small mastoid processes. Alisquamous suture moderately convex forward. Zygomatic process of temporal 5·2 cm. from middle root to anterior end of zygomatico-malar suture. External pterygoid plates 10 mm. broad. Lower margin of external auditory meatus moderately thickened.

Norma facialis.—Scapho-cephalic. Supraciliary eminences not well marked. Nasal bones do not reach frontal. Long axis of orbital aperture nearly horizontal. A suture runs from root of nasal process of superior maxilla nearly to the infra-orbital foramen. Infra-orbital foramen 6 mm. below orbital margin on right, 7 mm. on left. Infra-orbital suture closed. Base of apertura pyriformis W-shaped.

Norma basilaris.—Teeth, two milk premolars and first permanent molar on each side, second molar just showing, canine not cut. Milk premolars worn. All sound. Condyles flat. Basi-occipital broad and flat. Hamular process very thick and strong. Basi-occipito-sphenoid suture open. Eustachian process of petrous bone present.

Norma occipitalis.—Lambdoid suture open and moderately serrated. Mastoid foramen present on right. Contour of skull, a pentagon.

No. 11. *Probably a female between thirty and fifty years of age.*

Norma verticalis.—Phænozygous. Sutures open externally, closed internally, and very simple. Parietal foramen absent. Parietal eminences moderately marked.

Norma lateralis.—Marginal tubercle of malar slight. Two malar foramina each side. Lower border of malar straight. Bulging of frontal below temporal crest. Alisquamous suture straight. Pterion H-shaped. Mastoid processes moderate. Zygomatic process of temporal 4·8 cm. from middle root to anterior end of zygomatico-malar suture. Lower margin of external auditory meatus thick. External pterygoid plates 19 mm. broad.

Norma facialis.—Scapho-cephalic. Foramen in frontal, leading from orbit, at junction of outer third and inner two-thirds of superior margin of orbit, opening 9 mm. above margin. Supra-orbital foramen on left, notch on right. Long axis of orbital margin nearly horizontal. Large infra-orbital foramina 6 mm. below orbital margin. Infra-orbital suture present on both sides.

Norma basilaris.—Teeth, molars, premolars, and canines, sound but worn. Alveoli for others perfect. Canal on left for temporal branch of third division of fifth nerve, just external to foramen ovale. Carotid canal small. Condyles distinctly convex. Posterior condylar foramen present on both sides. Basi-occipital broad and flat. Eustachian process of petrous bone present.

Norma occipitalis.—Lambdoid suture moderately serrated.

No. 12. *Male, probably over fifty years of age.*

Norma verticalis.—Very phænozygous. All sutures obliterated except squamous externally and internally. Right parietal foramen present. Parietal eminences well marked.

Norma lateralis.—Spheno-maxillary fissure large. One malar foramen on each side; that on the left being 7 mm., that on the right 5 mm. from orbital margin. Lower border of malar straight. Alisquamous suture straight. Mastoid processes moderate. Zygomatic process of temporal 5·2 cm. from middle root to anterior end of zygomatico-malar suture. Lower margin of external auditory meatus thickened. External pterygoid plates 15 mm. broad.

Norma facialis.—Scapho-cephalic. Supraciliary eminences prominent. Single supra-orbital foramen on right, foramen and notch on left. In frontal bone there is a double foramen on right 9 mm. above orbital margin and 16 mm. from mid-line. Long axis of orbital margin nearly horizontal. Very large infra-orbital foramen on left 6 mm. below orbital margin, that on right being 7 mm. below the margin. Infra-orbital sutures present on both sides. In each of the nasal bones is a circular foramen. Base of apertura pyriforimis W-shaped.

Norma basilaris.—Three molar and one premolar teeth very much worn. The alveoli show that some of the others had been lost during life. Left jugular foramen larger than right. Large foramina ovalia. Posterior condylar foramina on both sides. Basi-occipital broad and flat. Eustachian process of petrous bone present.

Norma occipitalis.—Lambdoid suture obliterated. Small mastoid foramina present on both sides. Contour of skull, a pentagon.

No. 13. *Male, probably between twenty and thirty years of age.*

Norma verticalis.—All sutures open externally and internally and fairly simple. Left parietal foramen present. Parietal eminences very well marked.

Norma lateralis.—Spheno-maxillary fissure large. On both sides there is a single malar foramen 8 mm. from orbital margin. Lower border of malar straight. Pterion H-shaped. Alisquamous suture straight. Mastoid processes moderate. Zygomatic process of temporal 5·6 cm. from middle root to anterior end of zygo-matico-malar suture. Lower margin of external auditory meatus thickened. External pterygoid plate 18 mm. broad.

Norma facialis.—Scapho-cephalic. Supraciliary eminences not prominent. Supra-orbital foramen on both sides. Very narrow nasal bones. Long axis of orbital margin distinctly down and out. Infra-orbital suture obliterated. Infra-orbital foramina 1 cm. below orbital margin on both sides. Base of apertura pyriformis U-shaped.

Norma basilaris.—Teeth, first and second right upper molars worn but very good. All other sockets perfect. Slight median antero-posterior elevation of palate. Right jugular foramen much larger than left. Posterior condylar foramina present on both sides. Basi-occipital broad and flat. Foramen magnum asymmetrical. Eustachian process of petrous bone present.

Norma occipitalis.—Lambdoid suture open and very simple. Mastoid foramen on both sides. Contour of skull a pentagon.

No. 14. *Male, probably about fifty years of age.*

Norma verticalis.—Phænozygous. All sutures obliterated externally and internally. Right parietal foramen present. Parietal eminences well marked.

Norma lateralis.—Spheno-maxillary fissure very large. Orbital process of malar very wide with a vertical ridge on it in the temporal fossa. Three malar foramina in a row 5 mm. from the orbital margin and parallel with it on right, two on left. Lower border of malar straight. Pterion had been H-shaped. Alisquamous suture straight. Mastoid processes moderate with no suture. Slight occipital bulging below lambda. Zygomatic process of temporal 5·3 cm. from middle root to anterior end of zygomatico-malar suture. Lower margin of external auditory meatus thickened. External pterygoid plates 16 mm. broad.

Norma facialis.—Scapho-cephalic. Supraciliary eminences prominent. Double supra-orbital foramina on left, single on right. Long axis of orbital margin slightly down and out. A suture runs down to infra-orbital foramen from margin of orbit at the base of the nasal process of maxilla. It is not the infra-orbital suture as this is nearly obliterated. In this, on left, are two small foramina. Infra-orbital foramen 8 mm. below orbital margin on right, 9 mm. on left. Base of apertura pyriformis very horizontal and flat.

Norma basilaris.—Nine teeth very sound and good but greatly worn, remain. Alveoli for others perfect. Median antero-posterior elevation of palate. Carotid canal very small. Left jugular foramen much larger than right. Anterior condylar foramen double on left, single on right. Condyles small and distinctly convex. Posterior condylar foramen present on both sides. Basi-occipital looks very broad owing to great flatness. Small Eustachian process.

Norma occipitalis.—Lambdoid sutures obliterated near and at lambda and moderately serrated. Contour of skull, a pentagon. Mastoid foramen very small on both sides.

No. 15. *Male, probably between twenty and thirty years of age.*

Norma verticalis.—Sutures open externally and internally and moderately simple. The right coronal is obliterated, as the result of a healed comminuted fracture in the neighbourhood. No plagiocephaly has resulted. No parietal foramen. Parietal eminences well marked.

Norma lateralis.—Orbital process of malar wide. Marginal tubercle of malar well marked. Single malar foramen on each side, that on left being 6 mm., that on right 5 mm. from orbital margin. Pterion H-shaped. Moderate mastoid processes. Zygomatic process of temporal 4·9 cm. from middle root to anterior end of zygomatico-malar suture. Lower margin of external auditory meatus thickened Alisquamous suture straight. Lower margin of zygomatic arch straight. External pterygoid plate 16 mm. broad.

Norma facialis.—Extremely scapho-cephalic. Supraciliary eminences prominent. Supra-orbital foramen on left, notch on right. In each nasal bone is a foramen. A suture runs down from root of nasal process of maxilla on each side. Infra-orbital foramina large, that on left being 8 mm. that on right 6 mm. below orbital margin. Base of apertura pyriformis W-shaped.

Norma basilaris.—Three teeth (first molars and right canine) in good condition but worn flat. Alveoli all sound. Posterior condylar foramina, of which the right is larger, present on both sides. Very large foramina ovalia, especially the right. Basi-occipital broad and flat. Eustachian process of petrous bone present.

Norma occipitalis.—Lambdoid suture open and well serrated. Small mastoid foramina on both sides. Contour of skull, a pentagon.

No. 16. *Probably a female between thirty and forty years of age.*

Norma verticalis.—Phænozygous. Sagittal suture obliterated in posterior half externally and internally. Coronal patent externally and internally. Remains of hair. Parietal eminences not well marked.

Norma lateralis.—Spheno-maxillary fissure large. Orbital portion of malar very wide with a vertical ridge on it in the temporal fossa. Marginal tubercle very marked. One malar foramen 7 mm. from orbital margin on both sides. Lower border of zygomatic arch flat. Mastoid processes moderate. Suture present. Pterion of H-shaped. Zygomatic process of temporal 3·6 cm. from middle root to anterior end of zygomatico-malar suture. Alisquamous suture straight. Thickened lower margin of external auditory meatus. External pterygoid plate 12 mm. broad.

Norma facialis.—Scapho-cephalic. Supraciliary eminences not very prominent. Double supra-orbital foramen on left, single on right. Long axis of orbital margin down and out. Infra-orbital foramina 6 mm. below margin of orbit. Base of apertura pyriformis very horizontal and flat. Infra-orbital sutures obliterated. Remnants of metopic suture for 15 mm. above nasion.

Norma basilaris.—Teeth, second premolars and molars, present, worn but very good. Sockets for the rest perfect. Carotid canal large. Right jugular foramen larger than left. Eustachian process of petrous bone present. Basi-occipital broad and flat.

Norma occipitalis.—Upper half of supra occipital divided into three separate bones arranged symmetrically side by side. Lambdoid suture occluded internally in its upper half.

No. 17. *Male, probably between twenty and thirty years of age.*

Norma verticalis.—Phænozygous. Sutures open. Coronal and sagittal very simple. Inter-parietal os Incae present. Parietal eminences well marked. Right parietal foramen present.

Norma lateralis.—Spheno-maxillary fissure large. Marginal tubercle of malar well marked. One malar foramen on left 7 mm. from orbital margin. Two on right 8 mm. from orbital margin. Mastoid processes moderate. Groove on mastoid part of temporal for posterior auricular artery. Zygomatic process of temporal 4·9 cm. from middle root to anterior end of zygomatico-malar suture. Alisquamous suture straight. Lower border of zygomatic arch flat. Lower margin of external auditory meatus not thickened. External pterygoid plates 17 mm. broad.

Norma facialis.—Scapho-cephalic. Supraciliary eminences prominent. Double supra-orbital foramen on right, single on left. Infra-orbital foramina very large, 6 mm. below orbital margin on left, 5 mm. on right. Infra-orbital sutures present. Long axis of orbital margin down and out. Suture to infra-orbital foramen from margin of orbit on both sides. Very narrow nasal bones.

Norma basilaris.—Teeth, first and second molars and right canine, sound but worn. Median antero posterior elevation of palate. Carotid canal large. Right jugular foramen larger than left. Basi-occipital broad and flat. Eustachian process of petrous bone present.

Norma occipitalis.—Lambdoid suture open and but slightly serrated. No mastoid foramen. Contour of skull, a pentagon.

Conclusions and Generalisations by F. G. Parsons, F.R.C.S., Lecturer on Anatomy at St. Thomas's Hospital and the School of Medicine for Women.

My pupil Mr. Brierley has collected these skulls and has been at considerable pains to get specimens of those of the heathen Eskimo before they were modified by any mixture with European blood. He has also made all the calculations and measurements, but he has felt that, possibly, the results of his work would be enhanced if someone with wider experience of skulls were to summarise his results, and this it has been a great pleasure to me to do. To minimise as far as possible the risk of error, I have watched his measurements, and in most cases have repeated them. Wherever we differed the measurements have been repeated at least twice, so that I believe that the records are trustworthy. The capacities have all been taken at least twice with shot in the way which I learnt many years ago from Mr. McAra, who made so many measurements for Sir Wm. Flower at the Royal College of Surgeons Museum. As a matter of fact, the capacities as measured by Mr. Brierley and by myself seldom differed by more than a few cubic centimetres; when they did, we re-measured them twice together.

With a view to testing some of the chief methods of estimating the capacity from external measurements as applied to Eskimo crania, a table has been prepared contrasting the methods of Manouvrier, Madame Pelletier and Pearson and Lee. It will be seen that the last method gives an average nearest to that obtained by the shot measurements, though, in individual cases, there is sometimes a difference of more than 100 c.c. between the estimate and the actual measurement. No. 5, for instance, took 1,400 c.c. of shot, but by Pearson and Lee's method it should have taken 1,550 and by Manouvrier's 1·562 c.c.

In spite of Mr. Brierley's care, we fear that one skull (No. 8) is not that of an Eskimo; it may possibly be that of an European sailor or whaler who died among them.

We have been greatly indebted to Dr. Duckworth's paper on Eskimo craniology (*Journ. Anthrop. Inst.*, 1900, p. 125), and shall refer to it frequently.

Anyone using the tables should bear in mind that No. 8 is probably not an Eskimo skull, though we have included it, in case other anthropologists should take a different view, also that No. 10 is that of a child about ten years old.

The following are the chief conclusions arrived at :—

1. All the skulls except No. 8 are markedly dolichocephalic, the average cephalic index, exclusive of Nos. 8 and 10, being 73·8. Duckworth obtained an average of 71·8 from ten skulls at Cambridge.
2. I have found it more difficult to distinguish between male and female skulls than in any other collection I have worked through. Nos. 1, 11, and 16 are, I believe, those of females, but this small proportion does not altogether surprise me, for in almost any collection the males outnumber the females, though perhaps not so greatly. Doubtless the greater fragility of the female skull makes fewer of them worth preserving as specimens.
3. All the skulls, with the exception of No. 8, are scapho-cephalic. Of course, in recognising scapho-cephaly the personal equation has to be dealt with, but I do not think that any anthropologist would hesitate to regard any of these as scapho-cephalic. It is interesting to notice that in the ten-year-old child scapho-cephaly is quite evident. Out of twenty-eight Eskimo skulls in the College of Surgeons Museum, Duckworth found eleven which were strongly scapho-cephalic, but he does not say whether the rest were less so. It would be an advantage if anthropologists agreed on an arbitrary angle below which a skull should be regarded as scapho-cephalic.
4. With regard to the closure of sutures, I believe that the internal closure is the only point of real interest (see "Relation of the Cranial Sutures to Age," by Parsons and Box, *Journ. Anthrop. Inst.*, vol. xxxv, p. 30, and "The Closure of the Cranial Sutures a Sign of Age," by T. Dwight, *Boston Medl. and Surgl. Journ.*, vol. cxxii, No. 17, p. 389), since it occurs first, and, when once it has occurred, the shape of the skull is fixed. In this collection Nos. 4, 6, 7, 9, 10 (child), 13 and 15, have the sagittal suture open internally as well as externally, yet they are all scapho-cephalic. I therefore agree with Duckworth that

Virchow's conclusion, that scapho-cephaly is due to premature closure of the sagittal suture, does not hold good for Eskimos. As is usual in Eskimo crania, the ectocranial outline of the sutures is very simple, but there is more serration in the lambdoid than in the others. I believe that there are evidences that, with this simplicity, the sutures close externally at an earlier date in Eskimo crania than in those of Europeans.

5. The infra-orbital suture is present on the face, on one side or the other, in nine out of fifteen of these skulls (60 per cent.). Duckworth found it in 81 out of 185 skulls he examined (44 per cent.). It is possible that in the older, pure blooded Eskimo this characteristic was commoner than in the modern.
6. Asymmetry of the foramen magnum is not a characteristic of these skulls.
7. An additional facet on the front of the foramen magnum was noticed in three out of 185 skulls by Duckworth. It occurred in two of our sixteen (available).
8. Eustachian processes were found by Duckworth in two out of fifty-five Eskimo skulls. He says that they were large, and, apparently, he did not look for anything which was not a striking feature. I find that, on looking closely, twelve out of sixteen skulls show a small but very definite process just in front of the opening of the carotid canal and behind that of the Eustachian tube; sometimes there is a little pit in it. It is occasionally, though rarely, seen in European skulls. Possibly it is in connection with the origin of the levator palati muscle.
9. Almost all the teeth left in their sockets are much worn, reminding one of those of mediæval Englishmen; like these, too, they are very free from decay. Where the teeth have fallen out, the sockets show that they were probably in good condition.
10. The mastoid processes as a rule are small.
11. The longitudinal palatine torus is well developed in three and slightly developed in two of the sixteen skulls.

The following points, as far as I know, have not hitherto been noticed as characteristics of Eskimo skulls, but they occur very often in this collection.

12. The flat lower margin of the zygomatic arch. The concavity so usually seen in other skulls in the lower margin of the zygomatic process of the temporal is very feebly marked, while the lower free border of the malar, instead of sloping downward and forward to the maxilla, is horizontal and usually considerably thickened. This arrangement is seen in fifteen out of the sixteen undoubted Eskimo

skulls, while skull No. 8, which is probably not Eskimo, is in marked contrast to the rest.

13. The zygomatic process of the temporal is proportionately much longer than in other skulls, its length is recorded in the description of each skull and is measured from the middle root to the most anterior point of the zygomatico-malar suture. It will be noticed that in skull No. 8 the process is shorter than in any of the others. The average of the sixteen skulls (exclusive of No. 8) is 4·9 cm. That of ten European skulls, selected at random, 2·8 c.m.
14. The alisquamous suture is much straighter than in most skulls. Instead of the anterior border of the squamous part of the temporal being curved with its convexity forward, it runs almost straight downward and forward. When once noticed the appearance is very characteristic, and is seen in twelve out of the seventeen skulls. In No. 8, as might be expected, it is not present.
15. The external pterygoid plate is very broad antero-posteriorly; this is probably due to the development of the pterygoid muscles. The measurements are recorded in the descriptions of each skull and were taken at the lower margin of the pterygo-maxillary fissure. The average is 15·5 mm., but No. 5 is as much as 20 mm. In ten ordinary European skulls the average breadth is 13 mm.
16. The basi-occipital in all sixteen skulls is very flat and smooth; this gives it a somewhat deceptive appearance of breadth.
17. The lower margin of the external auditory meatus as seen from the side of the skull is, in ten of the seventeen skulls, thickened and rough. No. 4 is the best example of this.
18. Double or triple malar foramina are present on one or both sides in five out of the sixteen undoubted Eskimo skulls. In No. 14, in which three are present on the right side, they are arranged in a curve concentric with the margin of the orbit. Double malar foramina are often found in other races, but the proportion of cases in which they occur is not so high, *i.e.*, more than a quarter of all cases.

Unfortunately, Mr. Brierley only brought one lower jaw, but he hopes to be more fortunate on his next expedition.

This collection of skulls is to be presented to the Liverpool University Museum, with the exception of No. 11, which is to remain at St. Thomas's Hospital.

No.	Found at.	Length, mm.	Glabello - maximal length.	Breadth, mm.	*Breadth* index.	Basi-bregmatic height mm.	Auricular height.	*Height* index.	Basi-alveolar.	Basi-nasal.	*Alveolar* index.	Nasal width.	Nasal height.
1	Near Holstensborg	178	177	131	736	128	116	719	93	94	989	25	51
2	" " ...	179	180	130	726	136	119	700	102	105	1029	23	52
3	" " ...	180	178	139	772	131	117	728	100	102	1020	24	52
4	" " ...	181	181	134	740	131	113	724	98	101	970	20	53
5	" " ...	184	185	135	734	142	124	772	108	107	991	24	52
6	" " ...	179	178	132	737	131	118	732	—	—	—	—	—
7	" " ...	176	176	124	705	134	119	761	96	100	960	23	53
8	Christianshaab ...	163	164	151	926	118	110	724	—	—	—	—	—
9	" ...	184	179	141	766	135	120	734	97	96	990	24	57
10	" ...	179	173	130	726	135	119	755	80	93	860	22	45
11	" ...	177	177	124	701	128	117	723	102	101	990	20	48
12	" ...	180	180	128	711	137	117	761	106	108	981	26	52
13	" ...	184	180	132	717	131	121	712	104	100	1040	25	50
14	Umanak Fiord ...	172	172	128	744	134	120	779	103	103	1000	20	53
15	Ikerasak	180	177	143	794	139	127	772	98	109	899	20	57
16	"	186	178	141	758	134	120	720	94	99	949	24	52
17	"	189	182	137	725	139	125	741	104	107	972	22	52
	Average ...	179	177	134	749	133	119	743	102	99	971	23	52

Nasal index.	Facial height.	Bi-zygomatic breadth.	*Facial* index.	Inter-Stephanic breadth.	*Stephano Zygomatic* index.	Orbital height.	Orbital width.	*Orbital* index.	Naso bregmatic.	Naso Lambdoid.	Naso Inial.	Sagittal arc.	Narrowest frontal width.	Capacity (shot) c.c.	Sex.
482	67	126	532	98	778	37	37	1000	123	234	300	361	89	1344	(?) F.
442	69	130	531	103	792	39	39	1000	120	245	300	359	92	1395	M.
460	72	134	537	109	813	38	38	1000	126	234	305	364	96	1420	M
377	71	130	546	101	777	35	37	946	130	244	290	356	91	1295	M.
460	70	138	507	104	754	35	40	875	130	258	312	371	94	1400	M.
—	—	—	—	—	—	—	—	—	126	258	320	380	88	1352	M.
434	67	133	504	97	729	38	39	974	123	245	297	352	89	1205	M.
—	—	—	—	110	—	34	36	944	110	235	305	340	86	1206	M.
421	75	135	556	113	837	34	38	895	131	260	331	381	92	1337	M.
489	56	116	483	111	948	35	36	972	128	252	300	371	93	1420	—
417	65	131	496	96	733	35	39	897	129	245	312	354	94	1166	(?) F.
500	66	133	496	90	677	36	38	947	122	250	310	362	88	1255	M.
500	69	136	507	105	766	33	32	970	125	252	313	370	91	1375	M.
377	70	130	538	105	808	35	38	921	115	240	295	351	94	1285	M.
351	72	142	507	115	810	40	41	976	131	255	320	362	99	1554	M.
460	67	143	469	113	790	38	40	1053	120	240	308	374	93	1492	F.
423	70	145	483	115	793	40	40	1000	140	—	333	386	103	1561	M.
442	68	133	511	105	789	38	37	974	125	247	309	364	92	1357	

Capacities in Cubic Centimetres.

No.	Capacity measured by shot (c.c.).	Estimated by Manouvrier's method.	Estimated by Madame Pelletier's method.	Estimated by Pearson and Lee's method.
1	1344	1307	1386	1282
2	1395	1402	1379	1345
3	1420	1423	1433	1382
4	1295	1400	1357	1330
5	1400	1562	1533	1550
6	1352	1356	1373	1340
7	1205	1288	1286	1295
8[1]	1206	1287	1278	1290
9	1337	1501	1499	1427
10[2]	1420	1333	1325	1308
11	1166	1238	1324	1233
12	1255	1391	1334	1314
13	1375	1371	1423	1375
14	1285	1400	1308	1296
15	1554	1550	1591	1489
16	1492	1482	1552	1411
17	1561	1527	1543	1456
Average ...	1357	1383	1407	1364

[1] Probably not an Eskimo.

[2] Child about ten years.

STRING FIGURES AND TRICKS FROM CENTRAL AFRICA.

BY WILLIAM A. CUNNINGTON, PH.D.

[WITH PLATE XIV.]

IT is only within quite recent times that our attention has been directed to the making of string figures and tricks by various primitive races. Although it was well-known that certain peoples amused themselves in this manner, such figures were difficult to learn, and still more difficult to remember. Matters were placed, however, on a satisfactory basis in 1902, when Drs. Rivers and Haddon[1] published a carefully thought-out method of recording string figures and tricks, giving at the same time an account of twelve of them which had been collected in the Torres Straits. A little later, Dr. Haddon[2] published other figures and tricks, known to North American Indians, and he included in this paper a single Eskimo figure, taken from some originally described and illustrated by Dr. Franz Boas,[3] fifteen years before. In Dr. Haddon's paper, it is mentioned that two of the string tricks described are known to the Japanese, and one of these is also well known in Europe, while one figure and one trick performed by tribes of Indians are identical with others recorded from the inhabitants of the Torres Straits.

When leaving, therefore, in March, 1904, for the great lakes of Central Africa, there seemed little doubt that, somewhere in that country also, string figures would be known and practised, and this indeed I found to be the case. My first enquiries on the subject were made in Zomba, the capital of British Central Africa, and I learnt at once that the European residents at least knew nothing of such games being played among the natives. By the kind aid of the officials, however, inquiries were made, and they soon afforded the desired evidence. As I sat in the Collectorate making figures with a piece of string, the native interpreter was called in and questioned on the subject. When he saw what I was doing, his face broadened into a grin, and he said he knew how to make such figures. He took the string, and I prepared to follow his movements, but he unfortunately soon got into difficulties, and was unable to complete any figure. However, he clearly understood what I wanted, and was instructed to find someone who could do figures, and be ready to give a similar demonstration when I came again. On this next occasion, he brought a sergeant and one or two men of the native military police, all of the Yao tribe, and they showed me the figure described below as No. 1, which I learnt and wrote down on the spot. Before I left Zomba, the kindly interest of the

[1] *Man*, October, 1902, No. 109, p. 146.
[2] *American Anthropologist*, vol. v, No. 2, April—June, 1903, p. 213.
[3] *Internat. Archiv für Ethnographie*, Bd. 1, 1888, p. 229.

Governor, Sir Alfred Sharpe, K.C.M.G., enabled me to add the string trick No. 2, which was shown me by his head servant "James."

It was not until a good many weeks later, on the southern shore of Lake Tanganika, that I again found time and opportunity to seek for native string figures. Here too I was not disappointed, and found also that this native amusement had not escaped the eye of the missionaries in the London Mission station at Niamkolo. By their kind aid, a young boy, knowing several figures, was found, and I at once proceeded to learn all he could show me. As I stayed at the south of the lake in this country of the Ulungu for some time, I was able to collect several more from different sources. One of my personal attendants, Swema, a Marungu by birth, but brought up amongst the Ulungu at the south end, was well up in such figures and tricks, and, as he could talk English, I was able to get a good deal of information on the subject. I also learnt figures from an Ulungu boy rejoicing in the name of "Jam," who temporarily filled the office of under-housemaid to my establishment.

During nearly six out of the eight months I spent on Tanganika, I cruised about the lake, visiting a large number of places on the lake shore, and staying sometimes a day or two, sometimes a week or so, at each. My work of collecting biological specimens took up so much time that I must frankly confess to having frequently quite overlooked the question of string figures, and so doubtless I lost many valuable opportunities of discovering them. At the same time it will be seen from those which are described below that I was able to obtain a few from districts widely scattered on the shores of this big inland sea. Two figures and a string trick were shown me by one of the crew of the dhow which I hired at Ujiji. The last figure in my list (No. 19), was not actually obtained in Uganda, but from a native of that country who was a servant of the German Governor of Usambara (North Tanganika).

It should be understood that, while on the one hand tribes and villages were passed without even an inquiry on the subject, on the other hand questions were several times asked in places where the natives did not appear to know anything about such games with a piece of string. In order to show the total number, and for the sake of convenience, the string tricks and figures which follow have been numbered consecutively, but it will be noticed that those of the Ulungu are best represented. Out of a list of nineteen, twelve are done by the Ulungu; there are six known to the Marungu, and three to the Wajiji, while from the other tribes mentioned still smaller numbers are recorded. This would suggest that the amusement is specially prevalent among the Ulungu, and possibly on the whole this may be correct. Still it must be remembered that my opportunities for gaining information were very limited, and it was precisely among the Ulungu that I made a more prolonged stay than elsewhere.

Further, I would urge that it by no means follows that string figures are quite unknown, even where my inquiries met with no response. In fact, I believe that the evidence I was able to acquire clearly proves that games of this nature are widely known in the African continent, where further investigation would bring to light more forms, and a much more extended distribution. It is because I believe this that I venture to offer such an incomplete list as this undoubtedly is, a list got together in the few spare moments afforded by my other pursuits. With the knowledge we have gained, and with a beginning thus made, we may hope for more complete investigations by other observers in the near future.

As regards the figures and tricks themselves, there is little to remark. I do not believe that in these cases sentences are spoken or muttered in connection with the construction, as is done by the inhabitants of Torres Straits.[1] It will be noticed that in this collection there are several figures which are intended to move, and what is perhaps more striking, there are figures constructed round the neck, round the leg, or by aid of the toes, instead of merely with the hands. No doubt it is still too early to discuss the significance of string figures, or their value from the standpoint of scientific ethnology, but it must remain a remarkable and interesting fact that the trick No. 14 of this collection should be equally well known to the native inhabitants of such widely separated areas as Central Africa, North America, and the Torres Straits. As another instance, No. 5, an Ulungu figure, is identical in result with one made by the Cherokee Indians, while it has been already pointed out that another Indian figure agrees exactly with one recorded from the Torres Straits.

The nomenclature used in the descriptions is, of course, that already referred to, devised by Drs. Rivers and Haddon.

YAO.—Shiré Highlands, etc.

Chitagao, general name for all string figures.

1. (No name ascertainable.)

Opening A.
Release thumbs.
Pass thumbs proximal to index and little finger strings, and with back of thumbs take up ulnar little finger strings.
Release little fingers.
Pass thumbs distal to the radial index finger strings, and with the back of the thumbs, take up the ulnar index finger strings from the proximal side.
Pass little fingers distal to radial index finger strings and with back of little fingers take up ulnar thumb strings from proximal side.
Release thumbs.
Pass thumbs distal to index finger loops and with back of thumbs, take up radial little finger strings from the proximal side.
Place index finger loops over both thumbs and index fingers.
Pass the proximal radial thumb strings over the thumbs on to the palmar aspect. Each thumb is now in a closed stirrup-shaped loop,

[1] *Man, loc. cit.*, p. 147.

with a triangular space adjoining it. Insert index fingers into these triangles, press them against the palm of the hand, release little fingers, rotate wrists inwards and extend.

2. A string trick.

Place string round neck (as necklace), and allow it to hang free in front of body. With right hand grasp left hand string, bring it under the neck and round it behind to the left side again.

Take right and left strings of hanging loop in right and left hands respectively near the lower end of the loop, and make there a small closed loop, by passing right hand to the left with a circular motion counter-clockwise, until the left string is grasped. Increase the size of this loop by sliding the hands until large enough, and pass it over the head, retaining hold of the single string which is in front. The whole will then pull free from the neck. May be done equally by reversing right and left all through.

ULUNGU. South end of Tanganika.

Wili, general name for all string figures.

3. *Sumbo*, a fishing net.

Place string as a simple loop round both wrists.

Pass left hand to radial side of radial wrist string, and take up centre of ulnar string, raise it above radial wrist string, twist it through 180° in either direction, insert little fingers of both hands into the loop above the twist, from the proximal side, and extend.

Take loops off wrists and replace them on index fingers. ×

Pass thumbs distal to index finger loops, and with back of thumbs take up the radial little finger strings from the proximal side.

Place index finger loops over both thumbs and index fingers.

Pass the proximal radial thumb strings over the thumbs on to the palmar aspect. Each thumb is now in a closed stirrup-shaped loop, with a triangular space adjoining it. Insert index fingers into these triangles, press them against the palm of the hand, release little fingers, rotate wrists inwards and extend. (Plate XIV, Fig. 1.)

Identical in result with the Yao figure No. 1, but up to the point marked × differently constructed.

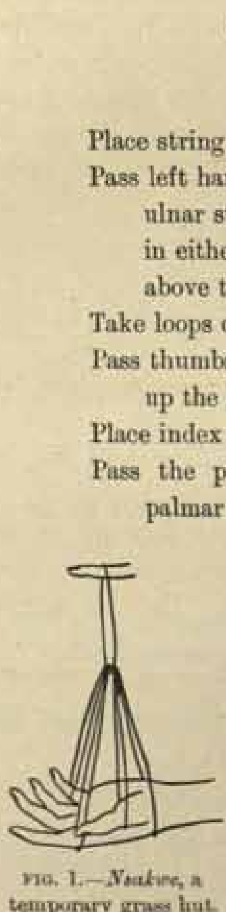


FIG. 1.—*Nsakwe*, a temporary grass hut.

4. *Nsakwe*, a temporary grass hut.

Place string on left hand as in Position 1, and draw out the dorsal thumb string into a short loop, hanging over the back of the hand, and coming some inches below it. With the right hand, bring this short loop through the other (long loop) and place it over the left index finger, drawing tight.

A string runs across the palm from the radial side of the little finger to the radial side of the index finger. Take this as close as possible to the little finger, and loop it over the thumb.

Bring the string on the back of the hand which runs across the knuckles, over on to the palmar aspect, and draw up and away from the left hand with the right hand. (Fig. 1.)

5. *Umuzwa*, a wooden spoon.

Seated on the ground with legs parted, extend the string by placing over the feet. Approach with the hands side by side, backs uppermost, but having index and little fingers only extended.

Catch the string which is nearer the body by means of the crooked little fingers, the index fingers remaining extended close together, and below the string in question.

With index fingers now catch the other string, bring it back beneath the nearer one and up, withdrawing the index fingers and reinserting them in the opposite direction.

Pass index fingers right and left into their respective foot loops and rotating wrists outwards, bring the fingers up again through the loop which extends between them. Remove from feet and extend the figure.

This figure is the same in result as the Cherokee Indian figure "crows' feet."[1]

6. *Nakameko*, swimming on the back.

Hold the string extended between the two hands, but passing under one leg just above the knee.

Cross the two loops by passing the left one through the right, and lay both loops down, leaving thus four strings resting on the leg.

With left hand take up the two inside strings where they rest on the leg, and similarly with the right hand the two outside, bringing them however first through the inside loop. There is now a St. Andrew's cross above the leg.

With the two hands, grasp the ventral legs of the cross, leaving go above.

Remove the whole from the leg and extend.

By slightly rotating the wrists in opposite directions, the swimming motion is produced.

[1] *American Anthropologist*, *loc. cit.*, p. 217.

7. *Kitala*, a bed.

If made very broad, this figure may also be known as *Sumbo*, a fishing net.

Make a double ring of the string and put it round the neck, holding it stretched by means of the left thumb, on which the two strings are to be separated, one being more distal than the other by about an inch. Rotate the left hand clockwise through 180°.

Pass right hand over and to left of proximal loop, and with fingers pointing downwards, take distal loop off thumb.

Rotate both hands back to their original position, and insert the little finger of the left hand into the loop held in the right hand.

Pass the finger and thumb of right hand through the little finger loop, from distal side, and take hold of the ulnar thumb string, at the same time releasing little finger. (Fig. 2 and Plate XIV, Fig. 2.)

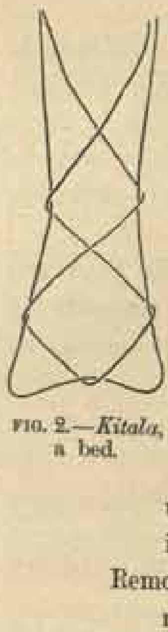


FIG. 2.—*Kitala*, a bed.

8. (No name ascertainable.)

Place loop over middle and ring fingers of each hand and extend.

Pull the string which passes over the back of these two fingers through between them, and place over the wrist of the opposite hand.

Hold carefully with the left hand on the palmar side, the two finger loops of the right hand, withdraw the fingers of the right hand from their loops, and rotating the right hand completely inwards towards the body and under the wrist strings, replace the strings on the fingers once more in the same position. Repeat the process for the other hand.

Remove the strings from the wrists, and place the loops over middle and ring fingers.

Place thumbs in ring finger loops from proximal side, and holding down the ulnar ring finger strings, press them against the palms.

Bend down the tips of the middle fingers into their loops from the distal side, pressing the radial strings against them firmly by means of the index fingers; straighten the middle fingers, taking care that the strings pass across their backs. Hold tight and extend the figure by rotating the wrists inwards.

9. *Kiuni*, a bird.

In sitting position, place the string round the two feet, and extend them, still retaining hold of the upper string with the left hand.

Pass the right hand over the string held by the left hand and pull up the lower string, at the same time releasing the left hand.

Put both arms through this loop now produced, from below, and with little fingers pointing away from body, take up the strings which lie across the feet, from below, outside the strings forming the large loop

Pull up, allowing the large loop to slip over the wrists. By pulling the hands alternately, the bird flies.

10. *Lutanda*, a star.

Begin with string on left hand in Position 1, and over the right wrist.

With the fingers of the right hand, grasp the string across the palm of the left, and draw tight.

Place the radial thumb string of the left hand between the ring and little fingers, forming a distal loop on the little finger.

Bring the proximal ulnar little finger string across the palm between the distal ulnar and radial little finger strings and loop it over the thumb.

Remove the loop from the right wrist and extend. (Fig. 3.)

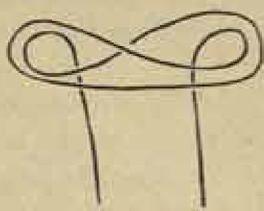


FIG. 3.—*Lutanda*, a star.

11. (No name ascertainable.)

Seated on the ground with legs parted, place the string as a double ring, over the feet and extend. Approach with the hands side by side, backs uppermost, but having the index and little fingers only extended.

Catch the string which is nearest the body by means of the crooked little fingers, and draw away from the rest, the index fingers remaining extended close together and below the string in question.

With index fingers now catch the next string (the second of those on the proximal side of the feet), bring it back beneath the first one and up, withdrawing the index fingers carefully, and reinserting them in the opposite direction. With index fingers still passing through this central loop, approach the first of the distal foot strings.

Catch this as before with the index fingers and bring through loop, withdrawing and reinserting index fingers also as before.

Repeat this process with the one remaining foot string. Withdraw the index finger of the right hand, and passing it below the left hand, insert it into the left little finger loop, at the same time withdrawing the left little finger. By pulling right and left hands, the finger will oscillate. (Plate XIV, Fig. 3.)

String trick No. 2 of the Yao is also known to the people of this tribe. Also said to be known figure No. 15, *Mwezi*, the moon, and trick No. 17, *Tambukira*, of the Marungu.

AFIPA. South-east shore of Tanganika.

String figure No. 3, *Sumbo*, a fishing net, of the Ulungu, is also known to the people of this tribe.

WAJIJI. District of Ujiji.

Ufindo general name for all string figures.

12. *Shimo*, a pit or large hole.

Place string as simple loop round both wrists. Insert thumbs into this loop from the proximal side, taking up on their palmar aspect the radial string. The strings now passing across the palmar surface of the thumbs are to be taken together and held on the toes or by another person. Allow the original loops to slip over the hands.

Insert the little fingers from the proximal side into the thumb loops and with the backs of them take up from the distal side the strings which enclose these loops distally, and extend.

Place the thumb loops on the middle fingers, pass thumbs distal to middle finger loops, and with backs of thumbs take up radial little finger strings from the proximal side. Remove the loops from the middle fingers and place them over the whole five fingers.

Pass the proximal radial thumb strings over the thumb on to the palmar aspect and place as loops on middle fingers (so that the radial thumb string becomes the ulnar middle finger string). Bring the strings across the backs of the hands over on to the palms.

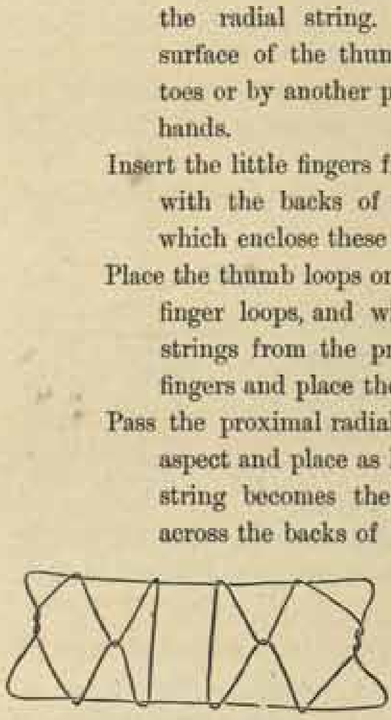


FIG. 4.—*Shimo*, a pit.

Release little fingers and extend, at the same time releasing the two strings which have been held during all these later movements. (Fig. 4 and Plate XIV, Fig. 4.)

13. (No name ascertainable.)

Place string as simple loop round both wrists. With left hand grasp centre of radial string, twist it through 180° in either direction, insert thumbs of both hands into the loop above the twist and extend. The two ulnar thumb strings have now to be held where they cross by the toes or by another person. Allow the original loops to slip over the hands.

Insert the little fingers from the proximal side into the thumb loops and with the backs of them take up from the distal side the strings which enclose these loops distally. Release at the point hitherto held and extend.

Remove the thumb loops to the middle fingers.

Pass thumbs distal to middle finger loops, insert into the little finger loops from the proximal side, and with the back of the thumbs take up radial little finger strings.

Remove middle finger loops and insert in them the five fingers of each hand respectively.

Pass the proximal radial thumb strings over the thumb on to the palmar aspect and place as loops on middle fingers (so that the radial thumb string becomes ulnar middle finger string).

Bring the strings lying across the back of the hand over on to the palm. Release little fingers and extend.

Identical in result with the Yao figure No. 1, and Ulungu figure No. 3, *Sumbo*—a fishing net, but different in construction from either.

14. A string trick.

This is precisely the same as *Kebe mokeis*, the mouse, of Murray Island, Torres Straits,[1] a trick also known to the Omaha Indians.[2]

MARUNGU. West shore of Tanganika.

15. *Mwezi*, the moon.

Opening A.

Take the ulnar little finger string in the mouth, and bring it over the other loops, at the same time releasing the little fingers but not pulling up tight.

Transfer the thumb loops to the little fingers, and insert the index fingers in the mouth loop from the proximal side.

Extend, at the same time letting go with the mouth. Place the proximal index finger loops carefully over on to the palmar aspect, and separate the hands. (Fig. 5.)

16. *Mwakatanga*, moon gone dark.

The figure *Mwezi* to be made first and laid on the knees. Place from above the thumb and index finger of the left hand in the original index finger loops, outside, but close to the spot where they are crossed by the diagonal strings.

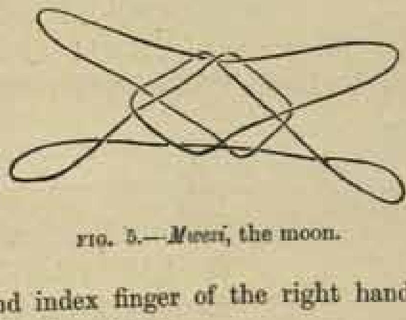


FIG. 5.—*Mwezi*, the moon.

Proceed similarly with the thumb and index finger of the right hand, inserting them into the former little finger loops.

[1] *Man, loc. cit.*, p. 152.

[2] *American Anthropologist, loc. cit.*, p. 218.

Passing thumbs and index fingers downwards bring them up again through the space in the centre of the figure and extend. Now pass thumbs and index fingers downwards once more through centre of figure and extend.

17. A string trick, *Tambukira.*

Place the string as a simple loop round the left leg below the knee. With the left hand hold the two strings together, close to and inside the leg, while keeping the string extended with the right hand. By doubling downwards the large right hand loop, insert in it from the original distal side, both the legs.

Take the large loop, now with the right hand on the outside of the right leg, and pull, releasing the left hand.

The string pulls off the left leg on to the right leg.

String figures No. 3 *Sumbo*—a fishing net, and No. 7 *Kitala*, a bed—of the Ulungu, are also known to the people of this tribe. Figure No. 8 of the Ulungu is known under the name of *Bukila*, a hammock or machila.

Ubwari.

Originally inhabiting the large peninsula on the north-west shore of Tanganika, but now also living opposite this on the east coast.

18. A string trick.

Place string as simple loop round both wrists.

Take the ulnar string in the mouth, bringing it up proximal to the other and above it.

Take this loop from the mouth with the left hand and twist it counter-clockwise through 180°, then inserting into the loop above the twist both the hands from distal side, extend again on the wrists.

Withdraw right hand, and with it take hold of the strings across the other wrist.

The string will pull free.

The string trick No. 14 of the Wajiji, the *Kebe mokeis* of the Murray Islanders, is also known to the people of this tribe.

Waganda. District of Uganda.

19. *Nzige*, a locust.

Place the string on the thumb of the left hand and the index finger of the right. By partially rotating the left hand counterclockwise and passing the index finger of the left hand under the two strings and up again, take the two strings across its dorsal surface and return.

Pass the right thumb under the two strings and bring it up again, so that the strings rest on its dorsal surface. Now bring the two hands

FIG. 1.—SUMBO. (No. 3.)

FIG. 2.—KITALA. (No. 7.)

FIG. 3.—NAME UNASCERTAINABLE. (No. 11.)

FIG. 4.—SHIMO. (No. 12.)

together and insert the thumb of the right hand into the space between left thumb and index finger from the dorsal side, but proximal to the two strings which cross the space.

In a similar manner insert the index finger of the left hand into the space between the thumb and index finger of the right hand and proximal to the strings crossing the space. With fingers pointing downwards separate the hands and extend, pulling tight. Wriggle if necessary until the knot is in the centre.

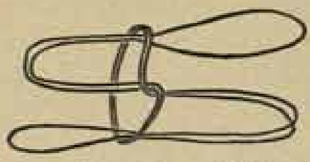


FIG. 6.—*Nzige*, a locust.

Fig. 6 illustrates the position of the strings before the knot is pulled tight.

YÖRUBA STRING FIGURES.

BY JOHN PARKINSON.

THE following string figures were all given to me by pagan natives. I am told that the figures are known on the Gold Coast and by the Kru tribe, so doubtless they extend all along West Africa.

1. *Añwoñ*, a Calabash Net. Yöruba.

Opening A.

Release thumbs. Pass thumbs proximally to index loops and radial little finger strings, and take up ulnar strings of little finger loops with back of thumbs. Release little fingers.

Insert thumbs from distal side into index finger loops and take up ulnar strings of index loops.

Pass little fingers from distal side between the radial index string and ulnar string of thumb loop, and take up the (proximal) ulnar string of thumb loop. Release thumbs.

(The figure should now have one index and one little finger loop on either hand, the strings crossing and twisted together in the middle.)

Pass the thumbs distally to the index finger loops and take up the radial strings of the little finger loops.

Take the radial string of the index finger loop on the palmar side of the palmar string and place it over the top of the thumb. Pass the proximal radial thumb string to ulnar side of thumb. Do this with both hands.

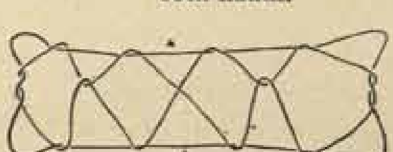


FIG. 1.—*Añwoñ*, a calabash net.

With palms of hands facing one another, pass index fingers from distal side into the triangles on palmar surface of thumb. Release little fingers, and extend. (Fig. 1.)

Place figure on knee, take up the two longitudinal strings in the centres at A A, pull, and the figure resolves into the original loop.

The figure represents a net, half bag, half girth, for stringing a calabash on a woman's back.

2. *Gari*, a saddle. Yöruba.

Make *Añwoñ*, lay on table.

With index and middle fingers of left hand pick up the central point of the figure, and with index and middle fingers of right hand pick up the crossing strings on the right hand side of the central point in the same horizontal line.

Lift the figure, passing the fingers upwards through the strings, bringing the wrists towards one another by a rotatory movement.

Extend figure: one index and one middle finger loop will result on either hand. (Fig. 2).

FIG. 2.

Pass the thumbs proximally to the index finger loops and take up with backs of thumbs the radial string of the middle finger loop and ulnar string of index finger loop.

With middle fingers take up radial strings of index finger loops.

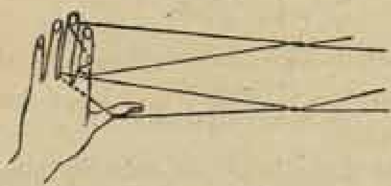


FIG. 3.—*Gari*, a saddle.

Extend figure, bringing backs of hands uppermost, catching ulnar strings of middle fingers with backs of thumbs. (Fig. 3.)

3. *Pang-pa-ta*, a net mask placed over the face at certain dances. Yöruba.

Opening A.

From the distal side pass thumbs into the index finger loops and take up the ulnar strings of the index loops and the radial strings of little finger loops. Release little fingers.

From the distal side insert the four fingers of each hand into thumb loops and take up radial strings. Release thumbs.

From proximal side with back of thumbs take up the two distal radial index finger strings (leaving one string wound round index finger and no dorsal string).

By bending the fingers throw off the three dorsal strings along their backs, leaving one index finger loop and two thumb loops.

From the distal side insert the four fingers into thumb loops as before, and repeat until the line beginning "By bending the fingers" is complete.

Repeat again.

(For the fourth time) from the distal side insert the four fingers into the thumb loops and take up the radial strings. Release thumbs.

From distal side with back of thumbs take up ulnar strings of proximal index finger loop.

From distal side pass the three ulnar fingers into the space thus produced and take up this ulnar string (radial thumb string). Release thumbs.

With backs of thumbs pick up proximal radial index finger strings.

From the distal side pass the four fingers into the space thus formed (*i.e.*, close fingers over palms of hands) and take up this radial string. Release thumbs.

Turn palms of hands inwards, index fingers extended and pointing away from body; the three ulnar fingers closed over palms.

Extend figure.

Centre of figure (Fig. 4). Position of right hand (Fig. 5).

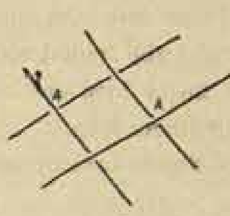


FIG. 4.—*Pang-pa-ta.*

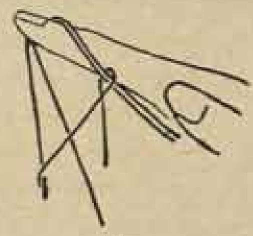


FIG. 5.—*Pang-pa-ta.*

4. *Omori-odo*, a *fu-fu* stick. Yöruba.

Make *Pang-pa-ta* and lay on table.

Seize the two nodes forming the ends in a horizontal direction of the central parallelogram (A.A. of figure) between the middle and index fingers of each hand.

Lift the figure, at the same time turning these four fingers upwards, the tips of the fingers passing into the parallelogram.

Extend figure.

FIG. 6.—*Omori-odo*, a *fu-fu* stick.

One-half shown in Fig. 6.

A *fu-fu* stick is a stout stick with a knob at one or both ends, used for mashing yams in a wooden dish.

[The final result of this figure has a general resemblance to "The Leashing of Lochiel's Dogs" and "Crows' Feet" (Jayne, *l.c.* 116)].

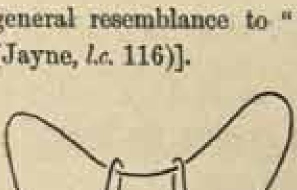


FIG. 7.—*Adũñ*, a bat.

5. *Adũñ*, a bat. Yöruba.

Place the big toe of the right foot in the pendent loop of the string, and with the fibular big toe string, take a complete turn round the big toe. Pull tight.

From the body side place both hands into the big loop and twist outwards bringing the hands upwards. Each wrist is thus enclosed in a string loop, the strings crossing on the palmar side of the wrist.

With the index finger and thumb of both hands seize the string passing over the top of the toe and pull through wrist loops (Fig. 7).

6. *Eye*, birds (in a cornfield). Yŏruba.

Hang the loop over the index figure of the left hand, holding the ulnar string between the thumb and base of middle finger of left hand; the radial string of the loop passing between thumb and index finger.

Seize the pendent ulnar string with thumb and middle finger of right hand, pass the right index finger from proximal side into index finger loop of left hand; turn the nails of the index fingers upwards, release left thumb and pass both thumbs from the proximal side into the hanging loop, draw tight. A figure with one index finger and one thumb loop on either hand results. (Fig. 8.) Turn palms of hands upwards.

The first position is a frequent West African beginning and might be called Position II (*cf. Man*, 1902, p. 148), and the following movement the Yŏruba opening.

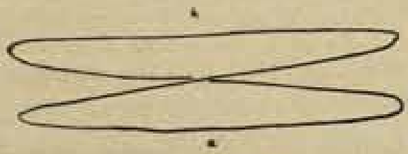


FIG. 8.—*Eye*, birds.

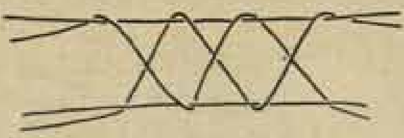


FIG. 9.—*Eye*, birds.

Pass thumbs from distal side into index finger loops and take up ulnar strings.

Pass little fingers distally to radial strings of index finger loops, and take up proximal ulnar thumb strings. Release thumbs.

Pass thumbs from distal side through the index finger loops, and take up radial strings of little finger loops.

Pass middle fingers from distal side into index finger loops on the sides of palmar strings nearest to centre of figure, and take up radial index finger strings. Release thumbs.

From proximal side with thumbs take up ulnar little finger strings.

Extend figure, backs of hands uppermost.

(Fig. 9.) The central diamonds are the birds.

7. Moving figure. Yŏruba.

Left hand in Position I, loop pendent.

Take the palmar string between the finger and thumb of the right hand, and draw tight.

Release right hand, and again pull palmar string tight; release right hand.

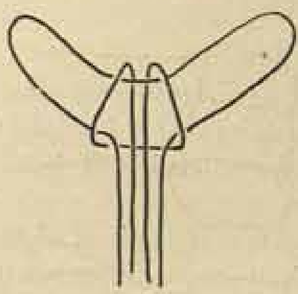


FIG. 10.—Moving figure.

Insert right hand into pendent loop from distal side, and seize the ulnar string of little finger loop between finger and thumb, passing under both strings of loop, seize radial string of thumb loop.

Holding these two strings draw hand back through pendent loop and pull tight.

Four strings are now pendent from palm of hand. (Fig. 10.)

Pass the four fingers of right hand between the two outside strings, and two inner strings, and open and close the triangle by rotatory movement of right wrist.

8. *Ile Unde*, a parrot cage. Yōruba.

Opening A.

On both hands transfer little finger loops to ring fingers.

" " " index " " middle fingers.

" " " thumb " " index "

Turning the back of each hand alternately upward, pull the dorsal string of ring finger loop (turning wristwards) over the dorsal string of middle finger loop, and pull the latter through the ring finger loop (dorsal loop) so formed.

Repeat with index finger; pull dorsal string of index finger through, and loop over thumb. Do this with both hands.

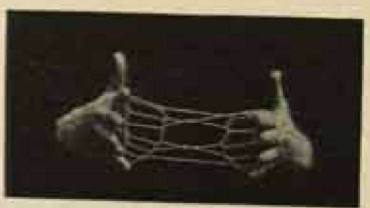


FIG. 11A.—*Ile Unde*, parrot cage.

With palms facing each other, take each finger string in succession beginning from radial side, passing it over to back of thumb, taking the then proximal thumb string over top of thumb towards ulnar (and palmar) side of thumb. (In both hands take the ulnar proximal middle finger string first in order.)

Do this with both hands.

Transfer thumb loops to little fingers, and extend figure (Fig. 11A).

The two pairs of strings in centre of figure should cross, the two outside strings lie parallel. One-half shown in Fig. 11B.

Release little fingers; pull tight, and the figure resolves into three loops on each hand, index, middle and ring finger loops.

9. *Awkwa Ileida*, a pig sack. Yŏruba.

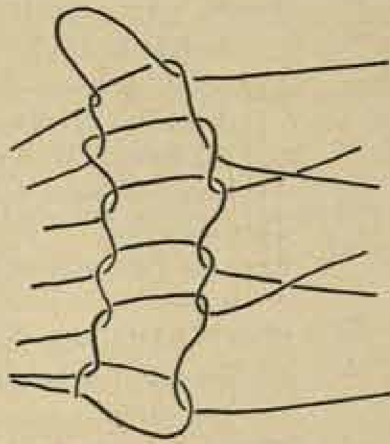


FIG. 11B.—*Ile Unde*, a parrot cage.

Opening A.

With the teeth pull the ulnar little finger string proximally to the other strings and draw out into a long loop.

From the lower side pass both hands through the "tooth loop" so formed (release teeth), slipping the former ulnar little finger string down to the level of the wrists. Release little fingers. Pull tight.

With finger and thumb of right hand, seize radial index and ulnar thumb strings of the left hand; release index and thumb loops, place the two strings seized in Position I. Repeat with other hand.

Take the palmar string of the left hand leading to the oblique string of central part of figure, release it from its position between the index finger and thumb, but not between little and ring fingers, and take two turns around the terminal joint of index finger.[1]

On the right hand take the other palmar string and repeat as above.[2] (Fig. 12A.)

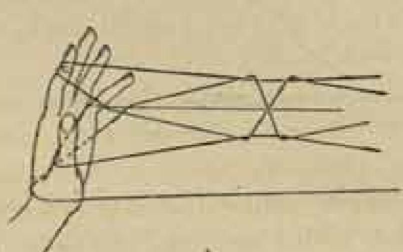


FIG. 12A.

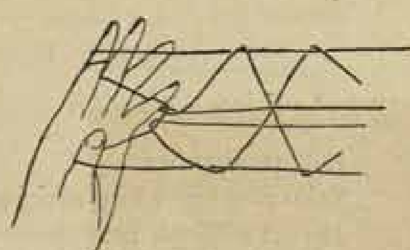


FIG. 12B.—*Awkwa Ileida*, a pig sack.

Take the remaining palmar strings in turn, release them from their position between index fingers and thumbs, but not between little and ring finger, pass them distally over all the little finger and wrist ulnar strings and return proximally to them and loop over thumb. Throw wrist string on radial side of hand to ulnar side and extend. The figure shows an unsymmetrical solid V. (Fig. 12B.)

Care should be taken to keep the palmar strings distinct, and not to allow them to become entwined.

[2] Note the two palmar strings thus taken are the same, as may be seen when wound round index fingers, the string passing directly from finger to finger through the figure.

10. *Kokoro*, a caterpillar. Yöruba.

Yöruba opening (p. 135) and with fingers pointing downwards, lay on table as in Fig. 8.

Pick up string nearest body (*a*) and pass both hands from farther side under this string towards body, twist outwards, forming a loop about the wrists. With right hand seize string furthest from body (*b*) and hang over index finger of left hand clockwise.

Yöruba opening.

From the distal side with backs of thumbs take up ulnar index finger strings.

From distal side with little fingers take up proximal ulnar thumb strings. Release thumbs. (One little and one index loop on each hand.) Transfer little finger loops to ring fingers of same hand.

With right hand seize dorsal wrist string of left hand and pull over left hand to palmar side, looping over little finger.

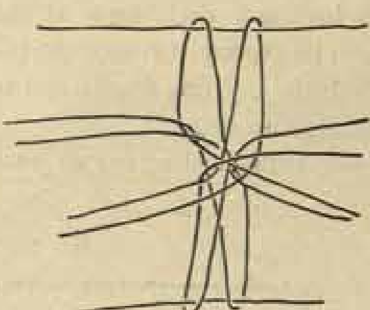


FIG. 13.—*Kokoro*, a caterpillar.

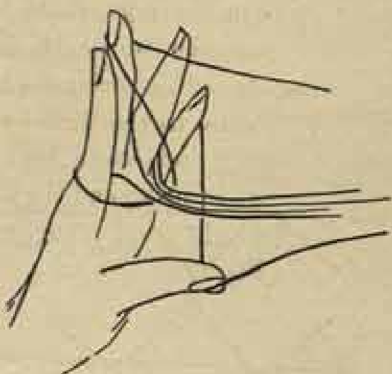


FIG. 14.—*Kokoro*, a caterpillar.

Repeat other hand.

Take ring finger loop of right hand, and place on ring finger of left hand.

Repeat with left hand, passing the proper left hand ring finger loop over original right hand ring finger loop.

From distal side pass thumbs into index finger loops; pass proximally to, and take up all strings except ulnar little finger strings.

With backs of middle fingers take up the radial index finger strings.

Fingers point outwards.

Release thumbs, and with backs of thumbs draw tight the ulnar little finger strings.

Place hands palms down on table, bring wrists up to finger tips, move fingers forward and repeat.

The motion is supposed to represent the walking of a (? loop) caterpillar. (Figs. 13, 14.)

11. *Ennu Ikoko*, a wolf's mouth. Yöruba.

Proceed as in Kokoro up to the change of ring finger loops; then instead remove both ring finger loops and hold in mouth.

From distal side pass thumbs into index finger loops, and take up ulnar index and radial little finger strings.

With backs of middle fingers take up radial index finger strings.

Movement of the fingers shows opening and shutting of the wolf's mouth.

12. *Agbo mejji fi wokorra*, two rams with horns interlocked.

Ennu Ikoko.

Release mouth loops and thumb loops, slip middle fingers and pull tight.

From the distal side pass thumbs into index finger loops and take up the ulnar index and radial little finger strings.

With backs of middle fingers take up radial index finger strings (on sides nearest centre of figure).

Release thumbs, turn palms downwards, and with backs of thumbs extend ulnar little finger strings. (Fig. 15.)

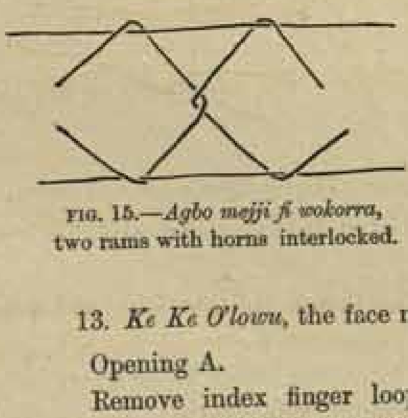


FIG. 15.—*Agbo mejji fi wokorra*, two rams with horns interlocked.

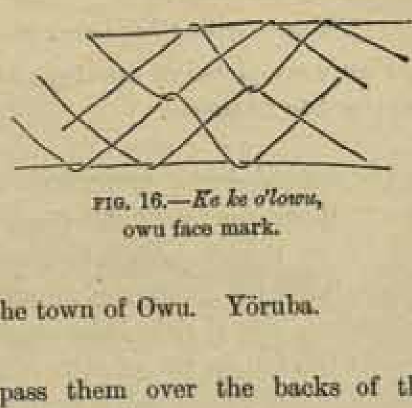


FIG. 16.—*Ke ke o'lowu*, owu face mark.

13. *Ke Ke O'lowu*, the face mark of the town of Owu. Yöruba.

Opening A.

Remove index finger loops and pass them over the backs of their respective hands forming dorsal wrist strings.

Seize radial little finger and ulnar thumb strings between index finger and thumb of opposite hand, and so remove these thumb and little finger loops.

Holding the strings (say) in right hand, twist left hand once clockwise.

Replace loops, but on middle and index fingers.

In dealing with right hand, this must be twisted counterclockwise, *i.e.*, away from the body in each case.

Seize dorsal wrist string, pull over hand, and hang over index and middle fingers of same hand.

Pass thumbs proximally to index loops, into middle finger loops and with their backs take up ulnar index finger and radial middle finger strings.

Hook little fingers round ulnar middle finger strings, and with backs of middle fingers take up the two radial index finger strings.

Release thumbs and extend figure, index and middle fingers pointing away from body. (Fig. 16.)

This figure, which represents a complicated face scarification, is rather interesting. All Yörubas have face-marks (cicatrices), such marks being distinctive of the town, and of the quarter of the town; they are also largely influenced by the family of the individual. A child takes his father's mark.

14. *Labbu*, a (certain) bird. Yöruba.

Pass big toe of right foot through pendent string.

Take one turn round toe from fibula to tibia side.

Pointing the hands towards the body, pass both hands into the loop of the string and twist up and outwards.

With right index finger and thumb pick up big toe dorsal string.

Pull tight, and in the loop so formed, place hands in position 1.

Opening A.

With index finger and thumb of right hand, pull dorsal wrist string over left hand.

Repeat with other hand.

Figure completed by opening and shutting fingers, the movement of the bird is supposed to be shown.

15. *Arubeli Ashaw Ayabe*, train of (dress) the cloth of the Queen. Yöruba.

Hang loop over index finger of right hand, holding radial string between thumb and middle finger.

Seize the pendent ulnar string between thumb of right hand and radial side of right index finger.

With ulnar side of right index finger draw out radial index finger string of right hand, both thumbs in the diminishing loop.

Turn thumbs upwards.

From distal side pass thumbs into index finger loops and take up ulnar strings.

With little fingers take up ulnar thumb strings. Release thumbs.

From distal side pass thumbs into index finger loops and take up ulnar index and radial little finger strings.

With backs of middle fingers take up radial index finger strings.

With backs of thumbs hold out ulnar little finger strings.

Extend figure.

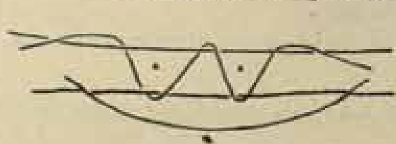


FIG. 17.—*Arubeli Ashaw Ayabe*, train of cloth of the Queen.

In Fig. 17, B represents the train of the cloth behind the woman; A.A. the breasts.

16. *Ebusoñ*, the white man's camp bed. Yōruba.

Pass head through string.

Take right string and pass counterclockwise round head, making two dorsal neck strings.

With left thumb pull tight.

Pull the ventral neck string out and loop over thumb (keeping the two strings apart).

Twist left hand so that thumb points downwards.

Remove distal thumb loop, twist over proximal thumb loop clockwise, and, untwisting hand, insert little finger in it, distally.

From the distal side, pass index finger and thumb of right hand through little finger loop; seize and pull through the ulnar thumb string.

Release little finger loop and replace it by the new loop just pulled through.

This figure is said to be a recent invention and to have been first made when the road to Oyo was opened up. This trick is the same as *Kitala*, No. 7 in Mr. Cunnington's paper (*supra*, p. 126). See Fig. 2, p. 126, and Plate XIV, Fig. 2.

A string trick identical with *Kebe mokeis*, "the mouse" (*cf. Man*, 1902, p. 152) also occurs among the Yōruba, but the explanation of the movement is very different; it is as follows:—

Certain thieves have crept into a yam plantation. Knowing the owner to be a very wide-awake individual, they arrange to tie up their yams into bundles as they are dug up. The strings wound round the four left hand fingers represent these bundles.

Remove the thumb loop, and the owner has appeared.

Pull the palmar string and you will see the speed and readiness with which the thieves and yams disappear. [This trick has the following distribution:— E. Africa (Cunnington), Batwa Pygmies, Torres Straits, Philippine Negritos and Linao Moros, Japanese, Alaskan Eskimo, various Plains Indian of N. America, Britain (Jayne, *l.c.* pp. 340, 341)].

I have been shown a complicated figure resembling *Sihnag*, "the fence round the well" (*cf. Man*, 1902, p. 149); in the Yōruba example the free central line is supposed to be a dead man, and the frame-work is a canoe bearing his body for burial.

STRING FIGURES FROM SOUTH AFRICA.

By A. C. Haddon, Sc.D., F.R.S.

Some years ago I knew of the occurrence of a string trick in Uganda which is the same as that now published by Dr. Cunnington. At the Universal Exposition at St. Louis, 1904, Mrs. Jayne learnt one figure from a Batwa Pygmy from the Congo Kasai Valley (*cf.* C. F. Jayne, *String Figures: a Study of Cat's Cradle in Many Lands.* New York: C. Scribner and Sons, 1906, p. 267) while at the same time Dr. Cunnington was collecting numerous examples in East Africa. In the same book Mrs. Jayne records that Dr. W. H. Furness found "The Leashing of Lochiel's Dogs" (*Man,* 1903, p. 117) among the Kabyles of Algeria, introduced from France under the name of "Cock's Feet" (p. 116), and real "Cat's Cradle" among some little Arab girls in Algiers who had learned it in a French school. I took the opportunity of the visit to South Africa of the British Association for the Advancement of Science in August and September, 1905, to see how far this amusement was known to the natives. Not a single white person to whom I mentioned the subject had seen or heard of the game amongst the natives, and although I tried numerous natives of the British Colonies south of Rhodesia, I could not find one who could do anything with a piece of string. It would be rash to conclude that string figures do not occur among these tribes, but I think they must be rare, especially in the case of the Zulu peoples. I append, however, one Zulu example, and there is evidence that others are known. I may add that I was aided in my search by several friends to whom I had taught many figures and tricks on the outward voyage; of these Professor W. M. Davis, of Harvard University, was most assiduous and successful in his inquiries among the natives, and I am indebted to him for the three figures which conclude this paper, and Miss May E. Swan succeeded in obtaining the first recorded Zulu example. In October, 1905, Mr. Parkinson collected the first specimens of string figures from West Africa, and later he obtained the others that are here published (*supra*, p. 132). My friend Mr. Dudley Kidd has permitted me to take the following account from his book, *Savage Childhood* (p. 176), published by A. and C. Black.

"In many districts the children play 'Cat's Cradle' in exactly the same way that we do. Mr. Hawkins, of Zululand, assures me the children in his district play cat's cradle in almost exactly the same way as English boys; the game is also played in Basutoland. The natives call the game *Uzamanyeka*, which means 'It sways of itself.' In Basutoland the favourite modification gives to the game the name of 'Fowl's Foot,' because the foundation pattern of the string looks like the foot of a hen. Unfortunately, I have been unable to get details of this modification. When the children are tired of playing this game they modify it thus: two boys lie down on the ground with feet to feet; a third boy takes a piece of string and loops it round the toes of the two boys in an intricate tangle. The boys have to release their toes without touching the string with their hands.

"Another string trick often practised by the boys is as follows: A boy takes a piece of string about two yards long, and joins the free ends to form a loop. He places this loop round his head and his two hands which are held out in front of his face. A string circle is thus formed which touches his head and the backs of his two hands. The string is steadied by being hitched half round the thumbs after it passes over the backs of the hands. The boy holding the string taut then moves his left hand in front of his open mouth, passes the string through the mouth and loops it under the chin. He then moves his left hand, still carrying the string, away to the left side. A similar operation is performed with the right hand, and the string in front of his face is made taut. When this is accomplished the boy passes the loop of string which is in front of his face over the back of his head, claps his hands and quickly withdraws them with the string entirely free from his mouth and chin, and also free from the head, which is disengaged from the loop by the manœuvre. This trick is the most elaborate one I have met with amongst the Kaffirs, and is by no means easy to describe lucidly in a few words."

So far as I am aware this completes all the records from Africa of this game.

1. MA-ROSE. Batoka Gorge of the Zambezi River.

Suspend the string on the right wrist so that two equal loops depend from its radial and ulnar sides.

Pass the left hand through both loops and place hands in the usual position.

Pick up on the radial side of the little fingers the two strings which cross each other in the centre of the figure.

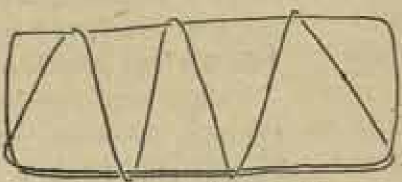
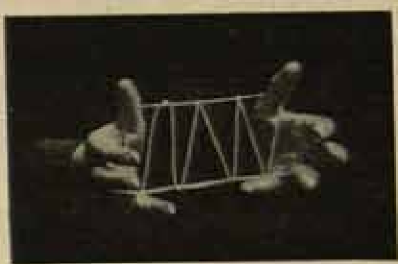


FIG. 1.—Zambezi River.

Draw hands apart with palms uppermost, then half turn the hands so that the thumbs are uppermost.

With a swinging movement throw the radial wrist string away from you over both hands and draw hands apart.



With the back of each thumb pick up the corresponding oblique radial little finger string.

Pass the ulnar wrist string to radial

FIG. 1A.—Zambezi River.

side of wrist. This is accomplished by closing together the thumb and fingers of each hand and by passing the tips of the digits distal to the two ulnar little finger strings and then, by bringing them towards you distal to the ulnar wrist string, allow that string to slip over the hands.

Extend the figure by separating the thumbs and little fingers. (Figs. 1 and 2.)

The simple zigzag line thus produced represents the remarkable Batoka Gorge of the Zambezi River below the Victoria Falls. This is one of the very few geographical string figures known to me, and I was particularly pleased to learn it from a native at the very spot it illustrated. My informant called it Zambezi River.

2. *Makora*, a canoe.

Opening A.

Transfer right index loop to left index and the original left index loop to the right index over the one just transferred.

The centre of the figure represents the canoe.

This figure is precisely the same as one from Torres Straits, where it is known as "Throwing the Fish-spear," but in the latter case there is a movement connected with it by releasing either index loop (Jayne, *l.c.*, p. 131). A similar figure is illustrated by Dr. W. Roth from North Queensland (*North Queensland Ethnography*, Bulletin No. 4, March, 1902, Plate V; copied in Jayne, *l.c.*, p. 378), where it is known as "The Flying Duck." I lay no stress on the distribution of this figure as its formation is so extremely simple.

3. *Inyoni*, a little bird.

Suspend the string over a peg, someone else's finger, or other object, so that one short loop and one long loop depend.

Pass the long loop through the short loop in such a manner that a new short loop is produced.

Continue the process indefinitely.

Smartly pull the tag end of the original long loop and all immediately runs out.

This trick was taught to me by a Ma-Rotse boy immediately after I had shown him the somewhat analogous *Kebe Mokeis*, "mouse" trick, from Torres Straits.

BA-TOKA.

4. *Kanyandi*, fish trap.

Opening A, with middle finger.

Release little fingers.

Pass little fingers distal to middle finger loops and take up the ulnar thumb strings.

Take off right middle finger loop and pass it right round and beneath the palmar string within its own loop, and keep hold of this loop and of the centre of the palmar string.

Release thumb and little fingers.

Still holding the two loops place the outer one (the original middle finger loop) over the index and remaining fingers of the right hand and the inner one (the original palmar string) over the right index.

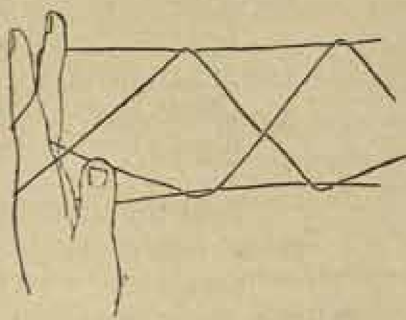


Fig. 2.—*Kanyandi*, fish trap.

Do the same with the left hand.

Extend the figure by passing middle fingers distal to ulnar index string and taking up the radial index string with the back of the middle fingers.

The *Kanyandi* is a kind of open screen made of reeds fastened by bark lashing; this is placed across the mouth of streams, and the people frighten the fish into these traps, the fish being entangled by their gills. This figure was taught to me by a Mu-Toka boy. *Kanyandi* is a Ba-Toka word.

It is very interesting to find that the figure called by Mrs. Jayne "The Pigmy Diamonds" (*l.c.*, p. 276), which she obtained from a so-called pygmy from the Congo Kasai Valley, is similar in result to this figure but reversed, and the mode of formation is different. This figure has an opening figure which consists of a straight string between the thumbs and one between the wrists and two strings which cross each other between these. A similar opening figure, arrived at in a somewhat different manner, has been described by Cunnington under the name of "Sumbo," or fishing net, from the southern end of Lake Tanganika. The opening figure of the Zambezi River figure is similar, except that in the latter the wrists support all the strings; at all events an opening with two straight strings and one central cross is characteristic of several African figures.

5. *Amadande.*

Opening A.

Release thumbs.

Pass thumbs proximal to index and little finger loops and take up ulnar little finger strings on dorsal aspect of thumbs.

Release little fingers.

Pass thumbs distal to radial index string and take up with back of thumbs the ulnar index string.

Pass little fingers distal to radial index string and take up ulnar thumb string from proximal side.

Release thumbs.

Pass thumbs distal to index finger loops and take up the radial little finger strings from proximal side.

Insert thumbs from proximal side into index finger loops between the finger and the palmar string.

Transfer proximal, or original, thumb loop over tip of thumb to its palmar aspect; this can be readily effected by slipping the thumb distally between the two radial thumb strings.

There is now a triangle on the palmar aspect of each thumb. Place each index into its thumb-triangle from the distal side.

Release little fingers and extend the figure by separating the thumbs and indices.

This figure was called *amadande*, but we could not be certain whether this was the general name for string figures of this particular form. It is known to the Ba-Rotse as *Latua*. This figure, which may be called "The East African Fish Trap," is widely spread. I found it was known by the Senna at Umtali, and it has been recorded from three places by Cunnington (*supra*, p. 124) although the method of making it varies somewhat. It crops up again as "The Calabash Net" in Lagos, West Africa (Parkinson, *supra*, p. 132). It is interesting to find that the same figure made in the African manner is recorded by Mrs. Jayne (*l.c.*, p. 24) from Osage Indians of Oklahoma, North America; she points out that in the Philadelphia Free Museum of Science and Art there are two finished patterns of this figure attached to cardboard under different names from the Hawaiian Islands; but we do not know how these are formed.

Strangely enough Mrs. Jayne records an abbreviated variety of the pattern from the Osage Indians (*l.c.*, p. 28) in which the string is doubled, but used throughout as if it were a single string, the resultant pattern being somewhat more simple. She refers to a Hawaiian example of this figure (done with a single string) in the same museum.

I was much interested to find at Umtali that a double string was occasionally used to make the *amadande* figure.

In Rhodesia I also saw precisely the same trick described by Cunnington from Yao, Shiré Highlands, which consists of twisting a string round the neck, and then by pulling one string the whole runs free. This is also known in Uganda.

It is worth noting that a similar trick occurs among the Philippinos of the Linas Moro and among the Negrito tribes (*vide* Mrs. Jayne, *l.c.*, 339), and Dr. W. H. Furness found it in the Caroline Islands, but in this instance the third movement consists of making opening A instead of a simple loop, but the movement ensures precisely the same end.

Portuguese East Africa.

6. Fighting Lions.

This and the following figures were obtained by Professor W. M. Davis from a boy at Bulawayo, who learned them from his mother at Beira.

Take up a small portion of the string between the thumb and index of each hand and bring the left hand counter-clockwise so as to form a loop, in which insert the left index in such a way that the two strings lie on it an inch apart. Put right index into these loops in same direction and draw hands apart, fingers pointing away from the body. There is now a double loop of parallel strings on the radial side of each index and crossed strings on their ulnar side, the proximal ulnar string of the right hand crossing over (radial to) the proximal ulnar string of the left hand.

Catch the middle of all the strings under the chin and bring the hands together.

Transfer left distal index loop through right distal loop to right index, and right distal loop outside of left distal loop to left index.

Pass thumbs over proximal radial index string and under proximal ulnar index string and over distal radial index string and under distal ulnar index string.

Raise proximal radial index string of each hand from palm over (that is, radial) distal radial index string and lay it over little finger.

Raise distal radial index string of each hand from middle of palm and lay it round index from the radial to back and to ulnar side.

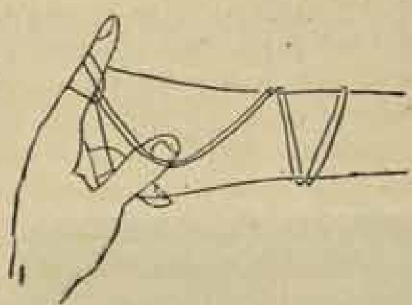


FIG. 3.—Fighting lions.

Release chin.

Stretch distal ulnar index string and ulnar little finger string until they are parallel between the hands, and release thumbs.

With thumbs raise the double loops that were on the thumbs and so pull the zigzag loops (lions) on the parallel cross strings to bring the parallel strings closer together; then stretch the cross string parallel again. (Figs. 3 and 3A.)

FIG. 3A.—Fighting lions.

Say "Oo-ah" while doing this (= the lions roaring).

7. Bird.

Position 1.

Carry right hand away from you round left ulnar string and up into the loop. Do the same with left hand and right ulnar string.

Extend figure.

Repeat the double process again.

Pick up left palmar string with right index and *vice versâ.*

Pass each distal dorsal string of its own hand on to the palmar surface.

Place each proximal dorsal wrist string on to thumbs only.

Insert indices into thumb loops from distal side and with back of indices take up straight radial thumb string, leaving one loop on each thumb.

Extend straight ulnar index string with middle and ring fingers and stretch ulnar thumb string with thumb (that is, change it to the radial side of the thumb).

Extend figure.

To release take front and back cross strings in the mouth, release fingers and spread the hands.

8. *Ambra.*

Place the loop over the three middle fingers of each hand.

Release the loop from the backs of the hands, letting it fall over the whole hand on the palmar side.

Place the entire right hand upwards through the left palmar string and *vice versâ.*

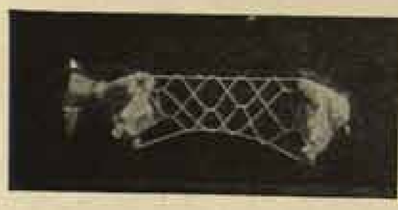


FIG. 4.—Ambra.

Draw tight.

With the left thumb and index hold the two middle right hand strings firmly and somewhat apart and take right hand finger loops entirely off right hand. Give the right hand one twist away from you and replace finger loops in former positions.

Repeat with the left hand strings.

Lay the outer thumb and little finger strings of each hand over the backs of the hands.

Twist each thumb and little finger string once round its own digit.

Remove each wrist string to the palmar side of the hand, letting it fall on to thumb and little finger (*i.e.*, position 1).

Plunge each whole hand from above through the triple triangular space nearest to it and extend, saying at the same time "*Ambra!*"

Natal.

9. *Isefuba S'encala.*

This string figure was obtained by Miss May E. Swan from a Natal Zulu girl named Carché, who belongs to the kraal of Funoi, an old induna living on a farm of Aanhouwen near Vryheid. Carché showed Miss Swan another figure which seemed to represent ears; the other girls said they did not know any, but showed Miss Swan some plaiting.

Use string double.
Opening A.
Let go thumbs.
Thumbs take up nearer strings from little fingers.
Let go little fingers.
Thumbs take up nearer strings from first fingers.
Pass lower thumb strings over upper ones.
Put first fingers downwards into loops formed between forefinger and thumb strings.
Extend and put up to face as spectacles.

SOME ASPECTS OF THE AWEMBA RELIGION AND SUPERSTITIOUS OBSERVANCES.

By J. H. West Sheane, B.A., J.P., F.R.G.S., Native Commissioner.

Introduction.

The origin and government of the Awemba tribe, predominant till 1898 over the Amambwe, the Wabisa, the Walungu, and the other inhabitants of the vast stretch of country which lies between Lake Tanganika and Lake Bangweolo, and is bounded on the east by the Loangwa and on the west by the Lipoposhi, has been already fully dealt with in the reports of Mr. Codrington, the Administrator of North-Eastern Rhodesia (*B.S.A. Company's Annual Report*, 1898–1900, pp. 66–67).

A treatise on their language, compiled by J. Dupont, Vicar Apostolique of the French Mission of the Algerian Fathers, was published in 1900 and subsequently Mr. Govan Robertson published his *Chi Wemba Handbook* in 1904. Up to the present date, however, no special article has been devoted to the Awemba religion, as exemplified in the superstitions and ceremonies, which surround the principal events of the native life from the cradle to the grave. The whole subject is very complex and difficult to investigate, since the old men who practised the ritual and observances under Kitimkulu, and the dreaded Mwamba, are very loth to disclose their rites, fearing the vengeance of the spirits for divulging mysteries, to them most sacred. The younger generation, freed from the reign of terror wielded by the royal house and the priesthood, have gladly abandoned and forgotten the human sacrifices and other sinister cults imposed upon them by their chiefs. Hence the present paper can only pretend to deal with certain phases and aspects of the Awemba religion, since the esoteric rites, such as those said to have existed at Mwaruli, have never been divulged. Indeed the "survivals" to be found in the ordinary events of native life are becoming fainter and fainter every day, and without the help of Father Guilleme of the French Mission at Kilubula, and conversations with Kanyanta, the son of the late King Mwamba, even the following paper could not have been written.

As with all Bantu faiths, so with the Awemba religion, ancestor worship is the mainspring of their theogony. However, they acknowledge a Supreme Being Leza,[1] who is above the tutelary spirits of the land (the Milungu and the Mipashi). He is the Judge of the dead, and condemns thieves, adulterers and

[1] Derivations.—1. *Le*, to nourish—*teste*, Dr. Scott's *Mang'anja Dictionary*, p. 278. 2. *Ez*, to know—but we had better follow Torrend (*Comp. Grammar*, § 365-6), who assigns no definite root.

murderers to the state of Vibanda, or Viwa (evil spirits), exalting the good to the rank of *mipashi*, or benevolent spirits. There is no special worship of Leza, for he is to be approached only by appeasing the inferior spirits, who act as intercessors. But in blessing, the parent beseeches Leza to protect his child, at the same time anointing the forehead of the infant with a drop of spittle (*chipalamate*) to show (they say) that the wish comes from his inmost feelings. Again, in cursing, the injured man prays that Leza will send a lion to devour the evildoer.

Leza is not anthropomorphic, like the Greek Zeus: though the chiefs are called *Wana Leza*, the Children of God; this is merely a compliment (*cp.* Torrend, *Comp. Grammar*, App. I (v).)

Note.—This must not be confounded, as in Dupont's Grammar, with the expression *Kana Besa*, referring to an old time chief.

The Milungu.

After Leza come the Milungu, or local guardian spirits. Torrend says that the word is foreign, and derives it from the Phenician Molocha (Torrend, *Comp. Grammar*, § 339), but Dr. Scott, *Mang'anja Dictionary* sub. verb, says the root is to be found in *Kuzungusa*, to perplex, *cp. mzungu*. It means the "Gods." But the Awemba do not clearly identify their milungu with the spirits of their ancestors, which they term mipashi. From the fact that the milungu are mainly entreated to send rain, and to fertilise the crops, that they reside in the hills, mountains and rivers, and not like the mipashi (ancestor spirits) in thickets near a village, it might be argued that they are primeval nature spirits, worshipped by the aborigines before the advent of the Awemba. Thus Mwamba used to sacrifice to Milungu, who were certainly not the spirits of his ancestors, sending oxen to appease deities as far afield as Musonde, a "mulunqu" living on the Kalungwisi, and as alien as the milungu of the Wabisa.

The Mulenga.

This argument is strengthened by comparison of the worship of another nature spirit, the Mulenga, the god of the Rinderpest. Tradition holds that he comes at stated periods to wreak vengeance on the chiefs who have not worshipped him by slaying their cattle. Any albino children who are born are said to be the daughters of the Mulenga, and the women of the country he devastated.

However, unfortunately, this view, that the Awemba worship nature spirits, is a heresy against the accepted doctrine that the Tonga and other Bantu tribes akin to the Awemba, have no truly nature spirits, but appeal in all things, for rain, etc., to the spirits of their ancestors. Hence it seems safer to conjecture that the milungu are the *mipashi* of very ancient chiefs, exalted to the state of *milungu* "Gods" by the natives, to whom their names, shrouded in the mists of antiquity, had become as mythical and meaningless as the prehistoric Dorus and Ionus were even to the ancient Greeks.

The Mipashi Ancestor Spirits.

Following the *milungu* are the *mipashi*, the spirits of the dead ancestors, which may be divided into two classes, the spirit of the chief who is worshipped by all his subjects, and the spirit of the head of each family, who may be compared with the Roman Lar Familaris, since he is worshipped inside the hut, at the hearth (*pa kyonto*).

In most cases the mipashi of chiefs inhabit the thicket where their bodies were laid to rest (*cp.* at Mwaruli, the Awemba kings' burying place), and in rare instances haunt the spot, reincarnated in pythons, as among the Wabisa at Nsombo on Lake Bangweolo at the present date. But the mipashi are not hill and mountain spirits like the milungu and worship is paid to them at their burying ground (*chitengerwa*).

The only way in which a *mupashi* can communicate and warn his worshippers, is in dreams, or by meeting some person, inspiring him, and making him rave. Sometimes they become permanently reincarnated in the bodies of the *imfumu shya mipashi*, possessed women.

Reincarnations—The Possessed Women.

These women assert that they are possessed by the spirit of some dead chief, and when they feel the "divine afflatus," whiten their faces to attract attention, and anoint themselves with flour which has a religious and sanctifying potency. One of their number beats a drum, and the others dance, at the same time singing a weird song, with curious intervals. Finally when they have arrived at the requisite pitch of religious exaltation the possessed fall to the ground, and burst forth into a low and almost inarticulate chant, which has a most uncanny effect. All at once are silent and the *Basing'anga* (medicine men) gather round to interpret the voice of the spirit.

Many men were denounced as *Walozi* (sorcerers) by these possessed women, and the accused, unless protected by the King, were instantly killed or mutilated. These *imfumu shya mipashi* are held in great veneration by the Awemba, and hunters ask them where game and elephants are to be found. They demand food and beer as their due from the villagers, asking it in the name of the chief they represent, and curiously enough using archaic forms of speech, when asking for tobacco and beer.

When a *mupashi* appears to a man in a dream without any special warning, it is a sign that he has been neglected, and the *Lupupo* (burial sacrifices) held in his honour must be renewed. If the dreamer neglects the warning, he is sure to fall ill and then the medicine man has to be called in to appease the wrath of the spirit.

Dualism—The Vibanda.

Here first, in the spirit world (for Leza has no opposing Ahriman), we notice dualistic tendencies appearing, and we find that the *mipashi* are thwarted in their benevolent acts by the *vibanda* (the evil spirits). Among the Mang'anga, the Chiwanda, or Chiwa, is the "mörder gheist" of the slain in battle, who drives the slayers to madness, unless they dance off the guilt, but among the Awemba they are evil spirits who roam about the earth, wreaking vengeance on all those who do not worship them or emulate their ill deeds. There are many stories of men meeting a *Chiwanda* on the way, and being enticed into a thicket, murdered and eaten by the same evil spirit, who reverts to the ghoulish banquets, which he enjoyed during his earthly life as a *waloshi*. All crimes committed by an individual are accounted for by his stating that he was temporarily possessed by a *chiwanda*. Only the *waloshi* (sorcerers) worship the *chiwanda*, and in fact there seems to be no demon or fetish worship of evil spirits, as practised on the West Coast of Africa. Indeed, with the exception of the image of God at Mwaruli, which is said to have existed on good authority (*Geographical Journal*, "Journey on the Tanganyika Plateau," by Charles McKinnon, Esq.) tended by the priestesses, who were called the wives of the God (*muk' a mwenyi*) sculptured images of wood or stone are unknown amongst the Awemba, or at least very rare, as the above instance is the only one on record.[1]

Images.

The small *tulubi* or idols, which are made by the Wabisa, and are sometimes found in Awemba huts, have no more religious worship paid to them than among the Awaiwa where the little girls use them as dolls. They are small images of women, carved with an Egyptian angularity of outline. It is interesting however to note that these dolls are buried with any young girl who dies prematurely, perhaps from the fear that they may be possessed by the spirit of the departed.

Charms.

The ordinary fetishes or charms, are made from the horns of small antelopes into which the medicine man has placed *muti* medicine, as a remedy against thirst, wild beasts, famine, and above all against the sinister arts of the sorcerer.

The Lilamfia.

The best known fetish is the Lilamfia, the gruesome use of which as a divining horn in the time of war is well known, but will bear repetition. When Mwamba and his warriors went on a foray, they seized the first man they met on the way,

[1] On this point, however, Mr. Robert Young, Native Commissioner, writes later that he found no image at Mwaruli burial ground, but that Weni Mwaruli, the village chief, supposed to be the attendant of the departed chiefs, when he has a dream about them, takes beer to their graves and fills their old pipes with tobacco.

and cut his throat. As the blood spurted out they placed the Lilamfia, affixed to a pivot, in the stream. The horn naturally spun round, and when it stopped they noted where the tip pointed, and made a raid in that direction.

Note.—I hope at a later date to give fuller details as regards the use of the Lilamfia.

Amulets.

Among amulets, the generic name of which is *mpimpi*, the following are the most noteworthy. The *mapingo*, composed of two tiny horns of duyker, worn by women, in the hope that they may bear children, since the reproach of *ng'umba*, or the barren woman, is the worst insult to an Awemba woman. The *nsakirwa* necklaces composed of little balls of wood inside which are *miti* medicines, mixed with oil, are supposed to avert the perils connected with pregnancy and delivery. These amulets are made by the *mung'anga* or doctor.

Totems.

With the amulets, and closing the description of the Awemba objects of veneration, come the totems. When questioned as to the origin of their totems, an old chief will say that they were chosen by the various leaders long ago as symbolical of their virtues or vices. Thus Mwemba is a *Wenang'andu*, "Son of the Crocodile," because he and his ancestors seized and evilly entreated men even as the crocodile. Other chiefs had for their totem a hoe (*mukoa*); Matipa the King of the Wabisa was the Wenangona, "the son of a mushroom," and these totems descended on the distaff side alone. Thus Kanyanta, who was the son of Mwamba by a woman not of royal blood, was the son of the hoe. But no special worship is paid to the crocodile, though the natives believe that the souls of the drowned migrate into the bodies of crocodiles. Thus at the river Luena, the natives assert that the large crocodile, which occasionally tries to seize the women going to draw water there, is a bad man, and that they can hear him at night crying in torment, "Give me porridge and give me beer. I am shivering with the cold."

The Awemba Hierarchy.

We must now return to the interpreters of the will of the divinities, but it must be noticed that any man could pray to a *mulungu* or to a *mupashi*, but when he offered sacrifices he generally consulted a priest.

I. The King.

The king seems to have generally acted as intermediary between his people and the *mulungu*, and to have sent sacrifices and to have prayed to the spirit of his father on their behalf, though he left the management of the ritual to the priests (the *basing'anga*) who seem to have formed the regular priesthood. Thus a chief never presided at the *lupupo* (burial sacrifices to his ancestor), but entrusted its performance to the *singanga*, or priest.

II. The M'ganga.

These priests were the learned class, the "leeches" and wise men of the people. Their main function was to interpret the will of the *milungu* and the *mipashi*, and to combat the evil enchantments of the sorcerers. They named children at birth, superintended the sacrifices, tended the sick, and charmed away diseases by divination and their amulets. But their office was in no sense hereditary, and in fact most of the old people pretended to be *basing'anga*, in virtue of their position as the oldest members of their family.

The Waloshi.

Opposed to the *wang'anga* were the *mlozi*, the wizards and sorcerers, who compassed the death of all who resisted them by means of their black arts and powerful medicines, imparted to them by some *chiwanda*, by whom in some cases they are possessed.

Like ghouls the *waloshi* are said to dig up, mutilate and finally eat the dead bodies of their enemies. By the power of the demoniac influence conceded to them by the *chiwanda*, they can change themselves into lions or other wild beasts, hunting like were-wolves at night, and afterwards devouring their prey with their fellow-sorcerers.

Instances of Superstitious Observances.

To realise how native custom and religion are inter-related, we have only to examine the ceremonies which take place at the principal events of natives' existence, and, indeed, the fear of the wrath of the *mipashi* looms large even in the most minute details of the village social life.

Birth.—After a child is born, it is washed and placed before the fire wrapped in a goat-skin, salt is put on its tongue to make it take to the breast, and the midwife shows it to the *sing'anga*, who at once goes out and consults the lots, *apanda misashi*. When he has finished throwing down the bones he comes in and gives the child the name of some dead chief, declaring that the spirit will look after his namesake.

Initiation.—When a girl reaches a marriageable age she is initiated at a dance called the *chisungu*, which corresponds to the *unyago* of the Yaos without the concomitant immoral practices. But the girls are not isolated for a month in huts built in the bush, as among the Yaos, since the ceremonies take place inside a hut in the village, and last several months. Inside this hut dancing is kept up, and the girls are instructed in the elementary facts of life. Only women are allowed to be present, but on analysing seven chants used at this ceremony, and written down by a native at the dictation of his wife, they prove to be mainly in praise of the midwives of the olden times, and exhortations to the girls to obey their husbands in all things inside the hut. I have a copy of one lengthy Awemba "epithalamium"—

> "The husband is powerful within the hut,
> We, the women, are merely as the chaff which hangs from the roof."

Old saws are quoted exhorting the girl to modesty and to dress with decency.

Divination.—The *sing'anga* takes no part in the marriage ceremony, but, two months after a child has been born, he comes to the husband and tells him that now the propitious time has come for him to resume cohabitation with his wife, or else the child will die. The husband obeys the doctor, and if the child dies subsequently the husband blames his wife, and says that the child has died because she has committed adultery. If she denies this they resort to the hunting test. The husband goes out and fixes nets for game. If the game caught is a female it is the woman's fault, but if it is a male the husband is to blame.

