ADVENTURES
WITH THE MISSING LINK
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By

RAYMOND A. DART

WITH

DENNIS CRAIG

Illustrated

HAMISH HAMILTON
LONDON
TO THE MANY WHO MADE THIS
BOOK POSSIBLE, ESPECIALLY MARJORIE
Acknowledgements

A story spanning half a century is bound to omit mention of innumerable individuals to whom the author has been deeply indebted and to fail in acknowledging adequately those obligations to which reference happens to be made in the text. I therefore seize this opportunity at the outset to thank all who have assisted me from infancy to retirement in the doing of things.

Many are no longer alive, like my old chiefs, Professor J. T. Wilson and Sir Grafton Elliot Smith, as well as Miss Josephine Salmons, Mr. A. F. Campbell, the general manager of the Northern Lime Company, and Mr. A. E. Spiers, the then manager of the Buxton limeworks at Taungs. To Mrs. M. J. Bonamour (née Hamilton) of Durban and the present tenant of her farm Makapansgat, Mr. Gordon R. Peppercorn, all those who have enjoyed the liberty of working there and the hospitalities they have extended over nearly two decades are most profoundly grateful.

During the 36 years of my professorship in the chair of anatomy at the University of the Witwatersrand a continuous stream of colleagues, laboratory assistants and students facilitated my labours and participated in these activities. I am fully cognizant that without this constant assistance these enterprises would have been beyond my powers.

This book, too, is a collaboration not merely of those whose names appear on the outside cover but of many others, particularly my wife, Marjorie, without whose patient typing and correction of manuscript errors we would have been helpless. The early drafts were prepared by Mrs. B. E. Wilson. Behind our illustrations lies the enormous task of sorting and developing the breccia, finding the bones to which the fragments belonged, and describing the fossil creatures. I am indebted to Miss Marjorie George (now Mrs. Greenwood) and Mrs. Hertha Erikson for much of the sorting. I must also express my appreciation for drawings, from those of Dr. le Hellocq in 1925 and of J. F. Heim between 1947 and 1950 to those of Miss
Camilla Wybrants, whose illustrations enhanced the memoir on the Osteodontokeratic Culture in 1957.

In 1925 Mrs. Benson (née J. C. MacAdam) was responsible with my assistance for the Taungs reconstruction. In 1948 B. J. Grobbelaar helped me and Dr. Ismond Rosen to give our groundwork of *A. prometheus* vitality. The following year J. F. Heim prepared the australopithecine family group, shown here, facing page 113, in full, side and semi-profile views. These, along with Dr. A. S. Brink's skull outlines and William Papas's spirited visualizations of australopithecine daily life based on our recent bone-breccia analyses should enable the least-informed reader to catch glimpses of proto-human life in Southern Africa about a million years ago. It has only been possible to reproduce the original pictures of the Taungs skull between pages 48–49 because the late Dr. Robert Broom took the precaution of securing copies from the Johannesburg *Star* for his joint monograph with Dr. G. W. H. Schepers and because the copper plates preserved by the Director of the Transvaal Museum, Pretoria, Dr. F. V. Fitzsimons, have been generously placed at my disposal for this book. The original 1924 negatives have been destroyed.

Mr. Charles P. Channon took the photograph at the top of the page facing page 48 on November 16, 1950, which—as I subsequently discovered from my son's scrapbooks—appeared in the *Illustrated London News* on December 2, 1950, with the following legend:

An historic gathering of four world-famous archaeologists, all of them contributors to *The Illustrated London News*, in Pretoria: (L to R.) Professor Raymond Dart, Dr. Robert Broom, the Abbé Breuil, Professor C. van Riet Lowe.

These four famous archaeologists had gathered at the Transvaal Museum, Pretoria, to act in a short film entitled 'South Africa as the Cradle of Mankind'. Professor Dart was the discoverer (in 1924) of the Taungs skull; Dr. Broom is best known to our readers for his discoveries of various ape-man skulls in the Transvaal; the Abbé Breuil is the doyen of archaeologists and is especially associated with the cave art of France; and Professor van Riet Lowe is the Director of the Archaeological Survey of the Union of South Africa.

Mr. J. P. Vorster took the three photographs (now reproduced between pages 48–49, 80–81 and 112–113), which em-
bellished the article in Afrikaans by M. M. Sadie on 'Mrs. South Africa: 800,000 years B.C.' in Die Brandwag, Johannesburg, on November 6, 1953.

I am indebted to Alun R. Hughes, the last of my chief laboratory assistants in the Department of Anatomy, for no less than twenty of the photographs. He also prepared the line drawings on page 11 (after Le Hulloco, 1925); 15 (after Finch and Trewartha's Elements of Geography, 1936, and H. L. Shantz and C. F. Marbut's The Vegetation and Soils of Africa, 1923); 98 (after Dr. C. K. Brain, 1957); 95 (after Dr. C. K. Brain, 1955, and W. I. Eitzman, 1958); and 164 (after C. van Riet Lowe, 1955, and Revil J. Mason, 1958), as well as the chart showing 'Primate Events in the Perspective of Time'. Of the remaining photographs, I am obliged to: the Star, Johannesburg, for three; to her daughter for the snapshot of Josephine Salmons; to Professor P. V. Tobias and Mr. Sidney Dry, Mrs. G. Chaplin, Dr. Paul Keen, G. Walters, Dr. G. S. Chenik, to Dr. Donald F. Thomson and the Journal of the Royal Anthropological Institute for the middle picture facing page 161, and to Dr. A. D. Bensusan and Mr. A. M. Shevitz for the illustrations from Kalkbank (160–161 and 208–209).

The front end-paper and the line drawings for pages 232–233 were all prepared by Dr. A. S. Brink of the Bernard Price Institute for Paleontological Research; Dr. H. B. S. Cooke, Reader in Stratigraphical Geology, kindly presented me with his original drawings for pages 98 and 99. Miss E. J. Walker prepared the groups of skulls (pages 112–113) after J. F. Heim, 1948 and Miss Camilla Wybrants, 1957. The original of the drawing on page 183 was drawn by Miss V. de Wet under the personal supervision of Dr. Revil J. Mason. The reconstructions of Cro-Magnon and Neanderthal Man used for comparison are the celebrated one made by my friend the late Professor J. H. McGregor of Columbia University.

To all of these and those from whose works I have extracted information and made quotations I extend my grateful thanks.

The tally of gratitude is still incomplete; this book's origins remind me of the house that Jack built. Robert Ardrey, author of Thunder Rock, Shadow of Heroes, etc., started it. He came to Johannesburg in 1955 just when I had completed the statistical analysis of the 7159 bone fragments from the Makapansgat man-
ape site for the Third Pan-African Congress on Prehistory at Livingstone. The result of his visit was ‘A Slight (Archaic) Case of Murder’ in The Reporter (May, 1955).

Stimulated by Ardrey’s article, Paul H. Oehser, chief of the Editorial and Publications Division of the Smithsonian Institution, requested a survey of the previous decade’s activities at Makapansgat, which appeared in the 1955 Report as ‘Cultural Status of the South African Man-Apes’.

The Smithsonian press release in 1956 on that article prompted a cable from my American publishers suggesting this book. But it would probably have remained stillborn had the American Association of Physical Anthropologists not nominated me in 1957 to receive the Viking Medal and Award. The Wenner Gren Foundation’s generosity enabled my wife and me to enjoy the hospitality and editorial advice of Messrs. Evan Thomas and M. S. Wyeth, Jr., in New York. By that time the necessity for collaboration in sifting the scientific chaff from this brain-child in order to present it became manifest. Then for ourselves the already rich experience in friendships brought about by this unexpectedly widened interest in my personal adventures became expanded by fruitful and delightful fellowship with Dennis Craig.

Raymond A. Dart
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Dear Professor Dart,

It was in 1929 that I first met you and your Taungs baby, Australopithecus, in your laboratory. Then you alone had the clarity of vision to diagnose it as an anthropoid form closer to mankind than any primate hitherto known.

Later discoveries at Sterkfontein, Kromdraai and Swartkrans by Dr. Broom brought you complete justification and amazingly amplified the genius of your original insight into the Taungs baby.

To these discoveries you have added those at Makapansgat, where I was taken by the late van Riet Lowe shortly after my arrival in South Africa. He showed me the layers that had been uncovered and already partly destroyed—as at Sterkfontein—by the workings in the stalagmitic formations of that ancient shelter at the threshold of the Pleistocene Age, and the astonishing heaps of bones accumulated by the anthropoids and their human successors.

At Makapansgat I saw the imposing succession of layers ranging in time from the age of Australopithecus to those of the Old and Middle Stone Ages. One could establish there the evolution of the one into the other, and not only the birth of human types but the development of their implements from the earliest, faltering beginnings. Your excavations have already established the presence of a Pebble Culture, appearing a little before the flowering of the most ancient, classical Old Stone Age. Discoveries at Sterkfontein and Kromdraai have confirmed it since then.

Inspired, as you yourself have confessed, by my investigations into the bone and antler industry of Sinanthropus at Choukoutien (China), you have laboured to establish that Australopithecus was capable of an osteodontokeratic industry, employing in an only slightly altered state horns, jaws and bones.

You have shown clearly that hyenas and porcupines have nothing to do with the accumulation of these remains and the alterations they have suffered. The detailed examination I made in your laboratory in 1951 confirmed this. The patient analysis and cataloguing of bone tools and fragments, which resulted in impressive percentages that prove bone selection by Australopithecus, cannot be discarded. Australopithecus certainly used bones, he chose the bone that suited him for carrying out a task, and neither the alterations in the bones nor the fantastic accumulation of debris can be explained as the work of eaters of carrion or gnawers of fresh bones.

If uncertainty still lingers in this matter it is to be ascribed to the fact that, before the rising of the industrial sun, there was a morning
twilight when the shapes of things were still but vaguely outlined in the subdued light that was soon to burst forth. The dawn of tool-
using, the first indication of a doubtfully human activity, and the
dawn of that further capacity of tool-creating slowly emerged and cer-
tainly took place among these prehuman creatures. But their vision was
still doubtless insufficient to reach beyond immediate needs. Yet birds
build their nests; and beavers, with their dams and lodgings built above
the water, show that certain mammals (not to mention insects) have
been capable of creating physical structures of a manufactured type.

Intelligence applied to practical ends might well have begun as early
as the australopithecines. Whether or not they were the direct ancestors
of Man, or his near relatives, is another matter upon which further
fossil discoveries will unquestionably throw added light in the near
future. It is a great and immense discovery that you and Dr. Broom
have extracted from your South African cases. It is one of the greatest
conquests of the human mind in this century. I am proud to have
witnessed it and to have been, however modestly, associated with it.

Another aspect of your work contributed towards bringing together
our views concerning the most recent pre-history of southern Africa.
You were the first, through studying the rock paintings of the
Transkei, to point out with great detail that the clothes of the people
depicted in them had nothing to do with purely indigenous South
African elements, and that your fellow-countrymen had been making
a big mistake by attributing to them a brief antiquity of two hundred
to three hundred years, hardly contemporaneous with, or even subse-
quent to, the Bantu immigration. You were the first to insist that
the influence of foreigners coming by way of the Indian Ocean and the
monsoons along the whole eastern coast had extended over many
millennia before Arab navigators.

My extensive journeys in southern Africa from Salisbury to Cape
Town and from south-west Africa to Port Elizabeth, covering
several years of intensive study, satisfied me that this magnificent
engraved and painted art, scarcely less ancient than our terminal
Paleolithic in Europe, had extended not merely over a few centuries
but over a very long period beginning in the Middle Stone Age and
reaching down to the European and Bantu occupation. While you
were able to push back the age of one portion of these frescoes to several
millennia, I strove by means of other evidences to suggest an even
longer perspective. Here again, in the process of freeing topics from
popular prejudice, it was my good fortune to support your efforts.

You, like myself, have been the herald of perspectives to which the
future only gives its assent step by step.

Your very grateful and understanding colleague,

Henri Breuil, l'Institut de France
Hon. D.Sc. (Cape Town)
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CHAPTER ONE

A Mystery in Limestone

As soon as I entered the dissection hall and looked at my class of students I could see that my only woman science pupil, Josephine Salmons, who was assisting me as a demonstrator, was in a state of excitement. Her normally pale face was flushed and when I caught her looking at me appealingly before taking my seat, I asked her, ‘Did you wish to speak to me, Miss Salmons?’

She gulped nervously with every man’s eyes in the room on her and said, ‘Oh, Professor, could I see you sometime today? I came across something last night that I’m sure will interest you.’

I asked her to see me during the break and got on with the business of dissecting.

It was the early summer of 1924 and I was in my second year as professor of anatomy at the medical school in the University of the Witwatersrand in Johannesburg. Since my appointment I had taken a particular interest in anthropology, a subject in which Josephine had become my most enthusiastic pupil. Before the July vacation I had encouraged my students to collect fossils during the holidays, impressing upon them that to be able to study anatomy properly, the school must have an anatomy museum composed of bones and other parts of any and every animal. I offered a prize of £5 to the student who collected the most interesting finds on the veld during the holidays.

There was no more vigorous collector than Josephine and I well remember her disappointment when she was
beaten to the prize by a student who had brought along a
crocodile stuffed with straw, an ox and some interesting
stones and bones from a cave. This disappointment had not,
I knew, soured her enthusiasm so that I was fairly sure her
excitement concerned some bone or fossil most probably of
no importance.

However, when we had tea together during break I soon
realized that she might have stumbled across an interesting
find. The previous night she had visited a family friend,
Mr. E. G. Izod, a director of the Northern Lime Company,
and had noticed a fossil skull on the mantel above the fire-
place. It had come from the Company’s mine at Taungs in
the Bechuanaland Protectorate.

She hesitated before expressing an opinion about the
fossil but when I pressed her she said, ‘Well, don’t laugh
at me if I prove wrong, but I’m pretty certain it’s a
baboon fossil.’

I was equally certain she must be mistaken.

‘I don’t wish to dampen your enthusiasm,’ I told her,
‘but other than Rhodesian Man and Boskop Man not a
single fossil of any of the primates—the order to which
man and all apes, monkeys and baboons belong—has ever
been reported south of the Fayüm deposit in Egypt. But
I’d very much like to see this skull and examine it. If it is a
baboon’s, it will be of rare interest.’

(My supposition was wrong. I learned later that year
that fossil baboons from Taungs had been sent to the South
African Museum at Cape Town and had been described by
Dr. S. H. Haughton in a paper before the Royal Society of
South Africa on May 19, 1920. It had not been published.
In addition baboons had been found by Hans Reck in 1914
at Oldaway Gorge in Tanganyika and an ape on the shores
of Lake Victoria.)

Josephine said she was sure Mr. Izod would let me keep
the fossil, adding quite casually the astonishing information
that fossil skulls and bones were often turning up at the
mine.
The following morning she brought the fossil to me and, to my surprise, it was the skull of a baboon that had been embedded in limestone rock. A baffling feature was a hole in the front part of the roof of the skull, as if it had been struck by a sharp instrument, but I noted this only briefly. Here, I thought, was a new and primitive species of baboon.

Within a few minutes I was careering down the hill in my model-T Ford to discuss the skull and Taungs with my friend and colleague, Dr. R. B. Young, a veteran Scottish geologist. Young not only knew the limestone works at Taungs from which the skull had been recovered, but had been commissioned by the owners of it to visit a neighbouring lime deposit at Thoming. He promised to call on the manager, Mr. A. E. Spiers, and ask his co-operation in sending any further bone-bearing rocks to me.

On his return Young told me that at Taungs he had met an old miner, Mr. M. de Bruyn, who for many years had taken a keen interest in preserving fossils. Only the previous week he had brought quite a number of stone blocks containing bone fragments to Mr. Spiers' office. Young mentioned my interest to Mr. Spiers, who gave instructions for them to be boxed and railed to me.

I waited anxiously for their arrival, reasoning that if fossilized baboon skulls were such a common feature at Taungs many other more interesting specimens might be found there. Of course, the packages turned up at the most inopportune time.

I was standing by the window of my dressing-room cursing softly while struggling into an unaccustomed stiff-winged collar when I noticed two men wearing the uniform of the South African Railways staggering along the driveway of our home in Johannesburg with two large wooden boxes.

My wife Dora, who was also donning her most formal outfit, had noticed the men with the boxes and rushed in to me in something of a panic.
'I suppose those are the fossils you've been expecting,' she said. 'Why on earth did they have to arrive today of all days?'

She fixed me with a businesslike eye. 'Now, Raymond,' she pleaded, 'the guests will start arriving shortly and you can't go delving in all that rubble until the wedding's over and everybody has left. I know how important the fossils are to you, but please leave them until tomorrow.'

Looking back on that summer afternoon of 1924, I can sympathize with her point of view. Our great South African friend, Christo Beyers, past international footballer and now senior lecturer in applied anatomy and operative surgery at the University of the Witwatersrand —was being married in our home to a French widow he had met when studying in London at St. Bartholomew's Hospital. My wife had made the most elaborate arrangements possible for the reception in the tiny gold-mining town of Johannesburg and had gone to special pains to ensure that my London-cut morning clothes were extracted from brown paper and mothballs and that in general my normally casual appearance would be smartened up so as not to disgrace my rôle as best man.

At the time, however, this seemed of little importance when I considered the exciting anthropological bits and pieces that the boxes from Taungs might contain. As soon as my wife had left to complete her dressing, I tore the hated collar off and dashed out to take delivery of the boxes which were by now obstructing the entrance to the stoep.

I was too excited to wait until my African servants carried them to the garage, and ordered them to leave the crates under the pergola while I went in search of some tools to open them.

(Later on that momentous day, my wife told me that she had twice remonstrated with me but had been ignored. I had no recollection of any interruption.)

I wrenched the lid off the first box and my reaction was one of extreme disappointment. In the rocks I could make
out traces of fossilized eggshells and turtle shells and a few fragmentary pieces of isolated bone, none of which looked to be of much interest.

Impatiently I wrestled with the lid of the second box, still hopeful but half expecting it to be a replica of its mate. At most I anticipated baboon skulls, little guessing that from this crate was to emerge a face which would look out on the world after an age-long sleep of nearly a million years.

As soon as I had removed the lid a thrill of excitement shot through me. On the very top of the rock heap was what was undoubtedly an endocranial cast or mould of the interior of the skull. Had it been only the fossilized brain cast of any species of ape it would have ranked as a great discovery, for such a thing had never before been reported.

But I knew at a glance that what lay in my hands was no ordinary anthropoidal brain. Here in lime-consolidated sand was the replica of a brain three times as large as that of a baboon and considerably bigger than that of any adult chimpanzee. The startling image of the convolutions and furrows of the brain and the blood vessels of the skull was plainly visible.

It was not big enough for primitive man, but even for an ape it was a big bulging brain and, most important, the forebrain was so big and had grown so far backwards that it completely covered the hindbrain.

Was there, anywhere among this pile of rocks, a face to fit the brain? I ransacked feverishly through the boxes. My search was rewarded, for I found a large stone with a depression into which the cast fitted perfectly. There was faintly visible in the stone the outline of a broken part of the skull and even the back of the lower jaw and a tooth socket which showed that the face might still be somewhere there in the block.

I must emphasize here the particular reason for my excitement. The most impressive feature of this endocast, or brain cast, as they are sometimes loosely called, was the
marked distance separating the two well-defined and unmistakable furrows at the back of its outer surface.

These two furrows, called the lunate (or moon-shaped) and parallel sulci, are found in the brains of apes and often of men—especially primitive men. My old professor in University College, London, Grafton Elliot Smith, had been the first to find the lunate sulcus in human brains and thus make these landmarks famous.

In some human brains, however, the brain substance in the territory between these two furrows expands so much that the lunate sulcus becomes greatly separated from the parallel sulcus and, especially in very advanced brains, is pushed back so far that it entirely disappears from the outer aspect of the brain.

In the Taungs cast, so much of this expansion had occurred between the lunate and parallel sulci that they were separated by a distance three times as great as in any existing endocast of a living ape’s skull, whether chimpanzee or gorilla. So even had I found no trace of the face in the rock, or if it had proved to be defective, I would still have known instantly that the creature whose skull could give a cast of this sort must have been at least three times as intelligent as any living ape.

I stood in the shade holding the brain as greedily as any miser hugs his gold, my mind racing ahead. Here, I was certain, was one of the most significant finds ever made in the history of anthropology.

Darwin’s largely discredited theory that man’s early progenitors probably lived in Africa came back to me. Was I to be the instrument by which his ‘missing link’ was found?

These pleasant daydreams were interrupted by the bridegroom himself tugging at my sleeve.

‘My God, Ray,’ he said, striving to keep the nervous urgency out of his voice. ‘You’ve got to finish dressing immediately—or I’ll have to find another best man. The bridal car should be here any moment.’

Reluctantly, I replaced the rocks in the boxes, but I
carried the endocranial cast and the stone from which it had come along with me and locked them away in my wardrobe.

I could scarcely wait for the ceremony to cease and the guests to leave so that I could re-examine my treasures. When the last couple were walking down the drive to their car I was back in the bedroom tearing off my collar and tie and reaching in the wardrobe.

A long and careful study of the cast confirmed the conclusions I had reached earlier in the day. What could an anthropoid ape with a brain bigger than that of a chimpanzee and rivalling that of a gorilla be doing down here in South Africa away from the tropical forests and jungles, out in the open, grass-covered plains and undulating, treeless prairie lands of the Transvaal?

Only recently, Dr. A. W. Rogers, head of the Geological Survey in South Africa, had pointed out in a paper that there was no evidence to show that climatic conditions in South Africa had varied appreciably since the Cretaceous period, 70 million years ago.