In case of serious illness the *sing'anga* is requisitioned to find out the source of the bewitchment, and the *mipashi* or *vibanda* who have caused the malady. When a man is really ill he sends for the *sing'anga*, who brings with him paraphernalia of small bones of gazelles and the bones of birds. These he gathers together and sorts out on the ground, as if dealing a hand at cards. If this method is unsuccessful he has recourse to the tortoise test. A tortoise-shell, within which some very potent medicine has been inserted, is placed floating on the top of some water in a jar. Then the *sing'anga* sprinkles a little flour on top and says: "O tortoise, if the patient is destined to recover, remain still, but if not, sink below." On discovery that the patient will live, he then repeats over the names of the *mipashi* who may have caused the illness through being neglected. In case the avenging *mupashi* is the spirit of the man's father, the patient's wives are told to make beer and place it over the grave of the latter. A pot full of beer is placed at the head of the patient at night, and if in the morning it has frothed over it is a good sign, as then the *mupashi*, being a spirit of the under-world, has drunk the beer and is appeased.

The Ordeal.—In case a man is accused of theft, witchcraft, or murder, recourse is made to the usual *mwavi* test, or ordeal, an appeal to Leza to decide. Among the Awemba the accused is made to drink a decoction made from the bark of a tree of that name, though among the Wabisa the boiling water test is the commonest. The trial is conducted in the presence of the chief, who prepared the *mwavi* himself, though in some cases it is prepared and handed to the accused by a little child, as the Awemba have the idea that the *mwavi*, if coming from innocent hands, will be more potent. The same superstition may, perhaps, be traced in the custom of carrying round a little child to plant bananas. If he vomits the poison the accused is declared innocent, and his accusers have to pay him a large indemnity. However, if he fails to vomit, unless an antidote is at once administered the man dies with all the signs of violent poisoning. Then the body is burnt, and every vestige of the man destroyed from fear that he may turn into an evil spirit (*chiwanda*) and thus avenge himself. If the accused is an important man or a chief the *mwavi* is given to a dog or a cock, which is taken to represent the accused. If the cock dies the man is considered guilty and has to pay a heavy fine to the injured or bewitched parties, but in cases of theft his ears are often cut off.

Funeral Ceremonies.

The funeral ceremonies of the Awemba are most impressive. As soon as a king, as the late Mwamba, had breathed his last, two of his wives were instantly sacrificed. Then the body was laid in state inside his principal hut, which was lavishly decorated with calico, beads and tusks of ivory. The house was closed, and no one was allowed access to it, until his successor was appointed, who alone could give permission for his predecessor's burial. On the burial day, when the body of the chief, now reduced to a skeleton, was laid to rest wrapped in a bull's hide, all his servants, councillors, and his wives were paraded before the tomb, and smitten between the eyes with a club. They were then left for dead at the tomb, and if by chance anyone managed to survive, he was not seized again, as the *Basing'anga* who preside at these functions say that he is not acceptable to the dead chief's spirit. Thus there is a man working at the Mission at Kilubula to day who was left for dead on the tomb of the former Kitimkulu.

When a Wabisa chief died, instead of sacrificing all his attendants as the Awemba did, his people only killed his head wife (*mukolo*), and this too when the chief had lain for a long time in state, and only his bones were left. Her body was split in twain, and the bones of the chief were put inside, and buried in this ghastly winding sheet. Two months after the death of the chief, *Lupupo* is held. They mourn while the beer is being made, and then have a great dance, and drink beer in honour of the defunct. The *Basing'anga* preside at the libations and sacrifices, which are offered by the successor to his ancestor's *mupashi*.

The burial of one of the common people is accomplished in this wise. The relations roll him up in a mat so that his knees touch his chin, and then carry him to the grave. On the way to the tomb some flour is sprinkled over the body of the deceased, to show—the natives say—that his friends are thinking of him. The head is turned facing the east. At burial, the nearest relation is let down into the grave, and cuts a hole in the blanket over the ear of the deceased that "he may hear when God calls him." Immediately afterwards the friends stand by, and one makes a small speech over the grave, saying that they will take care of his wife and surviving children, and express the hope that he will become a good spirit in the next world. With the corpse are buried some food and calico, and his pipe. If a *fundi*, iron or ivory worker, his implements are broken over the tomb. If the head of a family, his relations generally hold a *lupupo* on a small scale. To go into mourning, a man binds a band, made from the bark of a tree, round his temples, for an infant for four days, for a grown up boy two months, and for his father at least three months. When a husband loses his wife he takes no active part in the mourning, but the relations, especially the mother of the deceased, lament. But when the husband dies it is the wife's duty to mourn him with a wailing dirge for at least a fortnight ;—"Thou hast cast me away, O my husband, I shall never see thy like again."

From the preceding glimpses of the ceremonies and procedure in the various events and stages of native life from childhood to burial, the influence of religion, and the superstitious dread of offending the spirits, is strikingly exemplified. The Awemba and other tribes on the Tanganika Plateau afford a rich field for the anthropologist, and it is to be hoped that some skilled observer may be sent out to rescue the records of these primitive faiths and superstitions, before they are totally submerged by the relentless waves of an absorbing and materialistic civilisation.

NOTES ON THE OCCURRENCE OF STONE IMPLEMENTS IN THE VALLEY OF THE ZAMBESI AROUND VICTORIA FALLS.

By G. W. Lamplugh, F.R.S., F.G.S.

[With Plate XV.]

Introduction.

While investigating the geology of the Zambesi Valley around the Batoka Gorge below Victoria Falls on behalf of the British Association in July and August, 1905, I noticed that in many places rudely chipped implements of chalcedony and chert occurred in great profusion on the rocky surface. Though unable to devote the time necessary for the proper study of these relics during my traverse of the country, I took note of the localities in which they were conspicuously present, and made a small collection which I exhibited to the Anthropological Section of the Association during the meeting at the end of August, 1905, in Johannesburg.[1] Since that time other collections have been made, and descriptions of the implements from the immediate vicinity of the Falls have been given by Colonel H. W. Feilden[2] and by Mr. J. P. Johnson.[3] And, as the subject is likely to be of interest to anthropologists, from the possibility that some of the implements may be of high antiquity, it seems desirable that, in bringing those which I collected to the notice of the Anthropological Institute, I should describe the conditions under which these relics were found.

Physiographical Conditions.

The Zambesi River, immediately above the Victoria Falls, flows in a broad shallow valley bounded on both sides by rising ground which represents the slightly worn margin of the great central plateau. At the crest of the Falls the river is a mile in width, but after its great plunge its waters are gathered into a narrow gorge only about 150 yards wide, with nearly vertical walls about 400 feet in height. This gorge, gradually widening at the top from the weathering back of its walls, is prolonged for a distance of over sixty miles below the Falls, beginning in a very remarkable series of acute zigzags; and it is characterised throughout by sharp changes of course, which do not, however, affect the broadly sweeping curves of its general direction. (Fig. 1.) Until recently, the "Batoka Gorge," as I have

[1] This collection, including the specimens figured in Plate XV, has been presented to the Department of British and Mediæval Antiquities and Ethnography of the British Museum (Bloomsbury).

[2] *Nature*, vol. lxxiii, Nov. 23rd, 1905, p. 77.

[3] *Trans. Geol. Soc. S. Africa*, vol. viii, *in the press.*

named this cañon, has been supposed to have had its origin in the sudden opening of a rift in the earth's crust by subterranean forces; but this supposition has been shown by Mr. A. J. C. Molyneux to be untenable.[1] The result of my own investigation has been to confirm Mr. Molyneux's conclusion that the river has itself excavated this extraordinary chasm in its rapid descent from the interior plateau.[2] The evidence is so clear on this point that we need have no hesitation in considering the upper part of the gorge—with which alone we are at present concerned—to be directly due to the slow recession of the great waterfall.

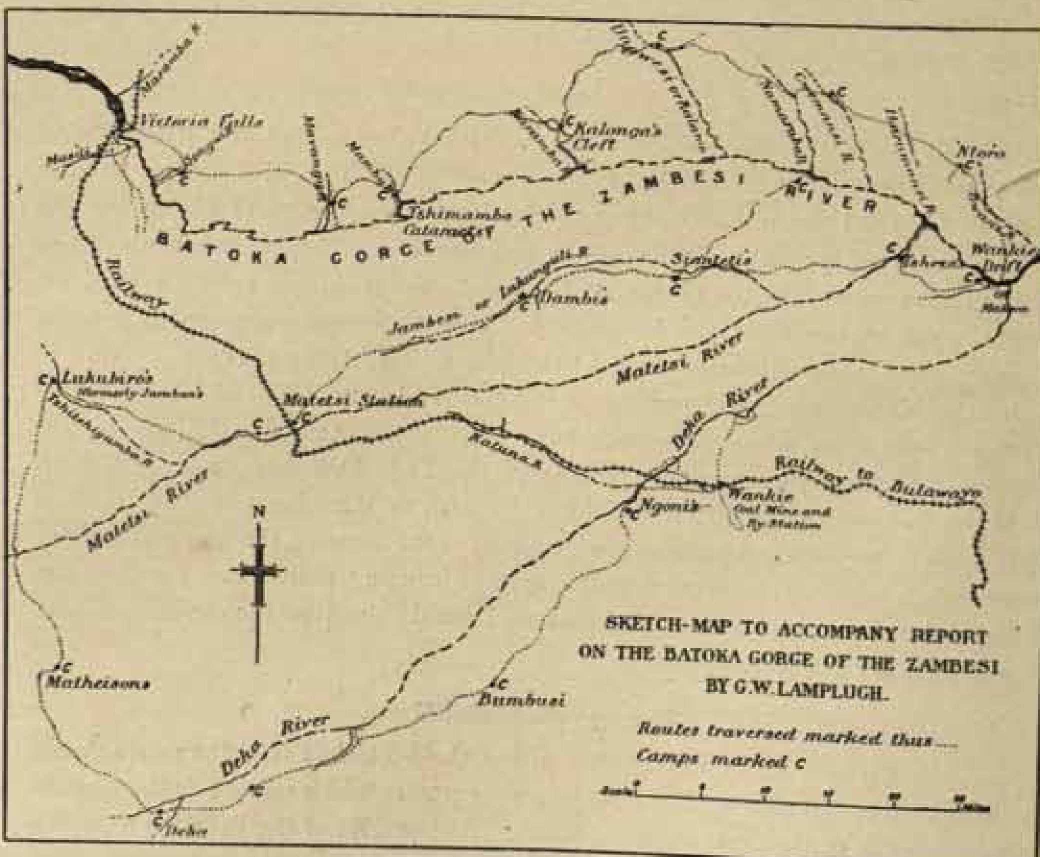


FIG. 1.

Reproduced by the courtesy of the Council of the British Association.

Throughout its length, the Batoka Gorge has been excavated entirely in a great series of basalts—the "Batoka Basalts" of Molyneux—which represents a succession of ancient lava-flows, and the same rocks are known to extend for many miles north and south of the river, and also far to the westward of Victoria Falls. These basalts frequently include large amygdales of chalcedonic, agate and jasper, due to the infilling of the original steam-cavities by silica; and these chalcedonic

[1] *Geograph. Journ.*, Jan., 1905, p. 40.

[2] See "Abstract of a Report on the Batoka Gorge," *Nature*, vol. lxxiii (Nov. 30th, 1905), pp. 111–114, also *Rep. British Assoc. for* 1905, p. 292

amygdales have yielded the material from which some of the implements have been made.

In the immediate neighbourhood of the Falls, and in many other parts of the region which I traversed, both north and south of the Batoka Gorge, wide areas are deeply covered with red sand, evidently equivalent to the "Kalahari Sand" of Dr. S. Passarge,[1] which overlies the basalt in broad smooth "bults" or swells, and overlaps the slopes of the old Zambesi Valley on both sides of the river above the Falls. This sand is evidence of a former period when the rainfall was less than at present and when the whole region was in the state of bare desert. The base of the sand is frequently indurated, and in some places, between the sand and the basalt, there occurs an irregular band of quartzite, sometimes several feet in thickness, rough and full of holes, but with a dense chalcedonic or cherty structure in its more solid parts. This quartzite has evidently been formed by the cementing agency of silica-charged water. As Colonel Feilden has noted, many of the stone implements are made from this quartzite.

General Distribution of the Implements.

The broad shallow valley occupied by the Zambesi above the Falls does not cease at the great cataract, but is distinctly traceable as an open outer valley for several miles below this point, with the zigzagging Batoka Gorge forming an inner trench upon its floor (Fig. 2). It was upon the bottom of this broad outer valley that most of the implements in my collection were found, and they were scattered almost as abundantly upon it below as above the Falls. The conditions of their occurrence suggest that the river probably flowed at its higher level over their present sites when the implements were deposited, and that the upper part of the gorge has been since excavated. If this be indeed the case, we must assign to them a very considerable antiquity.

It may here be noted that a striking characteristic of the Zambesi, and indeed of all other South African rivers which I had an opportunity to examine, is the extraordinary sparsity of their fluviatile deposits. The thick benches of river-gravel and deep accumulations of loam and silt that we are accustomed to find under like conditions in Europe and North America are, so far as my experience goes, curiously wanting in the interior of South Africa; and we find, instead, that the decomposing rock is usually quite close to the surface on the old river-terraces, and that the fluviatile deposits are represented by a mere sprinkling of pebbles or, at the most, by only a few feet of river-borne material. In no place on the old Zambesi platform that came under my observation was there a continuous or measurable layer of gravel, but merely a more or less attenuated surface-sprinkling of pebbles, with occasionally a foot or two of loam; and similar conditions ruled generally in the smaller valleys.

Under these circumstances it is of course much more difficult to determine the antiquity of the implements from their position, as they nearly all lie at the

[1] *Die Kalahari*, Berlin, 1904.

surface and there is very little chance of finding direct stratigraphical evidence relating to them. In one case only, to be described presently, did I find an implement actually buried in alluvium. The rest were seen lying exposed at the surface, mainly on bare rocky places, and usually associated with a sprinkling of stones which showed no sign of artificial manipulation.

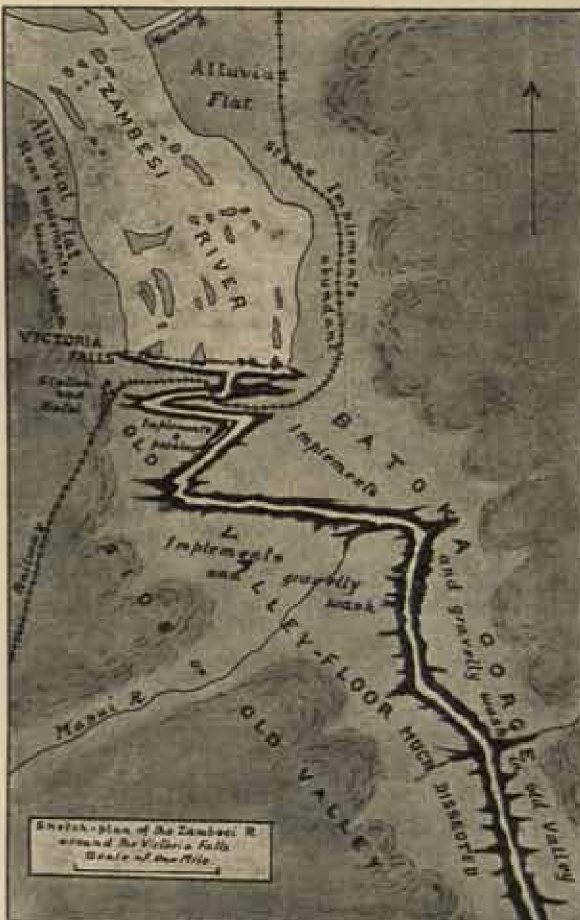


FIG. 2.

It is noteworthy also that although I journeyed for many scores of miles over the sand-bults, now bush-covered but showing much bare ground, I did not find a single implement upon them; and this experience is borne out by the observations of Colonel Feilden,[1] who closely examined the sandy tracts near the Falls. Neither did I find any implements on the treeless grassy flats, swampy in the wet season, which occur in every part of the plateau that I visited. These flats are generally underlain by a dark tenacious loam or clay of no great thickness, apparently derived in part from decaying vegetation, but mainly from the decomposition of the basalt.

It is possible, however, that, if implements were very sparsely scattered in the sand and loam, though difficult to find *in situ*, they might become conspicuous at the underlying rock-surface, if concentrated upon it by the stripping away of the finer particles by an agency that was not powerful enough to remove the heavier bodies. The abundance of the implements on some of the sites in the Zambesi Valley near the margin of tracts of sand and loam was rather suggestive of some such concentration.

General Character of the Implements.

Although at most of the implementiferous sites it was easy to find specimens that showed undoubted artificial working, these were always associated with a

[1] *op. cit.*

much larger number of chipped stones in which the evidence for design was very slight, and also with stones of like composition that showed no trace of artificial fracture. Even in the better examples the workmanship is always rough and crude, and the resultant implement indifferently shaped. Yet many of the specimens show a secondary chipping which corresponds more nearly to rough European Neolithic work than to the earlier Palæolithic method. A few examples are figured on Plate XV to show the prevailing characters, but these are mainly representative of a grade above the general average. Indeed the whole of my collection consists principally of the better specimens selected from among the very much larger number that were rejected, though a few examples of the cruder work were retained.

Some of the implements bear a rough resemblance to types common in Europe, but I think that this is probably accidental. At any rate, I searched without avail for anything comparable to the Neolithic arrow-heads, celts etc., with which I am acquainted. Neither did I find anything resembling the Palæolithic *hache*, though I believe that something of this kind has been found by a later investigator.

It appeared to me that, in the majority of the Zambesi implements which passed under my observation, the object of their fabricators was simply to obtain a sharp curved edge in order that the stone might be used in the hand as a cutting-tool; and that as soon as an edge of this kind was attained, no further work was done on the implement.

In their present condition, a few of the implements seem to have been waterworn, and many are characterised by a highly glazed or polished surface, which in some examples is most striking and peculiar. To these secondary characters reference will again be made when the probable age of the instruments is discussed.

Implementiferous Sites.

I first found the implements near Victoria Falls on the low ground bordering the eastern side of the river, between it and the new railway. The worked stones occur here very abundantly upon the low bosses of weathered basalt that rise slightly above the alluvial soil of the flat in the angle between the Zambesi and its tributary the Maramba, which flows to it from the north and has its confluence some two miles above the Falls. Along the line of the railway the rocky ground continues to be richly implementiferous up to the edge of the grassy flats of black loam that intervene as we approach the place where the railway crosses the Maramba; and a large proportion of the specimens in my collection were obtained from these sites.

The implements were mostly found interspersed among rounded pebble-like stones of similar materials that were sprinkled freely over the rocky surfaces; and, as some of the implements themselves are more or less worn and are generally highly glazed, the whole assemblage looked not unlike a scantily developed river-gravel.

M 2

In the west bank of the Maramba, some two or three miles above the railway crossing, where the stream is confined between well-defined banks, I found the single implement obtained from beneath the surface, to which reference has been already made. This specimen, illustrated in Plate XV, Fig. 1, is one of the most shapely in the whole collection. The following section of the river-bank at this place will serve to indicate the conditions under which it occurred.

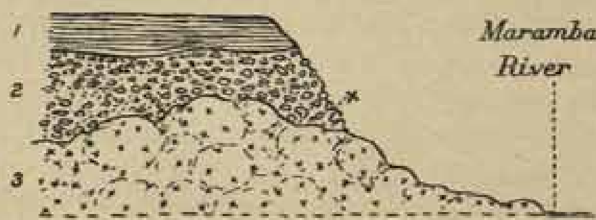


FIG. 3.—SECTION OF THE WEST BANK OF THE MARAMBA RIVER, A FEW YARDS SOUTH OF THE WAGON-DRIFT NEAR LIVINGSTONE.

1. Brown earthy loam, 2 to 3 feet thick. A shard of coarse earthenware occurred at the base of this loam, 3 feet below the surface.
2. Irregular pockets of coarse gravel, up to 4 feet in thickness, composed mainly of partly worn lumps of "surface-quartzite," chalcedonic pebbles and much-weathered fragments of the subjacent basalt.
   The stone implement (Plate XV, Fig. 1) was found in this gravel at a depth of 5 feet from the top of the bank.
3. Amygdaloidal basalt, forming the bed of the stream and the lower part of its banks.

The loam (1) of this section is equivalent to the loam of the grassy flats mentioned above and is probably still within reach of the river-floods and therefore may be of recent accumulation. But the gravel (2) which contained the implement rests directly upon basalt and may be of considerable antiquity, as the Maramba has here almost reached its base-level of erosion in relation to the Zambesi above the Falls. In the course of time, however, when by the gradual recession of the Falls the gorge of the Zambesi shall have been cut back till it reaches the confluence of the Maramba, there will be a sudden rejuvenation of this tributary and an immense gain of erosive power. Its lowermost portion will then at once commence to develop a deep subsidiary gorge of its own, like those possessed by the present streams that join the Zambesi below the Falls, and the relics of its alluvial detritus that now borders the stream will eventually be left on a platform 400 feet above the torrent, like the pebbly material that is now found in this situation along the margins of the Batoka Gorge.

Near the landing-place at the Lower Ferry on the western bank of the Zambesi, three quarters of a mile above the Falls, a narrow loamy flat adjacent to the river has been trenched in places by shallow rain-gullies, which reveal some patches of gravel beneath two or three feet of loam. In these gullies I found a few worked flakes which had evidently been derived from the gravel, but did not discover any of these actually *in situ*. (See Fig. 2.)

Below the Falls I found the flaked stones in plenty on the ancient river-flat bordering the edge of the gorge on both sides, and here again they were nearly always associated with patches of thinly sprinkled chalcedonic and cherty detritus. I surmised at first that this gravelly material might be simply a residuum of the durable amygdales remaining nearly in place after the rotting away of amygdaloidal basalt, but further examinations showed that, at any rate in some cases, this could not be so, as the material was sometimes overspread upon basalt which did not possess the amygdaloidal character, and, moreover, along with the jaspers, agates and chalcedony of the amygdaloids, there were generally many fragments of the peculiar cherty "surface-quartzite" to which reference has been already made. In these places the gravelly detritus had evidently undergone transportation, and probably by the agency of the Zambesi itself before the adjacent portion of the gorge was cut. In a few instances, however, there was an alternative possibility that the transport may have been effected by tributary streams.

On the northern side of the river, scattered patches of this detritus, always associated with flaked stones, occurred frequently in the first nine or ten miles of our journey along the Batoka Gorge, and numerous implements were collected from it between the Falls and the Songwi River, six miles distant, and again between the Songwi and the Kapandi River, three miles farther eastward. (Fig. 1.)

On the opposite or south-western side of the gorge, patches of cherty and chalcedonic detritus, yielding many implements, occur here and there for at least five miles below the Falls, beyond which I had no opportunity for examining the plateau bordering the river. A readily accessible site in this quarter is the narrow flat-topped spur between the sharp zigzag of the gorge, about a mile south-east of the Falls Hotel, and here I found a few well-rounded pebbles along with the usual shapeless subangular fragments and the chipped flakes. That my collection contains only a few specimens from this side of the Zambesi, must not be taken to indicate a relative scarcity of the implements; it merely implies that I collected less keenly here than during my earlier traverse of the country north of the river, when the discovery was still novel, the superabundance of material, of course, soon producing its usual damping effect. For the same reason, the higher average of workmanship shown by these few examples denotes only that the collector's standard was raised and the rougher specimens more freely rejected.

Of the remaining implements in my collection, from localities other than those already mentioned, several are from the little valley of the Mamba River on the northern side of the Zambesi, 28 miles east-south-east of the Falls. Here the flaked stones were abundant around our camping place, which was in the valley within a mile of its junction with the Batoka Gorge, on a rocky flat between craggy sides 60 or 70 feet high, the present bed of the Mamba being excavated a further 15 or 20 feet below the level of this flat. The gorge of the Zambesi is here sunk to about 600 feet below the level of the plateau, and the Mamba at a short distance below our camp makes a terrific leap into a gloomy chasm through which it flows into the main gorge. In this region the outer valley of the great river, if it ever existed, is no longer clearly recognizable, as the dissection of the plateau, consequent upon the rejuvenation of the drainage, has reached a stage at which the whole country bordering the river is broken into an intricate maze of ridges and cañons.

The implements obtained from this site differ somewhat markedly from those collected in the country to the west where the old outer valley of the Zambesi is not yet obliterated. Their average size is smaller; they show rather finer flaking; and they are without the high glaze or burnish so prevalent in those from the more westerly sites. In spite of these differences, however, the implements are of the same general type and shape. (Plate XV, Fig. 10.)

The position of the flaked stones in this instance is compatible with only a moderate degree of antiquity, since the little valley itself cannot be very old; and since it is probable that these implements are newer than those of the old Zambesi Valley previously described, they are an illustration of the conservatism of type which characterizes the stone implements of South Africa.

Our route eastward from the Mamba usually lay at a greater distance from the Zambesi, and although a sprinkling of chalcedonic detritus was still occasionally observed, very few artificially flaked stones were seen, and none collected. That this indicates a marked, though not exclusive, localization of the implements to the vicinity of the Zambesi will be evident from the following observations culled from my notes on the journey.

Near the Karamba River, about 35 miles east-south-east of Victoria Falls, I noted "much chalcedony in places on surface, but no chips seen"; on the next march eastward—"a few poor 'flint' chips seen, but not good and not plentiful"; and again, at about 70 miles from the Falls—"a few doubtful chips *en route.*" One fresh-looking chip was collected near Wankies Drift, some 75 miles distant from the Falls, where we again reached the Zambesi.

My observations during a subsequent journey on the southern side of the river from Wankie's Drift to Matetsi, thence southward across the broken plateau to Deka, and from Deka to Wankie Coal Mine, a distance in all, with detours, of over 250 miles, served to confirm the relative scarcity of the flaked stones in the country distant from the Zambesi, though as this journey was made partly on horseback the ground was less closely examined than during the more northerly trek, which was made afoot. I noticed a few poorly-worked chips in the Matetsi Valley about one and a half miles south-west of the railway bridge, the site being as usual in the vicinity of permanent water, on a rock platform 30 or 40 feet above the present stream. But in several places toward the head-waters of the Matetsi, and on the low watershed between it and the Deka River, where chalcedonic detritus was abundant, I failed to find any certain indication of artificial chipping, though an experienced archæologist might possibly have been able to recognise it in some of the "doubtful" specimens. Respecting the upper part of the Deka Valley my notes state "no chips found in this district, though looked for, and agates not rare"; and no better results were obtained from the places examined lower down the valley.

I may here mention a very modern flake which I picked up on the outskirts of a native kraal on the Lukunguli or Jambesi River, a large tributary of the Matetsi. The specimen is of interest in showing that the natives still occasionally prepare flakes for cutting purposes, not very dissimilar in shape from the smaller of the ancient implements. The object, as was pointed out by a speaker when the implements were exhibited at the Johannesburg meeting, proves to be a chip of porcelain which has apparently been struck from a telegraph-insulator. The place where I found the specimen is 30 miles or more from the nearest telegraph line, but the natives travel for very much longer distances to work on the railway.

It is worthy of note that Chapman, in his record of a journey across the Kalahari in the year 1862, describes how one of his Damara followers skinned a buck with a sharp stone, and the author adds that "an edged stone is not a bad substitute for a knife."[1] The term "edged stone" here used is perhaps the best short description that could be given of most of the implements in my collection.

Concluding Notes.

Besides any strictly archæological evidence that may be afforded by the workmanship of the Zambesi implements, which I am not qualified to discuss, there are other factors to be taken into account in considering the question of the antiquity of these "edged stones" which I propose briefly to recapitulate.

The first and most important of these is whether the implements form an integral part of the gravelly detritus with which they are associated, or whether they have been shaped subsequently to its deposition. It is evident that the Batoka Gorge has been cut backward very slowly. Owing to the resistant character of the solid basalt, the river has been compelled to concentrate its energies mainly along the joints and other planes of weakness that intersect the rock, and has picked out its channel along them even when their direction lies athwart its general course, thus giving rise to the singular zigzags of the gorge, and thereby greatly lengthening its channel. The carving out of these zigzags must have required a very long time; and the high antiquity of the shallow outer valley within which they lie is further indicated by the presence of the red "Kalahari Sand" upon its slopes.

Therefore if the implements that occur on top of the spurs between the zigzags, and in corresponding situations for several miles below the Falls, were indeed deposited there by the river when it still flowed over these sites, they must be of very great antiquity. The state of preservation of the implements, though favourable to this supposition, is not in itself convincing. Some few, like the examples shown in Plate XV, Figs. 2 and 7, are so much worn as to suggest that they have been rolled along the river bed; and most have had the sharp

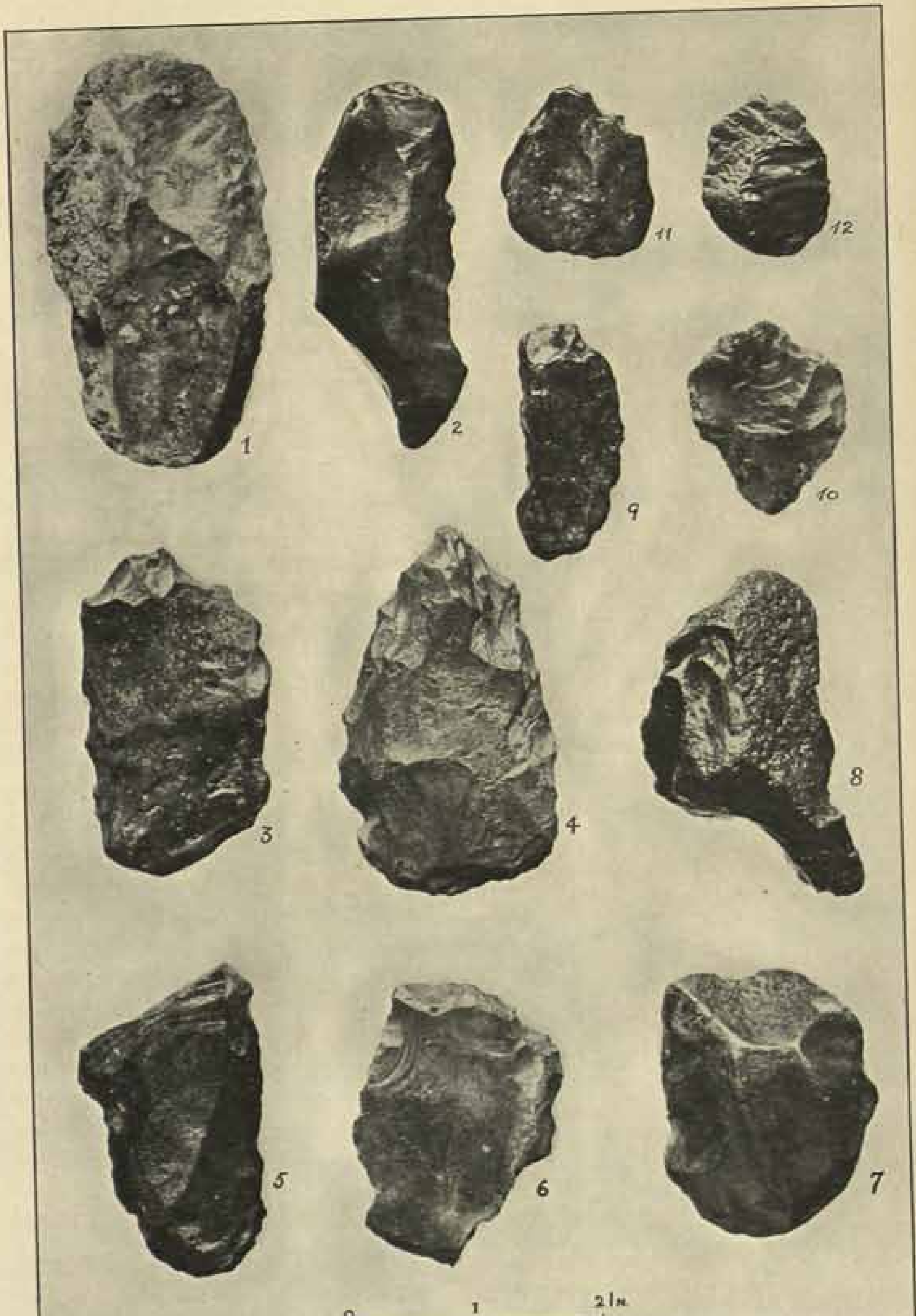
[1] *Travels in the Interior of South Africa* (London, 1868), vol. ii, p. 59.

angles of the original chipping more or less smoothed and blunted, as in Figs. 3, 8, and 9. But this blunting may have been done, in part at least, by the same agency that produced the wonderful burnish or glaze that is so remarkable on many of the specimens (*e.g.*, Plate XV, Figs. 2 and 11), which cannot, I think, be assigned to the direct agency of the river, but has probably been caused by some subærial operation.[1] The burnishing action of wind-borne sand is well known, but seems inapplicable in this case, as the glaze is spread evenly over every surface, including all the minor irregularities, without any trace of the unequal rasping of the sand-blast; and, moreover, the bush-covered country in which the implements are found, is not, under present conditions, open to sand-drift. It seems more probable that the phenomenon is akin to the "desert varnish" with which the water-worn rocks of all the stream beds of this region are glazed, and that it represents a thin mineral film deposited by evaporating moisture which carried mineral substances in solution. The "surface-quartzites" themselves are sufficient evidence that the solution and re-deposition of silica by ground-water has been prevalent on an extensive scale in the region; and it seems quite likely that the implements of chert and chalcedony have been affected by this reaction, in which case the burnish might be regarded as an extreme type of patination. However, even if the blunting of the chipped stones be assignable to this process and not to direct river-wear, it must still surely have been a slow process and must indicate a considerable antiquity for them.

As already remarked, it is unfortunate that the curiously scanty development of river-gravel in the region almost precludes the chance of obtaining direct stratigraphical evidence. In the one instance where such evidence was available, viz., that at the Maramba above described, there was no doubt that the implement was actually embedded in the river-gravel, but it was not possible to prove with certainty that the gravel was very old, since it still forms part of the existing river-flat. It should be noted that this implement has its chipping quite freshly preserved and is neither worn nor polished, which lends support to the idea that the peculiar condition of the surface specimens is due to some subærial agency.

Setting aside the condition of the implements, it might perhaps be possible, in the case of those found above the Falls and in the tributary valleys, to explain their present position by supposing that the ancient inhabitants of the country, when they needed cutting tools, resorted to the places where suitable stone was plentiful, and there prepared, used, and discarded the implements. It is certainly remarkable how often, in different parts of the world, we find worked stones abundantly near the spot where the raw material occurs, while where such material is absent in neighbouring districts apparently as suitable in every respect for human occupation, they may be quite rare, and it is evident that primitive man did not habitually carry his ruder implements far from the place where he shaped

[1] It has been suggested to me, however, by my friend, Prof. T. G. Bonney, that the burnishing may have been produced by long-continued drifting of very fine silt or mud over the surface of the implements, either by wind or water action.



STONE IMPLEMENTS FROM THE ZAMBESI VALLEY.

them. But I do not think that this supposition can be applied to the sites in the extremely rugged ground bordering the gorge below the Falls, where in the dry season there is no accessible water, and, so far as I could judge, no better material than that of the more convenient sites to induce the native to establish his working places there.

Taking the whole evidence into consideration I therefore lean to the opinion that most of the implements were left in their present position when the Zambesi flowed in its higher valley for some distance below the present Falls. At any rate, the facts are sufficient to justify a more thorough investigation of the subject than I was able to undertake.

NOTE UPON AN IMPLEMENT OF PALÆOLITHIC TYPE FROM THE VICTORIA FALLS, ZAMBESI.

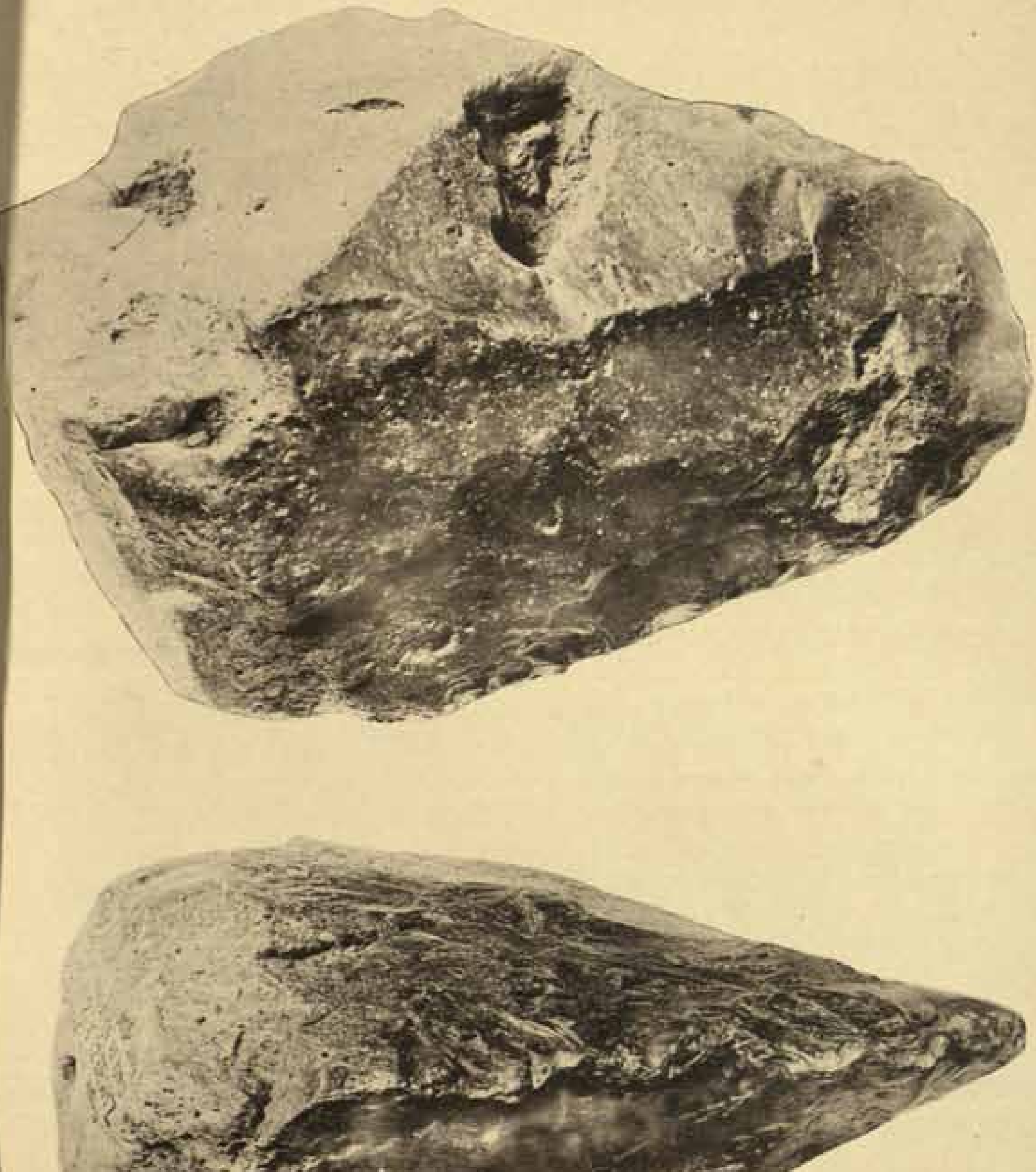
BY H. BALFOUR, M.A.

[WITH PLATE XVI.]

As bearing upon Mr. Lamplugh's interesting paper, the following note may be of interest for the sake of the additional light which is thrown upon the question of the antiquity of the stone implements of the Zambesi Valley.

During a week spent at the Victoria Falls in September, 1905, I devoted a portion of my time to searching for Stone Age remains, having been stimulated by the results already achieved by Mr. Molyneux, Mr. Lamplugh, and Colonel Frank Rhodes. Below the Falls, on the plateau which originally formed the bottom of the wide Zambesi Valley, and through which the deep Batoka Gorge has been cut, I found, as they had done, quantities of artificial flakes and rudely worked implements of chalcedony and other stone considerably patinated in most cases. Of these, some were almost as sharp as they were when freshly made, and do not convey the impression of great antiquity; others, on the contrary, show evidence of considerable attrition by rolling, caused, no doubt, by river action, and appear to have been brought down from a distance by the river, and deposited by it on the spot where they are now found. It seems to me difficult to account otherwise for their abrasion, but if their presence upon the bare rocky expanses some 300 to 400 feet above the present level of the river in the gorge is due to their having been so deposited by the river when it was still flowing at this high level—the same as that of the river above the Falls—the evidence of their great antiquity is manifest. It is not of these that I wish to write, Mr. Lamplugh has already dwelt upon them; I wish particularly to call attention to one specimen which I found on my last day's hunt for implements.

While walking in company with my friend, Colonel H. W. Feilden, along a piece of newly-made road on the left bank immediately above the Falls, I found amongst the coarse stones with which the road was roughly metalled, the implement figured on Plate XVI. It is of chalcedony, 13·7 cm. long, 9·7 cm. wide, 6·6 cm. thick, and weighs just over 26 ounces. As will readily be seen from the illustrations, it is, as regards shape and manufacture, thoroughly palæolithic in type, resembling completely a type of flint implements well known from the River-Drift gravels of Western Europe and England. It has a rounded butt for holding in the hand, and the opposite end has been carefully flaked to produce a cutting edge. As far as



CHALCEDONY IMPLEMENT OF PALÆOLITHIC FORM FROM AN OLD GRAVEL DEPOSIT OF THE ZAMBESI.

form goes, therefore, this implement is typically palæolithic, and suggests that it belonged to a very rudimentary condition of culture, comparable to that of the River-Drift period of N.E. Europe. It is, further, considerably patinated, and presents a smooth, shiny surface which is probably due to the action of sand during a prolonged period, and there is evidence of long-continued river action in the abrasion of the surface and edges, which has completely dulled the sharpness and definition of the original flaking. The implement has, in fact, the appearance of having been rolled by running water and of having been transported some distance by this agency. The ballast-pit, from which the stones used in metalling the road at this point had been obtained, was within a few yards of the road, and was excavated in an ancient deposit of coarse gravels, formed when the river was running at a level perhaps some 15 to 20 feet above its present level at this point. These gravels consist of coarse water-worn pebbles of various sizes, many of them large and heavy, and include several perfectly spherical nodules as large as a cricket ball. The deposit does not probably exceed about 4 feet in depth, but I was unfortunately unable to take measurements.

We have here then an example of an implement taken from an ancient river deposit of the Zambesi, of which the patination and abraded surface point to a considerable antiquity, and the form and manufacture is pre-eminently characteristic of the implements of the river drift period of Western Europe. The combined evidence seems to point strongly to a strict correspondence of conditions in the two widely separated regions, to a like condition of culture, in both cases of great antiquity. Whether it is legitimate to assign to these Zambesi implements as remote a date as that given on geological evidence to the implements of our own River Drift must be determined by further examination of the older Zambesi deposits, but I cannot doubt that a very long period of time is necessary to account for their characteristics and for the position in which some of them are found. The specimen which I have described appears to me to furnish more complete evidence of high antiquity than any other which I have so far seen from this district, and it is, I think, of interest, in view of the evidence of a very remote Stone Age in South Africa, which is gradually being discovered in other districts.

THE ORIGIN OF WAMPUM.

By D. I. Bushnell, Junr.

[With Plates XVII, XVIII.]

Although much has been written on the subject of Wampum, its origin and use, yet very little evidence has been produced to substantiate the theory of its use by the North American Indians during prehistoric or rather pre-colonial days. However, it is the belief of the writer that sufficient evidence does exist to prove that wampum originated with the Indians, and that it was probably made and certainly used by the Indians of Virginia when the first English colonists reached Roanoke in 1585.

It has been the opinion of some American writers that true wampum[1] was unknown to the Indians until it was introduced by the Europeans—presumably by the Dutch traders at New Amsterdam. It is true that early in the seventeenth century some Dutch from New Amsterdam furnished the English colonists at Plymouth with a large quantity of such beads to be used by them in the Indian trade. These particular beads were undoubtedly made by the Europeans, using metal tools and lathes. That much is to be conceded; but the question now presented is, what suggested to the Dutch the advisability of making this particular form of bead?

There are no records of shell beads being made in Europe at that time, consequently the use of shell for that purpose was probably not conceived by the Dutch until after their arrival in America. It is highly improbable that as soon as they reached America they would have begun the manufacture of shell beads, unless, seeing similar beads in the possession of the Indians and recognizing in them a medium of exchange, they began making others in imitation of the native product.

One, if not the earliest, record of an example of wampum in a European collection appears in the small printed catalogue of the "Museum Tradescantianum"[2] dated 1656 and reads (p. 51) "Black Indian girdle made of wampum peek best sort." As this list was made less than fifty years after the settlement of the first

[1] The term *wampum* has, during later years, been applied to all shell beads; but the true wampum beads are cylindrical in form, averaging $\frac{1}{8}$-inch in diameter and $\frac{1}{4}$-inch in length. There are two sorts: violet, often described as black, and white. The former were made of a part of the *Venus mercenaria*, while various shells were used in making the white variety.

[2] *Museum Tradescantianum: or a Collection of Rarities preserved at South Lambeth near London*, by John Tradescant. London: M.DC.LVI.

permanent English colony in Virginia it is safe to assume that the specimen was brought to England soon after that time.

The reference in this entry to a girdle made of "wampum peek best sort" is evidence that even at that early day the American Indians distinguished between different sorts or qualities of beads, or the various articles formed of them. Now if wampum had just been made known to the Indians by the Europeans it is not probable that such a distinction would have been made; this certainly points to an older use and knowledge of the beads in pre-colonial times. The allusion to "the best sort" as distinguished from other forms of wampum is clearly explained in the catalogue of the collection belonging to the Royal Society;[1] prepared by its Secretary and published in London during the year 1681. As the description of wampum is of such interest and value it is here quoted at length.

P. 370. "Several sorts of INDIAN MONEY, called wampam peage, 'Tis made of a shell, formed into small *Cylinders*, about a ¼ of an inch long, and ⅓ over, or somewhat more or less: and so being bored as *Beads* and put upon *Strings*, pass among the *Indians*, in their usual Commerse, as Silver and Gold amongst us. But being loose is not so current.

"The meanest is in *Single Strings*. Of which here is both the White and Black. By measure, the former goes at Five shillings the Fathome; the latter, at Ten. By Number the former at Six a penny; the latter, at Three.

"The next in value is that which is Woven together into *Bracelets* about ¼ of a yard long: Black and White, in Stripes, and six pieces in a Row; the warp consisting of *Leathern Thongs*, the *Woofe* of *Thread*. The *Bracelets* the *Zauksquaes* or *Gentlewomen* commonly wear twice or thrice about their Wrists.

"The best is woven into *Girdles*. Of this there are two sorts. One about a yard long; with fourteen pieces in a Row, woven, for the most part, into black and white *Squares*, continued obliquely from edge to edge. The other, not all-out so long, but with fifteen pieces in a Row woven into black *Rhombs* or *Diamond-Squares* and *Crosses* within them. The spaces between filled up with white. These two last, are sometimes worn as their richest Ornaments; but chiefly used in great Payments, esteemed their Noblest Presents, and laid up as their Treasure."

Another piece of evidence remains to be considered, evidence proving the use of wampum by the Indians of Virginia at the time Sir Walter Raleigh's colony reached the island of Roanoke, during the year 1585.

The original drawings made at that time, by John White, showing the Indians, their costumes and ornaments, are preserved in the British Museum. Two of these are reproduced in Plate XVII. The figure on the right (Fig. 2) is marked "One of the wyves of Wyngyno." This was engraved and published as the sixth plate in Hariot's *Virginia*, where it bears the title "A younge gentill woeman, daughter of Secota." The other figure (Fig. 1) of the same plate is described as "A cheif Herowan." This was engraved and used by De Bry as the seventh plate, where it is styled "A Cheifl Lorde of Rounoac." It will thus be seen that the title as written by White when

[1] *Catalogue and Description of the Natural and Artificial Rarities, belonging to the Royal Society, and preserved at Gresham Colledge*, London, 1681.

the sketches were made, were not retained by the engraver, and so it may be that the descriptive text in Hariot would not agree with the originals as they are *seen* by White.

The original sketches, in colours, have remained remarkably clear and brilliant during the three centuries and more since they were made and are consequently far superior to, and more satisfactory than, the engraved reproductions. In examining these coloured sketches we are at once impressed by the apparent exactness of detail and evident care on the part of the artist to show the true colour as well as drawing of the various articles represented, as the different materials are easily distinguished one from the other.

On the two figures shown in Plate XVII, the aprons of buckskin are easily distinguished by the colour as well as the drawing. Of special interest at this time are the necklaces and ear ornament on both figures and the bracelets worn by the "Chieff," all of which are represented as being composed of rather small violet coloured beads. The large rectangular ornament suspended from the "Cheiff's" necklace is easily recognized by its colour as having been a piece of burnished copper.

The violet coloured beads shown on these and other drawings were undoubtedly the dark variety of wampum, as the *Venus mercenaria* alone among all the shells on the coast would have produced a bead of that particular colour. I have been unable to find a reference in any of the early writings to a blue dye, with which the Indians on the Atlantic coast could have coloured bone or other materials of which beads could have been formed; turquoise, of course, was unknown to them. Therefore it appears highly probable that beads made of the *Venus mercenaria* were the only *blue* beads known to the Indians in the eastern parts of North America during pre-colonial days.

In the brief description of White's drawing, given by De Bry, there are several references to beads of various sorts.

In the third plate showing "A weron or great Lorde of Virginia," the Indian is shown wearing several strings of small dark colorued beads, and in the text it is said, "They weare a chaine about their necks of pearls or beads of copper, wich they much esteeme, and therof wear also bracelets on their armes."

Describing the fourth plate, representing "One of the chieff Ladyes of Secota," this was written "For the most parte they hange at their eares chaynes of *longe* Pearles, and of some smootht bones."

A part of the description of the seventh of the series of De Bry's plates ("A Cheif Herowan" which is reproduced in this article) reads:

"They hange pearles stringe uppon a threed att their eares, and weare bracelets on their armes of pearles, or small beads of copper or of smoothe bone called minsal . . . but in token of authoritye and honor, they wear a chain of great pearles, or copper beads or smothe bones about their necks."

As has already been stated the original coloured sketch of this chief shows him wearing violet coloured beads with a few white ones intermixed. These were probably the two varieties of wampum. Had they been made of copper the artist would certainly have coloured them as he did the large rectangular ornament.

Hariot in the list of "Commodities" refers to *Pearle.*

"Sometimes in feeding on muscles wee founde some pearle; but it was our hap to meete with ragges, or of a pide colour; *not having yet discovered those places where we hearde of better* and more plentie. One of our companie; a man of skill in such matters, had gathered together from among the savage people about five thousand." . . .

This is interesting as it shows that the so-called pearls were never actually found by the Europeans.

In the account of the second voyage to Virginia undertaken by Sir Richard Grenvill in the year 1586, we find this record.[1]

"He gave me a rope of the same pearle, but they were *blacks,* and naught, yet many of them were very great . . . yet he *tolde* me that the sayd king had a great store of pearle that were white, great, and round, and that his blacke pearle his men did not take out of shallow water, but the white pearle his men fished for in very deepe water."

This probably refers to the shells collected and used in the manufacture of beads.

Wampum beads have puzzled many, even in recent times, and it is the belief of the writer that when they were first met with by the English colonists they were regarded as natural pearls. Wampum being of two colours would, therefore, have been described as black and white pearls, as has been shown above.

The collection of wampum in the British Museum,[2] although small, contains some interesting specimens illustrating the different forms of beads—some evidently the work of the Indians, others made by Europeans. All are shown in Plate XVIII.

The various specimens shown in the plate may be described as follows:

A. This is a very good example of a comparatively small belt having a length of 605 mm. and a width of 50 mm. being formed of seven rows of 165 beads each, although the belt, in its present form, is by no means a recent piece of work; the beads appear to be quite old and worn, they may have been used in an older belt. The beads are strung in the usual manner. Narrow strips of tanned buckskin extend between the rows of beads and two threads running through each bead pass one on each side of the strip of skin.

The ground of this belt is formed of white beads, while the simple form of decoration—oblique lines—is formed of the more highly prized violet-coloured variety. These latter are the *black* beads of the old writers. The oblique bands, appearing on this belt, identify it as having been made by the Iroquois.[3]

[1] Quoted from the Glasgow edition of Hakluyt, vol. viii, p. 323.

[2] For a description of the various uses of wampum during historic times the reader is referred to Mr. W. H. Holmes' most valuable paper, "Art in Shell," in the *Second Annual Report Bureau of Ethnology,* Washington, 1883.

[3] "Four Huron Wampum Records," by Horatio Hale, in the *Journal of Anth. Inst.,* vol. xxvi, 1897, p. 244.

The beads have bi-conical preforations, made by means of a metal drill. In section, the beads are very irregular, proof of their having been made without the use of a lathe. They were without doubt made by the Indians using drills obtained from the Europeans.

B. A small wrist-band formed of twelve rows of twenty beads each. This is similar to the belt A and was probably obtained at the same time. It is interesting to find two pieces in which no glass beads occur, as a few are often found intermixed with the shell. The strips of buckskin extending from either side of the band were used in fastening it around the arm.

C. An interesting pair of small bands, having similar patterns in white beads on a violet ground. These pieces are each about 235 mm. in length and 40 mm. in width, being composed of six rows and having eighty-seven beads in a row. Many white glass beads made to imitate the wampum are found in these pieces.

D. Another small band, similar though somewhat longer than the two described above. The majority of the white beads in this piece are glass; but all the violet coloured are made of shell and were evidently manufactured by the Indians.

These three pieces (C D) resemble the work of the eastern Algonquians and were probably made by the Micmac or neighbouring tribes.

E. A short string of beads of unusual size, the length of one being 18 mm. The perforations are cylindrical, the beads were turned on a lathe, having been made by the Europeans.

F. Five strings of violet coloured beads, all lathe turned and having cylindrical perforations. The beads on four of the five strings are extremely uniform in thickness, being only 2·3 mm. in diameter and averaging 6 mm. in length. The beads on the fifth string are 3·8 mm. in diameter and 8 mm. in length.

G. These are very old beads, much worn and polished, evidence of age and use. They are strung in an unusual manner. Beginning at the top, two threads are attached to a single white bead, then each thread passes through three violet beads, after which both threads pass through one white bead and so continue. As has been said, these beads are very old, the perforations are bi-conical and very irregular. Unfortunately there is no number attached to these beads and consequently no records of when or where they were collected; but as they are very old and were undoubtedly made by the Indians, they may have belonged to the Sloane Collection. According to the catalogue there were many examples of wampum in the old collection, and probably this was one of them.

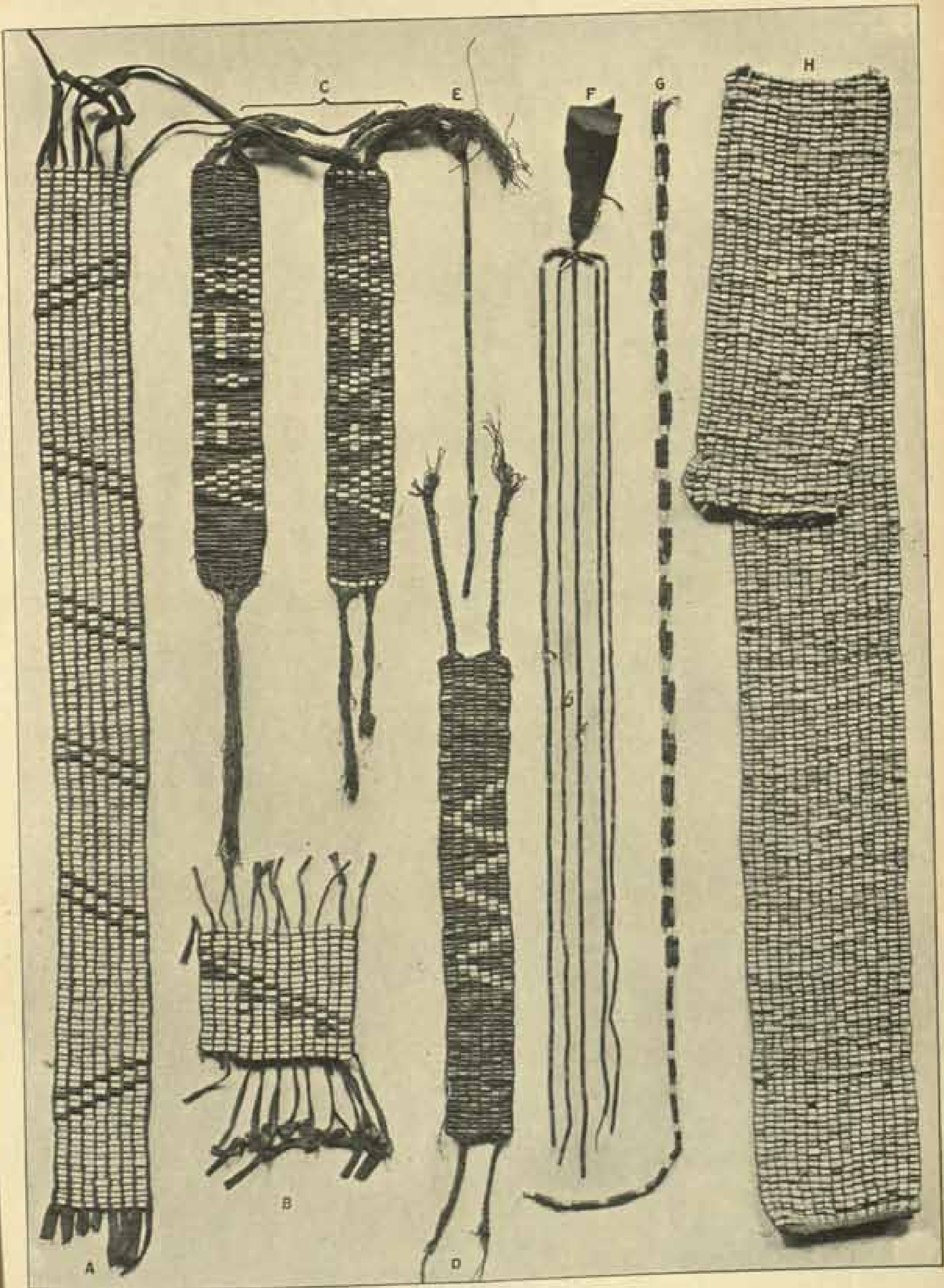
H. The beads forming this belt are said to have been found in a grave near Fleming, in the State of New York. Both the violet and white varieties occur, but it is difficult to distinguish one from the other, as all are badly decomposed. After being removed from the grave they were restrung and now form a belt 15 beads in width and 890 mm. in length.

The beads appear to have been mixed; the majority were probably turned on a lathe and have a cylindrical perforation, while others have a large bi-conical

FIG. 1.—"A CHEIF HEROWAN."

FIG. 2.—"ONE OF THE WYVES OF WYNGYNO."

THE ORIGIN OF WAMPUM.



WAMPUM IN THE BRITISH MUSEUM.

THE ORIGIN OF WAMPUM.

perforation; but on account of the decomposed surface it is not possible to formulate any definite conclusions.

Very few, of the great number of wampum beads now existing, were drilled by means of a small piece of flint; but we have evidence of their having been so made in New England as late as the year 1700.

This record is quoted from the old catalogue of the Sloane Collection in the British Museum.

"No. 1728. An Indian breast plate which they wear when they go to warr or at any great feast, made of shells out of the up country fresh water lakes. With the collar consisting of *blue* and *white* shells, whereof four blue ones make a penny and six white ones. They drill the holes with the point of a sharp flint and worle them round on a fine gritty stone, from New England by Mr. Jno. Winthrop."

It is obvious that "blue and white shells" should have been written "blue and white shell beads." Although the note as it appears in the catalogue was not written by Winthrop, we are safe in assuming the facts to have been stated by him. Another object in the collection sent from New England at the same time bears the date 1702. Therefore it is evident that as late as the year 1700 the Indians of New England were making wampum in their primitive fashion, perforating the small pieces of shell by means of a stone pointed drill, then shaping them on a rough stone—certainly a primitive art, and one not taught them by the Europeans.

NOTES ON THE TOTEMISM OF THE GOLD COAST.

BY C. H. HARPER AND OTHERS.

COMMUNICATED BY C. G. SELIGMANN AND N. W. THOMAS.

THE following notes were received by Dr. C. G. Seligmann in reply to his questionary on Totemism (*Folklore*, 1901, p. 385). Mr. Harper's contribution is printed as it was written save that the earlier portion is tabulated; the native replies were frequently unintelligible and are accordingly cut down in parts.

THE FAMILIES OF THE GOLD COAST.

BY C. H. HARPER.

ABUSUA.

The Gold Coast Colony is a geographical expression and does not correspond with any tribal or linguistic division of the natives in that part of Africa. It is inhabited by numerous tribes, Ashantis, Wassaws, Fantis, Akims, Accras, etc. There are three languages, the most important and widespread being Tshi, which is subdivided into Akan, spoken in the north, and Fanti, spoken on the coast. In the eastern part of the colony is spoken Ga, and in some villages along the coast Effutu, which is said to be that of an older people. As regards Tshi, the difference between Akan and Fanti is considerable; one finds at times that a Fanti interpreter is often unable properly to understand or to be understood in Akan. Besides this the various Tshi tribes have dialectic peculiarities of their own. Common to all the tribes are the Abusua or families. There is considerable divergence of opinion as to their number and their names.

The earliest reference to them I have come across is in Bowdich's *Mission to Ashanti*, published in 1819. He gives twelve family names and where possible their etymology. He states that the *Kwonna*, *Nsonna*, *Ntwa*, *Twidan*, are the four patriarchal families of which the others are branches.

Ellis in the *Tshi speaking people of the Gold Coast* gives the same list. He refers to the four patriarchal families and also to others more recent, named after fishes. He suggests that *Abadzi* means "Cannibals."

Christaller in the *Fanti Dictionary*, Appendix F, gives the twelve mentioned by Bowdich and eleven others obtained from natives.

Anaman, a native minister, in a small book called the *Gold Coast Guide*, is of opinion that there are seven original families, the rest being branches.

Sarbah in the *Fanti Customary Law* repeats the twelve mentioned by Bowdich and the seven given by Anaman.

In my own inquiries I was always told that the number of families was seven, though when I asked for their names, the number was not always strictly adhered to, nor did two people give me the same seven names.

TABLE OF TOTEMS.

Bowdich. / Ellis. / Christaller.†	Anaman (said to be 7; only 6 in MS., see notes).	Sarbah.	Harper.
†Kwonna (buffalo)	IV	Gives Bowdich's 12 and Anaman's 7.	—
Ebrutu (corn stalk) ...	III		(= Twidan).
Abradi (plantain)	... ...		(? = Twidan.) (plantain.)
†Nsonna (bush cat)	I		(snake, but also elsewhere fox or crow.)
Annona (parrot)	II		(parrot).
Yoko (red earth)	II		(hawk).
†Ntwa (dog)	V		Eduana (= Ntwa).
Abadzi (? cannibals—E) ...	V		—
Appiadi (servant race) ...	... ...		—
†Twidan (leopard)	III		(leopard).
Agona (place where palm oil is made)	II		—
Dwimina	I		(= Nsonna.)
Equana	II		Techina.
†Abakamadi	Eberadzi IV ...		—
†Dako...	Odumna IV		Asini (bat).
†Eduana	Egyirna IV		Setchiri (vulture).
†Amoakadi	Adwinadzi VI[1] ... (? Counsellors or riverfish.)		—
†Nanyo	Aonwin VI		Dihina.
†Nyago	... ...		Yogo (= Agona) (? bird).
†Poni.			
†Asakiti.			
†Apeni.			
†Toa.			
†Woko.			

Of my list *Nson* means a snake, *Dwimina* is the same family as *Nsonna*. *Abradi* in Fanti means a plantain; one person told me that the family was the same as the *Twidan* family.

Twidan is the leopard family.

Ebrutu is the same family as *Twidan*. In Fanti the word means corn.

Yoko, a hawk.

[1] May not intermarry with Twidanfo.

Annona, parrot family.

Ebiradzi, is the same family as *Kwonna*.

Ntwa is the dog family.

Yego, the same as *Agona*; the word I was told means a certain kind of bird. In Christaller's Dictionary *Nyago* means palm oil.

Agona is said in one case to be the same family as *Annona*.

Eduana, the same family as *Ntwa*. *Edua* is a small antelope.

Asini, a bat.

Setchiri, a vulture.

Adwinadzi, said to mean "Counsellors"; another informant says it is a "river fish."

A chief of that family told me that they had no animal which they respected, but that they were not allowed to intermarry with the *Twidanfo*. His grandfather had to try a case arising out of a marriage between the two families. He annulled the marriage and fined the parties.

The seven names which I found most frequently were:— *Twidan*, leopard family; *Nsonna*, fox or crow family; *Kwonna*, buffalo family; *Ntwa*, dog family; *Annona*, parrot family; *Agona*, probably palm oil family; *Abradi*, probably plantain family.

This differs from Anaman's list. He gives *Adwinadzi* as one of the families, but from what I have said above it seems to be a branch of the *Twidan* family. In its place I have placed the *Agona* family which was given to me as a separate family in several instances.

Until there is considerably more information leading to a comparison of the totems, or, where they are wanting, the marriage laws, it will be impossible to determine accurately the names or number of the families.

Unfortunately the family customs are fast dying out. In Ashanti and some parts of Akim I am informed they are still to a certain extent kept alive, but on the coast there are very few people who can tell one anything about them.

RESPECT SHOWN TO TOTEMS.

Abradifo.—Ellis states that in the interior some families still abstain from the plantain, but in the south it is not customary. One person told me that the *Abradifo* would not eat either buffalo or plantain, that if they did they would die. Another informed me that the *Abradifo* eat plantains, and that there was no tradition of their showing any respect to it in old days.

Twidanfo.—According to Ellis they abstain from the flesh of all feline animals. When a member of the family sees a dead leopard, he must scatter shreds of white cloth upon it and anoint the muzzle with palm oil. I was informed that no member of the family is allowed to kill a leopard; if he finds he has shot one he would say, "I have killed my brother," and would put palm oil on the wounds. If one was found dead it would be carried into the bush. If a dead leopard is brought into the town, the family smear themselves with chalk and bury it. If one of the *Twidanfo* met a leopard on a journey he would turn back.

Kwonnafo.—Ellis says they would not eat buffalo, but I have found no evidence of this.

Nsonnafo.—Respect the bush cat, the crow, and a red snake, Nson, "the terror of the Nsonnafo." They would not hang a crow on their farms to scare birds. If they were to kill a crow or bush cat they would get sores on their bodies. In the old days if they were to find a crow or a bush cat dead they would bury a piece of white cloth with the crow and a piece of speckled cloth with the bush cat. Whenever the red snake appears it means certain death to one of the family.

Annonafo.—Are not allowed to kill or eat parrots. This was also in one instance said of the Agonafo.

Ntwafo.—Are not allowed to keep or eat dogs. There is a small bird and a small snake which they also respect. The small bird they used to hang on the neck of a dog.

TITLE.

The animal is called grandfather "nana." This is a word of respect and was used in addressing the kings of Ashanti. One informant told me that if a man of the Kwonna tribe, whose father was one of the Eduana tribe, should meet a man of the latter he would call him father. There is no evidence that the family has any special relationship or influence with the totem animal, *e.g.*, if leopards are troublesome to a village, the leopard family would not be called upon specially to deal with the matter. I was told by an educated native that, if a member of the family was troubled by a leopard, he would not hesitate to kill it, but he would put oil in the wounds.

ORIGIN OF THE FAMILIES.

Traditional accounts of the origin of the families were hard to obtain.

One account was that people originally came from the earth, sky, sea, mountains, and the animals etc., that came with them are their totems; *e.g.*, the Annonafo, the parrot family, came with the parrots on their loads. (It is a tradition that a parrot will say if anyone steals your things when you are away.)

Ebrutufo, the leopard family, came from the earth. Ebruto corn, and Ebrutofo are identified with Twidanfo.

Eduana or Ntwafo, the dog family, came from a river. They came with a broom, and with a dog carrying fire.

Nsonnafo, the bush cat family, came in a net, and the neck was tied with the red snake, "the terror of the Nsonnafo."

There were two stories told me of the adoption of a totem, by a town and by a household.

There was a tribe at war with Chief Frempon of Akim. They were driven from their villages and closely pursued. They came to the banks of the Volta, then swollen with rain, and as none of them could swim they were like to fall an easy prey to Chief Frempon. As they stood gazing at the river a wild boar came out from the bush and ran across the stream. Thus they learnt of a ford and crossed into a friendly country. For this the whole people made the wild boar sacred and forbade on pain of death any of their tribe to kill the wild boar or to eat of its flesh.

The wild boar thus became a totem for the whole of that people. According to the tradition the defeated chief was of the Eduanfo or dog family, so that the wild boar totem was in addition to the family totems. The story is also told of a deer instead of a wild boar. The other story was of a man going to fish in a large river where there were many crocodiles. He had scarce set foot on the river's bank, when a large crocodile seized him and dragged him under the water to its hole. The crocodile left him there, and went again into the stream to fetch its young, so that they could devour its prize. The man lay there without moving, afraid that the crocodile was watching him. Some time after the crocodile had left, the man felt small grains of earth falling on him, and, looking up, saw a small ray of light. He plucked up his courage and with all his might pushed his head against the roof, where he saw the light. The earth fell in and the man found himself in the open air. He climbed out of the hole and ran behind a large tree. As soon as he got free he saw his captor returning to the hole with young crocodiles to feast on him. Now what made the grains of earth fall on him? It was a partridge scratching for its food, for the man saw it fly away as he was climbing out of the hole. When he reached home he called his family together and told them his story. He made the partridge sacred to his family. They must not kill the bird nor eat its flesh, and if they catch one in their traps they must set it free.

Transformation.

I could find little account of transformation. What was told me was in connection with the leopard family. In that family if the funeral custom is not done well the deceased turns into a leopard and destroys the farms. Whenever a member of the family eats a plant called susua he turns into a leopard. Again, if the family do anything in violation of the dead man's wishes, he will turn into a leopard and plague them.

Marriage Laws of the Family.

In old days if members of the same family married or had intercourse they would both be either beheaded or sold into slavery. At the present time if such a thing occurred the matter would be investigated by the head of the family or the chief of the town. The parties would be at once divorced, the man fined £2 or more, a sheep would be killed, and he would have to walk in the blood. If done unwittingly they must kill a sheep and protest their innocence. If persevered in, the children would die and bad luck would follow the parents. If a chief had anything to do with a woman of the same tribe as himself he would be deposed. Confusion often arises from the fact that in different places there are different names for the same families. It such a case it is customary to go to an old man in the town for assistance; King Tachie of Accra is said to have given the matter up in despair and to have ruled that when people came from the bush and married with those on the coast an investigation into the families was unnecessary. On the coast these marriage laws are not strictly enforced though there is a prejudice against marriage within the family.

FUNERAL CUSTOMS.

When a member of the Twidan family dies they scratch the picture of a leopard on the wall of the house and on the coffin, and the mourners make spots on their bodies with red, white, and black clay to represent a leopard. They also put spots on the neck of the corpse, for if this is not done the deceased will become a leopard. In some instances a hut is placed in the bush and food is placed in it. When the headman of the leopard family is dying a leopard is heard crying round the bush.

Nsonna family at their funeral customs put white clay or white cloth round their necks. This family respects the crow which in West Africa has a white band round its neck.

Aburadzi make a cross of red clay on their heads.

Kwonnafo on the death of one of their family cut up plantains and throw the pieces on the road. This is also a custom of the Abradifo (derived by Bowdich from *Abradi*, a plantain).

DISTINCTIVE MARKS.

There are no marks or signs which distinguish the families from one another, nor are there any initiatory rites. Some of the chiefs and wealthier natives use the family totem as a badge, and put the skin on drums, canes, stools, etc., *e.g.*, the chief of Essikema has a crow on his hammock. There are no special dances. I heard of one song, "Leopard does not eat leopard." To find out to what family a person belongs, you must ask him. The child takes the family of its mother.

COMMON PROPERTY.

The families have common burial grounds. This was the case in Saltpond, the headquarters of my district. They have also common lands, but they do not live in separate parts of the town. Every member has a right to a share of the land. In some cases the members help to pay each other's debts. A summons was on one occasion taken out before me by the head of the family to compel a member to pay a share of the expenses incurred in connection with such lands. At Srafa, a small fishing village, the salt beds are owned by the families. In the division of profits a share is always laid aside for the payment of any debts the family may incur. Land was in the first instance distributed according to the amount of work done by the different families in cutting paths when invading the country. A member of a family would save a captured enemy of the same family from sacrifice by exchanging another prisoner for him. I did not gather enough information to speak with any certainty about family fetish and sacrifices. One person told me that the totem animal or in its place a sheep is slain yearly.

Omens, etc.

Nsonna.—This family should do nothing on a Thursday. If one of them sees the red snake on a journey he returns at once, as he is going to see one of the family dead. If the snake is seen dead leaves are thrown on it.

Twidanfo.—It is bad luck to see or hear a leopard, as it portends death to one of the family. Palm-oil mash is sometimes placed in the bush and a cloth with spots hung up as an offering to a leopard.

Ancestor Worship.

The dead are worshipped and are known as *Asamanfu*. Sacrifices are offered to them every year. In cases of sickness or trouble the spirits of the dead are consulted. Ghosts appear in the form of snakes, moths, and vampires. When a moth comes to one's room at night it is considered good luck if it lingers there and flies about. If it goes out at once it is bad luck.

Ntoro.

In addition to the *Abusua* are the *Ntoro*, which are on the father's side. The group consists, I was told, of one's father's cousins. The four chief *Ntoro* are:—

Bosumprah, who are forbidden to eat white fowl, Afasia yam, and to drink palm wine on Wednesdays. *Bosumoru*, who are forbidden to eat dog or hyæna. *Bosumchwi*, who are forbidden to eat tortoise, deer, and to drink palm wine on Sundays. *Nketia* are forbidden to drink palm wine on Tuesdays. Bosumprah is also the name of a river and Bosumchwi of a lake in Ashanti. The first group seems connected with leopards. When a leopard is killed, one of the Bosumprah must die; a leopard would not injure one of the group.

If a member of the group eats the prohibited food, or drinks palm wine on the prohibited days he will fall sick. In such cases fowl and eggs must be sacrificed to his *okra*. The prohibitions are passed on by a member to his children, so that he himself becomes freed from them. The *Ntoro* and *Abusua* exist side by side, the former being, I was informed, connected with fetish. The custom is that "you take your father's fetish and your mother's family."

I had no opportunity to make further investigations into the *Ntoro*, whether there were any marriage laws, or whether they could be classed as sex totems.

The impression remaining with me is that the *Ntoro* were a group of the father's near blood relations.

Bosman, writing in the first decade of the eighteenth century, refers to the prohibition of certain kinds of food and of drinking palm wine on certain days. He is, if I remember rightly, referring to the *Ntoro* and not to the *Abusua*; if so, it is the only literary reference to them I have succeeded in meeting.

Sacrifices were made to one's *okra* (soul) on one's birthday, and also on special occasions, *e.g.*, planting a cocoa farm. The sacrifice consists of mashed yam and eggs, put on the floor at night-time at the head of one's bed. Next day it is given to the children, who eat it.

REPLIES TO THE QUESTIONNAIRE.

By A. van Hieu.

1. The natives are divided into tribes and clans, the following are the principal ones with their subdivisions:—

1. Nsonna	subdivision	Dwinna, etc.
2. Annona	„	Yoko, Agna, Eguana, etc.
3. Twidan	„	Eburotaw, etc.
4. Akona	„	Ebiradzi, Odumna, etc.
5. Aburadzi	„	Eduana Ofwna, etc.
6. Intwa	„	Abadzi, etc.
7. Adwinadzi	„	Awonin.

Vide *Anaman's Gold Coast Guide.*

The following are the totem animals of each tribe:—

I. *Nsonna*	Fox.
II. *Annona*	Parrot, Eagle, Lion, Hawk, Falcon, etc.
III. *Twidan*	Leopard.
IV. *Akona*	Buffalo.
V. *Aburadzi*	Plantain.
VI. *Intwa*	Dog.
VII. *Adwinadzi*	Unknown.

2. The members of each tribe or clan revere the animals or plants representing the tribe or clan, but the respect is shown more or less by all the tribes. Now-a-days most men do not know to what tribe or clan they belong though they may be intelligent enough in other matters; I refer to twenty years ago; out of respect, the hunter who is an enthusiastic member of the clan and tribe would not kill his totem, he would be afraid of some evil befalling him if he did, and, as a matter of fact, if he becomes ill, the fetish doctor would very often recommend an oblation to the totem of the patient, whom he may have offended by killing it, even if he did so unwittingly. If he found his totem dead in the field he would put leaves on

the body and pass along, uttering something by the way of an apology to the spirit of the totem for not having the time to perform a proper ceremony.

I have personally witnessed in Elmina women performing a mock funeral custom on the carcase of a leopard killed by a man of the same clan; of course, this man was obliged to go through some mock ceremony, too, by way of pacifying the soul of the totem; a person would express horror and sorrow if any of his totem was killed by a man of a different clan, but in all this, as far as I have seen, there was nothing real, though I must confess the old women do show such interest in them as if they believed in all they do.

3. The members of a tribe or clan do not call themselves by anything designating to what clan they belong, though if they took interest in these things they would always know to what tribe they belonged; individuals are not called by any parts of the sacred animal. A clansman is not cut or tattooed, etc., with any design whatever representing his sacred animal. The clan invariably reveres its own totem.

The oldest man of the clan is not called by any special title, nor would he have any influence over the sacred animal. But if a leopard is troublesome in a village by carrying away live-stock or threatening life, it is probable that the clansmen would make sacrifice through the oldest clansman or the fetish priest to stop the depredations of the animal.

4. The founders of the different tribes believed that a man could change his form after he is dead and take that of his sacred animal. I have heard the story of a hunter who killed a deer and part of the body turned into a human being before it expired, but I believe it is a mere legend.

5. A man may not marry a woman of the same totem, but he may marry in any other tribe or clan; if by mistake or force of circumstances he unwittingly marries a woman of the same totem, a sacrifice is to be made. The influence of a maternal uncle is exceedingly strong in some places in the colony. A father cannot pawn children without the uncle's consent. With regard to presenting a youth with his first weapon, it is done by the father, in some families the father is everything to the boy, in others the maternal uncle; should the nephew be killed the uncle will exact vengeance or receive blood money.

6. A man may not have sexual intercourse with a woman of his totem; if it became known to the members of his tribe there would be the same sacrifice to be made.

7. The children of such marriages are not believed to live long. The tribes punish such breach of tribal law by making the offenders bear the whole cost of the sacrifice and attendant expenses necessary for the remission of the offence.

8. A man cannot readily ascertain whether he may marry or have intercourse with strange women, but during the funeral ceremony of any member of a trbe, he can ascertain the tribe to which certain acquaintances of his belong by the special dances and songs, and the character of the totem animal on the wall near to the spot where the deceased is laid.

9. Tribes or clans are not distinguished from each other by badges or dresses or anything else, but even in these days I have known educated gentlemen use by way of crest on their writing papers their sacred animal denoting to what tribe they belong.

10. There is no special ceremony observed at the birth of a child of any tribe or clan.

11. No initiatory rites are performed as far as I know on boys or girls at puberty to admit them with full position in the tribe.

13. I do not believe children are much humbugged with matters pertaining to totemism, it is the old people who take interest in these things; if a youth, however, offends his totem or the sacred animal of his parents, his father will have to go through the ceremony of appeasing the wrath of the totem.

14. On the death of a member of a totem tribe there would be some special songs relative to the particular tribe; there is a belief that at death the member would migrate into the totem.

15. Omens are sometimes drawn from the appearance of the totem.

16. The totem is supposed to help the clansmen in most ways.

17. Food is offered to the totem animal, and the latter is not to be caught and kept in captivity.

18. The totem is treated like a human being, but only in mocking manner, and prayers are offered to it.

19. Restraint is placed on the totem in order to compel it to grant the wishes of the tribe.

20. The members of the totem tribe or clan perform special dances on the death of a fellow member, but do not dress themselves in the skins or feathers of the totem animal.

21. Each tribesman or clansman reveres all members of the totem species equally, the old folks however believe every member has his particular totem for his protection, and his fate is so bound up in it, that if it dies he must himself die also, though not at the same moment.

22. Every member supposes that his fate is bound up in special totem of his own, but how it is acquired is not clear to me.

23. I answer only a few of these questions. The spirits of the dead are worshipped; they are often invoked to bring health to the sick member of the family, the name of the spirits are called "Asamanfu." There is a supernatural being—a kind of great father who first gave being to men, whom we call "Yankupon," great friend, but the conception of him is very vague.

24. The totem animal is not slain sacrificially.

25. I think there was territorial totemism, but none exists now, they all live together.

26. They have no special burial ground, and the burial ground is no place of refuge to anybody.

28. When the totem animal is troublesome, sacrifices are made for it in the belief that it will cease to be troublesome; the ceremony consists in singing totemistic songs and dances.

29. A man cannot visit with safety a member of the same totem of a non-friendly tribe; in battle a man does not avoid killing another belonging to the same totem as himself.

Replies by a Negro.

Natives are divided into twelve clans as far as I can ascertain them, viz., Nsonna, Annana, Akwonna, Dumna, Twidan, Aguanna, Aburadzie, Tekyina, Adwinnadzie, Dehyina, Otwiafu, Abriadzie. We have been frequently told that in the ancient time, if a man met a member of any other clan killing an animal belonging to his clan, he had to investigate the matter, and if the animal had done wrong, he had to satisfy the party and let the animal free.

It was forbidden to destroy an animal of one's own totem in the olden time.

A man may not marry twice in each totem. There is no rule of avoidance between men and women of the same totem, but they may not marry or have sexual intercourse.

MIGRATIONS.

(*The Huxley Lecture for* 1906.)

BY PROFESSOR W. M. FLINDERS PETRIE, D.C.L., F.R.S.

[PRESENTED NOVEMBER 1ST, 1906. WITH PLATES XIX–XXVI.]

THE growth and decay of races, their changes and movements, form a large part of the study of man. To trace these features in the past is one of the principal results sought amid the enormous mass of measurements and details which are being recorded. But amid this mass of material, which is so vast, and yet such a small fraction of what is needed to comprehend the facts, we require some orderly progression, some systematic precedent for its interpretation. In this, as in all research, we must proceed from the known to the unknown, and the historical records of races must be our guide in learning how to interpret their remains. We must learn the methods and grammar of the physical anthropology by its relation to historical facts. Such seems to be the first need of this science at present; and all that I can hope to do in this lecture is: (1) to give an outline of the general considerations bearing on the mutations and movements of races; (2) to sketch the racial history of one country that we know best historically—Egypt; and (3) to give an outline of the changes in one great period where they are best recorded, the convulsions of Europe from Augustus to Charles the Great. Each of these subjects might well occupy a long course of lectures; and I am painfully aware of the fragmentary nature of what I can now offer in a single paper. But the absence of any modern work dealing with these subjects, from an anthropological standpoint, must be the sufficient ground for the present endeavour to stimulate students to produce some adequate researches on these important enquiries.

In dealing with questions so far-reaching, and at the same time so full of minute detail, our scope must be severely limited; the information so important to the historian about the personage and the exact places of the movements must be entirely set aside; and the great political changes of governance, the brilliant raids and the forlorn hopes, have nothing to do with our subject. Our purpose should be to compare and understand the racial movements where they come into historical view, so that they may show the true interpretation of those physical changes which are our sole informants concerning most of the past of mankind.

Migration may be described as an animal habit, whether we regard temporary migration, to and fro with the seasons, which the birds perform on the largest scale; or the permanent occupation of new ground, which has been the necessary progress in the growth of every species. The great seasonal march of the bison up and down North America, and the consequent movement of its hunters, was the type of the movements which doubtless existed in Europe, and from which grew the annual migration of pastoral nomads in search of summer and winter pastures. A curious trace of such movements may be seen in Yorkshire, at Scamridge Dykes, between the head of a branch of the vale of Pickering, and the head of another valley system. There a narrow neck of land is deeply scored with dozens of cattle-tracks, some as much as five feet deep, and all gradually worn by the passage of herds of cattle from one valley to the other during long ages.

The permanent occupation of new ground has never been on a greater scale than it is at present. The ease of movement now has led to half the world being in course of occupation by the other half. Races are exterminated, and wholesale changes are going on now in a lifetime which might have occupied a thousand years in past ages. And not only is there migration, but there is also mixture which always accompanies it. The multitudes of Eurasians in India, the whole tribes of Dutch-Bushmen in Africa, the Negro-Americans, the complexities of South American-Negro-European mixtures, the Dutch-Javans, the Scottish-Canadians, all show how inevitably fusion of even most diverse races will occur. The common verdict that mixed races inherit the vices of both and the virtues of neither parent, is only due to the unhappy fact that the parents of such mixtures are usually those who have far more vices than virtues to transmit. The noble ideal of Alexander at the great marriage of the East and West in the Babylonian plain, when Greek and Persian promised to unite in one great ruling race, has seldom been carried out. But many splendid examples of diverse parentage show that the causes of failure lie rather in character than in diversity.

In our own country also we may see the progress of gradual migration, the slow continuance of those great movements which have produced the present population. Those who question the continuance of British parentage among the Saxon population have taken little account of the universal fact that women of a conquered race are always incorporated with the conquerors, "to every man a damsel or two"; and also they have neglected the back-flow of the British during peace. A striking recent instance of Welsh penetration of England may be seen at Hereford, where there is scarcely a Welsh name inside the city, while a new road between the city and the station is mainly occupied by Welsh. Even in the East of England the mixture has been noticeable. In the upper classes of Sussex there are 58 per 1,000 of Welsh names, and nearly as large a proportion in London.

The examination of names of the upper classes shows that in Sussex there are 20 per cent. un-English; in a rather foreign quarter of London, the north-west, there are 30 per cent. un-English; while of Sussex farmers there are but 2 per cent. un-English.

The details are, *per* 1,000 :—

	London N.W.	Sussex, private.	Sussex farmers.
English	698	803	978
Welsh	44	58	7
Scottish... ...	86	65	11
Irish	10	25	2
French	21	23	1
German... ...	101	26	0
Others	40	(In French.)	1

These represent the mixture since the introduction of surnames. Probably considerable mixture had also taken place before that period. Thus we see that the Saxon occupation is being largely changed by a more eastern migration of semi-Slavonian Germans.

The results of migration are very different according to the nature of the changes which it imposes. The forms may be classed thus :—

Displacement	by occupying emptied lands,	as Lombards in Po valley.
	" pushing on another people,	" the Huns pushed the Goths.
	" entire massacre,	" the Tasmanians by the English.
Mixture	of men only,	" American-Negro mulattoes.
	" women only,	" army of Claudius, which took 50,000 women.
	" men and women,	" in German mixture in London now.

The consequences of all these different forms of mixture depend upon four variables, and a main purpose of anthropology should be to attain some estimation of these factors of change in a race. They are (1) Plasticity of race. For instance, this appears to be facile in English, as a foreigner has remarked on the difference of type produced in a few generations of different conditions in the various colonies; and it appears to be resistant in Jews, among whom peculiarities of face and expression are alike after segregation for thirty or forty generations. (2) Force of environment; which may be very slight as between similar climates, or very severe in very diverse climates. (3) The amount of mixture with another race, which may vary not only directly but also by subsequent conditions tending to eliminate one of the races, artificially or naturally. (4) Time.

In dealing with the history of migrations it appears that there is a previous movement some centuries in advance of a general migration. This usually consists of the more active men coming in as raiders or as mercenary troops, some of whom often rise to leading positions among the earlier inhabitants. This requires notice, as such forerunners are liable either to be mistaken for the main body, or to be entirely discredited because they are not the main body. We may here notice some instances, beginning with the latest. There is evidence of

Syrian influence, and of a body of Saracen cavalry, in the eastern side of Egypt as early as 402 (in the *Notitia*), that is, 238 years before the Arab conquest of Egypt. The well-known Saxon shore of England is another instance; the conquest of Britain by Carausius with his Dutch pirates in 287, at the same time that the Saxons infested the Gaulish coasts, the raids of the whole coast of England by 350, the Saxon occupation of the more distant coasts of Normandy by 370, and the Saxon shore of England, already so named, in 402, were all stages in the preparation of the great migration one to two centuries later. The Huns appear about 100 A.D. north of the Crimea, and at that time Decebalus, the king of Dacia, bore the same name as the great Mongolian khan four centuries later, Dizabul—Dizabulus—as Latham pointed out. Forerunners of the Hunnish migration of 425 appear here. Earlier we notice the body of German guards of Caligula in Rome, centuries before these people conquered Roman territory. Looking to Egypt we see the Greek mercenaries employed by 664 B.C., more than three centuries before the Greek conquest of Egypt. Similarly we read of a Hittite chief in Palestine about 1800 B.C., some five centuries before the Hittites descended from their Armenian home. Before that there are remains of eastern rulers in Egypt, probably some centuries before the Hyksos invasion. And still earlier the decorated buttons of barbarian manufacture which belong to the invaders of the VII–VIII Dynasties in Egypt, are first found a century or two earlier, showing that the foreigners were coming in during the time of the pyramid-builders. Though attempts have been made to deny, or explain away, some of these instances, the uniform nature of these examples show that we have here a general feature of migrations.

We now turn to the view of the history of one country for about 10,000 years. In the absence of exact data, from even the best-known lands, in regard to physical changes in man, Egypt may give us perhaps a better general view of historical and material changes in a people than we can reach elsewhere.

Of the palaeolithic man no remains but flints have been found. But the extreme freshness of surface flints of palaeolithic type, found at the present low level of the Nile, suggests that there has been on long neolithic age as in Europe. This is borne out by the conditions of the country. While there were a few inches of rainfall in Egypt, making up for the loss of the Nile by soakage and evaporation, there was no cause for the alluvium to be deposited. At that time no agriculture was possible, from the absence of alluvial flats and the slightness of the rainfall. When the rain ceased the mud was deposited by the lessening river, and agriculture became possible by irrigation. In the earlier age the Nile valley would have had a deep gorge channel, with a stream rapid enough to carry all its mud; some amount of trees and wild herbs would sustain animals, and man would be a hunter. The strata at the close of this age, the beginning of alluvium, are at a depth of about 10 metres under the present surface, corresponding to about 10,000 years of deposit. This date leads us so nearly to the beginning of the continuous civilisation, that it seems probable that the hunting man was ejected by the agriculturist so soon as cultivation was possible in Egypt. The late condition of the flints found point the same way. Now it is remarkable that in the earliest graves which we know, probably 9,000 years or more in age, many figures have been found with the Bushman, or Koranna type of steatopygy. And these figures are always painted red, while the figures of European type with them are white. The steatopygous type in the French caves is shown, even in females, as being hairy over the body; and the Egyptian female figures of the same type have hair along the lower jaw. It seems that this earlier race was the same as that known in France, in Malta even in the times of temple building, later in Somaliland, and now only in the extreme south of Africa. And it may not be unreasonable to see in this the last remains of the palaeolithic man of Egypt, whom we can thus restore to view as a steatopygous and hairy Bushman. The figures found being all female, and apparently put into the graves as slave-models, agree well to their representing the captive slave woman of a disappearing type, partly expelled, partly exterminated.

An entirely different people succeeded these, of European type, tall, slender, pale, with long brown wavy hair. Throughout the long age of the prehistoric civilisation we find no marked difference in the figures of this type until the beginning of the dynastic conquest. The best portraits of the type are given in the *Jour. Anth. Inst.*, xxxi. The high, well-domed head, the long, sub-aquiline nose, and the pointed beard are constant in all the figures.

Whence came these people? They are unlike anything from the south, and the portraiture is not at all that of the Semite on the east. We are not justified in expecting any considerable water transport in such a barbaric state, so either Syrians or Libyans must be regarded as the most likely invaders. Now it is among the Amorites of Syria and the Libyans that we find exactly the same facial type (see heads in *Jour. Anth. Inst.*, xxxi, Pl. XVIII), and it is agreed by all that there are very close resemblances in the Libyan culture. We may note the following connections:—

(1) Profile closely like Libyan and also Amorite.
(2) Colour fair, as modern Kabyle and ancient Amorite.
(3) Pottery hand-made and burnished, as Kabyle.
(4) „ faced with haematite, as Kabyle.
(5) „ decorated with white slip lines as Kabyle.
(6) „ patterns, geometrical, as Kabyle.
(7) „ cross line decoration, as on Libyan men.
(8) Flint work delicate, as armlets from Sahara graves.
(9) Tatu patterns, like those on Libyans.
(10) Royal title *bati*, as Libyan *battos*.
(11) Crown on pottery, as crown of Libyan goddess Neit.
(12) Emblem of goddess Neit on Libyan tatu.

Now as against this, on the other hand there is—

(13) Pitchamber burial, instead of dolmen burial of Libya and Syria.

(This is a natural result of the conditions. In Egypt it is difficult to pick up blocks of stone, and there are gravels to dig in. In Libya the cemeteries are on tracts of rocky ground where blocks abound, and no pit could be dug.)

(14) The prehistoric language is unknown, but the later Egyptian comprises much Semitic in structure, though most of the words are of other sources.

(This only shows a Semitic mixture; and we know that a minority of Arabs have sufficed to substitute an entirely Semitic language since then. In no case can language prove a race descent, as all anthropologists know.)

We now turn to the evidence of skull measurements, and these will be here treated directly as lengths, and not compounded in ratios, as it is desirable to know what elements vary. We shall first notice the facial measures, as it will be seen (in the annexed paper on the interpretation of curves), that dimensions of a single bone are preferable to those which depend on many variable qualities, as in the length and breadth. References to curves 1–79 belong to illustrations in the interpretation of curves. The median is always used here instead of arithmetical mean, as it is less liable to casualty in dealing with short series.

Nasal Height.—This in the early prehistoric has a mean of 50 millimetres with probably two groups at 48 and 52½ (curve 30). Later in the prehistoric age the main group is at 50, and a new small group at 53½ (curve 35). The Roknia tombs in Algeria show a mean of 50; but as that is mixed male and female, and female is 2 less than male in Egypt, we should put 51 as corrected to male value. The measures of living Algerians give, Chawia 51, and Kabyles 51½ for males. (See MacIver and Wilkin, *Libyan Notes.*) These summarised are:

Early prehistoric	...	50, groups 48 and 52½.
Late "	...	50, new group 53½.
Algerian tombs	...	51.
Living Chawia	...	51.
" Kabyles	...	51½.

With a mean variation in these of 2 millimetres either way and a range of 14, a difference of 1 millimetre is quite insignificant. The Algerian falls between the two components of the Egyptians.

Nasal Breadth.—There were none measured of the Algerian tomb series, and the measures on living Algerians do not refer to the bone, but to the flesh. In general terms both Egyptian and Algerians are mesorhine, the Egyptian low mesorhine, the Algerian high mesorhine. Some admixture of a lower race in Egypt would make this difference, which is however all within one class.

Nasi-alveolar height.—This in early prehistoric falls in two groups with means at 66 and 73 (curve 32); in later prehistoric these were fused into one at 69, and a new small group arrives at 75. This measurement is not in the Algerian tomb series. The living Chawia give 71, grouping rather on 67 and 72, and the living Kabyle give 69½:

Early prehistoric	...	68½, groups 66 and 73.
Late "	...	69, new group 75.
Living Chawia	...	71, groups 67 and 72.
" Kabyle	...	69½.

Here no distinction can be made, the early groups are almost the Chawia groups, and the later type is close to the Kabyle. The variations are insignificant.

Bizygomatic breadth.—This in early time was about 125, groups being probably at 122 and 129; and later it was about 128, with a main group at 126, and a minor group at 133. The Algerian tombs give 127, which might perhaps rise to 130 if corrected for female example. The living Algerian is of course not comparable exactly; the Chawia gives 136½, with groups at 131 and 138, and the Kabyle 139. Probably 7 may be deducted for the flesh; thus we should have:

Early prehistoric	...	125, groups 122 and 129.
Late "	...	128, " 126 " 133.
Algerian tombs	...	130 ?, mixed sexes 127.
Living Chawia	...	129½, groups 124 and 131.
" Kabyle	...	132.

Here the groups in the late and early Egyptian types are on either side of the Chawia groups; and it would be impossible to separate the Egyptian from the modern Algerian. The means taken above show a difference of only 2 millimetres in a dimension which differs by 14 millimetres in various races, and this is therefore insignificant.

Breadth, maximum.—We here reach the commonest measurements, but those which have probably less intrinsic value owing to their complexity of the elements of growth involved. We take both sexes together in order to compare with the Algerian tombs. The early prehistoric is 130, (male 131, female 128½, see curve 84); the later skulls give 132 (male 133½, female 130½, curve 85). The Algerian tombs give 136 (male and female mixed, curve 86). The living Chawia males centre on 147½, with a break into two groups centering on 146 and 153; and the living Kabyles give 149½. From these probably 8 may be deducted for the flesh, and 1½ for reduction to mixed sexes (see curves 84 and 85) thus the figures are:

Early prehistoric	...	130.
Mixed (Naqada)	...	133.
Late prehistoric	...	132.

Algerian tombs	...	136.
Living Chawia	...	138, groups 136½ and 143½.
„ Kabyle	...	140.

(For the reduction of life measures to the skull, see Broca, *Bull. Soc. Anthrop.*, 1868, p. 25.)

Here it seems that the Egyptian skulls are 4 millimetres narrower than the Algerian.

Length maximum.—The amounts, after allowing on the living 6 for flesh thickness and 3 for correcting to mixed sexes (see curves 80, 81) are as follows:—

Early prehistoric	...	181½.
Later „	...	181½.
Algerian tombs	...	182.
Living Chawia	...	183.
„ Kabyle	...	184.

There is no difference of any significance between these figures, in view of the range of variation in each group.

Or, if it be preferred to compound the length and breadth in an index, the cephalic index (reduced for the living to mixed sexes to agree with the Algerian tombs, and reduced for constant of living to skull forms, see also Ripley, *Races*, p. 593), will be:—

Early prehistoric	...	72, prob. error range 70–74½.
Late „	...	73 „ „ 71–75.
Algerian tombs	...	75.
Living Chawia	...	74.
„ Kabyle	...	75.

Thus the Algerian may be shortly stated as being at just about the probable error limit of the prehistoric Egyptian. And this difference of the means is due to about 4 millimetres in the maximum breadth.

We may, then, sum up the anthropological evidence for the Libyan source of the prehistoric Egyptian thus:—

For; the 10 points of culture noted above,
„ profile and colour,
„ nasal height, and class of breadth,
„ nasi-alveolar height and bizygomatic breadth,
„ the maximum length.

Against; „ burial customs, due to difference of soil,
„ mixed origin of the *historic* Egyptian language,
„ difference of 4 millimetres in the maximum breadth.

The last datum is the only one that can be seriously placed against the large number of cultural and anthropometric points of agreement; and the maximum breadth of the skull is perhaps the dimension most liable to variation in a race by increased brain-growth.

There can be no reasonable doubt, after reviewing all this evidence, that the

Libyan is the main stock of the Egyptian race in prehistoric times; in accord with the obvious probability of the Egyptians being one with those cognate peoples which lie on either side of the country. The slight differences that we have noticed are far within the changes that may be expected from a difference in time of many thousand years, in space of 1,500 miles, and from the early mixture of one or more other races in Egypt itself.

On referring to the curves 30 to 34, and their analysis there shown, it would appear that we must recognise two different groups in the early prehistoric age; in the late prehistoric age these became fused; and the Algerian agrees most nearly to the fused type of the facial height, and to a still later fusion of the facial width.

	Early.	Late.	Algerian.
Nasal height ...	48 52½	50 +53½	51
Nasi-alveolar ...	66 73	69 +75	70
Bizygomatic width	122½ 129½	126 +132½	130

It seems then that, as far as data so widely separated in time and place can be compared, there was a mixed race in North Africa and Egypt in the early prehistoric age; and that this, fused together, has persisted in Algeria with some slight improvement in general size, and especially the width of the skull from increase of brain. To get behind this mixed race is quite beyond our present data. That there was somewhat of the old palaeolithic Bushman stock is very probable; and that there may have been another low type such as the Socratic Sinai Bedawy seems likely from its position.

These results are, however, for the Abydos region; and on going fifty miles further up the country to the Naqada region we find that the lower of the Abydos types seems to predominate.

	Naqada.	Abydos.	
		A	B
Nasal height ...	49	48	52½
Nasal breadth ...	25	27	24½
Nasi-alveolar ...	67½	66	73
Bizygomatic width...	125½	122½	129½

(Biauricular width was not measured on Naqada skulls.)

To settle how far either of these results may be representative is impossible until some other large series of prehistoric skulls may be obtained in different parts of the country. So far, it might well be that the Naqada type had been mixed with a more European type at Abydos, and also lower down in the Nile valley and along the African coast.

The later prehistoric people were a fusion of the earlier elements, as we have noticed above, with a smaller addition—perhaps a third—of a higher type. That there was some distinct change in culture from about 38 to 44 sequence date,[1] is evident from the considerable changes there. The older forms of pottery disappear at this time, and new forms come in. The plain red polished and the black topped pottery cease to start new forms at 43; the fancy forms of pottery cease to arise after 40; whereas the decorated pottery with ships and animals practically begins at 40; the wavy-handled pottery also begins at 40, and the late rough pottery begins at 43. In short, the old style of ware, like the Kabyle, was arrested (the white cross-lined patterns had died out before), and the new styles had nothing in common with the Kabylian. The minority type of man with larger faces was apparently that of the people who brought about this change, as the few of this class clear of the majority range (curves 35 to 39) that can be dated are of sequence dates 42 to 65 or later, and probably were equally spread over the whole time. Such a continued separation points to their being a distinct class.

This incoming people may be somewhat understood by the different character of objects which they brought in. The most important of these is the barrel-shaped vase of stone, unknown before S.D. 39, and in full use by 42 sequence date. This form is shown in the I Dynasty as being offered in tribute by the people with pointed nose, and hair plaited in a pigtail, who also wear a long robe of skins. They came then from a rocky region where stone was used, and from a cold region where long robes were needed; yet not far from Egypt, as they were early subdued by the dynastic race, and employed in the conquest of lower Egypt, shown on the slate carving with captives. Moreover, a few small vases of the decorated pottery are rarely found in earlier graves of 31–40 sequence date, probably imported, but showing that this other civilisation was in existence almost as early as any graves in Egypt. The only district which agrees with these indications would be the eastern desert hills. There are still many fertile valleys in this region, as at the convents of St. Antony and St. Paul, and the porphyry quarries; it has been shown by Floyer that the eastern desert had much more vegetation before the introduction of the devastating camel; and Sneferu is known to have made 122 tanks for cattle, probably in these desert valleys.

A hardy people in this region might well obtain control of the Nile. They were accustomed to ships, as figures of great galleys are a common subject of their vase painting; and model boats made of similar pottery and colouring are found almost at the beginning of the series of prehistoric graves, apparently imported

[1] The whole of the prehistoric graves are divided into a scale of 50 parts, which are numbered from 30 to 80, ending in the reign of Mena, founder of the I Dynasty.

there, as no similar clay occurs so early in Egypt. They had considerable connection with other lands; at 38–40 sequence date the clay beads of earlier times are supplanted by lazuli, serpentine, haematite, and silver, which show a foreign trade. They substituted the pear-shaped mace-head for the older sharp-edged disc. They brought in the use of spoons, of amulets, and of forehead pendants. And the ostrich and the aloe were familiar to them, as shown by their paintings. The plaiting of the hair into a pigtail, shown on the I Dynasty carvings, agrees with the cessation of the long-toothed combs which were so commonly used before S.D. 40 to fasten up the hair. The position of these people, as a small body of hardy mountaineers, explains how a minority could rule the larger bulk of the Nile folk, and yet not be lost by admixture.

Another racial indication is found in the painted grave of Hierakonpolis. There a black man is shown holding a black cord which ties up three red men kneeling; he is threatened by two red men advancing with sticks. This shows that at S.D. 63 there were conflicts between a red and a black race above Thebes.

We now reach the age of the dynastic race which seems to have come across from the Red Sea by the Koptos road. The immense difference in culture is at once evident. Never previously had there been any passable figures executed of men or animals, accompanying the fine mechanical work of the prehistoric times; at once now spirited carvings appear, with that minute ethnographical distinction which the Egyptian continued to retain through all his art. In the prehistoric time only a signary of linear marks was in use, mainly by the earlier people, and diminishing as time went on; the dynastic people bring in a pictorial system of hieroglyphs well developed.

This outburst of artistic work has left a magnificent memorial in the series of slate palettes covered with reliefs relating to the conquest of Egypt, and the great mace-heads of king Narmer. From these we can trace three other races who were conquered in Egypt. The heads of these are published in *Jour. Anth. Inst.*, xxxi, Pl. XIX. They are—

1. The plaited beard type, with curly hair and thick nose. These are probably from a hot climate, as they wear no clothing; but the face is not at all prognathous like the negro, nor is the nose short. They are most like figures at Ibriz in North Syria. They were conquered early in the unification of Egypt, and are therefore not probably on the north border. The only mixture of the known races that might produce this type would be a mulatto mixture of the pointed-nose type with the negro, having the beard and nose length of one and the thickness and curly hair of the other.

The pointed-nose type has been dealt with as probably the ruling race of the later prehistoric age.

2. The tilted-nose type; with a short nose, sharp pointed, and tilted up below. This is the type of a captive chief who was probably of the Fayum district; his hair is wavy, and the growth of the beard like that of the Bedawy. He might be a mixture of Semite with the next type.

3. The forward-beard type, with sub-aquiline nose, lank hair and a beard growing out straight in front. This is strikingly like the men on early Greek vases (see *Nebesheh and Defenneh*, Pl. XXX), and we might well assign this to the coast people of the Delta, mixed with northern emigrants, and akin to the Fayum people behind them. These men served in the army of Narmer, at his conquest of the Fayum. Unfortunately, all our early material for measurement comes from the Abydos-Naqada region, and there we cannot hope to find any trace or influence of these three types, as they belong to the lower country. From the difference between Abydos and Naqada material, only fifty miles apart, we see how much change there might be at some hundreds of miles distance.

The dynastic race is marked by a face wholly different from all the other types. The forehead and nose are in almost a straight line, the head massive, the ear large and flat, the nose straight with rounded tip and slight slope beneath, the jaw long and square. (*Jour. Anth. Inst.*, xxxi, Pl. XX). A head which is clearly of this type is here published for the first time, Pl. XIX; it is a life study of one of the earliest kings made as a model for sculptors to copy. From these dynastic people first appearing at Abydos and El Kab, and later conquering the Delta, it seems that they entered Egypt at the middle, probably by the Red Sea road to Koptos. The statues of the god Min, which I found there, are the rudest and earliest known, and bear artistic figures of animals, with pteroceras shells and sword fish which are probably Red Sea produce. The evidence of the skulls of the Abydos region (curves 40 to 44) would not indicate any noticeable numbers of a different race, unless indeed they were so much akin to the pointed-nose type as to appear unified with them. This is possible from the physiognomy, though they were not exactly the same people.

The declining civilisation of the II Dynasty seems to have been broken up by an invasion from the south; the head of king Sa-nekht, the founder of the III Dynasty, being strikingly Sudany in type (see *Researches in Sinai*, fig. 48). That some invasion occurred at this point is certain from comparison with other periods; no declining civilisation ever revives, as this did at the pyramid age, without an infusion of new blood. The mixture, however, may not have reached below Upper Egypt, as there is no distinct new type appearing in the skull measures (curves 45 to 49) which are at this period from Middle Egypt, Deshasheh and Medum. They seem to show much the same two types, of the older stock and the dynastic race mixed. The portraits of the IV Dynasty show that the old Libyan stock was dominant in the ruling caste by that time.

At the close of the Old Kingdom in the VI Dynasty we find the carved button seals coming in, which mark a large infusion of a ruder race in the VII–VIII Dynasties. On looking at the skull measures (curves 50–54) it is seen that the majority of the people at Dendereh in Upper Egypt were a fusion of the two older types; while a minority of about half the amount were of a lower type, with short nose and narrow head, just the same as the lower type of prehistoric people.

	Low prehistoric.	VI–XI Dynasty, low.
Nasal height	48	49
" width	24·4	26
Nasi-alveolar	66	65·6
Bizygomatic	122½	121½
Biauricular	112	111

Such a near duplication of measures (without the least personal equation in imitating the earlier type when analysing them) is strong evidence that it was the same race again entering the country.

It is likely, then, that they were the lower stratum of Libyans, who had become more civilised in three or four thousand years, and had developed a curious fashion in these button seals, which are more akin to early Cretan design than to anything else.

At the same time a different stock was entering the land from the Syrian side. The sphinxes and heads which used formerly to be termed Hyksos are certainly older. Lately the similarity between these and the heads of the kings in the later half of the XII Dynasty has led to their being attributed to that age. But it will be clear on comparison that the Egyptian kings have the characteristics in a much softened form, without any of the savage strength of the unnamed heads. (Compare Fig. 108 with 141–2 in *Students' History of Egypt, I.*) This new type had a large round head, nose slightly aquiline and broad, sharp projecting lips, and rather prognathous angle. The facial muscles are always strong and heavy, and the cheeks wide and flat. There is no trace of Mongolian tilt or smallness of the eyes.

This powerful race, which most likely came from Syria, gave the new infusion which started the XII Dynasty civilisation; and the kings of that age evidently inherited a good deal of the new type.

The measurements of skulls of XII–XV Dynasties (curves 55 to 59) show a new stock coming in of a high type, while the previous stocks were fused together. As these are so far south as Abydos, it is unlikely that this change would be due to the Hyksos migration; it is probably the effect of the previous race that we have noted becoming mixed throughout the country; if so, we must allow for a very large number of immigrants, as the new high element is almost as large as the old fused stock.

Possibly it was a type that was dominant toward a recessive type of the old stock, and every descendant of the newcomers took up their character. Just the same character is seen on comparing the curves of female skulls. The XII–XV break into two nearly equal curves, of which the low one is the fusion of VI–XII groups, and the higher one is added new. But the new high group is so large that it cannot be referred to a Hyksos element so far south, but is more probably an inheritance from the stalwart Syrians of the IX–X Dynasties.

The Hyksos immigration began in the XII Dynasty, as shown at Beni hasan; chiefs, apparently of the Semitic Babylonian stock, came in during the XIII–XIV Dynasties; and the great break-up of the Semites flooding Egypt was in the close of the XIV, leading to the Hyksos rule of the XV–XVII Dynasties. From the accounts, which are the most definite that we have about any immigration, there were 250,000 men in the great central camp, in their flourishing time; and 240,000 persons (say 50,000 men) left Egypt when expelled after long warfare. If we allow that there were as many scattered in the country as the central garrison, that implies half a million men; but, on the other hand, they probably doubled in number during their residence of two or three generations, before their centralisation; again, perhaps only half of those who came to Egypt brought women. So perhaps half a million may be allowed for the actual number of migrants. These mainly settled in the Delta and on the eastern side of it. As the population might be four millions in the Delta, the immigrants would probably only be one in four on the east side and a few elsewhere. By taking Egyptian wives they would soon rank as at least half the population of the eastern side. They might reasonably have increased, by absorbing Egyptians and multiplying, to two or three millions; then they were much worn down by continual fighting at the close of their stay, perhaps to half a million again; but the quarter of a million expelled left probably as much of their blood behind mixed with Egyptians.

The change at the rise of the XVIII Dynasty was the invasion by a small dark race from Nubia, like the present Berberis. Such is the type of the royal mummies then. But probably not a great number came down, as the space there is but small, and the movement seems rather to have been a successful heading of the forces of Egypt itself. The result from the skulls of this age (curves 60 to 64) show the same two stocks as before in Upper Egypt, approximated but not yet fused together.

After this there was no marked mixture except of Libyans. In the later years of Ramessu II they had settled all down the west of the land; they became the main auxiliary troops of the Egyptians in the XXII Dynasty, though the rulers seem to have been a Babylonian family; in the XXV Dynasty a Libyan chief tried to conquer all Egypt, and the west of the Delta was mainly Libyan; in the XXVI Dynasty the Libyan stock ruled the whole country. In the north there took place a considerable immigration of Greek troops, who mixed freely with the native women. But that probably did not affect the race south of the Delta.

Our next group of measures is in Upper Egypt, Dendereh, in the Ptolemaic time (curves 65 to 69). Here we find the main group is the fusion of the previous groups. But a new low stock appears which is very nearly the same as that of the old prehistoric group.

	Low prehistoric.	Ptolemaic, low.
Nasal height	48	49
" width	24·4	24
Nasi-alveolar	66	66½
Bizygomatic	122½	124
Biauricular	112	114

This group is about a quarter of the total, and it seems only reasonable to connect it with the known immigration of Libyans which was going on before this point.

During the Ptolemaic time there was much intercourse with Cyrene which was united to Egypt: and probably more Libyan stock was coming in. On reaching Roman times we see the effect of this in the increase of numbers of the lower group to an equality with the higher (curves 70 to 74), and a slight drawing together of the groups due to fusion. The actual number of immigrants from Europe was probably very small in Upper Egypt, though in the Fayum the reclaimed land was all given to the Macedonian troops as settlers, and the Delta coast, especially about Alexandria, became largely Greek.

The Arabs began to filter into the eastern side as mercenary troops of cavalry by A.D. 400, the fore-gangers of the great invasion of 640. The population of Egypt at the lowest estimate then was at least two and a half million men, about as many men as there are now in a total of nine million people. The Arab conquest up to Cairo was carried out by about 20,000 men; but they swarmed in further, for 20,000 are said to have been killed at the siege of Alexandria, and 20,000 more went to subdue Nubia. It is doubtful if we can put the total of men at over 100,000, with perhaps half as many women. Therefore they cannot have formed more than a small fraction of the whole population. And as their policy and practice was more merciful than that of any of the great northern hordes, there was no depopulation, and hence no great space to be filled up by new occupants. In short, the Arab conquest was more a change of masters than a change of stock. Owing, however, to a stern fanaticism compelling the dominance of the Quran, their language has in a thousand years completely extirpated the old Egyptian. This is an excellent illustration of language meaning very little in regard to race.

Since the Arab invasion there has been another Libyan movement in the Fatimite conquest by the Tunisians, which must have repeated the events of the XXVI Dynasty. Syrian and Central Asiatic peoples have come in by the Caliphat and the Turkish conquest, but probably not to any perceptible extent above Cairo. A recent Libyan movement again took place during the last century. Many Tunisians occupied all the west side of the land; the so-called Arabs at the Pyramids are of this stock, and large half-settled encampments of them may be found to the south of the Fayum, living an entirely different life to that of the Egyptian.

We may now give an outline of our results: these mainly rest on historical facts, which we have attempted to supplement by what seem to be the only conclusions attainable from the skull measurements. How far our reading of these will be justified by further research on crossing of races of men or animals remains to be learned in future. But at least the whole of the curves were settled as shown before attempting to connect them with the history:

Before 8000 B.C.	Bushman.		
8000–7000	?	Mixed Libyan (A) +	Higher Libyan (B).
7000–5500		Fused +	Pointed-nose people.
5500–5000		continued.	increased.
5000–4000	Small Sudany mixture		
4000–3500	Low A again +	Fused +	High Syrian.
3500–2500		Fused.	Fused.
2500–1600			+Hyksos in Delta.
1600–1400			+Berber in Upper Egypt.
300–0	Low A again +		Fused.
0–400 A.D.	increased		continued
700	+ Arabs.		
900			+ Libyans.

We must, however, always remember that this is only drawn from a portion of Egypt; and, as the early dynastic carvings show, there were different races in other parts which have doubtless had a share in the formation of the whole people. The general result of this view of the changes of type is that one or two thousand years are needed to fuse two different stocks in such a country as Egypt.

We now turn to the other side of our subject, not limited to one land, but regarding one race at a time. The maps (1 to 20) given here show the movements of twenty of the principal peoples that entered Europe, during the centuries of great movements that are best known to us. The small raids and wars of political supremacy are ignored, the object here being to show transference of peoples; but the larger raids which may have led to some infusion of new blood are included here. In the eight maps (21 to 28) which follow, the lines of movement in each century are placed together. The use of such drift-maps is to show what the general movements were. From these it may better be seen what is likely or unlikely in any case which is not historically certain, and whether connections are probable between tribes of similar names in different regions.

The sources used for these maps are the most available collective authorities. I am fully aware that such a work should be constructed from the original ancient writers; but I am equally aware that it would require as many years of work as the weeks used for the present result to produce a final memoir on this subject. The present maps are only a handbook for first reference, and I have given in describing each map the authority for every date; from this it is easy to see what limits of certainty and exactitude belong to each statement. The obvious manner in which the various positions of a race support the credibility of each other in nearly all cases is very satisfactory; but that could not be grasped from the maps hitherto made, which refer to one period and not to one people. The order here taken is in that of the earliest known habitats of the various peoples, from west to east. All of the facts stated by the following authors that lie within our scope are here incorporated:—

Gibbon, *Decline and Fall*, with Bury's Appendices. Marked as i to vii.
Hodgkin, *Italy and her Invaders*. Marked as I to VIII.
Bury, *Students' Roman Empire*. Marked B.
Oman, *The Dark Ages*. Marked O.
Smith, *Dictionary of Greek and Roman Geography*. Marked S.D.
Connections which I have not found suggested elsewhere are marked *.

1. FRANK.—This confederacy of cognate people appears to have arisen about 240, and comprised the Chauci (Hocings,* Scôps tale, 59), Cherusci, Catti (Hessi, Zeuss, 347), Sugambri (river Sieg; Sycs and Ymbers,* Scôp, 63, 65, 125; Secgas,* Fight at Finnesburg, 49), Chamavi, Amsivarii (Amswaras, dwellers on the Amisia, Ems), Chattuarii (Hetware, Beowulf, 4715, 5824; Scôp, 67), and Bructeri. They occupied the region of Oldenburg, Westphalia, and Hesse. The Chauci were among the general division of the Ingaevones in early times, the Ingwinas,* who were ruled by the Danes in the time of Beowulf (2092, 2642). Probably among this confederacy should be included the Marvingi* of Ptolemy, to the south of the Catti, M on map, by Hesse (? Marburg), who seem to have given the Merving family to rule the Franks. The early history of these peoples under the Augustan wars (B, 124–136, 169–175) led to 40,000 Sugambri and Sueves being settled between the Lower Meuse and Rhine (S.D.). 256–268. The first great raid was through Gaul to Spain and Mauretania (i, 256); 291, settled in lands of Nervii and round Trier (i, 464); 293, more *coloni* settled in Gaul (i, 464); 354, settled in Toxandria in Brabant (ii, 273–4); 430(?) occupy Tournay and Cambray as far as Somme (iii, 454); 440, in Cologne (iii, 455); 470, in Franconia (III, 20); 486, conquer from Somme to Seine (iv, 102); 489, up to Loire (O, 59); 496, sweep back the Alamanni (iv, 105); 503, eject Alamanni from Main and Neckar (III, 352); 507, they reached the Garonne (O, 63); 508, held all Aquitaine (iv, 118), but there were few actually settled in Central Gaul (O, 188); 536, take Marseilles and Arles from Ostrogoths (iv, 119); 539, raid Lombardy and retreat (IV, 310); 547, occupy Venetia (iv, 413), and remain in force there till after 552 (iv, 413); 553, raid Italy, and exterminated 554 (V, 30, 44); 584, 587, 588, 590, raids on Italy (V, 228, 258, 261, 267).

2. ALAMANN.—This was a Germanic confederacy south of the Franks, and

formed about the same time. They originated in a westward movement on to the Main in 211, which united various tribes, who took the joint name of All-menn, or the whole people (i, 257); 260 they were settled on the Main and Neckar, and thence invaded Italy as far as Verona (I, 66), but were exterminated, 300,000 killed (i, 259); 269–70, they twice raided North Italy as far as Umbria, but were exterminated—probably Juthungi and Vandals are mixed in this account (i, 295–8); 280 (?) they were pushed by the Burgunds from the Main to the Rhine (i, 463); 286, they invaded Gaul, but were exterminated (i, 463); 365, from the Upper Rhine they ravaged Rhaetia and Gaul (I, 142), and continued in Elsass, and the Schwarzenwald till 730 and on (O, 323); 460, see Map, II, 513; 470, in Swabia (III, 20); 493, see Map, III, 1; 503 (or 496, see O. 25), on Main and Neckar, ejected into Rhaetia and by Constanz (III, 353); 535, as 460 (see Map, IV, 1); 553–5, with the Franks in Italy, exterminated V, 30–44.

3. SAXON.—100, placed by Ptolemy in the base of Denmark; 287, infested coasts of Armorica and Belgica (S.D.); 350, raiding all the British coast (iii, 43); 370, in Normandy and Picardy, exterminated (I, 198); 450, in Kent; 451, settled in Bayeux (iii, 461); 493, extent in Germany, Map, III, 1; 520, in Lincolnshire and Yorkshire (Green, *Short History*, pp. i, 22–3); 535, east of Elbe (Map, IV, 1); 540, in Northumberland (Green i, 36); 550, take Lancaster from the east (Green, i, 22); 568, 20,000 in Italy, with families; moved to Swabia and exterminated (V, 156, 193); 570, up to Chester (Green, i, 20); 580, from east of Northumberland across to Severn (Green, i, 29, Map 30); 770, see Map, O, 350; 804, 10,000 families from Nordalbingia (south-west of Denmark) exiled to Neustria, and Slavs enter (O, 366); 840, Cornwall subject to Saxons (Green, i, 55). The north-east to south-west shading shows the ancient Saxony; the north-west to south-east shading shows modern Saxony; S. is position of the modern Sassen, perhaps an outlying branch.

4. DANE.—Hygelac (who in 515 raided the Rhine mouths, O, 113) is commonly called a Dane, but Beowulf expressly calls him a Goth (ll. 391–2, 526–7, 4700–1, 4734–47, 5969–75, etc.), and he belonged to the northern Goths of Scandia. These people were very likely joined in the later raids named after the Danes; 843, Danes winter at mouth of Loire (O, 419); 843, Norwegians settle in Ireland (O, 418); 847, Danes hold Bordeaux (O, 421); 850, winter in Thanet (O, 408), and hold all the Frisian Coast (O, 419); 851, raid east half of Saxony (O, 419); 853, settle at Loire mouth (O, 421), and raid to Orleans (O, 422); 858, raid up Rhone (O, 426); 860, fix on mouths of Somme, Seine, Loire, and Garonne (O, 429); 867, the great colonising of England, till 878 settlement of the Danelagh (O, 431); 880, they slaughter and ravage up all the Elbe (O, 438); 885, an army of 40,000 at Paris (O, 442); 891, ousted from Frisia and the Rhine (O, 469); 911, settle all land north of Epte, from Somme to Brittany (O, 502); 923, raid Burgundy down Saone (O, 504).

5. LONGOBARD.—The original home of the Longobardi is claimed to have been in Scandia, and they state that they started thence ten generations before 500,

say, about 200 (O, 182). To this it has been objected that they appear in Germany as early as the first century, as they occur in Strabo and Ptolemy. But as the main migration seems to have swept as a solid body east and south in the second to fourth centuries, it is more likely that the German Longobards were earlier migrants from Scandia, and the main body may have moved about 200. The account in the Codex Gothanus, which Hodgkin cannot reconcile with the Origo and Paulus, is apparently due to the attempt to fit the earlier south-western migration with the later general movement.

The earlier migrants were settled east of the Elbe (Strabo, VII, i, 3) at perhaps 0 A.D.; and soon after crossed to the west (Velleius Paterculus 20 (?) A.D.). At about 100, Ptolemy places the Suevi Langobardi up the Rhine at about 51°, and Langobardi about the Spree, marked 90 here for distinction. It was these peoples who were the source of the Saga statement that their leaders were sons of Gambara, as the Gambrivi* lay between these two groups of Langobardi. From these people came the movement in 166, when the Longobardi moved from the Elbe into Pannonia, but were driven back across the Danube (B, 543).

The later migrants we may accept as starting about 200, and probably therefore at the time of the great southern flow of 166 to 181, when the Goths and other peoples were moving. The earlier Longobardi have been taken as the source of this movement, in defiance of the statement of ten generations before 500. But attempts to fit the geography of the Saga have not yet succeeded. The names in their travels are thus: They came from Scandia to Scaringa, there they were attacked by Vandals, on the frontier were the Assipitti, they passed then into Mauringa, thence into Golanda and possessed the region of Anthaib and Banthaib and Burgundaib. Here they set up their first king Agelmund; on the march they came to a river barred by Amazons whom they defeat, and cross it into a quiet land. There Bulgarians fall on them. Three reigns later, they enter Rugiland, after 487. Most of these names point clearly to an eastward migration, as Zeuss saw even without observing several of the identifications. Scaringa may have been Schwerin,* as it lies west of the Vandals, who occupied the north of Brandenburg, where they blocked the way. Mauringa may have been Mirow and the Müritz See in the east of Mecklenburg. Thence they passed into Golanda, which is the key to the whole question, as it is impossible to separate this from the Galindae* of Ptolemy, who at 100 were about Wilna, and who later moved into E. Prussia, where their land is named as Galanda, Galandia, Golenz (Zeuss 674, Cod. Dip. Pruss.); they are known in modern times as Galinden* (about $53\frac{1}{2}° \times 21°$). Here the Longobards took the lands of three tribes, all ending in *-aib*, the other forms of which are *-aevones*, or *-winas* in Beowulf. These Istaevones, Ingaevones, Frisaevones, Hilleviones, Aeviones, Aviones, refer to religious leagues (see Bremer, *Ethnog.* in Paul's *Grundriss Germ. Phil.*, 2nd edit., III, 814). The tribe Ant are the Slavonian Antae (Zeuss), see Map 14; the Bant or Vant may well be the Slavonian Venedi* or Wends in W. Prussia; and the Burgund are obviously the Burgunds about Posen (Pliny). Here the Longobards dwelt five reigns before 487, or about 300. On their march they came against Amazons, *i.e.*, Cwens* or Finns, and Finni were by 100 already west of the Galindae, and therefore quite as much in reach of the Longobards by 300. They next are attacked by Bulgarians (say at 350), a name so confused with Huns, Avars, etc., in later times (iv, 344) that it probably merely implies here eastern Slavonians at this period. It will be seen how all of these names agree to an eastward migration to the eastern borders of Prussia and then a turn southward. This is in accord with the general course of migration before 250 (Map 22); and the bend south-west later was due to the eastward pressure at 270 (Map 23); 489, they entered Rugiland (V, 143 and Map, III, 1); 520, the capital of Waccho was south-east of Prag (V, 142); 535, they subdued the Quadi (S.D.) and settled in Pannonia and Noricum (iv, 344; Map, IV, 1), and they settled in Noreia (V, 124); 540, they scatter the Heruli in South Poland (iv, 343); and about now pass on to Dyrrachium (iv, 344); 547, they occupy all west of the Danube (V, 124); 567, cross the Danube up to the Theiss (V, 139); 568, they crossed the Predil pass (V, 158) along with Saxons, Swabians, Bulgars and Slavs (O, 185); 569, taking of Milan (V, 161); 571, occupation of Tuscany (V, 164); 572, South Italy conquered (v, 518). They formed the bulk of the population of North Italy (O, 188), as the wars of Justinian with the Goths, and their expulsion, had devastated Italy until it "seemed to have sunk back into primeval silence and solitude," Paulus Diaconus (O, 181).

6. GOTH.—The general appearance of these people is given by Eunapius (1, 161), and in the account of Theodoric's person (II, 353). They were tall, with chest prominent and stomach drawn in, or waists pinched in like insects, feet heavy; skin white, hair long and curly, and worn partly over the ears. This description of the form and hair so exactly agrees with the figures on the Vapheio cups, and some other figures of Mykenaean age (but not all), that it is not improbable that these people had entered Greece by 1500 B.C. Possibly Gathaei in Arcadia and Guthion in Laconia may mark their refuge from the Dorian migration.

That the Getae were Goths was the universal belief of the Goths themselves, stated by Cassiodorus and Jordanes. As they knew both parties at first hand, we must give full weight to their belief that such an identity was probable. The modern objections to this view only refer to the lineal descent of the Goths from those Getae who were already in the Roman Empire; and Professor Bury, who has written most strongly against this descent, would welcome the view of an earlier migration of the Geatas forming the Getae. Another connection strongly corroborates this. The Getae were the eastern half, and the Daki the western half, of the same people north of the Danube (Strabo VII, iii, 12). Similarly, the south of Scandia was occupied by Goutai and Daukiones; the parallelism of the two names makes the connection irresistible. The route of the later Goths in 170 across the low plains between the Vistula and the Bug was so obvious a line of communication that it must have been familiar to pastoral nomads from early ages. Indeed, the river Bug of the Euxine runs direct from the source of the river Bug of the Vistula; one name is common to the road down either way. Probably much of this track of about 700 miles was covered year by year in the migration from winter to summer pastures by the nomadic tribes; a shift of four miles a day, grazing onward, covers 500 miles in four months. That earlier Getae and Daki should come down this road in Mykenaean times, or in the great Kimmerian and Scythian movement of the seventh century, B.C., or in the Cimbric movement of the second century, B.C., is internally probable. And that the history of the Getae should be claimed by the Goths is as if the modern Danes were proud of the Norman kingdoms, or like the people of Jersey who claim that their Duke conquered England,—a legitimate pride in the deeds of the race. The communication across from the Baltic to the Euxine was evidently a short one, even for a national migration, as the Goths had not lost their seafaring skill by a long nomadic life. On reaching the sea they at once settled (I, 42), and soon began a great system of piracy round all the coast within reach. As Tacitus says, Scandia was powerful by its fleets.

The Goths included many subdivisions—Ostrogoths, Visigoths, Moesogoths, Tetraxitae, Taifalae, Juthungi, Sciri, Turcilingi, Rugii; but we do not distinguish these, as our purpose is the race as a whole. Two separate branches of importance, which mingled with other peoples, are dealt with in the following maps of GEPID and HERUL:—

In the fourth century B.C. (marked—320, Map 6), Pytheas named them as Guttones, probably by the gulf of Danzig; they had then already crossed from Scandia, where yet part remained in 100 A.D. as Gutae, while others were south of the Venedi below Danzig. From their Baltic home the first recorded movement south was the conquest of the Marcomen in 18 A.D. (B, 176), followed by a settlement east of the Quadi, marked 20 on map (Tacitus). The great movement took place in 170, across to the Euxine (I, 40); 211, they were in the place of the Roxalani and Iazyges, and also separated into east and west by the Dneister or Pruth (I, 43); 230, they were raiding in Dacia (i, 242); 242, in Thrace (i, 190); 248, Dacia was occupied by an army of 70,000 (i, 246); 255, Dacia was finally occupied by Goths crossing Carpathians (I, 57); 258, they took Pityus and Trapezus (I, 59); 259, they raided Bithynia (I, 60); 267, occupied Athens (I, 63), attack Thessalonika (i, 266); 269, great army defeated at Naissus, and men killed, by Claudius (i, 289); 270, Dacia was given up to Goths and Vandals (i, 294), and a large body surrendered in Macedonia (I, 68). A long period of recuperation followed during two or three generations in their new home.

332, Goths crossed the Danube, but retreated as the Crimeans were pressing on them (S.D.); 348, the Christian Goths cross the Danube and settle in Tirnova (I, 81); 376, 200,000 cross the Danube, under pressure from the Huns (I. 250); 377, the Taifili colonise Modena and Parma (iii, 109); 377, Goths ravage Thrace, and again in 378 and 379, when 20,000 women and children were taken; 380, they made a four years' expedition up the Danube (iii, 127); 383, occupied Thrace (iii, 129), and colonised in Phrygia and Lydia (iii, 129);

395, invaded Peloponnesus and retired by Epirus (iii, 242–6); 401, enter Italy; 402, in Istria; 403, in Verona (iii, 500); 408, march on Rome (iii, 288); 412, enter Gaul, occupy south up to Atlantic (iii, 334); at 413, Bordeaux; 414, enter Spain, and in 418 reach the south (iii, 347–8); 451, see Map, II, 97, kingdom between Loire and Garonne (II, 108); 454, fill Pannonia (II, 480; Map, II, 513; iii, 476); 456, crush the Suevi in Spain (II, 389), and remain thinly scattered over the country (O, 130, 141); 473, enter the Rhone and the Loire (II, 481); 473, settle in Gulf of Thessalonika (III, 27); 474, take Berri and attack Auvergne (II, 486); 478, settle in the Dobrudsha to 488 (III, 27, 180); 491, settle in Italy (III, 202), thickly on Po and Picenum, fewer in Tuscany, very few in south (O, 22); 508, reduced to Septimania (iv, 118); 536, 200,000 retreat from South Italy (IV, 67, 497); 551, in Crimea (iv, 538); 553, final exit from Italy (IV, 657); 580, finally conquer Suevi in north-west Spain (O, 139); 711, lose Andalusia (v, 477); 713, lose all Spain (v. 480).

7. GEPID.—This laggard branch of the Goths was in Ptolemy's time in the same home. By 230 they were in the Upper Vistula, in Gallicia ? (I, 51); between the Oder and Vistula (S.D.), where they continued till driven out by Slavs about 340 (I, 77); 370, see Map, I, 185; 451, see Map, II, 97; 454, occupy capital of Huns (iii, 476 and Map, II, 513); 460 (?) settled in Yazygia (iv, 342); 473, move from Dacia into Pannonia (III, 184); 530, in Upper Hungary and Transylvania since 454, and move into Pannonia and Noricum (iv, 342); 535, see Map, IV, 1; 547, cross the Danube to Sirmium (V, 123); 567, destroyed by Longobards (V, 139). But about the middle of the sixth century there were Gefthas still with the Wends (Scôp, 121), on the Baltic (Beowulf, 4,981).

8. HERUL.—These were the most disorganised and wandering of the Gothic peoples. They appear to have divided at the old centre about Danzig, for they are found united with Batavi in Roman troops attacking the Alemanni about 370 (S.D.). It may well be these same who crossed into Britain, and later ravaged northern Spain in ships (S.D.). The main body followed the Gothic migration to the Euxine, as they joined in the raid on Athens, 267, sailing from the Sea of Azof, where they were settled out to the Caspian (V, 104), see 270 on Map VIII; 343, they were subdued by Hermanric near the Sea of Azof (I, 77); 375, they were pushed up the north bank of the Danube by the Huns (V, 104); 454, in north of Hungary (II, 511; Map, II, 513); 454, probably in Noricum (II, 194); 460, as far as Salzburg (V, 104). About 480 they were in Hungary, east of Danube, and south of the Longobards (V, 104); 493, see Map, III, i; 507 about, moved up the Danube perhaps between Augsburg and Passau (III, 355); 508, crushed by Longobardi (V, 106), fled into Rugiland; 510 about, entered Thule (= Scandia ?) after flight across Europe. After defeat, part paid tribute to Gepidae, and then, 512, crossed into Moesia, and were accepted by Romans; 535, in North Hungary, see Map, IV, 1. The branch that fled to Scandia are probably those known in the sixth century as Herelingas, named between branches of Goths in the Scôps tale, 226.

9. BURGUND.—These people were kin with the Vandals (i, 329; iii, 36; Pliny). They may have some mixture of Slavonian from their position and connections. The name might refer to a confederacy if the Frugundiones were the Fara-gund-winas, or War clans. Ptolemy names the Buguntes west of the Vistula, who are supposed to be the Burgundiones of Pliny, marked here 99; and he also names the Frugundiones east of the Vistula 100. They stayed here till impelled by the great westward drift of the third century. They then expelled the Gepidae between the Vistula and Oder (S.D.), and in 277, passed on from the Oder to the Seine (i, 329), but were repulsed; 354, they are in Thuringia (iii, 36; I, 223); 370, 80,000 came down to the Rhine and retired again (iii, 37); 406, large numbers were exterminated at Florence (iii, 263, 267); and others join in raiding Gaul (iii, 268); 413, they crossed the Rhine, but were checked (S.D); 440, they raided Belgica, but were defeated and went down to Savoy 443 (iii, 450; II, 110); 450, see Map, II, 97; 470, they were south of Swabia (III, 21); 493, westward in Gaul, Map, III, 1; 499, they occupied down to Marseille and Arles (iv, 110). But, 500, are otherwise said not to have held the lower hundred miles of the Rhone (III, 323).

10. SUEVE.—This was the name of a group of lesser tribes, which in A.D. 20 were in possession from the Rhine to the Elbe, and some of them—the Hermonduri and Longobardi—east of the Elbe (Strabo, VII, i, 3). They included the Semnones as chief tribe, Hermonduri, Longobardi, Reudigni, Aviones, Angili, Varini, Eudoses, Suardones, and Nuithones (Strabo, Tacitus, Pliny); and the limits stated, over the Hercynian forest, and out to the frontier of the Getae, seem to include the Marcomanni, Quadi, Narisci, Marsigni, Buri and Lugii, and are accepted thus (in B, 241). The Cherusci were also confederate (B, 176). Of these tribes there may be identified in the sixth century in the Scôps tale, Longbeardas, ll. 66, 162; Rondingas, 50; Engles, 15, 71, 89, 123; Waernas, 52, 119; and Sweord-weras, 126. The name Sueve descended to the Sweben or Swabians. 9 B.C. the Marcomans pushed from the Main into Bohemia and expelled the Celtic Boii (B, 131). 5 A.D. 40,000 Sueves and Sigambri settled between Meuse and Rhine (S.D.); 10 A.D. the Suevi occupied between Rhine and Elbe (Strabo, VII, i, 3). About 18 the Gotones from the Lower Vistula conquered the Marcomans (B, 176). After 20, the Marcomans still in Bohemia, and Quadi in Moravia (B, 241), on to 50, when many fled into Pannonia (B, 241); 50, the Lugii in Silesia were Sueves (B, 241); 100, Ptolemy places Suevi-Langobardi on Rhine, also Suevi east of these; and at 110, Suevi-Angrivarii (*i.e.*, Angelwaras, on the Angel branch of Ems, 51° 50′ N.); 211, on the Main (i, 257); 406, with others exterminated at Florence (iii, 263, 267); and in migration through Gaul to Spain (iii, 346); 409, settle in Galicia (iii, 346); 450, see Map, II, 97; 454, in north of Pannonia (II, 20); 470, in south-west of Germany, and along Upper Danube, mingled with Alamanns (III, 20); 493, Map, III, 1; 568, broken bands of Swabians join Longobards (O, 185); 580, end of Suevic kingdom (O, 189).

11. VANDAL.—This people were reckoned by Pliny to include the Burgundiones

Varini, Carini, and Gotones. Zeuss counts them as a branch of Hermiones. Tacitus calls them Germans, but it is probable that there was considerable Slavonic mixture (S.D.). Procopius states that they were kin to the Goth and Gepid (II, 213); 60, they occupied between the Oder and the Vistula (Pliny, S.D.) and perhaps up to Holstein (i, 242); 170, they joined the Marcomans (S.D.); 180 (?) they passed into Pannonia (S.D.); 181, settled in Dacia (II, 215); 250 (?) settled between the Marisia and Crissia (i, 295). On the north of the Danube (Peutinger); 271, crossed Danube and returned to Dacia (II, 216); 277, brought into Britain (II, 217); 331, in Moravia and north-west of Hungary and pushed over Danube; 337, much reduced and fled into Pannonia (II, 218); 405–6 raid into Italy and exterminated at Florence (iii, 263, 267); 406, ravage Gaul (iii, 269); 409, settle in Galicia with Suevi (iii, 346); 409, the Silingi occupy Baetica, but in 418 were extinguished by Goths (II, 223); 429, Gaiseric takes 80,000 with Alans to Carthage (iii, 402–11; II, 244); 455, Genseric raids Rome (iv, 5); 480, the Moors regain the coast west of Caesarea (O, 28); 493, see Map, III, 1; 536, some go to Mauretania (IV, 37).

12. ALAN.—We now leave Germans for the Sarmatians, Tartars, or Turanians (I, 739). B.C. 80 the Alans were in Alania and remained till the sixth or tenth century (S.D.). In 0 they were among peoples north of Maeotis (S.D.); 50, Seneca names them on the Danube (S.D.); 70, ravaged Media and Armenia (S.D.); 70, on Tanais and Maeotis, Josephus; 100, Ptolemy puts the Alauni up far north of Crimea, apparently their original home; 130, raid Cappadocia (S.D.); 242, in Thrace (i, 190); 370, Roxalani, Map, I, 185; 372, between Volga and Don, some to Caucasus, some to Baltic (iii, 91). After 375 Alans about Dniester (S.D.); 382, with Goths in Moesia, and mixed with them later (S.D.); 406, exterminated at Florence (iii, 263, 267); 406, raid Gaul (iii, 268–9). About 420 settle in Carthagena and Lusitania (S.D.; iii, 346); 429, Gaiseric takes them, 80,000 with Vandals, to Carthage (iii, 402–11; II, 244); 450, settled in Valence (iii, 449; II, 111); 483, an edict addresses bishops of Vandals and Alans in Africa (S.D.).

13. IAZYG.—These were Sarmatians, akin to the Alans; but they appear to be distinct from the Slavs (ii, 563; S.D.). In nature—and possibly in name—the Cossack is their modern representative. The first site of this people at the time of Strabo (VII, iii, 18) and Ovid, was north of the Crimea, marked O. About 30 they reached the Theiss (ii, 216); and at 50 they are found holding the land between Danube and Theiss (B, 241); 335, the Slavs over whom they ruled expelled them into Pannonia and among the Quadi (ii, 219–20), and 300,000 were accepted as colonists in Pannonia, Thrace, Macedonia, and Italy; 357, they returned from the Quadi to their old land (ii, 263); 365, raiding Pannonia with the Quadi (I, 142); 950, they are known in Podlachia (S.D.). And after 1000 the Yazwingen occupy province of Lublin (Droysen *Atlas*). At present the people of the old district between Danube and Theiss are known as Yazygien, with towns Yasz Apathi and Yasz Bereny on the river Zagyva.

14. SLOVANE.—This was the original form of the name (Miklositch, *Gram Slav. Sprache*). In contact with Germany there were three tribes, the Venedi

Slavi and Antae; or the Winidi were divided into Sclaveni and Antes (see Jordanes). The various tribes, where known, are marked on the map with V, S, and A respectively. In 100 the Venedi were to the east of Danzig according to Ptolemy, to which Tacitus well agrees; and the Borusci (marked B) at some distance to the north-east. They were probably of the same stock, as they joined with the Wends later as Prussians. 300, the Antes were apparently in this region when met by the Longobardi in Anthaib (V, 94); 343, the Slaveni were on Upper Danube and Vistula, and the Antes between the Dniester and Dnieper (I, 77). The Venedi had pushed south, as by the third or fourth century there were Venadi Sarmati in North Dacia, and Venedi at the Danube mouth (Zeuss, 592); 360, the Venedi were in the Polish plains (iii, 58); 420, the Slavs (Wiltzes, Sorbes, Abotrites and Czechs) were on the Elbe and Oder (O, 177): 454, Slavonians, on break up of Attila's army, entered Carinthia and Carniola (II, 194); 470, Sarmatians got Singidunum, and lost it 472? (III, 24); 537 about, Antes from Dniester to Dnieper (I, 77; Jord.); 537, Antes in Moldavia and Wallachia (iv, 347); 549, Slavonians ravage Thrace and Illyria (IV, 564); 550, Slavonians attack Naissus and Thessalonika (IV, 567), and are turned into Dalmatia; 568, they enter Italy with the Longobards (O, 185); 582 to 7, they settle in Thrace, Macedonia and Greece (O, 153), and are driven back 601; 585, they begin to move across Danube and settle in Moesia, which was almost desolate (O, 151, 152); 605, Slavs with Avars attacked Constantinople (O, 155); 610, Slavs on south-east of Alps and in South-East Bavaria (Zeuss, 616); 630, Venedi and Sorbi border on Thuringia (O, 179; iv, 296); 659, Slavs hold all Moesia, and inland Thrace and Macedon, to near Hadrianople and Thessalonika (O, 240); 770, Czechs and Moravians on Upper Elbe, Carentanians on Drave (O, 345); Slavinia east of Elbe, and Abotrites up to Lubeck (O, 350); 800, Abotrites in Mecklenburg, Wiltzes in West Pomerania, Sorbes in Brandenburg (O, 360); Slavs on the Save and the Drave (O, 362); 804, Abotrites extend to Eider (O, 366); 843, Slavs extend from Baltic to east of Istria (O, 410); 1000, Slavinia from Elbe to Oder; Polonia from Oder to Vistula (Droysen *Atlas*). Modern V, north of Denmark, Vend-syssel; W. Wendelsö; SL, Slavonia, south of Bayreuth (Ripley, *Races*, p. 244). At number 770, Mecklenburg, the Grand Duke of which is "Prince of the Wends."

15. HUN.—In beginning to deal with the Tartar races it should be noticed how all the Hun tribes have names compounded of Igur.* The Uighurs were eastern Turks, in the seventh century north-west of Mongolia (about 43°–46° N., 81°–95° E., Map, II, 1; and Skrine and Ross, *Heart of Asia*, p. 116); and the persistence of the name in nearly all the Hun tribes is a strong evidence of their origin. The names are in Jordanes, Priscus, Procopius, and Agathias.

Kotr—igur.	Ultz—inzur.	Cutzi—agir.
Uti—igur.	Amil—zur.	Altzi—agir.
Ult—izur.	Alpil—zur.	On—ogur.
Alc—idzur.	Sar—agur.	Hun—ugur.
Ac—atzir.	Sat—agar.	Bit—ugur.

Some of these may probably be duplicate forms of the same name; but all appear to be compounds of Uighur, with softening of the g to j in some cases. Whether this is again connected with their old border river the Jaxartes (Yajartes) must be left open. For the large question of their identity with the Chinese Hiong-nu, see II, 1–36. At 100 the Chuni were north of the Crimea, and it would be very difficult to dissociate them from the Huns; the possibility, however, of a later addition to Ptolemy's geography might be a question. The first of the great migration drove out the Alans in 372. Thence they crossed the shallows of the sea of Azof (according to national tradition, I, 243); and in 374–6 burst upon the Gothic kingdom of Hermanric, and drove the Goths up the Danube to take refuge in the Roman empire (I, 246–9); 378, they invaded Thrace (I, 264); 395, another branch raided Armenia, Cappadocia, Cilicia, and on to the Orontes (II, 38); also the Upper Euphrates (I, 654); 408, they cross the Danube, far into Bulgaria (II, 38); 425, 60,000 advanced to Italian border, and then settled in Pannonia (iii, 417). About 430 they ravage Media (iii, 423); 446, Moesia and south of Danube given to Huns (iii, 430); 451 Attila invaded Gaul, by way of the Danube and Main, as boats were built in the Hercynian forest (II, 108); they raided Belgic Gaul (II, 114), Metz (116), failed at Orleans (121); turned to Troyes, near which the great battle took place (124). Thence returned across the Rhine to Hungary, probably by a different route in order to get more spoil; 452, moved from Hungary to Aquileia, and up the Po to Milan, and returned (II, 146–169); 454, expulsion of the Huns from Hungary, after death of Attila, to Scythia (II, 193); 539, Huns raid to Constantinople and Corinth, and across into Asia (iv, 347–8, 537). U, Utigur Huns, K, Kotrigur Huns dwell divided by the Don (iv, 537); 550, Kotrigurs were brought by Gepids against Longobards; 551, Uturgurs attack Kotrigurs, enter Crimea and across strait of Kertch (iv, 538); 559, Kotrigurs cross Moesia and up to Constantinople (IV, 525–532).

16. AVAR.—These were kin to the Huns, living under Khans (S.D.); 558, migrated to the Alans at foot of Caucasus (iv, 353); 559, on Don and Dnieper (v, 516); 560, defeated the Antae; 562, fought on the Elbe (v, 516). Probably centred in Galicia at 565 (v, 517); 567, spread all over Gepid lands, occupying all west of Theiss; 570, held the Danube from Vienna to mouth, and ravaged Balkans (O, 146); 581, conquered Slavs of Dacia and Lower Danube (v, 517); 605, with the Slav raid to Constantinople (O, 155); 619, raids up to Constantinople (v, 75); 770, on the Drave and Pannonia (O, 345); 788 to Friuli (v, 74; O, 361); 800, decaying on the Danube (O, 361); 896, decaying and mixed with Slavonic Moravians (O, 471).

17. BULGAR.—These were also an Ugrian tribe (O, 248), and part of the Huns (Zeuss). About 450 between Danube and Dnieper, probably a stranded fragment of Attila's army. Note that in 765 Irnek, son of Attila, is claimed as a Bulgar prince* (vi, 546) and his date agrees to the period. 570 (?) they formed part of the Avar empire (vi, 130); 635, they were still north of Danube (vi, 545); 640 (?), they cross into Pannonia and on to Adriatic; and they reigned south of the Danube

from 640 to 1017 (vi, 136); 679, settle in Moesia (vi, 545); subdued the Slavs and occupied up to the Balkans, adopted Slavonic (O, 248); 680, five centres of Bulgars and kin, (1) Don to Dnieper, (2) Kotrigurs beyond Don, (3) Danube kingdom including Utigurs, (4) Pannonia, (5) settlements in Italy (vi, 545); 690 (?), 30,000 taken captive, and sent to Asia (O, 249), where they joined the Saracens (O, 250). [This great weakening of the Bulgars may have been the cause of Slavonic prevailing after.] 750 (?), by the sea of Azof, west of Don (vi, 545); 550 to 750, extension of Slavonic settlement in Greece owing to war and plague (in 749) clearing the land (vi, 543); 950 (?), black Bulgars far north between Volga and Kama; Bury supposes migrants from Azof, but may have been left on the same incoming track as that of the Huns.

18. UGUR.—The Ugri or Ungri were of Finnish stock in the main, with Turkic added (vi, 552). From the name it seems impossible to separate them from the -ugur tribes of the Huns,* and when they first appear, 837, they are called Oungroi, Ounnoi, and Tourkoi. About 834–7 they were in Lebedia, near Chazaria (vi, 552); Bury supposes it to be between the Don and Dnieper, but this should be compared with Livadia* in south of Crimea. 837–9, they cross the Danube in a raid, their home being perhaps nearer than before (vi, 552); 840–90, they were in Atelkuzu between Dnieper and Danube, and 896 entered Hungary (vi, 552). By 899 they raid at Verona (O, 465); 907, they overrun Danube up to Linz (O, 474); 913, up to Coblenz (O, 476); 917, to Basel (O, 476); 924, Pavia looted and burned, and annual raids extended to Calabria (vi, 143); 924, raid up to Constantinople (vi, 144); 955, raid into Flanders, but finally checked by Otho (vi, 145–6).

19. TURK.—This race approached by the south of the Caspian, and not by the north, like all the preceding Asiatics. 841, the Turkish guards were brought in to Baghdad, and about 850 there were 50,000 established in camp at Samara (vi, 47); 1050, raid from Taurus to Erzerum (vi, 235); 1063, cross the Euphrates and take Caesarea; 1065, take Armenia and Georgia (vi, 236). Driven back to Euphrates in 1070; 1074, they were camped in Phrygia, and by 1084 occupied Asia Minor (vi, 248); 1076, take Jerusalem (vi, 206).

After a pause of over two centuries the Othman Turks renew the conquests Seated in Phrygia about 1300 (vii, 23), by 1312 they take Ionia and Lydia (vii, 26); 1326, they take Prusa (vii, 24); 1360, Thrace was subdued; 1361 Hadrianople taken; 1362, Philippopolis (vii, 31); 1373, Macedonia occupied; 1375, Bulgaria became a vassal; 1385, Sophia was taken (vii, 31); 1453, Constantinople taken; 1460, the Morea taken (vii, 204).

20. ARAB.—In the Notitia (402) there are Saracen cavalry of the tribe of Thamud stationed between Cairo and Belbays. The active movement, precipitated by Islam, began with the taking of Damascus in 633 (v, 419); 637, Jerusalem was taken (v, 434); 638, Aleppo and Antioch taken (v, 437); 639, Egypt occupied (v, 445); 641, Alexandria taken (v, 451); 647, Safetula was taken (v, 462); 654, Rhodes taken (O, 239); 659, most of Armenia taken (O, 240); 668, siege of Constantinople (vi, 2); 683, Lambesa taken (v, 464); 698, conquest of Carthage

(v, 469); 710, Spain entered (v, 474); 711, Sardinia taken and Tyana (O, 254), 712, Pontus taken (O, 254); 713, all Spain (except north-west) conquered (v, 480), and colonised thickly from Arabia, Syria, and Africa (O, 506); 713, Pisidia and Asia Minor in general occupied (O, 254); 716, siege of Constantinople, and death of 80,000 (vi, 5; O, 303); 731, Septimania taken (vi, 14); 732, defeat at Poictiers (vi, 17); and slaughter of 375,000 (questionable, O, 295); 739, pushed back to Narbonne (O, 296); 751, driven out of the plain of Leon (O, 507); 790, they lose Sardinia (O, 364); 797, evacuate Barcelona and all north Spain (O, 365); 823, they conquer Crete (vi, 37); 827, they enter Sicily (vi, 38; O, 448); 831, Palermo taken (vi, 39); 843 to 851, south Italy occupied (O, 450); 846, raid on Rome (vi, 40); 853-71, the Sultanate from Bari to Reggio (O, 452); 878, Syracuse taken (vi, 39); 882, settle at Garigliano and raid Samnium (O, 461); 890, raids extend up to Lausanne (O, 464); 902, Taormina taken (vi, 39).

Having now placed the successive movements of each people together as a consecutive view of their migrations, another view may be taken of the subject, referring to migration as a system, apart from the importance of the peoples separately. The maps 21 to 28, here given, show the direction, distance, and date of the movements, in order to compare them. It is obvious that a displacement of one people is likely to cause another movement, either in front or in rear, or both. Hence the general direction of migrations may be expected to be similar in any one age. The use of such maps is various. If a movement be doubtful in its place or its time, the resemblance of other movements will help to prove or refute it. If the date of a migration is uncertain, the date of others affecting the same region may settle it. If it be doubted whether a people can have come out of a region, the example of other movements may establish its probability. The division here is roughly into centuries, but the intervals of tranquillity have rather been taken as dividing the groups of movements.

21. B.C. 29–90 A.D.—This shows that two movements were in progress: one a flow down from the west side of Denmark, pushing even eastward from this, and carrying forward down to the Danube; another move was part of the ceaseless flow of eastern peoples into the Danube valley and Hungary.

22. 100–211 A.D. Here the northern flow is very strong. The great line down Denmark continued, but there was also a line directly across the Baltic. This led to serious pressure on the Roman empire, which was checked by Aurelius, and the great Gothic trek down to the Euxine.

23. 238–287 A.D. The eastern pressure now began, driving the Germanic peoples to the west and up the Danubian highway. A few dates here given are not entered on the racial maps. 238 the Carpi from the back of Hungary pushed down to the Dobrudsha (I, 48); 277, about, the Burgunds pushed the Alemans from the Main to the Rhine (i, 463), the date is probably given by their passing on to the Seine, whence they were repulsed (i, 329); 286, the Alemans and Burgunds both invade Gaul, probably by different routes (i, 463); 268 or later, the Goths push into the Crimea (i, 261); 277, the Franks were driven back into the morasses (i, 329).

24. 331–395 A.D. The great movement of the reign of Gallienus having been checked, there was quiet for a couple of generations so far as the Roman Empire was concerned. But the break-up of Constantine's rule brought on a fresh pressure from the east. The easternmost of the Germanic tribes, the Burgunds, had moved west from Prussia to the Rhine, and the Alans pushed into their place. This apparently marks the loss by the Germans of the country east of Denmark: the pressure was all eastern, flowing into Germany, along the Danube, and even past the Caucasus.

25. 401–493 A.D. By this century the central Asian Huns had pushed through to Europe; and the pressure was so severe that whole peoples were projected through the Roman Empire into Spain and Gaul. There seems to have been some northern pressure also, by the Gepid in 451 and Sueve in 454 flowing south-east, as well as the south and south-west movements on this side of Denmark.

26. 512–589 A.D. The newly-settled peoples west of the Danube had crystallised a firm resistance to further pressure; and thus the Avar flow mainly broke into the Greek peninsula.

27. 605–698 A.D. Another Asiatic wave—that of the Bulgars—pressed the Danubian region, which overflowed into Italy. The great southern movement of the Saracen (or Sharuqin "easterners") now broke up into Syria and along north Africa.

28. 710–804 A.D.—The great movements from Asia now cease; the Arab pushed into Asia Minor and up Spain and France. The Slav made a final move westward up to the Elbe mouth, and also south into full occupation of Greece.

The movements after this are outside of the scope which I proposed; but they can be seen in their principal importance in the maps of the Ugur, 18, and the Turk, 19. Across the latter one would have to be brought in the considerable counter movement of the Crusades, a continued shift of the Germanic peoples south and east, but not on a national scale.

After this review of the historical anthropology, we may turn to see if it has a serious bearing on the interpretation of anthropometry. I cannot profess here to discuss all the results which require to be treated; but in one respect the historical evidence has been so much slighted that it requires a more decisive statement. In *The Races of Europe* Ripley argues about the Lombard invasion: "Eighty-thousand immigrants in the most thickly-settled area in ancient Europe surely would not have diluted the population very greatly" (p. 254). Now the whole historic evidence goes to show that so far from Lombardy having been "the most-thickly settled area," it was practically empty when the Lombards entered it. The decay of the Italian population had long been the disease of the empire; in 380 Ambrose deplored the ruin of the lower Po valley (iv, 55); in 480 Gelasius wrote that in Aemilia, Tuscany, and adjacent provinces, the human species was almost extirpated (iv, 56). This void was filled by about half a million Goths in 489. In 536 there were 200,000 in the Gothic army. Ten years of incessant war up and down the whole peninsula, between the Goths and the extraneous army of Justinian (IV, 497), must have wrecked all the remaining chances of settled population; besides a plague in 542 which is reckoned to have destroyed a third of the population (O, 94, 181). The Goths were reduced from 200,000 to 20,000, and after that had been further diminished, the last remnant retired from Italy with all their families and possessions (IV, 656). Then 75,000 savage Franks and Alamans raided down the whole length of Italy, destroying everything that might remain, as far as Sicily; and then they were all exterminated by pestilence and a final slaughter of 40,000 by Narses (O, 106). After these successive rinsings out of the land, especially of the northern region, it is no wonder that the Lombards found on coming in that "the land seemed to have sunk back into primeval silence and solitude"—as their national historian Jordanes states. And the conclusion of modern historians is that "all the northern parts of the peninsula were desolate and well-nigh uninhabited" (O, 181); "alike in the northern plain, in Picenum and Aemilia, and in the neighbourhood of Rome, the whole population had disappeared" (O, 106). There was a small imperial garrison left in the fortresses, but only three cities in the whole of the Po valley attempted even a passive resistance; and "the whole Lombard nation—men, women, and children, with their cattle and slaves—descended into the Venetian plains and spread themselves over the deserted lands" (O, 184). If ever we could verify the wiping out of an earlier population by decay, and then by two successive rinsings out by different peoples who were each exterminated, it is in this case. So far from being "the most-thickly settled area in ancient Europe," it was probably the thinnest. Now let us remember that these Lombards had left Scandinavia, which has the longest-headed population of Europe, and yet at present the Lombards have almost the broadest heads in Europe. We are reduced to enquire (1) whether Scandinavia has entirely changed its type, or (2) whether the Lombards have entirely changed, or (3) if the Lombards who entered Italy in 568 had any resemblance to their forefathers of three centuries earlier in the Baltic plains? To my own sense of history it seems certain that twelve hundred years have sufficed to change entirely the cephalic index of a people so as to accord with their environment.

I have dwelt on this at length because it is a very clear case of historical fact; but it does not stand alone in its teaching. Ripley discusses the Jewish cephalic type (*Races*, p. 397): "In long-headed Africa they were dolichocephalic. In brachycephalic Piedmont, though supposedly of Sephardim descent, they were quite like the Italians of Turin. And all over Slavic Europe no distinction in head-form between Jew and Christian existed. In the Caucasus also they approximate closely the cranial characteristics of their neighbours." And then adopting the big *petitio principii* that cephalic index is constant in race, he concludes that therefore the Jews have everywhere become swamped by an included majority of Christians, and this in the face of the Ghetto and all its obloquy. Surely history and common observation lead us to the equally legitimate conclusion that the country and not the race determines the cranium.

To take another case, not so historically complete. All our evidence shows that Europe was lastly divided, by a line northward from the Adriatic to the isles of Denmark, into a Slavic east and a Germanic west. Yet the cephalic index divides Europe exactly across this, into a long-headed north, and a short-headed south.

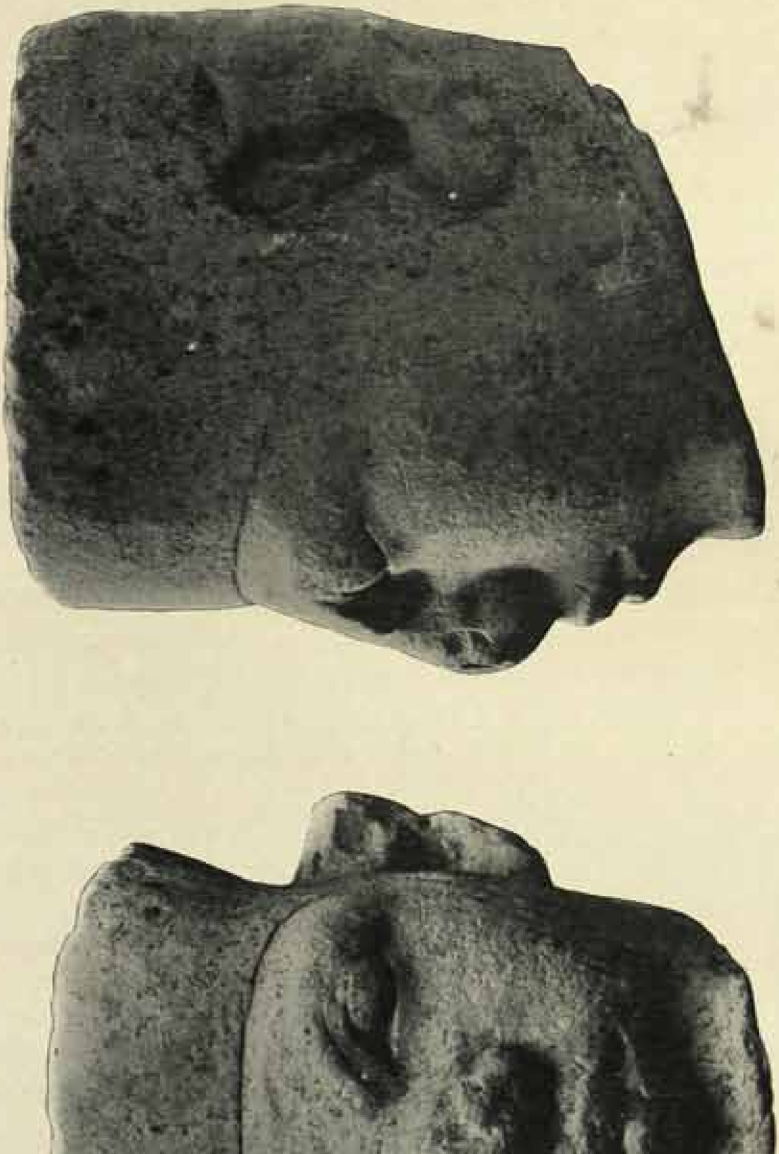
I fail to see a single proved case of racial permanence of cephalic index, while environment has changed; but each case that we can test shows a local permanence of cephalic index while the race has changed. This is a radical question to be settled as to the meaning of anthropometry, and a question which can only be settled by historical evidence. *A priori*, the cephalic idex is just as likely to depend on place as on parentage, after a sufficient time has elapsed for the conditions to take effect.

To turn to another supposed test of race, Nigrescence, or Brunetness, or more simply—Colour. This subject has been studied in admirable detail, as everyone will know from the Huxley lecture of last year. But looking at the maps of colour in Europe, we see a distribution which shows scarcely a trace of difference at the real dividing line from the Adriatic to the Baltic, separating Slav from German; whereas looking north and south we find large differences in either the Slavic or the German region. As a whole, colour approximates far more to iso-thermals than to iso-racials, a result to which Dr. Beddoe has already called attention.

It seems, then, that two of the main physical tests, cephalic index and colour, must be only regarded as decisive during periods of less than a thousand years. A difference existing under like conditions, such as the diversity within a small area, is good proof of a mixture within a thousand years. But a difference or a similarity in different regions proves nothing for longer periods.

To review in brief our anthropological tools. (1) Bony structure is certainly subject to the influence of conditions within a few centuries; but *a priori*, it seems better to study single bones, where there is only one factor of change, than compound forms, such as the whole skull where many factors are mixed with variable co-efficients. (2) Colour is not more stable than structure; perhaps the colour of well-protected parts, such as the armpit, would be less liable to vary by conditions. (3) Physiognomy and general expression is very vague, and impossible to compress into formulæ with any definiteness, as two similar descriptions might mean entirely different appearances. Yet the general type of features is very marked; and the expression can be estimated by so far more delicate and complex mental analysis than any measurement can give, that it deserves much more systematic study. Tests of discrimination of mixed photographs should be systematically carried out to ascertain the value of facial details and of mental estimates. In general, the possible scope of anthropometry on the least utilitarian structural variation, needs to be carefully investigated. Such a detail as the brain venation shown inside the skull promises, *a priori*, to give variation of descent irrespective of conditions. (4) Language, which has been too much trusted or distrusted. We require a study of the effect of known mixtures and amalgamations on the structure, on the common words, and on the general vocabulary. In particular, place-names need a more exact valuation racially, as they seem to be by far the most valuable department of language. (5) Culture, which may be borrowed, but which has enormous value owing to the variety in it giving absolute proofs of a connection. In this class of evidence, Laws, especially of descent, are of the first value, as a people cling to them most closely, and they involve property. The Arts are so linked with the mental structure that they vary but little in character with changed conditions. The utilitarian types of houses, tombs, and clothing may vary greatly with conditions, but yet are of much weight when alike in small detail. (6) History, which we have here endeavoured to bring more into the scope of evidence, is so absolute that it is of greater weight than all other proof, where we are able to distinguish between political and racial domination. I greatly hope that the preliminary arrangement of the facts which I have here attempted, may lead students to more completely put in order every detail of historical record that has been preserved.

Lastly, let us look at the meaning of migrations. We deal lightly and coldly with the abstract facts, but they represent the most terrible tragedies of all humanity—the wreck of the whole system of civilisation, protracted starvation, wholesale massacre. Had the Goths been left alone in their humane occupation of Italy, there might have been a set-back of two or three centuries; but, by expelling them, civilisation was thrown fifteen centuries back. This fearful waste, not only of life, but of all the best gains and endeavours of man, if it cannot be avoided, shows hideous incompetence; if it can be avoided, it is then the most gigantic of crimes. Can it be avoided? That is the question before all others to the statesman who looks beyond the present hour. If we have to sum up the problem in one word, that is, Weeding. The one means by which all natural progress has been gained is weeding; the only means by which improved races have come forward in the world is by weeding. The hardest weeded race, which has endured most, has always overcome the less weeded race. The fatal curse of Rome was the state-maintenance of a people among whom weeding was thus at an end. The maximum of opportunity to the most able, the full penalty of incompetence when deserved, is the only rule for a state which intends to avoid the far more terrible fate of a catastrophe when it touches a more competent people. The most recent panaceas of political ignorance, equality of wages and the right to maintenance, are the surest high road to racial extinction. The higher the walls of artificial restrictions,—the exclusion of more industrious races, the limitation of free labour, the penalising of the capable in order artificially to maintain the incapable,—the more certain and more sweeping will be the migration of a stronger and better race into the misused land. The one great lesson of all this world-agony of migrations is the necessity of weeding; and the statesman's duty is to see that this is done with the least disturbance, the least pain, and the most whole-hearted effect.



A KING OF THE FIRST DYNASTY.—A STUDY FROM LIFE IN LIMESTONE.

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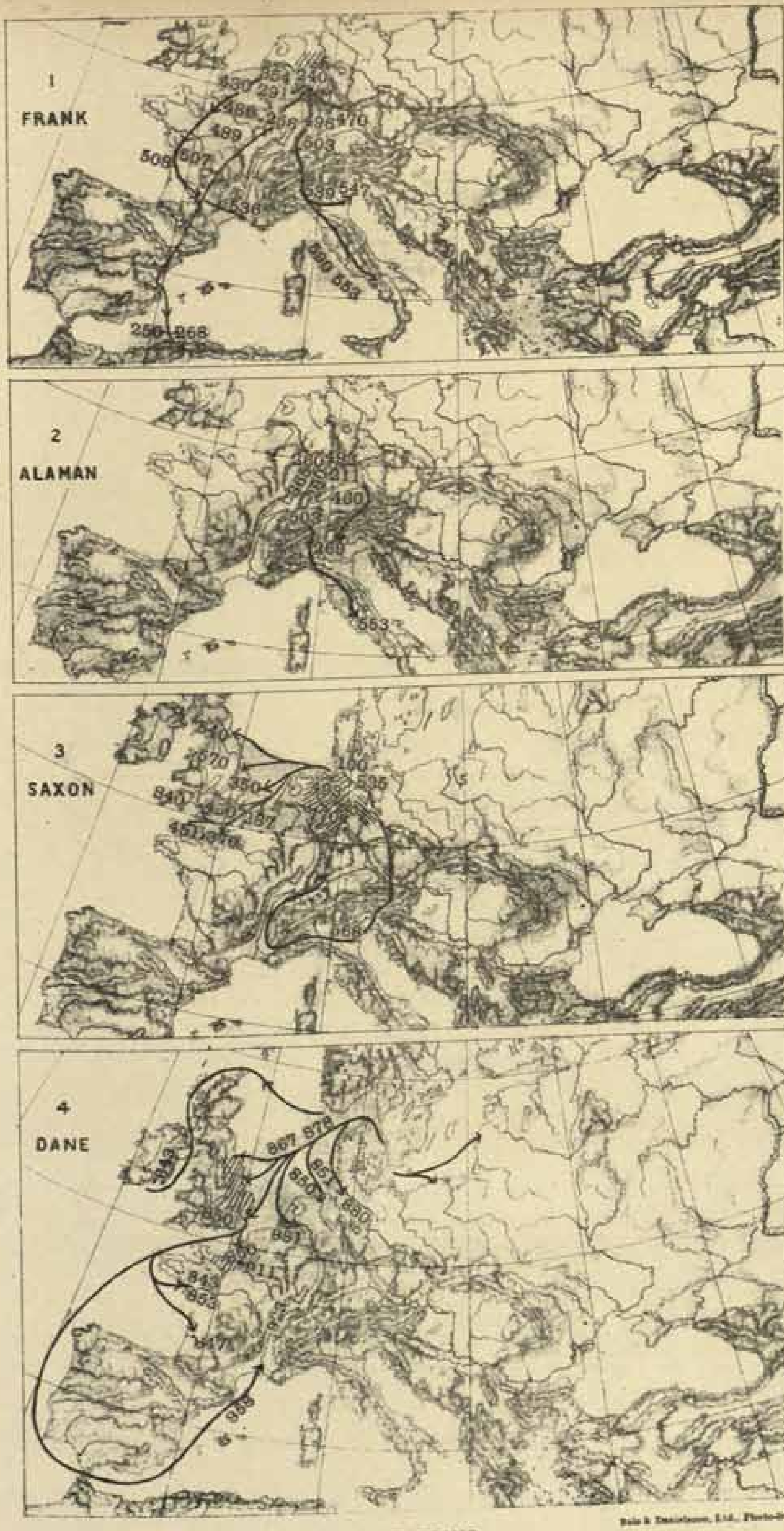

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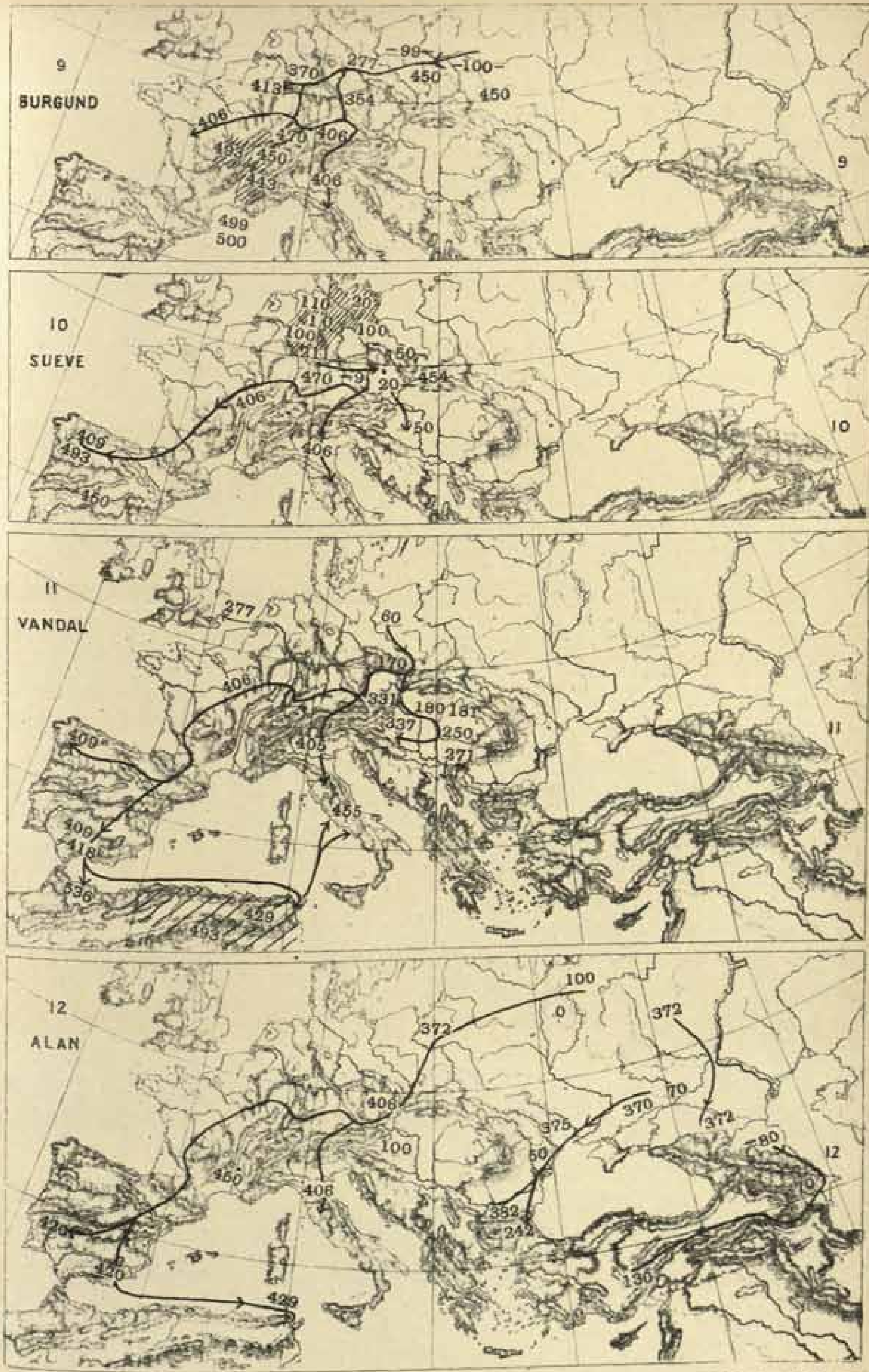

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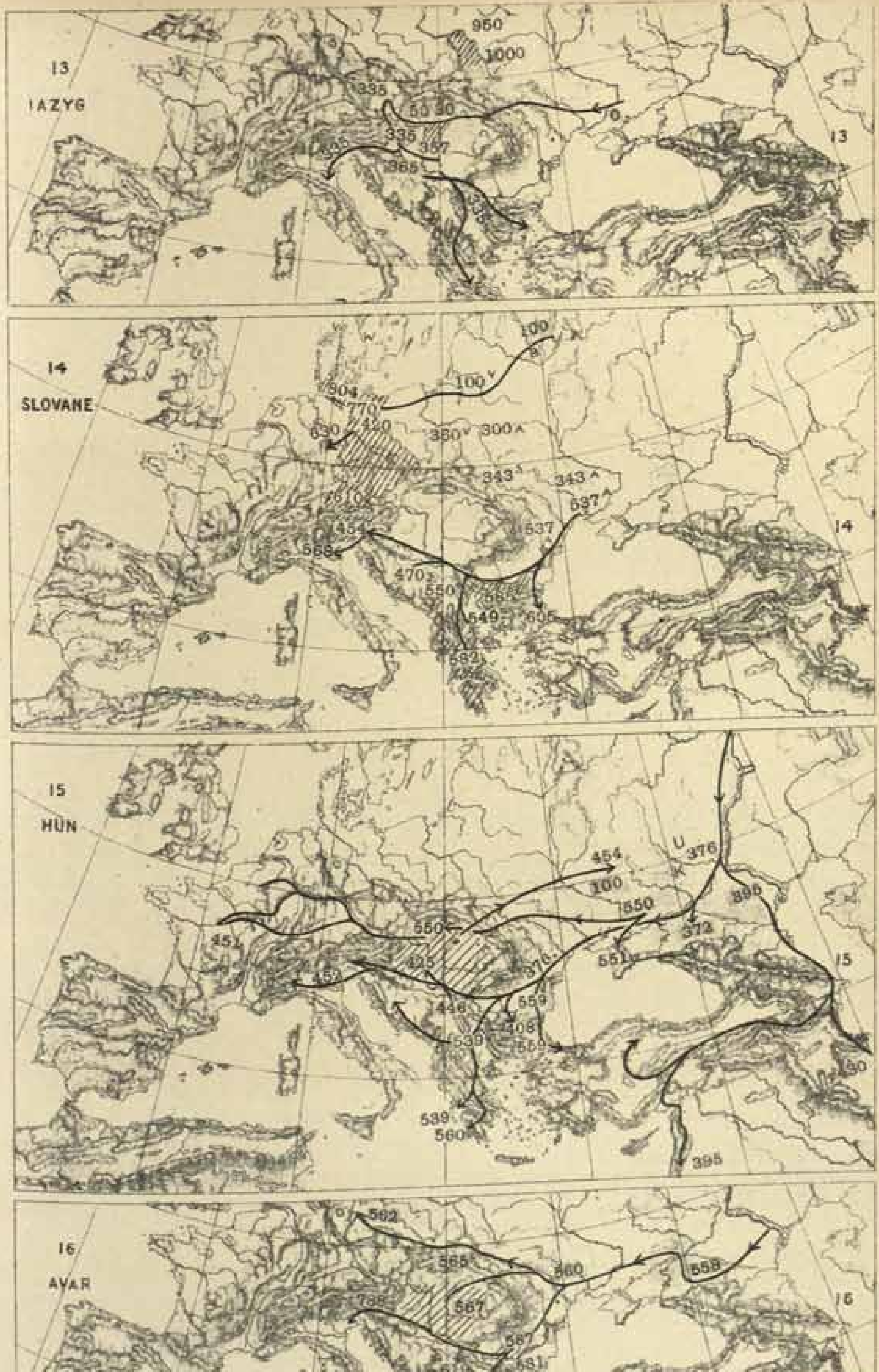
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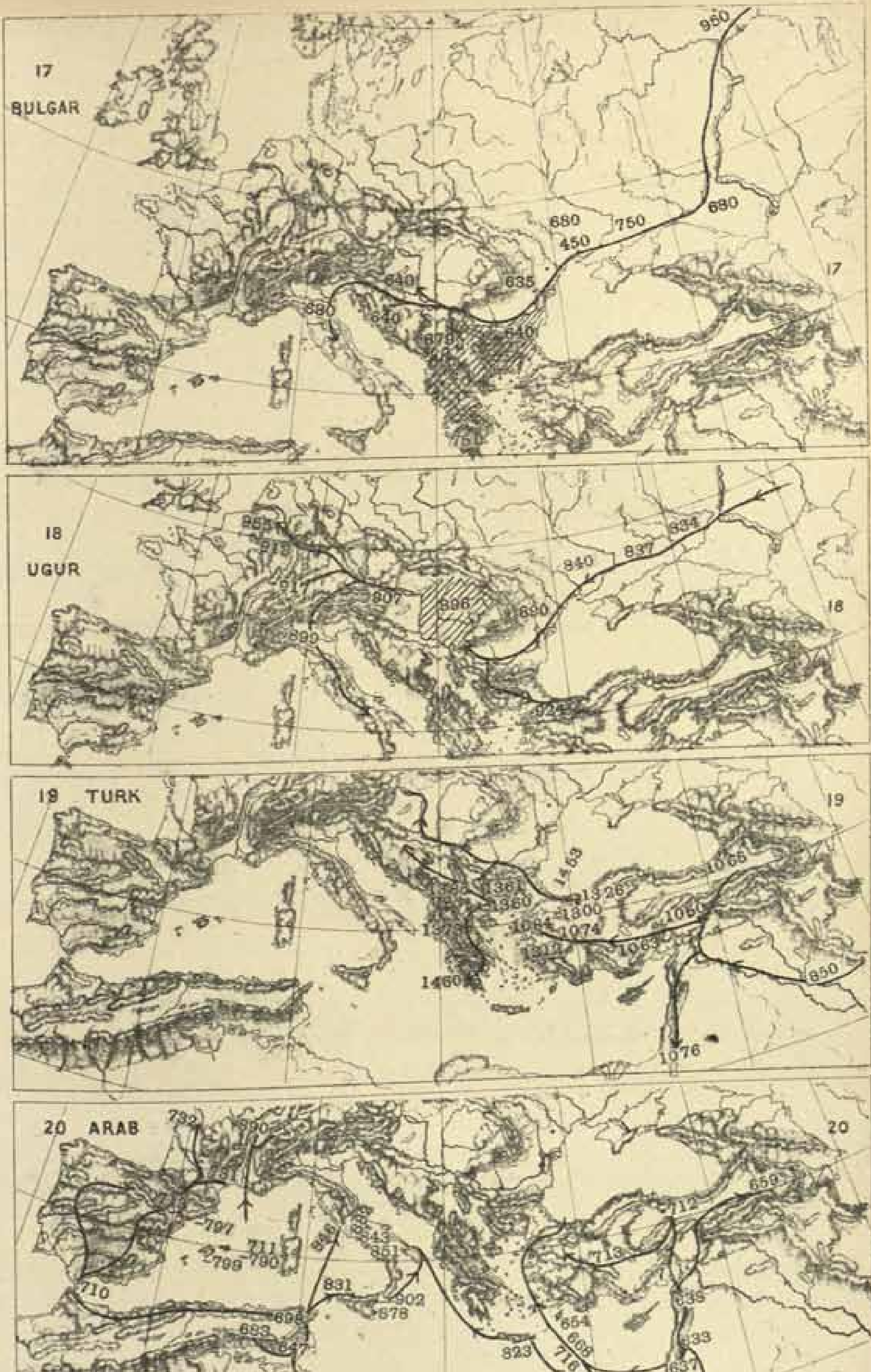

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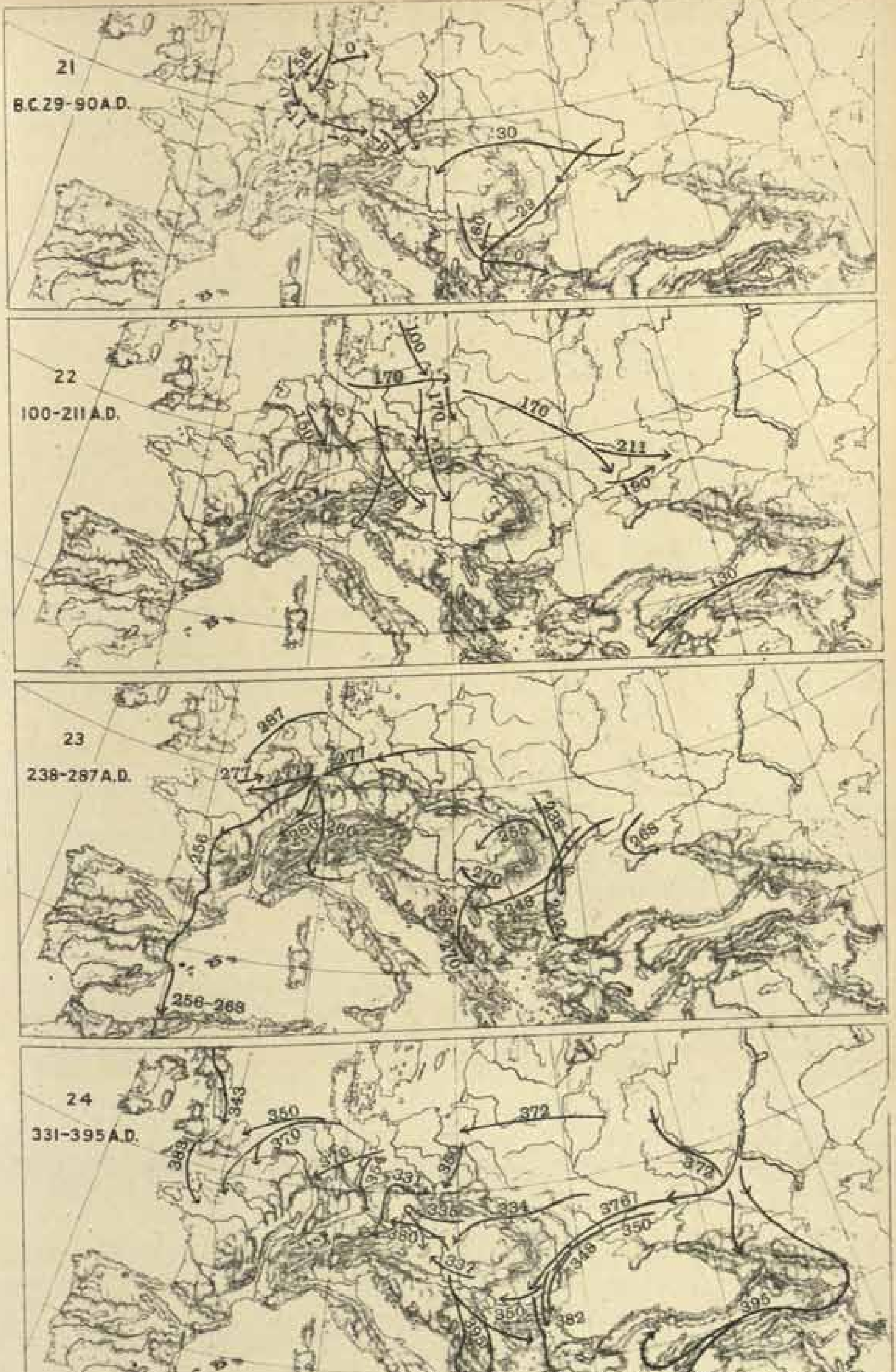

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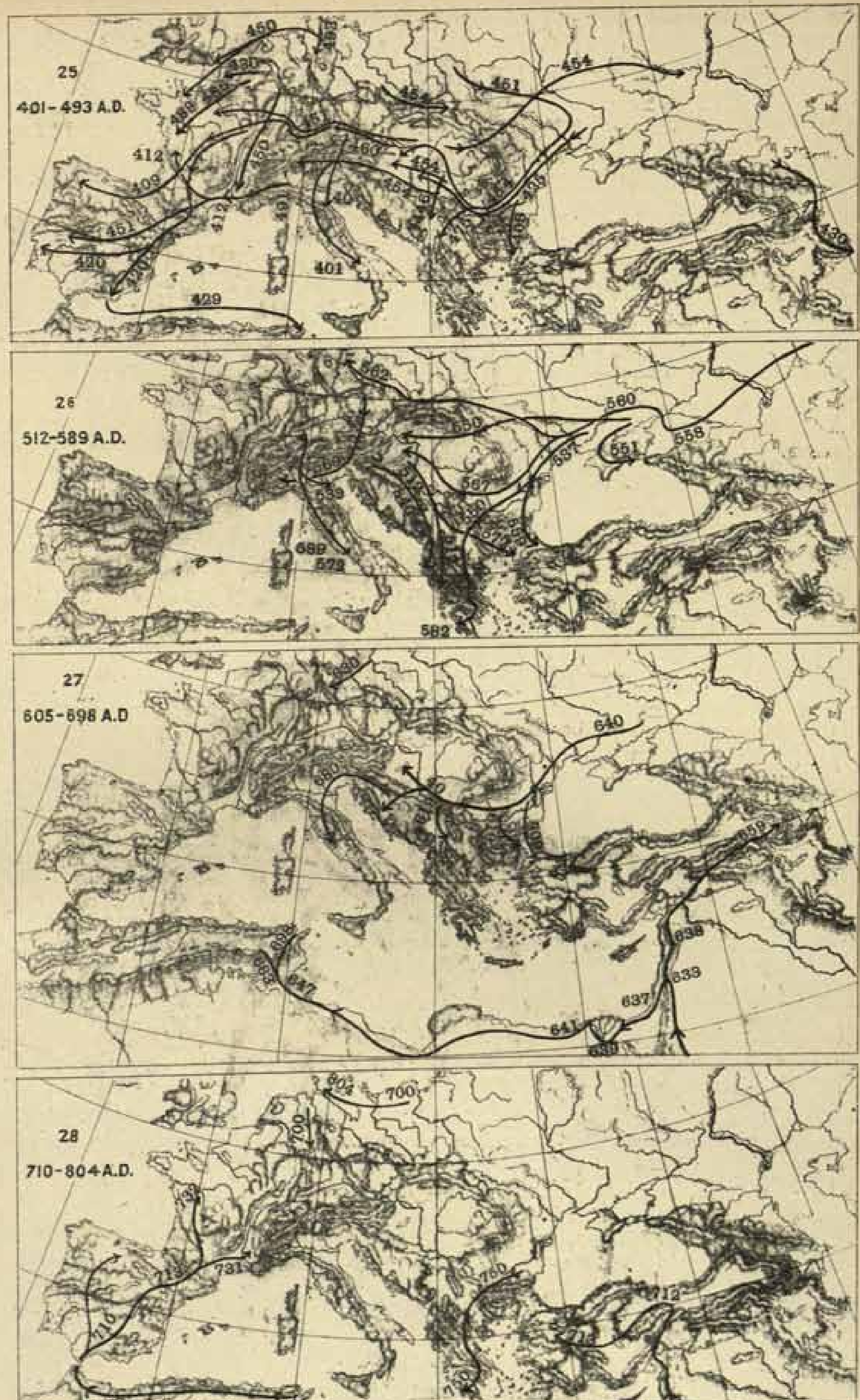

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APPENDIX.

The Interpretation of Curves.

[Plates XXVII-XXIX.]

A. *The Balancing of Casualty.*

It is desirable in all cases to gain an insight into the nature of distribution by means of curves and graphic treatment rather than by inspecting numbers alone, even when the amount of material may be enough for numerical mathematical analysis subsequently. But the principles of the interpretation of curves seems scarcely to have been noticed by anthropologists; this is much as if inscriptions were freely translated without any study of grammar. Moreover, the need of principles in graphic interpretation is all the greater because the amount of material generally to be obtained, of homogeneous character, is very seldom enough to fairly render results from a mathematician's point of view. We are often loftily warned that no certain results can be obtained from any but a large amount of examples—a hundred at least—while we remain in darkness as to how much we can possibly extract from the few dozen of instances which is all that can be secured in most cases.

The practical way to learn how to deal with small groups of material is to make several small groups from the material of one large one by casual selection. For an instance of this we may take a large group of over 150 examples of nasal breadth of Egyptian male skulls of the VI to the XII Dynasties from Dendereh. Any other large group would do as well, only this one is of importance in itself, as it lies at the basis of the results in a large work on the subject.

The total of the whole group is shown in the curve No. 1, formed by 167 examples. The question arises, Is the departure of this curve from the normal curve of distribution to be taken as evidence of heterogeneous origin? To study this, let us suppose that we only had a chance third of the examples, such as the 3rd, 6th, 9th, 12th . . . in the whole list; similarly we may take the 1st, 4th, 7th, and 10th, . . . and the 2nd, 5th, 8th, and 11th, . . . as giving two other chance series. Draw the curves from these three groups and we have the curves in No. 3. Here each curve is of more than fifty examples, a larger amount than is generally available in anthropometry. But it will be seen that not a single departure from the normal in one curve is common to the other two. Every obvious variation is therefore due to casualty. And as the variations of each of these curves from the normal is larger than that of the total curve, and they do not agree in the abnormalities of the total, they show that there is little reason to attribute the abnormalities of the total to any cause beyond casualty.