In the Transvaal there was no food for apes unless they lived, like baboons, on insects and scorpions, lizards and birds' eggs, berries and grubs. There were no natural storehouses of nuts and acorns here such as the squirrels of Europe might collect; they could not wrest bulbs from this tough African turf during our rainless, fruitless winters without some type of digging tools.

As I pondered the mystery of how the big-brained creature could have survived in the Transvaal without an anthropoid's natural foods my mind flashed back to Miss Salmons's baboon skull which had come from the same mine. I remembered the neat round hole on top on the right side.

Was it possible that the opening had been made by another creature to extract its brain for food? Did this ape with the big brain catch and eat baboons? If so it must have been very clever to catch them and kill them; and very courageous too.

However, there were more immediate problems to be
faced with my new find, the most important of which was how to expose the face if there were one embedded in the matrix. Although I had no experience in doing this, there was nobody to whom I could turn. I had no proper equipment and had to be satisfied with a hammer and chisels bought from a local ironmonger’s.

The shocks of the small hammer were absorbed by the smallest of the chisels, the rock being supported in sand and buttressed by sand-filled tobacco bags. When I had exposed enough of the skull to get an idea of its general position I found that my most useful ally was one of my wife’s knitting-needles.

I sharpened it pyramidally like a trocar and, working during every spare moment for the next two months, pecked, scraped and levered the lime-consolidated earth from the front of the skull and eye-sockets. No trace appeared, however, of eyebrow ridges such as one finds in living apes, even in young ones. The upper and lower jaws, instead of jutting far forward, were shortened and retracted under the skull.

My excitement grew as the outer sides of the jaws were exposed and I became more convinced that the whole face would be there. I lay awake at nights in a fever of thoughts about cave-dwelling apes and impatient for dawn to break. On my visits to town I searched the ill-stocked bookshops for literature as, during those early days of the University of the Witwatersrand, there was not even a university library, let alone a medical or an anatomical library. Beyond the books and casts which I had brought out with me from England nearly two years earlier, I had no references whatsoever.

When I visited Cape Town in November to mark examination papers, I met for the first time Dr. S. H. Haughton. I then learned of his preliminary paper concerning the baboons from Taungs. These were at the South African Museum in Cape Town and were generously placed at my disposal for examination.
The principal primate types and their succession in time
The first thing I noticed was that all these skulls too seemed to have been broken before fossilization in much the same way as the skull brought to me by Miss Salmons. What could this mean? Had the big-brained creature from Taungs been carnivorous and deliberately killed the baboons, or were the latter the victims of a series of rock-falls? The first view was too revolutionary even to whisper it to anyone else; the second seemed too improbable a series of coincidences to conjecture.

I was soon back in Johannesburg working away with my hammer, chisels and knitting-needle, in constant fear that the slightest slip of the chisel would shatter the relic within. No diamond cutter ever worked more lovingly or with such care on a priceless jewel—nor, I am sure, with such inadequate tools.

But on the seventy-third day, December 23, the rock parted.

I could view the face from the front, although the right side was still embedded. The creature which had contained this massive brain was no giant anthropoid such as a gorilla. What emerged was a baby’s face, an infant with a full set of milk (or deciduous) teeth and its first permanent molars just in the process of erupting.

I doubt if there was any parent prouder of his offspring than I was of my ‘Taungs baby’ on that Christmas of 1924.
CHAPTER TWO

*Ape-Man or Man-Ape?*

For many years after the news of my find was presented to the world, I was to be accused of being too hasty in arriving at the definite conclusions I formed after studying the skull, teeth and endocranial cast for a matter of only four months.

This I refuse to acknowledge to this day, for although at that time it was considered correct to ponder fossils like these in secret for as long as ten years and to release the facts only after a conclave of senior scientists in the British Museum and other international institutions had pronounced judgement, I believed my conclusions about the brain to be irrefutable. I felt justified in that confidence, too, when my old professor and chief, Sir Grafton Elliot Smith, then Britain’s leading comparative neurologist, wrote in the *Illustrated London News* on February 14, 1925:

‘It was a happy circumstance that such a specimen fell into his [Professor Dart’s] hands, because he is one of, at the most, three or four men in the world who have had experience of investigating such material and appreciating its real meaning.’

I had studied endocranial casts under his guidance for four years in London and America and my basic scientific interest for the previous four years had been the evolution of the brain and nervous systems.

Therefore when I saw the basic differences between the Taungs brain and those of living anthropoids, I knew that at least I had a most advanced type of ape. Although only
a child, its skull capacity was 520 c.c. and thus bigger than the 320–480 c.c. of all known adult chimpanzees. Yet, as it was still below the gorilla’s (340–685 c.c.) it could scarcely be termed overgrown.

Profile of Taungs skull and cast of its interior to show the expanded area between the lunate and parallel sulci concerned chiefly with appreciating the appearance, sound and feel of things handled. [After H. Le Hulloco.]

But it was the brain’s form that was impressive, for the brains of the living apes, like their skulls, are low and broad, and the forebrain has not expanded enough relatively to the hindbrain or cerebellum—the organ of equilibration—to cover it completely.

The Taungs cast had inhabited a skull that was narrow and high. Its impressive feature was quality and not quantity,
with its globular form and forebrain completely covering the hindbrain.

Even more conclusive, however, were the physiognomy and dental formation. Fortunately, I had brought to South Africa from London a copy of Dr. H. L. Duckworth’s *Morphology and Anthropology* (1915) which (Fig. 147) carried drawings of an infant gorilla and an infant chimpanzee similar in age to the infant from Taungs.

![The skulls of Australopithecus and a chimpanzee of the same age seen from above to show the differences in their cranial and facial parts.](image)

I have little facility in drawing but one of my student demonstrators, Mr. (now Dr.) Henri Le Hellocq, made an excellent copy of the Taungs skull, similar in scale to those in Duckworth’s book. When the drawings were completed, I compared them with Duckworth’s baby gorilla and chimpanzee and found that the Taungs child differed from both even more than the gorilla and chimpanzee differed from each other.

Even at this early age gorilla and chimpanzee skulls slope back from their eye-sockets which have pronounced
and overhanging beetling eyebrows. The Taungs child had no trace of eyebrow ridges, but a true forehead arched directly upwards from the inward-sloping eye-sockets. The markedly shortened face, instead of protruding like an anthropoid's, receded. This contrasted with the massive upper and lower jaws of the gorilla and chimpanzee which clothe formidable rows of molar teeth and large canine fangs.

As Darwin, following Rütimeyer and others, insisted, it is the effect of the jaw muscles on the skull that causes anthropoids to differ so greatly from man, especially the males, 'who have a truly frightful physiognomy'. Even gorilla and chimpanzee infants have obvious fangs in both jaws while behind these, especially in the lower jaws, lie sharp-cutting, infant molars.

In this young creature from Taungs the canine teeth—as in human beings—were quite small, and the teeth behind them seemed to be grinders, not cutters. Consequently its physiognomy could not be called 'frightful'.

As my investigations continued I grew prouder of my 'baby'. Here was a creature which, in the exasperating fashion of children throughout the ages, was daring to vie with Man. Its forehead, facial form and dental equipment were startlingly similar while its brain was decidedly bigger than an adult chimpanzee's but not as large as an adult gorilla's.

This similarity was unexpected, and contrary to the assumption of all the authorities. Even Darwin had in mind ancestors that were long in the tooth when he wrote:

The early male forefathers of man were probably furnished with great canine teeth; but as they gradually acquired the habit of using stones, clubs or other weapons for fighting their enemies or rivals, they would use their jaws less and less. In this case the jaws, together with the teeth, would become reduced in size.

I was also convinced from the earliest period of my investigations that these creatures had placed great
reliance on their feet for walking and running and that, consequently, their hands must have been freed for other tasks. This was implicit in the globular form of the skull which was obviously balanced on a more vertically placed type of backbone than that of a gorilla or chimpanzee. The improvement in the poise of the head implied a better posture of the whole body framework it had surmounted, as there must have been a relative forward displacement of the foramen magnum (the hole in the base of the skull which links the brain with the spinal cord).

It was to be many years before my belief in its upright posture was to receive any support from all but a handful of scientists throughout the world and I could never have dreamed in even my most pessimistic moods what doubts—and in some cases scorn—would be heaped upon my conclusions.

The most revolutionary aspect of my find was the semi-desert place from which the skull had come, the Harts Valley in Bechuanaland. The Taungs child was separated by 2000 miles of territory, mostly grassland, from its nearest living anthropoidal cousins. The Taungs creatures must have been cliff dwellers on an arid plateau, separated from the Zambesi watershed by a vast open tract of country. In the west, from the Atlantic Ocean to Western Rhodesia, is the Kalahari Desert and to the north and east, from the Rhodesias to the Drakensberg Mountains, is an almost unbroken belt of savanna grassland or open veld.

This prairie land between the tropical forests and Taungs had been an effective barrier from Cretaceous times (120 million years ago) against the southward migration of any semi-arboreal anthropoid such as the gorilla and chimpanzee. Yet this new anthropoid group must have forced its way through the barrier no more than one million years ago, had sufficient intelligence to find types of food other than fruit, and the agility and resourcefulness to avoid the carnivorous beasts of Africa.
Vegetation maps of Africa showing australopithecine sites.
[Alun R. Hughes.]

Although certain that my discovery went further than any previous discoveries towards bridging the gap between man and his anthropoid ancestors, I did not, when naming it, claim it was an ape-man, missing link or anything other than an ape, although I did feel a new family might have to be made to receive it.

Because it had come from the Southern Hemisphere and not from the tropics, I named it Australopithecus from Australis 'south' and pithicus 'ape'.

I prepared a report based on my conclusions for Nature,
the British scientific journal, half anticipating the scepticism with which it would be greeted, half hoping that because of the great advances made in anthropological discoveries and the subsequent increase in knowledge in the years since Darwin, they would be seriously accepted. I worked away happily and, I am not ashamed to say, proudly. I was aware of a sense of history for, by the sheerest good luck, I had been given the opportunity to provide what would probably be the ultimate answer in the comparatively modern study of the evolution of man.

All the previous major anthropological discoveries had been primitive men like Neanderthal Man (and his relatives such as Rhodesian Man and Heidelberg Man) and the still more primitive Java Man (*Pithecanthropus*). They had been proved to be men with ape-like features. *Australopithecus* was the reverse—an ape with human features.

Although the science of anthropology is relatively young, my scientific predecessors stretched back to 1699 when the very first description of an African ape, the chimpanzee, was compiled by Dr. Edward Tyson under the title, *The Anatomy of a Pygmy*.

Stories about the great apes, which were given little credence, had been brought back to England by sailors for two centuries; but Tyson, in his first contact with a chimpanzee, was, like the seafarers who had brought it to England, astonished to find how closely it resembled man and how it differed more from monkeys than from mankind.

‘Our Pygmy is no Man,’ he said, ‘nor a Common Ape; but a sort of Animal between both.’

Perhaps unwittingly, Tyson had opened up the great question of man’s direct relationship to the primates, and when Linnaeus drew up his *Systema Naturae* in 1735, he unhesitatingly classified man with his anthropomorphomic relatives.

But it was not until 1856, three years before Darwin’s and Alfred Russell Wallace’s identical theories on evolution were announced, that an important fossil human discovery
was made and reported. A large skull, with great bony ridges over the eyes and thick cranial bones, was unearthed in the Neander Valley near Düsseldorf.

So it was named Neanderthal Man and was non-committally described by Professor Schaafhausen of Bonn University as ‘a type inferior to any race of mankind now living’.

The leading pathologist of the 19th century, Rudolph Virchow, described it as a ‘pathological specimen’, while others, more crudely, said it was the skull of ‘an individual affected with idiocy and rickets’, and ‘a powerfully organized Celt, somewhat resembling the skull of a modern Irishman with low mental organization’.

The reaction to Darwin’s Origin of Species in 1859 was, generally, one of indignation. Now the whole human race was being implicated in these scientific blasphemies!

At the Oxford meeting of the British Association for the Advancement of Science in 1860 there were numerous heated debates on the subject of man’s origin. Bishop Wilberforce, known as ‘Soapy Sam’, used his suave rhetoric to pour sarcasm and scorn upon Darwinism. Turning to T. H. Huxley, who had earlier championed Darwin, he asked with mock politeness, ‘Is it through your grandfather or your grandmother that you claim descent from a monkey?’

Amid the applause as the bishop sat down, there were calls for Huxley who whispered to his neighbours, ‘The Lord hath delivered him into my hands.’

He began quietly, saying he had heard nothing in the bishop’s arguments to prejudice Darwin’s theory which was much more than a hypothesis. Having warmed to his argument, he lashed into the bishop and his supporters, finishing by remarking that he would not be ashamed to have a monkey for an ancestor, but he would be ashamed ‘to be connected with a man who used great gifts to obscure the truth’.

Darwin’s greatest disciple in Europe outside Huxley and Wallace in England was Ernst Haeckel, a German scientist
who coined the word *Pithecanthropus* (ape-man) to describe man’s progenitor. Unlike Darwin, however, who considered Africa to be the cradle of civilization, he believed that this ancestral creature would be found in Asia and where Darwin believed the gorilla to be man’s nearest relative, Haeckel plumped for the gibbon of Indonesia.

A young Dutchman, Eugène Dubois, was studying medicine at the University of Amsterdam in those stirring days when the writings of Darwin, Huxley and Haeckel were the main topic of debate among students, and Neanderthal skeletons were popping up regularly along the Rhine and in the south of Belgium.

For some time Dubois was uncertain who was correct, but eventually decided that since Java and Sumatra had escaped destruction by glaciers during the ice age, these islands would be the best places to search for fossils.

He was successful in obtaining an appointment in Sumatra as a surgeon in the Royal Dutch Army and sailed for the Dutch East Indies in November, 1887, confident that he would find the first ape-man. And five years later in Java, after a series of exciting discoveries of extinct fossilized animals, he came across a shallow skull-cap of 850 c.c. capacity. The miracle had happened!

As Elliot Smith, the British anthropologist, wrote: ‘Dubois had actually found the fossil his scientific imagination had visualized.’

A year later, at the same level of the stream gravel where he had found the skull-cap, he uncovered a completely human femur of patently erect type. He had not been convinced that the skull-cap, which was low with a heavy bony bridge above the eyes, was that of a man but there was no doubt about the thigh bone, which had belonged to a creature which walked upright like man. So, inspired by Haeckel, he dubbed their owner *Pithecanthropus erectus*.

In 1895 Dubois returned to Europe laden with fossils. He exhibited the bones of *Pithecanthropus* at the Third
International Congress of Anthropology at Leyden and subsequently at scientific meetings in Liége, Paris, London, Dublin, Edinburgh, Berlin and Jena. Instead of the acclamation he must rightly have expected, his confirmation of Darwin, and his few remains of an actual missing link between man and ape, evoked a furore among scientists, churchmen and the lay public.

Dubois called *Pithecanthropus* a transitional form. Most German scientists, led by the same Virchow who had described Neanderthal Man as a ‘pathological specimen’, classified it as purely an ape—a gigantic gibbon because of the small brain size. Sir William Turner, the great Edinburgh anatomist, saw no difficulty in admitting a creature with 850 c.c. skull capacity into the human family. The younger and more competent British anatomists of that era, such as Elliot Smith and Arthur Keith, agreed with him, for they knew that there were many human beings—microcephalic idiots—with a brain capacity half the size of *Pithecanthropus*, who walked upright, performed small tasks with their hands and talked—even if there was little sense in what they said.

Attacked on both sides by churchmen and scientists, the sensitive Dubois, though he was given an appointment as professor of geology at the University of Amsterdam, locked up his bones of contention in a strong-room in the Teyler Museum in Haarlem, his home town.

That was in the year 1896 and it was not until 1923, after a plea by Henry Fairfield Osborn, the brilliant director of the American Museum of Natural History in New York, that Dr. Alès Hrdlička of the Smithsonian Institution was invited to become the first scientist in twenty-seven years to see and handle the precious specimens.

Following Dubois’s discoveries in Java, Otto Schoetensack, professor of geology at Heidelberg, intensified his excavations in the Mauer district, six miles to the southwest of Heidelberg, where there were known to be fossil-bearing clay beds. A whole menagerie of fossil animals was
exposed—cave lions, sabre-toothed tigers, rhinoceroses, hippopotamuses, bison, pigs, panthers and almost every other animal which now inhabits tropical countries. These he carefully laid aside until finally, on October 21, 1907, after twenty years of patient Teutonic searching, he found an immense human lower jaw. It was as big as an ape’s and, although it had no chin whatsoever, was furnished with a complete set of relatively small and definitely human teeth.

Whereas Neanderthal remains found in Europe could not be more than between 50,000 and 100,000 years old, the gravel in which the Mauer jaw lay showed that Heidelberg Man was at least 250,000 and probably half a million years old; as old as *Pithecanthropus erectus* and certainly the most ancient human being found in Europe.

Up to the year 1924, South Africa was virtually unknown anthropological territory. True, in 1914, two farmers digging at a depth of four feet while excavating an irrigation furrow, had found a strange, voluminous skull at Boskop in the Transvaal. Although it was announced to the Royal Society of South Africa, its significance was overshadowed by the tremendous controversy then raging in the anthropological world around the notorious—and now discredited—Piltdown skull that had been found in Sussex the previous year. In addition, World War I had broken out and it was not until 1917 that Dr. Sidney H. Haughton described the Boskop skull-cap in a paper which he read to the Royal Society of South Africa.

I had seen a cast of its interior in Professor Grafton Elliot Smith’s laboratory when I had been a senior demonstrator in anatomy at University College, London, shortly after the war. The enigma about this Boskop skull was the enormous brain it had contained. According to Haughton it occupied a space of 1832 c.c., yet the average living European is called big-brained if he has a skull capacity of 1450 c.c. or more. It is only when his capacity is less than 1350 c.c. that he is described as small-brained.
However, numerous people whose behaviour patterns have been considered normal have been found to possess brains of no more than 1000 c.c. while Franz Joseph Gall, the great German anatomist and physiologist, and Anatole France, the novelist, both had intra-cranial volumes of about 1100 c.c. Among the biggest human brains on record are those of Byron (2350 c.c.), Oliver Cromwell, (2000 c.c.) and Jonathan Swift, whose volume was well over 2000 c.c.

Yet here in Africa, the homeland of Bushmen and Hottentots—regarded since the time of Vasco da Gama as the lowliest of living mankind—had once lived a race of folk with skulls 412 c.c. greater in volume than that of the divine Raphael (1420 c.c.) and many other European men regarded as geniuses.

Only two years before I arrived in South Africa, an even more amazing find had been made in a quarry at Broken Hill, Northern Rhodesia.

Shortly before leaving England in 1922, I had been present at an excited meeting of the Anatomical Society when Sir Arthur Smith Woodward had exhibited the skull of Rhodesian Man for the first time in public.

It was a staggering sight to see an undoubtedly human skull with beetle wing ridges thicker than those of Neanderthal Man and a muzzle as massive as that of a gorilla. Yet the teeth were like those of any modern man and the brain quite large (1280 c.c.). It was not until 1925, however, after Dr. Hrdlička had visited Broken Hill to collect evidence from the men who were employed at the mine when the skull was discovered, and had presented his findings, that the real significance of Rhodesian Man was appreciated by scientists.

In 1923 Mr. F. V. Fitzsimons of Port Elizabeth had sent me some bones of a type like Boskop Man and at the time I was extracting the Taungs skull, Dr. Gordon D. Laing, my newly arrived assistant from Aberdeen University, was examining eight skulls from superficial levels of the Zitzikama Cave of the Cape Province from whose base these
Boskop bones had come. As I prepared my Taungs paper for Nature, I constantly thought of the rôle Southern Africa might play in solving the riddles of mankind.

The Boskop type of man was being unearthed in widely-scattered parts of South Africa and we were then beginning to suspect what I was later able to confirm—that in this country the living Bushmen were really hybrids of Bush Man and Boskop Man.

In the Zitzikama skeletons we could already trace the mingling of a fossil with a living type of mankind. From evidence of this sort we could answer questions of human hybridization that had puzzled anthropologists in Europe and America for years.

The other continents of the Old World had but one distinctive living race; white in Europe, yellow in Asia and black in Australia. Here in Africa, the biggest land mass of all, we had still living at least three human races that were distinctive—the yellowish Bush Man of the Kalahari (to whom the dwarf Pygmies of the Congo were closely akin), the Negro of the centre and the brown Hamite of the north. Had Africa been the fertile mother of all three? What was the relationship between these living races on the one hand and the fossil men of Boskop and Rhodesia on the other?

We would never know how to distinguish the living races from the fossil human types until we had gathered together representative collections of the skeletons of the living races: men, women and children of all ages.

Up to this stage, I had played a lone hand with my ‘Taungs baby’—or Australopithecus africanus as I had decided to call him without bothering to consult anyone else for a possibly more glamorous name. I had dropped several large hints to some of my colleagues but did not wish to give them my optimistic views until they had been substantiated by leading experts overseas.

However, when it came to the question of photographs with which to illustrate the article, I had to call in my friend
Len Richardson who had helped me on previous occasions as I had no camera in my department and Len, who was a press photographer for the Johannesburg Star, had to be told something of what I was doing. The former champion marathon runner of South Africa was interested in my find only as a subject for his lenses, but I cautioned him not to let his news editor, Mr. B. G. Paver, know.