Now let us follow this line further. These abnormalities of the three curves being proved to be casual by their disagreement, this is equivalent to saying that there are too few instances in each division of the scale to give a fair average for each division, or the scale is too much subdivided. To take an extreme case, it is obvious that if we had even a thousand examples, but insisted on too many subdivisions—say five hundred—we should not get an even series of totals in each division forming a smooth curve. The number of divisions of the scale must bear some proportion to the total of examples to give a result free from casualty. Here ten divisions for fifty examples, or five *per* division, show abnormalities; and even fifteen *per* division in the total curve No. 1 is probably too few to smooth out all abnormality. If, then, we have but few examples we must adopt but few divisions; and in the curves in No. 4 the same fifty examples are divided only into a scale of five divisions, or ten *per* division. The results are much more harmonious, and show little departure from the normal.

On looking at it from another side, let us see how reducing the number *per* division acts. In No. 3 there are five examples *per* division, in No. 5 are three examples, in No. 7 two examples, in No. 9 only one example *per* division. The increase of abnormality and of differences between the three curves is very obvious as we descend. Similarly in No. 2 there are twenty examples *per* division, in No. 4 there are ten examples *per* division, in No. 6 are six examples, in No. 8 are four examples, and in No. 10 are two examples *per* division. From all these we may well say that *nothing less than an average of ten examples* per *division of the scale employed will give results fairly free of casual abnormality.* If, then, we have only twenty or thirty examples we cannot adopt more than three divisions to the scale, fewer that can give any curve worth having. For so few instances it is impossible to prove abnormality by a curve. And to avoid being misled by casualty we must never adopt more divisions in a scale than one-tenth of the number of examples.

The lower mode of graphical inspection by spots along a line may be useful, and may in extreme instances indicate heterogeneous origin. We may note in passing that the diminution of the number of instances has very little effect on the mean, and on the probable error of one example, either as graphically estimated or as calculated rigidly. The results from these curves were all estimated by eye separately, and they come out:—

	Estimated.				Calculated.
50 examples ...	No. 3	25·8 ±1·5	25·5 ±1·5	No. 4	25·86 on 164 ±1·17
30 " ...	No. 5	26·0 ±1·2	25·5 ±1·5	No. 6	25·7 on 90 ±1·1
20 " ...	No. 7	25·7 ±1·4	25·5 ±1·5	No. 8	25·6 on 60 ±1·2
10 " ...	No. 9	25·7 ±1·0	25·7 ±1·2	No. 10	25·8 on 30 ± ·9

The general conclusions then are, that ten examples give as good a mean as larger numbers; but that even fifty examples would not suffice to prove a minor abnormality or heterogeneity.

To these conclusions a rider must be added that we are only dealing with such material as anthropometric measurements, of which the variations of one source will overlap more or less the variations of another. In the abstract view, the number of examples needed to prove heterogeneity is a function of the probable errors of the two sources and their distance apart. Where the distance is many times larger than the probable error, less than a dozen examples may prove difference of source; on the other hand, many thousands of examples would be needed to prove difference of source where the distance was only a small fraction of the probable error.

There is a curious prejudice sometimes shown against "smoothing curves," by taking the averages of adjacent columns: it seems to be supposed that this is a "cooking" process, and that it opens the way to arbitrary alteration of results. It is quite likely that the adoption of wider spaces of the scale in order to avoid casual variations, as above described, may be resented as being equivalent to taking the averages of adjacent columns; a word is therefore needed about this fallacy. Such objection to averaging or adding adjacent columns together can only exist with a blind fetishism of the millimetre. Were the measurements all taken in hundredths of an inch, the results in millimetres would be equal to adding or averaging four columns together of the hundredths scale; or if the measurements were all in tenths of inches, they would equal adding or averaging two or three columns together of the millimetre scale. The only rational rule for determining what closeness of scale shall be adopted is to see that there shall be an average of at least five to ten examples in each division of the whole range of the curve, as we have already seen that this is barely enough to avoid gross casualty. If there be enough examples it is better to adopt a scale which shall give an average of ten to fifteen examples in each division. If there are so few examples that there are but three divisions possible, it only proves that there are not enough to give a curve of any value.

Another point to notice is that if we are adding, say, three columns together of a very close scale (as if we were using measurements in tenths of inches instead of millimetres) there is no virtue in any particular mode of grouping; but the groups divided, as columns, 1, 2, 3, | 4, 5, 6, | 7, 8, 9..., or 2, 3, 4, | 5, 6, 7, | 8, 9, 10..., or 3, 4, 5, | 6, 7, 8, | 9, 10, 11..., are all equally valid.

The outcome of this is that if there are not about ten or more examples in each division of the scale or unit of measurement employed on an average of the whole curve, it is better to average the columns in twos or threes, or even larger groups. The error caused by assuming that the probability curve is straight along short lengths is less than the error produced by casualty of distribution. And this averaging of adjacent columns should be repeated at every single unit of measurement along the scale; the number of columns to be added together (or averaged) being fixed by the need of having an average of about ten examples in each compound column as used for plotting.

B. *The effect of Heterogeneity.*

The actual effect of the mixture of two sources upon the combined mass of observations is so seldom seen, that it is well to review it and to draw some conclusions. The curves 11 to 29 are each compounded from two normal probability curves, the separate forms of which are included in the area. The three columns (of curves 11 to 25) show varying degrees of distance between the component curves; the five rows show varying proportions of height between the component curves. A third variable is that of the breadths of the curves, and some examples are given in curves 26 to 29: but that is far less important in this subject, as variation of any human dimension is not very different in different races, so the widths of the curves will be nearly the same. The relative amounts of the sources is the most variable element, and five grades of it are given here. The distance of the sources may also vary a good deal, but when further apart than here shown, in curves 11 to 15, the component curves are easily parted on inspection.

The right-hand curve is the variable, the left-hand curve is uniform throughout. Upon both curves the vertex is marked by a short line, and upon the left-hand curve another line shows the position of its half area, or of probable error. It need hardly be stated that the normal curve of distribution, or probability curve, may be magnified indefinitely in height (number of examples) or width (range of variety), but the character of the curve is always the same, and the variations which it may undergo should be clearly in the memory. Observe that the middle third of the height is almost straight, and the point of greatest flexure is about one-eighth from the base.

When the sources are about four times the probable error apart they are easily located in the compound. Curves 11 or 12 would be analysed at once by inspection; and 13 to 15 show how we are to interpret a curve with a lop-sided tail. When the sources have their probable errors just clear of each other, the result is almost indistinguishable from a single curve if they are equal in amount, as in curve 16. This shows that any lack of height, or extra width in a curve gives ground for expecting two equal sources involved. In the lower curves, 17, 18, 19, the slight humpiness in a curve is seen to imply a minor source of about half the amount; and in curve 20 the slightly lengthened tail is produced by a source only a fifth or less of the main source. When the two sources approach to near the probable error of each, as in curves 21 to 25, it becomes impossible to distinguish them by eye from a single curve.

A main lesson to be learned from these curves is that unless we are dealing with sources extremely different in their amounts of probable error—say as 1 to 10 —(which do not occur in anthropometry), we cannot attribute any sharp peaks in a curve to heterogeneous sources. The cause of sharp peaks we have already seen in curves 3 to 10 to be entirely due to an insufficient number of examples in each compartment of the scale employed.

In curves 26, 27, and 28 are shown the compounds of two curves equal in height, one half the width of the other, and at varying distances. And in curve 29 is a near approach to a flat-topped curve produced by two equal curves.

C. *The analysis of compound curves.*

Having now simplified the material by showing that a notched curve must be cleared of casualty, by taking wider units of scale, and having looked at the instruments of research in the various types of compound curves, we may try how far it is practicable to analyse the compound curves found in actual observations.

For selecting the material most likely to give an intelligible result, I proposed in 1895 (Brit. Assoc.), that single elements of growth were more promising than compounds of several elements, which might vary in opposite directions. Thus the dimensions of the whole skull are composed of so many separate elements of growth, that it was very likely that the final result might hide some variations. Similarly the effect of compounding two amounts in an "index" may entirely mask changes in the different factors, especially where each factor may consist of two rather different groups. For analysis it seems best to try what can be done on the simplest elements of growth; if we can interpret those it will be time enough to then interpret an "index" by means of them. Of course, the usual view is that proportion alone is of consequence, and larger or smaller growth is immaterial. But what first threw doubt on that was an attempt to carry it out completely, by adopting the cube root of the capacity as a modulus for all dimensions of a skull. The results were that the grouping visible in the dimensions or indices entirely disappeared, and mere confusion resulted.

Among the dimensions which are usually published, the simplest are the nasi-alveolar length (or height of the face bone), the nasal height, the nasal width, the bizygomatic width, and the biauricular width. The first three of these each depend on a single bone or symmetric pair, and the latter two are almost as simple. On trying an extensive series of possible correlations of dimensions, it was in these facial measurements that Mr. MacIver found the best evidences of correlation, and the most intelligible results. I have used only those measurements which he has published in the tables attached to *The Ancient Races of the Thebaïd*, as that comprises most of the material which I had collected, and is available for anyone to examine the results here given.

The curves of distribution of the examples of these five dimensions in nine successive periods are shown in curves 30 to 74. In these curves the outer one is the compound curve of actual examples; the dotted curves within that are the components of it, as deduced from the study of these curves. On the left hand of each curve is a number stating the average number of examples in a unit of scale. Where the number is low a jagged curve must be expected. And the use of this number is when judging of the smoothness and freedom from casualty in a curve, For instance, the nasal height curves, Nos. 30, 60, 65, and 70, are all much smoother than the corresponding nasi-alveolar height curves, Nos. 32, 62, 67, and 72, although the number of examples per unit in any of these pairs is closely alike. This indicates that nasal height is the simpler element, and that the depth of the upper jaw is a disturbing element added to that in the whole nasi-alveolar height.

We have already seen in curves 16 to 20 how hard it is by inspection to distinguish what are the components when they are near together and of the same width. And therefore it might seem impossible, or merely fanciful, to distinguish the components in most of the curves here given. But by taking in one view the curves of quantities which may probably be related, such as the height and breadth of the nose or face, the interpretation of one curve will explain the others. For instance, in the first line, curve 32 shows that two groups are here mingled, and that the tall-faced group is rather fewer than the other. Two curves of similar relative areas are doubtless to be seen in No. 30, the length of the nose. Presumably also the longer face or nose is associated with greater width, and thus the two curves of the same relative areas will, when combined, give the curves 31, 33, 34. In the next line two curves were also distinguished in curve 35; and, after these had been traced in 36, 37, 38, lastly, on taking the biauricular width, 39, the lesser curve, was found standing almost entirely detached.

Another application of this method may be illustrated, where it may seem quite uncertain how a hummocky curve is to be analysed. In 35 and 37, the two components are fairly clear. Taking now all the examples in one component that are beyond the range of the other, that is, all nasal heights below 50, and all over 54, and then plotting the two curves of the nasal breadths of these examples, we find that they have exactly the same centre, but one is much less spread than the other. These combined, exactly explain the form of curve 36. In another case, the bizygomatic width, No. 63, is the most certain evidence of the relative areas of the component curves in that line. Taking now all of the examples below 125, and all over 132, and plotting the curve of nasi-alveolar heights of these, we find the two curves shown in No. 62 as components.

It is sometimes more practicable to distinguish components by plotting a diagram as in No. 75, where the nasi-alveolar heights used in curve 32 (where they are easily distinguished) are crossed with the nasal heights of curve 30, which have to be disentangled. The diagram shows at once which of the nasal heights belong to each of the nasi-alveolar components, and enables us to resolve the curve 30 with accuracy. The second dimension gives a perspective to the view, which at once makes the two groups disentangle, though when foreshortened into one mass they are indistinct. Reduction to two curves of relative areas is not arbitrarily forced here; in No. 39 is one exception which cannot be entirely reduced by two component curves like those in 35 to 38. The explanation is that the larger curve in 35 to 38 is a compound of the earlier curves fused together, as we have noticed; and in the biauricular width they are not yet fused, but the separate curves of No. 34 are still showing in No. 39. There is no reason against three different stocks being traceable, out of the dozens really involved; and though only two components are discussed here, that is because the material is insufficient for the precision requisite to disentangle a third factor. Doubtless each of the curves here are already composite in earlier stages, and partly fused into unity. The physical meaning of this tracing of curves of similar areas, in one line of related dimensions, is that two different types of man are mixed together, but not fused. The examples are probably merely mixed mechanically, all of comparatively pure parentage of one type or the other; but it may in other cases be due to atavism of one of the parental types, that is to say, that whatever causes bring forward a dimension of one type, may also bring forward other *related* dimensions of the same type. Probably the distinction between pure inheritance and atavism would be shown by unrelated dimensions being also found in pure inheritance, and only strictly related dimensions being found in atavism. But we have not enough material to discuss this question.

The problem may perhaps be placed in general terms thus:—Given a series of curves of variation of correlated dimensions, to find two (or more) component probability curves, which when combined at varying distances, and of varying heights and breadths (their relative areas being always the same), shall be capable of forming all the compound curves in question.

The practical method in this analysis is to look over all the correlated curves, and select whichever shows the components most separately, as it is only from such that the other curves can possibly be analysed. Draw the two outer sides of the curves which are clear of mixture; note that the crossing point (C.P.) of the inner sides of the curves must be at half the height of the compound over it, and the angles of the slopes through the C.P. must be equal and opposite to the angles of the other sides of the two curves. By inspecting the types of the compounds given here, curves 11 to 29, and while remembering the various figures of the probability curve of different heights (as shown also in 11 to 29), a trial should be made of completing the best defined curve symmetrically through the C.P. Then the height of the compound curve above it at each point should be brought down to the base line, and the second probability curve plotted through these heights. If it fairly conforms, this may be accepted; or else the first curve may be widened or narrowed to alter the material left over for the second curve, until two curves can be found which shall yield the compound curve as closely as may be. But the irreducible requirements are: (1) that every curve shall be a probability curve; (2) that every curve shall be equal sided or symmetrical; (3) that the C.P. must be at half the height of the compound; (4) that the area of overlapping of the curves below the C.P. shall equal the area included in the compound over the C.P.; (5) that these two areas shall extend to the same distance either way; and (6) shall be as nearly as possible of the same height at any vertical line.

Before leaving this we should notice some cautions and limitations, and the bearing of other researches on the position here taken. First we must not assume that the proceeding here is applicable to a fused race, but only to a mixture of two races. Of course, when two races live together, at first there is mere mixture, at last there is fusion; and the actual results which we study are those of the combined curves of the two elements mixed, smudged in all directions by the polymorphic variations let loose by the disturbance of fusion. But still the mixture is all that we can profess to analyse.

In fusion there will no doubt be many examples of reversion; that is to say, in the Mendelian distribution of variations the extreme cases may be conveniently labelled for our purposes as atavism. And atavism may appear in one element or more. We need practical studies as to the proportion of atavism, and its correlation in different dimensions, both in those that are related as nasal height and width, or nasal height and nasi-alveolar height, and in those that are unrelated.

The disturbance due to fusion of *dis*continuous variation, as in different colours of animals, or horned and unhorned breeds, is not yet shown to be similar in continuous variation, such as the few *per cent.* greater growth of one bone, which may vary without a stress between different types. Simple fusion variation seems much more likely to occur where the difference is only a minute change in the amount of a single activity.

The whole question of skew curves of variation, instead of symmetrical Gaussian curves here adopted, is not yet clear. It has never been shown that a truly single, natural, inorganic cause does not vary in a symmetrical manner. In saying this it must be remembered that variation is on a logarithmic scale and not by natural increments, as I pointed out in "Pyramids and Temples of Gizeh," and illustrated by an extreme case of conscience money in "Religion and Conscience." Hence when skew curves appear in organic variation, it is at least the first hypothesis to try if they may not be the result of an unlimited complex of compound curves, due to the infinite complexity of conditions and ancestry. Whether a test can be devised which will exclude such an unlimited complexity as a sufficient cause for the skewness of any given set of observations, seems extremely doubtful. At least it has not yet been done so far as I am aware. We must all respect mathematical analysis as the elaborate tool for doing what nothing else can do; but its efficiency all depends on the questions which it is set to solve, and the framing of those questions must be done with due regard to all the causes, which can only be distinguished in the results where they have been anticipated in the framing of the questions to be solved.

Before parting from the curves which we have here attempted to analyse, it should be noted that the possibility of so doing varies greatly in different groups. In the early prehistoric, the nasi-alveolar height (32) gives a clear separation, and shows what relative size of groups may be expected in this age. The late prehistoric is well divided by the biauricular width (39), though that was not noticed until the others had been analysed. The I–II Dynasty is divided best by the nasal width (41) but this is not so certain as the division in other ages. The III–V Dynasty is well divided by the biauricular width (49). The VI–XII Dynasty is uncertain in division, but that shown seems the more probable; the curves are too near together to be safely separated. The XII–XV Dynasty is tolerably separated by the bizygomatic width (58). The XVIII Dynasty is again divided by the bizygomatic (63), and somewhat by the nasal width (61). The Ptolemaic is not clearly resoluable; the nasi-alveolar height (67) is the best indication. The Roman groups are very uncertain in result; thus we see the great use of looking at many different measurements, as where four out of five curves may be insoluble owing to having the components too near together, the fifth may give a good analysis, as in such cases as curves 32, 39, 49, or 63. This process must not, then, be judged as if it made a vain profession of resolving the majority of curves apart from others; its possibilities entirely depend on searching so many dimensions that one may be found to help to a solution of the less distinct curves.

D. *The conclusions to be drawn.*

Having thus resolved these compound curves of one period each into two separate curves, we reach the practical question of the interpretation of the results historically.

Looking at curves 30 to 34 it is seen that in the early prehistoric age of Egypt, say 8000–7000 B.C., there were two types; one which was rather more numerous, had a small face, about 122½ bizygomatic width, and only 66 in nasi-alveolar height, and with a short nose 48 high and 27 wide. This is as short but not so broad as the negro type, which is about 46 to 50 high and 27 to 30 wide in different groups. There are other short-nosed types nearer Egypt, as in Sinai, where an entirely un-Semitic and Socratic type may be seen. The other type of this age had a larger face, of 129½ bizygomatic width and 73 in nasi-alveolar height, with a longer nose of 52½, and narrower, being 24½. This nose is the Algerian size, and of the usual European proportion. So far we may say that there was a lower race intermediate between the Algerian and a Socratic or negroid type, and a higher race comparable with Algerian or European. Though there is a difference of 1/20th in the breadth of the face, the average capacity only differs by 1/12th, showing that the other dimensions of the head were not smaller in proportion.

In the later prehistoric age, say 7000–5500 B.C., there was in each dimension one large group which occupies the mean place of the two previous groups. This is markedly the case in all but the nasal width, where the difference of position of the groups is too small to show this. The large group seems to be the result of fusion of the preceding groups. Beside this there is a small group with longer nose and larger face, altogether a higher type, slightly better in each dimension than the higher group of earlier times, and not probably developed from that, or else it would merge in the large group. The nasal height of 53½ and breadth of 26 might well belong to a good type of Semite or European race.

So far we have dealt with the material from Abydos, El Amrah, and Hou, a district of about twenty-five miles. But forty miles beyond that, further up the

Nile, is the Naqada district, from which a large series of skulls was brought, now published in *Biometrika*, i, pp. 408–67. As the nasi-alveolar height gives the distinctive curve of two elements, No. 39, this was extracted from the Naqada measurements, sorted into male and female, and also early and late by the sequence dates of the graves. Owing to this series having been found long before plates of the pottery were drawn or sequence dates were invented, the dating has to depend on the registration of the pottery which was preserved; hence where there was no good or perfect pottery the dating could not be recovered. In the later excavations, after plates of pottery types were published, it was usual to carry a set of type plates of pottery to the work, and register every form, no matter how broken. Thus the dating is far more complete for the skulls from later excavations (published by Mr. MacIver) than it is for those from earlier excavations published in *Biometrika*. To get enough to show any result evenly, it was necessary to include both male and female skulls. In the early prehistoric there is no difference in the median, both being 68; but in the late prehistoric the male median is 67, and the female 65. Hence the latter were all raised by 2 units to 67 in order to be added to the male skulls. In order to avoid any question about comparing mixed sexes in this way I have similarly treated the female skulls from the Abydos region. In curve 76 are the female skulls alone. They have a median of 67½, which is 1 below the male median of 68½. Hence they are raised by 1 unit and added to the male skulls in the curve 77. This bi-sexual curve from the Abydos region shows the deep cleft in two parts very distinctly, as in the male curve (32) alone; and the female curve alone (76) shows the same cleft, but not so prominently.

Now, turning to the Naqada early prehistoric curve 78, we see it is of a totally different shape from 77. There is no second element at all comparable with that seen in 77, and for No. 78 a single curve with an axis at 68½ seems all that can be fixed. There is no trace of the great peak at 73, so marked in curve 32. It seems, then, that there is a local difference, and in the Abydos district there is a considerable long-faced element which is not found at Naqada, further up the valley. Which of these two types most pervades the whole country is quite unknown. Of the late prehistoric age the Naqada curve 79 appears to be single, and to have little or none of the higher element which was fused into the larger curve in No. 37. Taking the numbers, 66 + 73 produce 69 at Abydos; while at Naqada 68 has slightly retrograded to 67, not having any addition to raise it. Moreover, there is no trace at Naqada of the new high element at 75 which is so distinct at Abydos. Here again the Naqada results show less mixture than those lower down the river.

Coming to the beginning of the kingdom, we see in Nos. 40 to 44 two equal curves. These are rather nearer together (in all but nasal height) than the large and small curve of the previous age. It might well be that the high type minority had increased, and some fusion had occurred between that and the lower majority. Some new influence is, however, suggested by a separation of the two types of nasal breadth.

In the pyramid age of the III–V Dynasties no fresh type is seen; the face became rather higher and narrower in both types, but otherwise there is little change.

By the break up of the old kingdom a change comes in. One large curve occupies the place of the two seen before, and the races were fused to a medium type. But by the side of this there is a large addition of about half as much again of a lower type, with narrower and shorter face, and shorter nose, while the width of the nose remains the same and is thus broader in proportion. This race is almost exactly the same in face and nose as the lower type of the early prehistoric.

Passing to the great age of the XII Dynasty and succeeding centuries we find again a group intermediate between the two of the previous age, apparently another fusion of the race. But by its side is as large a group of a higher type, apparently a new stock about equal to the higher group that came into the later prehistoric age. The XVIII Dynasty continues, apparently, these two types, with perhaps a very slight approximation together.

On reaching Greek times we again see in each dimension a large fusion group nearly in the middle of the two preceding groups. And added to this is a new group of lower type with short face and nose, and narrower face, just as low in each respect as the lower of the prehistoric. In Roman times the same groups continue, but the lower group is as numerous as the better type.

The summary of the changes that we can trace in the facial dimensions, then, are as follows:—

Early Predynastic	Low type + High type.
Late "	Fused type + High new.
I–II Dynasty	continued. increased.
III–V Dynasty	slight improvement in both.
VI–XII Dynasty	Low new + Fused type.
XII–XV Dynasty	Fused type + High new.
XVIII Dynasty	Slightly nearer
Ptolemaic	Low new + Fused type.
Roman	Low increased. continued.

Thus the great changes have been a high and a low type alternately introduced twice over. These results must only be looked on as a first attempt on new lines, where all previous work has not yet cleared the subject. It is to be hoped that a much wider examination of all the dimensions, on a larger body of material, will enable such a research to be carried out far more completely than is possible as a bye-issue in the midst of other work. The various questions about the variability of fused races also need much more illustration, before we can interpret what we here see with certainty.

Explanation of Plates XXVII–XXIX.

XXVII. Curves 1 to 10 show the diminution of irregularities by the increase of material, 1, 2, formed from 167 examples; 3, 4, show three curves, each formed from 50 examples of the same measures as 1 and 2, the variations between the curves showing what are non-significant irregularities; 5, 6 show curves from 30 examples; 7, 8, from 20 examples; 9, 10, from 10 examples. The difference between the columns is that in the first column, 1, 3, 5, 7, 9, there are 10 divisions in the scale; in the second column, 2, 4, 6, 8, 10, there are only 5 divisions. The avoidance of casual irregularity by thus increasing the number of examples per division is clear.

Curves 11 to 15 show the compounds of two curves where one is of variable height, and the distance is sufficient to show the components; 16 to 20 show the same components nearer together when they can scarcely be distinguished in the compound; 21 to 25 show the same curves so close together that they are indistinguishable in the compound. The vertices of the curves, or medians, are marked with a short line; and another line is put at the probable error limit, or quartile, on the right hand of the major component.

Curves 26 to 28 show the compounds of two curves of equal height, one half the width of the other, and distance variable; 29 is a near approach to a flat-topped curve.

The use of all these forms is to show what components may be expected in various forms of compound curves.

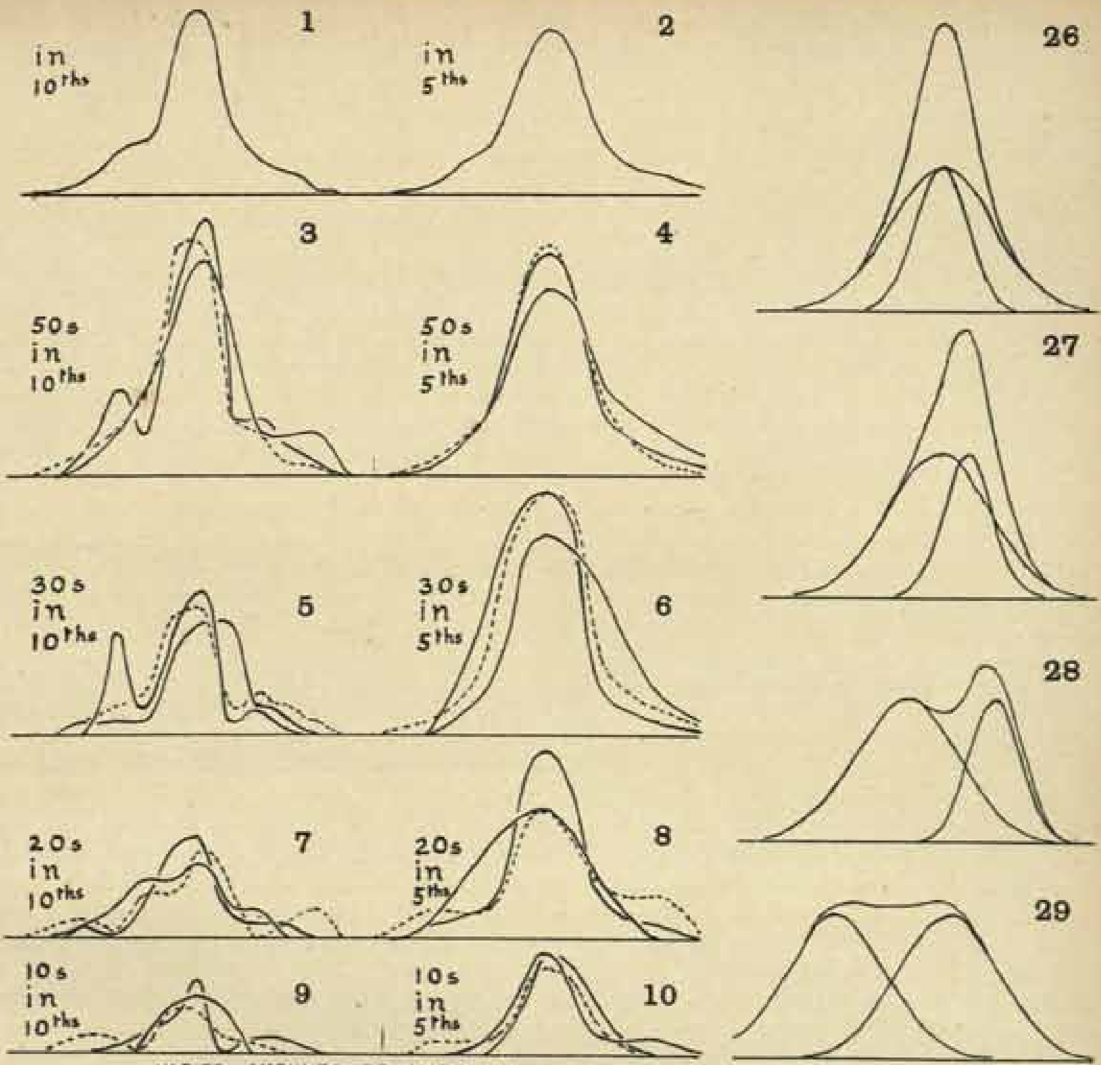
XXVIII–IX. The curves 30 to 74 are those of five dimensions of male skulls of successive ages. The full line shows the total of the measurements; the dotted curves within it show the probable components. These components have their relative size indicated by the curves with most marked division, as 32, 39, 49, 58, 63. The solution of the other compound curves by two curves, which shall have the same relative areas along the line of one period, shows what are probably the components.

Diagram 75 shows how a group of nasal height which was insoluble, could be truly divided into two curves by crossing it in a diagram with the nasi-alveolar height, which was already clearly divided by its curve, No. 32.

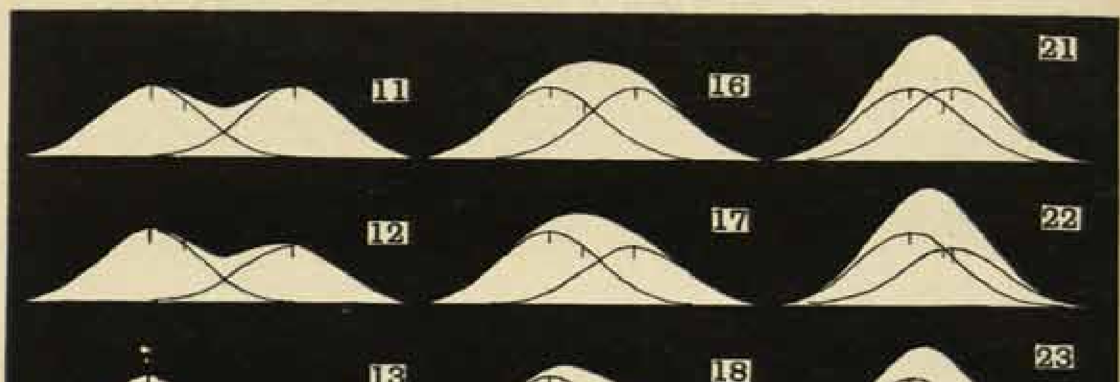
Curves 76–79 are to show the difference between Abydos and Naqada skulls. The male and female had to be treated together, as there was not enough dated material from Naqada to give a result for one sex only. The curve 76 is the female curve, the male being No. 32 above. This (76) was raised 1 mm. to accord with the mean of the male skulls and then added with that to form curve 77. This is comparable with 78 and 79, in which it will be seen that the higher group at 72 mm. is absent.

Curves 80 and 81 show the maximum length, for male and female added, in order to be comparable with the skulls of mixed sex from Algeria, 82; the Ptolemaic group 83 is also closely in accord, and is given as it is probably the nearest in date to the Algerian. Curves 84 to 87 show the maximum width, of the same classes as those of the length. The signs ♂ ♀ show the position of the averages of male and female separately. M is the median of the Algerian.

Journal of the Anthropological Institute, Vol. XXXVI., 1906, Plate XXVII.

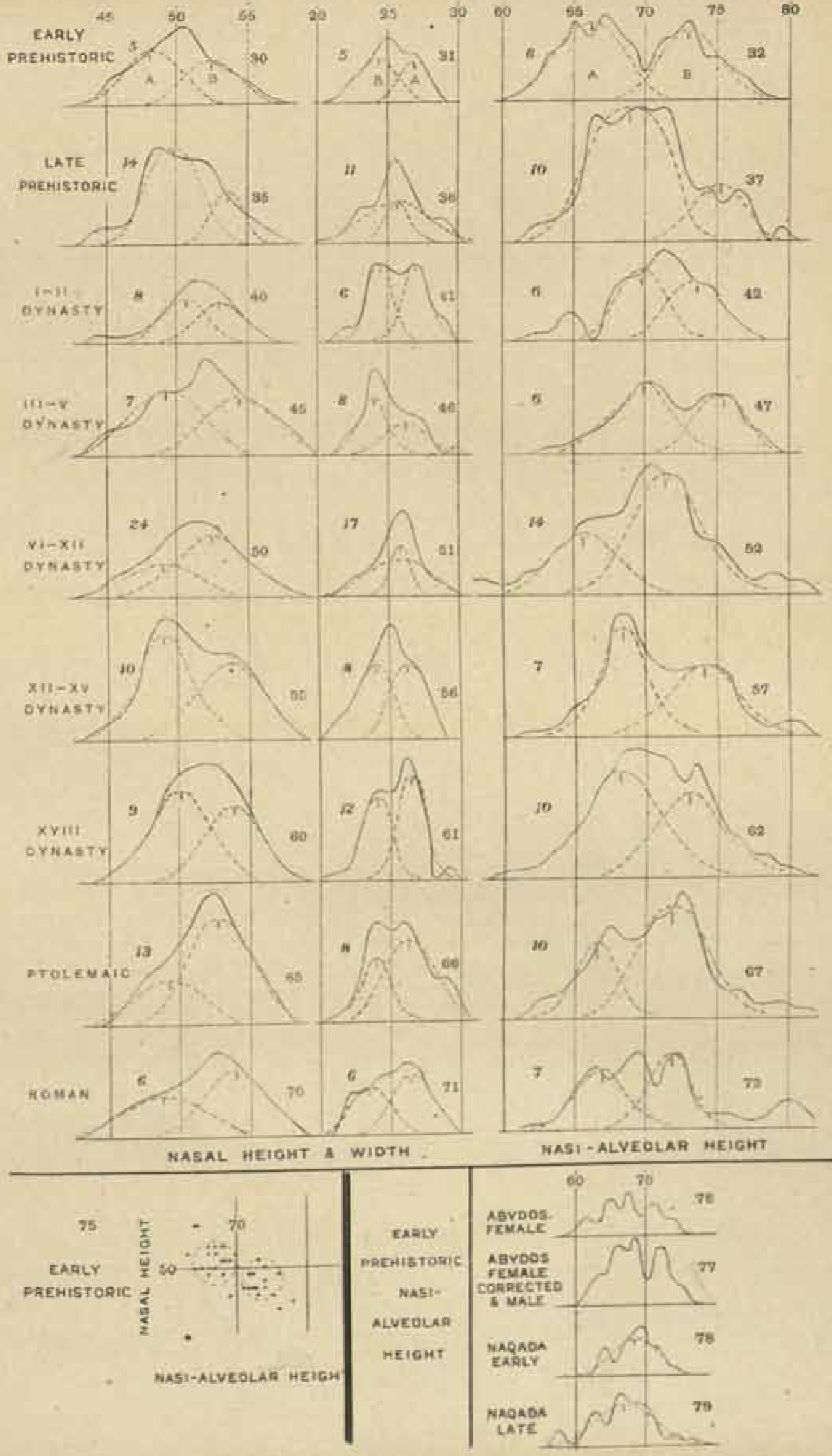


VARIED AMOUNTS OF MATERIAL.

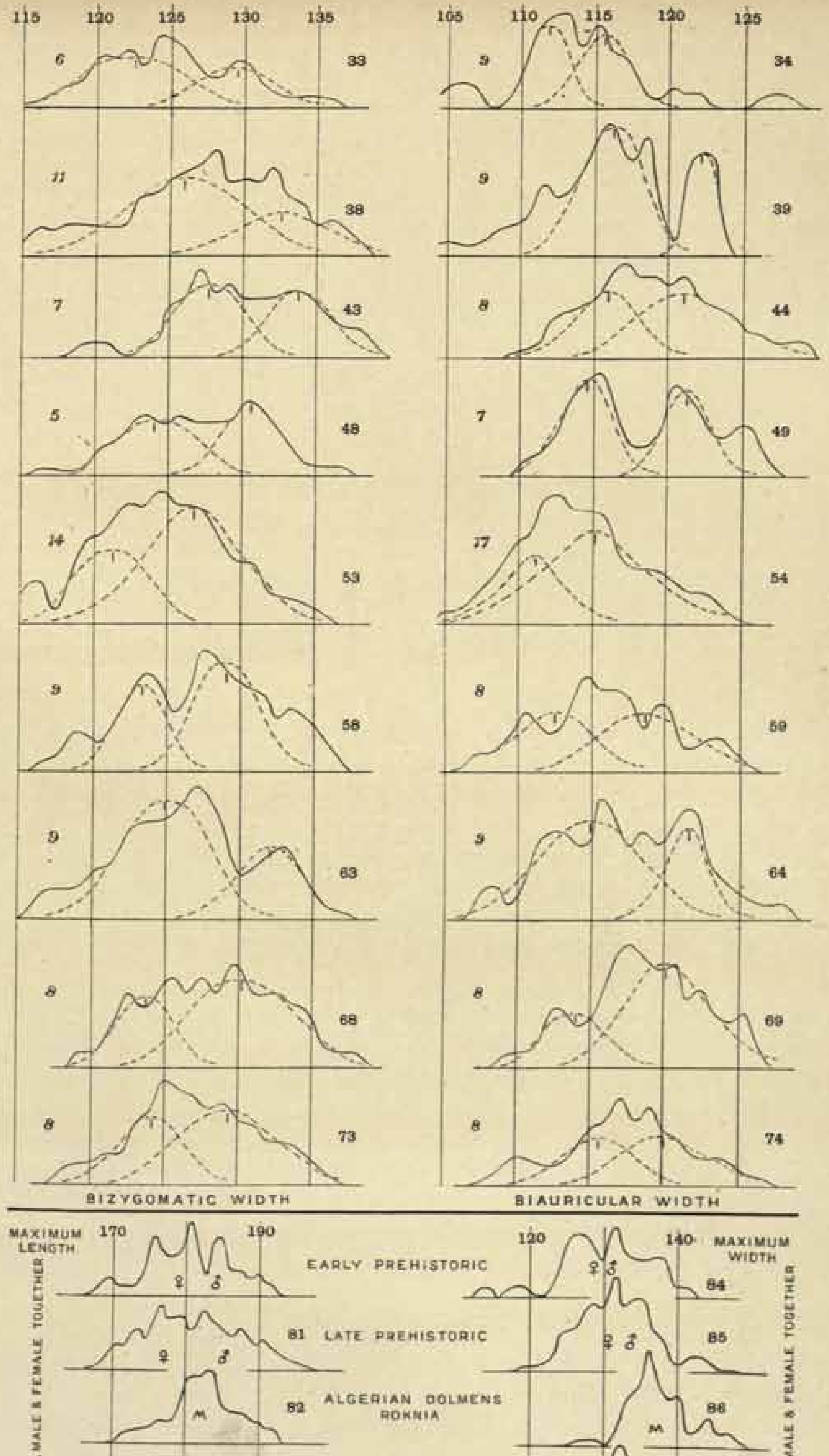


Bale & Danielsson, Ltd., Photo-lith.

VARIABILITY OF CURVES, AND FORMS OF COMPOUND CURVES.



CURVES OF EGYPTIAN SKULL DIMENSIONS.



CURVES OF EGYPTIAN SKULL DIMENSIONS.

A WINTER'S WORK ON THE IPSWICH PALÆOLITHIC SITE.

By Nina Frances Layard, F.L.S.

[With Plates XXX, XXXI.]

Since the British Association Meeting at Cambridge, when I had the honour of giving a second account of the Palæolithic discoveries in Ipswich,[1] I have had another winter's work on the same site. The results have again been satisfactory, as many as fifty-four definitely formed implements being found, besides several dozens of small flints showing signs of work, though of rougher construction. On Plate XXXI, Figs. A and B, two specially fine examples of the tools are shown. It is, however, to the more unpretentious forms that I should like to call the attention of workers on Palæolithic sites, as they are easily overlooked, and would certainly escape the eye of the ordinary workman. Only when found in large numbers, within a small area, are they likely to attract notice. (Plate XXX.)

These small tools are of two kinds, but are found associated together, a fact which suggests that they were both required for the particular work in hand. They appear to be respectively adapted for scraping and skinning. I have discovered them at depths varying from 10 to 12 feet in red gravels below clay, in close proximity to larger tools which have been more carefully made. Again and again during previous excavations I had picked up and preserved odd specimens of these small varieties, but it was only during the winter of 1905 that I fully realised that they may be found in sufficient numbers to be described as distinct Palæolithic types deserving attention.

Within a compass of 3 square yards, I found thirteen of the small scraping tools. (Plate XXX.) Some are roughly squared, but they are by no means uniform in shape. Most of them show the bulb of percussion on the under side, and on the upper side the edge appears to be worked down. Though probably as serviceable, they have not the artistic finish of the Neolithic scraper. In size they are larger than the neat thumb-scraper (the largest being 2¾ inches in length), and are not so thick in proportion. Mr. S. H. Warren has proved convincingly that shapes closely resembling these forms, and with chipped edges, can be produced by the pressure and movements of soil-creep.[2] In other words, Nature was the first to fashion scrapers, and these man naturally selected for this purpose, afterwards imitating them when the desired shapes were not to be found. This being the

[1] Published in *Journ. Anth. Inst.*, vol. xxxiv, p. 306.

[2] *Journ. Anth. Inst.*, vol. xxxv, p. 337.

case, if we happen to light upon a spot where skin-scraping once took place, we may expect to find both natural and artificial scrapers lying together, and this has been my experience. Strewn among the scrapers I also noticed a number of small flat flakes which appeared to have been selected on account of their sharp edges. (Plate XXX.) I picked up seventeen of these in the same small space, and on examining them afterwards, noticed that in cases where not flat enough for whatever purpose they were to serve, a few extra delicate blows had been given to reduce them to the required shape. These pieces closely resemble Neolithic flint knives. Only six days after finding these specimens I came upon another nest of the small scrapers, ten more of which I secured; and these were again associated with ten flat sharp flakes lying beside them. In all I obtained forty-six of the scrapers, and thirty-three of the flat flints. There is one argument in favour of their acceptance as true scrapers and skinning tools which must not be overlooked. As it is generally supposed that Palæolithic man clad himself in the skins of animals, then the dressing of skins must have occupied much of his time; but where are the tools with which this was done? Except in rare instances where a few larger tools of the kind have been recognised, no form has, I think, been considered sufficiently suited to the purpose to have specially claimed this distinction. Everyone knows the Neolithic thumb-scraper and the Neolithic flint knife, but their Palæolithic prototypes have so far escaped detection.

While it is certainly true that the same tools may have been used for many purposes, it is equally true that implements sharpened on both sides of an edge would be liable to cut instead of merely scraping, and as this is the case with a large majority of Palæoliths, they are precluded from being regarded as true scrapers. Neolithic man found a very small tool most convenient for this work, and it is reasonable to suppose that his predecessor's experience was the same. In these specimens before us it is possible that we see the small Palæolithic scrapers and skinning knives hitherto overlooked.

We do not recognise in them an early stage in the development of skill in flint chipping, but the deliberate work of men who knew that these quickly made implements would serve their purpose quite as well as more finished tools. That those who fashioned them were capable of superior work is evident by the large ovate tool found within a yard or two of these simpler forms. (Plate XXXI, Fig. A.)

Since writing the above I have received an interesting consignment of stone tools from Dr. J. Mildred Creed, of Sydney. Among them are ten flat sharp stones exactly corresponding to those which I found beside the scrapers. They are described by Dr. Creed as "chipped scrapers or knives, used in skinning, cleaning skins, and finishing wooden weapons by a Sydney tribe extinct at least one hundred years."

As regards the geology of the pit, one or two points, which the extension of the excavation brought to light, may be worthy of note.

Working in a southerly direction, the bed of brick earth which had hitherto divided the upper from the lower gravels, in both of which implements had been found, was seen to be getting narrower on both south and west walls of the pit, until it finally ended in a tongue of clay, beyond which the two gravels were united. (Fig. 1.)

Here a fine example of false bedding was seen. I forwarded drawings of the sections to Professor Boyd Dawkins, who sent me the following notes:—

"Your interesting sections find their explanation in the normal action of currents in depositing materials. The river currents which have deposited with swift movement the gravels, slower movement the sands, and with slowest of all the mud, have moved in the direction of the pencilled arrows. When the bottom of the shore had been filled up to A the way sand and gravel were deposited above it, parallel to the level of A. The clay is the latest of the sloping beds."

FIG. 1.—PHOTOGRAPH OF PIT.

It would appear, then, that the clay-pit represents a pool in a river-bed, at the bottom and up the sides of which the flints were found, as well as in the parallel gravels which were finally deposited above it.

The finding of this junction of the gravels appears to me to be of considerable importance in determining the age of the Palæolithic tools, for had it not been reached, it would have been natural to suppose that the true depth of the lower Palæolithic bed was from 12 to 14 feet, that an enormous interval then ensued during which the thick band of clay was deposited, and that another Palæolithic bed of much later date, and quite distinct from the first, was then laid down over it. It now appears possible that some of the flints from what was then the surface were swept into the pool with the rapid rush of water; that when this subsided, the mud had time to settle down over them, while other flints from the same original level were brought with the gravels and laid horizontally over the silted-up pool. That the mud had not yet compacted into clay when this was done is evident, as the flints had in some cases penetrated it a foot or two.

If this be the true interpretation, we need no longer wonder that tools similar in type were found in both upper and lower gravels, for both must have belonged to the same period. That period should apparently take its date, not from the lowest level at which flints occurred, but from the highest spot at which they were found, namely, 5½ feet only from the present surface.

Had we worked northward instead of southward we should doubtless have found flints just as deep as the original depth of the pool, which might be, for all we know, another 20 feet deeper. It is a pity that this cannot be determined by further work on this spot, but, unhappily, our excavation is stopped for the present, and it is doubtful whether we shall ever have the opportunity of continuing it.

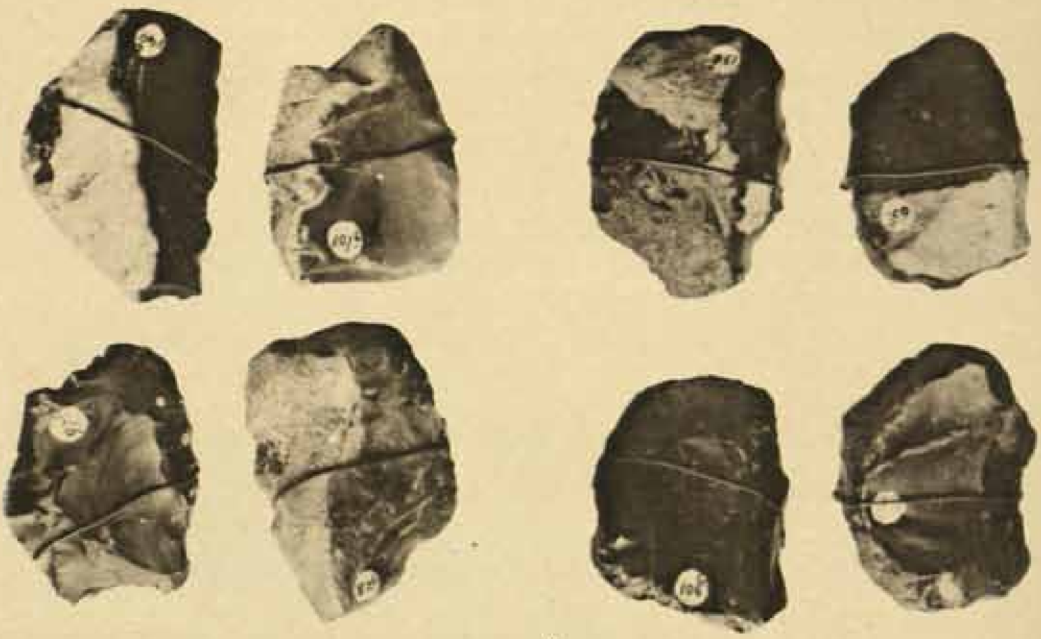
Description of Plates XXX, XXXI.

PLATE XXX. A.—Eight Palæolithic scrapers. (Ipswich.) Scale: slightly larger than ½.

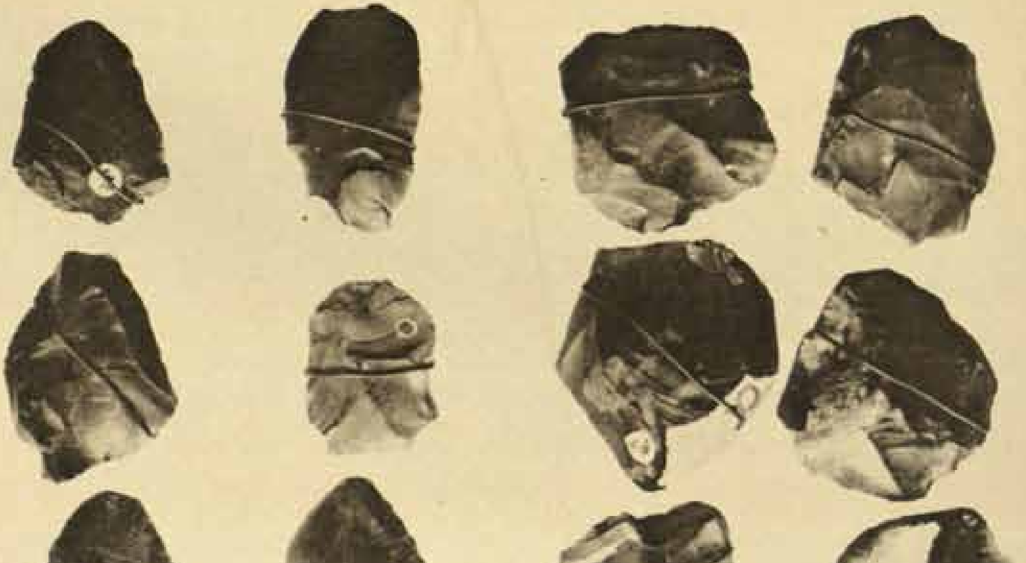
" " B.—Twelve Palæolithic skinning knives (Layard Coll., Ipswich Museum). Scale: slightly larger than ½.

PLATE XXXI. A.—Found in red gravel at a depth of 11 ft. 10 ins.; length 6½ ins.: within a few yards of it were ten small scrapers and sixteen small skinning knives; *cf.* Plate XXX.

" " B.—Found in mixed red and grey clay at a depth of 9 ft. Beside it were fifteen small scrapers and skinning knives; *cf.* Plate XXX. (Layard Coll., Ipswich Museum.)



A.



B.

A WINTER'S WORK ON THE IPSWICH PALÆOLITHIC SITE.

Journal of the Anthropological Institute, Vol. XXXVI, 1906, Plate XXXI.

A.

B.

A WINTER'S WORK ON THE IPSWICH PALÆOLITHIC SITE.

CONTRIBUTIONS TO EGYPTIAN ANTHROPOLOGY.[1]

By Charles S. Myers.

III. THE ANTHROPOMETRY OF THE MODERN MAHOMMEDANS.

A. Comparison of Average Measurements.

I here give a complete list of the measurements which I made during my anthropometric investigations in Egypt. It comprises height when (1) sitting, (2) standing, (3) kneeling; height above the ground of (4) ear-hole, (5) chin, (6) acromion, (7) elbow, (8) wrist, (9) great trochanter, (10) knee, (11) ankle; (12) maximum breadth and (13) length of head; (14) upper and (15) total length of face; (16) bimalar, (17) bizygomatic, (18) bi-auricular and (19) bigonial breadth; (20) width of mouth; (21) minimal frontal breadth; (22) external bi-orbital, (23) external bi-ocular and (24) internal bi-ocular breadth; nasal (25) breadth and (26) length; (27) orbito-nasal and (28) bi-auricular breadth; (29) horizontal circumference of the head; length of the radius between the ear-hole and the (30) vertex, (31) forehead, (32) nose-root, (33) upper incisors, (34) chin and (35) occiput; (36) bi-acromial and (37) bi-trochanteric breadth; circumference of chest after (38) expiration and (39) inspiration: (40) maximal and (41) minimal circumference of the calf; (42) maximal and (43) minimal circumference of the arm; (44) span of arms.

About sixteen of these measurements were made by me on each individual, so that altogether more than 17,000 data were collected for Egypt and about 2,000 for the Sudan. I hope that at least the more important of these data may be published in a future contribution to this *Journal*.

[1] The expenses of this investigation have been in part defrayed by the Government Grants Committee of the Royal Society and by the British Association for the Advancement of Science. For the supply of subjects I am indebted to Major-General Sir F. R. Wingate, K.C.B., K.C.M.G., Sirdar of the Egyptian Army and Governor-General of the Sudan. The two previous contributions appeared in this *Journal*, vol. xxxiii, 1903, pp. 82–89, and vol. xxxv, 1905, pp. 80–91.

In the present paper it is only possible to examine a few of these measurements and the indices derived therefrom. I have selected those which are *a priori* most likely to be of value in a comparative study of the anthropometry of different Egyptian provinces.

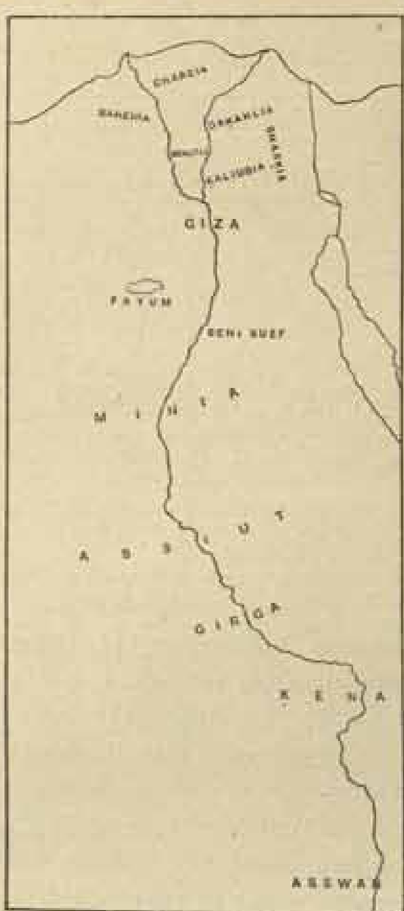


FIG. 1.

The names and position of the provinces into which Modern Egypt is divided are indicated on the map (Fig. 1). I group the soldiers whom I measured according to the province to which their parents belonged. In this section I leave out of consideration the data obtained (i) from the Copts, (ii) from individuals whose parents were born in different provinces or outside Egypt, and (iii) from the inhabitants of the cities of Cairo and Alexandria.

The following table gives the means of certain measurements and indices calculated for six important provinces of Egypt. The measurements are expressed in millimetres. The number of individuals measured in each province is shown.

The column headed A gives the averages or means with their probable errors;[1] that headed σ gives the standard deviations;[2] and that headed C the coefficients of variability.[3]

Do these various values of the averages point to underlying physical differences in different provinces of Egypt, or is their disagreement attributable to accidental errors arising from an insufficient number of individual measurements?

[1] The probable error is found from the expression, $\pm 0{\cdot}6745 \frac{\sigma}{\sqrt{n}}$.

[2] $\sigma = \sqrt{\frac{\Sigma d^2}{n}}$, where n is the number of individual measurements, and Σd^2 is the sum of the squares of the differences of the individual measurements from the average.

[3] $C = \frac{\sigma \times 100}{A}$.

TABLE I.

Province.	Head Length.				Head Breadth.				Auricular Height.				Horizontal Circumference.			
	No.	A.	σ	C.	No.	A.	σ	C.	No.	A.	σ	C.	No.	A.	σ	C.
Ķena ...	53	194·79 ±0·54	5·83	2·99	53	143·91 ±0·35	3·80	2·64	27	146·26 ±0·48	3·66	2·50	19	545·47 ±2·24	14·49	2·66
Girga ...	83	194·53 ±0·43	5·83	3·00	83	144·33 ±0·34	4·60	3·19	37	144·78 ±0·54	4·89	3·38	38	547·18 ±1·40	12·75	2·33
Ķena and Girga	136	194·63 ±0·34	5·83	3·00	136	144·16 ±0·25	4·31	2·99	64	145·41 ±0·37	4·47	3·07	57	546·61 ±1·20	13·38	2·45
Giza ...	54	194·56 ±0·54	5·99	3·08	54	143·41 ±0·37	4·06	2·83	31	146·77 ±0·62	5·09	3·47	14	545·43 ±1·97	10·95	2·01
Daķahlia	109	193·00 ±0·39	6·07	3·15	109	144·64 ±0·28	4·30	2·97	55	145·38 ±0·42	4·60	3·16	40	547·75 ±2·10	12·48	2·28
Baheira ...	50	196·82 ±0·60	6·33	3·22	50	144·38 ±0·42	4·40	3·05	29	146·69 ±0·51	4·08	2·78	11	546·64 ±2·21	10·90	1·99
Sharķia ...	20	196·75 ±0·73	4·86	2·47	20	145·40 ±0·74	4·90	3·37	10	146·50 ±1·02	4·80	3·28	—	—	—	—

TABLE I—*continued*.

Province.	Cephalic Index.				Upper Facial Index.				Nasal Index.				Gnathic Index.			
	No.	A.	σ	C.	No.	A.	σ	C.	No.	A.	σ	C.	No.	A.	σ	C.
Ķena ...	53	73·94 ±0·27	2·90	3·92	53	48·52 ±0·31	3·36	6·92	53	78·90 ±0·78	8·44	10·07	23	102·47 ±0·45	3·35	3·27
Girga ...	83	74·25 ±0·23	3·15	4·25	82	47·81 ±0·22	2·96	6·19	82	77·77 ±0·52	7·11	9·14	28	103·44 ±0·27	2·77	2·17
Ķena and Girga	136	74·13 ±0·18	3·04	4·10	135	48·09 ±0·17	3·14	6·53	135	78·22 ±0·45	7·68	9·82	51	103·00 ±0·29	3·08	2·99
Giza ...	54	73·76 ±0·23	2·46	3·33	49	48·05 ±0·27	2·84	5·90	47	75·33 ±0·72	7·31	9·74	20	101·00 ±0·66	4·38	4·34
Daķahlia...	109	75·01 ±0·19	2·95	3·98	106	48·72 ±0·22	3·38	6·94	103	73·41 ±0·51	7·63	10·39	24	101·24 ±0·50	3·66	3·61
Baheira ...	50	73·42 ±0·29	3·03	4·12	48	49·00 ±0·32	3·32	6·77	45	74·39 ±0·67	6·66	8·96	19	100·68 ±0·49	3·18	3·16
Sharķia ...	20	73·94 ±0·46	3·03	4·09	19	47·56 ±0·37	2·38	5·24	19	76·70 ±0·86	5·58	7·28	6	100·01 ±0·52	1·90	1·90

The Cephalic Index.—Consider, for example, the extreme values of the cephalic index in the above table. The highest is Daḳahlia with 75·01, the lowest is Baheira with 73·42. Is this difference of 1·59 units real, or is it due to insufficiency in the number of measurements from which the averages are calculated? The probable error (E_D) of the mean cephalic index for Daḳahlia is $\pm$ 0·19; the probable error (E_B) of the mean cephalic index for Baheira is $\pm$ 0·29. The probable error of the difference of the two means (derived from the square root of $(E_D^2 + E_B^2)$ is therefore $\pm$ 0·35, which is less than one-quarter the actual difference (1·59) between the two means. From this calculation biometricians would feel justified in supposing that the difference in average cephalic index is more likely to be real than accidental; in other words, that in all probability its occurrence is not due to random sampling. A similar conclusion would be drawn from a comparison of the cephalic index of Daḳahlia with that of Giza.[1]

On the other hand, the difference between the cephalic indices of Daḳahlia and Ḳena only just exceeds, while that between the cephalic indices of Daḳahlia and Girga is actually less than, three times the probable error of their respective differences. This relation becomes still less when the other provinces are similarly compared with one another.

We may conclude, then, that while it is not permissible to regard the differences in cephalic index between the provinces of Daḳahlia, Girga and Ḳena, as with certainty significant, the people of Daḳahlia, on the other hand, are *probably* less dolichocephalic than the people of Giza and Baheira. However, these three provinces lie so near one another geographically as to raise a doubt whether the *improbable* has not occurred in this particular case.[2] As regards the province of Sharḳia, so few individuals were measured that no conclusions can be drawn.

The Upper Facial Index.—The most divergent values for the average upper facial index in Table I are those for the provinces of Sharḳia and Baheira. But so few individuals—only seventeen—belonging to Sharḳia were examined that this average is clearly not very trustworthy. Comparing the average facial indices of Girga and Baheira, we find that while their difference amounts to 1·19, the probable error of their difference is $\pm$ 0·39. The ratio of these two figures is only just sufficient for us to conclude with any degree of certainty that the difference is not accidental, arising from the measurement of an insufficient number of individuals. When, on the other hand, we proceed to take into account the differences in nasal index of the various provinces, we are perhaps entitled to assume (*cf.* page 241) that the differences in facial index are more significant than we should otherwise have supposed them to be.

The Nasal Index.—In striking contrast to the cephalic and upper facial indices, the nasal indices show such marked divergence that it is hardly necessary

[1] It is generally admitted that a difference acquires significance when it is more than three times its probable error.

[2] *Cf.* footnote on page 255.

to resort to statistical methods in order to demonstrate that *the differences cannot be accidental.* If, however, we do take the trouble of comparing the population of Ḳena and Girga with that of Daḳahlia, we see that, while the nasal indices differ by 4·81 units, the probable error of differences of pairs of samples amounts only to ± 0·68.

From the figures in Table I, we may strongly suspect that the nasal index increases in value as we proceed south, a conjecture which is, on the whole, confirmed by the following table:—

TABLE II.

Province.	Number of individuals.	Nasal index.	Province.	Number of individuals.	Nasal index.
Ḳena ...	53	78·90	Fayum ...	34	77·61
Girga ...	82	77·77	Giza ...	47	75·33
Assiut ...	57	78·01	Baheira ...	45	74·39
Minia ...	34	77·36	Gharbia ...	100	73·98
Beni Suef ...	25	77·61	Daḳahlia ...	103	73·41

The three remaining provinces, intermediate in position between Giza on the south, and Baheira, Gharbia, and Daḳahlia on the north, give the following average nasal indices:—

Province.	Number of individuals.	Nasal index.
Menufia	80	76·84
Ḳaliubia	18	78·73
Sharḳia	19	76·70

The high nasal index of Ḳaliubia is in part due to the inclusion of one index of 100 among the eighteen from which the average is derived.

One might, indeed, feel disposed to disregard the values given both by Sharḳia and by Ḳaliubia owing to the small number of individuals examined from these provinces, were it not for the fact that a high index is also given by Menufia, a province lying in about the same latitude as, and westward of, Ḳaliubia and Sharḳia. Here eighty individuals were measured; so there can be little doubt that the average nasal index of this region of Egypt lies somewhere near 77.

It is conceivable that the nasal index of Giza has been unduly lowered owing to the position of Cairo in this province; and that, but for the leptorhine influence of so cosmopolitan a city upon the suburban villages, the nasal index of the various provinces of the Nile valley would have shown a more regular decrease in value from Upper to Lower Egypt; this decrease being especially and suddenly marked in the three provinces, Baheira, Gharbia, and Daḳahlia, which are at the very mouth of the Nile.

The differences among the provinces in upper facial index possibly points in the same direction. Thus this index for Ḳena and Girga averages 48·09, for Giza 48·05, for Daḳahlia 48·72, and for Baheira 49·00. A higher facial index implies a longer or narrower face. When we come to study the upper facial index of the Sudanese, we shall find it noticeably lower than in Egypt. The exceptionally low facial index of Sharḳia is doubtless associated with its surprisingly high nasal index. We shall have occasion to refer to this correlation later, when (in the Appendix to this paper) we make a more detailed study of the province of Menufia.

Gnathic Index.—Differences corresponding to those which we have noted in the nasal index are also apparent in the gnathic index (Table I). This index expresses the ratio between (i) the distance from the ear-hole to the lower margins of the gums of the upper incisor teeth, (ii) the distance from the ear-hole to the root of the nose. Its value is less in Lower than in Upper Egypt, but the number of measurements made in the different provinces is not sufficient to make this relation more than highly probable. I have already called attention[1] to the unsatisfactory character of this index unless supplemented by a determination of the inclination of the two linear distances on which it is based.

Length of Tibia and Radius.—The question naturally arises, is this tendency to prognathism and to platyrhiny in Southern Egypt accompanied by the changes in the proportion of the long bones to one another, with which we should expect to meet in passing from a more Caucasic to a more Negroid people? Has the *fellah* of the province of Ḳena, for example, a longer tibia relatively to his stature than the *fellah* of Daḳahlia? I have attempted to base an answer to this question on the index formed from the ratio of the kneeling height to the standing height. Other things being equal, individuals who have relatively to their stature a longer tibia, should yield a lower index.[2]

[1] *Man*, vol. iii, 1903, 4, pp. 12, 13.

[2] Such an index is obviously a very rough instrument for our purpose; it is unnecessary to point to the fallacies which may be involved in its use. I chose it mainly on the ground of ease of calculation.

TABLE III.

$\frac{\text{Kneeling Height} \times 100}{\text{Standing Height}}$	Provinces of Ḳena and Girga.		Provinces of Daḳahlia and Gharbia.	
	Number.	Percentage.	Number.	Percentage.
70–70·99	1	1·25	0	0
71–71·99	1	1·25	0	0
72–72·99	3	3·75	2	1·48
73–73·99	16	20·00	12	8·89
74–74·99	41	51·25	57	42·23
75–75·99	18	22·50	54	40·00
76–76·99	0	0	10	7·40
Total number ...	80	100·00	135	100·00
Average index ...	74·35		74·90	

Obviously the probability that these differences are significant is not very great. Let us turn to the results of examining for the presence of another negroid character, the relative length of the radius.

By subtracting the height of the elbow joint above the ground from that of the acromion above the ground, the length of the upper arm is obtainable. Similarly the difference in the heights of the elbow and wrist joints above the ground gives the length of the forearm. I have calculated and compared the indices for the above four provinces obtained from a ratio of the length of the forearm to that of the upper arm. This is clearly a far more accurate test than the previous index.

TABLE IV.

$\frac{\text{Forearm length} \times 100}{\text{Upper arm length}}$	Provinces of Ḳena and Girga, Assiut and Minia.		Provinces of Giza, Baheira, Daḳahlia and Gharbia.	
	Number.	Percentage.	Number.	Percentage.
Below 70	1	3·45	3	11·54
70–74·9	6	20·69	6	23·08
75–79·9	12	41·39	9	34·61
80–84·9	5	17·24	5	19·23
85–89·9	3	10·33	1	3·85
90–94·5	1	3·45	2	7·69
95 and over	1	3·45	0	0
Total number ...	29	100·00	26	100·00
Average	79·32 $\sigma = 6·36$		76·73 $\sigma = 8·51$	

Here again the probable errors are very considerable. The difference of the two means is (79·32 − 76·73 =) 2·59, while the probable error of the difference reaches the high value of ± 1·64. Obviously, the range of values is too wide and the number of data too small to justify a more elaborate study of these indices. The difficulties in measuring accurately the kneeling height and in estimating the length of the long bones on the living subject must also be taken into consideration. Nevertheless, unsafe as they are, these data suggest that *pari passu* with increasing prognathism and platyrhiny in Upper Egypt, there is an increasing relative length of tibia and of radius.

B. COMPARISON OF AVERAGE VARIABILITY.

In Table I, I have given the standard deviations for six provinces in respect of eight different characters. By its aid we may attempt to compare the variability of the peoples of various parts of Egypt. Now the standard deviation serves to indicate the distribution of the individual measurements about their mean. The more scattered they are—in other words, the greater the variability of the character—the larger becomes the standard deviation. But the magnitude of a standard deviation is also affected by the magnitude of the mean to which it refers. Consequently the coefficient of variability, the ratio of (one hundred times) the standard deviation to the mean, is a better instrument for the comparison of variabilities than the standard deviation.

The trustworthiness of a single standard deviation or coefficient of variability depends, like the mean, upon its probable error. It would be unwarrantable to compare the different provinces, as regards variability in any single character, without taking this into account. However, the chances of error become considerably reduced if we add together the coefficients of variability for the eight characters and compare the averages of their sum in different provinces. For Ḳena, the average coefficient is 4·37, for Giza 4·34, for Daḳahlia 4·56, and for Baheira 4·26. Approximately the same numbers of individuals were measured, belonging to Ḳena, Baheira and Giza. But as about twice as many were measured from Daḳahlia, it may be well to compare the mean variability of this province with that for the combined provinces of Ḳena and Girga; the values, however, are unchanged, namely, 4·56, and 4·37 respectively.

I conclude then, that it is impossible to show from my data that any difference in *average* variability exists between the inhabitants of various provinces. Only by a still larger collection of material could we hope to detect differences of variability as regards *individual* characters.

C. COMPARISON OF DISTRIBUTION CURVES.

So far we have had under consideration only the average values of various measurements and indices for different provinces, and the variability values deduced therefrom. Let us now examine the frequency of distribution of the individual measurements and indices, and compare the distributions in different provinces. It is obvious that a study of such frequency curves—or frequency polygons, as they should more properly be called—may reveal important features which are concealed in the average figures. The frequency polygons which have been drawn for this paper, relate to the (*a*) head length, (*b*) head breadth, (*c*) cephalic index, (*d*) nasal length, (*e*) nasal breadth, (*f*) nasal index and (*g*) upper facial index, for the provinces of (1) Ḳena and Girga, (2) Assiut and Minia, (3) Gharbia, (4) Daḳahlia and (5) Menufia. (Figs. 2–36, pp. 247–253).[1]

It is now recognised that a frequency polygon of the individual values of such a measurement as stature will approximate to a smooth curve of definite form—called the "normal," "probability" or "binomial" curve—if only a sufficient number of unselected individuals within the community be measured. The mathematical properties of this curve are well known; if certain constants are given, the value of any points on the curve can be calculated. When, on the other hand, the individual measurements are too few in number, as must usually be the case in anthropometric investigations, we may have no longer an approximation to the smooth frequency curve, but a polygon with peaks, the number, height and position of which vary in different samples drawn from the same population.

Comparing the frequency polygons that are presented in this paper (pages 247–253), we see that, while the majority of them contain two or more peaks, others approximate very closely to some form of a simple smooth or theoretical curve. We may assume that the theoretical curve to which they approximate is not appreciably different from the normal or probability curve. For most practical purposes this assumption appears justifiable.[2]

It has been shown by Livi[3] that when two similar binomial curves, expressing the distribution of stature in two (Italian) populations of different race and stature, are compounded, the resultant distribution curve is, to all appearances, smooth, unless the mean stature of the two populations differs by about 16 cms. We have already observed that irregularities in the smoothness of a distribution curve do not necessarily mean plurality of type.[4] We are now warned, conversely, that the approximate smoothness of a distribution curve does not necessarily imply singleness of type.

Professor Pearson has devised a formula for testing the closeness of fit of an actually obtained distribution to a theoretical distribution curve. This formula gives a measure of the probability that we shall obtain a more peaked polygon than that under consideration by taking further samples from the same population;

[1] All the graphs on page 247 refer to head length, all those on page 248 to head breadth, so on for the remaining five measurements. The five graphs on each page refer each to a different province in the order stated above.

[2] I assume here that a single type implies a character from which a number of individuals belonging to that type will certainly diverge, and that a given community may conceivably consist of two or more component types.

[3] *Antropometria*, Milano, 1900, pp. 77–85.

[4] *Cf. Biometrika*, 1902, i, p. 443.

the formula rests on the supposition that the entire series from which the samples are taken truly follows the theoretical distribution. I have tested the goodness of fit for two of the published frequency polygons: and I find, as indeed I had been led to conclude from actual inspection, that while for the one series the normal curve was a fair fit, for the other it was an exceedingly bad one. But the task of calculating the goodness of fit of each of these frequency polygons is a matter rather of statistical concern. I turn now to certain features of the curves which are of greater and more immediate interest for anthropology.

In the frequency polygons of the cephalic index for the province of Assiut and Minia (Fig. 13), and of Daḳahlia (Fig. 15), we note that two peaks are present, a higher at 73 and a lower at 77, while for the provinces of Ḳena and Girga (Fig. 12) the higher peak is at 73, the lower at 76. The polygons for Gharbia and Menufia (Figs. 14, 16) show a single peak at 74. It would be tempting to suppose that each of the above frequency curves is a composite of two (or more) elementary constituents, each having a single peak, *e.g.*, at 73 and at 76–77 respectively, which represents an underlying ethnic type. We might suppose that, combined in certain proportions, the two component curves would yield a resultant curve with these two peaks, while under other conditions of combination a single peak, placed somewhere midway, would result.

So seductive a hypothesis at first sight gains striking support from a like study of the distribution curves of the nasal index (page 252). For in Ḳena and Girga (Fig. 27), in Assiut and Minia (Fig. 28), in Gharbia (Fig. 29), in Daḳahlia (Fig. 30), and in Menufia (Fig. 31), the frequency polygons for the nasal indices *all show one peak at* 72 *and another at* 76–78.

Now it is indeed remarkable that, while the mean nasal index of these provinces varies, roughly, from 73·5 to 78·5, according to the situation of the province, yet in all of the provinces which we chance to have examined, the frequency polygons show one peak at 72 and another at 76 or 78. At first sight it is hardly conceivable that such a series of coincidences is a purely accidental occurrence. And we can hardly escape the conclusion that in each distribution curve we have to deal with a duality, or plurality, of type. For are we not here on the meeting-ground of the platyrhine Sudanese filtering in from the south and the leptorhine Mediterranean colonising from the north? What is more natural than that we should be able to dissect out from a curve two (or more) types, present in different intensity in the different provinces of Egypt? At one time, I must confess, this was the view I myself adopted, but on closer examination it has to my mind proved untenable.

In the first place, the five distribution curves of the nasal index refer only to seven provinces, and include 509 individuals. Of the six remaining provinces (Beni Suef, Fayum, Giza, Ḳaliubia, Sharḳia, and Baheira) the number of individuals measured is too few (188 in all) to warrant the construction of six distribution curves. Yet we cannot neglect the fact that none of these provinces, so far as their few nasal indices go, would give curves with similar features to those of the published curves.

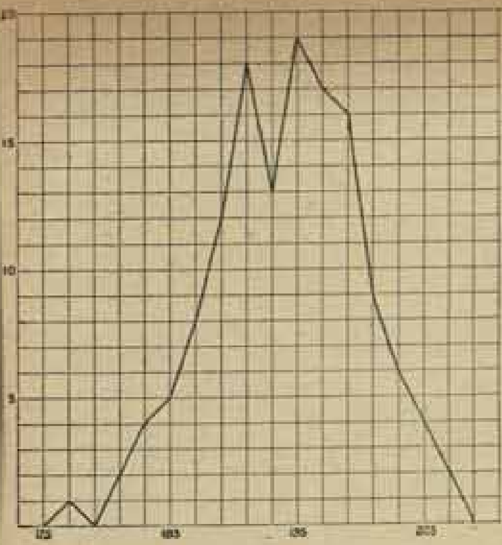


FIG. 2. (ḲENA AND GIRGA.)

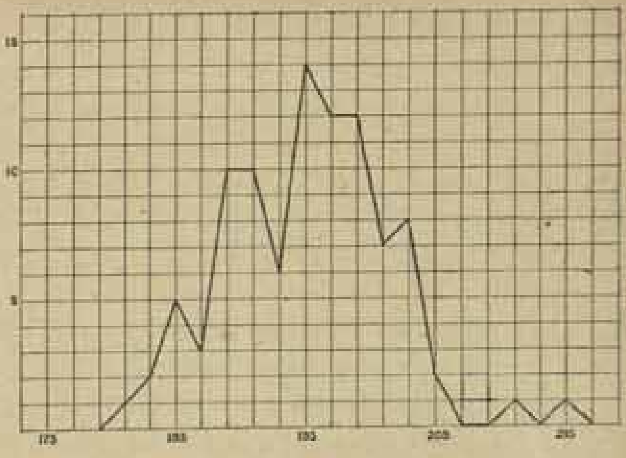


FIG. 3. (ASSIUT AND MINIA.)

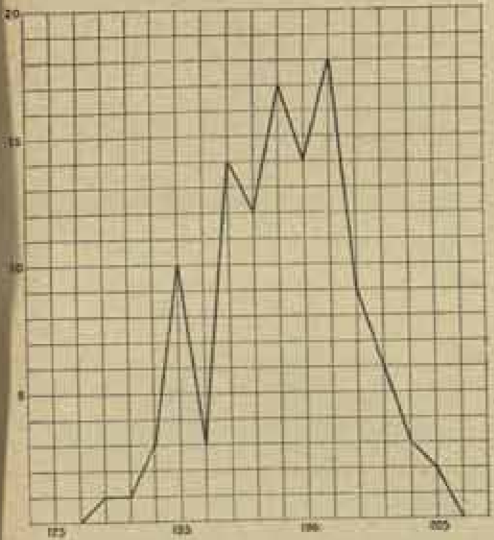


FIG. 4. (GHARBIA.)

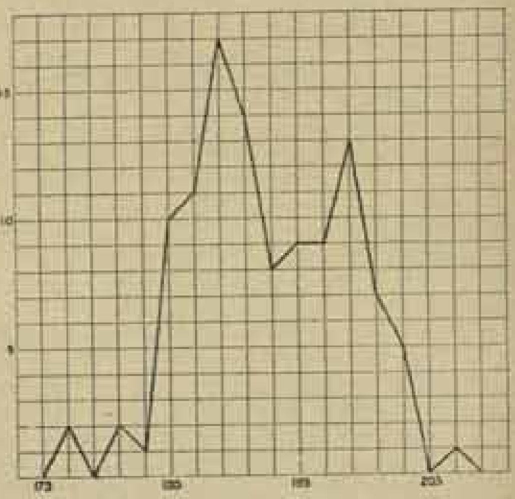


FIG. 5. (DAḲAHLIA.)

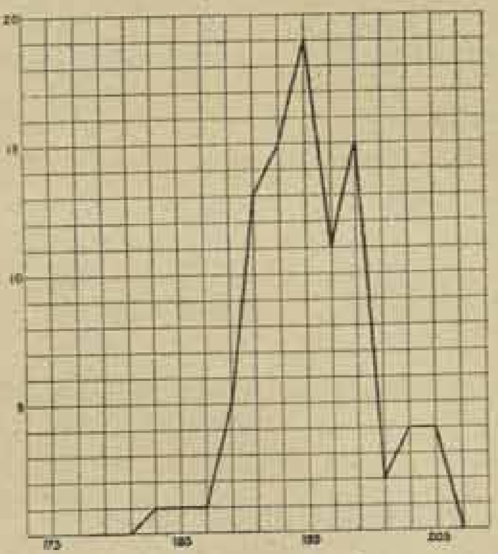


FIG. 6. (MENUFIA.)

HEAD LENGTH.

For an explanation of the curves on this and the following pages see footnote on page 245.

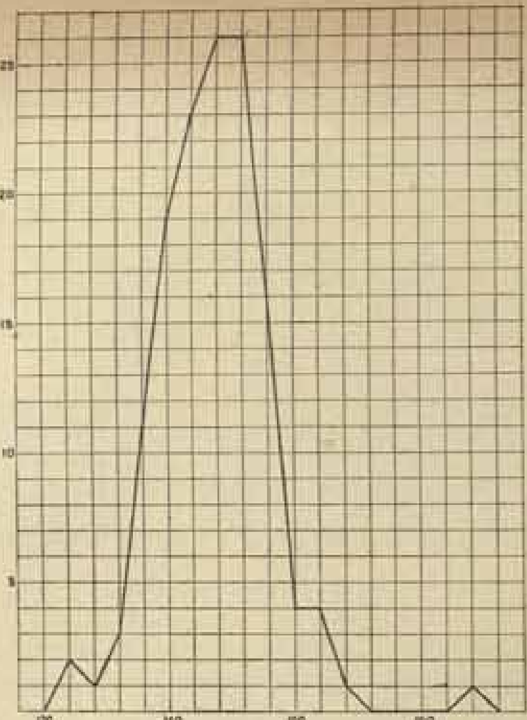


FIG. 7. (KENA AND GIRGA.)

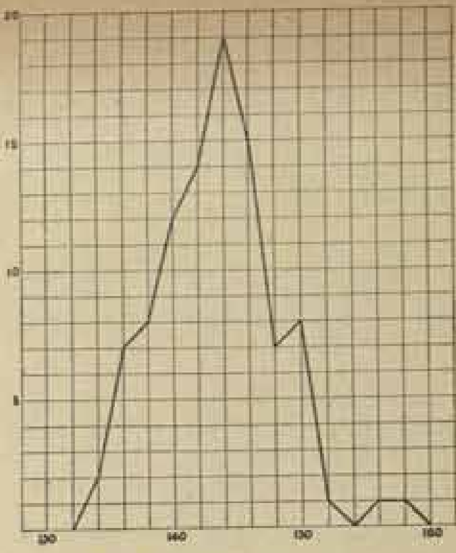


FIG. 8. (ASSIUT AND MINIA.)

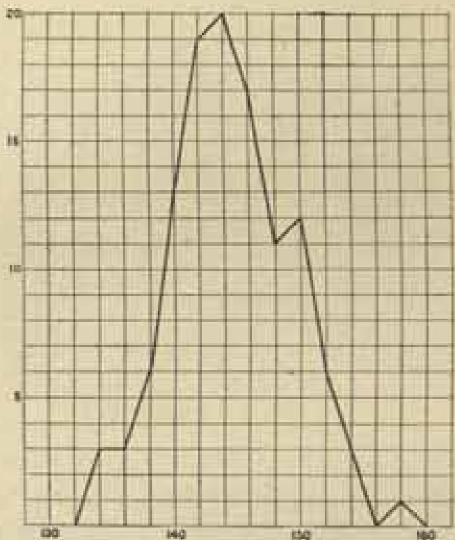


FIG. 9. (GHARBIA.)

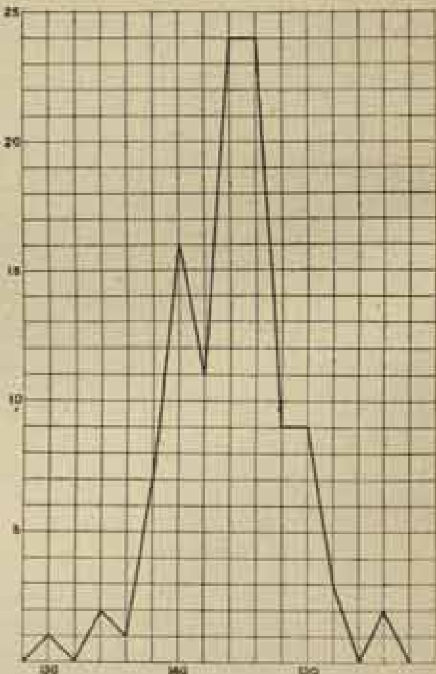


FIG. 10. (DAKAHLIA.)

FIG. 11. (MENUFIA.)

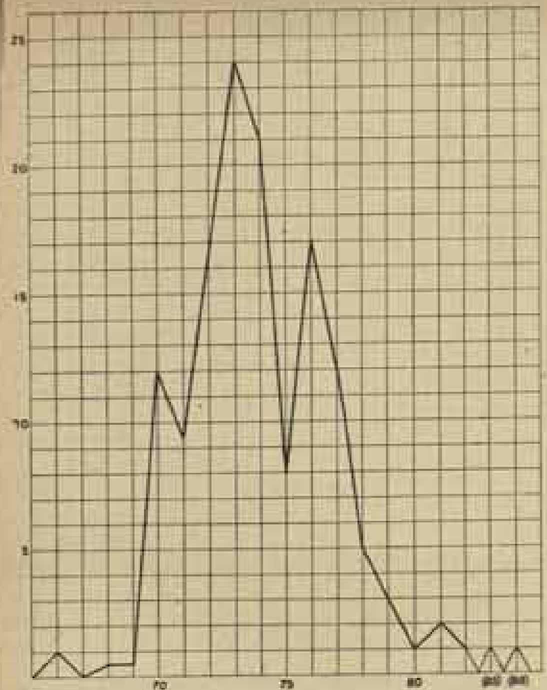


FIG. 12. (ḲENA AND GIRGA.)

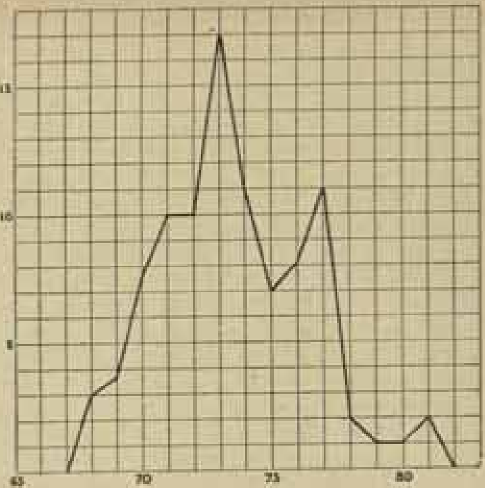


FIG. 13. (ASSIUT AND MINIA.)

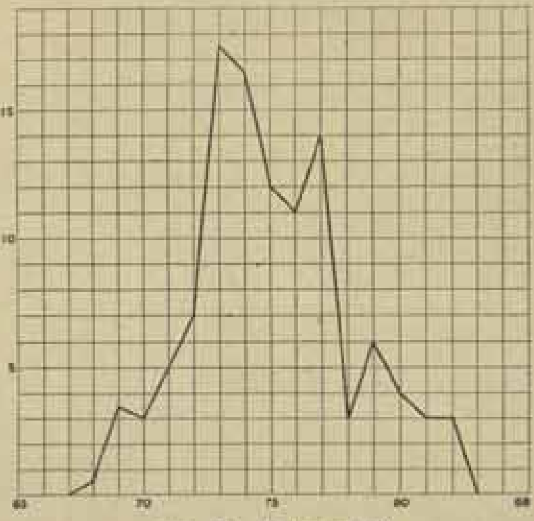


FIG. 15. (DAḲAHLIA.)

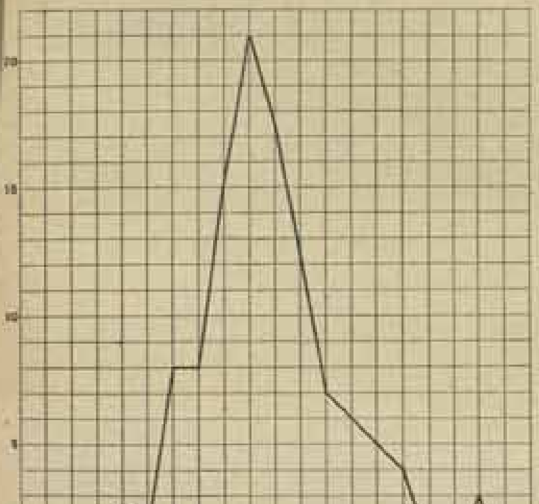


FIG. 14. (GHARBIA.)

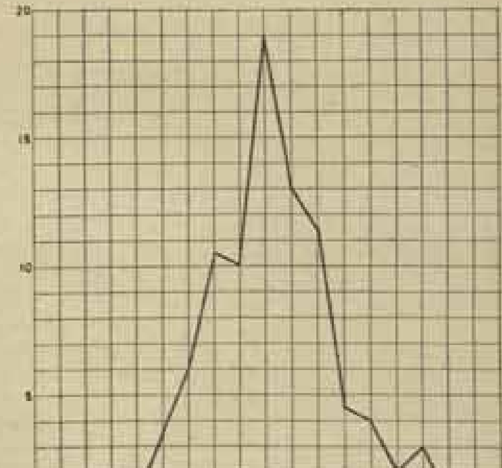


FIG. 16. (MENUFIA.)

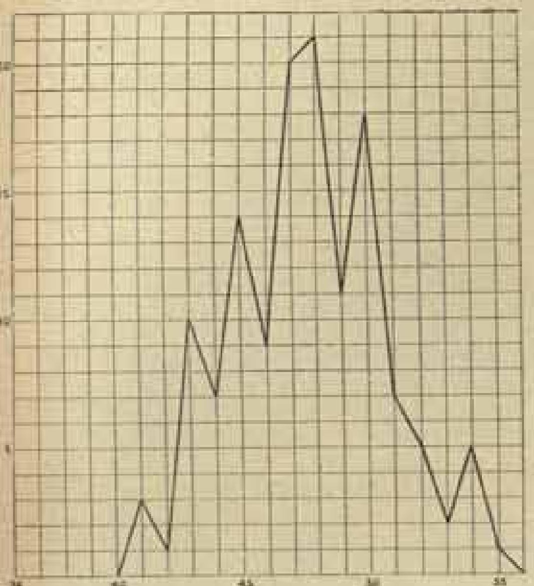


FIG. 17. (KENA AND GIRGA.)

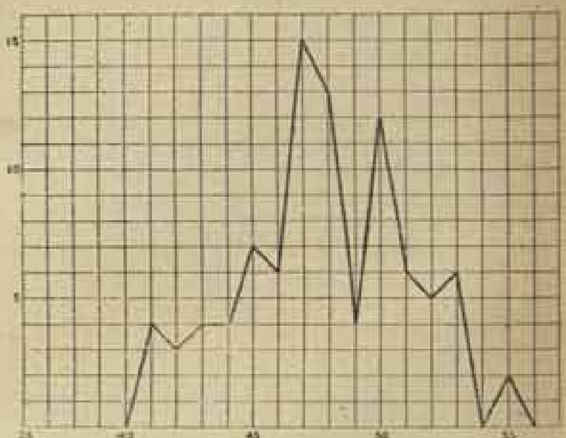


FIG. 18. (ASSIUT AND MINIA.)

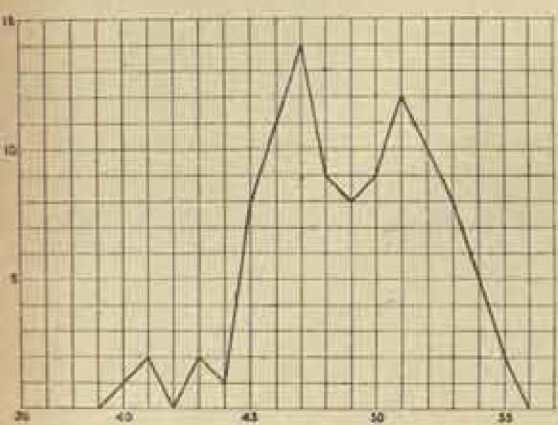


FIG. 19. (GHARBIA.)

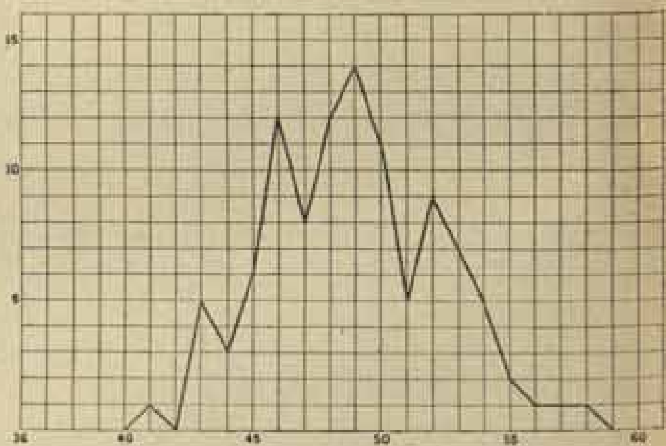


FIG. 20. (DAKAHLIA).

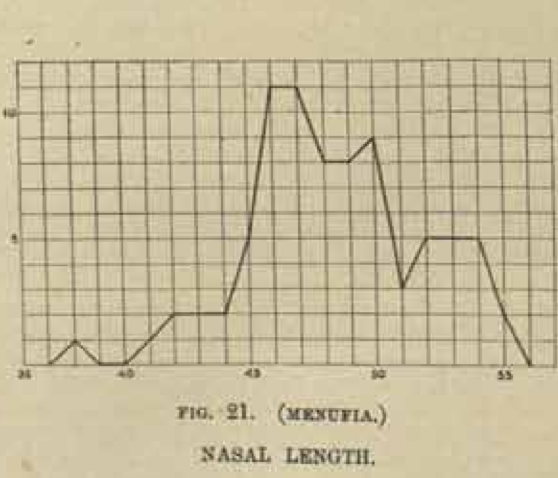


FIG. 21. (MENUFIA.)

NASAL LENGTH.

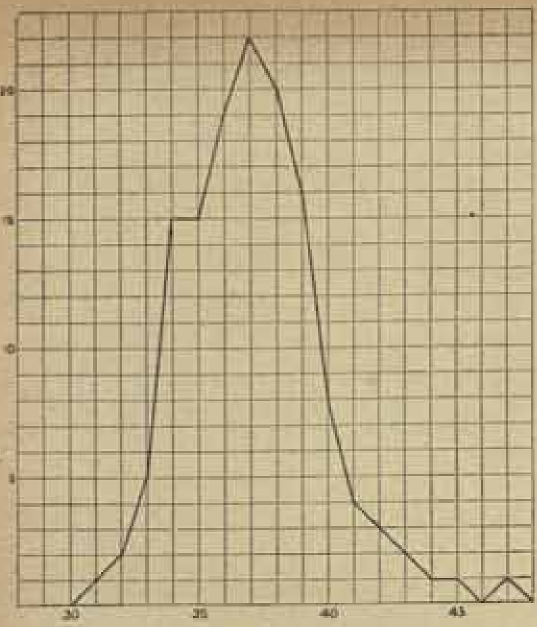


FIG. 22. (ḲENA AND GIRGA.)

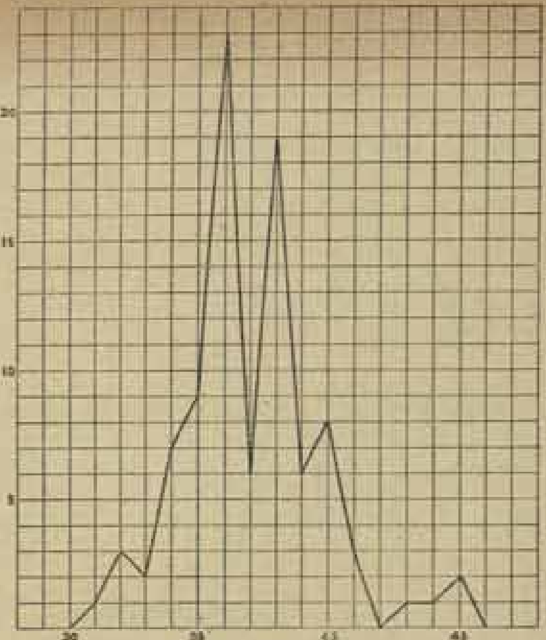


FIG. 23. (ASSIUT AND MINIA.)

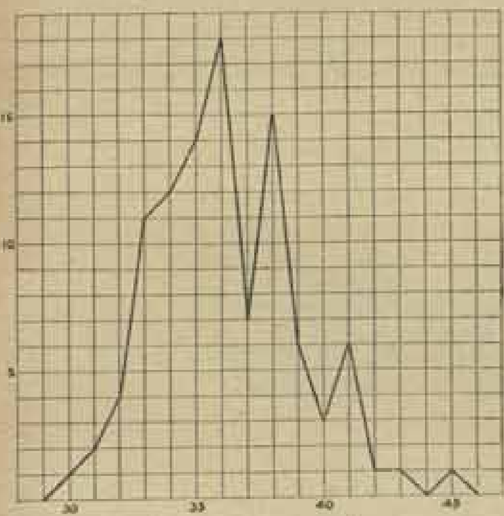


FIG. 24. (GHARBIA.)

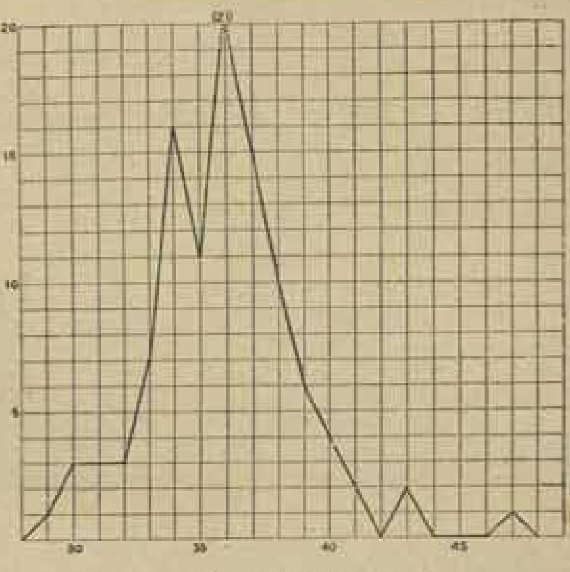


FIG. 25. (DAḲAHLIA.)

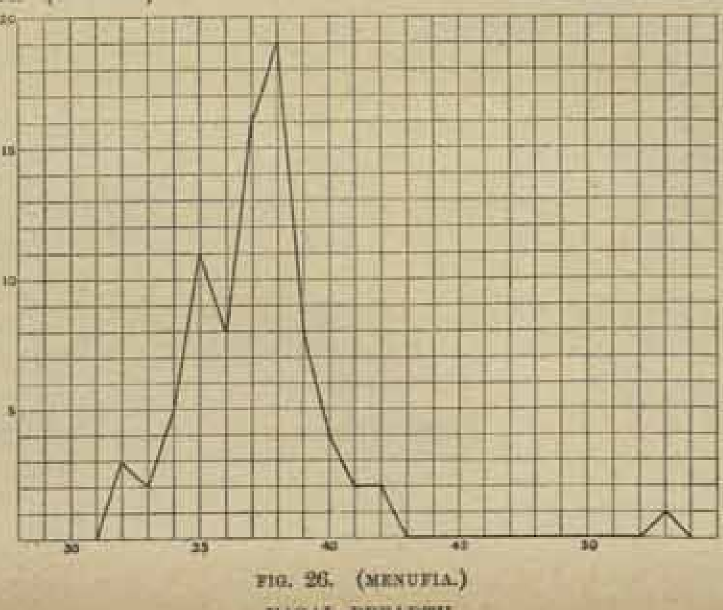


FIG. 26. (MENUFIA.)

NASAL BREADTH.

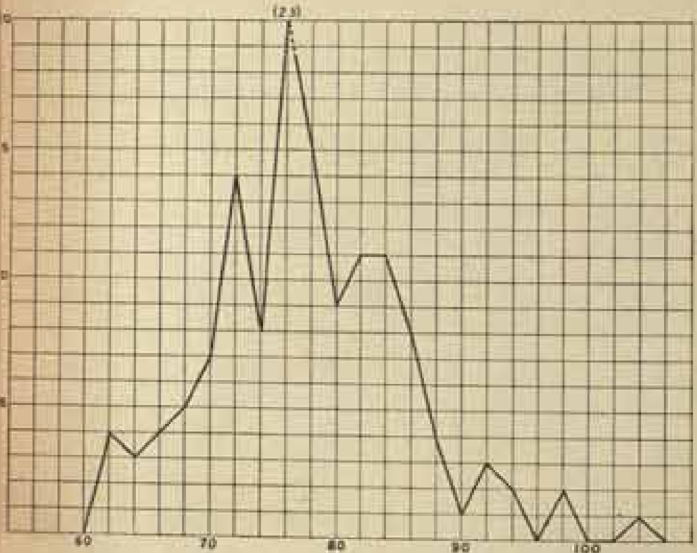


FIG. 27. (ḲENA AND GIRGA.)

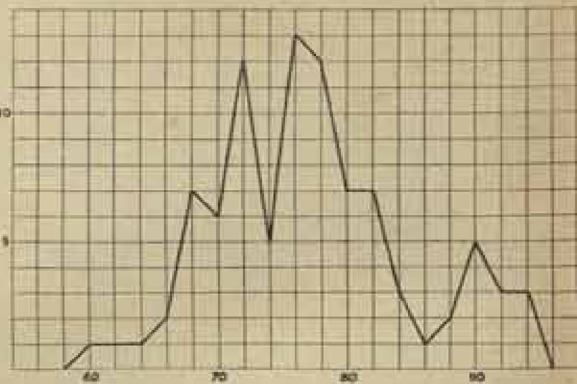


FIG. 28. (ASSIUT AND MINIA.)

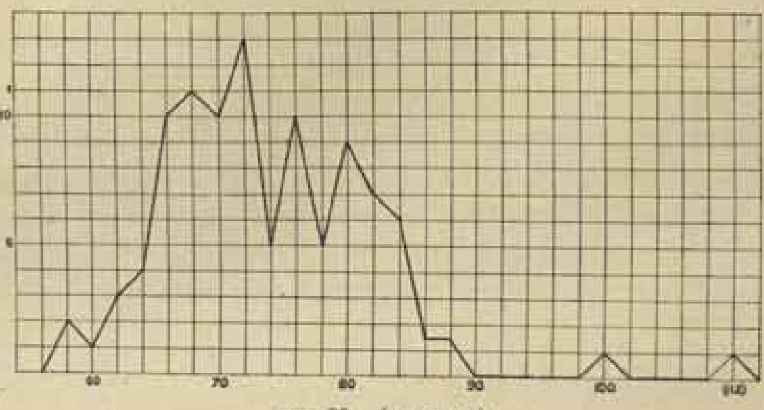


FIG. 29. (GHARBIA.)

FIG. 30. (DAḲAHLIA.)

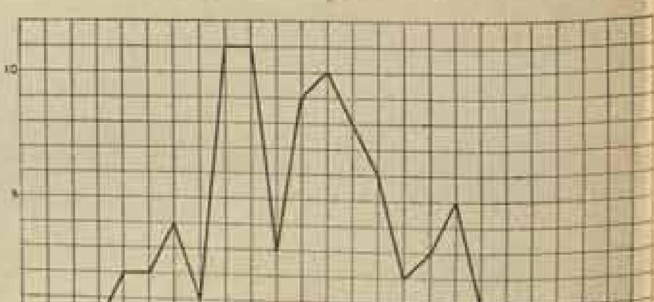


FIG. 31. (MENUFIA.)

NASAL INDEX.

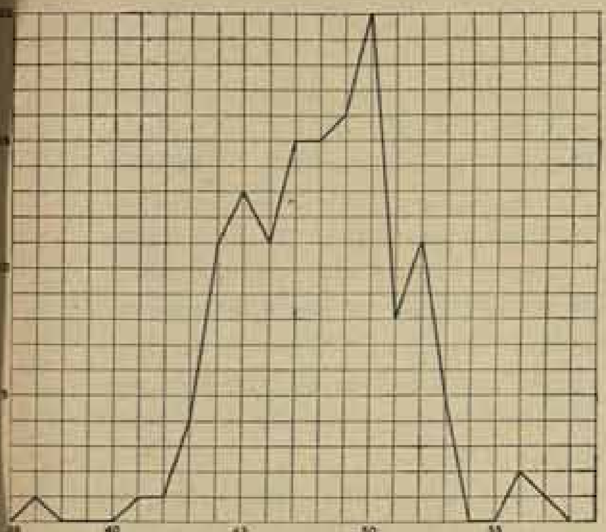


FIG. 32. (ḲENA AND GIRGA.)

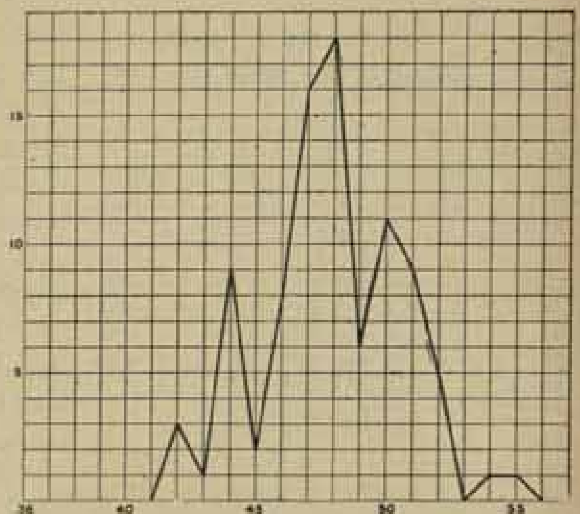


FIG. 33. (ASSIUT AND MINIA.)

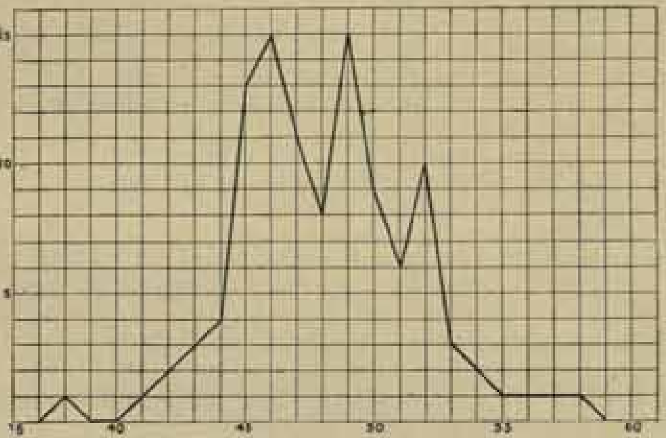


FIG. 34. (GHARBIA.)

FIG. 35. (DAḲAHLIA.)

FIG. 36. (MENUFIA.)

UPPER FACIAL INDEX.

So, too, the five distribution curves of the cephalic index neglect the cephalic indices of the other provinces. Fig. 37 shows the composite distribution curve for the provinces of Ḳena, Girga, Assiut, Minia, Fayum, Menufia, Baheira, Gharbia, and Daḳahlia. We see that there is no longer a peak at 73 or 76, but an intermediate peak at 74, and a similar unimodal curve is obtained even from the already mentioned five provinces. When, in addition, we remember that no important difference in mean cephalic index was found in the different provinces, our belief is strengthened that these peaks are purely due to chance.

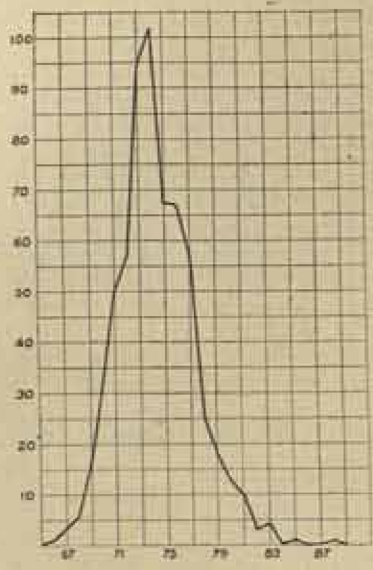


FIG. 37.

But in the case of the nasal index, the position is very different. Here we know that the nasal index rises as we proceed further south. And here the combined curve (Fig. 38), for the (509 + 188 =) 697 individuals of all Egypt still yields the same features as those we have seen in the five curves of which it is in part made up. It shows a depression at 74 and a peak on either side of it at 72 and 76. Evidently the peaks in the curves of the nasal index deserve further study.

Taking the distribution curve of the nasal index for all Egypt, my friend Mr. John Gray suggested and kindly made for me a calculation as to the significance of the two peaks at 72 and at 76. It is obvious that in another draw of 697 Egyptians the peaks might not precisely imitate those in the present sample. Moreover, for all we know to the contrary, if only 69,700 instead of 697 Egyptians had been measured, we might have had a smooth instead of a peaked or irregular distribution curve. Let us make this assumption, that the curve is really smooth, and let us calculate the odds against these two peaks being random occurrences due to insufficient numbers of measurements. Mr. Gray finds that the peak 72 would occur 49 times, and the peak 76, 55 times, in a thousand such random samples of 697 individuals. There are thus very fair odds in favour of the *accidental* nature of the two peaks.

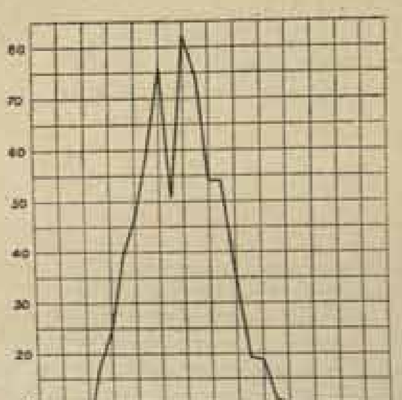


FIG. 38.

I have, however, made a similar calculation as to the significance of the depression at 74. In this case the odds are 100 to 1 against the deviation from the normal curve being due to random sampling. Yet even these odds are occasionally met;[1] our hypothesis of plurality of type again, therefore, receives no material support.

The question remains, whether this improbability of 100 to 1 is not raised by the occurrence of the depression at 74 in all the five sample curves, and this in spite of the different value of the mean nasal index in each curve. After considerable attention to this point, I have come to the conclusion that the improbability is not thereby raised.

But even were the two peaks and the intervening depression really significant, it would nevertheless be impossible to resolve the doubly-peaked curve into two component curves. The apices stand far too near one another to permit of analysis in this way. It has been already pointed out (p. 245) that the respective means (or rather modes) of two normal curves must differ by a considerable amount in order that the combined curves may yield a doubly peaked curve. It is easy to convince oneself of this fact by empirically compounding various pairs of distribution curves of different modes and of different extents. Only by the unwarrantable assumption that the two curves are markedly and in opposite directions asymmetrical, can the required effects of composition be obtained. Indeed, the very closeness of the two peaks itself suggests the accidental nature of their constant occurrence. We may observe that the distribution curves of nasal length in these provinces all show one peak at 46 or 47, and another at 49, 50, or 51. Evidently it is a mere chance that a depression occurs in all of them at 48, and I believe that the same explanation holds of the depression at 74, between 72 and 76, in the case of the nasal index.[2]

Lastly, it may be pointed out that even were such composition and resolution possible in the case we have been considering, the analysis would have no known anthropometrical significance. We have seen that the value of the nasal index varies in Egypt roughly from 73·5 to 78·5. The nasal index in South Europe is 70; in Nubia it is 85, and in the Sudan, 100. What ethnological meaning, then, can be attached to two curves, the means (or modes) of which are at 72 and at 76 respectively?

We are forced to the conclusion that the coincident position of the peaks, in the various provinces which we have been considering, is a matter of pure accident, and that it is in no sense a proof of the presence of two or more distinct ethnic types, variously distributed in the different provinces of the country.

[1] Professor Bowley, who has kindly given me advice on the subject, tells me that he has recently met with a number in random sampling, the odds against which he knows to be 1200 : 1. He is of opinion that odds of something like 25,000 : 1 are required by statisticians before they can acknowledge the *necessity* of an interfering cause.

[2] One special cause for the appearance of peaks lies in the unconscious tendency to misinterpret near lying measurements in terms of a more convenient central value, *e.g.*, to read 49 or 51 millimetres as 50 millimetres, whereby a falsely and constantly preponderating frequency at 50 is obtained. But this cause clearly fails to account for the present instances.

4. COMPARISON OF NON-NUMERICAL CHARACTERS.

I have left to the last the consideration of these differences of form, colour and texture of certain parts of the body, which it is difficult or impossible to express numerically.

Table V gives the coloration of the eye, skin and hair, the texture of the hair and the form of the chin and lips, in thirteen provinces. The figures which are enclosed in brackets show the *number* of individuals who were examined for any particular character. The other figures express the *percentage* of individuals belonging to the various classes into which the characters are divided.

TABLE V.

	Kena.	Girga.	Assiut.	Minia.	Beni Suef.	Fayum.	Giza.	Menufia.	Kaliubia.	Sharkia.	Baheira.	Gharbia.	Dakahlia.
Eye colour.	*(51)*	*(82)*	*(60)*	*(32)*	*(31)*	*(34)*	*(46)*	*(105)*	*(24)*	*(68)*	*(54)*	*(124)*	*(109)*
Dark brown	37	30	28	16	14	16	22	22	25	17	13	7	18
Brown ...	51	49	38	53	42	46	40	42	44	58	53	55	47
Light brown	10	20	32	25	29	30	34	32	27	22	30	33	31
Dark blue ...	0	0	0	3	2	3	0	0	0	0	0	0	0
Blue ...	0	0	1	0	5	0	0	2	2	0	1	0	1
Light blue ...	2	1	0	0	3	0	0	1	0	0	1	2	1
Green ...	0	0	1	3	5	4	4	1	2	3	2	3	2
Grey... ...	0	0	0	0	0	0	0	0	0	0	0	0	0
Skin colour.	*(53)*	*(82)*	*(63)*	*(33)*	*(28)*	*(29)*	*(45)*	*(93)*	*(25)*	*(15)*	*(49)*	*(114)*	*(98)*
Very dark ...	11	5	3	3	4	0	0	1	0	—	0	0	0
Dark... ...	51	21	27	6	14	10	7	4	0	7	4	4	5
Slightly dark	19	34	27	12	11	28	27	13	12	13	12	12	14
Medium ...	19	35	25	64	43	45	42	44	44	60	47	56	42
Slightly fair...	0	4	10	9	14	10	9	24	24	7	17	12	20
Fair	0	1	8	6	11	4	13	11	16	13	16	13	18
Very fair ...	0	0	0	0	3	3	2	3	4	0	4	3	1

TABLE V.—*continued.*

	Kena.	Girga.	Assiut.	Minia.	Beni Suef.	Fayum.	Giza.	Menufia.	Kaliubia.	Sharkia.	Baheira.	Gharbia.	Dakahlia.
Colour of hair on head.	*(43)*	*(60)*	*(54)*	*(20)*	*(20)*	*(24)*	*(34)*	*(73)*	*(19)*	—	*(40)*	*(87)*	*(77)*
Black ...	53	47	51	45	43	46	41	42	42	—	44	52	49
Dark brown...	13	17	15	23	22	21	18	29	19	—	25	24	19
Light brown	0	2	1	5	2	2	6	2	5	—	1	3	0
Reddish ...	34	34	33	27	33	31	35	27	34	—	30	21	32
Texture of hair on head.	*(24)*	*(29)*	*(20)*	—	—	*(16)*	*(19)*	*(38)*	—	—	*(22)*	*(35)*	*(43)*
Spiral ...	13	19	25	—	—	6	0	13	—	—	9	0	5
Crisp... ...	48	33	33	—	—	19	37	19	—	—	23	19	23
Curly ...	29	24	30	—	—	38	50	42	—	—	41	46	39
Wavy ...	2	14	7	—	—	25	13	21	—	—	23	17	24
Straight ...	8	10	5	—	—	12	0	5	—	—	4	18	9
Chin.	*(50)*	*(78)*	*(62)*	*(32)*	*(27)*	*(28)*	*(43)*	*(92)*	*(19)*	*(14)*	*(52)*	*(112)*	*(100)*
Feeble ...	10	11	14	13	4	5	7	10	10	11	12	8	8
Moderate ...	60	66	72	48	74	77	62	69	74	68	56	75	64
Prominent ...	21	23	14	39	22	18	31	21	16	21	33	17	28
Lips.	*(57)*	*(83)*	*(61)*	*(34)*	*(29)*	*(31)*	*(50)*	*(104)*	*(23)*	*(16)*	*(53)*	*(113)*	*(102)*
Negroid ...	24	2	0	0	0	0	0	1	0	0	0	0	0
Thick ...	22	19	14	15	10	10	6	8	4	3	4	5	9
Medium ...	56	63	64	69	48	63	53	52	63	66	62	58	52
Thin... ...	20	16	22	16	42	27	41	39	33	31	34	37	39

I found little difficulty in fixing for myself and maintaining standards of eye colour. If an individual's eyes were midway in colour between my standards or showed a speckling of two colours, he was ascribed half to one class, and half to another.

The determination of skin colour presents much greater difficulties. I saw at the outset that without standard colours I was liable to error from contrast between a given skin colour under consideration and the skin colour of the individual who had just previously been examined. On the other hand, I found it extremely difficult to obtain standard coloured papers which had the requisite number and variety of hues. Moreover, I found that the colour class to which an individual belonged would vary with the region of the skin chosen. It by no means always followed that, because the skin of an individual A was lighter than that of B in one region, therefore it was also lighter in another region. The plan which I finally adopted was this. An artist friend spent a morning with me, painting in oils the skin colour of various Egyptians, and choosing for this purpose the inner surface of the upper arm. I was fortunate in having an unusually extensive and representative series of skin colours among the subjects who came to be measured on that occasion. The papers on which these colours were painted, were then cut into equal slips, and having been arranged in order of brightness, they were numbered and tied together. Experience soon enabled me to call certain shades medium, others dark, fair, etc. And on this basis the classes in which individuals are grouped in Table V were formed.

As regards the colour of the hair, only one remark is necessary, namely, that the characteristic Egyptian hair colour is a reddish black. Hence the percentage figures for this character must be used with caution, most individuals being recorded half in black, and half in the red class.

We are able to draw the following deductions from Table V:—

Eye and Skin.—A material lightening of the colour of the iris and skin is evident as we proceed northward, province by province. While the percentage of brown eyes keeps fairly constant, that of dark brown falls and that of light brown eyes rises. The percentage of blue and green eyes is lower in the four southernmost provinces taken together than in any other four more northern provinces.[1] Similarly as regards skin colour, no "very fair" skins are met south of Beni Suef, and (with one exception) no "very dark" skins are to be found north of the Fayum.

Hair.—With two exceptions the cases of light brown hair are all "half cases." That is to say, they are instances of hair colour the shade of which falls intermediate between dark and light brown. Of the two really light brown-haired individuals, one belonged to Menufia, the other to Kaliubia. It is evident that there is a remarkable uniformity of the hair colour throughout Egypt, in spite of such divergences in measurement as we have already described.

Spiral and crisp hair is relatively predominant, as we should expect, in Upper Egypt, curly and wavy hair relatively in Lower Egypt. The rare instances of straight hair which are almost all "whole cases," appear to be scattered fairly uniformly throughout Egypt, when due consideration is paid to the small total of cases examined.

[1] The cases in which an oblique direction of the long axes of the eyes was noticed appear to be uniformly distributed through Egypt. Twenty-three well-marked, and fourteen slight cases were noted in all.

The degree of prominence of the chin bears no obvious relation to the various provinces of Egypt.

TABLE VI.

Exceptional nose forms.	Kena (*58*).			Girga (*83*).			Assiut (*73*).			Minia and Beni Suef (*70*).			Fayum (*39*).		
Wide root	21	84	36	31	91	37	26	90	36	15	83	21	13	93	33
Narrow root	4	16	7	3	9	4	3	10	4	3	17	4	1	7	3
Wide bridge ...	20	87	34	26	87	31	21	100	29	14	64	20	7	88	18
Narrow bridge	3	13	5	4	13	5	0	0	0	8	36	11	1	12	3
Wide alæ ...	17	89	29	22	92	27	20	95	27	15	79	21	9	82	23
Narrow alæ ...	2	11	3	2	8	2	1	5	3	4	21	6	2	18	5

Exceptional nose forms.	Giza (*56*).			Menufia (*114*).			Kaliubia (*27*).			Baheira (*60*).			Gharbia (*137*).			Dakahlia (*122*).		
Wide root	12	92	21	31	79	27	9	100	33	7	70	12	24	69	18	11	48	9
Narrow root ...	1	7	2	8	21	7	0	0	0	3	30	5	11	31	8	12	52	10
Wide bridge ...	11	69	20	20	69	18	6	75	22	8	50	13	16	48	12	12	40	10
Narrow bridge	5	31	9	9	31	8	2	25	7	8	50	13	17	52	12	18	60	15
Wide alæ	7	70	13	25	78	22	6	100	22	7	50	12	20	57	15	14	45	11
Narrow alæ	3	30	5	7	22	6	0	0	0	7	50	12	15	43	11	17	55	14

Nose.—Table VI gives the number of exceptional nose forms. When an individual differed noticeably from the average type in narrowness or breadth of the root, bridge or alæ of the nose, note was made of the fact on his card. The figures in brackets beneath the name of the province indicate the number of individuals who passed under examination. Of the three columns of figures ranged under each province, the first gives the absolute number of unusually narrow and

TABLE VII.

Shape of Occiput regarded from behind.	Kena. (*36*)	Girga. (*57*)	Assiut. (*44*)	Minia. (*23*)	Beni Suef. (*19*)	Fayum. (*17*)	Giza. (*29*)	Menufia. (*55*)	Baheira. (*29*)	Gharbia. (*76*)	Dakahlia. (*73*)
Ovoid	89	85	83	85	89	94	81	80	81	90	90
Pentagonoid	11	15	17	15	11	6	19	20	19	10	10

TABLE VIII.

Development of Lobe of the Ear.	Ḳena and Girga. (*104*)	Assiut and Minia. (*73*)	Menufia. (*76*)	Gharbia. (*87*)	Dakahlia. (*91*)
L_0 (=absent)	15	11	5	12	11
L_1	17	15	21	18	26
L_2	36	41	42	36	32
L_3 (fully developed) ...	32	33	32	34	31

wide cases recorded, the second gives the percentage relation of these two classes to one another, and the third the percentage relation of each class to the total number of individuals (the bracketed figures) belonging to that province.

The table clearly corroborates the conclusions we have already drawn from a study of the nasal index.

Other characters.—Tables VII and VIII are two of many vain attempts to discover other differentiating characters in Egypt, the one showing that the relative frequency of the ovoid and pentagonoid forms of the norma occipitalis and the other that the degree of development of the lobe of the ear is fairly constant throughout different provinces of this country. I have also records of the form of the head and face in norma verticalis and frontalis, according to Sergi's nomenclature, but a study of the data yielded by the various provinces utterly failed to indicate that these characters are of ethnological value in Egypt. Similarly negative results attended a detailed study of the ear, *e.g.*, the development of the helix, the prominence of the tragus, the size and delicacy of the auricle and the degrees of its outstanding from the head. It would be useless to publish tables of these data.

Appendix.

The People of Menufia and the Fayum.

For different reasons these two provinces merit separate treatment (Table IX).

The Fayum is an oasis lying some thirty miles from the Nile Valley. It was inhabited by the Egyptians from a very early date and was largely colonised by Greeks from the year 600 B.C., until after the beginning of the Christian era. It seemed worth while to find out whether, owing possibly to climatic conditions or to influences of the above admixture, the modern inhabitants of the Fayum sensibly differ from the general population of Egypt as regards the measurements which we have previously been studying.

The province of Menufia, too, deserves special study owing to the unusually high nasal index (76·84) which it gave (p. 241), compared with the indices of Baheira (74·39), Gharbia (73·98), Daḳahlia (73·41). The standard deviations are too low, the number of individual measurements too great and the difference found is too wide for it to be, with any degree of probability, a matter of accident. This high value of the nasal index in the case of Menufia is corroborated by the similar indices obtained from the inhabitants of the neighbouring provinces of Ḳaliubia and Sharḳia. The question naturally arises, are other exceptional features, besides the relatively high nasal index, present in the people of Menufia?

The head length and breadth and cephalic index for the province of Menufia are in no way remarkable, when compared with those already given in Table I for other provinces of Egypt. The unusually great auricular height is noticeable, but we are at present ignorant of its meaning.

TABLE IX.

Group.	Head length.				Head breadth.				Auricular height.			
	No.	Av.	σ	C.	No.	Av.	σ	C.	No.	Av.	σ	C.
Moslems[1]	369	194·56	6·09	3·13	369	144·29	4·34	3·01	173	145·84	4·65	2·83
Menufia	91	195·69	4·30	2·20	93	145·16	4·59	3·16	58	147·93	4·63	3·13
Fayum	36	194·61	6·78	3·49	36	143·50	3·75	2·61	25	147·00	4·04	2·75

Group.	Cephalic index.				Upper facial index.				Nasal index.			
	No.	Av.	σ	C.	No.	Av.	σ	C.	No.	Av.	σ	C.
Moslems	369	74·26	2·86	3·85	391	48·39	3·53	7·29	349	75·83	7·67	10·12
Menufia	91	74·18	2·59	3·49	81	47·85	3·14	6·56	80	76·84	7·36	9·55
Fayum	36	73·81	2·87	3·89	34	48·61	2·47	5·08	34	77·61	6·51	8·39

The upper facial index is lower in Menufia than in Daḳahlia and Baheira; indeed it is lower than in Giza, Ḳena and the Fayum. Thus, we have once again a low facial index associated with high nasal index, just as we found to be the case in Sharḳia (*cf.* p. 241):—

	Nasal index.	Upper facial index.
{ Daḳahlia	73·41	48·72
{ Baheira	74·39	49·00
{ Menufia	76·84	47·85
{ Sharḳia	76·70	47·56

On the other hand, the gnathic index for Menufia is 101·05 (No.$=$35; $\sigma=3{\cdot}43$), a value not sensibly different from those obtained for neighbouring provinces. And further, the kneeling-standing index (*cf.* p. 243) is 74·84 (No.$=$53), a value again not sensibly different from those obtained for neighbouring provinces. Much stress, however, cannot be laid upon these indices, as neither of them appears to be much altered in the case of more northerly provinces.

[1] The term "Moslems" refers to the general population of Egypt.

Turning to Table V we note the high percentage of dark brown eyes and of spiral hair in the provinces of Menufia and Ḳaliubia, compared with that in other provinces of Lower Egypt.

We can only conclude that the sample of individuals who were measured, belonging to Menufia, is more negroid in character than we should have expected in so northerly a province of Egypt. If, as we may perhaps suppose, this sample is a true representative of the entire province, it must be left for future investigation to determine the cause. On the other hand, with regard to the Fayum, it is interesting to note that the nasal index has the value we might have expected from the latitude of the Oasis (*cf.* p. 240). There is no trace of any leptorhine influence resulting from the settlements of Greeks, who were so plentiful there years ago. On the contrary, the nasal index is considerably higher than that of the coast provinces of Baheira and Gharbia. We can only infer that whatever influence the colonists from the Mediterranean had is now wiped out and that the aboriginal type has reasserted itself. Neither in head nor in face measurement do the inhabitants of the Fayum differ from the inhabitants of a corresponding latitude in the Nile Valley. That is to say, the conditions of life in the Fayum appear to have had no special influence in these respects.

IV. THE COMPARISON OF THE MAHOMMEDANS WITH THE COPTS AND WITH THE "MIXED" GROUP.

A. Comparison of Non-Numerical Characters.

We pass now to a comparison between the Mahommedan population of Upper and Lower Egypt which we have already studied, and two other classes of Egyptians which so far we have left unconsidered. These are (1) the Copts, who number possibly about one-sixteenth of the entire Egyptian population, and, having intermarried solely among themselves during the past thirteen hundred years, still preserve the Christian religion which prevailed throughout Egypt before the Mahommedan conquest: and (2) the "mixed" group of Mahommedans, whose parents belong to different provinces of Egypt, or one of whose parents is of non-Egyptian origin.

Of the thousand Egyptians whom I measured, forty-two were Copts, and seventy belonged to the "mixed" group. More than three times as many of the forty-two Copts belonged to Upper Egypt as to Lower Egypt, while nearly twice as many of the "mixed" people belonged to Lower as to Upper Egypt. The greater prosperity and ease of communication in Lower Egypt is doubtless responsible for these conditions. Fewer of the Copts in Upper Egypt have the means of purchasing their release from service in the Army. A larger number of the Lower Egyptian *fellahin* find an opportunity of obtaining wives from other provinces than their own. The seventy individuals, belonging to the "mixed" group, may be thus classified :—

TABLE IX.

Parents.	No. of cases.
Both Lower Egyptian	23
Lower Egyptian and Sudanese	15
Lower Egyptian and Turkish	2
Lower and Upper Egyptian...	8
Both Upper Egyptian	9
Upper Egyptian and Sudanese	9
Upper Egyptian and Maghrabi	3
Upper Egyptian and Bedawi	1

The table suggests that intermarriage with the Sudanese is more frequent in Lower than in Upper Egypt. If this be so, it is doubtless the result of the employment of Sudanese in various factories and works in Lower Egypt. The word "Maghrabi" in the above table applies to a man who has come to Egypt from the West.

In the following table we are able to study and to compare the colour of the eye, skin and hair, the texture of the hair and the form of the nose and lips, (i) among the Mahommedans of Upper and Lower Egypt, (ii) among the Copts, and (iii) among the "mixed" group. The figures in the table, which are enclosed in brackets, represent the total number of individuals on whom the observations were made. The unbracketed figures give the percentage frequency of the different characters.

TABLE X.

Character.	Upper Egypt.	Lower Egypt.	Copts.	Mixed.
Eye colour.	*(290)*	*(460)*	*(36)*	*(68)*
Dark brown	24	17	12	43
Brown	46	49	49	40
Light brown	24	30	29	15
Dark blue	1	0	0	0
Blue	1	1	1	1
Light blue	1	1	3	0
Green	3	2	6	1

TABLE X.—*continued.*

Character.	Upper Egypt.	Lower Egypt.	Copts.	Mixed.
Skin Colour.	(*288*)	(*439*)	(*40*)	(*63*)
Very dark	4	0	3	16
Dark	21	4	2	11
Slightly dark	22	15	15	22
Medium	39	49	48	30
Slightly fair	8	16	10	14
Fair	5	14	20	5
Very fair	1	2	2	2
Texture of hair.	(*109*)	(*169*)	(*17*)	(*38*)
Spiral	14	7	6	26
Crisp	31	25	20	41
Curly	36	43	44	19
Wavy	12	17	24	9
Straight	7	8	6	5
Colour of hair.	(*221*)	(*336*)	(*36*)	(*50*)
Black	48	48	45	53
Dark brown	19	19	15	10
Light brown	1	2	7	0
Red	32	31	33	37
Nasal root.	(*120*)	(*135*)	(*6*)	(*33*)
Unusually wide ...	87	77	83	88
" narrow ..	13	23	17	12
Nasal bridge.	(*104*)	(*135*)	(*10*)	(*34*)
Unusually wide ...	81	60	60	82
" narrow ...	19	40	40	18
Nasal alæ.	(*94*)	(*133*)	(*12*)	(*38*)
Unusually wide ...	87	69	83	84
" narrow ...	13	31	17	16
Nasal tip.	(*118*)	(*165*)	(*11*)	(*34*)
Unusually wide ...	89	83	73	88
" narrow ...	11	17	27	12

TABLE X.—*continued.*

Character.	Upper Egypt.	Lower Egypt.	Copts.	Mixed.
Lips.	(*295*)	(*461*)	(*39*)	(*68*)
Negro	1	0	0	11
Thick	15	6	5	24
Medium	60	58	55	43
Thin	24	36	40	22
Occiput in vertical view.	(*198*)	(*293*)	(*26*)	(*29*)
Flat	14	17	13	15
Round	74	63	75	59
Prominent	12	20	12	26

Let us first survey the general position which the Copts occupy, as compared with the Mahommedans of Upper and Lower Egypt. On the whole we find that the differences with which we have already met between the Upper and Lower Egyptians are still further accentuated between the Lower Egyptians and the Copts. When we pass to the Copts, the fairness of the eyes and skin increases, the crispness of the hair and the fulness of the lips still further decrease; and this, in spite of the fact that the bulk of the Copts come from Upper Egypt, where in the Moslem population negroid features are most accentuated. But it is noteworthy that, although the average Copt is less negroid than the Lower Egyptian, and is considerably less negroid than the Upper Egyptian, nevertheless, instances of thick lips, crisp or even spiral hair and very dark skin do occasionally occur. It is highly improbable that this is the result of any modern irregular intimacy with the Sudanese and of subsequent adoption of the offspring. The probability is far greater that it expresses the past history and present variability of the Coptic race.

Turning our attention to the "mixed" group, we find that on the whole the distinguishing features of the Moslem Upper Egyptians are here accentuated. Although the nose alters little, the lips are more frequently thicker, the hair and eye colour is darker, and the hair inclines more to a negroid character than is the case in Egyptians of unmixed parentage.

B. COMPARISON OF MEASUREMENTS AND INDICES.

We now pass to a comparison of certain measurements made (i) upon the (unmixed) Moslems of Upper and Lower Egypt, (ii) on the Copts of Upper and Lower Egypt, and (iii) on the Moslems of "mixed" parentage. The numbers of individuals examined, the averages, their probable errors, standard deviations and coefficients of variability are set forth in the accompanying table.

TABLE XI.

Group.	Head length.				Head breadth.				Auricular height.				Horizontal circumference.				Nasal height.			
	No.	Av.	σ	C.	No.	Av.	σ	C.	No.	Av.	σ	C.	No.	Av.	σ	C.	No.	Av.	σ	C.
Moslems ...	369	194·56 ±0·21	6·09	3·13	369	144·29 ±0·15	4·34	3·01	173	145·84 ±0·24	4·65	2·83	116	547·19 ±0·88	13·16	2·40	510	48·29	—	—
Copts... ...	44	193·05 ±0·62	6·13	3·17	44	143·09 ±0·52	5·09	3·56	23	146·39 ±0·58	4·15	2·83	17	548·41 ±1·97	12·01	2·19	42	47·76 ±0·37	3·41	7·14
"Mixed" ...	64	195·98 ±0·48	5·65	2·88	64	145·14 ±0·39	4·64	3·20	43	146·77 ±0·50	4·90	3·3	16	547·25 ±3·47	20·60	3·76	58	47·38 ±0·30	3·43	7·24

Group.	Nasal breadth.				Cephalic index.				Upper facial index.				Nasal index.				Gnathic index.			
	No.			C.	No.	Av.	σ		No.	Av.	σ	C.	No.	Av.	σ	C.	No.	Av.	σ	C.
Moslems ...	514	36·6	—	—	369	74·26 ±0·10	2·86	3·85	391	48·39 ±0·12	3·53	7·29	349	75·83 ±0·28	7·67	10·12	120	101·80 ±0·25	4·01	3·94
Copts... ...	43	35·93 ±0·28	2·72	7·57	44	74·00 ±0·35	3·48	4·70	42	48·57 ±0·33	3·18	6·55	42	75·77 ±0·85	8·16	10·77	15	100·86 ±0·61	3·53	3·50
"Mixed" ...	59	38·24 ±0·28	3·22	8·42	64	74·10 ±0·24	2·86	3·86	62	48·12 ±0·24	2·68	5·57	56	79·41 ±0·74	8·21	10·33	25	101·35 ±0·55	4·07	4·02

We will now examine whether there are any significant differences in measurement between the Moslems and Copts. The excess in head length (1·56 mm.) and in head breadth (1·20 mm.) of the former over the latter is not great enough in relation to the probable errors of these differences ($\pm$ 0·65, $\pm$ 0·54) to be with certainty significant. These differences and those in nasal height and breadth are possibly in part due to the fact that the Moslems are selected for the army on account of their stature, while the Coptic soldiers, whose superior education leads to their frequent employment in military clerical work, undergo perhaps a somewhat less rigorous test of physique. It is conceivable that the average measurements of breadth and length of head and nose run somewhat higher in a taller group of men. Even making this allowance, the diminution in nasal breadth is greater than that in nasal length (*cf.* Table XII). On the other hand, in the measurements of auricular height and horizontal circumference, the excess is on the side of the Copts; but here again the probable errors of the Coptic measurements are too great to make certain that the difference is not accidental.

Turning to the comparison of indices among the Moslems and the Copts, we find that the cephalic, the upper facial and the nasal indices are almost identical, while the difference in gnathic index is not large enough to be with certainty significant. We might at first sight be led to conclude that metric methods fail to reveal *any difference at all* between the Copts and the Mahommedans, although other differences to which attention has been already drawn (*e.g.*, the relative rarity of dark skin, full lips and spiral hair among the Copts) undoubtedly exist. But in drawing such an inference we should be leaving unnoticed the fact that whereas the Moslem data in Table XI have been obtained as much from Lower as from Upper Egyptian measurements (*cf.* Table IX), the Coptic data, on the other hand, are derived predominantly from an Upper Egyptian source. Of the forty-two Copts measured, only ten belong to Lower Egypt.

The effects of this undue weighting of the Coptic data with Upper Egyptian material come out sufficiently well in a study of the nasal index. We saw in Table XI, that the Copts have a nasal index of 75·77, while the Moslems have the almost identical index of 75·83. If now we differentiate between Upper and Lower Egyptian Copts, we find that the Coptic nasal index for Upper Egypt is 76·76, and for Lower Egypt 72·61, in each case noticeably lower than the corresponding values for the Moslem population (*cf.* Table II). There can thus be little doubt that the same features, *i.e.*, the increasing negroid characters, which we have already traced in the case of the Moslem population, also occur among the Copts, as we proceed to an increasing distance from the Mediterranean shores. But throughout alike in Upper and in Lower Egypt, the Copts are relatively less negroid than the Moslems.

Now let us turn to a comparison of the Moslem with the "mixed" group, remembering that the latter are the offspring of marriages between Egyptians of different parts of Egypt, and between Egyptians and Sudanese or other foreign peoples, as set forth on p. 264. Here again the greater head length and head breadth of the "mixed" group is not with certainty significant, the difference falling short of the requisite value, viz., more than thrice the probable error of the difference.

Neither cephalic, nor facial, nor gnathic index shows any sensible difference. It is only in nasal breadth and in nasal index that we meet with a striking contrast between the two groups.

The following figures are here given to show the average nasal length and breadth for the individual provinces, with which the "mixed" group may be compared.

TABLE XII.

	Provenance.	No.	Nasal length.	Nasal breadth.
Moslems	Ḳena and Girga	134	47·63	37·10
	Assiut and Minia ...	91	47·78	37·05
	Menufia	80	48·36	37·16
	Gharbia	102	48·88	36·16
	Daḳahlia	103	48·96	35·89
	Copts	42	47·76	35·93
	"Mixed"...	58	47·38	38·24

It will be seen that none of the provinces are so wide in nasal breadth or so short in nasal length as the "mixed" group.

As regards the difference in nasal index between the Moslems and the "mixed" group, we note that while the difference amounts to 3·58 units, its probable error is $(\pm\sqrt{(0{\cdot}25)^2+(0{\cdot}74)^2}) \pm 0{\cdot}78$, so that the difference is undoubtedly beyond the likelihood of accident. It is true that in Table X we found no evidence of such difference in comparing the nasal forms of Egyptians, mixed and unmixed; but we must remember that we were there concerned with the proportion of abnormally broad to abnormally narrow noses, as determined by the unaided eye. This proportion might well be the same in the two groups despite a difference in the mean value of their nasal index. In point of fact, Table X does serve to corroborate our present conclusion, as it shows that the lips are more frequently thicker, the hair and eye colour is darker, and the hair inclines more to a negroid character among the Egyptians of "mixed" parentage.[1]

[1] It is very interesting to study the results of this comparison, between the "Moslem" and the "mixed" groups, beside the comparison instituted by Dr. Arthur Keith (*Man*, 1906, 2), between a series of ancient Egyptian crania and a series of which one-eighth were negro crania and the remainder were ancient Egyptian crania. No significant differences between the two series were found in respect of average head length, head breadth, cephalic index, and upper facial height. There was a possibly significant difference as regards facial breadth and upper facial index. Unfortunately no nasal measurements were available for comparison.

To some extent, the relation between this "mixed" group and the general Moslem population may be regarded as similar to that between the general Moslem population and the Copts. The Copts differ from the general Moslem population in having kept free from Arab, Levantine and Sudanese admixture during the past 1300 years. So, too, the general Moslem population differs from the "mixed" group by an absence of heterogeneous elements in its immediate parentage. We might therefore expect that the greater breadth of nose, the higher nasal index and the more negroid character of the skin, hair, etc., which are the distinguishing features of the "mixed" group, would also distinguish the Moslems from the Copts. This we have found to be the case. We may also note that the only index which appears to be at all sensibly affected by the admixture of Egyptians with outlying peoples is the nasal index.[1]

C. THE COMPARATIVE VARIABILITY OF THE COPTS AND MOSLEMS.

At one stage of this enquiry, I thought that the Copts showed greater individual variability in the above measurements than the Moslem population, but the subsequent calculation of further constants has convinced me that no appreciable difference in variability exists between them. Evidence is similarly wanting to show that the Moslems are more homogeneous than the "mixed" group. One might have expected that the introduction of Turkish and Sudanese parentage would have led to a perceptibly greater variability, say in the upper facial, nasal and gnathic indices of the offspring. In point of fact, the coefficient of variability of the facial index is considerably lower for the mixed group than for the general Moslem population, while the coefficients of variability of the other indices are not sufficiently different to be significant.

The general truth seems to be that there is so wide a variability in the individual measurements and indices among the different provinces of Egypt, that the introduction of foreign blood (in not too great amount) makes no perceptible impression upon determinations of the average or of the variability. Under these conditions the peoples with which Egypt is surrounded on the west and north-east —the Libyans, Syrians, Bedawin and other Arabs—are not so different physically from the Egyptians as to be able appreciably to modify the measurements and indices which we have had under consideration. On the south, however, the Sudanese are capable of effecting such a change. It is unnecessary here to repeat the already studied results of Sudanese admixture.

SUMMARY.

1. The cephalic index, probably has a constant mean value throughout the various parts of Egypt.

The only difference in cephalic index, likely to be significant in the present material, occurred between the (more dolichocephalic) provinces of Giza and

[1] There is good reason to suppose, however, that slight changes in facial and gnathic index are correlated with change of the nasal index (*cf.* pp. 241, 262).

Baheira and the (less dolichocephalic) province of Daḳahlia. But these three provinces lie so near together, and there is for other reasons so little ground for suspecting any ethnic difference between them, that we are justified in believing that the found difference is in reality accidental and that it would vanish if a still larger number of individuals were examined.

2. The nasal index increases in Egypt as we pass from the more northern to the more southern provinces.

3. Probably the upper facial index decreases and the gnathic index increases in the same direction.

4. The mean length, breadth, and auricular height of the head is constant throughout the various provinces of Egypt.

5. There is some likelihood that, as we pass from Lower to Upper Egypt, the lengths of the tibia and radius increase relatively to the lengths of the femur and humerus respectively.

6. The colour of the eye and skin darkens, the frequency of spiral and crisp hair and of unusually broad noses increases, as we pass in the same direction.

7. It is possible that three provinces, Menufia, Ḳaliubia and Sharḳia form an exception to the conclusions 2, 3, 5 and 6. But in two of these provinces a sufficient number of measurements was not obtained.

8. The average colour of hair, shape of head, face and ear, and degree of prominence of chin appear to be constant throughout different parts of Egypt.

9. There is no evidence that the peoples of various provinces differ in variability.

10. It has not been found possible to resolve distribution curves of measurements or indices into two or more component curves, each corresponding to an underlying "ethnic type."

11. The Copts are fairer in eye and in skin colour, they have straighter hair and thinner lips than the Moslems. The nasal index, alike for Upper and for Lower Egyptian Provinces, is distinctly lower among the Copts than among the Moslems. It is lower among the Copts of Lower Egypt than among those of Upper Egypt.

12. The "mixed" group is darker, with a tendency to more spiral hair, broader nose, thicker lips than the unmixed Moslems. The nasal index is distinctly higher among the "mixed" group.

13. Neither in the Copts nor in the "mixed" group was any *significant* deviation from the general Moslem population discoverable, as regards head measurements, cephalic, facial, or gnathic indices.

14. There is no appreciable difference between the variability of (i) the Copts, (ii) the (unmixed) Moslem, and (iii) the "mixed" (Moslem) group.

NOTES ON THE ETHNOGRAPHY OF THE BA-HUANA.

By E. Torday and T. A. Joyce, M.A.

[With Plates XXXII–XXXIV.]

Introduction.

The Ba-Huana, one of the principal peoples inhabiting the banks of the Kwilu, an affluent of the Kasai, may be divided into two sections, the Ba-Huana proper or Ba-Wangana, extending along the river banks from the Inzia River to the Luzubi River, and the Ba-Honi south of the Luzubi to the mouth of the Kwengo. They are completely settled in the country they inhabit. They claim to be related to the Ba-Teke, the bulk of whom inhabit the region between the Alima River and the Congo in French territory, but who are also found in scattered colonies on the Belgian side.

It would appear that the Ba-Huana first invaded the Kwilu under the leadership of one great chief, but that they spread so far down the river banks that the maintenance of a single central authority became impossible. Consequently, whereas the Ba-Huana to the north of Chimbane are all under the suzerainty of one paramount chief, to the south of that point the authority of the latter is unrecognised and, indeed, hardly a matter of knowledge.

First as regards the Ba-Teke, from whom the Ba-Huana claim descent. Our knowledge of this tribe can hardly be said to be in a satisfactory condition; it is known that they occupy the region between the Alima and the Congo, as stated above, and that they act as intermediaries in trade between the Ba-Yanzi and Ba-Kongo.[1] Mense[2] relates them with the inland tribes, and Johnston[3] states that they are recent arrivals from the high plateau watershed of the Ogowé. Guiral,[4] however, while stating that the Ba-Teke inhabit the Congo-Ogowé watershed, says that the Ba-Teke of the Ogowé have nothing in common with the Ba-Teke of Stanley Pool except the name. Baumann[1] and Wissmann[3] both bear witness to the presence of the Ba-Teke on the southern bank of the Congo, the former stating that the Ba-Mfumu (also written Wa-Pfuno) are one of their tribes. The latter are also mentioned by Mense.[2]

Ethnographical evidence is not of much assistance, in so far as our information concerning the Ba-Teke is scanty, and that which exists seems rather to contradict the native tradition than to confirm it. For instance, the particulars in which the

[1] Baumann, *Mitt. Anth. Ges.*, Wien, xvii, 160.
[2] *Journ. Anthrop. Inst.*, vol. xiii, 461.
[3] *Im Innern Afrikas.*
[2] *Zeit. f. Eth.*, Verhandl., xix, 625.
[4] *Le Congo Français.*

Ba-Teke resemble the Ba-Huana, circumcision[1], [2], fondness for red paint,[2] hair-dressing in the form of a *chignon*,[2] suspected cannibalism,[4] the shape of the hut roof, the use of the wooden pillow,[2] the placing of the dead man's pots on or in the grave[3], [2], the use of a pentatonic scale,[2] and the recognition of a malignant principle called *Olaghi*[5] (Ba-Huana *Moloki*), are of little importance and are characteristic of many other tribes also. On the other hand, there seem to be many respects in which the two peoples show considerable divergence.

Ba-Teke.	*Ba-Huana.*
Incised tribal marks on the face [1], [2], [3], [4], [5].	Scars rare among men, and if present only on the trunk.
Women clothed in two aprons, the larger of which hangs behind.[6]	Women wear a waist-cloth.
No verandah to the hut.[3]	Verandah to the hut.
Baskets used as moulds for pots.[2]	Pots made by hand only.
No ordeals.[2]	Poison ordeal.
Secret society called *Ndembo*.[5]	Apparently no secret societies.
Mild form of ancestor-worship.[3]	No trace of ancestor worship.
Anthropomorphic fetishes.[3]	No anthropomorphic fetishes.

Even the Ba-Mfumu, who, from their comparative proximity, might be expected to show a greater resemblance to the Ba-Huana, differ from them in the few respects concerning which we have information; for instance, they incise tribal marks on the face,[6] dress their hair over a cross-shaped wooden frame,[6] and erect mounds over graves.[3]

As for the Ba-Teke of the Ogowé described by Guiral,[7] the difference is even more marked. The latter file the teeth, sell as slaves women who have been found to have committed adultery, bury the dead in an upright position, use a totally different form of harp, employ as fetishes horns filled with a magical compound and decorated with feathers, and, finally, make use of poisoned arrows, throwing-spears and basketwork shields.

Thus existing evidence seems somewhat against the theory that the Ba-Huana are descendants of the Ba-Teke; at the same time this evidence is scanty, and tribal traditions are not lightly to be set aside. Once again we have a question which it seems safer to shelve pending further research.

In their ethnography the Ba-Huana show considerable similarity to the Ba-Mbala, colonies of whom are found scattered amongst them; and since the two peoples are conterminous and appear to be connected by ties of hospitality,

[1] *Journ. Anthrop. Inst.*, vol. xiii, 461.
[2] Johnston, *The River Congo.*
[3] Baumann, *Mitt. Anth. Ges.*, Wien, xvii, 160.
[4] Ward, *Five Years with the Congo Cannibals.*
[5] *Notes Analytiques sur les Collections Ethnographiques du Musee du Congo*, tome I, fasc. 2.
[6] *Zeit. f. Eth.*, Verhandl., xix, 625.
[7] *Le Congo Français.*

considerable interchange of customs, etc., has doubtless taken place. At the same time, they exhibit striking divergences in certain respects. These may be summed as follows:—

Ba-Mbala.	*Ba-Huana.*
No circumcision.	Circumcision general.
Scars and tattooing practically universal.	Scars rare among men; tattooing not found.
Extended burial.	Contracted burial.
Inheritance in the first instance by sister's son.	Inheritance in the first instance by brother.
Children belong to the father.	Children belong to the maternal uncle.
The crop belongs to the head of the family.	The crop belongs to the community.
No avoidance of relations by marriage.	Avoidance of certain relations by marriage.

The last custom is peculiarly interesting, since the tabu is of a very unusual type. The man must avoid his wife's parents, but the woman is expected to show great respect to her parents-in-law and to visit them; in her case the tabu is laid on her intercourse with the maternal uncle of her husband. Like the northern Ba-Mbala, the Ba-Huana are cannibals from deliberate choice, and in this connection it will be as well to mention that, since the publication of the paper on the Ba-Mbala in *Journ. Anthrop. Inst.*, xxxv, 398, fresh information has arrived to show that the latter people are divided ethnographically into two sections, a northern and a southern, of which the paper just quoted refers only to the former. The authors hope shortly to publish a brief note on the Southern section, showing in what respects they differ from the Northern; in the meantime it may be said that the former are distinguished by the fact that cannibalism is never found among them. This fact gives rise to the question whether the Northern Ba-Mbala have acquired the taste from the Ba-Huana, or whether the Ba-Huana have adopted the habits of the northern Ba-Mbala in this respect, and the Southern Ba-Mbala have dropped the custom owing to association with the Ba-Yaka, which seems less likely.

In the section on Psychology (p. 276) a short protest is made against the almost universal habit of judging the intellectual capacity of a people by their skill in arithmetic, and facts are cited showing that the negro is, in certain circumstances, the superior of the white man, and that the development of the faculties stands in direct relation to the environment. Of course it is not meant to imply that the negro is, on the average, the intellectual equal of the European; the point which it is attempted to emphasise is that each is admirably adapted to his surroundings, and therefore it is unfair to compare their respective faculties by simply transferring, as it were, one to the environment of the other; it is merely the first half of the story of the fox and the crane without the compensating sequel. And this has a direct bearing upon the question of the civilisation of the negro; it is ridiculous to clothe a primitive people in a civilisation made to the measure of someone else and expect the result to be a good fit. Human nature is plastic, but not so fluid as immediately to take the form of any mould into which it is poured. "In structure and inherited tendencies," writes Mr. Clodd,[1] "each of us is hundreds of thousands of years old," and, individually, the white man, in his immaturity, passes through a stage which may well be compared to the "perfect" stage of the negro; but though he belongs to a later, and therefore higher, stage of evolution, the advance has been attended by certain sacrifices. To take an analogy from the insect world; the nervous system of the perfect insect is more elaborate than that of the *larva*, but "certain nerves, which supply many structures with vital force in the *larva*, become atrophied and withered, as it were, in the *imago* (or perfect insect) when those particular structures are no longer required, or when they do not form important parts of the insect's economy."[2] The analogy is not perfect, but it will serve as an illustration, and, at any rate, no one would judge a *larva* by *criteria* taken from the perfect insect.

Finally the Ba-Huana would seem to offer a magnificent field for enquiry to the physical anthropologist, since, from their peculiar social system, the investigator may be practically certain that all free Ba-Huana are the descendants of pure-blooded ancestors on both sides, and that all slaves are either foreigners or have foreign blood in their veins.

In collecting the following information, use was made of the African ethnographical *questionnaire* issued by the Ethnographical Department of the British Museum.

PHYSICAL.

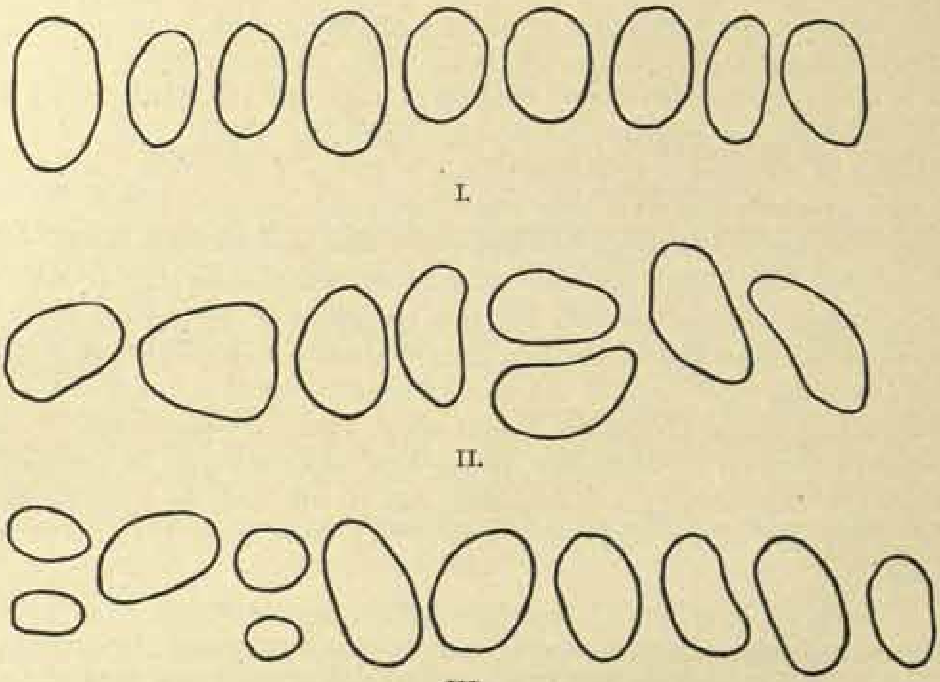
Pigmentation.—Skin, reddish-brown to chocolate; eyes, greenish-black, the "white" of the eyeball strongly tinged with yellow.

Hair.—Of the finest black, and usually woolly, but individuals with dark brown, curly hair, are frequently to be observed.

Of the latter variety of hair three samples were collected, all from adults. These were submitted to Dr. R. N. Salaman, who very kindly undertook to cut sections for the microscope and to whom the authors are indebted for the accompanying drawings. (Fig. 1.) The hair collected differs considerably from that considered typical of Africans, in the fineness of its texture as well as its comparative straightness. As might be expected the section is unusually rounded, sample No. 1 exhibiting this characteristic in a very marked degree.

Stature.—Though well-built, the Ba-Huana are inclined to be rather short, and are not gifted with the powers of endurance possessed by the Ba-Kongo. They can, however, abstain from food for forty-eight hours without much difficulty.

[1] *Animism*, p. 46.
[2] Professor Duncan, *Transformations of Insects*, p. 23.



I.

II.

III.

FIG. 1.

Odour.—As a general rule the Ba-Huana, who are an exceedingly clean people, have no smell appreciable by a European accustomed to live amongst natives; but certain individuals are to be found who are distinctly offensive. This characteristic, which is by no means to be attributed to unclean habits is, when present, equally disagreeable to their fellows, who say that there is no remedy for it.

PSYCHOLOGY.

As usual in African tribes, youths of about ten or twelve years show the greatest intelligence. In dealing with this subject it will, perhaps, not be out of place to say a word of warning with regard to the tests which are too often applied as the sole *criteria* of native intelligence. Travellers are too often wont to judge the mental capabilities of savages by their proficiency, or rather the lack of it, in mental arithmetic. Now the latter, though a simple matter to a European from the very circumstances of his up-bringing and daily life, is practically unknown to the native, who has no occasion to make use of it; indeed the following conversation with a Mo-Huana youth may be regarded as typical almost all over savage Africa.

"How many eggs have you there?" "One less than ten." "How many is that?" The boy opens his fingers, bends down one and counts "One, two, three ..." up to nine. "Good. I shall take all but one; how many must I pay for?"

"Let me count them." Or again: "How many are two and two?" "Two and two what?" "Two eggs and two eggs." The boy, doubtfully, "Five." Similarly with regard to time, which for the native is a matter of absolutely no consideration: "How old are you?" "How can I know that?" "You remember your little brother's birth; how old is he?" "I don't know." "How many months are there in a year?" "I never counted." "How many days in a week?" The boy counts on his fingers: "*Buvuka, mokili, okojo, pike;* four." The questions of number and time have, in fact, very little bearing upon the everyday life of the native. There is, of course, a reverse side to the picture; take, for instance, a subject which is of little importance for the average modern European, but of the greatest moment for the native, the subject of hunting. Travellers have often commented on the intimate knowledge of natural history possessed by natives, but few have realised that practically *every* individual has a knowledge of the local fauna and flora which in Europe can only be paralleled by that of the specialist. In the vocabulary appended to the paper on the Ba-Mbala[1] the names of sixteen species of field-rats are given; the Ba-Huana distinguish eleven species of this animal. They know every bird, not only by sight, but by its cry, or by its nest. Plants are carefully distinguished, and it is only in speaking to Europeans that general terms such as *Matiti* (grass) are used. The precise food of each animal is known, and every insect has its special name. Their memory is good as far as figures are not concerned.[2] Moreover if they have once been in a place they know every tree and every bush; but since they do not travel much their knowledge of the geography of their country is necessarily limited.

This superiority in what may be called general observation is particularly striking in cases where the faculty of hearing is concerned. Everyone knows how difficult it is to tell the exact direction from which a sudden sound comes; the native, however, can indicate not only the direction but the distance. For instance, on hearing the call of a partridge, he can point out the exact bush in which the bird is, even though it may be two or three hundred yards' distant. Judged by such a test, the native is as superior to the European as the latter to the former in mental arithmetic. Their conversation is voluble and picturesque; they are hospitable to strangers.

Numerals are as follows:—

1. *Momo.*	6. *Binin.*	20. *Makumole.*
2. *Bili.*	7. *N'tsema.*	30. *Makumitatu.*
3. *Matutu.*	8. *Nan.*	100. *Kam.*
4. *Wana.*	9. *Una.*	1,000. *M'pfun.*
5. *Watan.*	10. *Kum.*	

Time.—See p. 295.

[1] *Journ. Anthrop. Inst.*, vol. xxxv, p. 423.

[2] "My body servant knows each of my sixteen keys, and each of the volumes which compose my small travelling library, twelve in number, by the name of the author."

Length is computed as follows:—(1) by the "hand," *i.e.*, from the tip of the outstretched middle finger to the lowest point on the palm which can be touched by the same finger when flexed; (2) by the cubit, from tip of the middle finger to the elbow; and (3) the span, between the outstretched arms.

Value.—See p. 283.

Ornament and Dress.

Tattooing proper is not practised; cicatrisation is uncommon amongst the men, and, when found, is confined to a few lines round the navel. Women usually ornament the arms, shoulders and stomach with scars; these are produced by simple incisions in the skin. The operation is performed by the mother or some other woman celebrated for her skill, when the girl is about four or five years old.

The hair, among women, is dressed at the back of the head to form a sort of *chignon* or a bunch of ringlets; the latter, called *Winzeke*, are painted with red clay. The fore part of the head is shaved and painted black with soot. The beard and moustache are removed by young men, and, though men of advanced years often grow a sparse beard, the majority shave the moustache. A comb is often worn in the hair, but no other form of ornament. (Plate XXXIII, Fig. 6.)

Painting with red clay or soot mixed with palm-oil is common and is practised with the object of increasing beauty.

Ornaments are not worn in the ears, nose or lips; bracelets of iron are found, and men often wear a hair from the tail of the elephant round the neck. No special ornament is worn to designate rank or social status.

Clothing is worn by all except small children, and consists of cloth made from palm-leaf fibre. A piece of this cloth is worn round the loins by both sexes, and forms the main article of attire; men of importance wear a second cloth over the first, extending to the calf.

No covering for the head is worn as a rule, but women, when they cut their hair, will wear a piece of cloth until it has grown again. This head-cloth is called *Hembe*. Nothing is worn under the waist-cloth, but women often attach to the latter a number of small receptacles made from the necks of gourds (a form of ornamentation used also by the Ba-Yanzi) and a few beads.

The clothes of the deceased are buried with him.

Food.

The chief food of the Ba-Huana is manioc and maize, *Chikwanga*, or boiled manioc flour called *Luku*; *Chikwanga* is purchased ready prepared from the Ba-Yanzi. The following are also used as food:—

All quadrupeds, except house-rats and -mice, and the shrew; the latter on account of its unpleasant flavour.

All birds, except the night-jar; no sacred character is attached to the latter.

All fish, except that called *Dziri*, probably owing to its unwholesome nature, as the Ba-Yanzi also abstain from it.
Insects such as locusts, crickets, termites, caterpillars, etc.

Women are forbidden to eat owls or others birds of prey, but are permitted to eat frogs, from which men are obliged to abstain under penalty of becoming ill. From this last fact the Ba-Mbala call the Ba-Huana *Koto*, or "Froggies."

The blood of animals is partaken of boiled.

Earth is eaten in small quantities, and is said to be good for the stomach.

Salt is eaten as a stimulant, and salt water is drunk with the same idea. Salt is made locally from ashes, but the imported (European) variety is preferred.

Native pepper, *Pili-Pili*, is used in great quantities as a seasoning.

The only native drink is palm-wine; ardent spirits are unknown.

Palm-oil is used in cooking, but the preparation of oil from ground-nuts is unknown.

All food is boiled, except insects, which are fried; termites, however, are eaten raw. The curing of meat, whether by smoking or any other process, is unknown. Cooking is exclusively the work of the women; cooking-pots are washed after use.

The Ba-Huana eat before sunrise and after sunset only; men and women eat together, but only the married eat off the same plate. The host drinks first and the guest after him. Drinking festivals are held at marriages.

Fire is produced by means of flint and steel, the latter imported originally from the Ba-Mbala, though at the present time a certain amount of European iron is in use. The only fuel is wood. There is no trace whatever of fire-worship.

Cannibalism is general, though practised by men only; the habit cannot be ascribed to a craving for animal food, since game is plentiful in the Ba-Huana country. It is, in fact, due to a sincere liking for human flesh, of which the natives are in no way ashamed. The bodies of enemies are consumed, and expeditions are arranged for the purpose of recruiting the larder. No special ceremonies are observed in connection with cannibalism, and the flesh is prepared and boiled in the same fashion as any other meat. The blood is not touched, and the sexual parts are thrown away; the head is placed in water until the flesh rots away, and the skull is preserved as a trophy in a special hut.

Tobacco is the only narcotic used, and is smoked in a clay pipe similar to the *Kinzu*[1] of the Ba-Mbala. Pipes are also improvised from the stalks of banana leaves.

Hunting expeditions are organised by the chief, but directed by some old and experienced individual; the entire male population of the village participates, and the hunters are prohibited from having intercourse with their wives on the night preceding the hunt. The game is driven by firing the grass. The individual who inflicts the first wound receives the head of the animal, and, in the case of an

[1] Torday and Joyce, *Journ. Anthrop. Inst.*, vol. xxxv, p. 405.

elephant, the ivory goes with the head, half, however, must be given to the chief. The rest of the spoil is shared equally among the crowd. Hunting is not allowed outside the local boundaries.

Before a hunting expedition, the hunting-fetish—a little charcoal kept in a bag—is sprinkled with palm-wine, and, if the hunt has been successful, a tuft of grass dipped in the blood of the quarry is subsequently presented to it. Nets are used to catch small antelope, but these nets are imported from the Ba-Yanzi, from whom the custom also has, in all probability, been borrowed.

Bows and arrows are the only weapons used, the latter being identical in pattern with those used in war (see WAR, p. 289); the natives are good shots on the whole, but cannot hit a flying bird.

Fishing by means of baskets is practised by women; automatic fish-traps (Fig. 2) with a falling door are set by men, and baited with meat or *Chikwanga*. No poison is used in fishing; fish is eaten fresh.

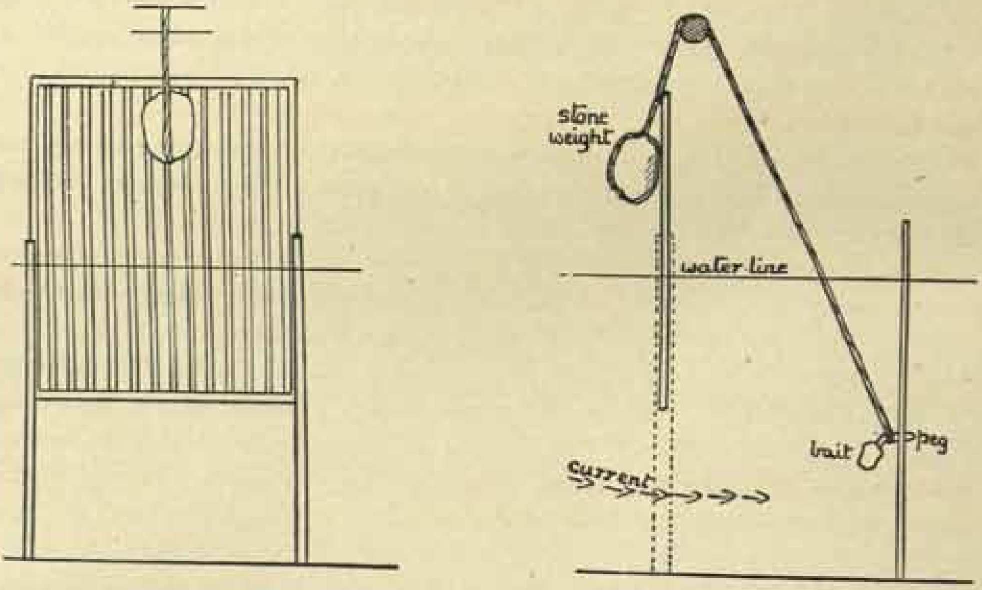


FIG. 2.

Domestic animals may be considered under this heading; these consist of goats, cats, the long-legged variety of fowl common throughout the Kasai region, a few pigs, and the red-haired Central African dog, the last used for hunting. When sick the only remedy applied to animals is bleeding, and this is common in the case of goats; the method employed is to cut off a portion of the ear. Goats and pigs are castrated. (A set of the knives by means of which the operation is performed is shown in Plate XXXII, Figs. 8 and 9. The knives are similar, but of different sizes; the blade is of iron, scimitar-shaped, with a single edge and tanged; the handle is of wood, increasing in diameter towards the butt and bound with iron, copper and brass wire. The butt is ornamented with four brass studs.

The sheath is formed of two flat pieces of wood, with a covering of iguana-skin sewn up one side with bark-fibre.)

Domestic animals are not supposed to contain the souls of the dead, though the latter are often believed to take the forms of elephants, hippos, buffaloes and leopards. (See RELIGION, p. 291.)

AGRICULTURE.

The work of clearing is carried out by men; the rest is left to the women. The plants cultivated are manioc, ground-nuts, a special kind of pea resembling the latter, small brown beans, gourds, bananas, maize, sweet potatoes in small quantities, cabbages and spinach. The land is cleared during the dry season, and, as soon as the first rain falls, sowing begins. Two successive crops of manioc are never planted in the same field, though a crop of manioc is often followed by a crop of peas or ground-nuts. The first is planted by sticking small slips of it into the ground, the two last are shelled before being sown.

The crop is the property of the community. Charms are placed only in fields where ground-nuts are sown, and consist of sticks, gourds or other small objects smeared with a little clay; however, the natives do not seem to place much reliance on them. Before sowing, the grass covering the fields is burnt and the ashes mixed with the soil; irrigation is not practised. The chief foes to agriculture are elephants, who visit the plantations at night. There are no superstitions connected with agriculture.

HABITATIONS.

The huts of the Ba-Huana are of two types, corresponding respectively to those of the Ba-Mbala and those of the Ba-Yanzi. The first have already been described in a previous paper[1]; the latter are built of straw and palm-leaves on a rectangular ground-plan, the transverse section forming a pointed arch; there is a verandah in front, and the interior is divided into two compartments. The roof is secured against wind by means of large branches laid across. To the front of the house, under the verandah, are attached various objects, such as skulls of animals slain in the chase, small packages containing "fetish," empty eggshells, arrows, etc. The villages are built at some distance from the river bank and are rather straggling; the wives of an individual live each in her own hut, and these huts are arranged so as to form an irregular quadrangle, which is connected by a narrow path with the next and similar group.

Unmarried men have each their own hut.

Among the Ba-Huana proper, assemblies are held in the middle of the village under a shelter called *kati*; among the Ba-Honi, also in the middle of the village, but under a kola-tree.

[1] Torday and Joyce, *Journ. Anthrop. Inst.*, vol. xxxv, p. 407.

Small houses on piles about a metre in height are constructed for fowls, and stables for goats are built on the level.

There are no granaries; the only produce stored consists of ground-nuts, which are placed in enormous baskets and either buried or hung on trees.

Crafts.

String is made from the twisted fibres of a plant called *ivungu*; these are obtained from the stem, which is first soaked in water, then dried in the sun and beaten. Palm-fibre, *pussu*, is also twisted to form string.

Nets are not made locally, but are imported from the Ba-Yanzi.

Hides are prepared by men, who simply dry them in the sun; the hides of all the larger animals are so treated and the hair is not removed.

Weaving is practised; strips of *pussu* are woven on a loom[1] to form a plain cloth without patterns. Similar cloth with inwoven diaper patterns is imported from the Ba-Yanzi.

Basket-work is made with considerable skill. (See Appendix.)

Pottery is made exclusively by women; local clay is used, and the pot is built up on a base, a broken vessel being utilised as a support. When fired, the pottery is hard and of a red tint; a vegetable varnish is usually applied all over; the commonest form of vessel is bowl-shaped (Fig. 3), but flat saucers and narrow-necked bottles with spherical bodies are also found.

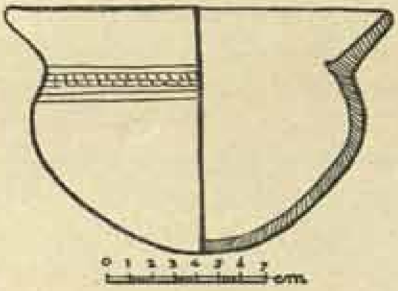


Fig. 3.

There is no special form of pottery for funerary purposes, but the pots belonging to the deceased are broken and put on the grave. Gourds are used as substitutes for pots.

Metallurgy is practised; although iron is, of course, the only native metal used, imported copper and brass are worked in considerable quantities. The southern tribes, or Ba-Honi, alone understand the smelting of iron, and the northern tribes obtain the metal from them.

Skill in handicraft is respected; smiths in particular are highly esteemed.

Children engage in work from an early age.

Navigation and Swimming.

Boats of the "dug-out" type are manufactured by means of adzes and without the use of fire; they are from 4 to 5 metres long and very light. The men paddle in a sitting position, keeping time; two individuals form a crew, but the boat can

[1] One of these looms has been sent to the British Museum.

carry two or three passengers as well. The paddles are about 1·75 metres long. Women do not paddle.

Swimming is universal; the hands and feet are used alternately, in dog-fashion. They also dive very well, head-foremost, and can remain under water for a long time. They keep the eyes open and can attain a considerable depth.[1]

TRADE AND PROPERTY.

Currency.—The unit is the small shell called *djimbu* (*olivella nana*), and values are reckoned as follows:—

10 *djimbu*	=	1 *mitako* (brass rod, length 16·5 cm., diam. 3 mm.).
20 *mitako*	=	1 fowl.
100 *mitako*	=	1 "salt" (from 1 to 1½ kg.).
2 "salts"	=	1 he-goat.
4 "	=	1 big she-goat.
10–20 "salts"	=	1 female slave.
20 "salts"	=	1 male slave.

The Ba-Huana are great traders; their principal imports are iron (northern tribes only), cloth and *chikwanga* (boiled manioc flour; see FOOD, p. 278); they also act as middlemen in the ivory and rubber trade, obtaining these commodities from the Ba-Yanzi and Ba-Mbala. The sale of agricultural produce is exclusively in the hands of women; the rest, including that of live-stock, is managed by the men. A market is established at a spot on a road within equal distance of several villages, and is held every fourth day. Credit is given, but no interest is charged; in case of non-payment, goods belonging to persons from the same village as the debtor are seized.

In dealing with Europeans, and doubtless with each other, they attempt many little tricks; a favourite device is to say that the goods offered have been brought with the object of finding out whether the customer pays good prices, and that a considerable quantity is waiting for his use at the village if he is found to be generous. The price asked at first is usually about ten times the amount expected. Curiously enough, they all use nearly the same words in playing this particular trick. Besides this, there is a form of the "confidence trick." One of the men will take the European aside and tell him, "I know the price they ask is too large, but I heard them say on the road that if the white man gives them so much (naming a price still double the worth of the goods), they will bring all their wares to him and never sell to anyone else. Take the advice of a friend, and pay them what they ask, and all the people will flock to you and sell you their goods at low prices." Sometimes they will wax sentimental: "Who is your friend? Is it not I? Why will you not pay a good price to the only man who really loves you?

[1] "To test the depth to which they can dive, I have dived with them, and suffered from the pressure of the water in my ears."

The others would not come to you, but *I* said, '*Deke* (Mr. Torday's native name) is our chief, go to nobody else,' and now you shame me!"

Land belongs, nominally, to the chief, but in reality to the community, and cannot be sold. Men alone can possess slaves, but other property can be held by any adult individual except a slave, who has no property. Poor people often combine to purchase a goat or a slave. There is no property in water. A creditor cannot seize the person of the debtor, but may seize his children or a wife who has already borne him a child; if the debtor dies, his brother is responsible for the payment of the debt.

Inheritance.—A man's heir is his eldest brother; in default, his eldest sister; in default, the eldest son of his eldest sister. If a man dies without heir his goods are burnt and his slaves become free. Widows cannot inherit the property of their husband. In the case of an orphan, the maternal uncle is the guardian.[1]

Government.

When the Ba-Huana first arrived in the Kwilu they were under the rule of one supreme chief; but, owing to the fact that they have spread over so wide a tract of country, the authority of the paramount chief has not only become weakened, but is even unrecognised throughout a large part of their territory. Between the Inzia and Chimbane, however, his authority is still maintained. South of Chimbane, each village recognises its petty chief only; the office is hereditary, and the eldest son of the eldest sister succeeds; if he is a minor, his (maternal) uncle acts as guardian. There are certain villages where the chief has died without heir, and in these cases the villagers live in a state of anarchy, but seem to agree very well nevertheless.

The position of chief is not very easy, owing to the fact that his council is composed of all the free adult males of the village; this council must be consulted when any matter of importance is to be decided. The principal function of the petty chief is to administer justice, and his income is derived solely from the fines which he inflicts in this capacity.

North of Chimbane, where the great chief is recognised, he levies a nominal tribute, consisting of a few goats or fowls, and decides matters relative to peace and war.

Social Organisation.

Kinship.—An attempt has here been made to show the terms expressing relationship by means of a diagram (Fig. 4). The black dots represent the members of a hypothetical family; the names radiating from each dot are each the term of

[1] "I am told by several that if an orphan is left without relations, *i.e.*, uncle, aunt, brother, grandparents, etc., he is left to shift for himself, or even, in the case of extreme youth, to perish by want. This, however, I do not believe."

relationship applied by the individual at the other end of the white line to the person in question. Thus the terms expressing the relationship between father and son are respectively *Moana*, applied by the father to the son, and *Tat*, applied by the son to the father.

Children are considered to belong to the family of the mother, and are sent to the village of the maternal uncle as soon as they arrive at puberty. In the case of slave-women, the children belong to the father, if a free man; if a slave, to the master of the mother. There is no difference in the treatment of legitimate and illegitimate children.

In actual intercourse the Ba-Huana address one another by their personal names, and not by terms of relationship, except in the case of parents and children, by whom the latter are employed. A younger man will address an elder as *Gwas*, or, if he wishes to show respect, as *Tat*. Great respect is paid to the eldest maternal uncle, and frequent presents must be made to him.

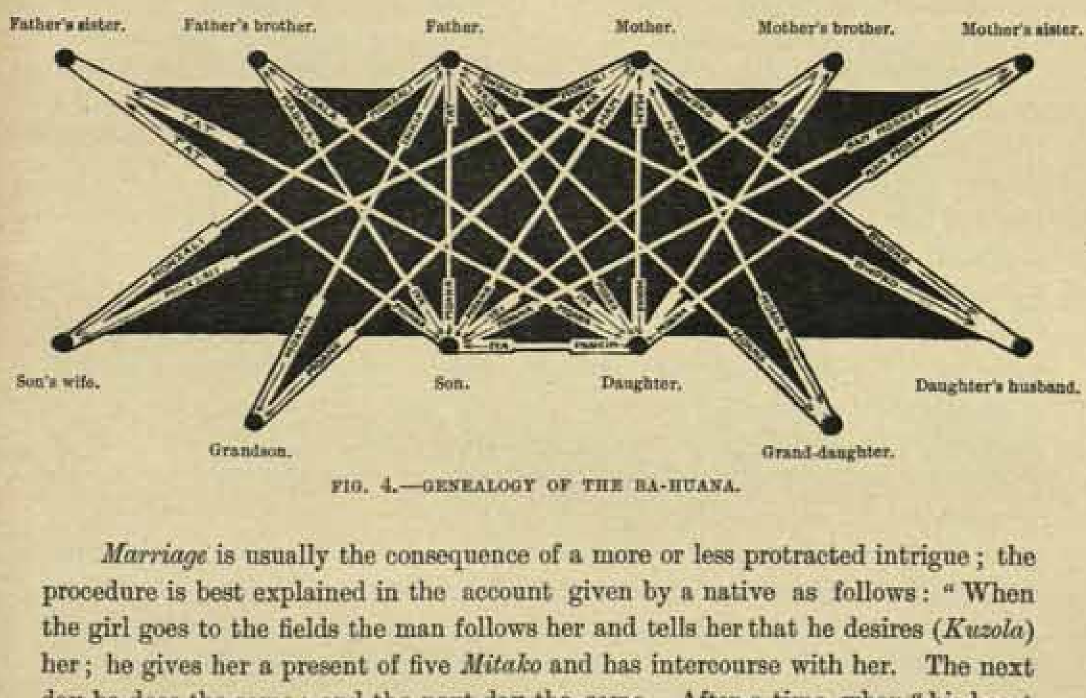


FIG. 4.—GENEALOGY OF THE BA-HUANA.

Marriage is usually the consequence of a more or less protracted intrigue; the procedure is best explained in the account given by a native as follows: "When the girl goes to the fields the man follows her and tells her that he desires (*Kuzola*) her; he gives her a present of five *Mitako* and has intercourse with her. The next day he does the same; and the next day the same. After a time, when "his heart becomes big," *or he has no more Mitako*, he goes to her mother, with a present of *Malafu* and a fowl, and tells her that he wants to marry her daughter.

"*Dzambo Lo!*" (I don't mind), says the mother, and the man takes the girl to his hut. Any man may marry any woman except his own mother and sister.

A peculiar taboo, similar to the *Hlonipa* of the *Zulu-Xosa*, exists between a man and his parents-in-law; he may never enter their house, and if he meets them in a road he must turn aside into the bush to avoid them. On the other hand, a wife may visit her husband's parents, and is expected to show them great respect, but she must avoid her husband's maternal uncle in the same way as he avoids her parents. Repeated enquiries as to the reason of this avoidance on the part of a man of his parents-in-law, elicited the invariable reply "that he was ashamed"; to a further enquiry of what he was ashamed, the answer would be "of marrying their daughter." No other reason could be obtained.

Child-marriage is not practised. Virginity is neither expected nor found in a bride. The woman follows her husband to his village, but her children, if a free woman, belong to her eldest brother and are sent to him when they arrive at puberty. At the same time, the children of a slave woman assume the nationality of their father; they are, however, slaves, and the father can sell them, and frequently does. Except in this case, the father, as might be expected, has very little authority over his children. The children of two slaves belong to the mother's master.

Divorce is not known, but if a woman becomes very ill, she returns to her parents until she has recovered.

Widows pass with other property into the possession of the heir.

Slavery.—The slave-system of the Ba-Huana is somewhat complicated; originally every Mo-Huana was a free man, and the slave population was composed of Ba-Yanzi and Ba-Mbala; but if, as occasionally happened, a Mo-Huana had children by a slave woman, these were forced to take the rank of their mother, while retaining, according to custom, the nationality of their father. In this way a slave population of Ba-Huana arose. The disability attaching to the children of slave women is of importance to those who study the Ba-Huana from an anthropological point of view, in so far as it may be regarded as certain that practically all free men are pure Ba-Huana, and that all slaves have at least some foreign blood in their veins. It is true that when a man dies without heirs his slaves become free, but such an event is so rare that for practical purposes the possibility may be disregarded. Slaves are purchased from the neighbouring tribes. The owner may not kill his slave, but is allowed to punish him; as far as occupations are concerned there is no difference between slave and free, but slaves cannot hold property, and if a slave works for a European he must give his wages to his master. Masters buy wives for their slaves, and the children are also slaves. As a rule the Ba-Huana are rather harsh in the treatment of their slaves, and frequently flog them; harshness is not considered reprehensible. The master is held responsible for debts contracted by his slave.

Circumcision is general; the operation is performed on boys of two days old by an old man; the part removed is thrown away. An uncircumcised adult has both *Bun* and *Doshi*. (See Religion, p. 290).

Amusements.

The Ba-Huana, in striking contrast to the Ba-Yaka, do not gamble.

Dances are held simply for amusement; the performers form two lines, the men in one, the women in the other, and perform the *danse du ventre*; at intervals a man and a woman advance towards one another and go through evolutions mimicking sexual intercourse.

Children play with sand or pieces of stick; no toys are constructed for them.

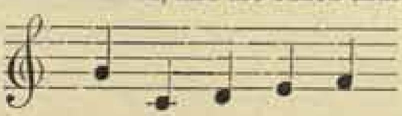
They are fond of music, and possess a good musical ear; their voices are clear and agreeable, the men tenor, the women soprano; both the chest and head voice are used. Singing is usually accompanied by the drum (*Goma*) if there are several performers; both sexes sing together.

Drums are made in a cylindrical form, tapering towards one end; the other is covered with a piece of hide, which is beaten with the hands.

The great war-drum is used only for sounding an alarm; there is no "drum language."

Friction-drums (*Puit*), similar to those used by the Ba-Yaka,[1] are also found.

Harps (*Gunge*) of the usual West African type occur, the strings of which are five in number, and consist of long fibres obtained from a fern; they are played with the two thumbs, and are tuned thus:—



Pianos (*Kimbanda*) are found, with metal (iron, brass or copper) keys on a hollow rectangular wooden sounding-board cut from the solid. (Plate XXXII, Fig. 7.)

FIG. 5.

Wind-instruments.—A simple pattern of flute called *Tsimbi* is in use; it is made of jointed cane and played with the nose, and is held in the position indicated in the accompanying sketch (Fig. 5). The upper end is partially closed by means of a kind of gum, and an alteration in the note is obtained by closing the other end with the right hand.

The Ba-Huana adopt foreign tunes very readily.[2]

[1] Torday and Joyce, *Journ. Anthrop. Inst.*, vol. xxxvi, p. 47.

[2] "Some time ago I had some natives of the Ubangi in Luano; their favourite song is now common among the Ba-Huana of the neighbourhood. It runs as follows:—"

Moderato.

D.C.

Morality and Justice.

The sexual morality of the Ba-Huana is conspicuous by its absence; the unmarried indulge as they please from a very early age, the girls even before puberty. Hence virginity in a bride is never expected and never found. Indulgence of this sort is not considered in the slightest degree shameful, and parents do nothing to check it.[1] Marriage seems to make little difference, in spite of the fine with which adultery is punished when discovered, and it may be said that the only time during which a woman contents herself with her husband is during pregnancy, since it is believed that adultery at this period would prove fatal to the child. Masturbation, both solitary and mutual, is frequent among children. Abortion (see Reproduction, p. 292) is common, the reason being that women are obliged to abstain from sexual intercourse during the long period of lactation.

As far as morality, other than in sexual matters, is concerned, the only misdeeds to which shame is attached are theft and breach of word; but the shame only endures until compensation is paid. Cheating and lying are considered a proof of high intelligence, and are respected as such. Hospitality is due to all fellow-tribesmen, and, strangely enough, is extended to Ba-Mbala, though denied to Ba-Yanzi. The coward is mocked, especially by the women.

All crimes against the person, even of chiefs, and fetishes are punished by fines; adultery and rape are considered personal injuries to the husband or father, and compensation is assessed by the chief; murder, which may be compensated, is not considered disgraceful; on the other hand, a murderer is respected as a clever and brave man; this idea is carried to such lengths that a man who has murdered his brother, to whom he is heir, is not fined at all.

In the case of the murder of a slave, the offender is fined and must provide another slave for the owner. Homicide in self-defence is not punished in any way. In cases of theft, restitution is ordered and a fine inflicted; if payment is refused, the thief's brother is seized; the mother is responsible for fines incurred by minors. Such matters are decided at a palaver, called *Tsa*, where the accused has the opportunity of stating his side of the question. Among the Ba-Huana proper, assemblies are held under a shelter, called *Kati*, in the middle of the village; among the Ba-Honi under a kola-tree. The chief assesses compensation, and inflicts fines, the latter forming his revenue. Drunkenness is not considered an excuse; thieving dogs and pigs are killed and eaten.

Suicide occurs, and the method chosen is by hanging, but it is considered shameful.[2] Where the parties in a suit belong to different villages, recourse is

[1] "I have received complaints from little girls about five years old that a boy 'had promised them five *mitako* and had only given three!' One of my men asked my permission to marry a girl who was certainly under six years of age; when I was angry and wanted to punish him the girl's chief told me, 'It is a long time now since she knew the first man.'"

[2] "All the cases of suicide known to me have, with one exception, been caused by grief arising from pecuniary losses; grief at the death of a brother was the motive in the excepted case."

often had to arbitration; the arbitrator is usually some important chief, and is paid by both sides.

Persons accused of crime (including demoniacal possession, see RELIGION, p. 291) are often subjected to the ordeal by poison. The drink administered is called *Kas*, and, as usual, vomiting alone can establish the innocence of the accused; death or natural evacuation are taken as sure signs of guilt.

WAR.

The chief instigators of war are the women; if the men are peaceably inclined and rather disposed to pocket an insult, the women make fun of them: "You are afraid, you are not men, we will have no more intercourse with you! *Woma, woma* (afraid)! *Hu! Hu! Hu!*"; then out go the men and fight. The fighting population is formed by the males from the age of about ten years; they are summoned by means of the war-drum, and commanded by their chief. There is a war-council composed of the chiefs and elders; the younger men are allowed to attend as audience, but must keep quiet. The chief is employed as an ambassador, and his person is respected by the enemy. A war-party marches in single file, with the young and inexperienced warriors in front and the older men, who are considered the more valorous, in the rear. Reserves are employed consisting, generally, of the oldest, who are the most ferocious. A fight is usually prefaced by an interchange of insults. They do not attack the villages of the enemy, but the fight is limited to the open, where the grass has already been burnt for the purpose. Women remain in the village during the fight. Ambushes are employed, and treachery is not unusual; for instance, the foe will be invited to settle matters peaceably by arrangement, and then attacked. Bows and arrows alone are used, although knives are worn. Neither shields, clubs, defensive works, pitfalls, nor poison are found. The bows (Plate XXXII, Fig. 2) are of wood, flat oval in section, with a broad groove down the inner face. In this respect they are similar to those of the Ba-Mbala.[1] Each end is pointed, and over the point is slipped a wooden knob, below which is a ring of copper wire. The arrows (Plate XXXII, Fig. 3) have leaf-shaped iron heads, ogee in section, with a pair of barbs and a socket. A plaited ring of fibre often encircles the lower part of the latter. The shafts are of palm-leaf ribs, nocked and furnished with three feathers bound on with fine fibre and the binding covered with a black resinous material. A similar binding similarly coated is found just below the head. No prisoners are made and no quarter granted, except to women, who are kept in captivity until the end of the war. Any man falling into their hands is killed and eaten. Wars are frequent, and in some cases last for years; their chief causes are women, theft and murder.

[1] Torday and Joyce, *Journ. Anthrop. Inst.*, vol. xxxv, p. 416.

SICKNESS.

Charms are used to guard against all forms of disease, and consist of small quantities of clay wrapped in pieces of cloth. The commonest diseases are pleurisy, *n'kosu*, and fever, *bao* (fire).[1] The last is treated by bleeding, to effect which numerous small incisions are made on the forehead and on the back parallel with the spine. Sleeping sickness, called *Tol* by the Ba-Huana, militates seriously against the increase of the population; it exists everywhere along the banks of the river, but is unknown in the interior. The patient is rubbed violently with manioc-leaves. Syphilis (*Kiaganga*) is not common, and is said to have been introduced by the Ba-Mbala; it will be remembered that this disease is called by the Ba-Yaka "The disease of the Ba-Mbala."[2] The root of the bitter orange is used as a remedy for gleet. No cases of elephantiasis were observed. Individuals with decayed teeth seem to be far more numerous than among most African tribes. With regard to snake-bite, if the wound is in the foot, a tight ligature is fastened round the leg above the ankle, and numerous incisions made to induce free bleeding; in this case the leg remains swollen for about a month. No remedy is known for a bite on the body, and the patient is left to take his chance.

DEATH AND BURIAL.

The Ba-Huana recognise death from natural causes, but decease is often attributed to the malign influence of the evil spirit *Moloki* (see RELIGION, below), acting through some person whom he has possessed, preying upon the heart of the deceased. The dying man is attended by his relations. After death the corpse is arranged in a sitting position and buried in a grave about 1·50 m. deep, with the face turned towards the west. The clothes and weapons of the deceased, together with food and palm wine, are placed in the grave; if he was a maker of palm wine, the implements which he used in the process are buried with him. A small hut about 30 cm. high is erected above the grave, and in it are placed the fragments of his pots, which have been broken at his funeral. Here, too, his brother often places an offering consisting of a little food. Women are buried in the same manner, with the exception that their pots are buried with them. A man killed by lightning is buried in an extended position lying on his back. In mourning men paint the forehead black, women the whole face.

RELIGION.

Three elements enter into the composition of a man: body, "soul," called *bun*, and "double," called *doshi*. The word *bun* also means "heart."

The *bun* of a dead man who has had no fetishes can appear to other men; such

[1] "This is rather remarkable, since, during the whole time I have been in this country, more than a year in all, I have not had a single attack of malaria."

[2] Torday and Joyce, *Journ. Anthrop. Inst.*, vol. xxxvi, p. 50.

an apparition, called *fakulu*, occurs at night only, and the *bun* is seen in human form and appears to be composed of a white misty substance. It portends approaching death. The *doshi* is a shadowy second self, corresponding to the *kra* of the *tshi*-speaking tribes of the Gold Coast, and the *ka* of the Ancient Egyptians. It leaves the body in sleep and visits other people in dreams; the *doshi* of the dead appear to the living in the same manner. All people have *doshi*, but only the adult have *bun*. In the case of a man killed by lightning, his *bun* is supposed to be destroyed; but suicide leaves both *bun* and *doshi* intact. Animals have *doshi* but not *bun*. At death the *bun* disappears, no one knows whither, but the *doshi* lingers about in the air, visits its friends and haunts its enemies; it will persecute the relations if the body has not received proper burial; there are no means of exorcising it. In the case of a man who has been the possessor of many fetishes, the *bun* enters the body of some large animal—elephant, hippo, buffalo, or leopard; animals so possessed are recognised by their ferocity. Fetishes have *doshi* but no *bun*; plants and weapons have neither.

Fetishes are common; they are insulted if they do not bring luck, but are subsequently conciliated by presents; they consist of small bags of cloth containing clay or charcoal; no fetish figures and no special fetish huts are found. The magician is, at the same time, the medical adviser of the community, and is succeeded on his death by his sister's son.

Like the Ba-Mbala and Ba-Yaka, the Ba-Huana believe in an evil principle which they call *moloki*, or *molosh*. *Moloki* takes up its abode in some adult individual and proceeds to prey upon the souls of others, who die in consequence. Individuals suspected of possession are forced to submit to the poison ordeal, and if their guilt becomes apparent, are clubbed. The poison, however, often kills outright.

Among the Ba-Honi the kola-tree in the centre of the village, under which the assemblies are held (see MORALITY AND JUSTICE, p. 288), belongs to the chief, and is supposed to exercise an influence upon the fertility of his wives. When one of the latter menstruates the chief gives it a cut with his knife to remind it of its duty. This tree is protected by a small fence, and the chief alone is allowed to pluck the fruit, which is considered an aphrodisiac, and is offered to privileged guests.

TIME AND THE ELEMENTS.

The year is divided into two seasons, the rainy and the dry; these are subdivided into lunar months, and the latter again into weeks of four days. Dates are fixed in advance by nights, *i.e.*, a man will say, "I shall sleep eight nights and then come to visit you."

Lightning is an animal like a cat which lives in the clouds; when hungry it springs to earth and eats a tree, or sometimes a man. Persons killed by lightning are buried in a peculiar fashion. (See DEATH AND BURIAL, p. 290.)

Rainbows are big snakes living in the water; when they have eaten enough fish they occasionally come out for a change and then may be seen.

Reproduction.

The usual position of intercourse is side by side; men do not abstain from their wives during the early stages of pregnancy, but do abstain during the period for which the child is suckled. Owing to the last fact, artificial abortion is very frequent, either by drinking very hot water or the infusion of a certain root, the identity of which is known only by the women. Women prepare for labour by fasting; delivery is accomplished in a sitting position; three women assist, two of whom support the patient by the shoulders, and the third receives the child, which is washed immediately after birth. Monsters and cripples are buried alive. Sterility is rare. It is necessary again to call attention to the extremely early age at which children begin to indulge, since the habit seems to be having a bad effect upon the physique of the people.