Paver was one of the few men to whom Australopithecus would have any significance. This gaunt middle-aged man, who later became editor of the Star, was one of the most knowledgeable laymen on scientific subjects I have ever met—and anthropology was his pet subject. He had been deeply interested in the Boskop finds at Zitzikama and in the Rhodesian Man too.

Although news editor, he insisted on handling any stories concerning this subject himself and, consequently, he was a frequent caller at my office. One morning he asked me to comment on a statement about Rhodesian Man made by Sir Arthur Keith in London and cabled to the Star. We chatted awhile and he told me the Press was in the middle of its annual ‘silly season’. There was one of those periodic dearths of local news stories which, of course, made Paver’s job at that moment an unenviable one as he had to supply the ideas for his reporting staff.

He sighed. ‘Now if you could come to light with an interesting skull like Rhodesian Man—or even another Boskop fossil—we would have a good local lead to get our teeth into.’

Paver’s long, wistful look mixed with my own pride—or vanity—and that overwhelming impulse to confide in somebody who combined interest with understanding loosened my tongue a little.

‘Perhaps I may shortly have news for you that will not be merely a good local lead,’ I told him, ‘I may have something of world-wide significance connected with man’s origin to announce shortly.’

Paver’s melancholy expression gave way to one of alert
attention. He reminded me of a losing gambler who has just had the name of a certain winner whispered in his ear. The questions poured from him in a steady stream.

Would I be referring to something more primitive than Rhodesian Man?

Oh yes, indeed!

'Something more primitive even than *Pithecanthropus*, the ape-man of Java?'

Let me confess that I was enjoying this little game and I answered, with as much nonchalance as I could muster, 'Oh, considerably older and much more primitive. *Pithecanthropus'*s counterpart in reverse in fact—not an ape-like man, but a man-like ape.'

'You can't mean that!' he ejaculated, and then recovered himself, for he could see that I was serious and he did not wish to offend me.

How did I know this? Where was the specimen? When did I intend publishing the information? Would I let him use a story that very day?

I told him I could give him no further information until I had his assurance that nothing would appear in the daily press before *Nature* had published the preliminary scientific announcement. It was a difficult decision for Paver to make and I could see he was tempted to write a story on the scraps of information I had fed him.

But his reputation as an accurate journalist triumphed, and knowing I could trust him, I gave him a full account of the find, my work on it and my conclusions. His caution and integrity were to pay dividends, for, as will be seen later, the *Star* was still able to obtain what was afterwards described, in an international survey of news stories, as 'the scientific scoop of the year'.

When Paver left me, I felt happier than I had been since posting my paper and photographs to *Nature* a fortnight earlier. His reactions and complete acceptance of my conclusions after much keen and knowledgeable probing had delighted me.
Would my expert colleagues in Europe and America accept them so readily or would they promptly reject them as they had every important anthropological discovery in the past?
CHAPTER THREE

From Living Brains to Fossil Bones

I had sailed for South Africa from England in December 1922 with my wife Dora, feeling more like an exile than a man elevated to a professorship. I hated the idea of uprooting myself from what was then the world’s centre of medicine and leaving my research and studies with the giants of the profession to take over the Anatomy Department at Johannesburg’s new and ill-equipped University of the Witwatersrand. I felt I had lived a pioneer’s life for quite long enough in my younger days.

My boyhood in Australia had been strict and religious. My parents were of early settler stock with a family of nine children and it was always accepted, without question, that my brothers and I milked the cattle before setting off for school and after our return home.

I have often been asked if it was as a boy on an Australian bush farm that I first became interested in anthropology. Certainly we picked up animal bones fairly frequently and occasional polished stone axes, but I think that like most children we were more interested in geological finds, for who knew, we might discover gold and strike it rich for our struggling parents. Although my childhood dreams of hidden wealth were not to be realized from digging precious metals out of the earth—even though I was to live most of my life in a city built on gold mines—the earth was to yield something far more precious to me than gold.

I was a pupil at Ipswich Grammar School when I decided to make a career of medicine, and in 1911 I won a
scholarship and became a pioneer student at the University of Queensland. There my eyes were opened to the wonders of science, particularly zoology, and I was such a keen student that I won a residential scholarship to St. Andrew’s College in Sydney. Before the end of my first year there I was awarded the college tutorship in biology.

When the British Association for the Advancement of Science visited Australia in 1914, I was asked if I would assist Dr. S. Arthur Smith, lecturer in anatomy and brother of the famous Grafton Elliot Smith, in the technical work for a paper he was to present at the association’s meetings.

Would I? I would gladly have paid for the privilege. I was ushered into a room piled high with the remains of South Sea Islanders and told to prepare certain bones for specific gravity determinations and to look for ‘squatting facets’ and other quaint variations on the thigh bones.

When the Association’s meetings opened I was able to see in the flesh celebrated scientists from Europe and America who had previously been only awesome names. Grafton Elliot Smith himself, as the principal guest, gave the first popular lecture to a crowded audience in the city hall on ‘The Evolution of the Brain’. I fell under his spell that night and prayed that at some time I would be allowed to work under him.

The congress closed abruptly when war broke out on August 4, 1914. The school staff was rapidly depleted as its members joined the Army medical units and we were pressed to stay and finish our courses for our ‘greater service as doctors’ rather than follow our emotional instincts and join up as fighting soldiers.

Professor James T. Wilson, head of the anatomy department, had become one of Sydney’s intelligence chiefs, but each night he returned to the medical school to continue his researches on neurological problems. In all seriousness, he would tell me, ‘This is the only way I can relax and gain a respite.’

He invited me to assist him, and for two years, from
1915 until I graduated in 1917, this intimate and treasured association continued. His influence on me was so great that even today, I often find myself guided by the standards he implanted in my young mind.

Like Darwin, Wilson was fascinated by vestigial structures and the light they threw upon the grand evolutionary story of the brain. Perhaps it was because of my personal association with him and the fact that his interests were automatically mine, rather than any outstanding ability on my part, that he took the unprecedented step of appointing me, while only an undergraduate, demonstrator in anatomy—an honour previously reserved only for medical graduates. This proved a heaven-sent opportunity, for it meant that after the war I was qualified to lecture to men many years my senior in other fields of medicine.

Soon after graduation, I was shipped to England in the Medical Corps, calling en route at Durban and Cape Town. After seeing out the last year of the war in France, I began to wonder what I would do on demobilization. I learned that anatomists were at a premium and that Elliot Smith, who had taken over the chair at University College, London, was looking for a senior demonstrator, his two other seniors having been appointed to the chairs of Guy's Hospital and Cairo University respectively.

When I was asked if I would accept the post of senior demonstrator, my knees went weak at the thought of pretending to be Elliot Smith's second-in-command. However, it meant that my discharge from the army would be expedited and I found myself, an embryonic captain, confronting classes of majors, colonels and other senior officers of the Australian Army Medical Corps who had come to revise their anatomy for the Fellowship examinations of the Royal College of Surgeons.

Among my pupils was Lt.-Col. W. W. Woollard from Melbourne, whose knowledge of detailed anatomy was considerably greater than mine. He wanted to become an anatomist and stay in England. Following the principle of
to thine own self be true', instilled into me by Professor Wilson, I told Elliot Smith that Woollard’s knowledge, seniority and his needs made my retention of the post fatuous. I said I would gladly hand it over to him.

Elliot Smith acted in his typically generous manner.

‘In view of what you’ve told me, I would be delighted to have Woollard on my staff. But what is this nonsense about your resigning? My dear fellow, I need both of you—that is unless you are anxious to leave University College.’

I assured him I was not and stayed on, working under this great man and with Woollard as colleague. So that Woollard would have more money to meet his domestic obligations, Elliot Smith soon had him appointed sub-Dean of the faculty and he went on to become Professor of Anatomy at St. Bartholomew’s. Finally, he succeeded Elliot Smith at University College and I was almost as proud of his success as he himself must have been. I knew then how right I had been in stepping down for him.

Working under Elliot Smith was my student dream come true. Not only was he a genius in his own field but one of the most pleasant human beings I have ever worked for or with. Tall, ruddy-complexioned and distinguished, with immaculate white hair, he was the complete antithesis of the woolly-minded, innocent genius of fiction. Elliot Smith was with all his brilliance, in every sense, a man of the world, a great raconteur and popular with his colleagues and assistants who could usually rely on him to attend and enliven their daily tea parties.

Not long after I joined University College, the Rockefeller Foundation, anxious to make an outstanding gesture of friendship to Britain after the two countries’ wartime partnership, donated $5,000,000 to University College Medical School and Hospital. Elliot Smith was invited to America to examine medical schools there whose structure had already been transformed by the foundation’s liberal generosity.

On his return he said he intended to recommend me as
one of the first two foreigners to initiate the fellowship scheme. The other was my friend Joseph L. Shellshear, also a graduate of Sydney. We were to sail for America in October, 1920, Shellshear to Johns Hopkins and the Carnegie Institution to study embryology with Louis H. Weed and George Streeter, while I was to work with Professor R. J. Terry at Washington University, St. Louis, and master histology (microscopic anatomy).

We would each have six months’ participation in teaching and then travel round together for three months visiting medical schools before spending our last three months doing research at the Woods Hole Marine Biological Station.

While visiting Cincinnati I met Dora Tyree, an attractive medical student whom I married shortly before sailing back to England in September, 1921.

I was put in charge of histology when I returned to University College and a new influence entered my life. On my first day back, Elliot Smith asked me to do my best in making a new Russian refugee arrival as much at home as possible.

‘His name is Kulchitsky,’ he told me, ‘and I’m afraid the most I was able to do was to employ him as a laboratory assistant.’

Startled, I asked, ‘You surely don’t mean Kulchitsky, the Kharkoff neurologist?’

‘I’m afraid I do,’ Elliot Smith replied. ‘There simply isn’t a vacant position for him at the moment and I’ve done the best I could for him for the time being. Besides, he doesn’t speak a word of English.’

I raced to the laboratory to find him. Our new ‘assistant’ had been Minister of Education for the whole of Russia under the Czar, and was one of the greatest living investigators of the microscopic structure of the nervous system. Perhaps because the Bolsheviks could still use his vast knowledge, his life had been spared when all the other ministers were executed. He eventually escaped with his wife and daughter, arriving destitute in England.
We managed to communicate in a mixture of French and German and although he was officially my laboratory assistant it was largely through the knowledge—and humility—I imbibed from this master that I was able to initiate with confidence an advanced course in microscopic as well as gross anatomy, despite the anatomical desert I found upon arrival in Johannesburg in 1923.

My decision to accept the chair of anatomy at the University of the Witwatersrand was due largely to Elliot Smith's persuasion. My last year at University College had been even happier than the previous ones, for I had found an exciting new interest—anthropology. Whenever I was free, I worked my way through the great comparative collections in the museum of the Royal College of Surgeons. Elliot Smith was reconstructing the Piltdown skull and I had gradually been drawn into this branch of my chief's interests.

After much debate over the South African vacancy, I filled in the application form and Elliot Smith sent me to talk it over with Sir Arthur Keith. Noticing that under religion I had written 'Freethinker', Sir Arthur asked, 'Do you think that wise? I believe the atmosphere in South Africa is strongly Calvinistic. I should say "Protestant". They're not likely to inquire what sort of Protestant you are nor what you feel like protesting against.'

My reluctance to do so may have caused Keith to write in his book, An Autobiography (1950):

As I move on to the crowded events of 1925 my first duty is to introduce another of J. T. Wilson's brilliant Australian pupils. His name is Professor Raymond Dart who has held the chair of anatomy in the University of the Witwatersrand, Johannesburg, for over a quarter of a century. I was one of those who recommended him to the post, but I did so, I am now free to confess, with a certain degree of trepidation. Of his knowledge, his power of intellect and of imagination there could be no question; what rather frightened me was his flightiness, his scorn for accepted opinion, the unorthodoxy of his outlook.
We sailed for South Africa shortly before Christmas, 1922. Among the passengers was a South African nurse. One day, the conversation got round to anthropology—a topic no doubt instigated by myself—and I was given my first introduction to South African anthropological discoveries. The nurse told me that before the war, one of her patients, a diamond digger, had shown her a strange fossilized skull. She thought it too small to be human but too large to be a baboon. Diamond miners in those days were notoriously superstitious and this one felt that his health and luck would never return until the skull was reburied. I subsequently tried to trace the miner to find out what became of the skull, but without result.

The French proverb which says ‘On ne va jamais si loin que lorsqu'on ne sait pas où l'on va’ could have been written especially for me and my adventures in Africa.

In those days, the appearance of Johannesburg was enough to depress anyone much less sensitive than ourselves. It had such an impermanent appearance with its endless rows of red-painted, corrugated-iron roofed buildings. It seemed to have progressed little since the days of the gold rush towards the end of the last century and one felt that if a financial slump hit the place, it would become a deserted ghost-town in a matter of days.

Like most first impressions, this was entirely wrong. Johannesburg weathered the depression of the 30’s and has developed into one of the world’s most modern and prosperous cities with a permanent population of more than a million.

The Medical School was a two-storeyed, L-shaped building, screened behind 10-ft. brick walls that had originally formed a garrison area below a fort of President Kruger’s time. No gardens had been laid out and, to add to the general air of dereliction, high grass and Mexican marigold weeds filled the space between the ancient brick wall and the doors of the school. Few townspeople even knew of the school’s existence.
The Department of Anatomy consisted of a dissecting hall with three side rooms and opened on to a lecture theatre. This was separated from my private office by the students' cloakroom. The architect had overlooked the necessity for planning water taps, electric plugs, gas or compressed air for student laboratories. My permanent staff consisted of one simple-minded preparator of material in the mortuary basement underground.

The walls of the vast, high-roofed dissecting hall above this mortuary were bespattered with marks that emphasized its customary use by the students for practising football and tennis. The zinc-covered, trestle-type dissecting tables supported dried-up portions of corpses whose only covering were hessian sheets.

Our first inspection of these conditions left my wife, whom I had taken from her medical studies at Cincinnati, in tears—a woman's prerogative I rather envied at that moment. It was no good bemoaning our fate, however, and with the new term only a month away, action was essential.

The University painted the walls; Dora ransacked the town for cheap but strong cotton cloth and, her sewing machine installed in a side room, she cut the cloth and hemmed the borders so that each body was properly wrapped. When the new class entered the freshly decorated hall, with separate white cloths covering each limb, head and trunk and the bodies shrouded in rubberized waterproof sheeting, they were as astonished as I had been at finding the previous mess.

I also had to break down a wall of prejudice as far as my colleagues were concerned. My predecessor had been forced to resign amid a storm of protest and controversy, having committed the then cardinal sin of divorce. In addition there lingered the South African's wartime prejudice against Australians. The prevalence of this attitude was pointed out to me before I left London when I was shown a letter written by Jan Hofmeyr, the young and brilliant Principal of the University of the Witwatersrand. His only
expression was one of regret that the appointee was an Australian!

Later Hofmeyr was to become a close friend and a most useful ally as Minister of Education and my colleagues were to give me unswerving and loyal support. But it would be useless to deny that I was unhappy in the first eighteen months. The abysmal lack of equipment and literature forced me to develop an interest in other subjects, particularly anthropology, the one for which Elliot Smith had fired my enthusiasm.
CHAPTER FOUR

The Debut of the Taungs Baby

After the Star had agreed not to publish the story of Australopithecus until after the issue of Nature of February 3, 1925, I let Paver have a complete copy of my paper and photographs. These were set up as the newspaper's lead story well in advance. When the publication date drew nearer, the Star cabled Nature and asked if they had received my paper and what they intended doing with it. Nature replied that they had all my information but the discovery and claims were of so unprecedented a character that the account had been referred to various experts in England who had been asked to give opinions on whether or not it should be published.

The Star, quite rightly in my opinion, informed Nature that they could not withhold their release beyond the evening paper of February 3. Sir Arthur Keith's diarized entry in An Autobiography throws light on the happenings in London:

On the day of my last lecture at College (January 30, 1925) Gregory, the editor of Nature, . . . rang me up and told me he had received an article from Dart describing a new 'missing link'. I advised publication; on the morning of February 3, I received a proof of Dart's article (on the discovery of the Taungs fossil skull); on working over the article I saw that the skull was that of an anthropoid. On the night of the 3rd reporters came in troops in consequence of a cable from South Africa. I kept quiet and left the talking to Elliot Smith, wrote an article for the Sunday Times (February 7) and for the British Medical Journal (February 14) and also a commentary for Nature.
Then he comments on his entry of 25 years back.

Dart maintained that the fossil anthropoid he had unearthed at Taungs was much more akin to man than were any of the living anthropoids. I on the other hand had come to the conclusion, from a survey of its features, that the Taungs anthropoid was first cousin to the gorilla and chimpanzee. Further discoveries, made many years later, proved that Dart was in the right; it was his judgment that was sound, not mine.

So Paver got his ‘scoop’ after all and it was a copy of his account in the issue of February 3 which was copied and commented upon by morning newspapers throughout the world on February 4, my thirty-second birthday. First reactions were favourable.

On the morning of the 4th I also received cables of congratulations from Elliot Smith and his staff at the Institute of Anatomy in University College and from Alěs Hrdlička at the Smithsonian Institute, Washington, who also asked me to send a hundred reliable words to him on my find. *Science News Service* in Washington cabled a request for an article; the Oxford University Press telegraphed their pleasure ‘to entertain the exclusive offer for British, foreign and local publication of your book or work on fossil skull’; Parcus Verlag of Munich offered a contract for publication rights of a book extending across the whole European market. No book had been—or until now has been—written. I was much more interested in digging out the lime which still joined the upper and lower jaws.

General J. C. Smuts who was at that time undergoing a period in the political wilderness and was subsequently turning his leisure to botany, philosophy, and anthropology, wrote to me from his home at Irene.

I wish personally and as President of the South African Association for the Advancement of Science to send you my warm congratulations on your important discovery of the Taungs fossil. Your great keenness and zealous interest in anthropology have led to what may well prove an epoch-making
discovery, not only of far-reaching importance from an anthropological point of view, but also calculated to concentrate attention on South Africa as the great field for scientific discovery which it undoubtedly is. The recognition of the unique importance of the Rhodesian Broken Hill skull in human evolution has now immediately been followed by your discovery which seems to open up still further vistas into our human past.

I congratulate you on this great reward of your labours which reflects lustre on all South Africa and I wish to express the hope that many further triumphs await you and those who have so willingly co-operated with you on the road on which you have begun so well.

Jan Hofmeyr, who was then Administrator of the Transvaal Province, wrote—in spite of his previous dislike of Australians—‘Just a line to congratulate you on your discovery. It is one of the things that make one (occasionally) regret having left the University.’

The evening newspapers of February 4 published an interview with Sir Arthur Keith in London. His comments were cautious. ‘Professor Dart is not likely to be led astray,’ he said. ‘If he has thoroughly examined the skull we are prepared to accept his decision.’

Before many more weeks he was to oppose my decisions most vehemently, as were many other anthropologists whose first reactions had been favourable. This could never be said of Dr. Robert Broom, the Scottish-born anthropologist who, after a lifetime of wandering in search of fossils, had settled in South Africa. Later, when an honorary member of my staff, he was to achieve world fame through his discoveries at Sterkfontein and during the difficult years when my contention that Australopithecus represented the transitional stage between ape and man was generally discredited his was frequently the only voice which defended Australopithecus.

Broom immediately wrote a letter of congratulations and two weeks later burst into my laboratory unannounced. Ignoring me and my staff, he strode over to the bench on
which the skull reposed and dropped on his knees ‘in adoration of our ancestor’ as he put it. He stayed with us over the week-end and spent almost the entire time studying the skull. Having satisfied himself that my claims were correct, he never wavered. He sent a short article to Nature and to the American Museum Journal, Natural History, stating that in his opinion I was essentially right in regarding Australopithecus as very distinct from the chimpanzee and the gorilla. Although about the same size as a chimpanzee, it had to be allied to the anthropoid from which the human line had arisen.

In the article to Nature, he concluded:

In Australopithecus, we have a being also with a chimpanzee-like jaw, but with a sub-human brain. We seem justified in concluding that in this new form discovered by Professor Dart we have a connecting link between the higher apes and one of the lowest human types. If an attempt is made to reconstruct the adult skull it is surprising how near it appears to come to Pithecanthropus erectus—differing only in the somewhat smaller brain and less erect attitude. While nearer to the anthropoid apes than man, it seems to be the forerunner of such a type as Eoanthropus (Piltdown Man), which may be regarded as the earliest human variety.

These conclusions differed widely from those of Sir Arthur Keith, Elliot Smith, Sir Arthur Smith Woodward and Dr. W. L. H. Duckworth. The opinions of these four anthropologists appeared in Nature on February 14, the week after my paper had appeared. Sir Arthur Keith certainly did not indicate now that he was ‘prepared to accept Dart’s decision’.

He said he had found it easy to enlarge the profile drawing to natural size and compare it with corresponding drawings of the skulls of children and young apes. Keith’s principal points were:

Those who are familiar with the facial characteristics of the immature gorilla and of the chimpanzee will recognize a blend
of the two in the face of *Australopithecus*, and yet in certain points it differs from both, particularly in the small size of its jaws. Even if it be admitted, however, that *Australopithecus* is an anthropoid ape, it is a very remarkable one. It is a true long-headed or dolichocephalic anthropoid—the first so far known.

It may be that *Australopithecus* does turn out to be 'intermediate between living anthropoids and man', but on the evidence now produced one is inclined to place *Australopithecus* in the same group or sub-family as the chimpanzee and gorilla. It is an allied genus. It seems to be near akin to both.