Miscellaneous.

When two Ba-Huana meet, they salute one another by saying *iy*,[1] and then sit down and chat. The host drinks first and the guest after him. When a traveller, whether a Mo-Huana or a Mo-Mbala, arrives in a village, the chief invites him to drink, his wife prepares food, and the two partake of it together, the chief eating and drinking before his guest. Free quarters are also allotted by the chief in some empty hut.

The aged and women are not well treated, but are often subjected to ill-usage. Children are well treated, but the men do not care much for them. The Ba-Huana are very cleanly, and are always brushing their teeth with a fibrous stick.

Vocabulary.

Personal.

Ancestor	*Kake.*
Brother	*Iya.*
Chief...	*M'fum.*
Child	*Moan.*
Cousin	*Kiswin.*
Father	*Ta.*
Friend	*Makun.*
Infant	*Masiki-masiki.*
Man	*Mut.*
Men	*Bat.*
Mother	*M'ma.*
Rebel	*Mayum.*
Sister	*Pangim.*
Slave...	*Muntu-kusum.*
Thief...	*Kuvibi.*
Uncle (maternal) ...	*Gwas.*
" (paternal) ...	*Tat.*
Woman ...	{ *Mokat.* / *Baket.*

[1] Now the word *moyo* is more frequent, but it is foreign.

Body.

Anus... ...	... *Kifit.*
Beard ...	... *Gilef.*
Bone... ...	... *Ipfa.*
Breast ...	... *Mabil.*
Buttock ..	... *Mato.*
Calf	*Muyi.* / *Mokum.*
Chest ...	... *Kingoni.*
Ear	... *Iti.*
Eye	... *Mes.*
Eyelashes ...	... *Makik.*
Fæces ...	... *Tchipi.*
Fingers ...	... *Molim.*
Foot	... *Milim.*
Forehead ...	... *M'bush.*
Gleet... ...	... *M'piki.*
Hair (on body)	... *Mika.*
Hand ...	... *Kikes.*
„ (hollow of the)	*Kikesh.*
Head... ...	... *Mutshin.*
Heart ...	... *Mila.*
Hunger ...	... *Ndzala.*
Jaw	... *L'ba.*
Leg	... *Kul.*
Lip	... *Pikop.*
Liver... ...	... *Mila.*
Mouth ...	*Pikop.* / *Monwa.*
Navel ...	... *Mukum.*
Neck... ...	... *Tsingo.*
Nose	... *M'bum.*
Penis... ...	... *M'bia.*
Pulse... ...	... *Motar.*
Ribs	... *Besh.*
Shoulder ...	... *Kim.*
Skin	... *Kiban.*
Small-pox ...	.. *Kutub.*
Syphilis ...	. *Mapan.*
Thigh ...	... *Sanduk.*
Thirst ...	... *M'pus.*
Tongue ...	... *Lilim.*
Tooth ...	... *Men.*
Vagina ...	... *Ben.*

Weapons, Utensils and the House.

Arrow ...	... *Bitut.*
„ (with iron point)	*Lipopo.*
„ („ wooden pt.)	*Tom.*
„ („ 4 points)...	*Kikash.*
Bag	... *Got.*
Basket (rectangular)	*Kitini.*
„ -base	... *Muteke.*
„ -cover	... *Ben.*
Bead	... *Mosa.*
Bottle ...	... *Molanga.*
Bow	... *Bota.*
„ -string...	... *Monkan.*
Cage	... *Kibil.*
Canoe ...	... *Boat.*
Cloth (European)	... *Keko.*
„ (native)	... *Kipus.*
Door	... *Mabei.*
Fork	... *Ita.*
Gong ...	*Kinkurr.* / *Gomo.*
Granary ...	... *Kian.*
Head-cloth ...	... *Yepi.*
Hoe	... *Tim.*
House ...	... *Nzo.*
Knife ...	... *Kipup.*
Mortar ...	... *Nko.*
Needle ...	... *Dongo.*
Pipe (with clay bowl)	*Kisa.*
„ (with gourd stem)	*N'kala.*
„ (with bamboo stem) ...	... *N'fa.*
Pot	... *N'dzu.*

Roof	... *Kuingi.*
Sieve ...	... *Moshwal.*
Snare (for birds)	... *Mit.*
String (native)	... *D'jüm.*
" ...	... *M'shi.*
Thatch ...	... *Leyi.*
Village ...	*Bodla.* / *Matt.* / *Bolla.*
Wood (for building)...	*Küsh.*
" (small pieces)...	*Wole.*

The Animal World.

Animal ...	... *Biri.*
Ant	... *Bankiri.*
Antelope ...	... *Nza.*
Bat	... *Wangim.*
Bird	... *Nün.*
" (young)...	... *Kifil.*
Blackbird ...	... *N'kan.*
Buffalo ...	... *Nyat.*
Chameleon ...	... *Gun.*
Dog	... *M'boa.*
Egg	... *Maki.*
Elephant ...	... *Djo.*
Falcon ...	... *Kanganu.*
Feather ...	... *N'sala.*
Fish	... *M'birr.*
Frog	... *Koto.*
Goat... ...	*Kom.* / *Tab.*
Grasshopper...	*Yu.* / *Meyey.*
Guinea fowl ...	... *N'ka.*
Hippopotamus	... *N'gub.*
Horn... ...	... *Libong.*
Kite	... *Imbi.*
Leopard ...	... *N'go.*
Louse ...	... *Banchin.*
Milk	... *Mabil.*
Monkey ...	... *Kima.*
Parrot ...	... *Monyari.*
Partridge ...	... *N'güm.*
Pig	... *Ngul.*
Pigeon ...	... *N'kuk.*
" (green)	... *Kutudi.*
Plantain-eater	*Kolonf.* / *N'kela.*
Rat	... *M'puk.*
Snake ...	... *Ter.*
Turtle-dove ...	... *Bem.*

Vegetable World.

Allspice ...	... *N'du.*
Banana ...	*Matipi.* / *Monko.*
Bean... ...	... *Kundu.*
Bush	... *Molil.*
Forest ...	... *Moshut.*
Gourd ...	... *Mondel.*
Ground-nut ...	... *N'zu.*
Maize ...	... *Mashish.*
Manioc ...	... *Nso.*
Mushroom ...	... *Bua.*
Palm-nut ...	... *M'ba.*
" -tree ...	... *M'ba.*
" -wine ...	... *Mal.*
Pepper ...	... *Kef.*
Pineapple ...	... *M'ba.*
Plantain ...	... *Manko.*
Tobacco ...	... *Make.*
Tree	... *Miti.*
Wood ...	... *Kün.*

Time, the Elements and Geography.

Air	*Mpil.*
Clay	*Pesh.*
Cloud	*Kidir.*
Day	*Bilumbu.*
„ after to-morrow	*Mber.*
Earth	*Man.*
Evening	*Pipi.*
Fire	*Tü.* / *M'ba.*
Iron	*N'don.*
Lightning	*N'zika.*
Marsh	*N'tsi.*
Moon	*Gond.*
Mountain	*Moshwel.*
Night	*Pipi.*
Plain	*N'tsia.*
Rain	*Vula.*
Rainbow	*Kongolo.*
Road	*N'zil.*
Sand	*Senge.*
Season (dry)	*Kishu.*
„ (rainy)	*Vula.*
Sky	*Zulu.* / *Ngi.*
Soon	*Geper.*
Star	*M'bir.*
Stone	*Eyiri.*
Stream	*Kwak.*
Sun	*Tang.*
To-day	*Lilibu.*
To-morrow	*Mojyua.*
Water	*Mass.* / *Madya.*
Week	*Pik.*
Wind	*Pil.*
Yesterday	*Machuk.*

Verbs.

Ask	*Kwim.*
Be	*Kel.*
Bear (a child)	*Kubut.*
Beat	*Kubana.*
Beat down	*Kubish.*
Bind	*Mokash.*
Boil	*Kulamb.*
Bring	*Zotwale.*
Buy	*Kusum.*
Call	*Kubikila.*
Capture	*Mopata.*
Carry	*Kutit.*
Castrate	*Kotokon.*
Come	*ZZa.*
Copulate	*Kukwale.*
Crush	*Kutut.*
Cut	*Kutsit.*
Discuss	*N'za.*
Dispute	*Kunuan.*
Divide	*Kukaba.*
Draw (a bow)	*Kota.*
Drink	*N'nua.*
Eat	*Dya.*
Enter	*Yatuk.*
Flee	*Kuty.*
Fly away	*Kufurmuk.*
Forget	*Kujimin.*
Go	*Tchwe.*
Give	*M'pa.*
Have	*Dindi.*
Hold	*Kushima.*
Jump	*Kusungulu.*
Kill	*Pfa.*
Know	*Kuyaba.*
Laugh	*Kushia.*
Lie	*Bompara.*
Lie down	*Kumōn.*
Listen	*Kuyuk.*
Love	*N'zorr.*
Mad, be	*Mongor.*
Mock	*Kunvan.*
Pay	*Mofut.*

Pick up ...	... *Kotul.*
Remain ...	... *Moanji.*
Return ...	... *Afutuk.*
Ride	... *Kunin.*
Run	... *Kubata.*
Say	... *Kumo.*
Send	... *Mutmis.*
Sew	... *Kochum.*
Silent, be ...	... *Tsumun.*
Sing	... *Kuim.*
Sit down ...	... *Kubwash.*
Sleep... ...	... *Kulal.*
Smoke ...	... *Kunya make.*
Speak ...	{ *Amo.* *Kufun.*
Stink... ...	... *Moak.*
Strike ...	... *Kubet.*
Swim ...	... *Kosa bola.*
Take	... *Kwat.*
Throw ...	... *Tilwoa.*
Travel ...	... *Tshe.*
Urinate ...	... *Kusub.*
Vomit ...	... *Kuluk.*
Walk... ...	... *N'da.*
Wash ...	... *Kukwal.*
Wish... ...	... *Dzeringi.*
Work ...	... *Kussal.*
Wound ...	... *Kulmen.*

Pronouns, Adjectives and Adverbs.

Above ...	... *N'gi.*
All	... *Wangin.*
Beautiful ...	... *M'pipi.*
Below ...	... *N'chin.*
Between the two	... *Ketenji.*
Big	... *Monene.*
Bitter ...	... *Gany.*
Black ...	{ *Bondun.* *Kuhit.* *Pipili.*
Brave ...	... *Dumlo.*
Cold	... *Moziri.*
Dirty ...	... *Binin.*
Far	... *Köl.*
Fat	... *Molil.*
Fierce ...	... *Put.*
Good... ...	... *M'pim.*
He	... *Yan.*
Here	... *Aha.*
How much ...	... *Kwe.*
I	... *Min.*
Ill	... *Kubil.*
Immediately	... *Lilibo.*
Little ...	... *Mosiri.*
Long... ...	... *Mole.*
Male... ...	... *Molüm.*
Much ...	... *Mangin.*
No	... *Lo.*
Old	... *Mokutu.*
Quickly ...	... *Komil.*
Satisfied ...	... *Kokisika.*
Slowly ...	... *Woke woke.*
Small ...	{ *Atchichi.* *Moshut.*
Sterile (female)	... *Opfi kisit.*
" (male)	... *Mokōb.*
Strong ...	... *Gol.*
Sweet ...	... *Yeke yeke.*
There ...	... *Kuna.*
They	... *Yan.*
Thou... ...	{ *N'je.* *N'ge.*
Tired... ...	... *Mirunduji.*
Very... ...	... *Bun.*
We	... *Ben.*
Where ...	... *Vili.*
White ...	{ *M'pes.* *Pez.* *Bondun.*
Wicked ...	... *Gesh.*
Yes	... *Ey.*
You	{ *Bin.* *Ben.*
Young ...	... *Makya.*

Numbers.

One ...	... *Momo.*	Nine ...	... *Uwa.*
Two ...	... *Bili.*	Ten ...	... *Kum.*
Three	... *Matutu.*	Twenty	... *Mak mole.*
Four ...	... *Wana.*	Thirty	... *Makumitatu.*
Five ...	... *Watan.*	Hundred	... *Kam.*
Six ...	... *Binin.*	Thousand	... *M'pfun.*
Seven	... *N'tsema.*	How much ...	... *Kwe.*
Eight	... *Nan.*		

Miscellaneous.

Bewitchment	... *Bangit.*	Plait ...	*Kianzu.* / *Kiandu.*
Brass rod ...	*Matak.* / *Milu.*	Skirmish	... *Kunoan.*
Devil...	... *Wulua.*	Sleep...	... *Tol.*
Fear ...	... *Dum.*	Song ...	... *Kisian.*
Fetish	... *N'kit.*	Soul ...	... *Bun.*
Flesh (human)	... *Mishun.*	Truth	... *Kwakirik.*
Hunt...	... *N'ku.*	War ...	... *Kunuan.*
Name	... *Din.*		

APPENDIX.

THE BASKETS OF THE BA-HUANA.

The baskets made by the Ba-Huana comprise many varieties of weaving and the specimens collected show considerable skill in workmanship. The materials used are split cane, palm leaf, bark strips, fibre string and wooden twigs, the last to form a frame work.

The following kinds of weaving are employed:—Checkerwork, twilled, wickerwork, and twined, the last including plain twined, wrapped twined and lattice twined or tee weaving. In some instances the weaving is very close and the baskets are rendered watertight by being painted over with a mixture of resin and bark.

The most constant feature appears to be the combination of a square base with a circular rim, though the triangular shape seen in Plate XXXIII, Fig. 2, is found frequently in many different sizes. The following details refer to the various specimens shown on Plates XXXIII and XXXIV. The terminology is that of Professor Otis T. Mason.

Plate XXXIII, Fig. 1.

Material.—Split cane.

Shape.—Conical.

Method.—Open checkerwork. The rim of the basket is formed of a bent twig, over which the split cane is bound by fine cane. The work near the rim is coarse and loose, and towards the apex it is closer and firmer. This basket is used as a rat-trap.

Plate XXXIII, Fig. 2.

Material.—Split cane; fibre string.

Shape.—Triangular, tapering to a point.

Method.—Twilled. The weft and warp of this little basket both consist of the same material, the warps of one side forming the wefts of the next and the warps of the third.

Border.—The rim is formed of three straight wooden rods bound in the form of a triangle, over which are bent two successive warp elements; these warp elements are bound down (1) by one row of string or fibre which passes over four warp elements and back under two, then over four again; thus the string passes over each pair of warp elements twice, (2) by two rows of plain twined weaving.

Plate XXXIV, Fig. 1.

Material.—Fine split cane; palm leaf fibre.

Shape.—Circular on square base expanding slightly towards rim.

Method.—Tee or lattice twined weaving. The weft, consisting of palm leaf fibre, is very closely woven, and the warp elements, though fine, are firmly bound together, thus making a strong and compact basket. This basket has been rendered completely watertight by a coating of resin and bark fibre.

Border.—The rim consists of plain coiled weaving over a wooden rod foundation, and at regular intervals three successive stitches are passed through the sides of the basket, thus adding both ornamentation and strength to the work.

Plate XXXIV, Fig. 2.

Material.—Split cane; palm leaf fibre.

Shape.—Circular on square base.

Method.—Wrapped twined weaving. In this basket there are two weft and one warp elements; the former and one of the latter consist of split cane, whilst the second weft element is formed of palm leaf fibre; the weaving is very regular and close; inside it appears oblique but outside it is vertical. It is perhaps worth while calling attention to the fact that in American basketry of this type, according to the general statement of Professor Otis T. Mason dealing with this subject, the vertical surface appears on the inside and the oblique surface on the outside.[1]

Border.—Plain coiled over a wooden foundation rod; the border is rendered more ornamental by two strips of cane being bound round and kept in position by two successive stitches of the coil at regular intervals.[1]

[1] Aboriginal American Basketry Report V.S. National Museum, 1902, p. 235.

Plate XXXIV, Figs. 3 and 4.

Material.—Fine split cane; fibre.

Shape.—Circular on square base, expanding towards rim.

Method.—Plain twined weaving; wrapped twined weaving. The base is double, and consists of the warp elements arranged in two series, crossing each other at right angles; one series passes above the other with the exception of three central and two outside elements which pass below; in the other series all elements pass below with the exception of three central elments which pass above; the elements of each series are fastened by a double row of very fine weft in plain twined weaving; the outside warp of each side of the base is attached to the warps of the opposite series by a row of wrapped twined weaving, and the structure strengthened by the addition of a band of split cane round the base attached by another single row of wrapped twined weaving.

Border.—The foundation of the rim is of wood, which is bound to the warps by a strip of split cane; each warp element is bent over a single turn of the coiled cane and bound down under the succeeding turns.

Plate XXXIV, Fig. 5.

Material.—Split cane; strips of palm leaf.

Shape.—Cylindrical on square base; the top of the cover is also square.

Method.—Coarse checkerwork. The warp elements consist of broad strips of palm leaf, the weft being formed of split cane; the five lowest rows are of wrapped twined weaving, the weft being fine twisted bark.

Border.—The edge of the basket and of the cover is finished off by bending each warp element over to the outside and inside alternately; these are fastened by a single row of fine cane passed under and over each warp.

The cover is connected with the body of the basket by two strings passing under three weft elements of the cover and also three weft elements of the body, where they are secured by knots. The cover can be moved up and down on these handles.

Plate XXXIV, Fig. 6.

Material.—Split cane; fine fibre or string.

Shape.—Bottled shape body with square base and constricted neck, circular in section.

Method.—*Base:* plain twilled. *Body:* The warp elements, formed of split cane, are fastened together by six bands of weaving. Each band consists of one row of plain twined weaving and two rows of three-strand twined weaving. The body is attached to the base by two rows of plain twined weaving, one row of three strand twined weaving worked over an extra strip of cane and one row of three-strand twined weaving worked over the warp elements only. It is attached to the neck by one row of plain twined, two rows of three-strand twined, one row three-strand twined worked over a strip of cane, and one row of three-strand twined weaving worked over the warp elements only.

The neck is in plain checkerwork.

Border.—Plain coiled over wooden foundation rod. This basket is used as a sieve

Plate XXXIV, Fig. 7.

Material.—Split cane.

Shape.—Circular on square base, expanding towards rim.

Method.—Wickerwork. The warp consists of six pieces of broad split cane interlaced at right angles to form the square base and an extra half-length which terminates under the base, as shown in the sketch; each piece is bent up sharply from the base to form the framework. The weft is of split cane, finer and more flexible. The weft of the base is formed of broad strips of palm-leaf fibre interwoven in coarse checkerwork, the roughly cut ends being left on the inside of the basket.

Border.—Each warp is hooped over and the pointed end run down parallel with the standing part of the succeeding warp; these hoops are connected by a broad band of coiled sewing in split cane, which is twisted over itself between each hoop.

Plate XXXIV, Fig. 8.

Material.—Split cane; palm leaf rib.

Shape.—Rectangular.

Method.—This specimen, though differing almost entirely from the baskets hitherto described, may be included in this series; the rectangular base is formed of parallel strips of palm leaf stem, to which are bound ten upright supports consisting of twigs. These supports are kept in position by a series of parallel strips of split cane which are fastened to each support by a plait of fine split cane. The rim, formed of a wooden rod, is bound to the supports by fine split cane, which is securely finished off by a few twists of "button-hole" stitch.

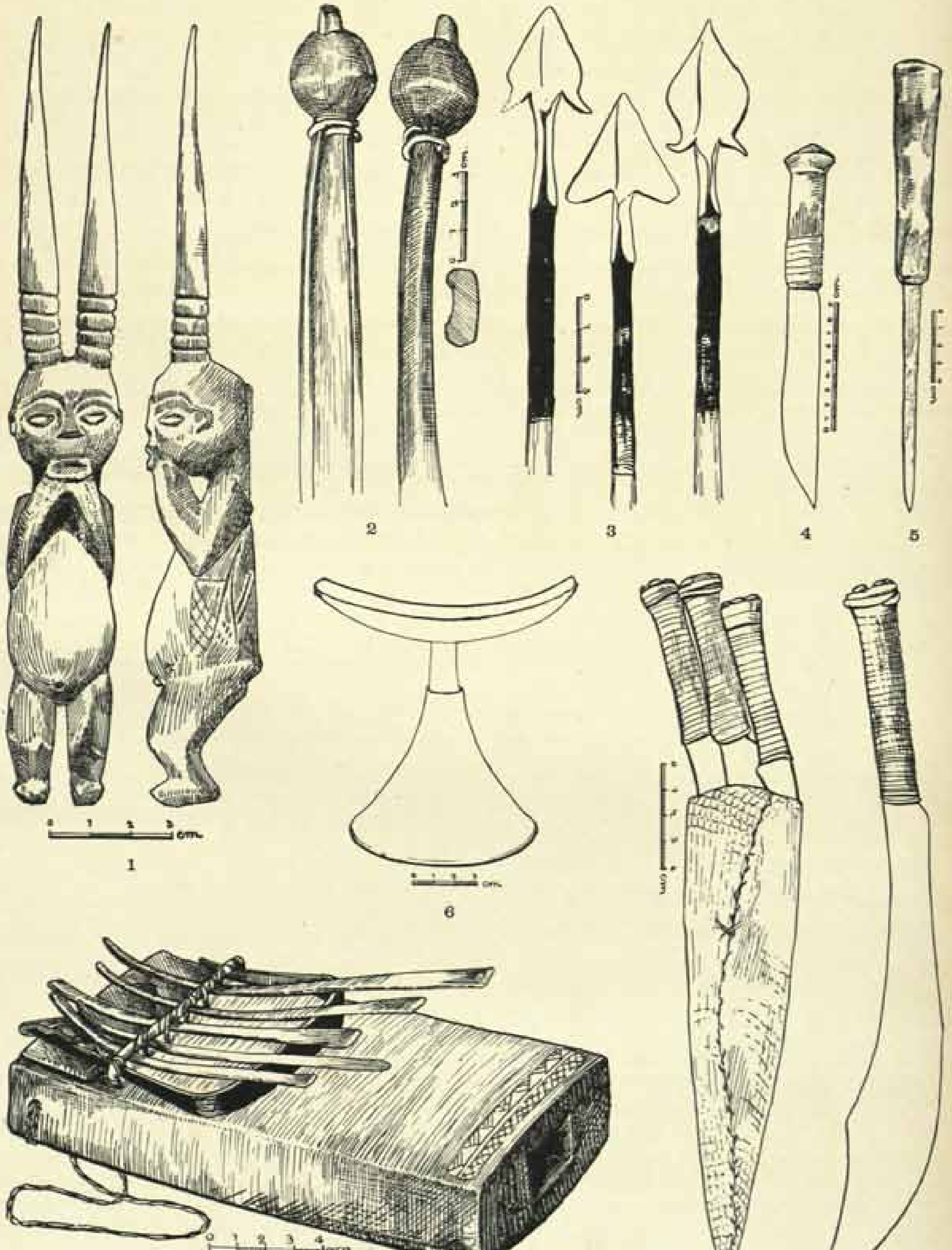
The whole basket shows skilful workmanship and is very elegant.

Description of Plates.

PLATE XXXII.

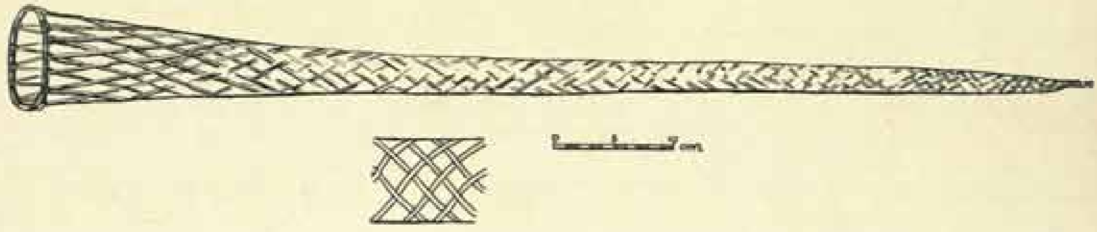
Fig. 1.—Fancy carving in wood.
Fig. 2.—Bow. (See WAR, p. 289.)
Fig. 3.—Arrows. (See WAR, p. 289.)
Fig. 4.—Iron bladed knife with wooden hilt.
Fig. 5.—Instrument used in making mats; iron quadrangular blade with wooden handle.
Fig. 6.—Wooden pillow.
Fig. 7.—Piano. *Kimbanda*; (see AMUSEMENTS, p. 287).
Figs. 8 and 9.—Knives used in the castration of animals. (See FOOD, p. 280.)

Journal of the Anthropological Institute, Vol. XXVI, 1906, Plate XXXII.



NOTES ON THE ETHNOGRAPHY OF THE BA-HUANA.

Journal of the Anthropological Institute, Vol. XXXVI, 1906, *Plate XXXIII.*



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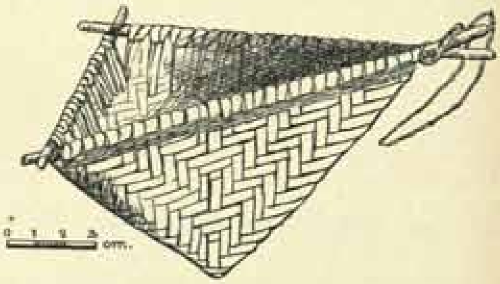

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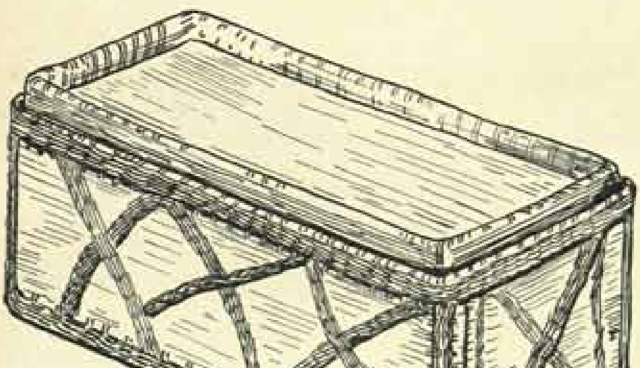

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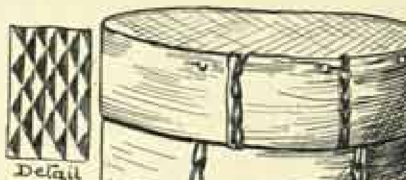

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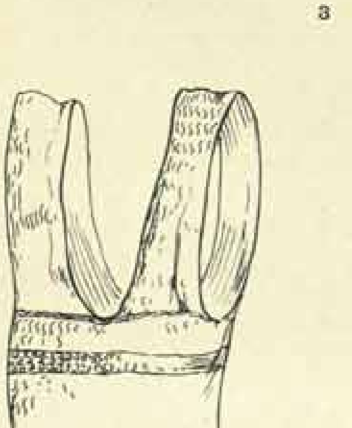

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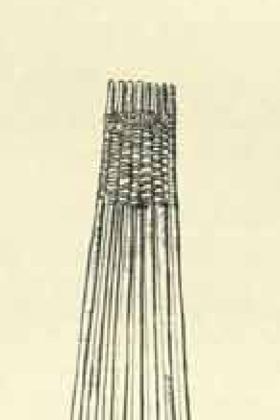

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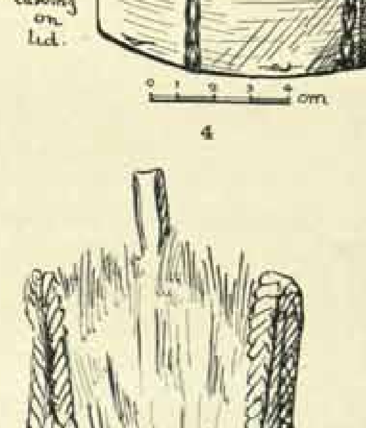

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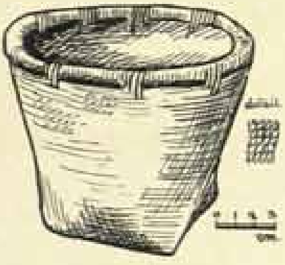
NOTES ON THE ETHNOGRAPHY OF THE BA-HUANA.



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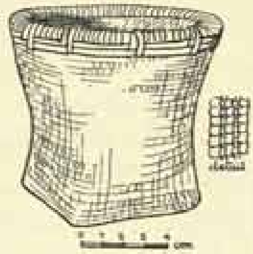

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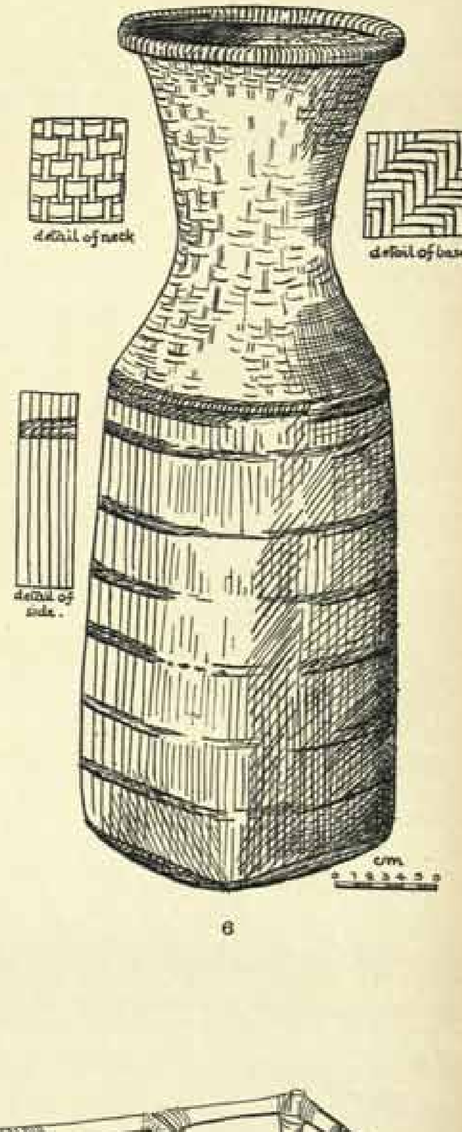

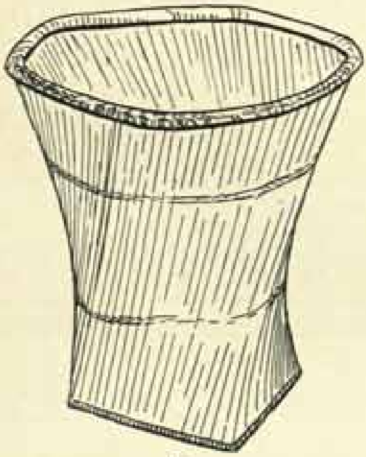

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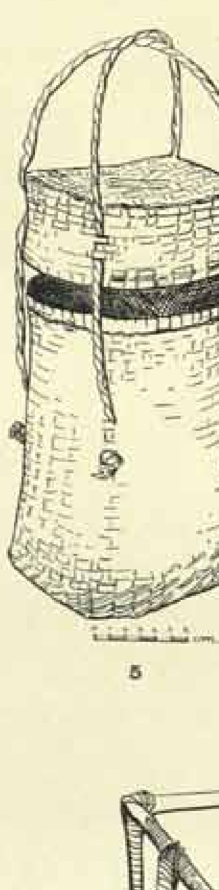

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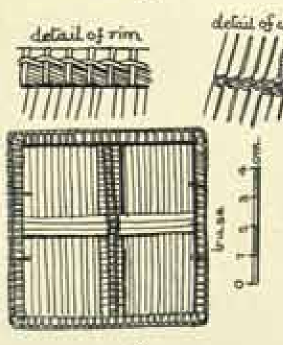

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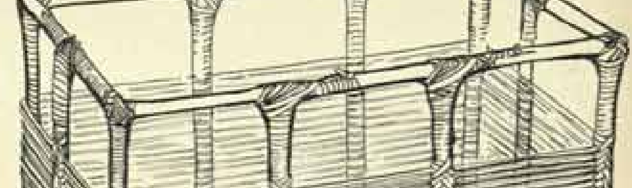

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NOTES ON THE ETHNOGRAPHY OF THE BA-HUANA.

PLATE XXXIII.

Fig. 1.—Rat trap. (See Appendix, p. 297.)
Fig. 2.—Basket („ „ p. 298.)
Fig. 3.—Wooden box, ornamented by sewing with split cane.
Fig. 4.—Wooden box, sewn with split cane, containing fetishes. (See RELIGION, p. 291.)
Fig. 5.—Network bag for carrying food.
Fig. 6.—Wooden comb in the making ; the wooden teeth are stuck in a piece of pith while the ends are bound together with fine split cane.
Fig. 7.—Small hide pouch, sewn with cane, containing flint and tinder.

PLATE XXXIV.

Figs. 1–8.—Baskets. (See Appendix, pp. 297–300.)

THE GYPSIES OF PERSIA.

A Second Vocabulary.

By Major P. Molesworth Sykes, C.M.G., H.B.M.'s Consul-General and Agent to the Government of India in Khorāsān.

In June, 1902, I had the honour of reading a paper before the Institute on "Anthropological Notes on Southern Persia."[1] In it I referred to the gypsies of Persia, and attached a vocabulary of about one hundred words, on which Mr. Longworth Dames wrote an interesting note. In 1904, the eminent Orientalist, M. de Goeje, was kind enough to write to me on the subject and to enclose a copy of his recently written *Mémoire sur les migrations des Tsiganes à travers l'Asie.* In it there was also a vocabulary, consisting of about one hundred words in four separate dialects, viz., Armenian, Egyptian, Syrian, and Persian. The last-named was, however, mainly blank, partly because there were but few words identical in the learned professor's and my vocabulary.

Under these circumstances, it struck me that it would be useful to collect the Persian gypsy words for Professor de Goeje's vocabulary. This has been done in two districts of South-East Persia, viz., Jīruft and Sīrjān, and also in Khorāsān. In each case the words have been written down by a good Persian scholar, and, as every accent, etc., is given, there should be no difficulty in obtaining the exact equivalent of each word. In my former contribution, the vocabulary was not written down by a good scholar; consequently, where words differ in the two vocabularies, the one I am now sending is the more trustworthy.

[1] *Jour. Anthrop. Inst.*, vol. xxxii, 1902 p. 339.

VOCABULARY.

	JIRUFT.	SIRJAN.	KHORASAN.
1. Noix	هَکُول	اَاکُول	١ گُردُوتم
2. Nous	مَارز	مَارزا	٢ امِین - برِي
3. Mener	ورسوندن	کِیموندن	٣ اُودُون‌دَه (infin.) - اُودُون (perf.)
4. Doigt	چَنگُو	خَس	۴ شَینُوم - چَنگُو
5. Anneau	انَگشتَر	خِسي	٥ کِلِیکِي
6. Venir	ورسِیدن	ورسِیدن	٦ اُودِي
7. Brebis	بَکِل	لِیمر	٧ یَزا
8. Cheveu, poil	بلمَک	وَال	٨ مُویان
9. Pierre	کُلُوت	کُلُوت	٩ دِزوار - کالر
10. Grand	بُهوُک	کُوَار	١٠ بُروُت - کُرَنک
11. An	خَس	سَال	١١ ورس - بَرس
12. Vingt	بِیست هالادا	بِیست	١٢ بِیست هات
13. Faim	بُوکار	بُونِیا	١٣ بارا
14. Pluie	پُونُو	پُونُوِي	١۴ بیُوت - باران
15. Beaucoup	اُبِیل	اُوِیل	١٥ بهُوت
16. Bouc	سَوِیند	لِیمر	١٦ بهِیر
17. Enfant	جَادِه	جَادِه	١٧ چُورزا

	JIRUFT.	SIRJAN.	KHORASAN.
18. Couteau	کاتي	کاتي	۱۸ گرگ - کتي
19. Père	بانک	بیانک	۱۹ باهنگ
20. Mère	مانک	مانک	۲۰ مار - مارغش
21. Dent	دنکي	دندان	۲۱ اشلمه
22. Dix	ده هالد	ده	۲۲ ده هات
23. Ceinture d'homme	بوشنائي	ته رات	۲۳ کمرتوم - دیت لو
24. Jour	روز	روز	۲۴ روز
25. Grappe	مهرک	خوردک	۲۵ بروم
26. Deux	دو هالد	دو هات	۲۶ دو هات
27. Aller	کیمیدن	کیمیدن	۲۷ کمیدن
28. Orge	زاپیل	گورز	۲۸ جو
29. Pou	جیکا	جیک	۲۹ چنغ
30. Femme	ندو	ندو	۳۰ جوید
31. Non-Tsigane	....	...	۳۱ اپناري
32. Cheval	گورا	گورا	۳۲ سولي
33. Village	مندل	مندل	۳۳ ده
34. Sac	ترکي	ته رات	۳۴ کبسه
35. Doux	شیلدا	شیلدا	۳۵ شیرین توم
36. Bœuf	تیرنک	تیرین	۳۶ سبابا
37. Manger	اشمولیدن	بچون	۳۷ شملیدن
38. Feu	آکي - نارک	منیر	۳۸ آتش

	JIRUFT.	SIRJAN.	KHORASAN.
39. Œil	نهور	نهور	۳۹ کاشا
40. Un	یک هالدات	یک هات	۴۰ یک هات
41. Poule	تینالی	تینالی	۴۱ چمری
42. Noir	سوته	سوته	۴۲ سیاه
43. Oreille	دهوت	گوش	۴۳ گوش
44. Bois	هوترا	کاشتا	۴۴ چوب
45. Faire	کمکری	کم	۴۵ کردن
46. Soleil	آفتاب	روزکام	۴۶ آفتاب
47. Âne	کره	کره	۴۷ کره
48. Maison	دیله -	دیله	۴۸ دیله
49. Bon	دخ	دخو	۴۹ دخ
50. Rouge	قرمز	قرمز	۵۰ قرمز
51. Sel	شورکی	شورکا	۵۱ شوران
52. Mauvaise fille	نامشت	دخ ناوه	۵۲ جبیدندخ
Fille			جبیدنیکی
53. Poisson	پونوی	ماهی	۵۳ ماهی
54. Mouche	مگس	مگس	۵۴ مگس
55. Désirer, vouloir	کل	کل	۵۵ خواهش
56. Pain	منا	منا	۵۶ مونا
57. Homme	مارز	مارز	۵۷ تهی
58. Battre	بتور	بتور	۵۸ بتور (imper.) - تور (inf.) - تو

	JIRUFT.	SIRJAN.	KHORASAN.
59. Viande	دهوت	دهوت	٥٩ سپی
60. Mois	ماه	ماه	٦٠ ماه
61. Mourir	میت	میتیدن	٦١ میتیده
62. Pudendum muliebre	هره	هره	٦٢ دونه
63. Face	دنفار	دنفار	٦٣ رو
64. Orphelin	دیکام	ریتام	٦٤ یتیم
65. Mort (*adj.*)	میته	متیت	٦٥ میت
66. Urine	پونری	پونو	٦٦ مینی
67. Nez	دماغ	دماغ	٦٧ بینی
68. Cinq	پنج هالدات	پنج هات	٦٨ پنج هات - پنج کاما
69. Eau	پونو	پونو	٦٩ پنو
70. Blanc	سفینو	سپینو	٧٠ سفید توم
71. Ventre	پیتو	پیتو	٧١ شکم توم
72. Sœur	دانک	دانک	٧٢ باجی - خواهر توم
73. Frère	برون	برونک	٧٣ برار توم
74. Boire	بشمولیدن	چویدن	٧٤ بشملیم
75. Laine	پلمک	پلمک	٧٥ پشمنا
76. Vieux	پیر آفتا	پیروات	٧٦ پیر
77. Garçon	جادو	جادو	٧٧
78. Nuit	لیل	لیل	٧٨ شوم
79. Argent	نقره کا	پهله	٧٩ نقره

	JIRUFT.	SIRJAN.	KHORASAN.
80. Serpent	مار	دیکاي	۸۰ مار ـ رِیسمان
81. Dormir	نُوفیدانَ	نُوفیدَن	۸۱ دُنُوف کَم
82. Étoile	سِتارِه	سَتاره	۸۲ سِتارِه
83. Fer	لَو	لَو	۸۳ لَو
84. Cent	صَد	صَد هات	۸۴ صَد کاما
85. Corde	رِیشکاي	رِیسکاي	۸۵ طَناب
86. Tête	رَأسَا	رَأسَا	۸۶ سَر ـ کُلُوري
87. Froid	سِیلکَا	سِیرات	۸۷ خُنُکي
88. Quatre	چَار هالادات	چَار هات	۸۸ حاه
89. Chaud	مَرما	کَوما	۸۹ گَرم
90. Jeune	جَادُو دَخي	مَارز	۹۰ جَوان
91. Fil	دِیرَک	دِیرَک	۹۱ رِیسمان
92. Gros	بُیوک	تَلو	۹۲ بُیوت
93. Petit	قَلِیلُو	قَلِیل	۹۳ خُردو
94. Trois	۳ سِه هالادات	۳ سِه هات	۹۴ سِه هات
95. Œuf	تِیناي	تِیناي	۹۵ مُرغانه ـ مُرغانو
96. Main	خَس	خَس	۹۶ چنگُو

TRANSLITERATION.

English.	*Jīruft.*	*Sīrjān.*	*Khorāsān.*
1. Walnut ...	*halūk*	*a-lūk*	*gurdūtam.*
2. We	*mārzu*	*mārzā* ...	*amīn.* *parī.*
3. To lead ...	*varsūndan* ...	*kīmūndan*	*ūdūndah* (*infinitive*). *ūdān* (*perfect*).
4. Finger ...	*changū*	*khas* ...	*shaitūm.* *changū.*
5. Ring ...	*angusht*	*khisī*	*kilīkī.*
6. To come ...	*varsīdan*	*varsīdan*	*ūdī.*
7. Sheep ...	*bakil*	*līmru*	*pazā.*
8. Hair ...	*palmak*	*vāl*	*mūyān.*
9. Stone ...	*kulūt*	*kulūt* ...	*dizhvār.* *kālār.*
10. Great... ..	*buhūk*	*kuvār* ...	*burūt.* *kurank.*
11. Year ...	*khas*	*sāl*	*vars, bars.*
12. Twenty ...	*bīst-hālādā* ...	*bīst*	*bīst-hāt.*
13. Hunger ...	*būkār*	*būniyā*	*pārā.*
14. Rain ...	*pūnū*	*pūnūī* ...	*buyūt.* *pārān.*
15. Much ...	*ubīl*	*u-īl*	*buhūt.*
16. Goat ...	*savīnd*	*līmru*	*bihyar.*
17. Child ...	*jādih*	*jādih*	*chūrzā.*
18. Knife ...	*kātī*	*kātī* ...	*gizak.* *kitī.*
19. Father ...	*bāng*	*bahāng*	*bāhang.*
20. Mother ...	*māng*	*māng* ...	*mār.* *mārghis.*
21. Tooth ...	*dinkī*	*dindān*	*ishlamih.*
22. Ten	*dah-hālād* ...	*dah*	*dah-hāt.*
23. Waist-band (Kamarband).	*būshnāī*	*tūh-rāt*	*kamar-tūm.* *dipat-lu.*
24. Day... ...	*rūz*	*rūz*	*rūz.*
25. Bunch ...	*mihrak*	*khordak*	*burūm.*
26. Two... .	*do-hālād*	*do-hāt*	*dū-hāt.*
27. To go ...	*kīmīdan*	*kīmīdan*	*kamīdan.*
28. Barley ...	*zāpīl*	*kūruz*	*jav.*

English.	*Jīruft.*	*Sīrjān.*	*Khorāsān.*
29. Louse ...	*jīkā*	*jīk*	*chunugh.*
30. Woman ...	*nidū*	*nidū*	*javīd.*
31. Non-gypsy ...			*īnārī.*
32. Horse ...	*gorā*	*gorā*	*suvulī.*
33. Village ...	*mindal*	*mindal*	*dih.*
34. Bag	*turkī*	*tih-rāti*	*kabsih.*
35. Sweet ...	*shīldā*	*shīludā*	*shīrīn-tūm.*
36. Ox	*tīrang*	*tīrīn*	*sabā-pā.*
37. To eat ...	*ishmūlīdan* ...	*bichūn*	*shamlīdan.*
38. Fire	*nārak, āgī* ...	*munīr*	*ātash.*
39. Eye	*nuhūr*	*nuhūr*	*kāshā.*
40. One	*yak-hālādāt* ...	*yak-hāt*	*yak-hāt.*
41. Fowl ...	*tīnālaī*	*tīnālaī*	*chamrī.*
42. Black ...	*sūtih*	*sūtih*	*siyāh.*
43. Ear	*dahūt*	*gūsh*	*gūsh.*
44. Wood ...	*hūtrā*	*kāshtā*	*chūb.*
45. To do ...	*kam-karī* ...	*kam*	*kavdan.*
46. Sun	*āftāb*	*rūzkām*	*āftāb.*
47. Ass	*kurih (gurih)* ...	*kurih (gurih)* ...	*kurih (gurih).*
48. House ...	*dīlih*	*dīlih*	*daylah.*
49. Good ...	*dakh*	*dakhā*	*dakh.*
50. Red	*kirmiz*	*kirmiz*	*kirmiz.*
51. Salt	*shūrkī*	*shūrkā*	*shūrān.*
52. { Prostitute ...	*nāmusht*	*dakh nā vih* ...	*jabīd-andukh.*
Girl			*jabīd-nīkī.*
53. Fish... ...	*pūnūī*	*māhī*	*māhī.*
54. Fly	*magas*	*magas*	*magas.*
55. To wish ...	*kilī*	*kih*	*khwāhish.*
56. Bread ...	*minā*	*minā*	*mūnā.*
57. Man... ...	*māruz*	*māruz*	*tuhī.*
58. To beat ...	*butūr*	*butūr* ...	{ *tur (infinitive).* *ba-tūr (imperative) tū.*
59. Meat ...	*dihūt*	*dihūt*	*sipī.*
60. Month ...	*māh*	*māh*	*māh.*
61. To die ...	*mayit*	*mīīdan*	*mayitīdah.*
62. Pudendum muliebre.	*hurrih*	*hurrih*	*dūnih.*
63. Face... ...	*danfār*	*danfār*	*rū.*
64. Orphan ...	*rīkām*	*rīlām*	*batīm (yatīm ?).*

English.	*Jīruft.*	*Sīrjān.*	*Khorāsān.*
65. Dead ...	*maitih*	*matū*	*miyyat.*
66. Urine ...	*pūnurī*	*pūnū*	*mēnī.*
67. Nose ...	*damāgh*	*damāgh*	*bīnī.*
68. Five... ...	*panj-hālādāt* ...	*panj-hāt* ...	*panj-hāt.* *panj-kāmā.*
69. Water ...	*pūnū*	*pūnū*	*pinav.*
70. White ...	*safīnū*	*sapīnū*	*safīd-tūm.*
71. Belly ...	*pītū*	*pītū*	*shikam-tūm.*
72. Sister ...	*dāng*	*dāng* ...	*bājī.* *Khwāhar-tūm.*
73. Brother ...	*burūn*	*burūng*	*barār-tūm.*
74. To drink ...	*bishmūlīdan* ...	*charīdan*... ...	*bishmalīm.*
75. Wool ...	*palmak*	*palmak*	*pashmanā.*
76. Old	*pīr-āftā*	*pīr-vāt*	*pīr.*
77. Boy	*jādū*	*jādū*	(caret).
78. Night ...	*lail*	*lail*	*shām.*
79. Silver ...	*nukrah-kā* ...	*pahlih*	*nukrah.*
80. Snake ...	*mār*	*dīkāī* ...	*mār.* *rīsmān.*
81. To sleep ...	*nūfīdan*	*nūfīdan*	*dūnuf-kam.*
82. Star	*mitārah*	*sitārih*	*sitārah.*
83. Iron... ...	*lā*	*lā*	*lā.*
84. Hundred ...	*sad*	*sad-hāt*	*sad-kāmā.*
85. String ...	*rīskāī*	*rīskāī*	*tanāb.*
86. Head ...	*rāsā*	*rāsā* ...	*sar.* *kulurī.*
87. Cold... ...	*sūlkā*	*sīrāt*	*khunukī.*
88. Four... ...	*chār-hālādāt* ...	*chār-hāt*	*chāh.*[1]
89. Hot	*mirmā*	*komā*	*garm.*
90. Young ...	*jādū-dakhi* ...	*mārz*	*javān.*
91. Thread ...	*dīrag*	*dīrag*	*rīsmān*
92. Big	*buhūk*	*tallū*	*bahūt.*
93. Little ...	*kalīlū*	*kālil*	*khurdu.*
94. Three ...	*sih-hālādāt* ...	*sih-hāt*	*sih-hāt.*
95. Egg	*tīnāī*	*tīnāī* ...	*murghānah.* *murgh-ānū.*
96. Hand ...	*khas*	*khas*	*changā.*

[1] I presume that the initial is Ch, although no diacritical marks are given.

Note.—In the above transliterations it has not been possible to discriminate between *g* and *k* with accuracy, as in the Jīruft and Sīrjān vocabularies no distinction has been made between these letters. In the Khorāsān vocabulary the distinction is marked, and this has, to some extent, served as a guide for the others. In 32 (Horse), I have given the form *gorā* instead of *kūrā*, as Major Molesworth Sykes pointed out in his note in 1902 that it was like the Hindustani *ghorā*. On the same analogy I have given *āgī* instead of *ākī* in 38 (Fire). Perhaps 47 (Ass) should also commence with *g*, as *girreh* is the form in the vocabulary published in 1902. There are few words of Indian origin to add to those I noted in 1902. They are—

Hair ...	... *vāl* (a closer form than *palmak*).	
Year ...	... *bars* or *vars* (H. baras).	
Hunger ...	... būkār (H. bhūkh).	
Much ...	... buhūt	(*Cf.* Panj. bahu, H. bahut, etc.)
Great ...	... buhūk	
Big ...	... buhuk, bahūt	
To do ...	... kam, kam-karī (*cf.* H. karnā, to do; Panj. kamm, work, kamm-karan, to work).	
Belly ...	.. pītū (H. pēṭ).	

M. L. D.

In all cases Mr. Longworth Dames has given the sound that was intended. In Persian there is no difference between the *g* and *k*.

P. M. S.

NOTE ON THE ASABA PEOPLE (IBOS) OF THE NIGER.

BY JOHN PARKINSON, Principal, Mineralogical Survey of Southern Nigeria.

[WITH PLATES XXXV, XXXVI.]

Introduction.—The following notes refer to a section of the important tribe of Ibos, who, as a whole, occupy the country from the valley of the Niger, near to and, at Asaba, westward of the Cross River. Any remarks of value which may be contained in the pages of this paper I owe to the kindness of Mr. James Watt, District Commissioner at Asaba, to whose care and attention I was indebted for a very excellent interpreter, and to the Fathers of the Roman Catholic Mission at Asaba. Among the latter I would desire to mention Father Zappa and Father Hummel, for to them and to my interpreter I owe the facts which I have been able to collect.

Under the present peaceful conditions, following on the establishment of British rule, immense facilities for travel and trade are given to the native. The mixture of races formerly distinct, and the introduction to one community of customs formerly confined to another isolated tribe, follow as a matter of course.

Such confusion will increase yearly, and I make this my excuse for the publication of a paper which is but a faulty and sketchy outline of part of a most interesting and important subject.

A. *Religious Beliefs.*

As amongst the Yorubas, we find a Creator-in-chief, or Supreme God, who is above all and to whom no sacrifices are made. He is called Chuku, a contraction for Chi uku, the great Chi or spirit.

The work of superintending the world is done, not by Chuku, who, I understand, takes but little part in its affairs, but by a second Chi; the relation being, to borrow an illustration from my informant, that of "headman and second headman." With Chuku and the second Chi we are but beginning the list of Ibo deities. Concerning the many other spirits, I have unfortunately been able to gather but little information: we find Agŭm, a deity bringing good luck (to be distinguished from the Ikenya̓ mentioned below) and Sadowă. The latter is a potent deity, though less powerful than Chuku, whose sign may be seen on many houses as a delicately shaped flask some 4 inches in height, placed in a niche, often triangular in form, let into the outer wall. I have noticed many similar niches in the walls of the houses in Benin City. (Plate XXXV, Fig. 3.)

Passing from gods common to all men to spirits whose offices for good are confined to the individual, we learn that each man is provided with two guardian spirits, the one known simply as Chi (my Chi or your Chi in conversation), who is the chief, and a subordinate spirit, Aka.

Thus a man will say to an enemy running away whom he cannot catch "My Chi and my Aka will kill you." In regard to this Chi it is difficult clearly to grasp the native idea. In the first place, everyone is considered to be created in duplicate, and the representative, or, as it were, the reflection in the spirit world of the body and of its possessions, is the Chi and its possessions. A man's Chi marries the Chi of the woman the man marries, and so on. In addition, the Chi, like Aka, acts as a guardian spirit or mediator between the man and Chuku, or the spirit acting in the place of Chuku. By representing the man's needs and judiciously pleading his cause, his earthly possessions and his happiness are greatly increased. *Chi i me jŭm*, My Chi has done badly, is a not uncommon expression.

On the death of the man, he and his Chi appear before God (? *Chuku*). What transpires I do not know: presumably some account of the past has to be rendered, but finally the spirit and the man are forgotten by their respective worlds, except when the question of re-birth arises. The spirit inhabiting man himself, and hence entirely distinct from his Chi, is called Mŏn. Mŏn is a generic name for spirits; for instance, speaking of a certain object, they would say: *Mŏn di imă*, A spirit lives in it. To be more specific, the spirit that lives in man is termed, *ŭnkpŭru obi*, literally, seed heart. The spirit world may be translated by *onnor na mŏn*, literally, to stay in the spirit.

In addition to his Chi and his Aka, each individual possesses an *Ikenya* or personal god of good luck acquired by a man on attaining to the wedded state and possessing a house. This Ikenẏa, the wooden representation of which can be made by anyone, is kept in the house and sacrifice offered to it. I am doubtful whether a woman ever possesses an Ikenẏa.

Salt is never used in such a sacrifice, but vegetables are a common form of offering, while an animal is given only on those occasions of special good fortune, when the man could say *Ikenya e meika*, My Ikenẏa has done well. On the man's death the Ikenẏa is split in two.

Some mention of the performance of *Ogubu* may not be inappropriate at this point. This represents the return of the spirit from the grave, and takes place about three weeks after interment, such reappearance marking the conclusion of the burial ceremonies.

The chief actor is generally a boy, holding his hand high above his head, completely clothed in cloth, so as to hide his feet and, having a long train. He appears not at night but in the afternoon, and has a right to any girl he can catch.

This ceremony, formerly believed in, is now, at least in Asaba, regarded with amusement.

Significant also of the mental attitude of the people is the sacrifice called

Abobo. The sacrifice, which is never of blood, is contained in a wooden canoe-shaped receptacle, found usually by the side of the path outside a town.

In general it appears to be an offering to appease any troubling and dissatisfied spirit, *e.g.*, that of a man killed. It also has relation to the following custom connected with burial ceremonies. A chief or person of importance is not buried until the goods, necessary to represent his wealth and station adequately, can be brought together, to be placed in the grave with the body. Collecting these goods takes some time, and the corpse is laid in the ground, but not considered buried until all preparations are finished. He is mentioned to by the people as being very sick, and may remain in that state for months or even years. The spirit of the man during this time is considered as existing in a betwixt-and-between state, neither of this world nor of the next.

This does not apply to a common man, whose friends on his decease contribute a few goods, and whose spirit passes directly to the next world.

Abobo is performed when the person responsible for the final obsequies of a chief believes, through trouble happening to him, that his friend or deceased relative desires speed in the proper preparations for his burial.

Those spirits of deceased friends are apparently not held in high esteem, for the offerings are made carelessly, and the spirit spoken of with contempt.

It may be mentioned here that there are no true altars connected with the little medicine houses (*unor oggu*) scattered around and about the houses of the people. When a stone is in a position resembling that of an altar stone, it is there because a spirit is resident in it. In an animal sacrifice the blood alone is used, the spirit thereby acquiring the whole offering. In the case of a fowl some feathers are left as well as the blood.

Re-birth.—These people believe in the re-embodiment through re-birth of a spirit once inhabiting an individual, now deceased (*i.e.*, the *ŭnkpŭru obi*), and also apparently of the Chi of an individual. The prefix Chi so-and-so is given to a child when this incarnation is supposed to have taken place.

A spirit (*ŭnkpŭru obi*) may also be embodied in an animal or a stick, but there is no suggestion that the status of the re-birth is correlated with the deeds done in life.

A man's spirit can leave his body temporarily during his lifetime and inhabit an animal. This is called *Ishi anu*, to turn animal. A man wishing for his own ends to turn animal makes request for the requisite medicine, with, of course, a money payment, to any person having a knowledge of the drug. This medicine, leaves, or whatever it may be, is placed in the food, and after a certain time, presumably when the man sleeps, the spirit leaves the body.

If the animal which by this means temporarily contains his spirit be killed, the man dies; if the animal be wounded, the man's body will presently be covered with boils.

This practice gives rise to many dark deeds, since, for purposes of revenge, the medicated food may be surreptitiously administered, and means taken to destroy the particular animal while inhabited by the decoyed spirit.

For example, a friendly hunter may be informed that out of a herd of six buffaloes a certain one is to be selected for slaughter, the request being prompted by the knowledge that in this animal the spirit of the enemy is located.

Sickness is usually attributed to the interference of a spirit, *e.g.*, a relative who is anxious to obtain something. A goat or fowl is sacrificed. Possession by evil spirits as a cause of sickness is apparently rarely credited, a fact due, I think, to the fear of ridicule.

The therapeutic action of drugs is not understood: any given medicine cures because of a spirit resident in it. Each medicine-pot around a house has its resident or attendant spirit.

Madness is not regarded seriously.

B. *Customs, etc.*

Origin of the people.—A double origin is attributed to these people; they say themselves that they have come partly from Oguta, to the east, *via* 'Ntegi, and partly from Idda, to the north, *via* Illa. This may account for a considerable difference in the native types, since we find on the one hand a light-coloured, tall and slimly-built race, on the other, one darker, shorter, and more heavily built. Of the two the latter appear far the less intelligent.

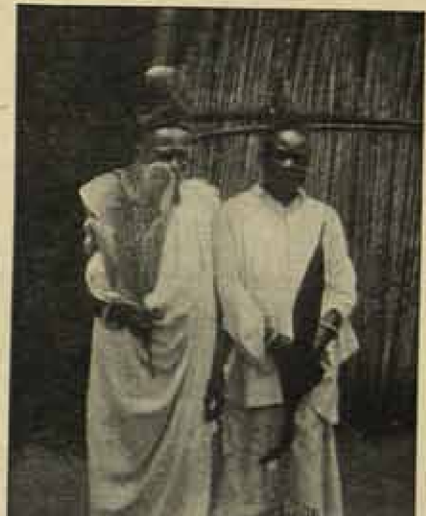

FIG. 1.—IGWI, HOLDING AZUZU, WITH ATTENDANT.

Photo. L. H. L. Huddart, Esq.

The first emigrant from the north is said to have been a woman who fled from Idda to Illa and there founded a home. She was followed by others, and gradually the people spread southward.

Grades of chiefs.—The first and highest grade is that of *Igwi* (Fig. 1). The distinguishing mark is a circle of broom (termed Aziza, from the palm tree), knotted before and behind, with upturned ends a couple of inches or so in length.

This circle is usually worn round a red cloth cap, rather like a flattened fez, but is occasionally worn round a brown one, and, when work has to be done, even on the uncovered head. In addition, the Igwi carries a circular fan made of untanned cow-hide, usually ornamented with red cloth strips or some similar decoration, and a short thin handle. This is the Azuzu. Finally, a short-handled many-thonged fly-flick is common, and is carried in the hand or over the shoulder. This is the Ijappa. Ivories round ankles or wrists are very usual and are termed respectively *ordu uku* (ivory [for] foot) and *orku uku* (ivory [for] hand).

Thumb rings are known as *umbăkă orpupu* (literally ring bone).

A horn, which, when properly blown, produces a long discordant note, is called *Oturu aka*, and is often carried by an Igwi. The origin of the name *Oturu aka* is doubtful; the instrument, in the form of a slightly bent cone, is made from the canine of a hippopotamus, the horn of a cow, etc.; it is blown through a small rectangular slit half way down the length, and is open only at one end.

To become an Igwi it is necessary to pay a considerable sum of money to the other Igwis, and a man cannot become an Igwi during his father's lifetime.

In earlier days a human sacrifice was made preparatory to a man becoming an Igwi, and after an Igwi's death three more were sacrificed.

The payments necessary before a candidate can become an Iwgi are often sufficient seriously to impoverish him. He expects, however, to get his own back with additions when, having obtained his object, other candidates are admitted.

Chiefs of the second grade are known as *Ikpa alaw.* These men carry only the Azuzu. About half the money necessary to make an Igwi is required to make an *Ikpa alaw.* A cow is sacrificed as a preparatory offering; a dead or a sick one may be accepted, but this offering is regarded as of little account.

A third or lowest grade exists, raised slightly above the level of the common people. This is termed *'Npwissi.* Even children may be *'Npwissi.* No money payment is necessary, but a feast is prepared for the benefit of the man's friends and relations.

Marriage.—The first wife has precedence over any wives subsequently taken, and is married by stricter ceremonial. No religious element enters into the ceremony, but the contracting parties are carefully bound, and adultery on the part of the woman is punishable by death in any village to which she might fly. Marriages are confined to people of the Ibo tribe, and I understand the woman is never taken from the same village as that in which the man lives. A man marrying into a neighbouring village derived a certain advantage in regard to intercourse with that village, as he could, in the troublous time existing some twenty years ago, pass freely without danger of murder or robbery from his own to his wife's town. A divorce can be arranged, but apparently not very easily, especially in the case of a first wife. Property descends to the brother, if the eldest son of the first wife is under age. Much depends on the proper payment of money on marriage; if this has not been made, the first girl of the marriage is taken by the wife's people as part payment.

A woman is not fattened preparatory to marriage, as is the custom among the Effiks and on the Cross River.

On "engagement" a present of beads, worth, say, £2 10*s.*, is given, but these can be recovered if the virginity of the girl is lost.

A woman confesses to the Diokpā[1] before parturition, naming all persons with whom she has had connection or familiarity. If this is not done, or any person is omitted, the danger of labour will be greatly increased and the woman may die.

The umbilical cord of a newly born child drops off some five days after birth. Up to this time the house is not swept and the mother and child remain indoors, fires are lighted for warmth, and food, wood, etc., is brought in by friends. After the period mentioned the house is swept; this is called *ikpu undu*, to clear all, but use of the words implies this particular act. The child remains in the house for three weeks, but after *ikpu undu* the woman may travel round the town.

Twins are looked upon with disfavour and formerly both were thrown away, a proceeding justified by saying that the birth of twins is purely animal in its nature.

Names.—The name of the father or of the family is considered of small account in naming a child. Frequently some event of importance to the family which happened about the date of the birth is commemorated in the name. Reference has already been made to the use of the prefix Chi.

As among the Efiks, a child is often named according to the day of the birth. The days in the Ibo week are four, *afor, unkwor, ekei* and *oldier* (or *olyier*); the days for rest, for public market and for work vary for the individual according to the particular governing *juju* as determined by the medicine man. One of these four days commonly forms part of the child's name; *afor* is commonly reserved for a boy, and to distinguish the sexes the word for girl is often affixed, but custom varies from place to place.

Shrines, houses for medicine, etc.—The stick with tripod termination for holding a medicine pot, familiar in the Calabar district, at Warri and elsewhere, is rare or absent. The *unor oggu*, or miniature houses for medicine, present many varieties. They have an adobe foundation, sometimes the walls are of the same material; the front is open and the whole is provided with a thatched roof. The jar, or jars, which the house usually contains, is of course a receptacle for medicine. A short stick or double cone of worked-up kaolin is doubtless phallic in origin, while the cowrie represents maternity. These are exceedingly common objects in the *unor oggu*. Now and again a house is whitewashed (? with kaolin and water); especially is this the case in the more elaborate houses which contain representations of the human figure.

Such a shrine is conspicuous in a main street of Okpanăm, a village not far from Asaba. Before and behind the shrine are constructions of medicine for the purpose of increase of family. One of these is shown in Plate XXXV, Fig. 3. The central house or shrine figured is now ruined, but it can be seen to have been profusely ornamented with a deeply incised carved design. On the further wall is an ornamented screen, in front of this are three female figures, now broken. The type of ornamentation is just discernible in Plate XXXVI, Fig. 4. These shrines,

[1] Diokpa, the head of the family, who is also a preparer of medicine.

and they are common, are, I believe, monuments to the original mother[1] of the family living in that part of the town. This founder of the family was not, I understand, buried on the site now occupied by the shrine.

Cicatrization.—The faces and bodies of the people are elaborately marked with small cuts. These are made with a small knife, the operation lasting three days. On the first day charcoal is rubbed into the wounds, then, after washing, on the second day burnt palm kernels and oil, and the wounds are again well washed to prevent the cuts becoming sores. I am uncertain of the treatment on the third day. The body marks are very elaborate in the case of women, extending downwards almost to the upper part of the symphysis pubis, but covering only a small part of the breasts. The cicatrices are made by women on both girls and boys, the operator being a middle-aged or elderly woman who can be trusted, for, should she have connection with a man during the time the work is in progress, the cuts will develop into sores. The woman operated on may have connection, provided she washes afterwards. The woman who operates is called *omorka*, but this name is extended to any one who works finely on any work of art, *e.g.*, on an azuzu. *Onei etu ebubu*, literally a person who marks on the skin, is a more specific designation. The woman who operates also circumcises the boys and performs an analogous office for the girls.

Face markings of a special type are confined to a special town, and formerly this was the case with the abdominal marks also, but the markings on the back were never for anything but ornament. I suspect that the customs in regard to these markings are changing. The body patterns are nearly always formed by straight lines: triangles, diamonds and half diamonds are the commonest forms, the marks being usually in double rows and most commonly not dots, but elliptical in form. I have seen one or two examples of small double circles, but no representations of animals, such as may be seen occasionally to the west in the Benin District.

Face pigments.—Kaolin, usually known as chalk, is commonly used, especially to form rings round the eyes. It is called *'nzu*. A black or violet colour used for the eyes is called *uli* and is said to be the fruit of a vine. It comes up gradually to full colour by repeated applications.

The violet pigment used on the eyelids by the Yoruba women in the Western Division of Southern Nigeria is powdered galena.

Colour.—The language is very deficient in names for colours. Black, white, red and blue are represented, but the name for the latter is probably imported.

There is no word for yellow; the colour would be expressed by saying *akpa mañu*, palm oil colour (literally, like oil). For green, a comparison would be made to grass or trees, *e.g.*, *ordika afifia 'ndu*, it is like grass life.

This paucity of words is not necessarily due to a lack of appreciation of colour.

Public ceremonies and feasts.—Two annual festivals following one another and

[1] It does not follow that the period of time has been very great. Compare Ellis, *Yoruba-speaking Peoples*, p. 13, for an example of the rap dity with which myths will grow up concerning a leading chief of a few decades past.

termed *Iwagi* and *Ikwensu*, connected by an intermediate ceremony known as *Ubor*, must be mentioned here. *Iwagi* is a yam festival, taking place at harvest time, to which each individual present contributes a fowl. For the intermediate ceremony of *Ubor*, a temporary King, called *Etz ubor*, is elected, chosen by turn from one of the families of the town. This king takes the red cap and broom band of the *Igwi* and is obeyed by them for the time being, although he may be quite a "common" man. The *Etz ubor* declares the date of *Ikwensu*. During *Ubor* a certain proportion of the men fight with poles "to find their enemies." These men are called *Obu*.

An *Obu*, which literally means a Killer, is a man who has done some deed considered brave by his fellows. The deed accounted highest is the slaying of another man; but a person may become an Obu in three other ways, (i) by buying a man and killing him, (ii) by killing a man when he is sick, (iii) by killing a tiger (*awoeo*) or a leopard (*ubido*); but in these instances a money present has to be given to the other *Obu* and to the *Igwi* who are *Obu*.

The *Obu* appear especially at *Ikwensu* and, on the day before the commencement of the festival, place a string of cowries and the fibre of a young palm branch around their wrists. Their eyes are surrounded with *'nzu*.

On the actual day the cowrie string only is worn; it is said as a badge, in order that one *Obu* may not kill another.

During *Ikwensu* only the *Obu* come out, the object of the ceremony being to frighten and drive away the devils of the town. Each *Obu* is followed by his train of admirers. If a stranger enters he is naturally killed for the sake of the reputation his slayer will thereby acquire. *Ikwensu* is followed by a general feast.

In connection with the *Obu* the following peculiar custom is worthy of note. A man who slays another publicly, the deed being publicly confessed, plants a cotton tree in the public street. In this tree the spirit of the slain resides, and forms a witness to confront any slanderer who dares impugn the bravery of the planter.

These cotton trees may not be cut down, but are not sacred in the ordinary sense of the word, *e.g.*, no sacrifices are made to them. If partly blown down by wind, the work may be finished by hand.

Cases may, however, arise in which the man who slays another cannot publicly parade his act abroad.

For instance, a young man joining the company of hunters should, on his being accepted, give a feast to all the hunters of the town. If this is neglected it may happen that he is shot in the bush. The people of the town are not told of what has occurred, but at the back of a certain house in the town a cotton tree is unobtrusively planted. Thereby the owner of the house becomes an *Obu*, and, if even his bravery should be questioned can retort "Do you know how to plant at the back of the house?"

The Eighu ulo.—This dance, which I had the good fortune to witness at Ibusa in March, 1905, takes place in each village, or in each quarter of a large town, before the yams are planted. The dancers come from one village to visit another, or from one quarter of a town to another, the compliment being returned later on.

The dancers are men and young girls, who are accompanied by a small group of musicians. (Plate XXXV, Figs. 2 and 4.)

The men are eight or nine in number, wearing white masks, high hats with double rows of feathers and a painted wooden bird, upright or sitting, on the top. They are clad in white and red striped robes and clumps of bells are pendent from their waists.

From this dress is derived the name of the dance—*Eighu ulo* (literally, dance from afar). A custom was introduced from Igara (a district on the left bank of the Niger, near or at the boundary between Northern and Southern Nigeria) in which the young men dressed up with a cloth upheld over the face, simulating a spirit.

The masked faces in the dance I saw recalled the ceremony introduced from the distant country of the Igaras, hence the name. The dancing girls are naked to the waist, with strings of blue beads below the knee and round the ankle, the calf of the leg being smeared with white ash or kaolin.

Poison and other ordeals.—Of these, that most commonly used is termed *Orachi*, also known as *Ini*, but *Orachi* is better. This ordeal consists in drinking an infusion of Sass wood. If the matter is of great importance the parties concerned themselves drink and the one who is lying dies; but on a lesser occasion two cocks are substituted for the men.

It may be noted that in addition to handing over the goods, etc., concerning which the dispute arose, the loser has to make a money payment.

In the Kukuruku[1] country, and, to a much less extent, near Asaba, the ordeal of *Ita* is resorted to.

In this two pots are used, one containing boiling oil with cowries, the other mashed leaves of a plant in water. The hand is placed in the latter first and rubbed, then immersed in the oil. The affair is, of course, decided by burns or no burns.

Settlement of minor disputes is attained by pouring water on a knife or matchet, each party drinking a little of the same. Unfortunately I am unable to give any details.

Pottery.—I have not myself seen any pottery manufacture in the neighbourhood of Asaba, although doubtless it exists in certain villages. The following details however may, I think, be taken as substantially accurate, for my informant, a native of Kukuruku and the son of a potter, had lived for many years in the Asaba district.

Most of the details I verified later for myself when travelling in the Kukuruku country. In the first place, any one is at liberty to make pots, and the industry is doubtless only restricted to those places where suitable material for the purpose exists. In the Asaba district they take a special clay (*ulaw*) from the river, in the Owo district (W. of the Kukuruku Hills) a decomposed mica schist is used. Its slightly greenish colour and spangles of mica enhance the appearance of the pot. The use of the wheel is said to be unknown, but near Owo a certain rude substitute is made by resting a shallow heavy bowl, on which the

[1] Lying on the boundary between Southern and Northern Nigeria, to the N.N.W. of Asaba.

future pot is moulded, on a rectangular piece of hard wood having a saucer-shaped depression[1] in the centre. The bowl and contained pot can be rotated on the wooden foundation with one hand while the pot is moulded with the other.

The operators are women, who, seated on the ground, place the apparatus just described between their outstretched legs.

The pot is started with a piece of clay about the size of an orange taken from a pile by the woman's side, a hole is made in the centre with the fingers, and the bowl rotated, the fingers still in position in the clay, and the beginning of the pot is made.

The pot is then built up, course by course, with strips of clay formed by rubbing a small lump between the hands and applying it to the unfinished edge of the vessel.

The process somewhat resembles coiling a rope. The only tools I saw used were a moistened leaf to smooth and form the sides and lip and a smooth ellipsoidal stone to finish the inside. Some at least of the patterns seen are made with string or cord held in the hand and rubbed round the vessel before the clay has set. Firing is accomplished by placing sticks inside, round and above the pot; they are not burnt in holes in the ground. I have nowhere seen signs of pigment, glaze or varnish.

Measurement of time.—A method of counting the moons common to this district and the country around Benin is perhaps worthy of note here. Each path where it enters a town is duplicated for a distance of a few yards. The path often divides on either side of a large tree or an artificial obstacle may be made. One of the two paths is always barred by a piece of stick or some nominal obstruction thrown across it; the other path alone is used. At the end of each moon the path previously barred is opened and that lately used is closed.

Language.—It is with the greatest diffidence that I venture to make any remarks on a subject of such extreme difficulty. No complete dictionary of Ibo exists and any information on the language, however fragmentary, is, I believe, not easy to obtain. The great difficulty in Ibo, as in Efik, Ekoï, Bini and other languages in the Protectorate, is in the accent and intonation. Needless to say, the people never help one in one's struggles: pronounce a word other than with faultless tone and they are entirely at sea; unable to place themselves mentally in the position of the white man, they are unable to follow his faulty efforts, or to find in the agonies of his speech any clue to his meaning.

It should be remembered also that amongst those nations, as amongst ourselves, many grades of correctness in grammar and of pronunciation exist. My authority for the words given below was a native of Kukuruku who, although perfectly conversant with Ibo, might, it may be supposed, be a bad subject for inquiry. He was, however, a man of exceptional education, capable of appreciating the differences I have mentioned. I give therefore a few details for what they are worth.

In the list of the numerals I have placed side by side with the Ibo equivalents

[1] Compare Keane, *Man Past and Present*, p. 44, where a similar practice is described as being used by the Wolofs between the Senegal and the Gambia, and claimed as unique.

those in Efik and Ekoï. The Ibos extend eastward as far as these two races, and comparison is, I think, of interest.

Number.	*Ibo.*	*Efik.*	*Ekoï (Oban town).*
1	*Ofu*	*Kiet*	[1]*Jutt.*
2	*Aboir*	*Iba*	*Ebbai.*
3	*Ataw*	*Ita*	*Essa.*
4	*Anoñ*	*Inañ*	*Enni.*
5	*Isei*	*Itien*	*Eronn.*
6	*Isi*	*Itiokiet* (5 + 1) ...	*Essasa* (3 + 3).
7	*Asa*	*Itiaba* (5 + 2) ...	*Innegasa* (4 + 3).
8	*Asataw*	*Itiaeta* (5 + 3) ...	*Inneganni* (4 + 4).
9	*Ita-ñyerni*	*Osukiet*	*Eronnani* (5 + 4).
10	*Ili*	*Duop*	*Affor.*
19	*Belli ofu n'ohu* ...	*Efurinañ* (15 + 4) ...	
20	*Ohu*	*Edip*	*Esam.*
30	*Ohu n'ili*	*Edip yeduop*	*Esam n'affor.*
40	*Ogu n'abo*	*Aba*	*Esam ebbai.*
50	*Ogu n'abo n'ili* ...	*Aba yeduop*	*Esam ebbai n'affor.*
60	*Ogu ataw*	*Ata*	*Esam esa.*
100	*Ogu isei*	*Ikia*	*Sameronn.*

The origin of the *Ibo* 9, *ita-ñyerni*, I do not know; but in Efik *osukiet* is said to mean, one short of.

The quinary basis of the Ibo numerals is not very apparent; in Efik it is sufficiently obvious, in Ekoï it exists in a modified form. I have placed in brackets what I conceive to be the true interpretation of the numbers 6 to 9.

Continuing we find—

Number.	*Ibo.*	*Efik.*	*Ekoï (Oban town).*
Once	*Ofu ekpo*	*Ini kiet*	*Kun jutt.*
Twice	*Egbe nabo*	*Ikaba*	*'Ntüm ebbai.*
Thrice	*Egbe ataw*	*Ikata*	*'Ntüm esa.*
First	*Izizi*	*Akpa*	*Da ambajum.*
Second... ...	*'Nkaboir*	*Udiana*	*En yirri.*
Third	*'Nkataw*	*Oyo ita*	*'Mbim essa.*
Fourth... ...	*'Nkanoñ*	— .	*'Mbim enni.*
Both	*Wanabo*	*'Mbiba*	(?) *Ebbai.*
All the three ...	*Wan ataw*	*'Mbita*	*Kun esa.*
All the four ...	*Wan 'noñ*	*'Mbinañ*	*Kun enni.*

[1] Almost *tsutt* in some dialects.

The present tense indicative of the verb to have, with the negative, is as follows:—

I have ...	*Engwem.*	I have not ...	*Engwem rŏm.*
Thou hast ...	*Ingwi.*	Thou hast not ...	*Ingwi ror.*
He has ...	*Aw 'ngwi.*	He has not ...	*Aw 'ngwi ror.*
We have ...	*Ani 'ngwi.*	We have not ...	*Ani 'ngwi ror.*
You have ...	*Unun 'ngwi.*	You have not ...	*Unun 'ngwi ror.*
They have ...	*Wa 'ngwi.*	They have not ...	*Wa 'ngwi ror.*

Of the verb to be—

I am	*Abum.*	We are ...	*Ani bu.*
Thou art ...	*Ibu.*	You are ...	*Unun bu.*
He is... ...	*Aw bu.*	They are ...	*Wa bu.*

The plurals of substantives are apparently usually made by prefixing either of the words *Mirrimi* or *Mirrikiti,* meaning several or many, thus:—

House ...	*Unor.*	Houses ...	*Mirrimi unor.*
Tree	*Osisi.*	Trees... ...	*Mirrimi osisi.*
Yam	*Ji.*	Yams ...	*Mirrimi ji.*
Fire	*Owrku.*	Fires	*Mirrikiti owrku.*

The following are exceptions:—

Old man ...	*Oke.*	Old men ...	('*ndi*) *ike.*
Woman ...	*Okpuru.*	Women ...	('*ndi*) *ikpuru.*

'*Ndi* is equivalent to they and is used when referring to three or four women or men who are known as the subjects of conversation to the speakers. Also—

Father ...	*'Na.*	Fathers	*'Nawa.*
Mother ...	*'Nei.*	Mothers	*'Neiwa.*
Child... ...	*Uwar.*	Children... ...	*Umu.*

Remembering the following words, the position of the adjective and numeral may be understood.

Egg, *Akwa.* Goat ♂, *Ei-u.* Goat ♀, *Nei-u.*
Chicken, *Okuku.* My, *'Nkem.*

My yams	*Ji 'nkem.*	Ten eggs... ...	*Akwa okuku ili.*
Five yams ...	*Ji isei.*	One goat (♀) ...	*Ofu nei-u.*
Five small yams ...	*Umu ji isei.*	Ten goats ...	*Nei-u ili.*

The use of the word *raw* expresses the opposite of an adjective, *e.g.,*

Heavy ...	*Alaw.*	Not heavy ...	*Raw alaw.*
Far ...	*'Ntitei.*	Not far	*Raw 'ntitei.*
Good ...	*'Ma* (almost *umma*).	Not good ...	*Raw 'ma.*

For the purposes of comparison the equivalents are given in Efik and Ekoï.

In Efik—

Heavy, *Odobe.*	Not heavy, *Odobeke.*
Far, *Oyum.*	Not far, *Oyumke.*
Good, *Afon.*	Not good, *Afonke.*

In Ekoï—

Heavy, *Ekuyup.*	Not heavy, *Ekaiyup.*
Far, *Edap.*	Not far, *Ekarap.*
Good, *Enop.*	Not good, *Ekanop.*

The following sentences may give some suggestions as to structure and composition:—

It is larger than this, *Orka 'nkei ibu* (*ibu* = large, *'nkei* = this).

It is heavier than this, *Orka 'nkei alaw.*

This is more than that, *'Nka kali 'nko* (*kali* or simply *ka* = more).

This is smaller, *'Nka pempe.*

This is smaller than that, *'Nka pempe kali 'nko.*

He gave the very largest to me, *Onyem inkei kali woncha* (*kali woncha* = more of all).

He goes to the market, *Ofi afia* (*afia*, the market).

The women have gone to fetch water, *'Ndi ikpuru 'njei ga kworta mirri* (*Kworta mirri*, to fetch water).

Where does this road go? *Ka eibei uzor 'nka* (or *'nkei*) *si?* (*uzor*, road).

The man buys yams, *'Nwa oke negoru ji.* (*'Nwa oke* literally male child.)

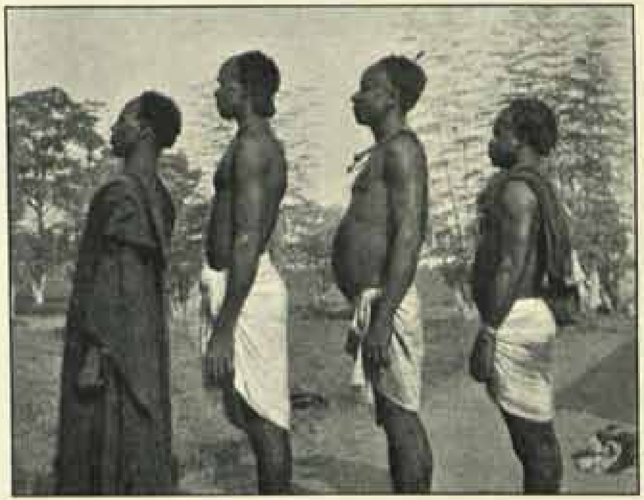

FIG. 1.—ASABA MEN.

FIG. 2.—THE EIGHU ULO. MEN DANCERS.

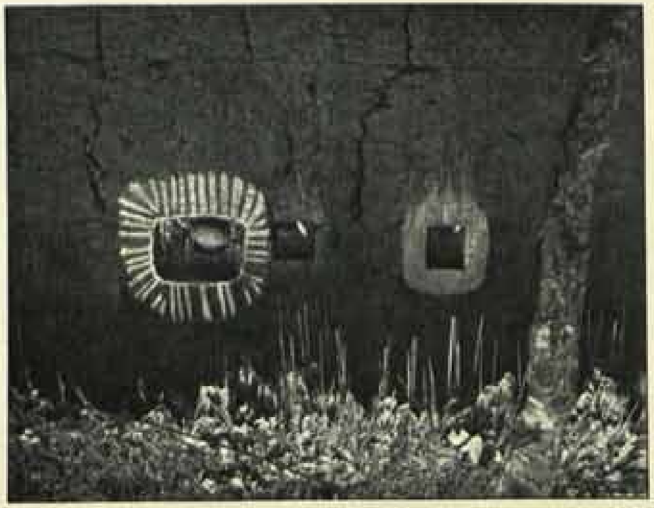

FIG. 3.—OFFERINGS IN NICHES, BENIN CITY.

FIG. 4.—THE EIGHU ULO. GIRL DANCERS.

NOTES ON THE ASABA PEOPLE (IBOS) OF THE NIGER.

FIG. 1.—ASABA MEN.

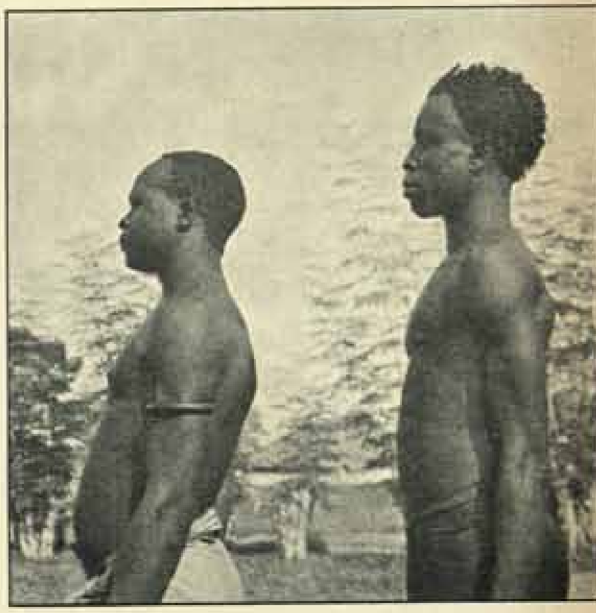

FIG. 2.—ASABA MEN.

FIG. 3.—CONSTRUCTION OF "MEDICINE": SHRINE AT OKPANĀM.

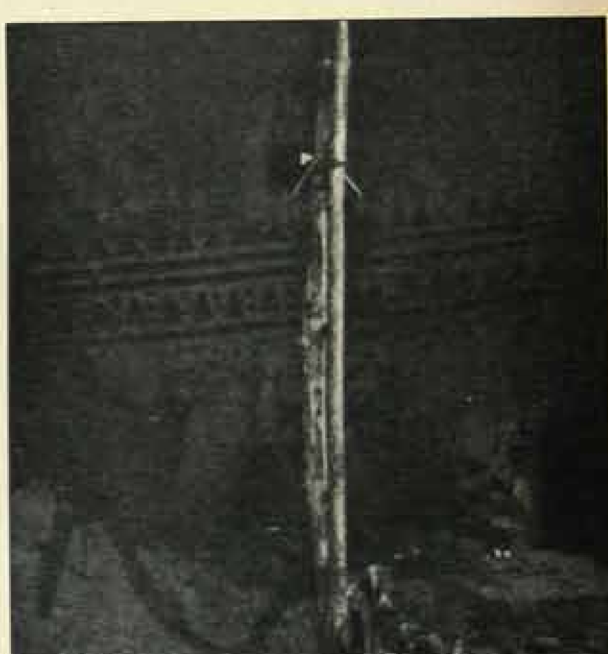

FIG. 4.—ORNAMENTAL SCREEN; SHRINE AT OKPANĀM.

NOTES ON THE ASABA PEOPLE (IBOS) OF THE NIGER.

ON THE INFLUENCE OF BIAS AND OF PERSONAL EQUATION IN STATISTICS OF ILL-DEFINED QUALITIES.

By G. Udny Yule, F.S.S.

I. Introductory.

Statistics of qualities present a very wide range of variation as regards the scope that is left for the idiosyncrasies of the individual observer. In some cases where the classes are naturally discrete—as in statistics of the proportions of the two sexes, of civil condition, of numbers of different coins issued from a mint, and so on—classification may be as certain and definite as with the most accurate measurements, indeed, more so. In other cases the classification may be rendered well defined, even if the classes be not naturally discrete, by the provision of suitable standards for comparison with the quality to be classed, *e.g.*, as in colour naming. But many important statistical memoirs have been published, during the last twenty years, on qualities, for which the classes employed are not naturally discrete, and for which no standards of classification have been, or in many cases can be, provided. I refer to such statistics as those of children under the headings dull, precocious, unruly, sickly or ill-nutritioned (references on page 380, Warner 11, MacDonald, 3); of eye colour, hair colour, as in many anthropological works; of artistic faculty, temper, health, and ability in man (Galton 2, Pearson 5, 6, 8, 9). In all such cases the headings under which the individuals are entered are either only verbally defined or not defined at all, the only guide to the meanings of the terms employed being common usage. The resulting ambiguity renders the subjective element of considerable importance, and makes it necessary to remember that, strictly speaking, we are dealing with statistics of names of qualities, not with statistics of qualities themselves.

Most people must have experienced in daily life the disagreements that arise as to the application even of the commonest terms in the case of such ill-defined qualities, *e.g.*, as to whether a certain individual should be called "fair," "tall," "ill-tempered," "plain," "dignified," "clever," "cautious," "rather cautious," "very cautious," and so forth; whether a carpet, wall-paper or cloth should be called light or dark, blue or green, red or brown. In general, of course, such disagreements are wholly trivial, but when scientific use is made of the terms they are no longer negligible; yet, so far as I am aware, no attempt has been made in any one case of the kind to investigate the real character of the nomenclature. There are more points that call for such investigation than might at first sight appear, *e.g.*, the self-consistence of the individual observer, the differences between individual observers, the combined effect of inconsistence of the individual and disagreements between individuals on a mass of statistics due to a number of observers, the statistical permanence of the nomenclature of the individual observer at widely separated times, the effect of different schemes of classification using two, three, or more headings, the relation between the individuals' nomenclatures under one such scheme and another, and so on.

An attempt must also be made to answer more complex questions, which were, in fact, the incentive to the experiment, viz., the questions raised by a recent memoir of the present writer as to the origin of certain peculiarities in tables illustrating the inheritance of qualities (Yule, 15). To explain briefly the nature of the questions, consider first the following condensed table for the inheritance of a measured character, viz., Head-length (Pearson, 8).

TABLE A.

Showing the number of cases observed in which two brothers had given head-lengths.

Head-length of second brother.	Head-length of first brother (millimetres).			
	−182·5	182·5 − 6·5	186·5 −	Total.
182·5 −	454	198·5	134	786·5
182·5 − 6·5	198·5	152	183·5	534
186·5 −	134	183·5	476	793·5
Total	786·5	534	793·5	2,114

Work out the ratio of the frequency in the first column to the sum of the frequencies in the first and second (454/652·5, and so on), for the three rows and treat the second and third columns similarly. The ratios run:—

TABLE B.

Derived from Table A.

Ratios 454/ (454 + 198·5), etc.	Ratios 198·5/ (198·5 + 134), etc.
0·696	0·597
0·567	0·453
0·422	0·279

In each case the ratios form a descending series. Now take a table for an unmeasured character, viz., temper, from the same source—

TABLE C.

Showing the number of cases observed in which two brothers were returned as possessing given tempers.

	Temper of first brother.			
	Quick.	Good-natured.	Sullen.	Total.
Quick	138·5	152·25	39·75	330·5
Good-natured ...	152·25	1026·5	106·25	1285
Sullen	39·75	106·25	84·5	230·5
Total	330·5	1285	230·5	1846

and treat it in exactly the same way. The result is quite different; the ratios run discontinuously:—

TABLE D.

Derived from Table C.

Ratios 138·5/(138·5 + 152·25), etc.	Ratios 152·25/(152·25 + 39·75).
0·477	0·794
0·136	0·907
0·272	0·558

For the first pair of columns the first is the greatest ratio and the second the least; for the second pair, the second is the greatest ratio and the third the least. Table A is what I have termed an isotropic distribution, while Table C is not. Further, Table C diverges from isotropy in quite a peculiar way; judging by the order of the ratios in Table D, it appears to present a relative excess of pairs of the same name ("homonymous" pairs), as compared with an isotropic distribution, *i.e.*, an abnormal excess of frequency in the diagonal compartments. An extensive investigation of a number of tables like A and C, for measured and unmeasured characters respectively, showed that all the tables for measured characters were approximately isotropic, whilst the overwhelming majority of those for unmeasured characters were not, fifty-five out of the sixty-eight tables examined exhibiting a divergence from isotropy precisely of the above kind. So remarkable a contrast cannot but suggest a possibility that the excess of homonymous pairs may be of subjective origin. It is therefore necessary so to arrange matters in the experiment as to elucidate such points as the following, in addition to those previously noted :—the bias of the individual observer in naming pairs of associated qualities, the statistical permanence of such bias in observations made at widely separated times, the effect of individual bias and personal equation on a table due to a number of observers, the influence of classification under two, three, or more headings on the effect of bias, the relation between the bias of an individual under one such scheme of classification and another.

It is, of course, probable that any effects observed will vary in magnitude with the quality under investigation, but there does not seem reason to suppose that there will be any difference in kind between one case and another. The matter actually chosen for investigation as presumably typical was the naming of graded tints of the same colour under such headings as "light," "dark," "rather dark," and so on.

II. THE MODE OF CONDUCTING THE EXPERIMENT.[1]

A matt-surfaced self-toning photographic printing-out paper was taken and a number of pieces printed to graded depths of colour by successive exposures, a sheet of cardboard being moved so as to cover piece 1 only, then pieces 1 and 2, then pieces 1, 2, 3, and so on. In this way sixteen pieces were finally obtained, graduating in tint from a slightly greyish-white to a very deep blackish brown.[2] If care be taken to keep the sheets moving while toning there is no very great difficulty in obtaining in this way small sheets (*e.g.*, half or whole plate size) of sensibly uniform colour, but the greatest care must be taken with the deeper tints. The intervals of exposure are not necessarily equal; I found longer intervals desirable at the darker end of the scale.

Small scraps of roughly $\frac{3}{8}$ inch square were then cut from each of the sheets and placed in numbered envelopes. White (greyish-white) cards were provided, about $2\frac{5}{8}$ inches by $3\frac{5}{8}$ inches, and sixteen of the tinted squares taken from each envelope and pasted one on each card, slightly above the centre, the number of the tint (1=lightest, 16=darkest) being marked on the card in pencil. There were thus 256 cards altogether, 16 with each one of tints. Each small pack of 16 was then taken, and under the first scrap—about $\frac{1}{8}$ inch distant from it—was pasted a second, of tint 1 for the first card, 2 for the second, and so on up to 16 for the third. This tint was again noted in pencil on the card. In this way a pack of 256 cards was formed, each having two tinted squares on it, the tints being

[1] An outline of the main results of this experiment was given in *Proc. Roy. Soc.*, vol. 77 (1905), p. 337.

[2] Such printing should be done out of doors or at an open window; printing behind ordinary window glass is liable to give rise to unevenness of tint. I think some of my darker tints were imperfect from this cause. It is difficult to judge such unevenness of tint before the sheet is cut up; I infer unevenness in the present instance from the slight irregularity of naming.

combined in every possible way. If a contingency table were formed between "upper tint" and "lower tint," there would be sixteen rows and sixteen columns, and the entry would be one unit in each square of the table.

The 256 cards were then dealt out on the floor of a room, picked up as much at random as possible, further shuffled, and numbered in ink in the more or less random order so obtained. A key was then written out showing the actual tints (denoted by their numbers 1 to 16) for each of the cards in the pack, and when this was done the pencilled marks on the cards were rubbed out. As a matter of practice it may be stated that "keys" in three forms were found useful: (1) a table like an ordinary table of double entry or contingency table with the numbers 1–16 at the heads of columns (upper tint) and the ends of rows (lower tint), and in each square of the table the number of the corresponding card in the pack; (2) a schedule giving the numbers of the cards in the pack in order and opposite each the numbers of the upper and lower tints, in the form :—

Card number.	Upper tint.	Lower tint.
1	3	7
2	10	2
3	9	11
4	7	7

(3) schedules giving for each tint the numbers of the cards on which it occurred, in their numerical order, distinguishing the upper and lower positions, in the form :—

Number of the Tint.

1		2		3	
Upper.	Lower.	Upper.	Lower.	Upper.	Lower.
—	6	—	2	1	—
16	—	—	9	—	33
17	—	—	11	—	34
21	—	—	19	36	—
—	24	24	—	—	58

The first key gives at once the card containing any required pair of tints, the second serves most readily for giving the numbers of the tints on each card, and the third is extremely useful for checking the compilation of certain tables, enabling the check to be carried out rapidly for any one tint in the entering of which there is obviously some error.

To explain the mode in which the experiment was conducted, I give in full the "Explanations and Instructions" which were circulated with the pack to those who kindly volunteered their assistance.

EXPERIMENT ON TINT NAMING.

EXPLANATIONS AND INSTRUCTIONS.

Within the past few years several series of statistics have been published based on non-quantitative observations, the observers having been asked merely to assign names to certain qualities of the individuals or persons observed. For example, in order to throw light on the degree of resemblance between brothers, the observer would be asked to name the eye-colour of each pair of brothers as "light," or "medium" or "dark." A whole series of tables based on such statistics were given, for instance, by Professor Pearson in the Huxley Lecture of 1903.

On examining a number of such tables from the above and other sources, they were almost all found to exhibit a certain peculiarity which was not noticed in tables based on quantitative measurements. The question, therefore, arose whether this peculiarity might not be due simply to the mode of action of the judgment in assigning names to such qualities, and be consequently of no organic significance. In order to throw light on this point I thought it desirable to conduct, with the aid of volunteer observers, an experiment in which the pairs of qualities named should be distributed in a known manner.