The tone of Elliot Smith's contribution was more cautious. He neither agreed nor disagreed with my findings but asked for more proof. He wrote:

Professor Dart is probably justified in creating a new species and even a new genus for his interesting fossil: for if such wide divergences between the newly discovered anthropoid and the living African anthropoids are recognizable in an infant, probably not more than four years of age, the difference in the adults would surely be of a magnitude to warrant the institution of a generic distinction.

Many of the features cited by Professor Dart as evidence of human affinities, especially the features of the jaw and teeth mentioned by him, are not unknown in the young of the giant anthropoids and even in the adult gibbon. The most suggestive feature is the position of the *sulcus lunatus* and the extent of the parietal expansion that has pushed asunder the lunate and the parallel sulci—a very characteristic human feature. What above all we want Professor Dart to tell us is the geological evidence of age, the exact condition under which the fossil was found, and the exact form of the teeth.

Sir Arthur Smith Woodward was the most critical. He said that as far as could be judged from the photograph, he could see nothing in the orbits, nasal bones and canine teeth definitely nearer to the human condition than the corresponding parts of the skull of a modern young chimpanzee.

The Taungs skull lacks the bones of the brain case, so that the amount and direction of distortion of the specimen cannot
be determined. I should therefore hesitate to attach much importance to rounding or flattening of any part of the brain-case, and would even doubt whether the relative dimensions of the cast of the cerebellum can be relied on. Confirmatory evidence is needed of the reality of appearances in such a fossil. In the absence of knowledge of the skulls of the fossil anthropoid apes represented by teeth and fragmentary jaws in the Tertiary formations of India, it is premature to express any opinion as to whether the direct ancestors of man are to be sought in Asia or Africa. The new fossil from Africa certainly has little bearing on the question.

Of the four opinions, Dr. Duckworth's was perhaps the most favourable. He wrote:

As good points in favour of the claims, there may be cited, in addition to the cerebral features, the level of the lower border of the nasal bones in relation to the lower orbital margins, the (small) length of the nasal bones, the lack of brow ridges (even though the first permanent tooth has appeared fully), the steeply rising forehead and the relatively short canine teeth. On the other hand, I feel fairly certain that some of the other characters mentioned are related preponderantly to the youthfulness of the specimen. . . . Generally, the elimination and detachment of features influenced largely by the factor of age demand special attention. If, however, the good points can be justified, then these characters of youth will not gravely affect the final decision. So far as the illustrations allow one to judge, the new form resembles the gorilla rather than the chimpanzee.

I was disappointed that these four eminent British anthropologists had not accepted my findings, but was not entirely surprised. After all, I was getting away much more lightly than Dubois and others who had made outstanding fossil discoveries. But criticism rather than adoration of their potential ancestry seemed to be the overseas reaction.

Shortly after Professor Arthur Robinson, in a lecture in Edinburgh on the Taungs skull, dismissed it as 'the distorted skull of a chimpanzee just over four years old, probably a female. . . .', my old chief was even more doubtful.
than he had been when giving his first opinion to *Nature*. In a lecture at University College in May 1925, which was fully reported in *The Times*, he said that although *Australopithecus* had been claimed as the missing link, it was certainly not one of the really significant links for which they were searching. It was an unmistakable ape, nearly akin to those still living in Africa, the chimpanzee and the gorilla, and there was no justification for the creation of a new family, though it certainly represented a new genus.

He added: ‘It is unfortunate that Dart had no access to skulls of infant chimpanzees, gorillas or orangs of an age corresponding to that of the Taungs skull, for had such material been available he would have realized that the posture and poise of the head, the shape of the jaws, and many details of the nose, face, and cranium upon which he relied for proof of his contention that *Australopithecus* was nearly akin to man, were essentially identical with the conditions met in the infant gorilla and chimpanzee.’

The reaction of the British Press, both popular and serious, to some extent offset the controversial and mutually conflicting opinions of my senior contemporaries. The name ‘Taungs’ became synonymous with ugliness and jokes such as ‘Who was that girl I saw you with last night—is she from Taungs?’ were hurled around the music halls of Britain. The shingled flappers and their young bloods of that period of the ‘Gay Twenties’ in London charlestoned to little ditties about ‘the young horror from Taungs’ and both the *Spectator* and the *Morning Post* ran competitions about it.

The *Spectator* invited readers to supply an epitaph for *Australopithecus* in not more than six lines of verse or sixty words of prose. The series was led by Humbert Wolfe’s prophetic:

Here lies a man, who was an ape.
Nature, grown weary of his shape,
Conceived and carried out the plan
By which the ape is now the man.

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The prize was finally awarded to Mr. G. Rostrevor Hamilton for the following:

Speechless with half-human leer,
Lies a hidden monster here:
Yet here, read backwards, beauty lies,
And here the wisdom of the wise.

In the South African Parliament, as Hansard soberly relates, there was a heated exchange between two Members one day and the Speaker had to intervene when Mr. J. H. Munnik, addressing Mr. W. A. Deane (Member for Um-voti) said, ‘If that is so, as stated by the hon. member for Taungs . . .’

Mr. Deane was on his feet instantly, protesting to the Speaker, who solemnly ruled that ‘hon. members must address other hon. members by referring to their proper constituencies’.

While the less serious publications generally treated the whole thing sensationally and frivolously, an unusually thoughtful editorial on ‘The Taungs Skull’ appeared in the Observer of February 8.

I am quoting part of it fully because it sums up, in a way on which I cannot improve, why, since the time of Darwin, thousands of scientists have spent their time, energies—and in some cases fortunes—on unravelling the history of man. The article closed with these sentiments:

There must needs be some who will say that the discovery of a damaged skull in sub-tropical Africa makes no difference. Admittedly it does not affect us materially like the discovery of wireless or electric light. The difference is in outlook. The stimulus to all progress is man’s innate belief that he can grasp the scheme of things or his place therein. But this stimulus compels him to track his career backward to its first beginnings as well as to carry it forward to its ultimate end. The more clearly he sees whence he has come the more clearly will he discern whither he is bound. Hence it is not an accident that an age of immense scientific advance produced Darwin with his Theory of Origins, or that a later period of social unrest has
stimulated archaeologists to reveal the strength of the social tradition. Viewed in some such intellectual context as this, the Taungs skull is at once a reminder of limitations and an encouragement to further endeavour. Its importance, significant in itself, is enhanced by the fact that its message has been preserved through unimaginable ages for discovery here and now.

From New York came a news message:

Professor Dart’s theory that the Taungs skull is a missing link has evidently not convinced the legislature of Tennessee, the governor of which state has signed an ‘Anti-Evolution’ Bill which forbids the teaching of any theory contrary to the Biblical story of the creation, or that man is descended from the lower orders of animals.

Similar legislation which is at present before other state legislatures marks the growth of a strict biblicist movement represented by so-called fundamentalist churches whose leading propagandist is the silver-tongued orator, William Jennings Bryan.

Letters from religious people all over the world poured into my office, warning me that I was ‘sitting on the brink of the eternal abyss of flame’ and would later ‘roast in the general fires of Hell’. One writer said he had no doubt that I would shortly be placed in a home for the feeble-minded; another hoped that, for my heresy, I would be punished by ‘being unblessed with a family which looks like this hideous monster with the hideous name’.

Under the title ‘Hammer and Taungs’, the following letter was printed in the Sunday Times. It was addressed to Professor Dart, Scientist, London.

... How can you, with such a wonderful gift of God-given genius—not the gift of a monkey, but a trust from the Almighty—become a traitor to your Creator by making yourself the active agent of Satan and his ready tool? What does your Master pay you for trying to undermine God’s word? Or do you not know his wages?

Man, stop and think. You with your splendid brain, God’s gift to you, have become one of the Devil’s best agents in sending
seeking souls to grope in the darkness. What will it profit you? The wages of the master you serve is death. Why not change over? What will evolution do for you when dissolution overtakes you? Yours respectfully, 'A Plain but Sane Woman'.

Callers came in dozens—students, friends, colleagues, visitors from near and far. Lectures were demanded on all sides, and casts of the remains requested from Europe and America. The young university with its own fantastic name of Witwatersrand (the ridge of white waters) at which I had winced when I first heard it and which had been given its charter only in 1919, had suddenly rocketed to world fame and become an international byword. Its bewildered young Professor of Anatomy received this letter from the Principal, Sir William Thomson, on March 24, 1925:

I beg to inform you that, at its meeting held on the 20th instant, the Council unanimously passed the following resolution—'That the Council convey to Professor Dart its congratulations on the valuable services rendered by him to science with the discovery of the Taungs skull and on the distinction which has thereby been conferred on the University.'

In the meantime, I was preparing plaster casts of the fossil remains which I had been requested to make for the South African pavilion at the British Empire Exhibition in the summer of 1925. Neither I nor anyone at the University had any experience of how to do this and I mulled over the problem for many an hour before the solution came to me. Why not get a professional plasterer and moulder to cast the face and endocranial cast?

The name of my artisan ally is now forgotten, but, considering the strangeness of his task, he worked enthusiastically and skilfully. Mr. Alaric L. Allen, then a medical student and later Chief Orthopaedic Surgeon in Natal, mounted copies of these casts on separate metal stands and they were then painted to resemble the originals by Miss S. Wilson, a friend of one of my students from Germiston. Two further casts were glued together and upon this the
midline was determined and the head, neck and shoulder, built up in semi-construction around the left half of the skull by an artist, Mrs. E. J. Benson. Plaster casts were then made of this semi-reconstruction by the artisan and finally upon one of these semi-reconstructions a full reconstruction was made and cast in its turn.

In an attempt to explain in simple terms the place of *Australopithecus* and Africa in the human story, I prepared a chart to accompany the casts. In the chart I set out the claims of the Taungs infant for ancestral rating relative to *Pithecanthropus* (Java Man). I related Rhodesian Man to Heidelberg, Neanderthal and Proto-Australoid forms of mankind generally, and an African stock such as Boskop Man to the various living types of mankind. The casts and charts were set out so spectacularly on velvet in a glass case by the exhibition committee and with such boldness on my part under the banner heading ‘AFRICA: THE CRADLE OF HUMANITY’ that they evoked indignant reactions.

When Sir Arthur Keith saw the display at Wembley, he made a statement to the Press saying, ‘The famous Taungs skull is not that of the missing link between ape and man,’ and he wrote to *Nature* as follows:

Professor Dart has described it as representing an ‘extinct race of apes intermediate between living anthropoids and man’—which is tantamount to saying that at Taungs there has been discovered the form of being usually spoken of as ‘the missing link’. That this is his real decision is evident from the fact that he speaks of it as ‘ultra-simian and pre-human’ and proposes the creation of a new family for its reception. An examination of the casts exhibited at Wembley will satisfy zoologists that this claim is preposterous. The skull is that of a young anthropoid ape—one which was in its fourth year of growth, a child—and showing so many points of affinity with the two living African anthropoids, the gorilla and chimpanzee, that there cannot be a moment’s hesitation in placing the fossil form in this living group.

At most it represents a genus in the gorilla-chimpanzee group.
It is true that it shows in the development of its jaws and face a refinement which is not met with in young gorillas and chimpanzees at a corresponding age. In these respects it does show human traits. It is true that it is remarkably narrow-headed while the other anthropoids are broad-headed—but we find the same kind of difference in human beings of other allied races.

The Taungs ape is much too late in the scale of time to have any place in man's ancestry.

This forthright rejection of my beliefs coupled with Elliot Smith's earlier remarks made me feel that leading anthropological opinion was 'ganging up' on me. None of their arguments persuaded me to deviate in the slightest from my earlier conclusions but, from being exultant, my mood changed to one of depression. However, Broom had been busy converting others to his and my views and he soon had news which cheered me. For many years he had been in regular correspondence with Professor W. J. Sollas, the well-known geologist and anthropologist of Oxford, who at the outset had agreed with other British authorities that *Australopithecus* was closely allied to the gorilla or chimpanzee. After examining a median section of the skull sent by Broom, he quickly changed his views and wrote a short paper to *Nature* which appeared on June 13, 1925. He said:

It is abundantly clear that in a number of significant characters . . . such as complete absence of frontal torus, position of the nasion, greater magnitude of the parietal arc, reduced prognathism and shortening of the maxillary region, *Australopithecus* makes a nearer approach to the Hominidae than any existing anthropoid ape.

Shortly afterwards, he came out even more strongly in my favour when, in a paper to the *Quarterly Journal of the Geological Society*, he pointed out many striking differences between *Australopithecus* and other anthropoids. He concluded:

The foregoing observations appear to me to afford ample confirmation of Professor Dart's conclusions. *Australopithecus* is
doubtless generically distinct from all known apes, and in those important characters by which it differs from them it makes a nearer approach to the Hominidae.

Even more welcome news was contained in a letter to Broom in which he said that Elliot Smith now held views similar to his own, regarding *Australopithecus* as an advanced anthropoid, probably near to the human ancestor.

One of the most cheering events in that gloomy June of 1925 was a request from the Prince of Wales (now the Duke of Windsor) to ‘have a look at Professor Dart’s baby’. The Prince was touring South Africa and was staying at Johannesburg’s Carlton Hotel. I was slipped in through a back door and taken to the Prince’s apartment where he was seated on the bed relaxing in shirt and jodhpurs after an afternoon’s riding. He said that since he had been in South Africa, he seemed to have heard of nothing but the Taungs ‘baby’ and was curious to see it. I thought he was being merely polite, but as soon as I handed it to him from my little black box I realized I was wrong. He ran his fingers over the cast with unfeigned interest and I think everyone in the room was startled when he remarked to one of his aides, ‘Look at this, you can actually see the blood vessels coursing over the brain cast.’

When I left him, I could not help reflecting what a pity it was that some of his scientifically knowledgeable subjects had not been as quick to grasp the more important points as their future king had been to notice a feature which would have been lost on most lay minds.

Whatever scepticism or anger my claims had met with overseas, however, the discovery of *Australopithecus* marked a new phase in my career and a new understanding with my colleagues and the students. I had arrived at the University a fully-fledged professor at the age of 29—but I was an Australian. The distinction—or notoriety—brought to the University by my find was followed by a noticeable difference in the attitude of my colleagues, and in 1925 I was elected Dean of the Faculty of Medicine. In
the same year, I was invited to become president of the anthropological section of the South African Association for the Advancement of Science and a Fellow of the Royal Society of South Africa. My election as Dean showed my complete acceptance by both the senior members of the Medical faculty and the Senate. I was destined to hold the position for the next nineteen years.
(Above) Professor Raymond A. Dart, Dr Robert Broom (holding *Paranthropus* skull), Abbe Henri Breuil, and Professor C. van Riet Lowe.

(Charles P. Channon)

Miss Josephine Salmons in 1925

Alun R. Hughes in 1958
(Above) Five fossil baboon skulls with holes in the top: three from Taungs (B, C, and D), and two from Sterkfontein (A and E). B is the baboon skull brought by Miss Salmons in 1925.

(Mrs G. Chaplin)

(Below) The Taungs skull: lateral and semi-profile views. A, Profile view of left side to show the recessed face with human type of teeth and vertical forehead in front and the cast of the skull interior with the pattern of the brain and its blood vessels behind. B, View of the left side to show the two pieces fitting into one another, face in front; cast of interior of skull covered with calcite crystals behind. C, Skull in semi-profile to show its completeness and generally human appearance. D, Skull from front showing the small incisor and canine teeth and the nasal opening well up behind the eye sockets.

('The Star,' Johannesburg)
Professor Dart holds the Taungs skull. A chimpanzee skull of the same age lies on the table; behind it from left to right are reconstructions of the man-apes from Swartkrans, Taungs (by J. F. Heim) and Makapansgat (by Dr Ismond Rosen).

(J. P. Vorster)

From left to right: Dr L. H. Wells, Dr Alexander Galloway, and Mr Trevor Jones salvaging the skeletons from Bambandyanalo in 1936.

(Dr G. S. Chenik)

P. V. Tobias in 1945.
Four photographs of infant, adolescent, adult and mature Bushman females to show the retention throughout life of the infantile or 'sway-back' type of posture.
CHAPTER FIVE

Sceptics and Believers

From the moment *Australopithecus* was introduced to the world, laymen and scientists have naturally wanted to know about the age of the creature, while the immediate question usually asked by those making their first acquaintance with anthropology is how it is possible for bones to be preserved for a million years or more.

It will be remembered that the skull and endocranial cast were found in a lime quarry and, though embedded in reddish sandstone when I received them, the spaces therein and the cast were covered by glistening white calcite crystals. Lime-covered cliffs like this are caused by dolomite, a calcareous rock formed originally under the sea by the depositing of calcium and magnesium salts around seaweed and the lime from sea animals and plants. Consequently it is a soluble sort of rock and surface water running over dolomite areas in dry countries becomes heavily lime-laden. When, as at Taungs, these lime-laden waters come to a cliff, the water evaporates and a solid curtain or waterfall of lime covers the face of it. Caves and galleries gradually form and become filled with dust and lime in this vast and thick mantle of glistening calcite. When animals die in these caves, their bones become covered with wind-blown sand coated and covered with lime which, being an alkaline solution, does not eat up the bones as do soil acids. The bones are often perfectly preserved in their protective coating of lime-consolidated sand and become bone-bearing rock—or bone breccia, as it is known to scientists.
The final answer about the age of *Australopithecus* still eludes us. Absolute assessments of age are not yet possible for deposits more than 40,000 years old—the limit that can be dated by the carbon isotope technique—and less than two billion years old, which was the limit then achieved by the technique based on the transformation of uranium and thorium into lead. It is within this enormous span and believed to be within the last 1,000,000 years (the Pleistocene period) that *Australopithecus* lived on earth. Only last year, Dr. Evernden and his associates of the University of California, Berkeley, announced a new potassium-argon technique that promises to give accurate measurements for the Pleistocene, or human, period, but at the time of writing this method is still being tested.

The Pleistocene age estimates are based in Europe and America on the annual rings of growth in trees and the silts deposited annually by retreating glaciers, and by comparing terraces above river beds with raised beaches above sea-level and with the great glacial moraines left by the four Ice Ages. Africa's glaciers were restricted to her highest mountains. Whatever fluctuations of climate she had were between dry and damp phases whose relation, if any, to Europe's Ice Ages are not yet adequately known.

We have to rely, therefore, on geologists, who are now generally agreed that the Pleistocene period with its four Ice Ages is not more than 1,000,000 years old. As South Africa escaped these relatively recent glaciations it was impossible to estimate the ages of different strata as in Europe, where the abrupt climatic changes of the Ice Ages are marked by deposits of destroyed fauna. The practical approach was to compare the terraces of the rivers and shores and their fossils.

The only way in which estimates could be made was by digging out various animal fossils from the australopithecine sites and comparing them with similar fossils found in sites which could be approximately dated. When the Taungs skull was described as that of an advanced ape resembling
man in various features, Professor R. B. Young, my geologist colleague, made a detailed study of the locality and the valley alongside and stated that the Buxton limestone deposit at Taungs was probably Pleistocene. This too was the conclusion of the late Dr. W. D. Matthew, the American Museum of Natural History's leading paleontologist, who wrote that on the fossil evidence he would regard the deposit as Lower Pleistocene.

These experts corroborated my own original opinion, backed by Broom, that Australopithecus was about one million years old. This was more than twice the age of Dubois's Java Man, the most significant find in Asia, which after being locked away for more than thirty years was again in the limelight when my discovery was announced. In spite of Darwin's predictions that Africa would prove to be the cradle of man, the foremost paleontologists had been of the opinion for far too long that man would find the answer to his historic riddle in Asia to believe that anything bearing on man's border-line past could come out of Africa. Consequently, as will be shown, this continent was consistently ignored while American money was pouring into anthropological expeditions across the Pacific Ocean to the Far East.

Inspired by Dr. W. D. Matthew and the Asiatic concept, Roy Chapman Andrews had organized an American Central Asiatic expedition back in 1920. The Gobi Desert and Mongolia became the natural destination of this amazing search. It yielded evidence of human beings who had practised Mousterian (Middle Stone Age) and Late Stone Age cultures, but no traces of more primitive men. But they did unearth fossils of far remoter geological eras, such as the 150-million-year-old dinosaurs of the Mesozoic Age and even their eggs.

For many years before that apothecaries' shops in Mongolia had been a happy hunting ground for German scientists who had been attracted to them as sources of fossil material. During the Boxer Rebellion of 1900 it was
discovered that from time immemorial Chinese apothecaries had been dispensing ground fossil teeth and bones—advertised as ‘dragon’s teeth’—in their cures. These shopping expeditions had yielded material from fossil antelopes, giraffes, hyenas, sabre-toothed tigers, elephants and rhinoceroses. Professor Max Schlosser of Munich bought a molar tooth that could have belonged to either a primitive man or an advanced ape.

In the very same year as my discovery, Father Teilhard de Chardin, the outstanding French paleontologist, was sent to China by the Institut de Paléontologie Humaine and discovered extensive hearths and factory sites of Early Stone Age Men buried beneath the great deposits of wind-blown dust in North-West China.

The oriental expeditions continued and in Java and China they brought to light remains of *Pithecanthropus* and his nearest relations. Yet it has never been suggested since Virchow’s early objections were overruled that any of these was ancient enough to be man’s first ancestor or primitive enough to be confused with an ape.

But through those expeditions one of the greatest contributions to our knowledge of man’s past was made by Professor Davidson Black, a Canadian who had also studied under Elliot Smith at Manchester in 1914. When the Rockefeller Foundation spent $44,944,665—the largest contribution it had ever made to a single project—to establish a medical college at Peking, Black was appointed its Professor of Anatomy in 1922. Like myself he had imbibed his chief’s passion for anthropology and he regarded his appointment at Peking as an opportunity to take up the search for the ‘Missing Link’ which he believed would be found in Asia. At first he searched caves and river terraces both in China and Siam but without finding anything of significance.