A pack of 256 cards, numbered from 1 to 256, is sent herewith, each card bearing two small scraps of photographic paper printed to different depths of colour. The tints run from a slightly impure white through all shades of brown to a deep blackish brown. You are requested to go through this pack and to name the tints according to one or more of the following schemes:—

Series A, 1 "light," 2 "dark."
Series B, 1 "light," 2 "medium," 3 "dark."
Series C, 1 "very light to light," 2 "rather light," 3 "medium," 4 "rather dark," 5 "dark to very dark."

If you have only time to conduct the one experiment, I would prefer that this should be an experiment of Series C.

To save time, schedules are sent herewith in which the results of your naming can be entered. It will be most convenient for me if you do this by not entering the *names* of the tints as above, but simply the *numbers* 1, 2, etc., *e.g.*, for Series B using the symbols 1=light, 2=medium, 3=dark.

As it is particularly desired to obtain the effect of the *unaided* judgment, you are requested not to make any attempt to form a scale of tints from the cards given nor to compare one card with another, but *to observe and name the tints on one card only at a time*, though before commencing naming you may look through the pack to get a general idea of the range of colour. You will probably find you can name the whole pack in half an hour to an hour.

As I have only the one pack of cards, please return it to me with your Schedules as soon as possible, *registered*, addressed to G. U. Yule, Esq., Central Technical College, Exhibition Road, S.W. Stamped addressed label enclosed.

G. Udny Yule.

Form of Schedule Supplied.

Observer________________ Series________________

Card Number.	Tint.		Card Number.	Tint.		Card Number.	Tint.		Card Number.	Tint.	
	Upper	Lower		Upper	Lower		Upper	Lower		Upper	Lower
1	—	—	33	—	—	65	—	—	97	—	—
2	—	—	34	—	—	66	—	—	98	—	—
3	—	—	35	—	—	67	—	—	99	—	—
4	—	—	36	—	—	68	—	—	100	—	—
etc.			etc.			etc.			etc.		

I do not think much need be said in justification of these instructions. Lack of definition of the terms used for classification was, of course, an essential point of the experiment. This makes the test more severe than that involved in some, though by no means all, of the statistics to which reference has been made; to this point I return.

The experiment was begun in March and closed in the middle of July, 1905, when I had obtained, from thirty-four individuals (including myself), seventeen returns of Series A, twenty of Series B, and thirty of Series C. I may take this opportunity of thanking the many friends who gave their time and trouble towards the making and procuring of returns; without their willing aid the success of the experiments would have been impossible. The names are given in the Appendix, p. 363, with the numbers by which they are in general cited in the sequel. The present writer in his alphabetical order is Observer 31.

III. Results.—The Naming of the Individual Tints.

The 256 cards of the pack contain altogether 512 samples of tints, two on each card. On each observer's schedule are given the names he assigns to the tints; on the key No. 2 the actual depths of the tints as expressed by the arbitrary numbers in the scale order 1 to 16.

From the schedule and key together a frequency table can be compiled with the numbers 1 to 16 at the heads of columns and the names "light," "medium," "dark," etc., at the heads of rows, showing the way in which the observer distributes the actual tints under the names. The table for each individual will show how far he is self-consistent in his naming; a comparison of those for different individuals will show how far they differ *inter se* in their use of terms, and finally a totalisation of all the individual tables into one will show how far a mass of observers can be treated as a consistent whole.

Such tables were formed for all the observers under each series (A, B, C), but it would be impossible to reproduce them all here. A few, however, for each series are given as samples. (Tables I, VI, XI.)

Series A. The tints classified under "light" or "dark" only.

In Table I are given, as illustrations, the results of the naming of four individual observers. In this case, where the individual is only given a choice between the terms "light" and "dark," a number of the observers are almost surprisingly self-consistent, *e.g.*, Observer 26. In his case all the thirteen tints, 1–7 and 11–16, are named with perfect consistency; in the case of each of the tints 8 and 10 one exception occurs to the general rule of his nomenclature, and only in the case of tint 9 do we find any marked uncertainty, this tint being named sometimes "light" and sometimes "dark" in the proportion of about 2 : 1. Of the four observers whose results are included in Table I, 7 and 12 are clearly not so good, whilst 10 is very much worse.

The self-consistence of the observers may be simply compared in a more definite way. If an observer has named a tint twenty times "light" and twelve times "dark," we may assume that if he had been quite consistent the tint would have been uniformly termed "light." The twelve occasions on which it was termed "dark" may then be reckoned *inconsistencies*. Adding up the total of such lapses we get a measure of the individual observer's inconsistency. In the case of Observer 10, for instance, tints 8 and lighter are named, in the majority of cases, "light"; 9 and darker, "dark"; the inconsistencies are $15 + 5 + 3 + 1 + 1 + 9 + 12 = 46$; in the case of Observer 26 they are only $1 + 1 + 11 = 13$. In Table II are given the *inconsistencies* reckoned in this way for each observer. The mean is 25·3 or only 4·9 per cent. Observer 10 is the worst of the series, with 46 inconsistencies; 26 the best with only 13. It is evident, so far as the figures go, that observers differ considerably *inter se* as regards self-consistency, but it remains to be seen how far the results may be taken as indicating a permanent characteristic of each observer; this is a distinct point on which light is thrown by some specially repeated experiments under Series C, and by some indirect evidence give below (p. 336).

As regards the differences between individual observers in their use of the names, in Table III are given the numbers of the samples out of the 512 in the pack which were named "light" and "dark" respectively by each of the observers; the number of "light" ranges from 258 to 380, with a mean of 310·5 and a standard deviation of 32·6. The coefficient of variation (percentage of the standard deviation on the mean) is therefore 10·5 per cent.; the standard deviation of the number of "dark" is, of course, the same and the coefficient of variation is therefore 16·2 per cent. This is a high degree of variation, the standard deviation of errors of sampling being only

$$\sqrt{512 \cdot \frac{310}{512} \cdot \frac{202}{512}} = 11{\cdot}1$$

corresponding to coefficients of variation of 3·6 per cent, and 5·5 per cent., and we must accordingly regard different observers as liable to attach significantly different meanings to the terms. I have not made experiments in this series or in Series B to determine how far such differences will remain constant on different occasions. The reader is again referred to the few special trials under Series C and to the remarks on p. 336.

The judgments of one observer may also be compared with those of another in a different way, viz., by counting on how many occasions they agree and on how many they differ. I have carried out such comparisons for thirteen pairs of observers, formed by writing out the list of those who had submitted returns in each of the three Series A, B, C, and taking each one with the next but one following. The results are shown in Table IV. The disagreements of judgment range from 22 to 121 out of the 512 samples named, or from 4·3 to 23·6 per cent. with an average of 11·4 per cent.

Finally, in Table V is given the distribution of the actual tints under the names for the whole of the observers together. The differences between observers now come into play so as to increase the proportion of inconsistencies very considerably above the average for the individual (4·9 per cent.); the total is 700 inconsistencies out of 8,704 namings or 8·4 per cent., the tints 1–10 being taken as "light" and 11–16 "dark" according to the majority of the namings. The distributions of the two names actually overlap by more than half the range.

Series B. The tints classified under the headings "light," "medium," and "dark."

In Table VI are given the distributions of tints under these three names for four sample individuals. The general features are the same as in Series A, Table I, there being always a marked overlapping of the tints to which the several names are applied, though the extent varies for different observers. The inconsistencies of naming in the case of each observer may be measured as before; in the case of Observer 6, for instance, we may say (judging by the majority of his namings) that if he had been perfectly consistent, all tints from 1–9 would have been named "light," from 10–13 "medium," and from 14–16 "dark." Counting all outside these limits as inconsistencies, the total is 10 + 4 + 4 + 11 + 4 + 3 + 9 = 45. The similar totals for the twenty observers making returns under this series are given in Table VII, the mean being 44·7 or 8·8 per cent. as compared with 25·3 or 4·9 per cent. for Series A. There is, therefore, a very marked increase in the proportion of inconsistencies of the individual judgment as compared with Series A, the existence of three classes instead of two increasing the opportunities for error.

From the figures of Table VIII it would also seem that the divergences between different individuals are emphasised, not lessened, by the introduction of the "medium" class; two out of the three standard deviations of the numbers classed under different heads are considerably greater than before, and the coefficients of variation are markedly greater in all cases. Instead of coefficients of variation of 10 and 16 per cent. we have to deal with coefficients of 20, 26 and 28 per cent., the actual ranges of the numbers of tints classed under the several headings being astonishingly large:—

Light: from 124 to 290
Medium: „ 92 „ 274
Dark: „ 102 „ 226

The result is confirmed by the frequencies of disagreements for the thirteen pairs of observers, given in Table IX; the table differs slightly from the similar Table IV for Series A, as in that case the observers could only differ by one class, now they may differ by two, the one calling a tint, say, "light" and the other not "medium" but "dark." Taking it altogether there were 1,555 disagreements by one class and 25 by two classes or a total of 1,580 (23·8 per cent.) as compared with 757 (11·4 per cent.) in Series A for the same number of pairs of observers (Table IV).

The distribution of tints under names by the whole of the twenty observers together is given in Table X. It is again evident that the only effect of introducing the medium class has been to increase the inconsistency of naming; the terms "light" and "medium" are so far from indicating really distinct classes that they overlap by nine tints, while "medium" and "dark" overlap by ten. Even "light" and "dark" are not distinct, all tints from 7–11 inclusive having been named sometimes "light," sometimes "medium" and sometimes "dark." If we take it that perfectly consistent observers would have classed tints 1–6 uniformly as "light," 7–11 as "medium," and 12–16 as "dark," the inconsistencies number 1,644 out of 10,240 namings or 16·1 per cent. as compared with 8·4 per cent. for the similar table (Table V) of Series A.

Series C. The tints classified under the headings "very light to light," "rather light," "medium," "rather dark," "dark to very dark."

The distributions of tints by four sample individual observers are given in Table XI and present the same features of varying degrees of self-consistence as before; it is evident that even for one single observer a mere name such as "rather light" or "medium" does not connote a definite class sharply bounded from the adjoining classes, but a frequency distribution widely overlapping those connoted by the adjacent terms in the verbal scale. The actual numbers of inconsistent namings for each individual, calculated as explained before, are given in Table XII; the average is 89·6 or 17·5 per cent., as compared with 44·7 or 8·8 per cent. for Series B and 25·3 or 4·9 per cent. for Series A. This is a very rapid increase indeed, in the ratio of 1 : 1·77 : 3·5.[1]

The number of samples classed by each individual under the respective headings are given in Table XIII. Here we find fluctuations of the same order of magnitude as in Series B, there being no sensible increase. In Series B the coefficients of variation are 20 to 28 per cent., and in C 22–28 per cent.

The numbers of disagreements for the thirteen pairs of observers taken as samples are given in Table XIV; the individual results fluctuate largely as before, but with one exception they are all greater than for Series B (Table IX) and the total shows 2,173 disagreements by 1 class, 212 by 2 classes and 1 by 3 classes. The grand total is 2,386 or 35·9 per cent. as compared with 23·8 per cent. for Series B and 11·4 per cent. for Series A. While, therefore, the individual differences as regards the total numbers of samples assigned to the several classes have not been markedly affected by the increase in the number of classes from three to five, the disagreements as to the naming of the single samples have been largely augmented. The observers in Series A, speaking roughly, differ in one case out of nine, in Series B in one case out of four, in Series C in one case out of three.

The individual differences as to the meanings of terms are of course only very imperfectly illustrated by the totals of Table XIII, and really require for their appreciation the whole original series of tables of which four fairly divergent examples are given in Table XI. Such tables might be summarised in another and more thorough way, viz., by treating each row as a frequency-distribution, with the difference between adjacent tints as an arbitrary unit, and evaluating the mean and standard deviation. Thus we have for the class "rather light" of Observers 6, 10, 12, 29. (Table XI.)

Observer.	Mean tint corresponding to "rather light."	Standard deviation.
6	8·62	1·25
10	3·97	1·04
12	6·57	1·42
29	4·95	1·22

[1] I have endeavoured to form a working hypothesis as to these ratios of increase, but failed to arrive at any satisfactory conclusions. The numbers given vary approximately as $(n+1)(n+2)$, where n is the number of classes, *i.e.*, 1, 1·67, 3·5. I do not suppose that the ratios hold except for the given scheme of class frequencies. (See below p. 338.)

This would form a somewhat interesting mode of quantifying, if only with respect to an arbitrary scale, the meanings attached to the same term by different observers, both in intension and extension, but I do not think that, in the absence of an absolute colour scale, any useful purpose would be served by it, while the work would be exceedingly laborious. The method seems, however, worth noting.

Table XV, corresponding to Tables V and X for Series A and B, gives the total distribution of tints, under names, for the thirty observers who made returns under this series. The relatively low frequencies of the intermediate classes "rather light" and "rather dark" as given by the totals of this table and the averages at the head of Table XIII are curious. The extreme classes "very light to light" and "dark to very dark" just fail to overlap, each occupying half of the range; tints 6–8 are, however, classed under all the first four headings and 9–11 under the last four; tint 1 (impure white) is the only tint classed by all observers at all times under the one heading only. The number of inconsistencies is 4,123 out of 15,360 namings, or 26·8 per cent. as compared with 16·1 per cent. for Series B and 8·4 per cent. for Series A. The result again emphasises the increase of doubtful and discordant judgments with the increase in the number of classes. To increase the number of classes above the minimum of two appears, in the absence of strict definition, to be a mistaken practice.

Permanence of individual peculiarities.—I have remarked in the preceding that the tests described do not indicate how far the individual peculiarities recorded may be regarded as of a *permanent* character, *i.e.*, peculiarities that would be re-observed if the same individual were to repeat his naming of the cards after a more or less considerable interval of time. Two of the Observers 11 and 16 were good enough to repeat their namings under Series C three times, at my request, and I similarly repeated my own with a view to affording a direct test on the point, the results being given in Table XVI. In the case of Observer 11 there was an interval of several weeks between the first and second namings and of a week between the second and third, in the case of Observer 16 five days between the first and second and a day between the second and third, whilst in the case of Observer 31 (the present writer) there was an interval of several weeks between each repetition. It will be seen that while the numbers of samples classed under the several headings by the same observer on different occasions fluctuate considerably, the number of disagreements between the namings on one occasion and another are generally low compared with the average for two different observers, viz., 184 (Table XIV)—as one might expect. The present writer was the most erratic of the three observers tested, but the exceptionally large number classed under the heading "light to very light" remained a permanent characteristic of his distributions; similarly Observers 11 and 16 always exhibited a somewhat high frequency for "medium." The numbers of inconsistencies fluctuate somewhat, but Observer 11 seems to be significantly more self-consistent than 16 or 31.

The material of Table XVI is extremely limited, so it occurred to me to apply a test of the permanence of individuality in another way in the case of those observers who had made returns under all three Series A, B, and C. If the individual differences exhibited were the mere result of temporary moods or variations of circumstance, a complete absence of correlation might be expected between the results of an observer under one series, say A, and his results under another, say B. If there is, however, a marked correlation, one may infer a statistical permanence of the observer's idiosyncrasies or "personal equation." The following correlations—based though they are on the very small number of 15 pairs—seem to render it certain that there is such a permanence as regards the class frequencies.

Correlation coefficient between number classed, by one observer, as:—

"light"	in Series	A and "light"	in Series	B	+ ·80
"	"	B " "	"	C	+ ·76
"	"	A " "	"	C	+ ·62
"dark"	"	A and "dark"	"	B	+ ·48
"	"	B " "	"	C	+ ·50
"	"	A " "	"	C	+ ·51
"medium"	"	B and "medium"	"	C	+ ·56

The much larger correlation in the case of "light" as compared with "dark" is curious, but the results are fairly regular and significant. For the number of inconsistencies, however, the figures are erratic.

Correlation coefficient between:—

number of inconsistencies	in Series	A	and Series	B	+ ·59
" "	"	B	"	C	+ ·04
" "	"	A	"	C	− ·02

The last two correlations are practically zero, the first significant. In view of the very limited material, little weight can be attached to the result, which, taken as a whole, would appear to indicate that you cannot infer the consistency of an observer's namings under one scheme from his consistency under another as tested by only 500 namings or so. Finally, the numbers of disagreements for thirteen pairs of observers as given in Tables IV, IX, and XIV for Series A, B, and C were tested and the results were surprising, at least to the present writer.

Correlation between the number of disagreements for any pair of observers under Series A and the same pair under Series B + ·83.

"	"	B	"	"	"	C + ·86.
"	"	A	"	"	"	C + ·93.

The first figure was checked by adding a second set of 14 pairs of observers. The disagreements for these pairs were less marked than for the first set, and, as might have been expected, the correlation was lowered; the coefficient for the twenty-seven pairs was 0·71. It appears, then, that, in spite of the low correlations for some of the class-frequencies and for the individual inconsistencies, the conclusion holds:—"If a pair of observers agree or disagree to an exceptional extent under one scheme of classification, they will probably agree or disagree to an exceptional extent under another."

General conclusions as regards the namings of the individual tints.—It is evident from the foregoing that (1) There is a considerable degree of inconsistency in the naming of tints by the single individual; classes defined by names only cannot be treated, even for one observer, as discrete. (2) Different observers attach very different meanings to the terms used for classification, although these are common terms in such general use that at least a moderate degree of uniformity might have been expected; and these differences are of a statistically permanent kind. (3) The inconsistencies of the individual and the disagreements between individuals are the more frequent the greater the number of classes; at least where such classes do not differ much in relative frequency. Some limitation such as that expressed by the last phase seems necessary. The addition of non-existent classes could obviously not increase any tendency to inconsistence; if there were a certain percentage of inconsistencies in classifying human hair colours into "yellow" and "brown or black," this percentage would not be increased by providing a class for "blues." Nor could the presence of a rare though existent class greatly increase the inconsistence. A classification of men into "tall," "short," "dwarf," would give rise to few more disagreements than a classification into "tall" and "short" alone. The percentage of inconsistencies or disagreements in a classification of ill-defined qualities must therefore depend in some way on the frequencies as well as the actual number of classes. (4) As a consequence of the variations of personal equation in the use of terms, the namings by a group of observers considered as a whole are necessarily more inconsistent than the namings by one individual alone. If the frequencies of actual variations in the intensity of any quality can be represented, ideally at least, by some frequency-curve like that of Fig. 1, the

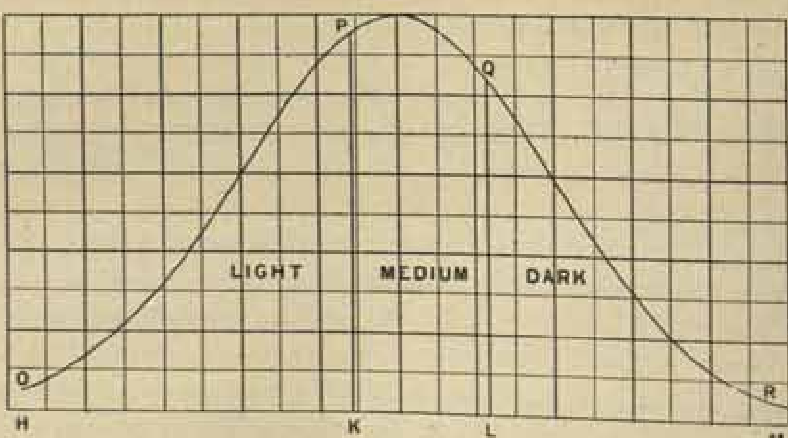

FIG. 1.

classification of these intensities under mere names cannot be represented by the breaking up of the distribution into segments like OPKH, PQLK, QRML, or anything like it, but only by the dissection of the curve into a series of widely overlapping frequency-distributions, as in Fig. 2 (plotted from the data of Table X, smoothed). The areas of these distributions alone are given by the class-frequencies, and

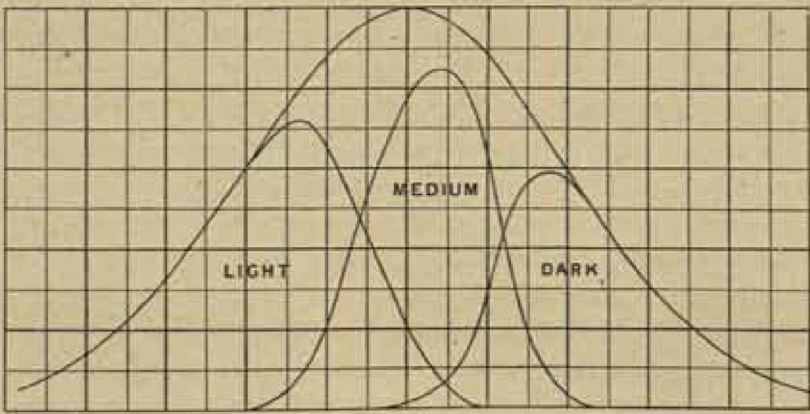

FIG. 2.

neither their positions nor their forms are accurately known; these could only be determined by actual trial—measurement of the quality and comparison of nomenclature with measurement for the observers concerned. Such a trial would be, for many qualities, impossible. It follows that methods like those of Mr. Galton (2) and Professor Pearson (5), which treat the classes as if they were discrete, and determine the relative class-intervals in terms of the dispersion of the whole distribution, have no strict applicability to such statistics as those with which we are here concerned. The classes not being determined by definite intervals, quantitative results, obtained on the assumption that they are so, must be considered as useful illustrative analogies rather than measures of the actual.

It may be also as well to note that in cases like those under discussion where the classes are not discrete, the use of such expressions as the *truth* of the statistics, the *truth* or *correctness* of any given observers' results, the *mistakes* made by one observer or another are out of place. If A and B are counting coins and A reckons a certain coin as a florin, while B reckons it as a half-crown, one or other at least makes a mistake; but if A says that a tint is light and B says that it is dark, neither has necessarily made a mistake. There is no rigid accepted standard of lightness or darkness, and the standards of two individuals not only may, but probably do, differ. Yet such phrases as those cited are not infrequently used. I give the following, merely as an illustration. "In reporting the pupils as bright, dull or average, the teachers were told to mark them average when in doubt . . . . While some may make mistakes, it is wholly improbable that those who do will all make mistakes the same way. . . . It may be said that the results are statistics of opinions of teachers. Then the real question is, what is the probable truth of the opinions of the teachers?" (3, p. 1015). The candour of the work from which these passages are taken is entirely obvious, but they are surely written from a wrong standpoint.

If the consequences of indefinite classification be grasped, the final question seems meaningless. Every teacher who says "I call this boy dull," presumably speaks the truth. In this sense all the judgments are true. The questions that arise relate to their consistence.

IV. SUMMARY REVIEW OF CERTAIN PUBLISHED STATISTICS.

I have little doubt that the discordances and inconsistencies exhibited in the preceding work may seem to many readers, as they were to the writer, startlingly large, and the question is sure to be asked whether the results obtained in this experiment can really apply without serious modification to this or that section of recent work. It may be as well, therefore, to pass in review, very briefly, some of the published data in question. In doing so, I will group the data according to the subject matter, and will take first statistics of colour—eye-colour—hair-colour—coat-colour of horses.

(A) *Eye-colour.* The classification of eye-colours presents problems in most respects similar to—indeed identical with—those of the experimental case. It is true that the tints exhibit two more or less distinct classes, viz., blue eyes and brown eyes, and this will tend to reduce the inconsistencies; but (1) these classes are not strictly discrete owing to the existence of greys, hazels, greens, and mosaics, (2) blues and browns are in general further subdivided into lights and darks, (3) judgment is rendered more difficult than in the experimental case by the fact that the iris is not usually of a uniform colour, but flecked, and sometimes graduated in tint from the outside inwards. The certainty of classification is probably dependent on the actual grouping used, as well as the number of classes, but I will only consider two recent classifications, to which I will have to refer again, both of importance on account of their application to the study of heredity.

(1) *Mr. Galton's Classification* (Galton 2, Pearson 5).—In the "Records of Family Faculties" collected by Mr. Galton, observers were permitted to use their own descriptive terms, these being grouped subsequently. In this respect the procedure is peculiar, but the final result (as regards consistency of the observers and definition of the classes) is probably the same as if the observers were asked to classify direct under the several headings finally used.

I base this conclusion on a comparison of tables obtained by reducing the results of series B and C (Tables X and XV) to twofold form with the results of series A (Table V), and of similar reductions of Table XV to threefold form with Table X. For Table V (Series A) the inconsistencies were 8·4 per cent. If Table X be reduced by adding together the first two rows, the inconsistencies are 6·3 per cent., if by adding together the last two rows, 9·8 per cent.—mean 8·0 per cent. If Table XV be reduced by adding together the first three rows and the last two, the inconsistencies are 7·3 per cent.; if by adding the first two and the last three, 8·7 per cent.—mean again 8·0 per cent. For Table X, Series B, on the other hand, the inconsistencies are 16·1 per cent. If Table XV be reduced by adding the first to the second row and the third to the fourth, the inconsistencies are 14·3 per cent.; if by adding the first to the second and the fourth to the fifth, 15·7 per cent.—mean 15·0 per cent. Hence, if an n-fold classification be used by observers and subsequently reduced to m-fold form, the result is sensibly the same as if the m-fold classification were used *ab initio*. Now Mr. Galton's final classification is eightfold, using the following terms:—1, light blue; 2, blue, dark-blue; 3, grey, blue-green; 4, dark grey, hazel; 5, light brown; 6, brown; 7, dark brown; 8, black. Here the difficulties of classification between light blue and blue, grey and dark grey, light brown and brown, brown and dark brown, dark brown and black, are precisely the difficulties met with in the experiment, and one may perhaps say the same of the distinctions between the light blues and blue-greens or greys and between the hazels and light browns. It is possible that I may be unduly prejudiced by the direct experience of my own results, but it seems difficult indeed to conceive any reason for assuming sensibly better classification in the one case than in the other. Admitting the absolute distinction between blues and browns, the classification of the blues is practically threefold, of the browns fivefold; probably the percentage of inconsistencies lies therefore between that for Series B and Series C.

The recorders in Mr. Galton's case were, of course, in no way specially trained or instructed; they were precisely on a par in this respect with the observers in the experiment.

(2) *Professor Pearson's Classification* (Pearson, 8).—This is a threefold classification into "light," "medium," "dark," the classes being defined as follows:—

Light.	Medium.	Dark.
Blue of all shades.		
Light grey.	Dark grey.	
Very light green.	Green.	
	Orange and grey combined.	
	Light chestnut.	Dark chestnut.
		Light and dark brown.
		Black.

I have set out the names so as to illustrate the continuity of the classes; the observers are required to separate light grey from dark grey, very light green from green, light chestnut from dark chestnut and chestnut of all shades from brown; Professor Pearson himself describes "medium" as a rather vague class (8, p. 149). The problems involved in separating "light" from "medium" and "medium" from "dark" are therefore the same, in each case, as those involved in my Series A (Table V). Assuming then that light and dark are distinct (corresponding to blue and brown), the inconsistencies are probably about the same as in Series A. The observers were school-masters with no special training in the naming of eye colours.

In dealing with Mr. Galton's data Professor Pearson expressed the views that "The personal equation in the statement of eye colour, when the scale contains only a list of tint names, is . . very considerable," and that "The vagueness in appreciation of eye colour when no colour scale accompanies the directions for observation" might be held to account for the irregularity of certain of his results (5, pp. 103 and 105). With these views I fully concur. It should not be impossible to the modern colour printer to produce a colour scale for eye namings of at least a fairly satisfactory character, and I do not think that any future investigation should be made without such a scale. Mere names are much too vague to serve for scientific uses.

(*b*) *Hair colour.*—The colour series here seems to be continuous, with the possible exception of reds—fair yellow hairs graduate into browns, light browns graduate into dark, dark browns into black. The classification used by Professor Pearson is:—Red—Fair—Brown—Dark—Jet black. Even allowing for the reds being a fairly distinct class, and for the fact that the epithet "jet" renders the last class more definite than is usually the case, it seems probable that the inconsistencies, etc., lie between those of my Series B and C.

(*c*) *Coat colour of horses.*—This is a somewhat more technical case than either of the preceding, and a case in which the more practised character of the observers ought to tend to greater definiteness. The colours recorded in the Stud Book (as cited by Professor Pearson 5) are entered under six principal heads, viz., black, brown, bay, chestnut, roan and grey, but intermediates also occur. The frequencies of the different classes vary greatly in the tables compiled by Professor Pearson in the memoir cited, but the following will serve as fairly typical (5, Tables VIII *bis* and IX *bis*).

Colour.	Colts.	Fillies.
Black	38	44
Black brown or brown black.. ...	15	20
Brown	356	281
Brown bay or bay brown	64	84
Bay	951	1,026
Bay chestnut or chestnut bay ...	0	1
Chestnut	567	524
Chestnut roan or roan chestnut ...	0	1
Roan	3	4
Roan grey or grey roan	1	3
Grey	5	12
Totals	2,000	2,000

It is evident that "black," "brown," and "bay" intergrade; chestnut is apparently somewhat distinct, if we may judge from the record of one intermediate only between bay and chestnut, but "grey" and "roan" are again freely intergraded, to judge from the fact that there are 4 intermediates recorded against only 7 roans and 17 greys.

Mental and moral qualities.—These have been dealt with by a number of observers, more especially of recent years under the influence of the child-study movement, though the statistics given by Professor Pearson are of relatively greater importance from the critical standpoint, owing to the very definite and far-reaching character of the conclusions which have been deduced therefrom. The following table gives a view of some of the qualities mentioned. I have not attempted to make anything like a complete collection, but cite only those with which I am more or less familiar.

Reference.	Character.	Classification.
Warner (11)	Intelligence ...	Dull, not dull.
MacDonald (3) ...	"	Bright, average, dull.
"	Laziness	Lazy, not lazy.
"	Unruliness	Unruly, not unruly.
Galton (2)	Artistic faculty ...	Artistic, not artistic.
"	Temper	Mild, docile, fretful, violent, masterful: also grouped to "good" and "bad" by pooling first two and last three.
Pearson (8)	Vivacity	Quiet, noisy.
"	Assertiveness ...	Shy, self-assertive.
"	Introspection ...	Self-conscious, unself-conscious.
"	Popularity	Popular, unpopular.
"	Conscientiousness ...	Keen, dull.
"	Temper	Quick, good-natured, sullen.
"	Ability	Quick-intelligent, intelligent, slow-intelligent, slow, slow-dull, very dull.

As in the case of eye-colour, Mr. Galton's statistics of temper and artistic faculty were reduced on different lines to the statistics of the other writers mentioned. Those of "artistic faculty" were based on answers to the question "Favourite pursuits and interests? Artistic aptitudes?" on the schedule, and the recorders were allowed to choose their own terms for the description of tempers, these being afterwards grouped by Mr. Galton under his own headings. In all the remaining cases the terms used for classification were specified to the recorders, but no definitions were given except in the last case—Professor Pearson's statistics of "ability." With this exception I think the namings of all the other characters must be subject to a greater amount of uncertainty than the namings of coloured papers in my experiment, the mental or moral character of an individual being a more difficult thing to assess than the depth of tint of a piece of coloured paper which lies immediately before the observer.

But Professor Pearson's statistics of ability are of special interest, not merely because the terms were defined,[1] but because this is the only character—so far as I am aware—as regards the naming of which any test of consistency has been made. The following are the passages in Professor Pearson's memoir (8, p. 147 and reprint of "directions" p. 161) referring to the test:—

"My next stage was to ask two or three different teachers in several schools to apply the classification to 30 or 50 pupils, known to each of them. The classifications were made quite independently, often by teachers of quite different subjects, and a comparison of the results showed that 80 to 85 per cent. of the children were put into the same classes by the teachers, while about 10 per cent. more only differed by one class.

" . . . I may remark that in response to my appeal in the *Journal of Education*, I received details of some 150 boys and girls tested for ability by three observers independently (language, science, and mathematical teachers), and belonging to half a dozen different schools. The agreement in classification was complete in more than 80 per cent. of cases, and only differed by as much as two classes in about 5 per cent. of cases."

The description is not given in very definite terms, but I take it that in perhaps 83 per cent. or so of the test cases all the observers were agreed on the class in which the child should be placed. In 10 to 12 per cent. of the cases two of the three differed by one class, and in the remainder—5 per cent. or more—two of the three differed by two classes at least. This is a form of test which is quite easily

[1] It may be as well to cite these definitions, which run as follows:—*Very dull.*—Capable of holding in their minds only the simplest facts, and incapable of perceiving or reasoning about the relationship between facts. *Slow dull.*—Capable of perceiving relationship between facts in some few fields, with long and continuous effort; but not generally or without much external assistance. *Slow.*—Very slow progress generally, but with time and continual care progress will be made. *Slow intelligent.*—Slow generally, although possibly more rapid in certain fields. Quite sure of knowledge when once acquired. *Intelligent.*—Ready to grasp and capable of perceiving facts in most fields; capable of good progress without much effort. *Quick intelligent.*—Very bright and quick both in perception and in acquirement, and this not only of customary, but of novel, facts. Ready to reason rightly about things on purely self-initiative. *Inaccurate erratic.*—Capable of perceiving facts, but quick to form erroneous conclusions about them, illogical and erratic in reasoning. This last class was judged to be exceptional, and those classed therein are not dealt with in Professor Pearson's tables. The classification is therefore virtually sixfold.

repeated on a much larger scale, on the schedules of the observers in my experiment. To carry it out, I collated the namings of the observers in consecutive threes, shuffling the schedules at intervals, so that the test gives the results of the namings of 512 samples by nearly—if not quite—as many distinct triplets of persons. The results were as follows:—

Series.	Agreements.	Disagreements by	
		1 class.	2 classes.
	Per cent.	Per cent.	Per cent.
A	84·8	15·2	—
B	67·0	32·4	0·6
C	48·8	44·7	6·5

Professor Pearson's classification is sixfold, but two-thirds of the children are classified under the two heads "intelligent" and "slow-intelligent," so that if his terms had not been defined one might perhaps have expected a number of disagreements, etc., between those of Series B and C. Actually the number of agreements in his test was nearly as high (over 80 per cent.) as in Series A, but the percentage of disagreements by two classes *nearly as high as in Series C.* It is consequently rather difficult to compare Professor Pearson's series with either of mine. Taking the number of agreements alone, as most favourable to his case, it would seem that the definition of the terms used for classification has reduced the number of cases in which disagreement may occur, between two out of three teachers, from one in every two or three to one in five. This is a satisfactory result, and distinctly encouraging as indicating the value of even verbal definition. At the same time, I am inclined to think that it is probably rather an over-estimate. The high proportion of disagreements by two classes or more is noteworthy, and it must be remembered that the teachers and children named in each case (*i.e.*, by each distinct set of three recorders) were drawn from one and the same school. Is it certain that two teachers accustomed to different types of school, *e.g.*, the one to a public elementary school the other to a good private school, with small classes, for the children of upper-class parents, would classify the children with equal consistence when *compared with each other?* It seems to me improbable that they would do so. The meaning they would attach even to the terms of the definitions ("slow," "rapid," "ready," "good progress") must depend to some extent on the material with which they are accustomed to deal.

Further, I cannot entirely agree with Professor Pearson that his result gives one "very great confidence not only in the value of this scale, but of other psychical classifications when used by observant teachers" (8, p. 147). It is at least open to question whether a series of observations in which the recorders differ as to the classification of no less than one case in five should be regarded as completely satisfactory for scientific purposes, and it is hardly open to question at all that the test cannot inspire confidence in classifications for which the terms were undefined. The only conclusion it permits to be drawn concerning these is that the observers, if working in groups of three, would differ as to the allocation of *more*—possibly considerably more—than one case in five, and this quite independently of the teachers being "observant" or no, or of their *self*-consistence in classification. I do not wish to imply by any means that observations so made are useless. However seriously two classes such as the "light" and "dark" of my experiment may overlap, there can be no doubt that at all events the latter are on the whole much the darker of the two, and this may enable one to draw some conclusions without risk of error. But many comparisons, such as those of statistics due to different groups of recorders, may be of a very doubtful character, and the wide play given to the personal equation and to bias may introduce disturbances of a hitherto unexpected kind, as is shown in the next section. I desire to emphasise the fact that it is more necessary than appears to be at present generally recognised to eliminate the subjective element by every possible means, by using quantitative methods wherever that can be done by any stretch of ingenuity; by the method of samples where that can be employed (as in records of hair-colour, eye-colour, etc.), by verbal definition if nothing better is possible, or by special training of the observers. No effort should be spared to make the classification as clear, definite and unambiguous as it can possibly be made.

V. THE NAMING OF THE SAMPLE TINTS IN PAIRS AS ON EACH CARD.

In section III, we have considered the naming of the single tints by the observers individually and *en masse*—the way they distributed the tints under the several names, their variations from each other and so forth. The samples, however, it will be remembered, were not placed one on each card, but in pairs, two on each card, the 256 pairs being formed by combining the sixteen tints in every possible way. Each observer had to name the pair of tints on a card more or less together, *i.e.*, although he had necessarily to enter on his schedule the one before the other, yet he had both tints and both entries before him at once. Similarly one of Professor Pearson's observers, for naming the qualities of a pair of brothers, was provided with a single schedule for the pair (8). so that even if he had not the two individuals before him he had at least the two entries under notice at once, the naming being thus a naming of pairs and not of single samples independently. The problem of the present section is to determine whether such a naming of pairs does or does not lead to a true representation of the real distribution of frequency of pairs, (*a*) by the single observer, and (*b*) by the observers *en masse* when their returns are pooled together. Attention will be particularly directed to the number of homonymous pairs returned by the observers as compared with the number which they should have returned, the question having been raised in the memoir (15) whether there were not some general bias towards returning an excess of homonymous pairs.

The mode of calculating the number of pairs of any given combination—*e.g.*, "light" and "medium" or "medium" and "dark"—which an observer should have returned is quite simple. Consider the contingency-table representing the actual frequencies of pairs of tints in the card pack (see above pp. 328, 329); it has sixteen rows, headed by the numbers of the tints 1–16, sixteen columns similarly headed, and one unit in each compartment of the table. The distribution of frequency is uniform. Hence, however an observer defines his classes, if he names without bias, the frequencies in every compartment of his table ought to be given by the "rule of independence":—

$$\text{frequency in compartment} = \frac{\text{total of row} \times \text{total of column}}{\text{whole number of observations}}$$

The original distribution being, in fact, a strictly independent distribution, any distribution that purports to represent it—to be in some sort a classification of it—must be independent also. If the distributions of tints in pairs given by the single observers or by the aggregate of the observers are not independent, they are misrepresentations.

Series A.—In this case the testing of independence is very simple as the criterion need be applied to a single frequency only, the differences of the four class-frequencies of the second order from their independence values being all equal in magnitude. Thus for Observer 5 the distribution given was

Lower tint.	Upper tint.		Total.
	Light.	Dark.	
Light	104	56	160
Dark	55	41	96
Total	159	97	256

For the given totals the number of pairs in which both tints were named "light" should have been, to one place of decimals,

$$\frac{160 \times 159}{256} = 99{\cdot}4$$

which is 4·6 less than the number actually returned. Similarly the number of dark-dark pairs should have been 36·4, or 4·6 less than the actual number. The excesses (+) or defects (−), in the frequencies of homonymous pairs so calculated, are given for all observers in Table XVII, where, for the sake of comparison with the other series, the *total* excess of homonymous pairs is also expressed as a percentage on the calculated number. For the above table of Observer 5, for instance, the percentage excess is

$$\frac{2 \times 4{\cdot}6 \times 100}{99{\cdot}4 + 36{\cdot}4} = 6{\cdot}8 \text{ per cent.}$$

It will be seen that the excesses and defects are almost equally balanced; while the algebraic sum shows a slight preponderance of excesses $(+3)$, there is actually a majority of observers exhibiting defects, in the proportion of 9 : 8. Further the fluctuations that occur are small, of the order of fluctuations of sampling or less. The observer whose return exhibits the greatest departure from independence of the names of upper and lower tints is 14; working out the sum of the ratios of the squares of the departures from independence to the independence values their sum, or χ^2 in the notation of Professor Pearson,[1] is 3·480. Hence from Mr. Palin Elderton's tables[2] the value of P, or the probability of any set of deviations of equal or greater infrequency occurring, is ·329. Practically speaking, a more divergent distribution might be expected on random sampling one time in three although this is the most divergent distribution out of 17. The smallness of the divergences must not, however, be taken to imply that they are wholly without significance, as is shown below; it must be remembered that the fluctuations of random sampling do not strictly enter into the naming of tints at all, and their magnitude serves simply as a standard of comparison. Relatively to this standard, however, we may say, as above, that the fluctuations due to bias in the present case are not large.

Passing from the results for the individual to the distribution that is formed when the returns of a number of observers are pooled together, the divergence resulting is absolutely somewhat larger though even less significant (Table XVIII). The actual number of light-light pairs is 1621, the calculated number

$$\frac{2626 \times 2652}{4352} = 1600.$$

The excess is therefore 21 or the total percentage excess 1·85 per cent. The sum of the individual excesses (Table XVII) was only 3 or 0·26 per cent., so that pooling of different observers' results has increased the excess. The value of χ^2 for the table is, however, only 1·772 and therefore $P = {\cdot}625$, so that a distribution exhibiting equal or greater divergence from independence might be expected on random sampling five times out of eight. If Table XVIII be treated as a grouping of normally-distributed frequency by Professor Pearson's method[3] I find the correlation coefficient $r = {\cdot}032$. Any effect of bias or of the differences of personal equation in naming would accordingly appear to be small, of the order of errors of sampling, where the classification is dichotomous only.

Series B.—As the distribution of frequency in a 3×3-fold table is more complex than in the preceding case I have thought it desirable to give in Table

[1] *Phil. Mag.*, July, 1900.

[2] *Biometrika*, i, p. 159.

[3] *Phil. Trans.* (A), vol. 195 (1900), p. 1.

XIX four distributions for single observers, as illustrations of more or less marked types of bias which occur in the tables of this series. For the sake of brevity, the frequencies actually returned by the observers are resolved in this table into two parts (1) the correct (theoretical) frequency, given by the row and column totals (2) the difference, actual−correct frequency; thus for Observer 9 the number of light-light pairs returned was 19·4 + 0·6 = 20, the number of light-medium pairs 26·3 + 1·7 = 28 and so on.

It will be seen that for the first and last observers (9 and 31) all the actual frequencies of homonymous pairs are in excess of their correct values, and this apparently is the common type of bias; for Observers 12 and 13, on the other hand, all the frequencies of homonymous pairs are in defect, this being an exceptional type. It is true that from the standpoint of the theory of errors of sampling the divergences exhibited could not be regarded as "significant," seeing that even for Observers 9 and 31 we have P = ·69 and P = ·62 respectively, and might accordingly expect greater divergences as often as not, but the results given below under Series C leave little doubt that the excesses in the one case and the defects in the other do represent personal bias of a more or less permanent kind. The results are summarised for all the 20 observers who made returns in this Series in Table XX: in column 1 is given the absolute excess or defect of homonymous pairs, reckoned by taking the algebraic sum of the excesses or defects in the three compartments of the diagonal, and in column 2 this is expressed as a percentage of he total calculated number. In Observer 9 we have, for instance, total excess = 0·6 + 5·1 + 7·4 = 13·1, percentage excess = 13·1/ (19·4 + 44·9 + 23·6) = 14·9 per cent. Thirteen out of the twenty observers exhibited an excess of homonyms, only seven a defect; there appears to be a marked tendency towards the bias of excess. To illustrate the matter in another way, if a frequency-distribution be formed showing the number of cases in which there is an excess of homonyms in 0, 1, 2 or 3 compartments of the diagonal, we have :—

an excess in no compartments	... ...	3 times
1 compartment	... .	4 "
2 compartments	... ...	5 "
3 compartments	... ...	8 "
		20

If a diagonal-compartment were equally likely to exhibit an excess or defect and the above distribution followed approximately the binomial law[1] there should only be two or three cases in which all the compartments exhibited an excess, instead of eight.

Passing from the results for individuals to the tables obtained by pooling different observers' returns, in Table XXI are given the aggregate tables (1)

[1] This is, of course, a rough illustration; the frequencies of compartments being correlated *inter se*, the presence of excess or defect would not follow a binomial law.

for the first set of ten observers in alphabetical order, (2) for the second set of ten, and (3) for the entire twenty. The first and second sets both exhibit a marked excess of homonymous pairs for all three compartments, though the details of the distributions differ, the excess being 8·1 per cent. for the first set, 10·7 per cent. for the second. For the entire set of twenty observers the total excess is 165 or 9·5 per cent. For the individual observers the total was only fifty-two, or an average of 2·8 per cent.; and so again in this case, though much more markedly than in the last, the pooling of different observers' results has increased—indeed more than trebled—the excess of homonymous pairs. For the first set of Table XXI, I find $\chi^2=13{\cdot}80$, $P={\cdot}087$: for the second, $\chi^2=22{\cdot}40$ $P={\cdot}0043$, and for the entire set of observers $\chi^2=27{\cdot}94$, $P={\cdot}0005$; such results, practically speaking, could not occur as random deviations. Grouping the results for the entire set of observers into a fourfold table, (1) with division between the first and second classes, (2) with division between the second and third, I find by Professor Pearson's method for the coefficient of correlation (1) $r={\cdot}086$, (2) $r={\cdot}056$; mean value of $r={\cdot}074$. The coefficient of contingency, calculated from the value of χ^2 given above, is ·074.

It appears, then, that the effect of passing from a dichotomous to a threefold division is to increase the individual tendency to bias, and also to increase the effect of varying personal equations on the pooled table; so that while in the first case even the aggregate table (XVIII) exhibits only a small divergence (of the order of errors of sampling), in the second case the aggregate table (XXI, 3) exhibits a divergence from independence that could only occur on random sampling once in two thousand times or so. This result, taken in conjunction with the increase of inconsistency, etc., in the naming of the individual tints, clearly indicates that classifications under more than two heads (in the absence of natural classes) are practically undesirable—a conclusion that ran absolutely counter, I may say, to my own preconceived ideas on the subject, and possibly those of others.

Series C. The tables for this Series, XXII–XXIV, are arranged on a similar plan to those for the last, so little explanation is required. Table XXII gives the results for four observers: 9 and 31 exhibit a uniform excess of homonymous pairs, 12 and 16 a defect. For Observer 9, whose excess is exceptional, $\chi^2=42{\cdot}31$ $P={\cdot}012$, such a divergence from independence being only to be expected about 1 time in 100 on random sampling, but for Observer 31 (with the next greatest excess) $\chi^2=20{\cdot}34$ $P={\cdot}677$: the divergences from independent distributions for the bulk of observers lie, therefore, as before, well within the limits of fluctuations of random sampling though, from the results stated below, they appear to be certainly significant of bias. In the first place, there is now an overwhelming majority of observers who return an excess of homonymous pairs (Table XXIII). The proportion which for series B was just under 2 : 1 is now over 3 : 1, 23 observers returning an excess and only 7 a deficiency. If, as in the last case, the number of individual returns be counted in which 0, 1, 2, 3, 4, or 5 of the compartments in the homonymous diagonal exhibit an excess of frequency, we have:—

an excess in 0 compartments	1 times
" 1 "	2 "
" 2 "	6 "
" 3 "	12 "
" 4 "	3 "
" 5 "	6 "

If the excesses and deficiencies were distributed at random, one would only expect the occurrence of the five excesses once, not six times. The total excess of homonymous pairs is 148·1, or an average of 8·81 per cent.—the individual percentage excesses being distributed as follows:—

Percentage Excess (+) or defect (−)	Frequency.
−30 to −20	1
−20 to −10	2
−10 to 0	4
0 to +10	12
+10 to +20	6
+20 to +30	3
+30 to +40	1
+40 to +50	—
+50 to +60	1
	30

The most frequent excess lies somewhere between 5 and 10 per cent.

These figures alone would render it fairly certain that we had to deal with definite cases of personal bias, but for this Series we have also the results of three observers (see above p. 335) who repeated their namings of the pack three times, viz., Observers 11, 16 and 31 (the present writer). It will be seen from Table XXIII, that at the first naming Observer 11 gave a moderate excess of homonyms, 31 a very large excess, and 16 a deficiency. The excesses at the three several repetitions are as follows:—

Observer.	Absolute excess for Trial.			Percentage excess for Trial.		
	(1)	(2)	(3)	(1)	(2)	(3)
11	+5·2	+7·1	+11·5	+9·2	+12·7	+20·8
16	−12·2	−7·2	−11·1	−22·5	−13·3	−20·2
31	+20·0	+22·5	+18·5	+34·5	+29·4	+27·4

In each case the sign of the divergence was maintained through the three trials; Observer 11 increased his excess from the first trial to the last, but otherwise the order of magnitude was maintained. Observers 11 and 31 were aware of the excess returned at the first trial; 16 was not informed. Judging from my own experience, the naming of 256 cards is too lengthy and confusing a business to give one, without compilation, any idea as to the excess or defect of homonymous pairs. Further, having the results of the three series of observations, we may now obtain indirect evidence, as in the first part of this memoir, as to the significance of the individual results. If the excess or defect of homonymous pairs returned by any one observer were due, not to any more or less fixed idiosyncrasies, but to casual fluctuating influences varying at different times, the excess returned under any one series would be independent of the excess returned under any other.

Actually we find for the fifteen observers who made returns under all three series:—

Correlation between excess of homonyms in series	A	and in series	B	+·216
" "	A	"	C	+·506
" "	B	"	C	+·713

There can be practically no doubt, accordingly, that in all three cases we have to deal with personal bias or peculiarities of a statistically-permanent kind, notwithstanding the relative smallness of the individual divergences.

In Table XXIV are given the aggregate tables for Series C; (1) (2) and (3) being compilations for the first, second and third sets of ten observers, and (4) the total table for the thirty observers. The excess of homonymous pairs is now very considerable. For the first ten observers there is an excess of 97 pairs or 18·3 per cent., for the second ten 82 or 15·5 per cent., for the third ten 71 or 13·6 per cent. For the entire set of 30 observers the excess is 253 pairs or 16·0 per cent. The total excess of the individual observers was only 148 or an average of 8·8 per cent. (Table XXIII), so the pooling of different observers' results has very largely increased the excess, as in the preceding Series. Further, it should be noted that in this total table the excess of homonymous pairs is not balanced, even partially, by a deficiency in the compartments bordering the diagonal; of the eight compartments in the diagonal-borders six exhibit an excess, and the eight together an excess of 24 pairs. The bulk of the deficiency falls not on the diagonal-borders but on the diagonals next removed, in which the names of the tints in the pair differ by two steps. Thus I find:—

Excess or deficiency of—

	Homonymous pairs (diagonal).	Pairs of names differing by one (diagonal borders).	Pairs of names differing by two (two from diagonal).	Pairs of names differing by three (next corners).	Pairs of names differing by four (corners).
Absolute ...	+252	+24	−232	−95	+50
Per Cent. ...	+16·0	+1·1	−11·7	−8·7	+6·9

There is an excess of pairs not only of the same name but of adjacent names, and of contrasted names, the deficiency falling on the names differing by two or three classes, chiefly the former. In Series B (Table XXI, 3) the result was simpler; the homonymous pairs were in excess, and both the pairs with adjacent names and with contrasted names were in defect.

I find for the total table (XXIV, 4) $\chi^2 = 103{\cdot}9$, $P = 5{\cdot}7 \times 10^{-13}$; it represents a quite impossible random divergence from independence. The coefficient of contingency $C = {\cdot}115$. If the table be grouped to fourfold form by divisions (1) between light and medium, (2) between medium and dark, the values of the coefficients of correlation, calculated by Professor Pearson's method on the assumption of normal distribution, are (1) $r = {\cdot}071$; (2) $r = {\cdot}098$, mean value of $r = {\cdot}085$.

In this case, as in the last, the distribution is of such a kind as to give a positive correlation coefficient on grouping to fourfold form, the excesses of frequencies of homonymous pairs not being cancelled by deficiencies in the adjacent compartments.

The theory of pooling.

In all the preceding cases it has been noted that the excess of homonymous pairs was much greater in the pooled table than in the individual tables. The existence of such an effect might have been foretold on theoretical grounds, though *a priori* one would hardly have expected it to be so large and marked. Let (a_p) (b_q) denote the total frequencies of the p_{th} row and q_{th} column for any individual observer, and $(a_p b_q)$ the frequency of the compartment common to the row and column. Then if the observer is without bias and judges rightly, in the present case we will have

$$(a_p\, b_q) = \frac{(a_p)\,(b_q)}{n} \quad . \; . \; . \; . \; . \; . \; . \; . \; . \; . \quad (1)$$

when n is the number of observations made by him. Let (A_p) (B_q) $(A_p B_q)$ denote the same frequencies as $a_p b_q$ etc. for the table formed from the returns of N observers. Then if this pooled table represented the facts we *ought* to have

$$(A_p\, B_q) = \frac{(A_p)\,(B_q)}{N\,.\,n} = \frac{\Sigma\,(a_p)\,\Sigma\,(b_q)}{N\,.\,n} \quad . \; . \; . \; . \; . \; . \quad (2)$$

Actually, however, if all the observers are without bias we will have a value $(A_p\, B_q)'$ given by

$$(A_p\, B_q)' = \Sigma\,(a_p\, b_q) = \frac{\Sigma\,(a_p)\,(b_q)}{n} \quad . \; . \; . \; . \; . \; . \quad (3)$$

The difference is

$$(A_p\, B_q)' - (A_p\, B_q) = \frac{1}{N\,.\,n}\left\{N.\,\Sigma\,(a_p)\,(b_q) - \Sigma\,(a_p)\,\Sigma\,(b_q)\right\} = \frac{N}{n} r_{pq}.\, \sigma_p\, s_q. \quad (4)$$

where $\sigma_p s_q$ are the standard deviations of (a_p) and (b_q) and r_{pq} is the correlation between them. Expressed as a percentage of the value (2) of $(A_p\, B_q)$ this may also be put in a very simple form; if $u_p\, v_q$ denote the *coefficients of variation* of (a_p) and (b_q) *i.e.*, the percentages of the standard deviations on the means

$$\text{Percentage excess of } (A_p\, B_q)' \text{ on } (A_p\, B_q) = \frac{r_{pq}\, u_p\, v_q}{100} \quad . \; . \; . \quad (5)$$

For homonymous pairs r must be very nearly if not quite equal to unity, and u_p v_p very nearly equal to each other, so that the excess is given by $u^2_p/100$ approximately. A coefficient of variation (of the numbers classed under any given term) of 10 per cent. would accordingly give an excess of the corresponding homonymous pairs equal to 1 per cent.; a coefficient of 20 per cent., an excess of 4 per cent., a coefficient of 30 per cent., an excess of 9 per cent., and so on in rapidly increasing proportion. Now although the row and column totals for the same terms exhibit, in the case of certain observers, remarkable differences, it is a reasonable assumption that the coefficient of variation is approximately the same for both, or for the sum of the totals of corresponding rows and columns, which have been given under Tables III, VIII, and XIII for Series A, B, and C[1]; for Series A they are 10 per cent. and 16 per cent. only, but average 25 per cent. or so in Series B and C. Hence even if all the observers were quite unbiassed in their namings, each according to his interpretation of the terms used for classification, there would nevertheless be an excess of homonyms amounting to 6 per cent. or so for both the latter series. If, in fact, the formulæ be applied, with the coefficients of variation given in the table cited, they will be found to give, within one or two units, the difference between the excess of homonyms for the pooled table and the total excess for the individual observers, viz., 18 for Series A, 113 for Series B, and 104 for Series C. I have thought it desirable for the sake of completeness to evaluate the correlations r_{pq} between class frequencies, neglecting, as in the above approximation, the differences between row-totals and column-totals, and dealing only with the total numbers classed under the several names. In the case of Series A, the correlation between the number classed under "light" and the number under "dark" is necessarily 1. For Series B and C the results are as follows:—

B.

Correlation between the frequencies of

light and medium	−·825.
" " dark	−·470.
medium and dark	−·111.

C.

very light and rather light	+·022.
" " medium	−·469.
" " rather dark	−·700.
" " very dark	−·144.
rather light and medium	−·146.
" " rather dark	−·405.
" " very dark	−·275.
medium " rather dark	+·314.
" " very dark	−·629.
rather dark " "	+·036.

[1] If the values of the standard deviations given in the tables cited are used for calculating the absolute excess from formula (4), it must be remembered that they are to be halved before insertion in that expression.

These correlations are, it should be noted, quite different from the correlations of random-sampling. For the latter we should have if ff' are the average frequencies of the two classes, N the number of observations :—

$$r = -\sqrt{\frac{ff'}{(N-f)\,(N-f')}}$$

always; in the present case several coefficients are positive, while others have much higher negative values than would be assigned by the formula. Using these values of the correlations and the values of u_p and v_q given at the head of Tables VIII and XIII, I find from (5) the percentage excesses or defects, due to pooling alone, given in the first line of each row in the tables below, the total percentages observed being given for comparison in the lower line.

Series B.

The figures in ordinary type give the percentage excesses or defects due to pooling only; those in italic type the percentage excesses or defects observed.

	Light.	Medium.	Dark.
Light	+ 6·9 *+ 8·3*	− 6·1 *− 9·8*	− 2·5 *− 0·5*
Medium	− 6·1 *− 5·4*	+ 8·1 *+ 12·6*	− 0·6 *− 6·4*
Dark	− 2·5 *− 5·2*	− 0·6 *− 0·9*	+ 4·1 *+ 8·0*

Series C.

The figures in ordinary type give the percentage excesses or defects due to pooling only; those in italic type the percentage excesses or defects observed.

	Very light to light.	Rather light.	Medium.	Rather dark.	Dark to very dark.
Very light to light	+ 7·6 *+ 8·2*	+ 0·1 *+ 0·5*	− 3·3 *− 13·1*	− 5·4 *− 10·4*	− 1·1 *+ 12·1*
Rather light ...	+ 0·1 *− 5·8*	+ 5·1 *+ 26·2*	− 0·8 *+ 5·6*	− 2·5 *− 16·1*	− 1·8 *− 12·0*
Medium ...	− 3·3 *+ 1·3*	− 0·8 *− 5·6*	+ 6·3 *+ 17·2*	+ 2·2 *+ 0·3*	− 4·4 *− 15·7*
Rather dark ...	− 5·4 *− 9·2*	− 2·5 *− 17·9*	+ 2·2 *+ 6·2*	+ 7·8 *+ 23·6*	+ 0·3 *+ 3·0*
Dark to very dark	− 1·1 *+ 1·1*	− 1·8 *− 3·1*	− 4·4 *− 14·9*	+ 0·3 *+ 7·8*	+ 7·7 *+ 12·8*

It is curious to note how similar are the two distributions. The divergencies due to all factors, with the exception, perhaps, of the excess of contrasts, appear, speaking generally, to be similar to those due to pooling of different observers' results alone, but more emphatic. This suggests at once the question—does the theory of pooling explain the *apparent* bias of the individual observer? The namings of one observer fluctuate from time to time, and he is, for all practical purposes, different observers at different times. The pooling of such different results will produce an excess of homonymous pairs and so forth, even if the observer be in the rigid sense of the term *unbiassed*. Is this sufficient to explain the effects observed? I think the answer to this question must be in the negative, for in the first place many of the individual excesses are much too large. One observer taken at different times could hardly exhibit so great a variation in the class-frequencies as the mass of observers in the present experiment; yet pooling alone for these latter would only produce an excess of homonymous pairs of 7·2 per cent. (Series C). Exactly half the individual excesses (Table XXIII) are greater than this. Further, the theory of pooling could in no way explain the exceptional bias resulting in a deficiency of homonymous pairs.

In the case even of these exceptional individuals, however, there is, as it seems to me, probably some tendency to excess, but it is overwhelmed by the opposite tendency to emphasise a difference of tints by a difference of names. For any observer, one may assert with some confidence, would always call each of a pair of identical samples of any one depth of tint, on one card, by the same name, even though that name were not always the same on different occasions: yet he should not do so. Suppose he names the given tint by one name (*e.g.*, "dark") and by another (*e.g.*, "rather dark) in the proportion of $p:q$ $(p+q=1)$; then in naming a series of pairs of samples he ought to call them both by the first name, the one by the first name and the other by the second, and both by the second in the proportions $p^2 : 2pq : q^2$. Practically, as stated, he would never call the two by different names but would return "homonymous pairs" of the first and second names in the proportions $p:q$. There would therefore be a percentage excess of homonymous pairs $200\, pq / (p^2+q^2)$ as regards these identical pairs alone. The inclusion in the experiment of non-identical pairs would reduce the percentage.

The effect of bias and of personal equation on a correlated distribution.

The preceding work has shown that statistics of ill-defined qualities based on the pooled observations of a number of individuals give an inaccurate and misleading representation of the facts as regards pairs of samples of the given quality. Although the members of the pairs are strictly independent in fact, the statistical observations present a large excess of pairs of the same name, possibly an excess of contrasted pairs (Series C), and a marked deficiency of pairs of other characters. If the table be grouped to fourfold form and the correlation-coefficient be calculated by Professor Pearson's method, there is a small correlation between the names of tints in the pairs ranging nearly up to $+0·1$. But these data do not enable one to answer a question of great practical importance: if the tints in the pairs were, in fact, correlated instead of independent, would the statistics give a higher or a lower coefficient of correlation than the true one, say for a true coefficient of about 0·5? It must be remembered that while the effect of bias and of pooling may be to raise the coefficient, the effect of mere inconsistency is to lower it.

It seemed to me that this question could only be answered by a practical trial, which I accordingly made. It would have been best to take an approximately normal actual distribution, but this was out of the question. I accordingly formed a *correlated* from the original *uniform* distribution of pairs of tints by simply striking out all pairs like (9, 1), (10, 2), . . . (10, 1), (11, 2), . . . (11, 1), (12, 2), . . . in which the two members of the pair differed by eight points or more on the arbitrary scale of 1 to 16. This left 184 pairs distributed as shown by the diagram. The card-numbers of the pairs to be omitted were then noted from the key, and these numbers marked on the observers' schedules. Aggregate contingency tables were then compiled as before, omitting the marked numbers, and the correlation coefficients determined for these tables by Professor Pearson's method. For comparison with the observed correlation coefficient, the correlation coefficient was also calculated for the *actual* distribution, *using a division so near as might be the same as that in the division of the observations.* The observed contingency-table for the 17 observers in Series A was, for example—

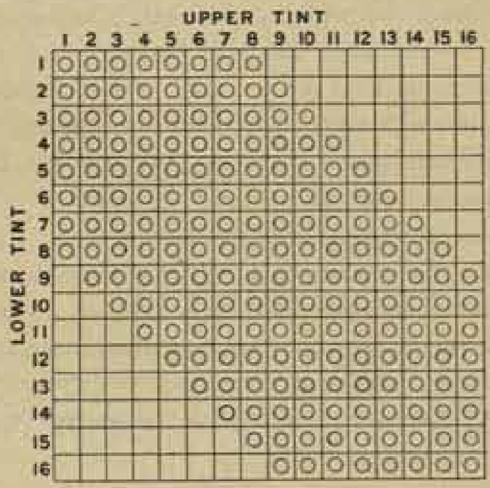

FIG. 3.

Lower Tint.	Upper Tint.		Total.
	Light.	Dark.	
Light	1,525	439	1,964
Dark	471	693	1,164
Total	1,996	1,132	3,128

The average proportion of "lights" to "darks" for the single observer is here approximately 116 : 68. The nearest we can get to this proportion in the actual table is 121 : 63, obtained by taking the division between tints 10 and 11. The correlation coefficient for the actual distribution so divided is ·556, and for the table of observations above ·593, calculating the coefficient in both cases to the second degree of approximation only, as the complete non-normality of the distribution renders further labour useless.

The table below shows the observed and the true coefficients similarly determined for Series B and C as well. In the case of Series B the points of division have been taken at all four corners of the central compartment (as in many of Professor Pearson's calculations); it will be seen that while the symmetrical divisions give coefficients that are too high, the unsymmetrical, on the contrary, give coefficients that are too low. When therefore the extremely contrasted pairs are eliminated, observation tends, apparently, to *exaggerate* the number of the most contrasted pairs remaining. In Table XXI, where the extreme contrasts were included, observation gave a deficiency of contrasts. The averages of the four actual and the four observational coefficients are almost identical, viz., ·614 and ·612. For Series C only the symmetrical divisions were tested, and again the observations gave too high a coefficient. The differences are not, however, in any case very large; they all lie within a range of $\pm$·08.

Series.	Division made between names.	(1) observed coefficient.	Division made between tints.	(2) true coefficient.	(1) − (2)
A.	light and dark	·593	10 and 11	·556	+ ·037
B.	light and medium ...	·627	6 and 7	·556	+ ·071
	medium and dark ...	·552	11 and 12	·516	+ ·036
	upper, lt. and me. : lower, me. and dark...	·632	upper, 6 and 7 : lower 11 and 12	·688	− ·056
	lower, lt. and me. : upper, me. and dark...	·646	lower, 6 and 7 : upper 11 and 12	·688	− ·042
C.	rather lt. and me. ...	·630	9 and 10	·590	+ ·040
	me. and rather dark ...	·627	6 and 7	·556	+ ·071

VI. Comparison of the Divergence of Contingency-tables for Certain Characters from Normality with the Divergence from Truth of the Experimental Tables.

The work of the preceding section has shown that the mere influence of bias and of personal equation will produce on a contingency table for ill-defined qualities a divergence from isotropy resembling, in respect of an excess of homonymous pairs at least, the divergence from isotropy noted in the memoir (15) as occurring in contingency tables for eye-colour, coat-colour, and other characters. It remains to be seen, however, whether the divergence from normality of these latter distributions is in every other respect (including magnitude) such as might be produced by the effect of bias and personal equation, or no.

The first illustration I will take is a simple one, where we need not really consider the question of normality, but only of independence, as in the tables of this experimental investigation. In the memoir of 1900, amongst other tables for eye-colour based on Mr. Galton's material, Professor Pearson gave a contingency-table for *eye-colour of husband* and *eye-colour of wife*. For the grouping used by Professor Pearson the coefficient of correlation was ·100. Now the coefficients of correlation between the name of the upper and lower tint in Series A, B, and C were respectively ·032, ·071, ·085; hence it would seem at least possible that the coefficient ·100 is of observational origin only, the actual eye-colours of husband and wife being very nearly, if not quite, independent. In Table XXV is given Professor Pearson's table with the actual frequencies resolved into (1) the independence-values given by the totals of rows and columns, and (2) after the + sign the excess or defect (as in Tables XIX, XXI, XXII, XXIV). It will be seen that in most respects the distribution resembles those of *e.g.*, Table XXIV (4) to a high degree, allowing, of course, for irregularities due to the very small frequencies in certain rows and columns. There is a large and marked excess of homonymous pairs and a deficiency of most others, but, just as in Table XXIV, there appears to be a slight tendency to an excess of contrasts. If the excesses and defects be grouped as on p. 352 above, we have—

Eye-colour.	Excess or defect of— Homonymous pairs.	Pairs differing by one tint.	Pairs differing by two tints.	Pairs differing by three tints.	Pairs differing by four tints.	Pairs differing by five tints.	Pairs differing by six or seven tints.
Absolute	+63·7	−23·7	−5·3	−19·2	−4·4	−13·5	+1·1
Per cent.	+38·8	−10·1	−4·8	−17·4	−4·4	−21·2	+5·0
Colour cards per cent. ...	+16·0	+1·1	−11·7	−8·7	+6·9	—	—

The chief points of difference from the figures of p. 352, are these, that there is a considerable deficiency of pairs differing by one tint instead of a slight excess, and that the relative excess of homonymous pairs is much greater than in the experimental case. It is obviously impossible to give a dogmatic judgment, but personally I think that the peculiarities of this table are largely of subjective origin, and that the true homogamy with respect to eye-colour is very much less than the coefficient 0·1 would indicate. The similarity with coefficients of homogamy based on quantitative measurements would seem to be accidental.

For the purpose of comparing tables exhibiting a higher degree of contingency with the normal distribution I have taken four illustrations, viz., the tables for Eye-colour, Temper, and Curliness of hair from Professor Pearson's Huxley

Lecture (8) and the table for inheritance of eye-colour from father to son based on Mr. Galton's data, and given by the same writer in the earlier paper previously cited (5). The three former are all of 3 × 3-fold form as published; in the latter the division is 8 × 8-fold (as in Table XXV) but the table was reduced to threefold form (blue—grey, hazel—brown) for comparison with the normal distribution. A 3 × 3-fold normal distribution is determined by calculating four frequencies only, or three if the table is symmetrical, so that the work is kept within moderate bounds.

But a certain difficulty arose at starting. The coefficients of correlation given by Professor Pearson did not appear to be all determined in quite the same way. In some cases, *e.g.*, in the Huxley Lecture, the coefficient given appears to be the mean of two determinations only, and in others of four, the divisions in the former case being both symmetrical, while in the latter two are symmetrical and two unsymmetrical. But it appears from the work of the last section that coefficients determined from symmetrical divisions would in general be too high, and those from unsymmetrical divisions too low. Hence four divisions should, if possible, invariably be used; coefficients determined some on one principle and some on another are not comparable with each other. Hence I judged it better to recalculate the coefficients, using the four divisions in each case. As it appeared at once, however, that the distributions diverged very largely indeed from the normal, I considered that the use of lengthy approximations would be out of place, and calculated the coefficients to the second approximation (the root of the quadratic) only. The results were as follows:—

Subject and Relation.	Coefficients of Correlation.				Average (1)—(2)	Average all four	Value given by Prof. Pearson.
	Sym. Divisions.		Unsym. Divisions.				
	(1)	(2)	(3)	(4)	(5)	(6	(7)
1. Eye-Colour. Bro. Bro.	·693	·655	·362	·362	·67	·52	·54
2. Eye-Colour. Fa. Son...	·523	·592	·277	·385	·56	·44	·55
3. Hair Curliness. Bro. Bro.	·776	·467	·410	·410	·62	·52	·50
4. Temper. Bro. Bro. ...	·516	·528	·015	·015	·52	·27	·51

Were the distribution normal, the coefficients (1) (2) (3) (4) should only differ slightly, *e.g.*, by about ·04; the fact that the calculations were stopped at the second approximation tends in itself to make (1) and (2) a little too high, (3) and (4) a little too low. But the differences are so very large, that it is quite clear the distribution cannot approach the normal. The case of Temper is the most remarkable, where the coefficient averages ·52 for symmetrical division of the table but approximates to zero for unsymmetrical division. The number of "Quick sullen" pairs (*cf.* Table XXIX) is in this case actually 39·75; if the brothers' characters were independent it would be 41·25—a difference of only 1·5. In the Eye-colour tables the coefficients for unsymmetrical division are not so low, but they are little more than half the magnitude of those for the symmetrical divisions. For curliness of hair the figures are much more irregular, the two symmetrical divisions giving very unequal coefficients, but their average is 0·62, against 0·41 for unsymmetrical division. The work on pp. 357, 358 would seem to indicate that pooling and bias could only produce a deviation of $\pm$·08 or so on either side of the true coefficient or ·16 altogether, but here we have differences of ·31, ·23, ·21, ·51. This certainly suggests that we have to deal with some effect other than that due to pooling and bias alone.

In Tables XXVI–XXIX are given the actual frequencies of Professor Pearson's tables, in the first line of each row, with the frequencies of the normal distribution in the second line of the row for comparison, the coefficients of correlation used being those of column (6) in the above table. An inspection of these tables will show that the differences are relatively much larger than in the experimental case. The excesses of homonymous pairs are 18·2 per cent., 15·9 per cent., and 18·4 per cent. respectively, as against 9·5 per cent. for Series B, and 16 per cent. for Series C. Further, the percentage excesses of the central class are 35·0 per cent., 24·2 per cent., 84·4 per cent., and 13·4 per cent. respectively, as against 12·5 per cent. for Series B (Table XXI). In all cases the contrasted pairs are very largely in excess; this is apparently the contrary of the results in Table XXI, but the work of pp. 357, 358 indicated that where extreme contrasts were eliminated observations tended to give an excess instead of a defect of contrasted pairs. Qualitatively, then, the results seem in accordance with the hypothesis of observational origin of the peculiarities; quantitatively, the divergences are too large and therefore probably in part real, as, of course, much recent biological work might incline one to suppose. The sole difficulty lies in the fact that such marked effects have in no case been observed for measured characters.

The conclusion is confirmed by a later piece of experimental work carried out during the summer of 1906, on lines more closely resembling such work as that of Professor Pearson on heredity. Schedules were circulated amongst friends asking for returns of fathers and sons classified under the heads: "tall or rather tall," "medium," and "short or rather short." The observer was asked to make the entries when the persons named were in his presence, or otherwise to enter only persons who were very familiar to him, and to fill up the form as he himself thought right without consultation. The latter instruction was, of course, given so as to obtain the full effect of varying personal equations. The issue of Schedules was begun in the middle of April, and by the end of July I had obtained returns for 1,126 pairs from some 70 to 80 observers; I cannot state the exact number, for some of those who were good enough to interest themselves on my behalf forwarded collective returns over their own signatures only. I have again to thank all those who assisted me in the matter, more especially Dr. A. Newsholme and Mr. Wolf Defries, who obtained many returns through others. The contingency-table between father and son, compiled from these observations, is given in the Appendix, Table XXX. The distribution may be compared with that based on measured statures and given by Professor Pearson in *Biometrika*, vol. ii, p. 415, which may be reduced so as to give very similar row and column totals by classing all individuals under 65·5 inches as short, and over 68·5 inches as tall. The table based on measurement is quite isotropic, Table XXX not so, but also not quite of the form typical of such tables as eye-colour (p. 339). If the correlation coefficients are determined from both tables for the four possible reductions to fourfold form, we have, working as before to the second degree of approximation only :—

	Table XXX.	Table based on measurements.
Symmetrical divisions ...	·484 ·410	·581 ·534
Unsymmetrical divisions ...	·334 ·358	·533 ·515
Average	·396	·546

Not much stress can be laid on the difference between the average values of the coefficients, for this may be due merely to difference of material; *e.g.*, Professor Pearson found 0·396 as the correlation between father and son in Mr. Galton's data (*Phil. Trans.*, A, vol. 187, p. 270). As regards the form of the distribution, however, it is evident that there is a much more marked difference between the first and second pairs of coefficients in Table XXX than in the measurement table. Even in Table XXX, however, this difference is only 0·100 for the averages of the two pairs, and for tables XXVI–XXIX it ranges from 0·21 to 0·51 (p. 360). If the normal distribution corresponding to a coefficient of 0·396 be calculated, it gives the frequencies shewn in the lower lines of Table XXX. As compared with this, the observations shew an excess of homonymous pairs of 8·4 per cent. and an excess in the central class 15·6 per cent., figures corresponding closely to the 9·5 per cent. and 12·5 per cent. in series B of the colour experiment, and markedly less than the excesses for Tables XXVI–XXIX. The table based on measurements, however, although isotropic, diverges slightly from normality in the same direction as Table XXX. There is an excess of "homonymous pairs," of 3·1 per cent. and an excess in the central class of 5·6 per cent. as compared with a normal distribution with a coefficient of 0·546. It would be well worth further investigation to see if other distributions from measured characters exhibited the same slight divergence, as this would tend to shew that the distributions of measured and unmeasured characters differed only in degree, and would in part dissolve the apparent antithesis which led to these investigations (*cf.* p. 339).

Statistics of ill-defined qualities may, I conclude, lead to fairly accurate values of the coefficients of inheritance for the close relationships *if these be calculated* *from four divisions round a central class and not from symmetrical divisions only* but not for the more distant relationships, where the true coefficients are small. Nor can they be used with any confidence to elucidate the theory of heredity by the nature of the distribution of frequency; and hence their province is limited.

List of Observers in the Colour Experiment.

The letters A, B, and C indicate the Series for which the observers returned Schedules (see above, p. 330).

1. Miss Armstrong (C). 2. Mr. W. A. Basham (Board of Trade), (ABC). 3. Miss F. Bolus (ABC). 4. Mr. J. A. Cable, M.A., late Assistant-Secretary, Royal Statistical Society (C). 5. Miss C. E. Collet, M.A., F.S.S. (Board of Trade), (ABC). 6. Miss E. S. Collet (ABC).[1] 7. Mr. W. B. Croft, M.A., Winchester College (AC). 8. Mr. C. Griffith, M.A., Winchester College (A). 9. Mr. E. C. Harris (ABC). 10. Mr. F. R. Heath (ABC). 11. Mr. R. H. Hooker, M.A., F.S.S. (Board of Agriculture),[2] (ABC). 12. Professor W. Johannsen, Professor of Botany at the University of Copenhagen (ABC). 13. Mr. A. Keshishian, F.S.S. (B). 14. Dr. W. H. Lang, M.B., D.Sc., Assistant-Professor of Botany, University of Glasgow (ABC). 15. Mr. R. Leach (Board of Trade), (ABC). 16. Mr. J. A. P. Mackenzie, Librarian, Royal Statistical Society[2] (C). 17. Mr. H. Rosenbaum (C). 18. Mr. S. Rosenbaum, B.Sc., F.S.S. (C). 19. Mr. C. P. Sanger, M.A., F.S.S., Assistant-Professor of Political Economy, University College, London (ABC). 20. Miss S. Sanger (ABC). 21. Mr. F. S. Spiers, B.Sc. (C). 22. Mr. F. Statham (C).[1] 23. Mr. E. R. Sykes, President of the Malacological Society (C). 24. Mr. A. G. Tansley, M.A., Assistant-Professor of Botany, University College, London (ABC). 25. Mrs. Edith Tansley B.Sc. (BC). 26. Mr. J. W. Verdier (Board of Trade), (ABC). 27. Mr. H. D. Vigor, F.S.S. (B). 28. Miss H. Vernon-Jones (C). 29. Mr. J. J. Wills (Board of Trade), (C). 30. Miss E. G. Woodgate (ABC). 31. The present writer[2] (ABC), and 32, his mother (C); 33, sister, (C); and 34, wife (C).

[1] This schedule was not used owing to the observer having misunderstood the instructions.
[2] This observer returned three schedules under Series C, taken at different times.

TABLE I.

Series A.—showing the distribution of tints under names "light" and "dark" for four individuals.

Number of observer.	Name assigned to tint.	Number of tint (1 = white : 16 = very dark brown).																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total.
7	Light ...	32	32	32	32	32	32	32	32	32	23	21	—	1	—	—	—	333
	Dark ...	—	—	—	—	—	—	—	—	—	9	11	32	31	32	32	32	179
10	Light ...	32	32	32	32	32	31	23	20	15	5	3	—	1	—	—	—	258
	Dark ...	—	—	—	—	—	1	9	12	17	27	29	32	31	32	32	32	254
12	Light ...	32	32	32	32	32	32	32	32	32	31	30	18	13	—	—	—	380
	Dark ...	—	—	—	—	—	—	—	—	—	1	2	14	19	32	32	32	132
26	Light ...	32	32	32	32	32	32	32	31	21	1	—	—	—	—	—	—	277
	Dark ...	—	—	—	—	—	—	—	1	11	31	32	32	32	32	32	32	235

TABLE II.

Series A.—Showing the number of samples named by each individual inconsistently with the majority of his namings of the same tint, out of a total of 512. Mean, 25·3 or 4·9 per cent.

Observer.	Inconsistencies.	Observer.	Inconsistencies.	Observer.	Inconsistencies.
2	27	10	46	20	19
3	29	11	18	24	24
5	33	12	30	26	13
7	21	14	25	30	14
8	21	15	19	31	28
9	30	19	33	—	—

TABLE III.

Series A.—Showing the number of samples classed by each individual observer as "light" and "dark."

Light : Mean, 310·5. Standard deviation, 32·6. Coefficient of variation, 10·5 per cent.
Dark : „ 201·5. „ „ 32·6. „ „ 16·2 „

Observer.	Light.	Dark.	Observer.	Light.	Dark.	Observer.	Light.	Dark.
2	281	231	10	258	254	20	339	173
3	293	219	11	284	228	24	324	188
5	319	193	12	380	132	26	277	235
7	333	179	14	265	247	30	346	166
8	335	177	15	283	229	31	310	202
9	306	196	19	345	167	—	—	—

TABLE IV.

Series A.—Showing, for thirteen pairs of observers, the number of disagreements as to the name of a tint, out of a total of 512 in each case. Total 757 disagreements in 6,656 judgments, or 11·4 per cent.

Pair of Observers.	Disagreements.	Pair of Observers.	Disagreements.	Pair of Observers.	Disagreements.
2, 5	62	11, 14	33	20, 26	63
3, 9	35	12, 15	93	24, 30	22
5, 10	76	14, 19	80	26, 31	38
9, 11	35	15, 20	62	Total	757
10, 12	121	19, 24	37	Per cent.	11·4

TABLE V.

Series A.—Showing the distribution of tints under names for the whole of the seventeen observers who made returns in this series. Total number of observations, 8,704.

Name assigned to Tint.	Number of Tint. (1=white; 16=very dark brown).																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total.
Light ...	544	544	544	544	544	543	531	519	423	273	211	32	25	—	1	—	5278
Dark ...	—	—	—	—	—	1	13	25	121	271	333	512	519	544	543	544	3426

TABLE VI.

Series B: (*cf.* Table I for Series A).—Showing the distribution of tints under names for four individual observers.

Number of observer.	Name assigned to tint.	Number of tint (1 = white; 16 = very dark brown).																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total.
6	Light ...	32	32	32	62	32	32	32	28	21	10	4	—	—	—	—	—	287
	Medium ...	—	—	—	—	—	—	—	4	11	22	28	29	23	4	—	—	121
	Dark ...	—	—	—	—	—	—	—	—	—	—	—	3	9	28	32	32	104
10	Light ...	32	32	30	23	7	—	—	—	—	—	—	—	—	—	—	—	124
	Medium ...	—	—	2	9	25	32	29	30	17	11	5	1	1	—	—	—	162
	Dark ...	—	—	—	—	—	—	3	2	15	21	27	31	31	32	32	32	226
12	Light ...	32	32	32	32	31	31	27	24	15	2	2	—	—	—	—	—	260
	Medium ...	—	—	—	—	1	1	5	8	17	30	28	28	27	4	1	—	150
	Dark ...	—	—	—	—	—	—	—	—	—	—	2	4	5	28	31	32	102
26	Light ...	32	32	32	32	32	29	9	—	—	—	—	—	—	—	—	—	198
	Medium ...	—	—	—	—	—	3	23	32	32	30	25	—	1	—	—	—	146
	Dark ...	—	—	—	—	—	—	—	—	—	2	7	32	31	32	32	32	168

TABLE VII.

Series B: (*cf.* Table II for Series A).—Showing the number of samples named by each individual inconsistently with the majority of his namings of the same tint, out of a total of 512: mean 44·7 or 8·8 per cent.

Observer.	Inconsistencies.	Observer.	Inconsistencies.	Observer.	Inconsistencies.	Observer.	Inconsistencies.
2	52	10	56	15	45	26	22
3	33	11	35	19	46	27	65
5	49	12	50	20	36	30	46
6	45	13	42	24	44	31	60
9	45	14	30	25	37	34	57

TABLE VIII.

Series B: (*cf.* Table III for Series A)—Showing the number of samples, out of 512, classed by each individual as "light," "medium" and "dark."

Light: Mean, 200·5. Standard deviation, 52·5. Coefficient of variation, 26·2 per cent.

Medium: Mean, 164·3. Standard deviation, 46·6. Coefficient of variation, 28·4 per cent.

Dark: Mean, 147·2 Standard deviation, 29·9. Coefficient of variation, 20·3 per cent.

Observer.	Light.	Medium.	Dark.	Observer.	Light.	Medium.	Dark.
2	223	112	177	15	170	199	143
3	205	149	158	19	290	106	116
5	269	112	131	20	272	92	148
6	287	121	104	24	196	144	172
9	141	215	156	25	132	235	145
10	124	162	226	26	198	146	168
11	148	221	143	27	183	179	150
12	260	150	102	30	219	140	153
13	157	166	189	31	224	160	128
14	135	274	103	34	176	203	133

TABLE IX.

Series B: (*cf.* Table IV, Series A).—Showing for thirteen pairs of observers, the number of disagreements as to the classification of a tint, out of a total of 512 samples in each case. Total, 1,580 disagreements or 23·8 per cent.

Pair of Observers.	Differences by—		Pair of Observers.	Differences by—		Pair of Observers.	Differences by—	
	1 Class.	2 Classes.		1 Class.	2 Classes.		1 Class.	2 Classes.
2, 5	91	—	11, 14	56	—	20, 26	92	—
3, 9	89	—	12, 15	148	—	24, 30	60	—
5, 10	212	12	14, 19	176	—	26, 31	75	—
9, 11	60	—	15, 20	127	—	Total	1555	25
10, 12	226	12	19, 24	143	1	Per cent.	23·4	0·4

Table X.

Series B: (*cf.* Table V, Series A.—Showing the distribution of tints under names for the whole of the twenty observers who made returns in this series. Number of observations 10,240.

Name assigned to tint.	Number of tint (1 = white; 16 = very dark brown).																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total.
Light ...	640	640	636	618	521	368	269	186	93	23	15	—	—	—	—	—	4009
Medium	—	—	4	22	119	272	366	451	524	564	516	227	193	21	6	1	3286
Dark ...	—	—	—	—	—	—	5	3	23	53	109	413	447	619	634	639	2945

Table XI.

Series C: (*cf.* Tables I and VI for Series A and B).—Showing the distribution of tints under names for four individual observers.

Number of Observer.	Name assigned to tint.	Number of tint (1 = white; 16 = very dark brown).																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total.
6	Very light to light	32	32	32	32	32	31	14	1	—	—	—	—	—	—	—	—	206
	Rather light ...	—	—	—	—	—	1	18	30	23	15	9	—	—	—	—	—	96
	Medium	—	—	—	—	—	—	—	1	9	17	23	17	13	3	—	—	83
	Rather dark ...	—	—	—	—	—	—	—	—	—	—	—	15	16	11	1	—	43
	Dark to very dark	—	—	—	—	—	—	—	—	—	—	—	—	3	18	31	32	84
10	Very light to light	32	30	6	1	—	—	—	—	—	—	—	—	—	—	—	—	69
	Rather light ...	—	2	26	28	14	4	2	—	—	—	—	—	—	—	—	—	76
	Medium	—	—	—	3	18	25	27	21	13	8	3	—	1	—	—	—	119
	Rather dark ...	—	—	—	—	—	3	3	11	18	24	28	23	16	4	—	—	130
	Dark to very dark	—	—	—	—	—	—	—	—	1	—	1	9	15	28	32	32	118
12	Very light to light	32	32	31	28	1	—	—	—	—	—	—	—	—	—	—	—	124
	Rather light ...	—	—	1	4	31	32	30	25	10	1	1	—	—	—	—	—	135
	Medium	—	—	—	—	—	—	2	7	22	31	31	32	30	9	—	—	164
	Rather dark ...	—	—	—	—	—	—	—	—	—	—	—	—	2	23	18	5	48
	Dark to very dark	—	—	—	—	—	—	—	—	—	—	—	—	—	—	14	27	41
29	Very light to light	32	32	22	14	4	—	—	—	—	—	—	—	—	—	—	—	104
	Rather light ...	—	—	10	17	24	17	5	2	—	—	—	—	—	—	—	—	75
	Medium	—	—	—	1	4	15	19	21	10	1	2	—	—	—	—	—	73
	Rather dark ...	—	—	—	—	—	—	8	9	21	25	22	3	3	—	—	—	91
	Dark to very dark	—	—	—	—	—	—	—	—	1	6	8	29	29	32	32	32	169

Table XII.

Series C: (*cf.* Tables II and VII, for Series A and B).—Showing the number of samples named by each individual inconsistently with the majority of his namings of the same tint, out of a total of 512: Mean, 89·6 or 17·5 per cent.

Observer.	Inconsistencies.	Observer.	Inconsistencies.	Observer.	Inconsistencies.
1	81	12	57	24	63
2	85	14	76	25	97
3	99	15	107	26	80
4	99	16	100	28	134
5	69	17	92	29	106
6	96	18	114	30	96
7	78	19	59	31	83
9	93	20	86	32	105
10	104	21	102	33	85
11	73	23	80	34	89

Table XIII.

Series C: (*cf.* Tables III and VIII, for Series A and B).—Showing the number of samples out of the 512 in the pack classed by each individual as "very light to light," "rather light," "medium," etc.

Very light to light.	Mean, 119·8.	Standard deviation, 32·9.	Coefficient of variation, 27·5 p.c.
Rather light.	" 92·2.	" " 20·7.	" " 22·5 "
Medium.	" 120·1.	" " 30·2.	" " 25·1 "
Rather dark.	" 76·2.	" " 21·2.	" " 27·8 "
Dark to very dark.	" 103·7.	" " 28·7.	" " 27·7 "

Observer.	Very light to light.	Rather light.	Medium.	Rather dark.	Dark to very dark.	Observer.	Very light to light.	Rather light.	Medium.	Rather dark.	Dark to very dark.
1	121	90	145	89	67	18	108	76	131	71	126
2	130	84	84	69	145	19	165	99	95	48	105
3	104	80	144	83	101	20	146	127	96	57	86
4	139	71	134	92	76	21	109	72	145	90	96
5	129	131	106	51	95	23	67	118	152	68	107
6	206	96	83	43	84	24	139	96	109	75	93
7	174	86	102	35	115	25	105	94	153	75	85
9	121	97	136	71	87	26	107	123	93	81	108
10	69	76	119	130	118	28	84	78	141	109	100
11	85	94	170	83	80	29	104	75	73	91	169
12	124	135	164	48	41	30	140	63	120	60	129
14	66	89	148	111	98	31	176	102	75	69	90
15	141	62	92	79	138	32	110	58	140	87	117
16	84	88	151	104	85	33	120	101	126	90	75
17	89	126	46	69	182	34	133	78	129	59	113

TABLE XIV.

Series C: (*cf.* Tables IV and IX for Series A and B).—Showing for thirteen pairs of observers the number of disagreements as to the classification of a tint, out of a total of 512 samples in each case. Total 2,386 disagreements or 35·9 per cent.

Pair of observers.	Differences by—			Pair of observers.	Differences by		Pair of observers.	Differences by—		
	1 class.	2 classes.	3 classes.		1 class.	2 classes.		1 class.	2 classes.	3 classes.
2, 5	144	19	—	11, 14	117	—	20, 26	154	2	—
3, 9	127	3	—	12, 15	191	54	24, 30	115	—	—
5, 10	247	24	1	14, 19	220	29	26, 31	169	3	—
9, 11	135	1	—	15, 20	170	24	Total	2173	212	1
10, 12	286	53	—	19, 24	98	—	Per cent.	32·7	3·2	—

TABLE XV.

Series C: (*cf.* Tables V and X for Series A and B).—Showing the distribution of tints under names for the whole of the thirty observers who made returns in this series. Number of observations, 15,360.

Name assigned to tint.	Number of tint (1 = white; 16 = very dark brown).																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total.
Very light to light.	960	957	748	605	217	78	27	3	—	—	—	—	—	—	—	—	3595
Rather light.	—	3	212	351	659	589	469	302	121	32	27	—	—	—	—	—	2765
Medium ...	—	—	—	4	84	290	441	607	709	646	556	117	133	15	—	—	3602
Rather dark.	—	—	—	—	—	3	23	48	127	264	341	640	534	244	49	14	2287
Dark to very dark.	—	—	—	—	—	—	—	—	3	18	36	203	293	701	911	946	3111

TABLE XVI.

Series C.—Showing, for three observers who named the whole pack three times each, the number assigned to each class and the inconsistencies at each repetition, together with the number of disagreements between the 1st, 2nd and 3rd namings for each observer.

Observer.	Very light to light.	Rather light.	Medium.	Rather dark.	Dark to very dark.	Inconsistencies.	Disagreements. Between naming.	Number.
11	85	94	170	83	80	73	1 and 2	85
	104	94	160	84	70	74	2 and 3	66
	118	97	152	67	78	82	1 and 3	99
16	84	88	151	104	85	100	1 and 2	112
	93	87	151	82	99	94	2 and 3	77
	109	74	154	76	99	80	1 and 3	122
31	176	102	75	69	90	83	1 and 2	143[1]
	243	63	63	47	96	96	2 and 3	115[2]
	214	63	86	51	98	92	1 and 3	108

[1] Of which three are differences by two classes.
[2] Of which eight are differences by two classes.

TABLE XVII.

Series A.—Showing (1) the excess (+) or defect (−) of the number of light-light or dark-dark pairs from the calculated number (total of row × total of column ÷ 256) for each observer, (2) the *total* excess or defect of homonymous pairs (twice the preceding number) expressed as a percentage of the calculated number.

Observer.	(1) Absolute excess.	(2) Total percentage.	Observer.	(1) Absolute excess.	(2) Total percentage.	Observer.	(1) Absolute excess.	(2) Total percentage.
2	− 1·1	− 1·7	10	+ 3·0	+ 4·7	20	+ 0·8	+ 1·1
3	− 1·8	− 2·7	11	− 1·8	− 2·8	24	− 1·8	− 2·6
5	+ 4·6	+ 6·8	12	− 1·0	− 1·3	26	+ 0·1	+ 0·2
7	− 1·3	− 1·9	14	+ 7·4	+ 11·5	30	+ 1·1	+ 1·5
8	− 3·6	− 5·1	15	− 5·1	− 7·9	31	+ 4·2	+ 6·3
9	− 1·5	− 2·2	19	+ 0·8	+ 1·1	Total	+ 3·0	—

TABLE XVIII.

Series A.—The distribution of frequency for pairs of names for all the observers (17) together. Excess = 1,621 − 1,600 = + 21. Coefficient of correlation = + ·032.

Lower tint.	Upper tint.		Total.
	Light.	Dark.	
Light ...	1,621	1,005	2,626
Dark ...	1,031	695	1,726
Total ...	2,652	1,700	4,352

TABLE XIX.

Series B.—Showing the distributions of frequencies of pairs of names for four observers as illustrations of the two marked types of bias—excess of homonymous pairs (Observers 9 and 31) and defect of homonymous pairs (Observers 12 and 13). The first figure in each compartment gives the correct frequency as calculated from the row and column totals, the figure after the ± sign the number to be added or subtracted to give the frequency returned.

Observer.	Name assigned to lower tint.	Names assigned to upper tint on card.		
		Light.	Medium.	Dark.
9	Light	19·4+0·6	33·1−0·1	20·5−0·5
	Medium	26·3+1·7	44·9+5·1	27·8−6·8
	Dark	22·3−2·3	38·1−5·1	23·6+7·4
12	Light	66·0−6·0	35·3+5·7	27·7+0·3
	Medium	40·9+4·1	21·9−5·9	17·2+1·8
	Dark	24·1+1·9	12·8+0·2	10·1−2·1
13	Light	24·1−2·1	25·0+0	28·9+2·1
	Medium	25·9+0·1	26·9−3·9	31·2+3·8
	Dark	29·0+2·0	30·1+3·9	34·9−5·9
31	Light	49·0+3·0	34·6−1·6	28·4−1·4
	Medium	35·4−1·4	25·0+6·0	20·6−4·6
	Dark	27·6−1·6	19·5−4·5	16·0+6·0

TABLE XX.

Series B: (*cf.* Table XVII. for Series A).—Showing (1) the total excess (+) or defect (−) of the frequencies of homonymous pairs as compared with the number calculated from the totals of rows and columns, (2) the value of this excess or defect expressed as a percentage of the calculated number for each observer. Total +52; average +2·8 per cent.

Observer.	(1) Absolute excess.	(2) Percentage excess.	Observer.	(1) Absolute excess.	(2) Percentage excess.
2	− 5·4	− 5·9	15	− 3·8	− 4·4
3	− 1·0	− 1·1	19	+ 5·8	+ 5·5
5	+ 3·5	+ 3·5	20	+ 6·5	+ 6·4
6	+10·7	+10·2	24	+ 3·4	+ 3·9
9	+13·1	+14·9	25	+ 0·5	+ 0·5
10	+ 3·5	+ 3·9	26	− 3·6	− 4·2
11	+ 0·9	+ 1·1	27	+11·0	+12·8
12	−14·0	−14·3	30	+ 6·2	+ 7·0
13	−11·9	−13·9	31	+15·0	+16·7
14	− 1·5	− 1·5	34	+13·1	+14·9

TABLE XXI.

Series B: (*cf.* Table XVIII, Series A).—Showing the distributions of pairs of names for the first and second sets of 10 observers on the list, and for the entire 20. Explanation as for Table XIX, but figures given to nearest unit only.

Observers.	Name assigned to lower tint.	Name assigned to upper tint on card.		
		Light.	Medium.	Dark.
(1) First ten in alphabetical order.	Light	371+33	318−24	284− 9
	Medium	323− 6	276+17	247−11
	Dark	283−28	242+ 7	217+20
(2) Second ten in alphabetical order.	Light	414+32	315−38	299+ 6
	Medium	331−30	251+49	238−19
	Dark	287− 2	218−11	207+13
(3) The entire set of twenty observers.	Light	785+65	633−62	583− 3
	Medium	653−35	527+66	486−31
	Dark	570−30	460− 4	423+34

TABLE XXII.

Series C: (*cf.* Table XIX for Series B).—Showing the distributions of pairs of names for four observers, as illustrations of the two marked types of bias: excess of homonymous pairs (Observers 9 and 31) and defect of homonymous pairs (Observers 12 and 16).

Observer.	Name assigned to lower tint.	Name assigned to upper tint on card.				
		Very light to light.	Rather light.	Medium.	Rather dark.	Dark to very dark.
9	Very light to light ...	14·3+0·7	10·9+0·1	17·9−3·9	7·3+0·7	11·6+2·4
	Rather light	12·0−4·0	9·1+9·9	15·0−2·0	6·1−0·1	9·8−3·8
	Medium	14·3+3·7	10·9−5·9	17·9+10·1	7·3−6·3	11·6−1·6
	Rather dark	9·4−2·4	7·2−2·2	11·8+2·2	4·8+3·2	7·7−0·7
	Dark to very dark ...	9·0+2·0	6·9−1·9	11·3−6·3	4·6+2·4	7·3+3·7
12	Very light to light ...	15·0−3·0	17·4+0·6	18·4+1·6	4·8−0·8	6·3+1·7
	Rather light	15·2−0·2	17·7−2·7	18·7+4·3	4·9−1·9	6·4+0·6
	Medium	21·3+2·7	24·7+3·3	26·1−6·1	6·9+1·1	8·9−0·9
	Rather dark	6·8+1·2	7·9−1·9	8·3+2·7	2·2−0·2	2·8−1·8
	Dark to very dark ...	3·7−0·7	4·2+0·8	4·5−2·5	1·2+1·8	1·5+0·5
16	Very light to light ...	6·9−2·9	7·2+2·8	11·6−0·6	7·3−2·3	7·0+3·0
	Rather light	7·2+1·8	7·5−2·5	12·1+3·9	7·7−1·7	7·4−1·4
	Medium	13·2+0·8	13·8+1·2	22·3−4·3	14·1+4·9	13·5−2·5
	Rather dark	9·8+1·2	10·2−5·2	16·4+3·6	10·5−1·5	10·0+2·0
	Dark to very dark ...	6·9−0·9	7·2+3·8	11·6−2·6	7·3+0·7	7·0−1·0
31	Very light to light ...	30·2+3·8	17·7−1·7	12·2−2·2	10·9−1·9	16·0+2·0
	Rather light	17·4−4·4	10·2+8·8	7·0−2·0	6·2−1·2	9·2−1·2
	Medium	13·6−0·6	8·3−2·3	5·5+3·5	5·1+0·9	7·5−2·5
	Rather dark	12·9+0·1	7·5−4·5	5·2+1·8	4·6+2·4	6·8+0·2
	Dark to very dark ...	15·0+1·0	8·3−0·3	6·0−1·0	5·1−0·1	7·5+1·5

TABLE XXIII.

Series C: (*cf.* Tables XVII, and XX, for Series A and B).—Showing (1) the total excess (+) or defect (—) of homonymous pairs, as compared with the number calculated from the totals of rows and columns; (2) the value of this excess or defect expressed as a percentage of the calculated number, for each observer. Total +148·1; average, 8·81 per cent.

Observer.	(1) Absolute excess.	(2) Percentage excess.	Observer.	(1) Absolute excess.	(2) Percentage excess.	Observer.	(1) Absolute excess.	(2) Percentage excess.
1	+ 5·2	+ 9·5	12	−11·5	−18·4	24	+10·9	+20·5
2	− 2·4	− 4·3	14	+14·2	+25·9	25	+ 2·4	+ 4·4
3	− 5·6	−10·4	15	+ 4·0	+ 7·4	26	+ 0·9	+ 1·7
4	+ 3·9	+ 7·1	16	−12·2	−22·5	28	− 4·6	− 8·6
5	+ 5·6	+10·1	17	+15·9	+25·6	29	− 4·3	− 7·5
6	+10·1	+15·9	18	+ 4·0	+ 7·4	30	+ 4·4	+ 7·8
7	+ 3·1	+ 5·1	19	+11·0	+19·0	31	+20·0	+34·5
9	+27·6	+51·7	20	+ 9·6	+17·3	32	+ 2·0	+ 3·6
10	+ 9·9	+18·3	21	− 0·1	− 0·2	33	+ 5·1	+ 9·6
11	+ 5·2	+ 9·2	23	+ 2·9	+ 5·2	34	+10·9	+19·8

TABLE XXIV.

Series C: (*cf.* Tables XVIII and XXI, for Series A and B).—Showing the distribution of pairs of names for the first, second and third sets of ten observers on the list, and for the entire set of thirty. Explanation as for Table XIX, but figures given to the nearest unit only.

Observers.		Name assigned to upper tint on card.				
		Very light to light.	Rather light.	Medium.	Rather dark.	Dark to very dark.
(1) First ten in alphabetical order.	Very light to light	160+17	111+ 3	155−19	88−12	127+11
	Rather light ...	115+ 2	80+23	111+ 8	63−15	91−17
	Medium	150+ 5	105− 7	146+19	83− 1	120−16
	Rather dark ...	98−26	68−11	95+ 9	54+22	78+ 7
	Dark to very dark...	115+ 1	80− 8	111−16	63+ 7	91+16
(2) Second ten in alphabetical order.	Very light to light	118+11	110+ 1	127−24	77− 1	119+12
	Rather light ...	103−16	96+18	111+12	67−11	104− 2
	Medium	135+ 5	126− 7	145+31	88− 6	137−23
	Rather dark ...	83− 3	77−12	89+14	54+ 5	84− 4
	Dark to very dark...	109+ 4	102− 1	117−33	71+14	110+17
(3) Third ten in alphabetical order.	Very light to light	145+ 4	112− 1	140−13	93−14	133+24
	Rather light ...	95− 4	73+24	92− 3	61− 4	87−14
	Medium	135− 3	105− 6	131+23	87+ 8	125−22
	Rather dark ...	96+ 4	75−16	93− 5	62+13	89+ 4
	Dark to very dark...	124− 1	96− 1	120− 2	79− 4	114+ 7
(4) The entire set of thirty observers.	Very light to light	421+34	334+ 2	421−55	258−27	380+46
	Rather light ...	313−18	249+65	314+17	192−31	283−34
	Medium	422+ 5	335−19	422+73	258+ 1	381−60
	Rather dark ...	277−25	220−39	278+17	170+40	251+ 7
	Dark to very dark...	348+ 4	277− 9	349−52	213+17	315+40

TABLE XXV.

Eye-colour of Husband.

Eye-colour of Wife.	1	2	3	4	5	6	7	8	Total.
1	0·9+1·1	8·2+ 4·8	7·8− 3·8	3·2− 0·2	0·1− 0·1	2·2−1·2	1·9+0·1	0·7−0·7	25
2	6·8−0·8	64·3+22·7	61·3−19·3	24·8+ 1·2	1·0− 1·0	17·2−1·2	14·9−1·9	5·6+0·4	196
3	7·7−1·7	72·2−16·2	68·8+24·2	27·9+ 3·1	1·1− 0·1	19·3−3·3	16·8−5·8	6·3−0·3	220
4	3·9+0·1	36·8− 4·8	35·0− 0·0	14·2+ 3·8	0·6+ 0·4	9·8+5·2	8·5−2·5	3·2−2·2	112
5	0·2−0·2	2·3− 2·3	2·2+ 2·8	0·9+ 0·1	0·0− 0·0	0·6−0·6	0·5+0·5	0·2−0·2	7
6	3·5−1·5	33·1+ 4·9	31·6− 4·6	12·8− 2·8	0·5+ 0·5	8·9+3·1	7·7+2·3	2·9−1·9	101
7	2·9+2·1	27·2− 7·2	26·0+ 2·0	10·5− 3·5	0·4+ 0·6	7·3−1·3	6·3+5·7	2·4+1·6	83
8	1·0+1·0	9·8− 1·8	9·4− 1·4	3·8− 1·8	0·2− 0·2	2·6−0·6	2·3+1·7	0·9+3·1	30
Total.	27	254	242	98	4	68	59	22	774

The following Tables show—(1) in the upper line of each row the actual frequencies observed; (2) in the lower line of each row the frequencies of a normal distribution with the correlation coefficient given. The data for Tables XXVI, XXVIII, XXIX, from Pearson, *Biometrika*, vol. iii, 131, and for Table XXVII from Pearson, *Phil. Trans.* (A), vol. cxcv, p. 79.

Table XXVI.

Eye-colour—Brother and Brother. $r = \cdot52$.

	Light.	Medium.	Dark.	Total.
Light	558 511	190 254	81·5 64·5	829·5
Medium	190 254	426·5 316	122 168·5	738·5
Dark	81·5 64·5	122 168·5	228·5 199	432
Total	829·5	738·5	432	2,000

Table XXVII.

Eye-colour—Father and Son. $r = \cdot44$.

Father.

		1, 2	3, 4	5, 8	Total.
Son.	Blue, 1, 2... ...	194 183·5	111 126	30 25·5	335
Son.	Grey, Hazel 3, 4 ...	108 136·5	254 204·5	59 80	421
Son.	Brown, 5, 8 ...	56 38	79 113·5	109 92·5	244
	Total ...	358	444	198	1,000

TABLE XXVIII. (See note, p. 378.)

Curliness of hair. Brother and Brother. $r = \cdot52$.

	Smooth.	Wavy.	Curly.	Total.
Smooth	1556·5 1507	111·5 168·5	34·5 27	1702·5
Wavy	111·5 168·5	134·5 73	20 24·5	266
Curly	34·5 27	20 24·5	11 14	65·5
Total	1702·5	266	65·5	2034

TABLE XXIX. (See note, p. 378.)

Temper. Brother and Brother. $r = \cdot27$.

	Quick.	Good-natured.	Sullen.	Total.
Quick	138·5 97	152·25 218·5	39·75 15	330·5
Good-natured	152·25 218·5	1026·5 905	106·25 161·5	1285
Sullen	39·75 15	106·25 161·5	84·5 54	230·5
Total	330·5	1285	230·5	1846

Table XXX. (See note p. 378, and pp. 361–362.)

Stature—Father and Son. $r = 0{\cdot}396$.

Father.

	Tall.	Medium.	Short.	Total.
Tall	288 273	194 214	69 64	551
Medium	95 116	203 175·5	88 94·5	386
Short	37 31	74 81·5	78 76·5	189
Total	420	471	235	1126

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CONTRIBUTIONS TO THE STUDY OF THE BORORO INDIANS.

(With a Description of an Ethnographic Collection presented to the Berlin Museum für Völkerkunde.)

By Vojtěch Frič and Paul Radin.

[With Plates XXXVII-XXXIX.]

I. Habitat and History.

The Bororos inhabit the entire course of the São Lourenzo river as far as its union with the Cuyabá, where they come into contact with the Guato. The northern boundary is formed by the north bank of the Rio des Mortes, the south bank being inhabited by the Cayapos with whom the Bororos have long waged war. Further north they occupy both banks of the Araguaya right across the road that leads from Cuyabá to Goyaz. They have been repeatedly attacked by the Goyaz Fazenderos, and live in constant enmity with them. This guerilla warfare has its periods of cessation but there is always some cause on one side or the other that kindles the flame anew. In the time of Mamelukes, the Bororos aided the Portuguese in their struggle with the other Indian tribes, but after that period relations with the whites were again broken and they became the most feared Indians of Matto Grosso, making the state roads impassable. Indeed all the Indian attacks were laid at the door of these Coroados as they were called; and when a few of them appeared before Cuyabá with proposals of peace the population was seized with panic. Expeditions were immediately sent out against the enemy but did not succeed in coming even face to face with them.

This state of affairs was radically changed when in 1884 Capitán Duarte succeeded in pacifying one division. These Bororos he settled in the colony of Theresa Christina, of which Professor von den Steinen has given an excellent description in his book *Unter den Naturvölker Zentral Brasiliens.*[1] After this military settlement the missionaries seized upon them; and one can best characterise the influence of the latter by citing the words of Senhor Yucudelara, who had a Fazenda on the boundary of the Bororo territory. "Before, the Bororos would often come to the Fazenda to work. There were generally 30 to 40 men and 2 to 3 women (*areidás*) of whom they were jealous. Now 5 to 6 men come and 30 to 40 *areidás*, and before they enter the village the chieftain introduces the women passing from one to the other, '*esta areida e casada; esta e solteira, outra solteira*, etc.' [this woman is married, this one single, this other single, etc.] and all jealousy has ceased."

[1] *Berlin*, 1894, pp. 441–518.

In 1890 war between the Bororos and Goyanos broke out again, when about 200 Bororos were killed through the poisoning of a well by a Fazendero. This act, as usual, was not punished by the representatives of civilisation, the Bororos not being Christians. The missionary who speaks of this event (Padre Malan) adds the following comment: "Here dwell the Bororos who provoke the swords and bullets of the soldiers . . . The poor Christians cry aloud at the sight of the broken limbs and pierced hearts of their brethren, murdered by the unerring and poisoned arrows [of these savages] . . . And yet," he goes on to say, "these false monsters, these Bororos, thieves and murderers of so many good Cristanos, adapt themselves to the peaceful labour of the plough."[1]

Naturally if such crimes are left unpunished by the "civilised" Brazilians, the Bororos take the matter into their own hands. And so indeed it happened. One day they fell upon the house of a certain Senhor Clarismundo, and after having been refused some sugar, they attacked the members of his family, and escaped unscathed. Padre Malan pictured in tragic colours this terrible event and offered up a Te Deum for Clarismundo's escape. But Senhor Clarismundo took a far more effectual revenge. With the aid of government troops and sixteen friends, he fell upon a small settlement, incidentally a division that had had nothing to do with the attack, and killed over 100 men, women, and children. After a few remaining Indians had fled, the conquerors ventured to enter the village and found a woman with a child at her breast, prostrate on the ground, feigning death in the hope of escape. But she expected too much from Christian civilisation. Although considered dead, to make quite sure they hacked them to pieces. Fortunately a large part of the Bororos still remain unknown and, protected by the inaccessibility of their dwelling-place, can resist for some years to come the blessings of our culture.

The Colonia Theresa Christina has become so important for the study of the Bororos that perhaps it may not be out of place to give an account of the changes it has undergone since it was visited by the members of the second Schingú Expedition in 1888. To-day it occupies an entirely different site, having been placed three leagues further down the river (Cuyabá). This change was necessitated by the construction of a new telegraph line and an accompanying road 8 to 10 metres wide running across the Bororo district. The Colonia itself consists of the cemented house of the "Director dos Indios Coroados," the telegraph station, five small huts of baked clay and straw, standing in a row and occupied by half-breeds and a Guato family. These houses are about 150 metres from the river. At one end of the village is situated the house of Senhor Pedro Fernandez, Inspector do Lineal Telegrafica, at the other the *bac* (Indian hut) of Capitán Mayor and his family.[2] Opposite his house the *Salesianos* (missionaries) have planted a large Bananal, which however does not yield any results as the fruit is alway plucked unripe by the

[1] *Boletino Salesiano II, Numero III*, pp. 70, Relaçion do P. Antonio Malan.

[2] His wife is the widow of Duarte, Maria "Reina dos Bororos" (*cf.* Steinen, *Unter den Naturv. Brasil*).

Bororos. A few hundred metres down the river is the Katechese, consisting of one Bahito, which, an exception to the general rule, is round and about 5 metres in cross-section. About this are grouped 6 *bai*, in which the Indians of Capitán Dotte live. Further up is the house inhabited by the body of the Bororo. The population to-day is 100 souls; 160 according to the official census.

The Indians have their own plantations, and work on those of the Colonia. Maize, mandioca, sugar-cane and rice are grown. Under the present director, the soldiers are compelled to help in the work of planting, and not merely stand guard as they were accustomed to do under his predecessor. Naturally, as often as the director leaves the village, hostilities break out between the soldiers and the Bororos. The director, Manõel Canavarões, is a fairly intelligent and practical man, but he will scarcely be able to do anything with the Indians, spoiled by the soldiers and accustomed to the easy and indolent life that they were taught by the missionaries. He is also trying to be friendly with the wild Bororos in order to increase the population of Theresa Christina, and for that reason he accompanied Mr. Frič for part of the way.

II.

MR. FRIČ'S JOURNEY.

Mr. Frič started on the 2nd of January, 1905, from Colonia Christina. The horses had been sent across the river on New Year's evening to give them a rest. A large canoe containing provisions and articles for exchange had been sent with them. They were to await his arrival at Kežari. At 7.30 a.m. all, Frič, the director of the Indians, and a negro, Antonio Bugio, were ready in their saddles.

The way led through a swampy wood, along a *pikade* that ran at the side of the telegraph line. On the second day, the telegraph line was left in order to reach the mountains. There being no trodden path, they were compelled to lead the donkeys from stone to stone, finally across a magnificent natural bridge, under which a picturesque waterfall broke the stillness of the forest. Half a league further, they found a brook with swampy banks, and from thence ascending a ravine with Buriti palms, they spent the night on a *chapada* (a high plateau), with dried meat, *Torados* (*Zwieback*), *rapachna* (black sugar), and Farinha for supper, and to the accompaniment of a frog's concert. Wet through and through from the night rain, Frič, to protect himself from the mosquitoes, selected the brook for his bed. The next morning they came to the Fazenda of Tunico Mariano, where some Bororo were working. The village was on the other side of the brook. As the day was far advanced, they desisted from their purpose of visiting it on that day, and called the Bororos to the Fazenda. They came in the evening, and, as a pastime, modelled animal figures in half relief, in the sand, using leaves to make the resemblance more striking. When Frič asked them why they did not live at the Fazenda, the priest answered: "The children do not know. They shoot with arrows. They wound horses, oxen; the others steal green maize, and the patron gets mad (*brabo*)." The next day, the director having left them, Frič and Bugio cleaned a canoe and rowed to the other side. Thence they walked further in the direction of the village.

The next day, after a very disagreeable night, they proceeded. Near the village they found an oblong-shaped place about 200 metres long and 12 metres wide, called by the Indians *Mano*, dance place. In the middle of the *campos cerrado* the grass was completely plucked out. They then went to the other side of the river toward the village but found no canoe. Here Antonio Bugio left Frič, and he proceeded with two Indians, whom he had obtained at the Fazenda. Suddenly a noise was heard which the Indians explained as the priests blessing the maize. It was the first day upon which they were allowed to eat it. After a short interval, some Indian women came to the river to wash the maize, and the Indians concealed Frič in the bushes with strict injunctions to remain perfectly quiet. He was compelled to remain there for more than an hour and a half, while the Indian conversed with the women, and although Frič hardly raised his voice above a whisper, his guide was very dissatisfied with his loud conversation. Afterwards some more women came along, calling, in tones resembling those of a peacock, to an Indian angling in the river. As soon as he came up to the bush, Mr. Frič was told that the Indians had no canoe. Nothing remained but to wait until they had constructed one of split bamboos.

At the Indian village, situated between Tunico and Itadarimana, they met with a rather cold reception, as the Indians were just preparing for the Marido dance, and protested strongly against Frič's presence at this feast. It was only through the influence of the chieftain Viti, who had previously lived with the tame Bororos, and served in the Brazilian army, that they were persuaded to continue their preparations despite the presence of the stranger.

The *Marido* dance is one of the two most important dances of the Bororo, the other is the *Mano*. Both in their essence have the same meaning as the Olympian games of the Greeks, festivities in which the Indians show their strength and agility, and which are celebrated in remembrance of their brave comrades who have fallen in battle.

The Dances.

As stated above, Frič arrived just as the preparations for the *Marido* were taking place. A large arena of bamboos and Akuri-palm leaves was constructed before the *Bahito* (house) to prevent anyone from spying, a new opening was made in the same, and the young men then assembled to prepare the *Mano*. The *Mano* consists of two pieces of cord between which strips of *Buriti* and water grasses are tied, the whole being then rolled together and bound anew by additional pieces of cord. There were two such *Manos*, a smaller one about 75 centimetres in diameter, and a larger one of more than a metre diameter. The weights were about 80 to 100 kilogrammes.

The Indians then made themselves ready for the dance, smearing themselves with black pitch, and then pasting feathers all over the body. Mr. Frič's face was ornamented with a black horse-shoe-like band above the forehead and the nose, and two patches, supplemented by a layer of white feathers, upon the cheek. His chest was ornamented with *Uruka* red, and both shoulders decked with white feathers. Around his neck he had an improvised necklace made of plaited *Buriti* leaves, one part forming a collar, the other being suspended therefrom. A girdle of the same material was bound round him, and not being the happy possessor of a *Ba* (penis cuff) his trousers and high boots had to take its place, being however completely covered with *Buriti* leaves. The Viti had decorated his feet, as far as the knee, and his hands, as far as the wrist, with feathers, so that he had the appearance of a person wearing high boots and gloves.

Throughout these preparations, the Indians played their flutes and sang, until at the end all arranged themselves in a circle around the *Bahito*. Then the priest went round from one to another singing a very sorrowful song, and the old chieftain Baro led them through the newly made door. Thence they marched out in pairs forming a circle and springing sideways, their faces toward one another, and their shoulders knocking together, all this to the accompaniment of much noise, and the music of the *Icas, Panas, Pariras* (long flutes) and calabashes, with the latter of which they imitated excellently the barking of dogs. Those that had no instruments sang and shouted as best they could. There were about eighty persons taking part in the dance, some with *Paricos* (head feathers) and some with tiger skins, with geometrical figures painted on their backs, painted bracelets on their arms and feathers over the body. Finally all were assembled in the arena, where they listened to the wailings and shrieks of the women without. Then of a sudden one after another they let forth a ferocious cry that was repeated by all the parrots in the village. Each one in turn then took the *Mano*, placed it upon his head, and with bent knees and bent arms sprang from one position to another, jumping generally four times upon each spot, while the others accompanied him with shouts of *hu! hu! hu!* and the women outside acted as a chorus with shouts, shrieks, and lamentations. When, towards the end, Viti, the strongest man in the entire village, went around the group a few times, the shouts of praise changed suddenly into a long howl, a howl of wonder.

Frič tried to place the *Mano* upon his head but although exerting all his strength could not move it. A Bororo immediately sprang behind him and took the *Mano*, mockingly suggesting that he should take the children's *Mano*, that boys from 14 to 15 easily carried and which weighed 50 to 60 kilogrammes.

After a high trill had been given by a man from without, the dance was finished by a *brincadero acabo*. It had lasted about three hours. As soon as it was over the people came in groups of three to the entrance of the *Bahito* where they were received with baptisms of water, held in clay bowls, and with the shouts of *Ehue! Ehue! Ehue!* Outside the *Bahito* stood widows covering their arms and breast with scars, crying and wailing. Then all returned into the *Bahito*, first running a few times up and down the house but finally forming themselves into a large circle and afterwards into two parallel rows. The chieftain walked before the first row and began to sing. This was the signal for all those in that row to assume a half erect position, knees bent forward, and afterwards with knees on the ground, their heads striking one another as they were moved intact, from right to left, so that the *Paricos* crossed alternately to the left and to the right, a manœuvre that was repeated again and again until they had gradually raised themselves to an erect position, upon which they approached the chieftain, who was decorated from head to foot with feathers. He immediately threw himself upon them and they retired, running backward in short paces, stamping with their feet upon the ground and crying with voices, imitating that of the Jaguar, *Jaru! Jaru!* This performance was repeated with all details by the second row.

While this was taking place Mr. Frič sat in the corner of the *Bahito* conversing with the chieftain Cuaguea and the *Bari* (medicine-man), who had come from Itadarimana to be present at the festivities. During the lengthy conversation lasting almost two hours, without a word being intelligible to Frič, they drank much *chicha*, a drink made of the stem of the Uakuri palms. A hole is made in the stem, the juice is allowed to ferment, and then with a bamboo pipe is drawn into the mouth from which it is squirted into a *Cuye* (bowl made of dried fruit). Mr. Frič was afterwards informed by Viti that he had been invited to Itadarimana an invitation that he gladly accepted.

In Itadarimana however he found the village deserted and he therefore returned to Tunico and hired a canoe for Kežari. The boatmen took pieces of the Mano with them as a remembrance of the festivities.

In Kežari Mr. Frič saw the chieftain's youngest child, who was about a year old, making short jumps, being led by his blind grandmother. Upon being asked the reason he received the answer, "*para ser guapo*" (to become brave). The next day he left for Theresa Christina.

The *Mano* dance was not personally witnessed by Mr. Frič but he succeeded in obtaining a few notes. It differs from the *Marido* principally in the fact that the participants are divided into two parties. A member of one of these places the *Mano* on his head and runs accompanied by his companions in the direction of the goal, *i.e.*, the other side of the oblong field before mentioned. If he is tired, a friend takes the *Mano* from him, etc. The side that first reaches the goal wins and is received with a sprinkling of water from the women in waiting. All then return to the village, where the victors celebrate the day feasting and rejoicing. The defeated party returns sad and depressed and takes no part in the feast.[1]

[1] For these details Mr. Frič is indebted to Senhor Pedro Antonio Fernandez, Inspector-General of the telegraph lines.

III.

SOCIAL INSTITUTIONS.

a. Chieftainship.

The Bororos have the most centralised tribal organisation that we know among the South American Indians. As soon as the children have been weaned, which generally does not take place before the fifth or even seventh year, they enter the *Bahito* (men's house) and only occasionally visit their parents. This *Bahito* is a public school where the children are taught spinning, weaving, the manufacture of weapons, and above all singing, upon perfection in which is centred the ambition of all those who wish to become chieftains. This is one of the most interesting and peculiar characteristics of the Bororos. Should the son of the chieftain be a poor singer, he must remain a common Bororo. As the Indians themselves say, "If chieftain has a son who sings not *Bakururu*, he is a common Bororo. Bororo who sings *Bakururu* well, he is chieftain." If there are two good singers in the same village either the one who is adjudged to sing somewhat the better is chief, or one of the two secedes with his followers and establishes a new village.

Under such circumstances there is no opportunity for the development of an hereditary chieftainship or castes. But not merely is the chieftain the best singer, and as such, highly honoured and respected ; as chieftain he can exact an unconditional obedience from all. This can be best shown by an incident that occurred in Kežari during Mr. Frič's stay. He wished to photograph the men in the *Bahito* and the latter had been commanded to line themselves up before the camera. But only a few had the courage to do so. Upon Mr. Frič complaining, the chieftain came before the *Bahito* and, singing, ordered them to obey, which they did, trembling and murmuring that the chieftain was bad. On all occasions, the chieftain is the leader, even on the plantations, where he generally works harder than anyone else. No tributes are paid him and he supports himself from the products of his own plantation.

One curious prerogative and custom of the chieftain deserves especial mention, both from its peculiarity and from its exemplification of the extent of his power, —the night orders. Every evening after sunset he goes before the *Bahito* where all the men are assembled, the women and children remaining in the family houses, and, singing, gives his commands. The whole village listens attentively, while the men give expression to their feelings by accompanying those parts that they like with whistling. The singer always begins his commands with a religious chant, in a langaage not easily understood by even the Bororos. He then recounts some hunting trips, describes a journey or some subject of general interest and ends with definite commands to each person of the village, regulating his work for the next day.

When Mr. Frič arrived at Kežari, the chieftain had just described his journey to Cuyabá, relating the smallest details—what he had hunted, what had seemed remarkable to him in the town, how he had exchanged his bow, arrow, and feather ornaments for a knife, axe, etc. Now, he told them, it was not necessary to go to Cuyabá any more, as there was a Braido here who would give them all these things in exchange for their bows, etc. Finally he gave commands as to what women should gather the *uakuri* (coconuts), who should prepare the drinks, and who should gather mandioca from the plantation; what men should chase peccaries in the forest, who should hunt tapirs along the river bank, who should obtain horses, etc. One of these night-orders Mr. Frič succeeded in partly taking down, though with only a fragmentary translation. It is the night-order of Adriano, the relative and substitute of the chieftain Mayor.

drorachu tažokedže
koledžaki léc redí
huahuraéhá horbobeši
žogoratóhá odubebep
pärot autéépá.

The *Bakururu* are the songs that are sung by the chieftain, the children acting as a chorus, before and after every important occasion. They have been very admirably discussed by Professor von den Steinen[1] in his account of the Bororo. The few texts given here are not translated; the tone-fall is generally —⏑—⏑—‖⏑‖.

Andante.

Wild pig (*Bakururu*).

I.

hyparéé hyparéé hyparéé
hod hohoho hehehe hyparéé hyparéé
tihajú bikai humumumu hyparéé
hadhéé hadhéé hajoká hajoká hyparéé
hy-diraku hy-diraku.

II.

bidehy bodogo bocorróo
bidehy bodogo bocorróo
biedure bocorróo
biedure bocorróo
arigaam ika
arigaam ika
aige modogo.

III.

hahahéhé hahahéhé
noridu nogu hadeé
hoalí hoho hí kú hoho
hitudo hitolée hohohéé
ato d aka iturajá
huh-hú-hú-

[1] *Unter den Naturv. Central Braziliens.*

Dead (*Bakururu*).

[žorakirirea]
oko dauge uema enodra
padiaigaba kuruga evilihuu
hidiu gu guažu eiu guadžó
inoron arárerí bocororo
hatŏde urubeli hato do
tarižó okuá okuáááhá
ádogó guuai.

Jaguar (*Bakururu*).

aige tumu guda ivoika pare.
oé oé lato uré tumuguta
atura bukedže.

β. Marriage, divorce, etc.

Mr. Frič was unable to discover whether any ceremonies take place at birth. About marriage the information was ampler. Monogamy is general, although polygamy is permitted. Every young man who wishes to marry must have killed either five peccaries or one jaguar, thus giving proof that he can support a family. If he kills five jaguars he has the right to have two wives, but although many of the older huntsmen had killed that number, only in two cases did Mr. Frič see polygamy practised. The priest, as in almost every tribe, is an exception to the rule, and he is enabled to support two wives through the wealth he obtains from his profession. The proposal of marriage, as is the case also among the Chaco tribes, comes from the woman. As Vito put it, "the young man sits in the *bahito*, the young girl sends him *mingau* of maize; if he accepts, he is a bridegroom." If he eats only a portion or does not eat any at all, he thereby signifies that he either wishes to postpone his decision or rejects the proposal outright. After the acceptance the men wait two or three, some even ten or fifteen, days, because they are ashamed to be seen entering the house of their bride. Occasionally their prospective father-in-law fetches them late at night so that they may not be hurt by the gibes and mockings of the other men in the *bahito*. This sense of shame is accentuated if neither of the two have had sexual intercourse before. After marriage the man stays in the house of the bride until he has a family of his own, when he builds a house for himself. Among the Chaco tribes, where no *bahito* exists, this feeling of modesty is not to be found.

Caldas told Mr. Frič that, at a certain time of the year, a feast takes place in the *bahito* at which the young men steal the virgins and keep them in the *bahito*. Upon interrogating the Bororo they answered that it only happens if the girl has no parents, because otherwise the father would be very angry.

If a Bororo suspects his wife of infidelity he puts her at the disposal of the young men in the *bahito*, and she becomes what is known as *areida bahito, i.e.*, tribal prostitute. She remains permanently in the *bahito*, is allowed to be present at the hunting *bakururu*, although her presence is prohibited at the more important religious festivities. She receives many presents from the young men, is painted with *uruku*, and in general enjoys a fairly comfortable life. Mr. Frič never met more than two such *areida bahito* in any village.

According to the *Bakururu* described by Professor von den Steinen, the Bororo bring the bones of their dead to the cemetery, where they are wrapped in dirt and then decked with feathers. The graves consist of a hole of which the walls are supported by pieces of wood. Every week they send men to pour water into them.

γ. *Religion.*

The principal element in the Bororo religion is the same as that found among the other South American Indians—fear of evil spirits, the spirits of the dead. The difference between men and animals is not sharply drawn.[1] In this respect they bear a great resemblance to the Chaco tribes and the Čamacoco where, according to tradition,[2] all animals are descended from human beings, and animals act exactly as men do, using bow and arrow, etc. Among the Matšikui, or Maskoi, the difference between some animals and men is clearly enough drawn; for instance only men, horses, parrots, and dogs possess immortal souls, the other animals and plants having souls that are freed through use and afterwards become mortal.

To the principal bad spirits the Bororo gives the names *Bope* and *Mareba*, but it was impossible to discover the difference between the two. The missionaries spoke of the Bororos believing in a good spirit (*Mareba*), who lives in the fourth heaven, and who has a *filha Mareba* (son), who lives in the first heaven, but it is apparent that the priest merely heard the somewhat disfigured doctrines that had been learned from some missionary. In reality *Bope* is nothing else than the *Digichibi* of the Čamacoco, *Nenigo* of the Kadioćo men, or *Idinibi* of the Kadioćo women, the *Ichaumra* or *Ighamha* of the Matšikui, *i.e.*, the human soul, which is regarded as a bad spirit. The Bororo are more afraid of the *Mareba* than of the *Bope*, and it may be that the former is the name of some old magician.

The Bororos often make images of animals and *Bope* out of wax (*cf.* p. 400). These are sometimes ¾ metre high. After they have been made they are beaten and destroyed.[3]

δ. Agriculture.

The Bororo plant very little in the Colonia Theresa Christina and for that reason, perhaps, Professor von den Steinen, who only saw them plough under compulsion, believed that they had never been an agricultural nation. Mr. Frič, visiting those still living in a wild state, discovered many plantations carefully kept. Between Kezari and Colonia Theresa Christina plantations

[1] *Cf.* Steinen.

[2] According to one fable at the time of the great flood many Čamacocos changed themselves into animals.

[3] It is remarkable that the modern missionaries should still be so poorly trained ethnologically that like old Dobrizhofer they can look upon such figures as divindados. (*Cf.* the Boletino of the Salesianos.)

of sugar-cane were met with which were, however, most probably due to the influence of the Colonia, as no others were found further in the interior. *Caricapapaiya* is found everywhere planted between the *bai* (houses), and these plantations probably belong to the community. In the neighbourhood of the village the large fields of *uruku* (*Bixa relacia*) are to be found, while the mandioca and maize are planted at some distance from the village so that the children cannot eat the green and unripe husks of corn before they have been blessed by the priest. This ceremony of blessing, to taste the corn before which would mean certain death, consists in first washing the half-ripe husk and placing it before the *aroetorrari* (the medicine man), who by uninterruptedly dancing and singing for several hours, and by incessant smoking, works himself into a state resembling hypnotic ecstasy, in which condition, trembling in every muscle, he bites into the husk, uttering shrieks from time to time. A similar ceremony is repeated whenever a large animal such as a tapir, wild pig, etc., or some large fish such as *Jahu*, *Dorado* (salmon), etc., is shot. It is the firm belief of the Bororo that should anyone touch unconsecrated meat or maize before the ceremony has been completed, he and his entire tribe would perish. The medicine men have persuaded their fellow men that *Bope* and *Mareba* enter the body of those who eat such food, and that such men tremble in every limb, as if they had an enemy within them.

e. DRESS, ETC.

The principal garment of the men is a penis cuff (*Ba*), which is made of a folded palm leaf (coloured with *uruku*), and on festive occasions covered with down (feathers). At the marriage ceremony the bride carries such a palm leaf unfolded in her hair, to be substituted for the old one whenever it should be necessary. A *Hüft Schnur* (hip girdle), such as Professor Steinen noticed among the half-civilised Bororos, was not found.[1]

The women wear the corset of bark (*Kudolige*), and Jatoba bast band (*parerinãgi*) spoken of by Steinen, and likewise suspenders (*Hosentrager*), a cord fastened around the shoulders and sides.[2]

IV. MATERIAL CULTURE.

The present sketch deals exclusively with the ethnographic collection given to the Berliner Museum für Völkerkunde by Mr. Frič, and with objects in his private possession.

A. DRESS.

The *ba*, the sole raiment of the men is, as stated before, made of palm (Oauss palm), according to Steinen, by folding the two ends together so that they form a ring (Fig. 1, *b*, *c*, *d*, *e*), and then turning one end 90 degrees and inserting it below

[1] Steinen, 472 ff. [2] *Ibid.*, 480.

the other.[1] They vary from 14 to 17 cm., and are always coloured with stripes of *uruku* red. The *bas* worn by the brides in their hair, forming a band around the head, are similarly painted. These are 40 to 42 cm. long and 3 cm. wide.

The corset and bast band are exactly identical with those described by Steinen.[2] The so-called "suspenders" consist of white, red, and buff-coloured cords, made in the characteristic manner that elsewhere we have only met among the Čamacoco. In the one there are twelve such cords, six on each side, held together by three lower and three upper fastenings of waxed cord set with quill chips in a technique similar to that of the lip sticks. The other two have only four cords on each side and are bound by only two such fastenings above and below, which are likewise inlaid with quill chips.

B. Head and Hair Ornaments. (Plate XXXVIII, Figs. 1 and 2.)

Crowns.—Among the Bororo, as stated above, the crowns of jaguar claws have a great importance. The type, described by Professor von den Steinen,[3] consists of large claws bound to a framework of bamboo sticks wrapped in palm leaf, in such a way that the curved claw points inward. Mr. Frič also brought home a type hitherto unknown, of much smaller circumference and having the claws of the tiger cat, *jaguarita*, instead. This latter type was only found among the Bororos of the Araguaya. Both are known as *adugo burege* in the Bororo language.

The *Parico* (feather diadem) is similar to that described by Steinen.[4] The single forehead ornament consists of a piece of *embira* bark 18 cm. long, covered with *Reiher* and *arara* feathers.

(*a*) *The types of hair feathers are large and characteristic.*

(1) Bamboo stalk with pointed white wood inserted in it. The stalk is covered with sewed black and red feathers, a long red one surmounting the top, and a row of feathers sewed on one side almost as large as the top one, of brown-white colour. The entire length is 75 cm.

(2) Bamboo frame with a hoop in the middle. The top is surmounted by long red feather, and the frame pasted with *Ardea* down. Length 52 cm.

(3) Bamboo stalk with wooden point inserted. The stalk is lined with short, alternately black and yellow, feathers, and three clusters, one at the base of the top brown-blue feather, one in the middle and one at the lower part of the stalk, of yellow, red and white down. Length, 60 cm.

(4) One long red feather with a wooden point inserted in quill. Small yellow feathers are attached to the long feather, and two clusters of down placed near the base. All these and more are worn at the back of the head.

Then there are various small feathers varying from 38 to 45 cm., which are worn in the hair. Generally the most conspicuous is the small black and grey

[1] Steinen, *cf.* 472. [2] *Ibid.*, 473 ff. [3] *Ibid.*, 480. [4] *Ibid.*, 477.

patched feather of the argia eagle, with small yellow and green feathers, clusters of down and two clusters of human hair hanging from each side. It is known as *kuruguga*. Other types are shown in *b* and *c* (Plate XXXVIII, Fig. 1) and in the Toucan-bill type *d*. During the fish dance, the men wear, in their hair, a feather ornament consisting of a diamond-shaped piece of bast pasted with feathers, with two others at each side. It bears a striking resemblance to an ornament worn at the *Angaité* fish-dance, as well as to old Peruvian feather dress.

The feathers worn behind the ear generally consist of two main feathers, not very long, with shorter ones and clusters of down at the base, although single long ones with short feathers at base are also found. (Plate XXXVIII, Fig. 2, *h*, *j*.)

(β) *The ear pendants.* (Plate XXXIX, Fig. 1.)

The general shape is that of a rhomboid coming to a blunt point at one end. There are always two such figures attached by *caraguata* cord, which is hung behind the back of the ear so that one pendant falls in front and one at the back. The principal types are :—

(1) A rhomboidal piece of Jatoba bark 14 cm. long, pasted with feathers of various colours and down so arranged that there are always two or more horizontal patches of feathers more or less relieved from the others. The width at its greatest point is about 5 cm. Some have short feathers at the side. (*a*, *b*, *c*, *d*, *e*, *h*.)

(2) A piece of fur, covered with feathers. Length, 17 cm.

(3) A long piece of palm leaf 26 cm. long, painted with pitch. The shape is pointed at top, forked at bottom. The ornamentation of the one consists of oblique crossed lines with black dots in the triangles formed; of the other, simply of black dots. (*g*.)

(4) Rhomboidal shape, widening towards the bottom, with five finger-like sections, divided into five segments. The object, in all probability, is intended to represent a human foot.

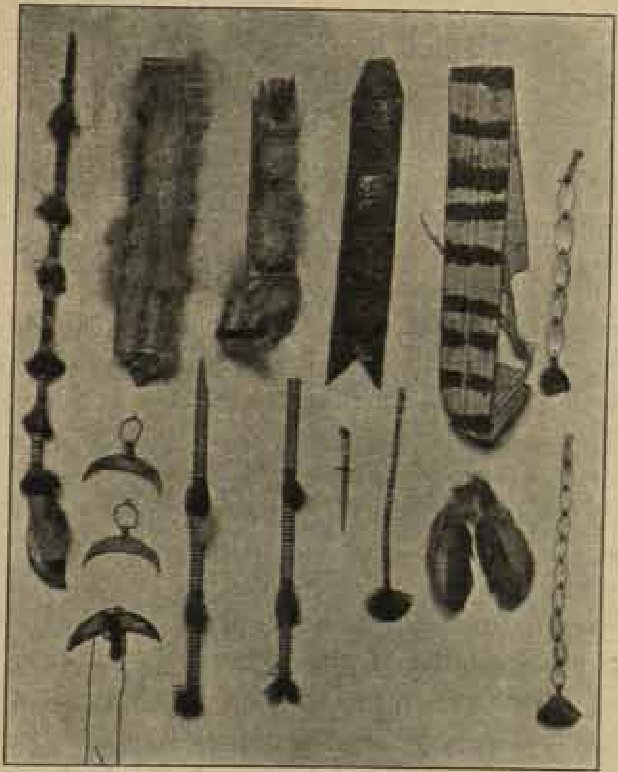
(γ) *Lip Ornaments.* (Plate XXXVIII, Fig. 1, *g*, *h*, *i*.)

All the Bororo men wear lip-chains or lip-sticks inserted in their lower lip. The hole is made by an instrument known as *Baragára*. There are two varieties; one, consisting of a wooden shaft and a bone point with a cluster of large feathers on the top and four clusters of down over various parts. The shaft is enclosed in blackened fine cord, on the surface of which are placed small pieces of feather quill, oblong in shape, arranged so as to leave two or three windings of the cord between each horizontal row of quill-chips and giving the whole a striking resemblance to inlaid ivory work. The other consists of a shaft of wood and a bone point, clusters of down and a number of long feathers on one side of the shaft only. There is no inlaying of feather-quill chips. There is also a third variety which differs only from the first in having merely one feather at the top and many feathers scattered over the shaft generally.

The lip-sticks are of four kinds; either:—

(1) They consist of halved bamboos (Fig. 1, *j, k*), about ½cm. wide, with three or four clusters of red and yellow feathers and feather-quills inlaid on *one side*, as before described, or (2), of a shaft of brown wood with three clusters of feathers—sometimes with five—and the feather-quill chips inlaid on all sides with the surface waxed over. The length is generally 18-20 cm. In Fig. 1, *m*, we have a lip pendant extremely difficult to obtain. It is made of shell-chips and coconut, afterwards filed, and given by the priest as a present to every new-born child. They generally take more than a month to manufacture. (3) A type of rare occurrence—a piece of harz 10 cm. long, tapering from ½ to ¼ cm. (4) A much longer type with quill-inlaying and feather covering, as well as six clusters and bunch at the end. (Fig. 1, *a*.)

a *b* *c* *d* *e* *f*



g *j* *k* *l* *m* *n* *o*
h
i

FIG. 1.—EAR AND LIP ORNAMENTS.

The lip-chains are of three kinds:—

(1) A number of discs about 1 cm. in their longest diameter, elliptical in shape, made of mother-of-pearl and bound to one another by red-cord. At the end is always appended a cluster of red feathers. The first disc is always shaped like a miniature club. (Fig. 1, *o*.)

(2) The same as (1) but with discs $2\frac{1}{2}$ cm. in their longest diameter. (Fig. 1, *f*.)

(3) A type of rare occurrence, consisting of a club-like shaped piece of bone about 2 cm. long, and a tapering piece of tin 8 cm. long. (Fig. 1, *l*.)

The reason for the variation in the first disc is merely to afford a better fastening in the lip.

C. ORNAMENTS OF THE BODY GENERALLY.

(*a*) *Arm-bands.*

There is only one kind, made of *arara* feathers fastened to a rough network of *caraguata* cord. A cluster of the same feathers protrudes at the point of union of the two ends. The arm-band is worn on the upper part of the arm. A bracelet of wool called *canã-gažežeo* is also often worn. (Length 26 cm.; width $1\frac{1}{2}$.) It is always woven by the men. (Plate XXXVII, Fig. 15.)

(β) *Breast ornaments.*

There are three kinds, made of two *Dasypus gigas* claws, made of teeth, and made of feathers.

(1) The claws of *Dasypus gigas* are so arranged as to form a crescent, being joined together by resin into which pearl buttons are pressed and from which feathers are suspended.[1] Professor Steinen found only one such crescent among the Bororos of Theresa Christina, but Mr. Frič found a double crescent among the wild tribes, made in the same manner. (Plate XXXIX, *n*, *o*, *p*, *q*.)

There are also two miniature ornaments to be found, one made of lead and one of the canine teeth of the peccary. (Fig. 1, *i*.)

(2) The teeth generally used are the canines of a monkey strung on to a bamboo stick similar to the one mentioned in the case of the claw-crowns. In one example we counted two rows of thirty-one canines each. This is the prevalent form. In some examples only five such canines are found, while other types have either four canines or four canines and two premolars of the tiger cat, a similar setting of jaguar teeth, or, lastly, two *capivara* incisors. All these teeth are so arranged that (with the exception of the long rows) one pair face in one direction and one in the other. Each tooth is wrapped with cord, in some cases black and white, in others black and red.

[1] *Cf.* Steinen, 479.

(3) The feather breast-ornaments are of no great importance. They vary in shape, in general, however, being either oblong or double-triangular. Feathers of various colours are pasted on the base of *embira*-bark or skin. (Plate XXXVII, 5, 8, 18.)

D. Weapons.—*Bows.* (*Cf.* pictures in Von den Steinen.)

The bows and arrows of the Bororo are among the most perfect found in South America. There are three general types:—

(1) The common fishing bow.
(2) The peccary bow, and the
(3) Jaguar bow.

(1) *Bahiga* or fishing bow is 170 cm. in length, made of *siriba* palm wood, with a bow string of *Tucum*-cord that is afterwards wound around the bow. There is no ornamentation of any kind. It is also used for birds and smaller animals.

(2) The peccary bow is more pointed and larger than the simple one. The bow-string is of *Tucum*-cord which is wrapped around the bow as in (1). For more than half its length the bow is covered with palm leaves about 2½ cm. wide, which become smaller toward the end. A leaf is added for each peccary killed. These are kept in place by *guymbé* thread crossed on the outer side. Very often, especially for festive occasions, the bow is decorated with a cluster of feathers.

Professor von den Steinen in his book[1] has called these jaguar-bows, but the wild Bororo, from whom Mr. Frič obtained these pieces, called them very distinctly peccary-bows.

(3) The jaguar bow is, to all intents and purposes, the same as the peccary, except that instead of palm-leaf wrappings it has those of jaguar skin, each ornamented with two parrot feathers. Their number is, however, never large, as each skin signifies a jaguar killed. The length is about the same as the peccary bows.

Arrows.

The arrows are even more various than the bows. The shaft-feathering is, however, constant, consisting of two feathers irregularly cut on one side and inserted in a *guymbé* shaft wrapping in such a manner that the upper and lower point are not within the same plane. The feathers are generally 19 to 20 cm. long.

1. There are three kinds of bird-arrows, those with a simple point of *siriba* wood, light white wood or hard brown wood varying from 40 to 45 cm., with bamboo shaft from 95 to 105 cm.; those with an equilateral triangular barbed point of light white wood 44 cm. long, an imitation of the bone pointed arrows, with shaft 98 cm. long; and those with *siriba* light white or hard brown wooden points having seven

[1] *Cf.* Steinen, 479.

right-angled barbs on one side, length 93 to 95 cm., and shaft varying from 93 to 103 cm. All these arrows have the point and the feathers fastened to the shaft by means of *guymbé* bark.

2. The peccary arrows always consist of three parts, point, middle piece and shaft, in which the latter has become reduced to barely one-fourth of the entire length. The relation being 26 to 114 cm. in one case; 35 to 100 in the second; and 34 to 107 in the third. The point is of *taquara* halved and pointed and bound to a long thin middle piece of *siriba* wood by a careful wrapping of *guymbé*. The shaft of a thin palm-wood is likewise fastened to the middle piece by *guymbé* with thin fine cord at the point of insertion of the feather. At about the middle of the shaft are inserted on each side five small bunches of red feathers, generally alternating with grey, and below this the *guymbé* wrapping changes from a simple to a cross-winding. At the end of the shaft similar bunches of red feathers are fastened in the fine cord wrapping.

3. The jaguar arrows resemble the peccary very much except that the point of *taquara* is much wider and consists not of the half but of a section of the palm, so that the inner side presents a flat surface and not a concave one, as in the former type. In one example the middle-piece projects into the point like the *tupanhuna* arrows. The point has likewise a notch on either side. The feather decoration of the shaft is identical with that of the peccary arrow.

4. The arrows that are used indiscriminately for smaller prey and sometimes for fishing consist of long *siriba*, light white or hard brown wooden middle-pieces with a bone point longer on one side than the other; the middle-piece varies from 30 to 45 cm. and the shaft from 102 to 113 cm. There is no ornamentation whatsoever.

5. For fishing and for crocodiles the Bororo generally use the harpoon-arrow. The shaft is made of thick palm-wood, resembling that used by the Guato, and the harpoon consists of a piece of bone with the ordinary barb fastened to the harpoon and this in turn to the shaft by coarse *tucum* cord. The length is 45 cm., the shaft 145 cm.

E. Musical Instruments.

The Bororos have a great diversity of musical instruments, the principal being the *Ica*, the *Pana*, the *Parira* and the Calabash.

1. The *Ica* is a large trumpet-like instrument composed of two parts; one long piece of wood becoming broader at the end and then tapering again. In this broader part a hole 2¼ cm. square is cut, from which point the instrument is hollowed out to the point of its attachment with the second part, a tube 7 cm. in diameter made of *Jatoba* bark. The two pieces are cemented together by resin. The whole trumpet is enclosed in a wrapping of *embira*-bark strips, 1 cm. broad, and covered with down feathers. The length is 102 cm., 67 cm. for narrow tube and 35 for larger one.

Professor von den Steinen has figured a similar trumpet which he calls "Totenflöte," funeral flute, but this seems to us a misnomer, as it is neither a flute, not being capable of producing a single simple note, nor is it used exclusively for funerals, but for every religious celebration. In our description of the *Marido* dance we have had occasion to speak of its use. The Bororos sing into it and the wide tube acts as a resonator. The instrument thus bears a great resemblance to the signal trumpet of the heralds of the Middle Ages.

2. The *Pana* is an instrument composed of four calabashes fastened together with wax; at the top of each one a hole is made into which the Indians sing. The whole is covered with down feathers and is about 35 cm. long. (Plate XXXIX, Fig. 2*f*.)

3. The *Parira* is a flute of bamboo completely covered with feathers so that even the hole is almost invisible. The hole is formed by merely cutting away the upper part of the bamboo for about 1 cm. The feathers are tied on to the flute by fine black yarn. There are two main types that differ, however, only in the nature of their feather decoration. (Plate XXXIX, Fig. 2, *g*, *h*, *i*, *j*, *k*, *l*.)

I. Short cut feathers fitting closely to the plate, either red, blue and yellow, with the latter colour predominating, or yellow and black with black predominating. They are 40 to 42 cm. long.

II. Short cut feathers but not fitting closely to flute; generally black with an occasional sprinkling of red, four clusters of down and two small bunches hanging from the top. The flute hole is entirely free. Generally 50 cm. long.

4. The calabashes are used as rattles, with pieces of shell for the rattle. Many are covered with down feathers, while some are simple with small holes to increase the resonance. Others are used as whistles, a hole being made at the top into which they blow, imitating the barking of dogs (*cf.* description of *Marido* dance, p. 385).

F. Miscellaneous.

1. Dolls.

(*a*) Dolls are made of palm-leaf folded together a few times with detailed characterisation of the sexes. The female dolls have, for instance, a corset of *Jatoba* bark and an apron of *Jatoba* bast, and one even has an imitation of the monkey-tooth-breast ornament, made of small pieces of light wood and cotton. (Plate XXXVII, Figs. 1, 2, 3, 6, 7, 21). Sometimes they have a belt of black cloth to signify the menstruation period. The male dolls are characterised by having no dress, but no attempt is made to imitate the *Ba*. In one example a covering of down is meant to signify that the doll has just been born, although, in general, feathers can be regarded as an imitation of hair. The figures vary in size from 6 to 12 cm.

in length and 2½ to 5 cm. in width. Sometimes a large number of dolls are strung together and hung on the wall of the house.

(β) But dolls are not always made of palm-leaf. Just as many are fashioned out of calabashes with feather covering. In Plate XXXVII, Fig. 4, is shown a person with hair shorn wearing a feather garland; Fig. 9, a calabash covered with pitch and feathers, that of a dancer at some festival; Figs. 11 and 17 are newly born children, and as in the case of the palm dolls, are covered with down. Also Figs. 10, 16, 19, 20.

FIG. 2.—BAD SPIRIT, "BOPE."

2. The planing instrument of a Capivara tooth bound to a piece of bamboo has been described by Steinen.[1]

3. A typical mandioca sieve of light palm-wood sticks, barely ½ cm. in width, bound together by their cord. The size is 41 × 47 cm.

4. A dagger made of the sharpened femur of the ostrich with feather decorations. Professor Steinen believed it to be an ornament, but in reality it is used as a secret weapon by those who have no knives. It is concealed in the hair, very skilfully among the feathers and a special ornament of foxtail with small black and white feathers. (Plate XXXVII, Fig. 13.)

APPENDIX.

Among the unpublished manuscripts and notes of the late Signor Guido Boggiani, now in the possession of Mr. Frič, we found a short vocabulary of Bororo, containing many words not found in either Professor von den Steinen's work[2] or in the pamphlet of Senhor Caldas.[3] We have deemed it best to publish it as it was found in Boggiani's note-book, with the Italian orthography of the Bororo, and the Italian translation, to which we add an English one.

The vocabulary was obtained at Porto Casado from three Bororo who had come to Paraguay by steamer.

[1] *Unter den Naturvölker, Central Brazil*, pp. 478. [2] *Ibid.*

[3] *Vocabulario do Lingua indigena dos Bororos Coroados*, Cuyaba, 1899.

Bororo.	Italian.	English.
Bororoddógghe	... .	Plural of Bororo.
abogâi (?)	*come star?*	how do you do?
ácco	*tuo*	you.
acógo	*frutto del taruma* ...	fruit of the taruma.
acōgoi / *acógo-i*	*albero del taruma* ...	berry " " "
i	*albero*	berry.
íppo	*palo, piccolo tronco, ramo*	stick, small trunk branch.
ibbóra	*pezzo di leguo, raga* ...	a piece of wood.
bóuge	*spaccare con la sense.*	
i	*prefisso pronominali d' 1er sing.*	Pronominal prefix, 1st sing.
a	*prefisso pronominali d' 2er sing.*	Pronominal prefix, 2nd sing.
íto	*denti (i miei)*	my teeth.
áco	" *(i tuoi)*	your teeth.
aughéto	" *(i loro)* (?) ...	" " (?).
áuto	" *(i suoi)?*	their " "
págo	" *(i nostri)*	our "
tágo (?)	" *(i vostri)*	your "
aughéto	" *(i loro)*	their "
inógua / *innógua*	*bocca (la mia)*	my mouth.
acógua	" *(la tua)*	your "
tagógua	" *(la vostra)* ...	our "
aughenógua	" *(la loro)*	their "
chénno / *iechénno*	*naso*	nose.
inúre	*piede* (1a)	foot, 1st person sing.
anúre	" (2a)	" 2nd " "
tau-úre	" (3a, 5a)	" 3rd & 5th pers. sing.
paúre	" (4a)	" 1st plural.
áughe-ure	" (6a)	" 3rd "
ichéra	*mano*	hand.
icheráco / *ichērácco*	*dita*	thumb.
chinóghe...	*unghie (della mano)* ...	finger-nail.
yuréghi	" *(del piede)* ...	toe-nail.

BORORO.	ITALIAN.	ENGLISH.
póba, póbba	*acqua*	water.
yóru, ioru	*fuoco*	fire.
bubut	*pioggia*	rain.
bubu taregóddo	*viene la pioggia*	the rain comes.
pemága	*buono, bello* (*una cosa o una persona*).	good, beautiful (a thing or a person).
péga	*brutto, cattivo* (*digusto d'aspetto o di carattere*).	ugly, bad (of taste, of aspect or of character).
ícca	*canoa*	canoe.
cah i chieirí	?	
ícca curirèu	*chiotta, grande imbarcazione.*	embankment.
iccărerèu	*vapore* (*nave a*)	steamer (ship).
cărerèu	*vapore, pironafo* ...	„
curirèu	*grande*	large.
tára-ígga	*pala o remo*	shovel or oar.
tarígga	*coltello*	knife.
bái	*casa, toldo*	house.
bái-poro } *bái-bóra* }	*porta*	door.
bái-pororógo	*finestra* (*piccola porta*) ...	window, small door.
rógo	*suffiso diminutivo* ...	suffix for diminutive.
pichiríri	*piccolo*	small.
pichirirógo	*piccolissimo*	smallest.
neghe-cugúri	*ragazzo*	boy.
nuguáre-cugúri	*ragazza*	girl.
médo } *méddō* }	*uomo*	man.
tapíra	*bue, vacca*	cow.
tapíra-meddō	*bue, toro*	ox.
tapíra-aréda	*vacca*	cow.
aréda, arédda	*donna, feminina* ...	woman (feminine).
médo curideghéddo ...	*uomo vecchio*	old man.
aréda curideghéddo ...	(*donna vecchia*)	„ woman.
médo-cúri	*uomo vecchiro.*	bad old man.
cúri	*abbreviazione di curideghéddo.*	abbreviation of *curideghéddo.*
iparédda	*giovane* (*m. cf.*)	youth, maiden.
itáuro	*testa, capo* (1ª per.) ...	head.

Bororo.	Italian.	English.
ími	*io*	I.
achi	*tu*	you.
áu	*egli*	he.
pā	*noi*	we.
tā	*voi*	you.
àughe	*essi*	they.
ími anāragoddúa ...	*io vado (io vado cammino).*	I go, I go to the room.
i-narāgoddua	„ „ „ „	„ „ „ „
paddúa	*andiamo (noi)*	we walk.
padduiágo	„ *via (noi)* ...	Let us walk on the road.
pamaragoddúa	„ *noi a lavorare*	let us go to work.
panoddúa	„ *-a dormire* ...	„ „ „ sleep.
pagoddúa	„ „ *bere* ...	„ drink.
coddúa	*bere*	drink.
coúgge	*mangiare*	eat.
noddúa	*dormire*	sleep.
inoddúa	*io dormo*	I sleep.
cai-bátore? / *caibá-tore?*	*dove vai?*	where are you going?
caibá-maragadré? ...	*dove vai a lavorare?* ...	„ do you work?
achirénna	*tu stesso, proprio tuo* ...	yourself.
aragúddu / *aragú„ddu*	*piangere*	cry.
meríggi	*giorno*	day.
bac„ióddi / *boccióddе*	*notte*	night.
ári / *árzi*	*luna*	moon.
cuiégge	*stelle*	star.
ippogóra...	*gamba (1ª per.)*	leg.
cu	*sangue*	blood.
córi	*dolore, dolere*	pain.
itto-córi	*(il mio dente)*	my tooth.
iccogóddu	*io sono ammalato* ...	I am sick.
irá	*tavola di leguo*	wooden table.
iúra	*costola*	rib.
rá	*osse*	bone.
tóri	*gamba (dal ginocchio ingue).*	leg.

BORORO.	ITALIAN.	ENGLISH.
tóri	*montagna*	mountain.
tóri	*pietra*	stone.
cáu	*capelli*	hairs.
itáia	*tonsuro* (1ª *pers.*) *sing.*	tonsure.
iócu	*occhi* (1ª *pers.*) *plur.*	eyes.
arédd-ipparédda	*giovinetta*	young girl.
itáu	*i miei capelli*	my hairs.
itau raúgge	*tagliare* (*i miei capelli*)	to cut my hair.
acáu raúgge	„ (*i tuoi* „)	„ „ your „
urugáddo	*basta*	enough.
urugaddiágu	*basta* (*inforzo del precedento*).	enough (strengthened).
ippōgoddá	*rotula giuocchio*	knee fracture (?)
ippióra } *ippīeríua* }	*gomito*	elbow.
icchēracó-yoco,pío	*giuntura tra ea falangi delle dita.*	{ joint below the phalanges of the thumb.
icchinnóggu	*unghie*	nail.
icchèru	*lingua*	tongue.
innógua ceboggèu	*labbro superior*	upper lip.
inno,guá-boró	*toro del labbro inferior*	torus of lower lip.
irá	*legna*	wood.
ū	*si, va bene*	yes, all's well.
tapīrará	*osso di bue*	ox-bone.
cogor,ágga	*gallina*	hen.
cogor,ágga-bá	*uovo di gallina*	hen's eggs.
curīdeghèddo-g,óddo,	*vecchio*	old.
mèddo-g,óddo,	*uomo vecchio*	old man.
cógghe	*dorado* (*pesce*)	(Dorado-fish.)
bo,i,a-r,úr,u *bo,i,á-cuaregóddo.*	*tuono*	thunder.
ba,e,ttúggu	*nuvolo*	cloud.
ba,e,ggábe	*lampo*	lightning.
méri-butto,	*tramonto, ponente*	sunset.
méri-rūtto,	*levante*	sun-rise.
bári-cuguagége	*pommeraggio*	orange.
méri-echehóddo	*verso le 5 poru*	about 5 oranges.
méri-braiadáddō,	*mezzo-giorno*	mid-day.
méri-barucū-guagégge	*verso le 3 poru*	about 3 oranges.

Bororo.	Italian.	English.
ittorèddúgge	*moglie (mia)*	my wife.
ittoèddo	*marito (mio)*	my husband.
imánna	*fratello maggiore* ...	elder brother.
imeddrógo	*fratello minore*	younger „
arèddrógo	*ragazza (sorella)*... ...	girl (sister).
baígga	*arco per frecce*	bow.
túggo	*freccia (generico)*... ...	arrow.
tuguá	*tucũ (Brasiliano)* ...	A vegetable from whose roots the Bororos make cord.
achígo, acchíggu... ...	*Ibid (corda mezzanetta)*...	cord of middle thickness.
buchígo, bucchíggu ...	*corda grossa*	bow-string.
boadíc,c,o, ma,rá,gua ciuccú,.	*tabacco, sigaro*	tobacco, cigar.
c,ebbèg	*rio, fiume*	river, large river.
tapíra bíri	*cuoio (di) bue*	ox-leather.
uãticugũio ... ... *aretiyacurú.*	*garza, grizia*	white "ardea."
mèríghi, meríri... ...	*catena di ferro*	iron chain.
bucchíggu	*gomena*	anchoring.
núgga	*no, non voglio*	no, I do not wish.
baichímo	*no*	no.
buẽnoguadáu	*tembeta di madre perla* ...	lip-ornament of mother-of-pearl.
bóra	*foro del labbro inferiore per il tembeta.*	The hole of the lower lip for insertion of lip-ornament.
meríri	*ferro, metallo*	iron, metal.
meríri-cúru	*bottiglio*	bottle.
cúru	*vino, canna, qualunque liquido bevibili ottenuto dallo spremere frutti.*	wine, a drink obtained from pressed-out fruit.
bódda	*amo da pesce*	fish-hook.
addúggo	*Jaguar*	Jaguar.
nobãia,re?	*come si chiàma questa cota?*	how do you call this (thing)?
noba?	*come? che dici?* ...	What? What did you say?
nobahìère?	*come ti chiàmi tu?* ...	What is your name?
mapã,?	*dove è? dove si trova?* ...	What is it? What have you found?

DESCRIPTION OF ILLUSTRATIONS.

FIG. 1, p. 395.—BAS AND LIP ORNAMENTS.

(*a*) Lip stick, with quill inlaying and feather covering.
(*b, c*) Bas with down covering.
(*d, e*) Bas unfinished, used for special occasions.
(*f, o*) Lip chains.
(*g, h*) Breast ornaments of lead in imitation of dasypus claws.
(*i*) Breast ornaments of canine of peccary.
(*j, k*) Lip sticks, ordinary kind, with quill inlaying and feather clusters.
(*l*) Lip stick consisting of bone and tin.
(*n*) Ear-pendant of feathers.

FIG. 2, p. 400.—BAD SPIRIT "BOPE."

Plate XXXVII.

(1, 2, 3) Dolls (feminine).
(4) Calabash doll representing man with feather crown.
(5) Breast ornament.
(6, 21) Male doll (newly born as shown by down covering).
(7) Doll with straw imitation of breast ornament.
(8) Breast ornament.
(9) Doll dressed for *Marido* dance.
(10, 11, 16, 17, 19, 20) Calabash dolls (newly born as shown by down covering).
(12) Breast ornament.
(13) Dagger made of sharpened ostrich bone.
(14) Breast ornament.
(15) Arm-band.
(18) Breast ornament.

Plate XXXVIII.

FIG. 1.

(*a, b, c, d, e, f*) Feather ornaments worn in hair.
(*g, h, i*) Lip borers.

FIG. 2.

(*a, b, c, d, e, f, g, i, l, m, n, o, p, q*) Various kinds of feather ornaments worn in hair.
(*h, j*) Feather ornaments worn behind the ear.
(*k*) Lip borer.

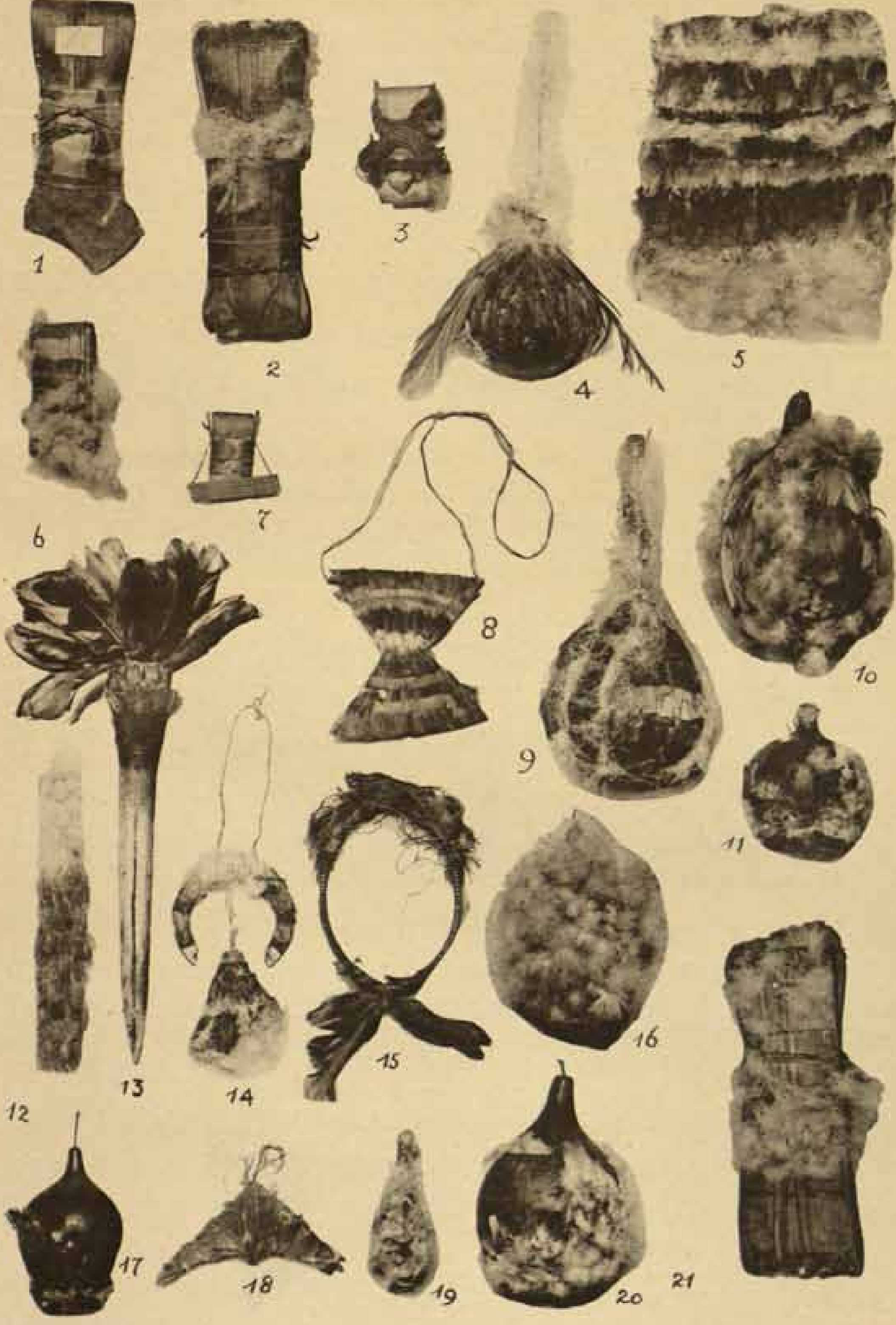
Plate XXXIX.

FIG. 1.

(*a, b, c, d, e, f, g, h, i, j, k, l, m*) Various kinds of ear-pendants.
(*n, o, p*) Breast ornaments made of dasypus claws.
(*q*) Breast ornament made of peccary teeth.

FIG. 2.

(*a, b, c, d, e*) Various feathers worn in hair during Fish Dance.
(*f*) *Pana*, a musical instrument.
(*g, h, i, j, l*) *Pariras* flutes.



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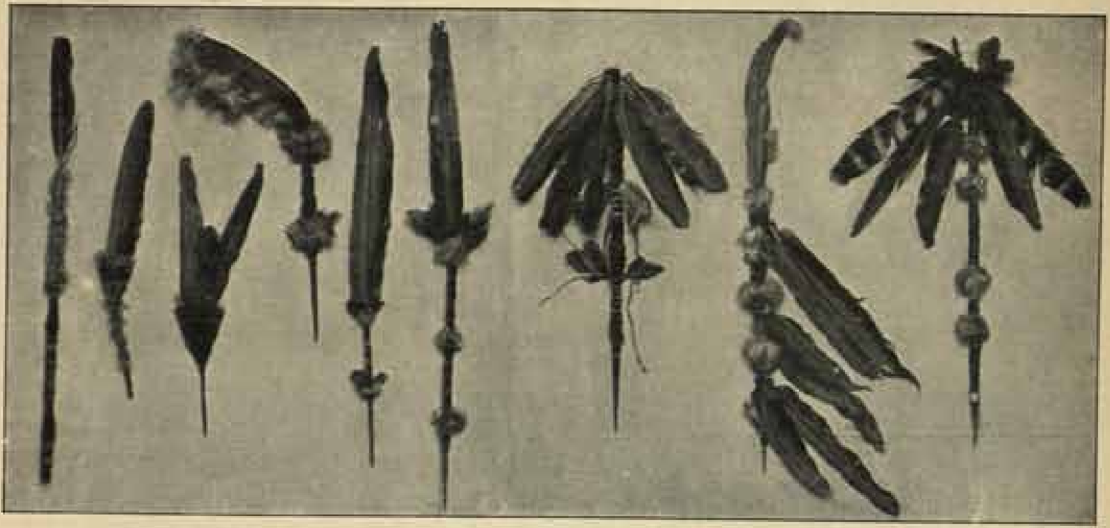
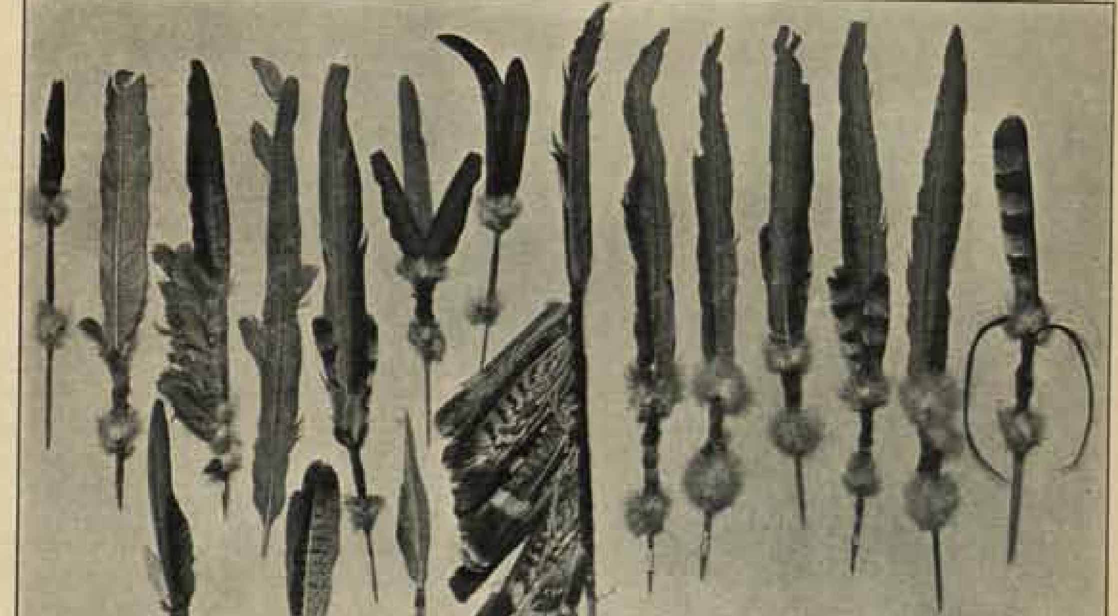


a b c d e f g h i

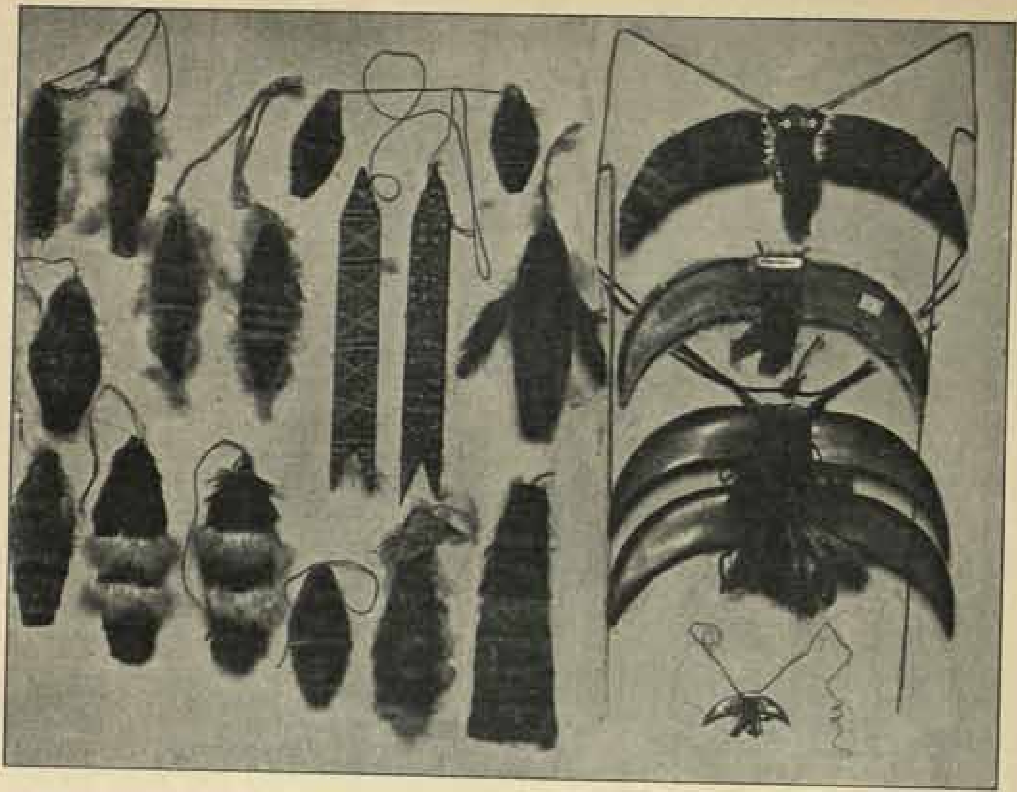
FEATHER ORNAMENTS AND LIP BORERS.



a b c d e f g h i j k l m n o p q

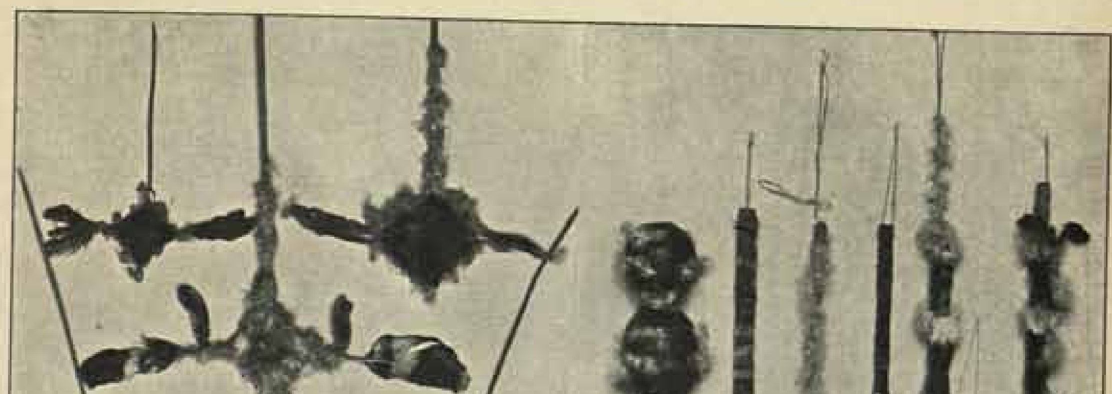
FEATHER ORNAMENTS WITH LIP BORER (*k*).

CONTRIBUTIONS TO THE STUDY OF THE BORORO INDIANS.



a b c d e f g h i k l m n o p q

FIG. 1.—EAR PENDANTS AND BREAST ORNAMENTS.



a b c d e f g h i j k l

FISH-DANCE ORNAMENTS. MUSICAL INSTRUMENTS.

FIG. 2.

CONTRIBUTIONS TO THE STUDY OF THE BORORO INDIANS.

MISCELLANEA.

PROCEEDINGS OF THE ANTHROPOLOGICAL INSTITUTE, 1906.

January 9th, 1906.

Prof. W. GOWLAND, President, in the chair.

The election was announced of Mr. E. A. PARKYN and Mr. H. L. TANGYE as Ordinary Fellows of the Institute.

Mr. R. H. PYE and Mr. F. W. RUDLER were appointed auditors of the accounts for 1905.

Mr. G. W. LAMPLUGH, F.R.S., read a paper illustrated by specimens and lantern slides on "The Occurrence of Stone Implements in the Zambesi Valley, near Victoria Falls" (p. 159).

The paper was discussed by Mr. BALFOUR, Mr. DALTON, Mr. HOLMES, Mr. WARREN, Mr. MACIVER and the PRESIDENT, and Mr. LAMPLUGH replied.

January 23rd, 1906.

Annual Meeting (see page 1).

February 13th, 1906.

Prof. W. GOWLAND, President, in the chair.

The election was announced of Mr. C. H. HARPER and Mr. A. W. OKE as Ordinary Fellows of the Institute.

The SECRETARY exhibited two clay images used by the Akikuyu in harvest ceremonies (*Man*, 1906, 1), and also a lantern slide showing four of the remarkable dance-armlets which are worn by dancers on that occasion (*Man*, 1906, 33).

Mr. A. L. LEWIS exhibited slides of Rude Stone Monuments with "Notes on some Rude Stone Monuments in Glamorganshire" (*Man*, 1907, 26).

The paper was discussed by Mr. ATKINSON, Mr. THOMAS, Mr. GRAY and the PRESIDENT, and Mr. LEWIS replied.

Mr. N. W. THOMAS read a paper on "Deluge Legends."

The paper was discussed by the PRESIDENT.

February 27th, 1906.

Prof. W. GOWLAND, President, in the chair.

The election was announced of Mr. R. C. BENINGTON, Col. H. W. FEILDEN, Mr. P. SCOTT-MONCRIEFF, Rev. H. A. SOAMES and Mr. CECIL WRAY as Ordinary Fellows of the Institute.

In the absence of the author a paper on "Ancestor Worship in Japan," by Mr. W. G. ASTON, was read by the President (*Man*, 1906, 23).

Mr. W. A. CUNNINGTON read some "Anthropological Notes on Lake Tanganika," illustrated by lantern slides.

The paper was discussed by Mr. BALFOUR, Lieut. BEHRENS, Dr. SELIGMANN Mr. LEWIS, Mr. DURAND, Mr. EBBS and the PRESIDENT, and Mr. CUNNINGTON replied.

March 13th, 1906.

Prof. W. GOWLAND, President, in the chair.

The election was announced of the Rev. A. T. BRYANT and Mr. R. H. DOUGLAS as Ordinary Fellows of the Institute.

Mr. WILLIAM DALE exhibited a large collection of palæolithic implements from the neighbourhood of Southampton, and illustrated his remarks with lantern slides.

The exhibition was discussed by Mr. RUDLER, Mr. GARRAWAY RICE and Mr. LEWIS and Mr. DALE replied.

Mr. R. SHELFORD read a paper by himself and Dr. C. HOSE entitled "Materials for the Study of Tatu in Borneo" (p. 60), illustrated by lantern slides.

The paper was discussed by Mr. LEWIS, Mr. VISICK, and the PRESIDENT.

April 24th, 1906.

Mr. F. W. RUDLER, ex-President, in the chair.

The election was announced of Mr. T. C. HODSON as an Ordinary Fellow of the Institute.

Mr. A. H. DUNNING read a paper on "Pottery making in New Guinea," illustrated by lantern slides and specimens.

The paper was discussed by Dr. SELIGMANN, Mr. LEWIS, Mr. DALTON, DR. MACIVER, Mr. PARTRIDGE and the PRESIDENT, and Mr. DUNNING replied.

May 8th, 1906.

Mr. H. BALFOUR, ex-President, in the chair.

The election was announced of Prof. O. JUETTERT, Mr. O. H. O. JOHARI, and Dr. LESLIE MACKENZIE as Ordinary Fellows of the Institute.

A number of phonograph cylinders, illustrating native songs from the Upper Lomami River, obtained and lent by Dr. J. L. TODD, were exhibited.

The exhibit was discussed by Dr. MYERS, Mr. DURAND, and the CHAIRMAN.

The SECRETARY read a paper by himself and Mr. E. TORDAY entitled "Notes on the Ethnography of the Ba-Mbala," illustrated with specimens.

The paper was discussed by Mr. DALTON and the CHAIRMAN.

May 22nd, 1906.

Prof. W. GOWLAND, President, in the chair.

The election was announced of Miss GERTRUDE FLETCHER as an Ordinary Fellow of the Institute.

The PRESIDENT welcomed as a guest Dr. EMIL GOLDMAN, lecturer at the University of Vienna, who was present.

Mr. T. C. HODSON showed a number of slides of stone monuments in India, and subsequently read a paper on "The Genna amongst the Tribes of Assam" (page 92).

The exhibit and paper were discussed by Dr. WESTERMARCK, Mr. BALFOUR, Mr. LEWIS, Captain O'BRIEN, Mr. THOMAS and the PRESIDENT, and Mr. HODSON replied.

The PRESIDENT announced the receipt as a present to the Institute of a series of type skulls from Prof. SERGI.

June 12th, 1906.

Prof. W. GOWLAND, President, in the chair.

The election was announced of Mr. JAMES BRIERLY, Mr. E. L. GIBLIN, Mr. M. W. HILTON-SIMPSON, Captain A. J. O'BRIEN, C.I.E., and Mr. A. P. YOUNG as Ordinary Fellows of the Institute.

Mr. W. SCORESBY ROUTLEDGE read a paper on "Two Years among the Akikuyu of British East Africa," illustrated by lantern slides.

The paper was discussed by Colonel BROUN, Miss WERNER, Dr. WRIGHT, Captain O'BRIEN, Dr. CAMPBELL, Mr. DURAND and the PRESIDENT, and Mr. ROUTLEDGE replied.

November 20th, 1906.

Prof. W. GOWLAND, President, in the chair.

The election of the following as Ordinary Fellows of the Institute was announced:—Major J. H. ANDERSON, Mrs. BLAND, Mr. D. I. BUSHNELL, Jr., Colonel G. E. CHURCH, Captain W. F. S. EDWARDS, D.S.O., Mr. E. W. ELKINGTON, Mr. J. HEWITT, Mr. W. L. HILDBURGH, Mr. F. W. HODGES, Mr. F. W. KNOCKER, Mr. A. MORISON, Mr. H. R. PALMER, Mr. J. PARKINSON, Mr. C. S. REDDIE and Mr. G. U. YULE.

Mr. W. CREWDSON read a paper entitled "A visit to the Hopi Indians at Oraibi," illustrated by lantern slides and exhibits.

The paper was discussed by Mr. HALL, Mr. DALTON, Mr. YOUNG, Mr. SALAMAN, Mr. TABOR, Mr. GOMME, Mr. DURAND, Mr. SMURTHWAITE, Dr. SELIGMANN and the PRESIDENT.

A paper by Mr. J. R. MORTIMER, "On the Relative Stature of the Men with Long Heads, Short Heads, and those with intermediate Heads in the Museum at Driffield," was read by Dr. WRIGHT, who opened the discussion. There also spoke Dr. SELIGMANN, Mr. SMURTHWAITE, Mr. GRAY and Mr. LEWIS.

December 4th, 1906.

Prof. W. GOWLAND, President, in the chair.

The election was announced of Mr. L. SPIERS, Mr. D. J. TATA and Mr. R. J. TATA as Ordinary Fellows of the Institute.

The Lord Bishop of Madras delivered a lecture on "Village Deities in Southern India," illustrated by lantern slides.

The paper was discussed by Dr. RIVERS, Mr. DALTON, Mr. BALFOUR, Mr. GOMME, Mr. LEWIS, Mr. YOUNG and the PRESIDENT.

December 18th, 1906.

Prof. W. GOWLAND, President, in the chair.

The election was announced of Mr. R. GRANT BROWN as an Ordinary Fellow of the Institute.

Mr. R. H. PYE and Mr. F. W. RUDLER were appointed auditors of the accounts for 1906.

The Rev. H. B. BARNES read a paper entitled "Notes on the Wa-Nyanja," illustrated by lantern slides and phonographic records.

The paper was discussed by Prof. STARR, Dr. HOWARD, Miss WERNER, Dr. FELKIN and Dr. STOEHR, and Mr. BARNES replied.

Addenda to Australian Canoes and Rafts. By N. W. THOMAS, M.A.

In my preliminary study on this subject (*Journ. Anthrop. Inst.*, vol. xxxv, p. 56 *sq.*) I sketched the main outlines of the types and distribution of Australian rafts and canoes. I give here a few additional facts which were overlooked or have since come to hand. There is no important change in the distribution there outlined; the canoe possibly extends further to the west in Northern Territory than is shown in my map, and I have ascertained an important fact bearing on the distribution of the dug-out in the eastern area. As regards the raft, my map merely showed the localities for which I had references. Its use is probably by no means uncommon in the Riverina district, on the coast of New South Wales and in North Central Queensland.

I did not point out, what is sufficiently obvious to those who have any acquaintance with Australian arts and crafts, that there is a close relation between the canoe and the water-vessel, which is either of bark or of hollowed wood. As Dr. Foy has suggested, the close relation between the two kinds of vessel is of importance for the solution of the question of aboriginal or extra-Australian origin of the bark canoe, and perhaps also of the southern dug-out.

There are numerous descriptions of the bark canoe in Victoria and New South Wales, of which I quote here one or two of the more important. Since my paper was written a canoe of this type with a spear paddle has been presented to the British Museum by Professor Gregory.

The aborigines make their *wakooies* (canoes) from the bark of the red gum tree ; bark of other trees, notably box, is also used, but merely for temporary purposes, as no other bark but the former will stand the weather without curling up and splitting.

When the bark for a canoe is cut, stretchers are immediately placed across it at intervals of 3 feet ; this is done to prevent the bark from curling whilst the sap is in it ; short props are also placed under the stem and stern to keep them from becoming too much depressed by reason of their own weight. If, at this stage, the canoe should not have the exact shape desired by the maker, he places heavy billets of wood inside at those parts which require pressing outwards, and the bark being full of sap the pressure effects the end aimed at. After this, and whilst the weights are still in the canoe and the props still in position outside, a coat of well puddled clay is plastered all over the interior, which effectually hinders sun-cracks ; in this condition the canoe is left in the sun to season. After ten or fifteen days' exposure the bark has become so hard that it is able to retain the shape ever after, no matter how roughly it may be handled.

After the lapse of two years or a little more the canoe becomes heavy and sodden, therefore correspondingly unwieldy, so the owner in his many rambles keeps his eyes about him with the view of discovering a suitable tree from which he can take a canoe wherewith to replace his now frail craft.

The stick for propelling (it can hardly be termed a paddle) is about 12 feet long, and 2 inches and a half in diameter ; it is round ; at one end it has three grains affixed, the centre one being half an inch shorter than the outer ones ; the latter have a barb each just above the points, the centre one is smooth ; the outer grains are made of wood hardened by fire, the centre one being of kangaroo bone ; the pole is made of pine ; the aboriginal name for the implement is *maroong*, that being the native name for pine tree. This instrument has a twofold use, that of propelling the canoe being one, and transfixing fish with the grains being the other.

When sailing over deep water both ends of the stick are used ; it is held by the middle at those times, and each end is dipped into the water alternately ; they are wonderfully expert in the management of their canoes, driving them along with amazing velocity, and a directness of bearing truly splendid.[1]

The method of removing bark for a canoe is shown by Blandowski's sketch.[2] An oval sheet of bark with pointed ends is outlined on the tree ; four men are removing it, using sticks three to six feet long. One of these has been passed diagonally under the sheet at a height of three or four feet ; one man on a branch and two on foot are applying leverage to the edges of the sheet, two on one side and one on the other, while the fourth

[1] **64**, pp. 63 *seq.* [2] **63**, Plates XXXIV, XXXVII.

is apparently holding the sheet in its place with his pole to prevent a sudden separation and consequent fall to the ground: the tree is red gum.

In the background is shown a canoe with six inmates and some dogs: they are standing and sitting alternately, and number five is poling. Another illustration shows fish spearers at work; two men are in a canoe and one has a torch in his left and spear in his right hand, while his companion is broiling fish on the fire in the canoe: in another canoe each man has a spear and torch; the canoes are apparently drifting with the stream. This attitude differs from that described by a later authority; at Bateman's Bay[1] the fisher sits on his haunches, his right leg under him, his left up to his shoulder; in his right hand is his wommera or spear thrower, which he uses as a paddle, in his left a small piece of wood for the same purpose; in front of him lies his fish spear. Apparently the spear is thrown, for the account goes on to state that he paddles up to the spear when the fish is hit and gives it a second thrust to make sure of the hold.

The women fish with hook and line and anchor their canoes to the so-called "yam-stick" with a cord or their arm.

Banks describes the canoe of Sting Ray Bay as of bark tied in plaits at the end and extended in the middle by small bows of wood; it carried one or two people and was poled in shallow water, paddled in deep with small paddles eighteen inches long.[2] Sinew was sometimes used to tie or sew the ends.[3]

The Narrinyeri made canoes of red gum bark. The sheets were laid on the ground and the sides and ends encouraged to curl up to the proper shape by being tied with cords strained from side to side and end to end, stones being placed in the bottom. The canoe soon got sodden and seldom lasted more than twelve months.[4]

The Bahkunjy used two kinds of canoes, the gum canoe (*koombahla booltaroo*) and the box canoe (*koorkooroo booltaroo*) according to a correspondent of E. M. Curr's; the names are those of trees from which they were made. The bark was somewhat bowed at each end and a lump of clay put to keep out the water; as a means of propulsion a pole (*werkka*) was used, which was pulled with long firm strokes. The sides were kept asunder with sticks (*yerkaka*) laid across abaft and forward of a third lump of clay (*koony-kahn-go*) which served as a fireplace; clay was also used for caulking.[5]

Worsnop mentions that the New South Wales canoe would carry five or six men across the strait to Montague Island, *i.e.*, about two miles.[6]

Flinders says that at North Island, Gulf of Carpentaria, the canoes were clinker built, with strips two feet broad.[7]

In Central Queensland the three-sheet bark canoe was made as follows: the bark was oval in shape and one sheet was put in a hollow in the ground, the ends resting on each side of the hole. A log was then placed as a weight on the centre and the ends pared down, so that they might give the more readily. To pierce the holes an awl was used, and fibre from a ficus root served as thread. The seams were caulked with a roll of paper tree bark and two saplings served as strengthening poles. The name of the canoe was *okka*; the paper in which the information occurs deals with the Ucumble, but there is also information as to Port Curtis, but as Curr gives no word for canoe from that place it is impossible to say whether Central Queensland means Port Curtis, as might well be the case; a neighbouring tribe has *kooga* as the term for canoe, which seems nearly related to *okka*.[8]

[1] 75, I, 31.
[2] 62, p. 320.
[3] 65, p. 224.
[4] 69, p. 41.
[5] Curr, II, 200.
[6] 70, p. 122.
[7] *Voyage*, II, 172.
[8] 76, XXIII, 40.

The use of wax for caulking canoes is mentioned by Favenc,[1] and he probably refers to the sewn-bark type. The spatulate end of the wommera in use at Port Stephens was used as a paddle.

Foelsche describes the canoes of Northern Territory as follows: Canoes are made of bark of similar size as in South Australia, but the ends, instead of being bent up, are cut slanting and neatly sewn together with fine strips of bamboo, giving them a sharp stem and stern. The gunwales are made of bamboo, thereby being nicely shaped. They are propelled through the water by small hand paddles at great speed. The Port Essington natives have acquired the knowledge of cutting canoes out of a solid tree from the Malays visiting that part of the coast every year, from whom they also obtain the necessary tools for the purpose. Weapons and canoes form the only real property the natives possess, but they do not accumulate them.[2]

In the Gulf of Carpentaria, west side, the Malay dug-out is found (Walker R., Bluemud Bay) as well as the bark canoe (Macarthur R.); the latter is some twelve feet long.[3] Willshire mentions a canoe (?) on a lagoon near the Victoria R. between the Gregory and the Gordon, but possibly the term is vaguely used and we should understand it to mean raft.[4]

Since I wrote my paper I have learnt from my friend, Mr. Norman Hardy, that on the coast of New South Wales, near Richmond, dug-out canoes are used which are not more than four feet in length. It does not appear whether these are identical with those of the Blue Mountains. Banks gives an account of the Endeavour R. canoes; they were ten to eleven feet long and very narrow; the paddles are two-handed. Small paddles were also used with what may have been bark canoes.[5]

Somewhere to the north of Moreton Bay a tribe used human heads as figure-heads for their canoes.[6] This recalls the fish figurehead mentioned by Bligh.

The following addenda to the bibliography include the works cited above, and one or two others which contain some information; it does not profess to be complete; some forty references are omitted as containing nothing of interest.

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[1] 74, II, 316. [2] 71, V, 12. [3] 72, II, 61.
[4] 68, p. 118. [5] 62, *loc. cit.* [6] 66, p. 309.

INDEX.

NOTE.—*The Numbers in ordinary type refer to the papers; the numbers in Clarendon type are the reference numbers of* MAN, 1906; *where necessary the page references to* MAN *are added in brackets. For collected references see especially Africa, America, Archæology, Asia, Australia, Craniology, Egypt, Europe, Folklore, Magic, Oceania, Physical Anthropology, Religion, Sociology, Technology.*

A.

B.

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C.

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