On his return to Peking, however, he was approached by Dr. J. G. Anderson, a Swedish geologist, who had found two primitive teeth at a site known to the Chinese as
Dragon's Hill near the village of Choukoutien, 37 miles south-west of Peking. Black was convinced that the teeth were those of an exceptionally primitive human being, and such was his enthusiasm that he persuaded the Rockefeller Foundation to provide funds for a major search there. Agreement had to be reached with the Chinese Geological Survey who insisted that any specimens found belonged to China. A Swedish scientist, Dr. Birgir Bohlin, supervised the field work, which began in April, 1927, under the general direction of Davidson Black.

In October, after sending more than 500 boxes of fossil-bearing rock to Peking, Bohlin found a human tooth close to the spot where the first two teeth had been discovered. He immediately took it to Black who identified it as the first molar of an eight-year-old child, unquestionably human but differing so greatly in his opinion from the corresponding tooth in Chinese children and also from Neanderthal Man that he created a new genus, Sinanthropus pekinensis (China Man of Peking), a species which was later to be more commonly known as Peking Man. Carrying the tooth in a special brass case attached to his watch-chain, Davidson Black toured Europe and America while on vacation that year in an attempt to enlist support for his new genus. Authorities on evolution were impressed but cautious. It was a small tooth upon which to base so impressive a classification and they waited the discovery of further material.

In 1928 a child’s jaw, some skull bones and twenty-odd teeth were recovered from 575 boxes of bone-bearing rock from Choukoutien, and the following year was even more successful when Dr. W. C. Pei discovered an adult Sinanthropus skull partly covered by sand and partly embedded in limestone alongside a complete rhinoceros skull. When these were handed to him Davidson Black knew without doubt that they completed the Sinanthropus picture. It was a first cousin of Pithecanthropus. From then until his death in 1934, he laboured day and night developing and
reconstructing the material from Choukoutien. His work was carried on by Professor Franz Weidenreich whose detailed series of monographs on the teeth, bones and skull of Sinanthropus are, apart from casts of the original material, the only records of the most complete collection of primitive human remains collected anywhere up to that time.

The joint efforts of the Chinese Geological Survey and the American Embassy in Peking to save the Peking Man collection when Japan declared war on America were to no avail. Today we do not know whether the bones were ground into medicine by the Chinese or lost at sea. During the Japanese occupation, American investigators made the most painstaking inquiries without ever finding a trace of the remains of some forty specimens of Sinanthropus.

Today there is much more support for the belief that Africa was man’s first home, but until the outbreak of World War II the attention of anthropologists and paleontologists in Europe and America and the financial reserves at their disposal remained fixed upon Asia as the key to the solution of man’s origin. Apart from the temporary South African interest in 1925 the scientific world and the daily press in America and Europe for nearly two decades after 1920 concentrated almost solely on the successful geological exploration of Mongolia and the Gobi Desert and the stupendous excavations at Choukoutien. Asia was the cradle of western, northern and eastern mankind. What dissonant squawkings were these from the puny South African infant at Taungs? Could anything good emerge from the Kalahari Desert? What was the use of a baby anthropoid when you were looking for men—and primitive men at that?

While scientific controversy over Australopithecus raged in Europe and America remained politely interested, the only overseas expert who could talk with a first-hand knowledge of South Africa was Dr. Hrdlička. In 1925 he went on a world-wide mission, visiting all the principal sites in India, Java, China and, having cabled about
Taungs, decided to include Africa in his itinerary. He arrived at my office towards the end of August and after examining the skull made arrangements to visit the Taungs site. He supported my view that the caves there were true ones in which animals had died and refuted the idea promulgated previously that the bones might have been washed into a fissure from above. He also agreed that the absence of forests might indicate that the Taungs type had grown daring and forsaken forest life.

As to Australopithecus being the missing link he cautiously reported: 'It is undoubtedly a missing link—one of the many still missing links in the realm of the primate ancestry.' In a subsequent lecture at a special meeting of the Royal Anthropological Society, with Sir Arthur Keith in the chair, he declared that Australopithecus was 'A new species if not genus of the great apes,' adding, 'Just what relation this fossil form bears, on the one hand, to the human phylum, and on the other to the chimpanzee and gorilla, can only be properly determined after the specimen is well identified, for which are needed additional and adult specimens.'

In South Africa miners in lime quarries were now on the lookout for bones, and boxes of breccia were turning up frequently at the Medical School for my inspection. Among these were lime-consolidated bones from Sterkfontein, thirty-five miles west of Johannesburg, and Makapansgat, a farm lying 200 miles north of the city. Both these limestone cave localities were to achieve world-wide fame as man-ape sites many years afterwards.

The Sterkfontein bones included the skull of a large baboon not greatly dissimilar from the living form, so I concluded that geologically this deposit must be relatively recent compared with Taungs. The bones from Makapansgat which had been sent by the local schoolmaster, Mr. W. I. Eitzman, were those of large animals, particularly antelopes. Some of them appeared to have been burned before fossilization so I sent samples of them to two chemists for
testing. When they reported that carbon had been isolated I assumed that Makapansgat must have been the site of great hunters and relatively recent people who were sufficiently advanced to cook their meat. This was the reason I felt justified in adding 'prometheus' to the already difficult name of Australopithecus when this too was found, in 1947, to be a man-ape site.

By the end of 1925, the initial excitement which had surrounded Australopithecus had faded. I was too occupied with other responsibilities to sit brooding on it, having been appointed Dean of the Faculty of Medicine. In addition to its inadequate medical school, the university had decided to establish the first dental school in Africa, which, until 1929, also fell under my administration. Broom, Hrdlička and all visiting scientists were given complete access to the skull and I continued writing articles on the discovery for scientific journals whenever requested, but my work at the university kept me too busy to concentrate primarily on anthropological research.

Perhaps, like Davidson Black, I should have travelled overseas with my specimens to evoke support for my beliefs, and I was presented with this opportunity. The Witwatersrand Council of Education wrote to say they appreciated that, because of the lack of comparative material in the form of anthropoid skulls of corresponding age, it would be impossible for me to perform a satisfactory monographic study of the Taungs skull in South Africa. The Council said they were willing to defray the expenses of my going to England for this study provided I donated the skull to the university. After careful thought, I decided I could not be bound by such a conditional undertaking, nor was I prepared to absent myself for so long a time from the young department and my newly established home.

My initial qualms about my new post had given way to burning pride in the Medical School. My duties were many and varied—from developing graduate and undergraduate education to writing up, in longhand, the minutes of faculty
meetings. One of our greatest burdens was the absence of a medical library, but in 1926 I was able to establish a joint Witwatersrand Medical Library in the Medical School with the collaboration of the Johannesburg General Hospital, the university and the local branch of the Medical Association. The reader will get an idea of the difficulties under which we all worked at the University of the Witwatersrand in those days from the fact that this medical library was the first joint library established in the university. At first it was conducted by two medical students on a part-time basis and later by the local branch of the Medical Association of South Africa, whose secretary also served as librarian.

This state of affairs continued until 1929. In the previous year two representatives of the Carnegie Foundation, Mr. J. Ferguson and Mr. A. S. Pitt, visited Africa to explore the library situation in the Union, the Rhodesias and Kenya. When they saw our pitiful collection of medical reference books, they were horrified.

‘How on earth have you been able to do any research with a library like this?’ they asked. I pointed out that my position was no different from that of any medical practitioner between Cape Town and Cairo. They indicated their deep concern about the medical school by making an immediate grant of £12,000 for library improvements, with £5000 specifically allotted to the University of the Witwatersrand.

I expected the subject of Australopithecus to be revived in 1927 when the British Association for the Advancement of Science met in Leeds, under the presidency of Sir Arthur Keith. After all they had had two years to examine the casts and other evidence and I confess that I followed reports of the association’s proceedings with some excitement. But although Keith emphasized the importance of Pithecanthropus and Eoanthropus (Piltdown Man) he pointedly omitted any reference to the Taungs skull. In the same year, however, in contributing a chapter on the evolution
of man to J. A. Hammerton’s *Universal History of the World*, he made mention of it.

Keith wrote:

I am certain that when the adult skull . . . comes to light the facial development will prove to be greater than that of the chimpanzee and smaller than that of the gorilla . . . but to be accepted as a missing link in the chain of man’s ancestry, it must have claims to a respectable antiquity; but it was probably Early Pleistocene; *Australopithecus* thus appears too late in the geological record to play a part in Man’s ancestry.

He dismissed any human characteristics in the Taungs skull as ‘largely due to the youth of this particular specimen’.

These disparaging remarks had the effect of shaking even some staunch local supporters and this loss of confidence was reflected in the Cape Town newspaper, *Cape Times*, which attacked my views in a leading article. A copy of this leader was sent to me by Lancelot Hogben, then the iconoclastic young Professor of Zoology in the University of Cape Town, who was later to astonish his colleagues by demonstrating the best-selling possibilities of such unlikely subjects as *Mathematics for the Million*, *Science for the Citizen* and *The Loom of Language*. He wrote, ‘Dear Dart, Saturday’s issue of the *Cape Times* contained a leader attacking your views and citing at great length the old dotard referred to in my letter. You may be interested to see it.’

He enclosed a copy of the stinging reply he had sent to the newspaper which was subsequently published under the heading ‘The Taungs Skull’. It read:

Sir, Saturday’s issue contained a leader on the Taungs skull which calls for critical comment. Whatever value is attached to Professor Dart’s interpretation of the affinities of this interesting specimen, its validity is not disposed of by citations, however well documented, from the pen of one individual in the somewhat ecclesiastical vocabulary of the writer of the article . . . Sir Arthur Keith’s conclusions have no more value as conclusions
than those of Professor Dart, unless the evidence on which they are based commends itself to other persons equipped to form a proper perspective. The author of your leader did not see fit to quote the judgement of any other specialist in this field. Sir Arthur Keith has occupied a very prominent place in anthropology, and justly so. Most scientific men and, I presume, Professor Dart among them, will rejoice that so distinguished a scientist has been spared to his relatives and friends so long. But if Press reports of Sir Arthur Keith’s comments are to be credited, one can only say that one prefers to suspend judgement on Professor Dart’s thesis, awaiting the testimony of those who are evidently more in touch with contemporary science.

The year 1929 was memorable for two things. After working painstakingly on the Taungs skull for four years, I had written a monograph upon it and finally separated the upper and lower jaws on July 10. This almost coincided with the visit to South Africa of the British Association for the Advancement of Science.

For the first time the entire pattern of the teeth was displayed and casts of them could be sent to dental experts all over the world. Among these was Dr. W. K. Gregory, Curator of Comparative Anatomy at the American Museum of Natural History. He immediately concluded that *Australopithecus* was not closely allied to the chimpanzee but was near to the ancestor of man, and catalogued its 26 dental characters as follows:

<table>
<thead>
<tr>
<th>Nearer to the chimpanzee</th>
<th>Nil</th>
</tr>
</thead>
<tbody>
<tr>
<td>To the gorilla</td>
<td>2</td>
</tr>
<tr>
<td>To both chimpanzee and gorilla</td>
<td>1</td>
</tr>
<tr>
<td>Common to chimpanzee, gorilla and primitive man</td>
<td>3</td>
</tr>
<tr>
<td>Transitional to or nearer to primitive man</td>
<td>20</td>
</tr>
</tbody>
</table>

Gregory added, ‘Now in the light of all this additional evidence, if *Australopithecus* is not literally a missing link between our older dryopithecoid group and primitive man, what conceivable combination of ape and human characters would ever be admitted as such?’
Professor T. Adloff in Germany was even more emphatic. He stated that from his knowledge of the teeth of anthropoids he did not have the slightest hesitation in excluding *Australopithecus* from the anthropoids and claiming it as a genuine hominid (*echte Hominide*).

When the British Association met in Johannesburg, I had hoped there would be great desire among the visitors to see the skull. Although some examined and made non-committal comments, it was obvious that few regarded it as anything of real importance in the evolutionary story.

Having separated the jaws, I completed my monograph on *Australopithecus*. My wife, whose medical studies had been interrupted by our marriage, had resumed them in Johannesburg and planned to go to England for a postgraduate course in 1930. At the end of 1929 the Italian Scientific Expedition arrived in South Africa. They invited me to travel overland with them to Italy and, as my sabbatical six months’ leave was due, I felt I could not refuse the opportunity to see more of this vast continent.

Extensions to the Medical School had been completed, the Anatomy Department had been established and could now be left in the hands of a competent staff. The library was on the point of materialization; a museum and skeletal collection had been initiated; baboon, rat and mouse colonies had been founded. I left Johannesburg for Europe on May 24, 1930 with an easy mind and with *Australopithecus* securely locked away in a little wooden box in my wife’s keeping. The chance to confound my critics would come when we met again in London.
CHAPTER SIX

From Fossil Bones to Living Men

My overland journey across Africa with the Italian expedition, led by Attilio Gatti, took eight months. This period turned out to be possibly the most exciting of my life, providing me as it did with an understanding of Africa and its peoples which I had previously lacked. My earlier feelings of being an exile and any disappointment felt during the five years since my discovery and its rejection by other anthropologists were washed away in my own sweat. We went through Central Africa by way of Broken Hill, Elizabethville, Bukama, the Lualaba tributary of the Congo River, Lakes Tanganyika and Kivu, the Albert National Park, Ituri Forest, Iruma, Kilo-moto, Aba, Juba and down the Nile.

For the first time I saw the Zimbabwe ruins over whose background I had dared to cross swords with Miss Caton-Thompson, and Solwezi, a site of curious rock engravings whose age has recently been determined by the Carbon 14 technique to be about 4958 years B.C., a rival in antiquity to the Egyptian early predynastic era. Perhaps the greatest thrill was in tracking a gorilla in the Congo after Gatti had been granted the rare honour of shooting one for an Italian museum. These gorillas are so carefully preserved by the Belgian authorities that few people are allowed the privilege of even visiting their haunts in the mountains to take pictures of them. After trekking for three days, our Pygmy guides led us to a group of five gorillas which were resting. Gatti shot a huge male which measured 6 ft. 9 ins. and weighed at least 400 lbs.
When I arrived in London early in February of 1931, lean, bronzed and feeling like a Rider Haggard character, I felt confident enough to tackle anything. Here in my spiritual home, I was sure, I could influence my colleagues to accept my belief that in finding *Australopithecus* I had bridged the gap between ape and man. Shortly before meeting me in Naples Dora had demonstrated the skull in Austria at a small informal gathering of Austrian scientists. Among these was Walther Abel, the son of the famous Viennese paleo-biologist Othenio Abel. He took the opportunity of making a detailed comparison of *Australopithecus* with a gorilla skull.

Dora broke the disappointing news as gently as possible. Briefly it was that Abel regarded my man-ape as having a common ancestry with the gorilla, although it lacked the latter’s large canines. The reduction of the face and the lengthening of the brain represented an evolution parallel in some respects with that of man; it might even be derived from the same Miocene stock as gave origin to man, but the features it was bound to possess in the adult prevented its being accepted as a human ancestor.

On arrival in London I had immediately got in touch with Elliot Smith, Keith and Smith Woodward. They were all friendly and hospitable but were much more interested in telling me about the recently discovered Peking Man remains than in listening to my story. Elliot Smith had a particular interest in Davidson Black’s discovery, for in the previous August he had visited the Choukoutien site at the invitation of the Rockefeller Foundation.

‘I’m exhibiting casts of these wonderful creatures at a meeting of the Zoological Society of London on the evening of February 17,’ he told me when our greetings were over. ‘Will you come along as my guest—and bring your Taungs baby with you?’ I readily agreed, for this seemed a splendid opportunity for me to present my case properly.

With Sir Arthur Smith-Woodward in the chair, Elliot Smith gave a graphic account of his visit to Asia and a
masterly demonstration of *Sinanthropus*. Assisted by lantern slides he showed how these creatures were a confirmation of Dubois’s Java Man, upright in posture, cannibalistic and sufficiently advanced to have known how to make fire. He sat down to resounding applause and the chairman, after introducing me briefly, gave me the floor.

This was no setting in which to vindicate claims once daring but now trite. I stood in that austere and chilly room, my heart bounding with the hope that the expressions of polite attention on the four score faces before me might change to vivid interest as I spoke. I realized that my offering was an anti-climax but with undiminished optimism launched into my story.

What a pitiful difference between this fumbling account and Elliot Smith’s skilful demonstration! I had no plaster casts to pass round, no lantern slides to throw on the screen to emphasize my points. I could only stand there with the tiny skull in my hand, telling the audience what I saw as I looked at it—all of which had been previously published, with illustrations.

My address became increasingly diffident as I realized the inadequacy of my material and took in the unchanged expressions of my audience. After the meeting a few of those present clustered round the skull to examine it and assess for themselves how much it resembled or differed from an ape’s. At least it dispelled any doubts they had as to *Australopithecus*’s authenticity or that my illustrations and casts had been distorted, as the chairman had once suggested. But mine had been a pathetic unrehearsed showing and when I dined later that night with Elliot Smith, J. P. Hill, William Wright, Solly Zuckerman and R. H. Burne, I probably proved a sorry companion. Elliot Smith, perhaps sensing my disappointment, invited me to dine the next night with him at the Royal Society Club. This club was composed of a very select group of Fellows who met convivially and who brought along from time to time to their gatherings guests to talk about their discoveries.
I was placed on the left of the chairman, Sir Charles Vernon Boys, the brilliant scientist who in 1900 invented the revolving lens lightning camera, with which Schonland in Johannesburg and MacEachron at Pittsfield, U.S.A., subsequently discovered the gradual development of single lightning flashes. Elliot Smith introduced me and I repeated my tale of discovery, reasoning and conclusions.

Happily there was a marked difference in my reception by this small but eminent gathering. There was no difficulty about demonstrating, as everyone there had an opportunity of examining the skull and endocranial cast as I spoke. As a result, they listened entranced and kept up a steady flow of pertinent questions. I left the club certain that, while I may not fully have convinced any member that what he had held in his hands was an ancestor, none of those present was likely in the future to dismiss Australopithecus as an insignificant ape.

My presence in London had done little, however, to convince the Royal Society Committee about the importance of publishing my monograph on the discovery, which had been sent the previous year to Elliot Smith. He informed me shortly before my return to South Africa that the committee was not prepared to recommend the publishing of any section other than that on the dentition. Sir Arthur Keith had already told me that he had written an exhaustive description of the cranial material for his forthcoming book on recent anthropological discoveries, so I took my manuscript back to South Africa in the hope that a more propitious occasion would present itself in the future. The thorough analysis but adverse conclusions concerning the fossil which I knew was soon to appear in Sir Arthur Keith's new book reflected the British attitude, and Wolfgang Abel's detailed paper of 100 pages about the dentition made any further publication by me in Europe superfluous.

I left my fossil with Elliot Smith so that Mr. F. O. Barlow, the British Museum's skilful maker of casts, could make accurate casts for distribution throughout the world.
Dora was continuing her studies in London for several more months and it was arranged that she would bring the skull back with her in August. This arrangement resulted in a nerve-racking incident for my wife and a wonderful story for the newspapers.

On the night before leaving for South Africa, Dora called on the Elliot Smiths to pick up the skull. After spending the evening at their home in Hampstead she was kindly escorted back to her hotel in a taxi by my old professor. With his customary affability Elliot Smith dismissed the taxi at the entrance, so that they could spend further time chatting over coffee in the lounge.

It was only after returning to her room and undressing that Dora realized she had not brought the skull upstairs with her. It had been left in the taxi! She told me afterwards that she was on the verge of collapsing from anxiety when she realized this—for, although my belief in its importance was generally discredited, she had lived with the skull long enough to be certain that one day it would be recognized as the missing link in the human story.

Pulling herself together, she began wondering what to do. It was already late and she did not like disturbing any of her friends at midnight to ask for advice. Then she decided on the only possible course of action—to call Elliot Smith who, although he might by now be in bed and in spite of not agreeing with me on the status of Australopithecus, realized how vitally important it was for her to return it safely. Elliot Smith had retired for the night when she telephoned but, putting his personal comfort aside immediately, he told her to come to their residence in a taxi. When she arrived, he was fully dressed and together they walked to the local police station where the desk sergeant promised to alert all other stations.

The sergeant failed, however, to inform at least one police station immediately—the one in the Fulham district. Apparently, it was not until about 4 a.m. and many fares later that the taxi driver discovered the little box, neatly
parcelled in brown paper, in the back of his cab. He was then cruising in Fulham and handed it in to the duty sergeant. The sergeant, after making sure that there was no clue of any address on the outside, opened it. His astonishment at finding a grinning skull inside can be imagined and it seems more than likely that he imagined he had stumbled across a case of murder.

However the Fulham station, on receiving the general message later that morning, saw that the box with its precious contents was delivered to Dora and she was able to catch the boat train to Southampton with an easy mind.

By the time Dora arrived back in Johannesburg, I had picked up the threads once more and was too busy organizing this ever-growing school and faculty to fret over my frustrations in England or even to do much personally in the anthropological field. There were, however, several events which aroused my interest as a physical anthropologist.

One of the most intriguing riddles arose from the discovery of an ancient civilization at Mapangubwe in the Northern Transvaal in 1932. The whole episode furnished another indication to me of an opposition and in some instances distrust which I now found was spreading even in South Africa, the scene of my discovery.

Toward the end of 1932, a party of three students from the University of Pretoria, led by Mr. E. S. J. van Graan, a former student of the same university, located the entrance to the sacred hill of Mapungubwe which had previously been only a legend. It was known that the natives of those parts worshipped the hill and it was suspected that somewhere in it was some sort of temple or shrine. This was confirmed by an old African whom, with his son, they prevailed on to lead them up the secret path. Half-way up the hill the old man said he could go no further and, almost fainting with terror, he was allowed to leave the party while his son led them to the top through a narrow defile.

At the summit they found a breastwork of stones and
great boulders balanced on smaller stones—patently ready for pushing over the cliffs on to any intruders. They had entered a veritable fortress. Scattered over the top were pieces of pottery and further investigation revealed a large number of earthenware pots near the top of the ascent, buried up to their necks. These had obviously served as a water reservoir. Fortunately, there had been an exceptionally heavy cloudburst in the area several weeks before which had eroded the summit enough to reveal rusted iron tools, bits of copper wire, glass beads and a piece of yellow plate which Mr. van Graan recognized as gold.

An excited search followed and the party soon found more gold in the shape of beads, bangles and skilfully made gold beaten work. The following day the search continued and more plate gold was found, some of it shaped in the form of small rhinoceroses which had originally surrounded a core of wood, long since reduced to dust. There were beautifully made tails and ears of solid gold which had once been tacked on to these animal figures.

The party then came across bones which they thought marked the site of an opulent burial. Their guess was right and on excavating with growing circumspection they laid bare a chamber in which lay the remains of the first skeleton found south of the Limpopo surrounded by gold ornaments. They extracted the bones with as much care as the circumstances allowed but much of the skeleton disintegrated before their eyes as the air got to it. They were not too horrified to make a thorough search of the burial chamber which brought to light no less than 70 ounces of golden treasure trove. There were 180 thin gold bangles, still intact, and under the left arm lay a black polished bowl, exquisitely made. Under the skull were pieces of gold plate which had apparently adorned a wooden headrest and nearby a bowl-shaped piece of gold plating. There was also a thick gold bangle, a gold circlet and a gold sheath which had probably ornamented his badge of office.
The searchers split the spoils and went their ways, but Mr. van Graan decided that his old professor at Pretoria, Leo Fouché, should know of the discovery. Professor Fouché was highly excited at the news and persuaded the others to part with their treasure in the interests of science. The gold was sent to the Royal Mint at Pretoria to be assessed. The deputy-master, Mr. R. Pearson, reported that the gold was of great purity—the bangles being 91·23 per cent, the two pieces of plate 98·82 per cent and the beads pure gold. The total weight recovered was 75 ozs.

Professor Fouché immediately brought the discovery to the notice of the Government, which bought the farm on which Mapungubwe stood and declared it a national monument. A committee was formed and during the following two years further investigations at the site brought to light the remains of twenty-four burials. Sir Arthur Keith was requested to examine the skeletal remains.

Keith replied that he was not prepared to do so when there were competent anthropologists in South Africa who had ample remains of the living population to compare with those at Mapungubwe. My participation in the interpretation of these remarkable discoveries had been avoided so that when Professor Fouché, who had recently joined the staff of the university, asked me to undertake the work following Keith's refusal, I too declined. I explained that I would have gladly undertaken the investigation but feared lest any report I might make on the remains would be regarded as prejudiced.

I suspected—quite rightly as it turned out—that I would be accused of trying to prove my own theories because of a conflict in attitude towards the Zimbabwe and other Rhodesian ruins that had developed between Miss Gertrude Caton-Thompson, the British archaeologist, and myself at the 1929 meeting of the British Association for the Advancement of Science. But I gladly placed the resources of the department unreservedly at the disposal of Dr. Alexander Galloway, who, as an Aberdeen graduate
and a recent arrival from Canada, could approach the problem objectively. With a background of five years of local experience, he was already familiar with skeletal remains found in Africa from Kenya to the Cape and had ready access to the comparative material essential for his work now gathered in the department and numbering hundreds of skeletons. In addition he had as companion Dr. L. H. Wells, now Professor of Anatomy in the University of Cape Town.

I could well have spared myself this scrupulous excess of modesty. Galloway’s report on the skeletal remains at Mapungubwe in *Mapungubwe: Ancient Bantu Civilization on the Limpopo* concluded that it represented a homogeneous Boskop-Bush population physically akin to the post-Boskop inhabitants found in the coastal caves of South Africa. They had inhabited the country before the coming of the Bantu. The variegated glass beads accompanying the burials were obviously trading beads of Oriental origin, some of them identical with those found in Indian kitchen middens of the eighth century.

The book containing Galloway’s analysis was handed to Miss Caton-Thompson to criticize the section dealing with the excavations and culture and to G. M. Morant to discuss the skeletal remains for *Antiquity*. Miss Caton-Thompson could not forbear an attempt to discredit the analysis of the skeletons by pointing out that it had been performed by ‘Dr. Galloway, a member of Professor Dart’s staff at Johannesburg’. She also added a misleading footnote to the effect that ‘Professor Dart himself has always hotly maintained his belief in the non-Negro origin and very ancient date of the Rhodesian ruins.’

Not having investigated the Rhodesian ruins archaeologically I had at no time been in a position to judge their absolute antiquity. I was, however, familiar with their geographical extent and nature and had repeatedly protested, orally and in writing, against those who had glibly dubbed the ruins and the cultural influences they represented
‘Bantu’. It was my contention that hitherto archaeologists had failed to assess these ruins in relation to their total setting of ancient mining, terraced irrigation and seaborne contacts foreign to South Africa.

These ruins, which show evidence of a previous civilization in that part of Africa, were originally classified as Bantu by Professor Randall MacIver in 1905. Shortly before the association met in Johannesburg I had written a paper pointing out that the distribution of ancient copper, tin and gold mines in Southern Africa, along with the comparison that could be drawn between bronze made in the Transvaal and the bronze statue of Pepi I of the 6th Dynasty B.C. and the bronze gates of Shalmaneser in Assyria, demonstrated the ancient nature of the mining background to Rhodesia’s ruins. This belief was supported by Bushman paintings which depicted naked Bushmen alongside robed and armed figures bearing headgear of Phrygian and Babylonian type.

Miss Caton-Thompson’s excavations had revealed cultural contacts with foreign lands and had pushed the date of the Zimbabwe ruins back to A.D. 900 but they were still dubbed indigenous and mediaeval. I contended that it was impossible to understand these ruins in Africa and to date them without first investigating the background of ancient mining and Bushman paintings and studying the whole territory from the Congo to the Cape.

The purpose of this digression is to picture this dignified, inflexible woman whose influence upon African archaeology from Egypt to Rhodesia has been redoubtable. Tall, white-haired and always dressed in a grey flannel tailored suit and grey felt hat, she later put me and many younger men and women to shame during expeditions in the steamy heat of Northern Rhodesia and the Belgian Congo in 1955. The rest of the Pan-African Congress in Prehistory party were dressed as informally as possible, but Miss Caton-Thompson stuck to her formal everyday wear. Like Dr. Broom in his stiffly starched white collars, she was
indefatigable; and while we slogged tiredly along, blinded by our own sweat, she looked as cool and composed in her precision of dress as if she were attending a vicar's tea party. Apocryphal as such stories may be, I learned later that she had made such an awesome impression on the natives of the Zimbabwe district in 1929 that they took to shushing fractious children by threatening to summon 'the Missy Gertie'.

Meanwhile Morant took exception to Galloway's temerity in basing his opinion on the imperfect skeletal remains of the eleven individuals that further searchings at Mapungubwe had revealed, and in diagnosing their racial divergence from the Bantu, principally by non-metrical features. Morant thought it incredible that Galloway could derive so much information on so little evidence. He failed to point out that a considerable amount of information can be derived by competent persons from only a single skull or part of a skeleton, and that Galloway had more than adequate Bantu and Bush material at hand for statistical comparison.

In spite of Miss Caton-Thompson's comments, Captain G. A. Gardner, who had previously assisted her in Egypt, tackled the Bambandyanalo hill across the valley from Mapungubwe subsequent to the publication of the work we have been discussing and came to the same conclusions as Galloway. He excavated there a further 74 skeletons, some of them virtually complete, and said they were of even greater age than those associated with the Mapungubwe civilization. He reported that the ceremonial interments were totally different from any known Bantu burials. 'They are exactly similar to predynastic inhumations such as I have seen in Egypt, the body being partly or fully flexed and pottery, either whole or deliberately broken, placed around the corpse.'

Galloway was able to say of these 74 Bambandyanalo skeletons: 'There is not a single specifically Negro feature in any of the skulls hitherto discovered. The people are
thus true representatives of the pre-Negro indigenous people, with which the Bantu-speaking negro peoples had never hybridized.'

The discovery of Indian beads at Mapungubwe was a further indication that the Rhodesian civilization owed its inspiration to external influences from centres of more advanced civilizations from the East. It was contact with these Eastern peoples that must have been responsible for the ancient mining and ruin cultures in Southern Africa.

My own interest in this belief was whetted when, by chance, I was presented with the first irrefragable piece of evidence linking Southern Africa directly with China. Marco Polo, who had served the Mongol emperor Kublai Khan for 20 years, recorded information given to him by Chinese informants about Zanzibar, Madagascar and Abyssinia—information that had been in their possession for three centuries. But the earliest tangible evidence in South Africa, apart from the physical features of some of its inhabitants, suggesting that Chinese or some other Mongolian people had come to this country in pre-Bantu times, were Bushman paintings discovered in the Cape Province at Barkly East and along the Kei River.

These paintings depicted people dressed in peaked Chinese and peg-topped Mongolian hats and, of course, there was—and still is—visual evidence of the Oriental influence in the peaked straw hats with typical Mongol knobs worn by Basutos.

In 1938 I heard of a strange incident which had taken place at St. Augustine’s Mission at Penhalonga in Southern Rhodesia when the priest in charge, Father Shropshire, was showing a Chinese educationist, Mr. C. H. Tien, around the village school. As is usual in parts of Africa, the walls of the buildings were colourfully decorated with geometric designs. Mr. Tien became agitated on observing one of these designs and demanded to know its origin.

The startled priest said he did not know. It was a design commonly used on walls and on clay pots made locally by
the natives. Becoming more excited, Mr. Tien asked if there was nobody who would know.

'Perhaps the village schoolmaster,' said Father Shropshire. 'But may I ask why?'

'Because that design spells my name—Tien—in Chinese script!'

The village teacher was unable to help. The design was traditional and had been used by the tribe for generations. Mr. Tien was so affected by the incident that before leaving the mission, he asked if he might sign his name in the visitors' book in Chinese alongside the English rendering of his name. When I heard of this, I wrote to Father Shropshire who not only confirmed the story but kindly cut out the two signatures and sent these to me for subsequent publication.

In 1937 I had been given a further opportunity of exploring Africa's Oriental contacts. That year a great exhibition covering the whole of the British Empire was to be held in Johannesburg and Donald Bain, a colourful hunter who had made the Kalahari desert his hunting ground, had the idea of collecting a party of Bushmen to put on display. Up to that time, no full study had been made of these tiny, yellow-skinned wizened creatures who live in the desert region by hunting and grubbing for insects and vermin. Bain invited me to accompany him to ensure that those he selected were true Bushmen, and this provided the university with a heaven-sent opportunity to send a party of scientists to the Kalahari to examine various aspects of the Bushman language, music and culture.

At that time only two European linguists in South Africa were familiar with Bushman languages, with their complicated clicks, and one of these, Professor Louis F. Maingard, was on the university staff. Also in the party were Professor C. M. Doke, Professor of Bantu Studies, Professor Percival Kirby, head of the Department of Music, Professor I. D. MacCrone, Professor of Psychology, two laboratory assistants and Professor Maingard's son John, a medical doctor
who was to assist me and examine their physical condi-
tion.

When we arrived at Bain’s camp at the junction of the 
Auob-Nosob rivers on the South African—South-West 
African border, Bain told us he had collected nearly 80 
Bushman of both sexes and varying ages. We all went 
about our various tasks and for the next month I was occu-
pied in measuring the little people from top to toe while 
my helpers made face masks and took photographs of them 
from every angle. I was astonished to see Mongolian 
features in many of the men and women. There was one 
man in particular who, had he been dressed in a coolie hat 
to cover his peppercorn hair, could have passed as Chinese.

The face masks provided some difficulty. First of all the 
person’s face has to be smothered in petroleum jelly and 
than a paste made of plaster of Paris and water smoothed 
on. Our subjects were highly suspicious at first but when 
Eau-de-Cologne was added to the jelly to make it smell nice 
and they were told that the masks were good muti (medi-
cine), they readily co-operated. After they had once had the 
treatment, some asked if they could have it again for, they 
agreed, it was certainly good medicine. Of course the face 
mask had had an effect similar to that of a mud-pack on a 
woman at a beauty salon so that the little people felt 
wonderfully refreshed after the operation.

For the Bush people, our month there was a dream 
period. Instead of having to grub for insects, reptiles and 
other small game for their food or go hunting big game 
with bows and arrows, they were frequently provided with 
their basic food. For the team of scientists it was a most 
rewarding experience—particularly for me. Not only was 
I more certain than ever that the Indian Ocean route had 
played a big part in bringing Asiatics to Southern Africa 
but here I had been able to examine ‘living fossils’.

I concluded that the Bush type was closely akin to, if not 
identical with, the Pygmy type of Central Africa, although 
containing more of an ancestral African stock. The facial
features of many I examined were distinctive in character and belonged to the ancient Boskop type. The Late Stone Age techniques of the Bushmen with their bows and stone-tipped arrows, only slightly in advance of the techniques in Boskop (or Middle Stone Age) times, afforded a vivid living daily picture of man's past. The secret of their deadly arrow poison, made by grinding the pupae of moths, was revealed by the samples we brought back for pharmacological investigation by Professor J. M. Watt and Dr. Breyer-Brandwyck. But I was chiefly struck by their retaining into adult life an infantile type of human posture (see Illustration between pages 48 and 49).
CHAPTER SEVEN

Valley of Bones

My interest in anthropological matters not directly related to Australopithecus—two of which I have given in the previous chapter—and my studies in comparative neurology filled most of my spare time between my disappointing visit to Britain and the period of my vindication after Broom's discoveries at Kromdraai and Sterkfontein from 1936 to 1949. A popular but unfounded legend has grown up that following the unresponsive attitudes of my overseas colleagues, Achilles-like, I retired into some parochial tent to brood and sulk. Thus Ruth Moore in her excellent book, Man, Time and Fossils (1954) says:

With the exception of the few believers, the rest of the scientific world joked about the 'South African missing link' or forgot the subject for most of the next decade. The South African find joined the limbo of discoveries about which someone has been over-enthusiastic. Dart himself was hurt by the treatment he had received and felt discredited. He did not attempt to follow up his work with further explorations.

Herbert Wendt in I Looked for Adam (1955) stated even more dramatically: 'The other gentlemen greatly enjoyed themselves at his (Dart's) expense and that of his "Baby". Their jokes went on so long that Dart gave up his investigations in disgust.'

Searching about for the source of the legend, I fancy I have run it to earth in the slender but popular book published by Dr. Robert Broom, Finding the Missing Link
(1950). In the inimitable style that stamped his public lectures, he seized there the opportunity of voicing his own objections to what he regarded as petty criticism and, incidentally, of indulging the Scotsman's traditional love of having a tilt at the Sassenach. Broom wrote:

In England, most took little interest in what might be a being closely related to man's ancestors, but they were greatly interested in the pedantic question of whether the name *Australopithecus* was good Latin! Professor Dart might or might not be a great anatomist, but they were sure he was not a great classical scholar. As if it mattered in the least! Even one of the leading scientists in the British Museum wrote as follows in *Nature*, June 20, 1925: 'If you want to join in a game, you must learn the rules.' But even worse was his statement: 'Professor Dart does not realize the one-sidedness of his offences.' It makes one rub one's eyes. Here was a man who had made one of the greatest discoveries in the world's history—a discovery that may yet rank in importance with Darwin's *Origin of Species*; and English culture treats him as if he had been a naughty schoolboy.

I was never able to discover what were Professor Dart's offences. Presumably the most serious was that when he found a very important skull he did not immediately send it off to the British Museum, where it would have been examined by an 'expert' and probably described ten years later, but boldly described it himself, and published an account within a few weeks of the discovery.

Whatever may have been the occasion of the personal attack on Professor Dart, the results were very disastrous. Our wonderful South African 'Missing Link' was discredited, and became a joke; and no one worried to look for more; and at Sterkfontein, where quarrying was going on, many skulls and perhaps skeletons were burnt in the lime-kilns. Dart was naturally hurt by the treatment he had received; and in South Africa anthropological research was practically stopped for 10 years. I doubt if the attack did any good to the British Museum. In 1921 the Rhodesian skull was sent there, but no early human or pre-human skull has been sent to London since then, at least from South Africa.
The facts are not as colourful as my doughty champion has depicted. It was largely because I already had Drs. Galloway and Wells as assistants and Broom joined the department in 1934 that I was able to devote more time to my first love—comparative neurology. I had no burning zeal for fossils like Broom nor any preconceived mission to find a missing link like Dubois. When I came to South Africa I just had no opportunity of doing the microscopical research in which I had specialized because of lack of equipment. I was compelled, therefore, to find a method of passing my leisure time and the Taungs skull had proved a challenge which I willingly accepted.

With Broom now able to devote most of his energies to anthropology and Professor C. R. van Riet Lowe, a civil engineer who had made a number of important contributions to archaeology, now established as Director of the Bureau of Archaeology, I could safely leave the field to this growing team and did so most willingly although they frequently consulted with me.

Personal matters also intervened. My marriage with Dora had steadily deteriorated until finally we were divorced. Three years later I married Marjorie Frew, head librarian of the Witwatersrand Medical Library. By a curious coincidence assurance re-entered my domestic life at the end of 1936, the year Broom discovered Plesianthropus. But my new-found happiness was temporarily disturbed when I learned that my old friend and mentor, Sir Grafton Elliot Smith, passed away on New Year’s Day, 1937.

Broom’s work from 1936 played so great a part in convincing most of the doubters that Australopithecus was a man-ape, and his last years are so closely interwoven with my own story that a fairly full report of his investigations is essential.

For eighteen months after coming to the Transvaal Museum he had been making a collection of fossil reptiles, the description of which, when published in sixteen papers,
created a lot of attention. In 1936 he recovered a huge jaw from a cave at Hennops River near Pretoria which at first he was convinced was that of an adult Australopithecus. When cleaned out, however, it proved to be that of a huge and extinct type of baboon. The subsequent publicity encouraged two of my students to tell him of the Sterkfontein cave from which they had gathered a number of bones and from which a more primitive baboon type had been recovered by Trevor Jones, a third student of mine. Sterkfontein, which lies about thirty miles west of Johannesburg, had never been visited by a geologist or paleontologist until he went there, although there are reports of fossil bones being found there as early as 1897. For more than thirty years it had been worked as a lime quarry but was opened on Sundays, when quarrying was stopped, as a sightseers’ curiosity.

Prophetically enough, the owner of the property had written in a little guide book to the place the slogan, ‘Come to Sterkfontein and find the missing link’. The two students, G. W. H. Schepers and H. le Riche, took Broom to the caves one Sunday morning and introduced him to Mr. G. W. Barlow who supervised quarrying during the week and guided visitors on holidays. When Broom discovered that Barlow had once worked at Taungs and knew something of the skull discovered there, he asked him if he had ever seen anything like it at Sterkfontein.

Barlow said he rather thought he had and promised to keep a sharp lookout. Eleven days later when Broom again visited the caves, Barlow handed him a beautiful brain cast and asked, ‘Is this what you’re after?’ It had been blasted out that morning. Broom saw that it was the cast either of a man-ape or an anthropoid ape. He told Barlow, ‘That’s what I’m after,’ and spent the next few hours hunting without success through the blasted-out breccia in the hope of getting other parts. He did, however, find the natural cast of the top of the skull in the side of the quarry and cut this carefully out. The next day he returned with a party of
helpers and found the skull base, most of the jaws and teeth and part of the skull roof. It was the first adult man-ape discovered.

Broom decided that this creature was closely allied to the Taungs form but because of differences in the teeth, he felt justified in placing it in a distinct species which he called *Australopithecus transvaalensis*. Full accounts were published in *Nature* on September 19, 1936 and in *The Illustrated London News* under the heading ‘A New Ancestral Link between Ape and Man’.

Later that year when he attended an international congress of anthropologists in Philadelphia, U.S.A., he lectured on his find. His address, illustrated with lantern slides, created a profound impression among the delegates who included Hrdlička, Hooton, Gordon Childe, von Koenigswald and Theilhard de Chardin. At Columbia University he was given an honorary D.Sc. degree. His lectures also had the effect of attracting to South Africa the two most distinguished living authorities on primitive human dentition, Dr. W. K. Gregory and Dr. Milo Hellman of the American Museum of Natural History. They inspected the sites at Taungs and Sterkfontein and made a personal on-the-spot study of all the material.

Dr. Gregory had previously stated that the skull found at Taungs was not that of a human ancestor. At a symposium on anthropoid apes held at the American Museum of Natural History on January 13, 1932, he had discussed the fossil on the evidence of a cast exhibited there. The New York newspapers reported him as saying it was the skull of a baby ape in a remarkable state of preservation. He admitted, however, that this ‘ape’ showed more human characteristics than any other ape yet discovered.

‘It is safe enough,’ he said, ‘to consider it a definite link between man and anthropoid apes. On the other hand I do not for a minute think that the skull is the long lost “missing link”. To my mind—and I have made a careful and detailed study of the fossil with particular reference to the
Looking south across the eastern arm of Makapansgat Valley at the two entrances of the Historic Cave.

(Alun R. Hughes)

Looking up the eastern arm of Makapansgat Valley to the Research House and the quartzite cliffs in the background.

(Alun R. Hughes)
Looking eastward across Makapansgat Valley at the limeworks dumps below and quarries above; working party in centre near kilns and site of collapsed cone at top right-hand corner.

(Alun R. Hughes)

Dr H. B. S. Cooke pointing to the layer of pink bone breccia in the 'roof' left in the quarry after the removal of the stalagmitic limestone floor. This layer apparently corresponds with Eitzman's third bone layer.

(Alun R. Hughes)
Captain Guy A. Gardner (with measuring rod) and James W. Kitching examining basal Old Stone Age stratum in Cave of Hearths excavation in 1947.

('The Star,' Johannesburg)

The Cave of Hearths excavation completed by Dr Revil J. Mason in 1952; the stratification is recorded on the back wall; part of the collapsed stalagmitic Old Stone Age floor is preserved under the small shed; and consolidated cave earth is supported on dolomite and concrete columns.

(Alun R. Hughes)
*Australopithecus prometheus* adult female skull reconstruction, with the adolescent male lower jaw (*centre foreground*) and the adult female lower jaw (*right*).

(*J. P. Vorster*)

*(Left)* Adolescent Bushman pelvis with australopithecine fragments inserted; (*centre*) the Bushman; and (*right*) a chimpanzee pelvis of the same age alongside for comparison.

(*Allan R. Hughes*)
teeth—the Taungs Man is an ape which had developed somewhat along human lines.

‘Imagine there were primitive men in existence at the time the owner of this primitive skull lived. What I think explains it is that man and the anthropoid apes, coming of a common stock, had separated as a species before the Taungs Man existed.’

After his investigations in South Africa, Gregory did everything possible to make amends. At a crowded public lecture in Johannesburg before the Associated Scientific and Technical Societies of South Africa (1938) he said:

‘Dr. Dart concluded at that time that his form represented a long step in the human direction of the human race; and I do not believe, after the most critical studies that my colleagues and I have been able to make, that any reasonable exception whatever can be taken to that conclusion. It is the missing link no longer missing. It is the structural connecting link between ape and man. . . This is an actual fossil form found in South Africa and it does, to that extent, favour the view of Darwin that Man arose in Africa.’

He generously summed up by saying: ‘I think the whole world is indebted to these two men—Dr. Dart and Dr. Broom—for their discoveries which have reached the climax of more than a century of research on that great problem, the origin and the physical structure of man.’

Prophetically he added: ‘They have also laid the foundation for the study of the higher faculties of man because this form, Australopithecus, must have been at a commencing stage of humanity, just before the tremendous distinction that there now is between the present human type of mentality and the great apes.’

Gregory and Hellman gave their reports to scientific journals in Europe and the United States, drawing attention to the importance of the Taungs and Sterkfontein fossils for the understanding of human evolution, especially in regard to the dentition. These changes in dentition, they declared, were due to the adoption of carnivorous habits as
opposed to the frugivorous habits of forest dwelling anthropoids. Their opinions carried great weight all over the world and marked the first unqualified recognition by overseas authorities of my original opinions on the omnivorous-carnivorous character of the dentition.

Their praise did not, however, tempt me back into the search for more links. This had become almost exclusively Broom's field and his tireless efforts were reaping rich rewards.

On June 8, 1938, when Broom paid one of his periodic visits to the caves at Sterkfontein, Barlow, the foreman-cum-guide, rushed up to him waving excitedly.

'I've something nice for you this morning,' he said, holding something behind his back and looking for all the world like a schoolboy who knows a thrilling secret. Then he held out part of what was undoubtedly a man-ape palate with a first molar tooth in position.

As Barlow had always conducted these transactions on a purely business basis, holding out for as great a reward as possible, Broom tried hard not to betray the surge of excitement which flooded over him.

'Yes, it's quite nice—I'll give you a couple of quid for it,' he said as casually as he could, frowning at the specimen as if he were gazing upon something thoroughly nauseous to him. He was also puzzled by the different appearance of this fossil from the previous one.

Barlow agreed to the price but stubbornly refused to reveal where it had been found. Inquiries by Broom among the native workmen proved fruitless, so the following week when Broom again visited Sterkfontein, he tackled Barlow seriously. He used his most brilliant oratory in persuading Barlow that in holding back information he was committing a heinous sin not only against local scientists but against his fellow men throughout the world.

Reluctantly Barlow capitulated and admitted that the fossil had not been found by him or his workers, nor had it come from the Sterkfontein site. A schoolboy, Gert
Terblanche, had found the palate on the neighbouring farm Kromdraai. Broom immediately went to Gert’s home but the boy was at school. However, his mother and sister talked freely about his discoveries and the girl took the scientist to the crest of the hill where Gert’s hammer had broken the skull out of a weathered outcrop of breccia. Broom picked up two other fragments of the skull and a couple of teeth.

When Gert’s sister saw the teeth she casually remarked that her brother had four other teeth like it with him at school. She was also sure that he had some other pieces hidden somewhere. Armed with this exciting information, Broom could not wait for Gert to return from school so he rushed there to interview the principal. Gert was summoned to the head’s office and he willingly showed Broom four teeth, two of which fitted into the palate Broom took from his pocket. The other two teeth belonged to the opposite side.

The time was 12.30 p.m. and the school would not break up for a further one-and-a-half hours so Broom suggested that the teachers and pupils might like to hear something about anthropology. The principal was delighted and for the next ninety minutes Broom held the school enthralled as he lectured with blackboard illustrations on dolomitic caves, how they are formed and how skulls and bones get into them.

This episode illustrates Broom’s passion for his subject. He would discuss it with anyone who was sufficiently interested to listen and, of course, his purpose in lecturing to the school was twofold. The children obviously lived in one of the world’s richest anthropological areas and the more he could stimulate their interest, the more chance he had of uncovering further australopithecine sites.

His lecture finished school for the day. Then the bespectacled, seventy-year-old scientist, clad as always in a formal black suit and stiff, winged collar, trudged up the hillside again with the fifteen-year-old boy who took him
to the place where he had carefully hidden the lower jaw. The next day more fragments were found at the site and when these and Gert’s specimens had been cleaned and assembled, Broom was in possession of most of the left side teeth of the palate, the face and skull (including the cheek and ear-bones) and the greater part of the right side of the lower jaw. The right side of the skull, together with its roof and rear portion, had for the most part eroded away, but there was sufficient to show how different man-apes could be.

The creature represented by these fragments was so different from that found at Sterkfontein that Broom declared it to be a new genus of the Australopithecus family. He called the Kromdraai skull Paranthropus robustus and changed the name of the smaller specimen found at Sterkfontein from Australopithecus transvaalensis to Plesianthropus transvaalensis.

The Kromdraai deposit had further riches; it yielded some upper limb bones; the lower end of a right armbone (or humerus); the lower end of a right forearm bone (ulna); some bones of the left hand (the second metacarpal and the proximal phalanx of the fifth finger); some lower limb bones; the upper half of a right anklebone (talus) and two bones of the left toes (the proximal phalanx of the fifth toe and the distal phalanx in the second or third toe). Before the weathering had taken place the skeleton might have been a complete one.

At Sterkfontein too the lower end of a thighbone—or femur—had been found and Broom felt that this belonged to a creature which must have walked upright and had about the same stature as a Bushman. The Kromdraai anklebone corroborated the evidence of the Sterkfontein femur and the forward position of the foramen magnum (the hole through which the brain communicated with the spinal cord) in both the Taungs infant and the Kromdraai adult. It was now clear to him that these members of the australopithecine family were terrestrial creatures with an erectness of
attitude very close to, if not identical with, that of living human beings such as the Bushmen.

These new finds, coupled with a paper written in 1937 by Dr. Franz Weidenreich—who had taken over Black’s work at Peking—stating that the dentitions of *Australopithecus* and *Sinanthropus* were intimately related to one another, and the verdicts of Drs. Gregory and Hellman in 1938 marked the turning point in attitudes of most scientists in America, Britain and the Continent.

In their joint paper on ‘South African Fossil Man-Apes and the Origin of Human Dentition’ in the *Journal of the American Dental Association* (1939) Gregory and Hellman stated emphatically that they agreed with my original diagnosis about the australopithecine way of life. They wrote:

‘As they lived in an open country which was much the same way as it is today, they may have chased away the vultures and hyaenas and filled themselves with the noisome remnants of the lions’ feasts. . . . The transitional conditions in the dentition suggests that there was a gradual shift from frugivorous to carnivorous food habits.’

The carnivorous Australopithecinae, whose dentitions were human in type, could no longer be dismissed as members of the same group as the fruit- and plant-eating chimpanzees and gorillas. Nowhere in the history of anthropology had there been found such an array of natural casts of the interiors of skulls from which to obtain direct evidence of the calibre of their owners’ intelligence. In addition to the Taungs endocranial cast, three of the specimens recovered at Sterkfontein had been natural brain casts. As Broom had had no experience in interpreting endocranial casts he asked me to undertake this on his behalf. I willingly agreed but decided to withdraw after reading certain remarks by E. A. Hooton in his book *Apes, Men and Morons*. Hooton wrote (p. 112):

‘The tendency towards aggrandizement of a rare or unique specimen on the part of its finder or the person to whom
its initial scientific description has been entrusted, springs naturally from human egoism and is almost ineradicable.’

He went on to point out the errors in interpretation that can arise through enthusiasm, ignorance, isolation and ‘the psychological conflict in which the describer is torn between his effort to find primitive, unique or anthropoid features which will enable him to place his specimen nearer to the apes than any previously recorded, and his equally proverbial urge to demonstrate the direct and central position of his new type in the ancestry of modern man’.

In conclusion, Hooton said, ‘A dispassionate interpretation of new fossil evidence is usually obtainable only when one awaits the reworking of the material by persons not emotionally identified with the specimen.’

It was Mapungubwe all over again and I felt duty-bound to surrender the material to another uncommitted investigator. Hooton’s attitude was sufficiently general for me to feel that it was best also to hand over the Taungs specimen to Broom and my description of its endocranial cast to G. W. H. Schepers, the newly appointed Professor of Anatomy at the University. Broom was in my department every week lecturing to the science students and both he and Schepers had access to all the comparative material available there.

Throughout the war years, they had ample time to collaborate on what was to become a massive work, detailing every scrap of evidence about the man-apes. Work stopped at the Sterkfontein quarry in 1939 because of a fall in the price of lime. Barlow died and apart from Broom’s cleaning out of a small pocket at Kromdraai in 1941 with his new young assistant, John T. Robinson, no further excavation was done during the war period.

By 1944 the monograph Broom and Schepers were preparing had reached such proportions that they began worrying about where they would find the money to have it published. I advised them to show the manuscript to General Smuts who, despite being deeply involved as
Prime Minister in the conduct of the war as well as a member of the British War Council and head of South Africa’s Armed Forces, still found time to attend to scientific and other intellectual matters. They took the advice, pointing out to Smuts that only a special book would do justice to the discoveries.

The former Boer fighter responded magnificently in spite of his pressing national and international responsibilities. Not only did he immediately arrange for the establishment of a national body to carry out research projects on behalf of the Government in specific fields and for research generally to be subsidized, but he wrote a preface to the monograph.

Funds for publishing Broom and Schepers’ joint research were provided by a grant from this National Research Council, which became known as the South African Council for Scientific and Industrial Research. Their amply illustrated book, *The South African Fossil Ape-Men: The Australopithecinae*, created an immediate scientific sensation when published in 1946 by the Transvaal Museum as its *Memoir No. 2*. The National Academy of Sciences in Washington awarded Broom the Daniel Giraud Medal for it as the most important work in biology published in 1946. The book also caused Sir Arthur Keith to write a letter to Broom in which he said:

I now agree with you that that piece of humerus, the lower end of the femur, the astragalus, metacarpal and os magnum are parts of the *Paranthropus* and *Plesianthropus*; that the teeth have all the characters of human teeth, that the hands were free and that the posture was bi-pedal; and yet I call even *Paranthropus* not a man but an anthropoid. Whatever theory one holds of human evolution, man as we know him must have passed through such a stage as is represented by the Australopets. I agree they may be direct descendants of such a stage.

In a later letter he confessed, ‘No doubt the South African anthropoids are much more human than I had originally supposed.’
The following year in *Nature* (1947) under the heading 'Australopithecinae or Dartians', the following magnanimous letter appeared above Sir Arthur's signature:

When Professor Dart of the University of the Witwatersrand, Johannesburg, announced in *Nature* the discovery of a juvenile *Australopithecus* and claimed for it a human kinship, I was one of those who took the point of view that when the adult form was discovered it would prove to be nearer akin to the living African anthropoids—the gorilla and chimpanzee. Like Professor Le Gros Clark I am now convinced on the evidence submitted by Dr. Robert Broom that Professor Dart was right and I was wrong. The Australopithecinae are in or near the line which culminated in the human form. My only complaint now is the length of the name which the extinct anthropoid of South Africa must forever bear. Seeing that Professor Dart not only discovered them but also so rightly perceived their true nature, I have ventured, when writing of the Australopithecinae, to call them by the colloquial name of Dartians, thereby saving much expenditure of ink and of print. The Dartians are ground-living anthropoids, human in posture, gait and dentition, but still anthropoid in facial physiognomy and size of brain. It is much easier to say that there was a 'Dartian' phase in man's evolution than to speak of one which was 'Australopithecinae'.

As soon as the war was over Broom was eager to get back into the field. Kromdraai and Sterksfontein sites were both made national monuments and Smuts promised financial support from the Government. By 1947, in spite of difficulties with the Historical Monuments Commission, he was blasting away full scale at Kromdraai but, finding no further evidence of man apes, he transferred his activities to Sterksfontein. Within a few days of starting operations there he had secured a crushed adolescent face with six unworn teeth; the face of a baby skull with a few upper milk molars; and an adult molar. On April 18, 1948, only a few yards below the spot where the first Sterksfontein skull had been discovered twelve years previously, a lucky blast brought out the almost complete skull of an adult female in two parts. Lining the piece of rock that came away
with the top of the skull (or calvaria) were small, sparkling lime crystals, giving it the effect of being diamond encrusted. The lower half was exposed in the solid wall of rock.

Broom had seen many interesting sights in his long, adventurous life but this, he said, 'was the most thrilling in my experience'. The female *Plesianthropus* soon became known to the South African public through the Press as Mrs.—or Madam—Ples.

June produced a nearly complete male lower jaw; August an almost complete female pelvis with part of the thighbone and some loin vertebrae belonging to the female skull. During the rest of the year, Sterkfontein yielded parts of three more skulls and when a second memoir on *Sterkfontein Ape Man: Plesianthropus* was published by Broom, Schepers and Robinson, they were able to claim:

'We in South Africa have collections which rival those of Choukoutien. We have about 200 teeth of our Australopithecines, five good skulls and eight imperfect ones, and we have more important remains of the skeletons than have so far been found in China.'

Thus the tireless efforts and staggering successes of my earliest and staunchest supporter, Robert Broom, had vindicated to the satisfaction of even the most eminent anthropologists most of the claims made more than twenty years previously.

I naturally followed his progress with the deepest interest, being touched particularly by the growing recognition of my earlier contributions, but with little thought that I would again participate in the search and become the storm centre of another anthropological controversy.

In 1944 Dr. Bernard Price, an electrical engineer and philanthropist, stimulated by Broom’s work, caused a committee to be set up in our university to recover fossils and encourage paleontology, in which I was asked to participate. Then in 1945 a student adventure led by a member of my science class, P. V. Tobias—the man who
succeeded me as professor of anatomy on my retirement this year—was responsible for thrusting me back into the maelstrom of man's beginnings.

Tobias and his group, thirty strong, visited the Maka-pansgat Valley in the Central Transvaal and brought back a story so astonishing that I could no longer resist returning to that earlier field of activity.

What I discovered there was that the Stone Age was not the first age of man. I am convinced that long before he knew how to fashion weapons and tools from stone, man had discovered another and livelier material for his primitive skill.
CHAPTER EIGHT

From 'Voortrekkers' to Man-Apes

Makapansgat Valley lies in a lonely corner of the Central Transvaal nearly 200 miles north of Johannesburg. Little kraals are dotted here and there along its sloping sides. The traveller is chased across the rutted road which branches off the main North road by African piccaninnies who open the farm gates in return for candy and other small gifts. The White man was not always given such a friendly reception.

The word gat in Afrikaans means 'hole' or 'cave'. Makapan was a Bantu chief occupying the eastern part of the Waterberg in the Central Transvaal, where he and his tribe led the undisturbed life of their forefathers until 1855. In that year, as a protest against British rule and especially over the British liberal policy concerning the treatment of natives and the abolition of slavery, Louis Trichardt, a Dutch Boer, initiated the Great Trek north across the Transvaal.

The leaders of the trekkers declared the Transvaal a republic and by 1852, when about 5000 white families had settled on large farms there, its independence was recognized. However, in 1855 the two outstanding leaders of the Voortrekkers, Andries Hendrik Potgieter and Andries Pretorius, both died and the affairs of the new young republic fell into considerable disorder.

Makapan and a neighbouring chief, Mapela, seized their opportunity when they heard of the weakened state of the settlers and connived in a plan to oust the white people
from their territories. Their chance came when Hermanus Potgieter, a brother of Andries, visited Makapan to trade in ivory in spite of the laws which strictly forbade any intercourse with natives. The behaviour of the Europeans is said to have been highhanded and in September, 1854, twenty-eight men, women and children were slaughtered at Moorddrift (Murder Ford) and other places in the two chiefs’ territories.

Hermanus Potgieter’s party of thirteen, having been enticed to Mapela’s kraal, was the first to be massacred, Potgieter being flayed alive. At Pruizen, Makapan’s village, two hunters, M. A. Venter and his son Willem, were killed and their wagon loads of elephant tusks captured. (These were hidden in the vicinity of Makapansgrat Valley but have never been recovered. The old chief who was charged with secreting the ivory still lived at the valley entrance fifty years ago but he persistently refused to divulge the locality of the booty.)

At Moordrift itself Willem Prinsloo’s party of twelve, entirely independent of the hunting party, was massacred. The commemorative monument erected by local subscription stands on the Great North Road between two acacia trees against which, according to tradition, the heads of the six children of the party were smashed.

News of the obliteration of these three parties reached Piet Potgieter, son of the former Commandant General of Zoutpansburg and Waterberg through K. Engelbrecht and William Robinson, who had passed through the drift after the massacre. The method by which Potgieter and his party met their deaths was related by an old Bushman servant who escaped. Later the news reached Commandant General Marthinus Wessels Pretorius, who had succeeded his father in the Magaliesberg area, and he immediately assembled a large commando which rode north to meet Piet Potgieter’s commando. A small force, which included a few Englishmen, rode from Bloemfontein to join them.

The natives soon realized that resistance to the avenging
A section through a valley like Makapansgat to show successive stages in forming, opening, filling and eroding a dolomitic limestone cavern. [After Dr. C. K. Brain.]
men on horseback was impracticable and Makapan and what was left of his followers fled up the valley into the immense dolomitic cavern now known as Makapansgat. As there was a drop of 80 to 100 feet in front of the eastern entrance, it was unnecessary to have more than a wall of rocks and a few hardy warriors to roll them down should the white forces attack. The twenty-yard-wide western entrance was more easily penetrable but was also easily guarded by a formidable stone barrier and the guns and assagais of the defenders.

About 2000 men, women and children herded together in the cave with some of their cattle and the commando encamped on the hillside. In his official report, Pretorius said he did not think attack advisable as the cave was quite 2000 feet long by 700, 500 and 550 feet wide.

'This is traversed by various walls and has dark hiding places into which we could not see.'

Except on pitch black nights anyone attempting to gain entrance would be silhouetted against the sky to watchers within this cave of refuge. The cave was blockaded by the commandos from October 25, 1854. Attempts were made to smoke the defenders out and even to clear the western entrance with a charge of gunpowder. Apparently Makapan's people, unused to such warfare, thought the commandos would leave after a short time. They had stocked themselves with a fair amount of food but were unable to find adequate water in or near the cave. (They could not have ventured very deeply into its recesses as Mr. Eitzman, who was the first to tell me of the cave, penetrated an underground passage and found water half a mile from the entrance.)

Although the besieged natives must have got a trickle of water from the moist walls, hunger and thirst eventually led to their undoing. When the commandos showed no sign of departure after a week, Makapan was forced to ration supplies and dissatisfaction grew among his followers. Numbers escaped at night by scaling down the
The stratification of the Makapansgat stalagmitic limestone floor [after W. I. Eitzman] and overlying pink and red breccias. [After Dr. C. K. Brain.]
cliff from the western entrance on the darkest nights and eluding the guards.

It was during this siege that Paul Kruger, veldkornet of the Potchefstroom commando and subsequently to become the Transvaal republic’s most famous president, performed two acts of bravery which must rank among the most brilliant and daring of all times. The memoirs of this doughty old Commander who with his comparatively tiny forces defied the might of England from 1899 to 1902, give an accurate and lively account of the first exploit. He wrote:

After the kaffirs had been besieged for some time and suffered greatly from famine without our getting any nearer to effecting our objective, I endeavoured to end the matter and bring about a surrender by stratagem. With this object in view I crept in the dark, unseen, into the cave where the kaffirs lay hidden. I sat down among them and began to talk to them in their own language as if I were one of them and suggested that it would surely be better to surrender than die of hunger. I also said that I was certain the White men would not kill us and offered myself to go to the White men to talk with them. Suddenly an armed kaffir exclaimed,

‘Magoa! White man!’

But this dangerous moment also passed, for when the kaffir shouted ‘Magoa’, all the others fled deeper into the cave and I jumped up and ran after them, right into the back cave. The kaffirs now began to hunt for the White man, looking for him in every direction except where he was—in their very midst. When they had quieted down a little, I once more addressed them in their own language and urged them to surrender. Finally I succeeded in bringing out of the cave 170 or 180 women and children and it was not until I was outside that they perceived it was I and not a kaffir who had been talking to them. My intention had really been to effect a voluntary surrender of the kaffirs and thus to get hold of their guilty captains. But I was unable to attain this object and we had to continue the siege.

Later during the siege, Commandant General Piet Potgieter was shot by a native sniper and fell behind the stone wall the defenders had built. Potgieter was directly in the
defenders’ line of fire but Kruger and a loyal native, Manoonga, leapt down after him. With utter disregard of their own lives, they carried the body from the very entrance of the cave back to their own lines. The defenders, overcome either by surprise or admiration, withheld their fire and allowed them to escape.

The blockade lasted twenty-five days, after which the commandos stormed the cave, meeting little resistance. One story says that several hundred thirst-starved natives surrendered and then rushed down the cliff side to the river below and drank themselves to death; another version that about a thousand perished at the mouth of the cave and more than 2000 within it. At any rate Makapan’s power was ended and his tribe decimated.

The skeletons of the defenders remained in the cavern for many years, but gradually dispersed into the homes of sightseers from all over the country. Six of the skulls, three adult and three juvenile, were sent to the Royal College of Surgeons’ Museum in London by W. L. Distant whose book, *A Naturalist in the Transvaal*, was published in London in 1892. According to Mr. Eitzman the cave also served as a storehouse of human bones for native witch-doctors in the neighbourhood who ground them into *muti* (medicine).

The site was declared a historic monument in 1936 after Professor C. van Riet Lowe, who had been recently appointed Director of the South African Bureau of Archaeology, had been sent to investigate it. Climbing up the cliff he came through a drive or cutting recently made in the hillside by the lime workers. In excavating the stalagmite or dripstone of an ancient cavern floor the workers had exposed a cavern deposit from which van Riet Lowe extracted old Stone Age hand-axe tools of the type labelled Stellenbosch by South African archaeologists. They lay in a stratum of ash and soot within twelve inches of the stalagmitic layer forming the floor of what had been the cavern many thousands of years previously.
It had subsequently been filled in with sand, fallen dolomitic rocks and stalactitic debris containing the hearths and tools of prehistoric man. The whole mass of the ancient cave exposed had a length of 50 to 60 yards, the bottom third being in a loose and crumbling state. The upper two-thirds consisted of lime-consolidated rock or breccia and were charged with the implements of Stone Age man and the bones of the animals on which he had feasted.

![Map of Makapansgat farm and valley: plan of named cave sites.](image)

When van Riet Lowe returned with his exciting story, both he and I assumed—quite naturally I believe—that in what he had decided to name The Cave of Hearths he had discovered the tools of the primitive men to whose midden heaps I had drawn attention twelve years previously. He made repeated visits there with the great French priest-archaeologist Abbé Breuil and with Robert Broom, both of whom recognized the great importance of the deposit. When the Abbé first viewed the site he immediately said 'A second Choukoutien.'

Shortly after Makapansgat was declared a national monument the Second World War broke out, and it became impossible to initiate any serious excavation, which
would obviously be a vast and expensive undertaking. In the meantime, however, the miners had exposed a second prehistoric cave below the eastern entrance of the Historic Cave. Because of the variegated colours of its strata it became known as the Rainbow Cave.

![Map of Makapansgat Limeworks](image)

*Makapansgat Limeworks: plan and section of the excavated area, collapsed cone, kilns and dumps.*

[Dr. H. B. S. Cooke.]

These were the facts known to Tobias and his band of fellow students when they visited Makapansgat in 1945. Fortunately we had kept some of the greyish type of bone breccia sent to me twenty years earlier by Mr. Eitzman. When the party returned they said that the two sites
were a mile apart. There were many Old Stone Age implements at the Cave of Hearths and plenty of Middle Stone Age implements at the Rainbow Cave. However, at the Limeworks site a mile lower down the valley—where the fossil-bearing grey breccia was found—there were no traces of implements. But they had brought back something much more significant than Stone Age tools. Among the grey breccia they collected was the skull of a fossil baboon, indistinguishable from the *Parapapio broomi* first found by Trevor Jones at Sterkfontein in 1936 and now recognized as a characteristic of australopithecine deposits.

‘Doesn’t this mean, sir,’ Tobias asked, ‘that Makapansgat may be far older than you or anyone else imagined?’

‘It does indeed. It certainly looks that way,’ I replied.

‘Then,’ asked the young student, ‘doesn’t this tempt you back into the field of anthropological research?’ Hesitantly, he added, ‘It might even prove to be contemporaneous with Sterkfontein.’

It was almost as if he had read my thoughts. It might not only prove to be as old as anything yet discovered but might also yield a more complete man-ape than those found by Broom. Summoning Tobias to follow, I went to my workshop and took down my hammers, chisels and other anthropological tools which had lain neglected for so many years.

‘You have my answer,’ I told him.

The next holiday break in September, 1945, which is autumn in the Transvaal, the whole anatomy science class camped in the valley. Marjorie and I joined them with our two young children (Diana five and Galen four years of age) under canvas. The days were spent ransacking the limeworks dumps for likely blocks of bone-bearing breccia, grey, pink and red, and exploring the caverns.

The method of cave formation at Sterkfontein and Makapansgat is in dolomite itself and thus somewhat different from what was described for Taungs. At Taungs the surface water running over the soluble dolomite leached out
the lime. Then, as the lime-laden water seeped and flowed over the side of the cliff it evaporated and left the lime to clothe the cliff like a thick white curtain. The galleries in this solidified curtain of travertine provided the caves for *Australopithecus*.

At Makapansgat and also at Sterkfontein, as the Illustration on page 93 shows, huge caves were formed by solution of the dolomite when it lay below the underground water level. Then, as the valley eroded and deepened and the water level fell during thousands of years the cavern became coated with a thick covering of pure lime. Gradually the fissures through which the lime-laden surface waters seeped and found their way into these underground cavities formed by solution widened and opened on to the eroding valley slope. Then the lime-coated cavern became a habitation first for small animals like bats, rats and mice and other small rodents. Later, as their droppings accumulated and the floor dried and the openings enlarged by further erosion, the cavern was frequented by other, larger, cave-dwelling creatures, including perhaps man. The remains of creatures that fell into the cave through its openings and of those that died inside it, or the bones carried into it by animals, became covered with soil from the surface, wind-blown dust and other debris. Where the soil was prevented by lime-impregnated moisture from becoming too acid and thus dissolving the bones they were preserved as fossils in the resultant lime-consolidated bone breccia.

As Dr. C. K. Brain has shown in his splendid monograph, *The Transvaal Ape-Man-Bearing Deposits* (1958), the breccias formed in the process of cave-filling can be divided into two phases. He gained a great deal of information about changes in the climate during the ages these caverns were filling in, and about their relative ages, by studying foot by foot the consolidated soil and wind-blown dust exposed by sections through the stratified cavern filling. Taungs and Sterkfontein are the oldest, followed by Makapansgat, Swartkrans and Kromdraai.
In the Sterkfontein and Makapansgat valleys the man-
apes are found in dolomitic caves of this underground sort
that went on filling up until they were choked to the roof.
With increasing erosion of the valley countryside, the
weatherworn roofs themselves assist in the choking-up
process by collapsing. Finally as the collapsed roofs dis-
appear by further erosion, the lime-consolidated filling,
which formed a succession of old cavern floors, becomes
exposed as part of the solid land surface. Then the floor
itself erodes and the bones that once lay underground
within the cave may be found in the red or pink bone-
breccia you are walking over on the hillside.

The vacation flew by all too quickly; there was no end
to the breccia inside and outside the limeworks site.

During the next year my students, assistants and I made
repeated visits to the great Makapansgat dumps; the
collections of fossil-bearing grey and pink breccia brought
back threatened to overwhelm my laboratory and the pre-
paration rooms. Our hammers and chisels prised loose
many extinct types of baboons, pigs, antelopes and giraffes.

Roads had improved but Makapansgat was far away.
We were hampered in our investigations at this stage by
lack of money and were forced to keep our visits to Maka-
pansgat to a minimum until Dr. Bernard Price became
interested. Dr. Price, a Scottish-born electrical engineer,
had for many years poured a large part of his fortune into
research work at the University of the Witwatersrand.
Before the war, when money was almost three times as
valuable as it is today, he had donated £77,000 towards
the Institute for Geophysical Research. After the war he
endowed the Institute for Paleontological Research by a
bequest which yielded at his death £46,000 and attended
meetings of the Paleontological Research Committee to
which he gave £1000 annually.

One afternoon in 1946 after one of these meetings I
invited him to see the paleontological specimens from
Makapansgat which I kept at the Medical School.
Until then the committee had concentrated on South Africa’s fossil reptiles. When Dr. Price saw the fossil baboons and heard of the possibilities at Makapansgat his enthusiasm knew no bounds. He stayed on until after dark, trying to catch up on the subject of the man-apes and finally confessing: ‘From a human point of view I find these creatures much more exciting and intriguing than Broom’s mammalian reptiles. I’m sure that many others who, like me, are not scientific experts will share my interest in the discovery of these long-lost relatives of the human race.’

Then he made a proposition. If I would put up a suitable scheme for Makapansgat he would donate a further £1000 a year to be used exclusively in searching for the elusive man-apes. When I told van Riet Lowe he was as delighted as I. For several years he had tried without success to interest overseas organizations in furnishing the funds needed to excavate the Cave of Hearths. Plainly we and our student teams would have to collaborate in this unique opportunity to work back from the known to the unknown; from Voortrekkers who had bottled up the Bantu in the Historic Cave (whose two entrances lay above the two prehistoric caves, the Rainbow Cave and the Cave of Hearths) back to the man-apes which, I was now certain, would be found in the same valley. Working together, we might expose an unrivalled story of human continuity throughout the entire Pleistocene epoch.

Van Riet Lowe and I reached complete agreement and I submitted my memorandum. I also arranged for our benefactor to visit the valley with Professors van der Horst, Gevers and van Riet Lowe during a week-end when I was again there with my family. Dr. Price, that grand old man who had given so much towards projects which were a complete mystery to him as a layman, was thrilled to find something—as he put it—‘to get my teeth into’. He was able to see for himself the huge deposits of bones in the rocks and to take an active part in planning the attack.

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Operations were started in April, 1947, by Captain G. A. Gardner, who had excavated the Mapungubwe and Bam-bandyanalo sites, and Mr. James Kitching. They were joined later by Kitching's two younger brothers, Ben and Scheepers. They began by fabricating concrete blocks on the spot from the abundant lime, and two huts were built, one for habitation and the other for storage. The stratigraphical relationship of the Cave of Hearths to the western entrance of the Historic Cave was exposed by clearing away dense vegetation; it was merely the collapsed entrance to the Historic Cave which, 50,000 or more years ago, had projected further forwards over the cliff-like face of the valley wall.

Within three months the mandible of a human adolescent aged about twelve was found in the Cave of Hearths breccia. It was too fragmentary to give rise to any positive conclusions about its affinities but it was provisionally allied with the Boskopoid skulls of Middle Stone Age found elsewhere in South Africa.

During the week-ends the Kitching brothers, trained fossil reptile gatherers from boyhood, were free to search over the Limeworks dump. In September came the first corroboration of my dream that Makapansgat would prove to be an Australopithecine site when James Kitching found an occiput (the hinder part of the skull) of one of these creatures. The skull to which this occiput had belonged differed, however, in so many respects from those found at Sterkfontein and Kromdraai that I decided to call it Australopithecus prometheus. In tacking the name Prometheus on Australopithecus, I was commemorating the discovery of carbon in the breccia from this same site twenty-two years before. It seemed likely in view of the carbon that Australopithecus had discovered the secret of fire but this is an angle I have never been able to confirm satisfactorily despite subsequent investigations of bones for carbon.

Broom urged me to create a new genus but I thought it unlikely now that all the Australopithecinae so-called really
belonged to more than one genus. They were too close to
man. In July, 1948, the lower jaw of a male adolescent
Australopithecus prometheus which corresponded in its dental
development with a human boy of twelve years was found
by Mr. Alun R. Hughes, my senior laboratory assistant at
the Medical School, and Scheepers Kitching. This lad had
obviously met a violent death for the jaw had been broken
through on both sides by a blow on the chin that had also
knocked out his four front incisor teeth. This was the work
of either a fist or a bludgeon.

Three months later the right side of a female adult face
was picked up by Mr. Hughes and in November a further
four pieces came to light. The upper jaw of a much older
adult specimen than anything we had yet seen was prised
from a piece of limestone discovered by Ben Kitching, who
also found a portion of the skullcap of a young person. The
other two pieces consisted of fragments of the pelvis, a left
ilium (hip blade) and a right ischium (sitting bone.) These
corresponded in age with the twelve-year-old’s lower jaw.
(In 1956 another left adolescent ilium was found of virtu-
ally the same age. It appears to be that of a female who
might well have been the boy’s twin sister. If so they died
or were killed and probably eaten at the same time.)

When Broom and Robinson blasted out a nearly complete
pelvis and adjacent skeletal parts on August 1, 1947, not far
from where they had found the complete female Plesian-
thropus skull, there were some who assumed that a more
recent type of human being had by some strange chance
become fossilized alongside the Plesianthropus. The hip-
bone was so far from the ape type of hipbone and so akin
to the human type found in Bushmen that these critics be-
lieved it could not possibly have belonged to so ape-like a
creature as they imagined Plesianthropus to have been.

The fact that the adolescent hipbone found at Makap-
pansgat a year later also resembled an adolescent Bush-
man hipbone, and not that of an adolescent anthropoid,
forced the doubters to reassess their original opinions.
They had to admit that it was extremely unlikely that the same sort of ape-skull and human-pelvis coincidence could occur in two fossil deposits of similar geological age nearly 200 miles from each other. Clearly these man-apes, whether adolescent or adult, all had the human type of pelvis because, like man, they were erect. They did not

Short and broad curved hipbones make the erect human pelvis a basin. Long and narrow flat hipbones make the semi-erect ape (e.g. gorilla or chimpanzee) pelvis more like a funnel. [William Papas.]

shamble over the veld like baboons, chimpanzees and gorillas; they stood, walked and raced across the open plains like men.

The Sterkfontein Valley was rich in australopithecines—or *Plesianthropus* as Broom had named the type found there—while Makapansgat, besides being rich in faunal and cultural remains, also chanced to contain an *Australopithecus*. Having solved most of the questions about the

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anatomy of early man from the remains at Sterkfontein, Kromdraai, Makapansgat—and, of course the original Taungs 'baby'—questions about the cultural status of the man-apes now arose. This valley might give the answer. We had a generous benefactor and Mr. Hughes had now started a systematic search through the entire dump.

_Australopithecines overturning stone for insects._

[William Papas.]

This creature had hunted—but with what? From the outset I had maintained that the bone deposits in the Taungs caves were introduced by _Australopithecus_. By 1929 when the lower jaw had been removed and the dentition examined I was claiming that _Australopithecus_ did not seek food and protection by climbing in trees. He had hunted his food in the open and was a shell-cracking, bone-breaking, flesh-eating ape. The carnivorous practices to which baboons resort in time of drought were the confirmed life habits of _Australopithecus_.

In the description of the dentition published in 1934 a picture of baboon skulls from Taungs was included to show that they had belonged to animals that had been killed by violence. The skulls were not only broken. Some showed radiating fractures due to the impact of sharp objects—which I assumed at that time to be stones—in the right side of the skull. Others had round openings made in the
top or at the base showing that the brains and other contents had been removed for food.

It was a suggestion by Professor (now Sir Wilfred) Le Gros Clark, head of the Anatomy Department at the University of Oxford, that put me on the track of what was to prove one of the most fascinating and rewarding studies of my life. In 1947 he visited australopithecine sites in South Africa and when examining the remains of baboon skulls found at the same sites, he also was amazed at the number of localized fractures.

Makapansgat was also yielding fossil baboon skulls with similar cranial defects and Le Gros said he thought a statistical inquiry into baboon skulls found at the three deposits might provide irrefragable proof of my previous contentions.

I took his advice and it was not long before I began kicking myself for being so blind for so long.
CHAPTER NINE

The Antiquity of Murder

I assembled forty-two baboon skulls from the three deposits at Taungs, Sterkfontein and Makapansgat and soon saw that Le Gros Clark had been right. Of the forty-two skulls, 27—or 64 per cent—had been fractured by blows from the front. A further seven were fractured by strokes delivered on the left side of the face and from the front, and presumably the skulls represented only by jaw fragments were fractured in similar manner. Six of the strokes appeared to have been delivered by stealth from the rear and, as all but two skulls had received blows on the left side, the Australopithecinae had apparently developed a preference for using the right hand.

These bludgeon attacks had not been confined to baboons! In the middle of my research, Mr. Hughes brought me, in part of another skull, the best example of localized fractures I had seen.

But this was not a baboon skull. It was the adolescent lower jaw of the Makapansgat Australopithecus prometheus, which had been bashed in by a formidable blow from the front and delivered with great accuracy just to the left of the point of the jaw. The large molar teeth and the massively constructed jawbone showed how strong it had been. Despite that strength the jaw had been split on both sides and, as these fractures had never had a chance of healing, it was obvious that they had occurred shortly before death. The impact had been so vicious that it had shattered the
jaw on both sides and knocked out all the front teeth, as noted in the previous chapter.

This dramatic specimen instantly prompted me to study the murderous and apparently cannibalistic manner of life of these violent creatures. Firstly it appeared that in their attacks upon baboons and fellow australopithecines, the onslaughts were generally made face to face. Most important, they were highly accurate.

Four views (approximately one-third actual size) of the adolescent australopithecine lower jaw from Makapansgat to show how the front teeth were knocked out, both sides were fractured and the right side impacted by the lethal blow received on the 'chin'. [After J. F. Heim.]

Human beings are the only creatures capable of clubbing creatures to death—despite imaginative magazine illustrations showing gorillas fighting with clubs. As Darwin (1871) said:

Baboons turn over stones and scratch up roots with their hands. They seize nuts, insects or other small objects with the thumb in opposition to the fingers, and no doubt they thus extract eggs and the young from the nests of birds.
American monkeys beat the wild oranges on the branches until the rind is cracked and then tear it off with the fingers of the two hands. In a wild state they break open hard fruits with stones. Other monkeys open mussel shells with the two thumbs. With their fingers they pull out thorns and burrs and hunt for each other’s parasites. They roll down stones or throw them at their enemies: nevertheless they are clumsy in these various actions and, as I have myself seen, are quite unable to throw a stone with precision.

The Australopithecinae had replaced the clumsy handiwork of living apes with precision and knew the technique of the truncheon. The fundamental differences between living anthropoid apes and human beings are visual and postural. Man has a capacity for keeping his eyes fixed on what his hands are doing and so concentrating. Both man and ape have stereoscopic vision, enabling each to see things in depth, but man alone keeps seeing them within the range of his moving hands or in width over extended periods of time, whatever his posture may be.

Living apes such as the chimpanzee, despite their muzzle-like faces, have sufficient depth and width of attention to be able, with training, to employ their hands under the direction of their eyes sufficiently long to thread a needle while sitting on the broad base of their haunches with their bodies well supported. But they cannot perform such feats entailing manuo-visual accuracy while standing on their feet. In general, like human infants, apes cannot sustain ocular convergence upon several objects—such as their fingers and the needle and thread—over long periods of time. The attention they can give to manipulated objects is like that of a near-sighted person; nor can it be maintained for long. Out of sight, out of mind, characterizes their thought processess.

Manual precision in boxing and brandishing a weapon is not merely a matter of seeing stereoscopically. It involves, in addition to ‘keeping your eye on the ball’, the ability to judge distance and direction with accuracy while
standing on the feet. Only that bodily skill which goes with the erect posture makes this possible, because through that bodily control each phase in the movement of head, body and limbs is accompanied by an appropriate postural attitude which enables the upright body to maintain each

Australopithecus with a humorus club dragging a baboon.
[William Papas.]

particular phase of the movement unaltered for a considerable length of time.

A chimpanzee cannot box, cudgel or bludgeon, for these activities are feasible only when ocular, cranial and manual mobility are combined with the physiological features found in the erect bodies of human beings. The localized fractures

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A growth series of australopithecine lower jaws.

*(Top)* The six-year-old Taungs baby.

*(Middle)* The adolescent Makapansgat lad.

*(Bottom)* The adult Makapansgat woman.

*(Alan R. Hughes)*

A series of skulls and busts to compare. From left to right: The young male gorilla; Sterkfontein Valley man-ape (*Paranthropus robustus*) (male); Makapansgat Valley man-ape (*Australopithecus prometheus*) (female); Neanderthal Man (*Homo neanderthalensis*); and Cro-Magnon Man (*Homo sapiens*).

*(J. P. Vorster)*
A. Two natural fossil australopithecine (*Plesianthropus*) endocranial casts from Sterkfontein with deeply depressed fractures due to the smashing of the skull by double-ridged bones such as antelope arm-bones or thigh bones.

(Mrs G. Chaplin)

B. The broken, double-ridged distal ends of the antelope arm-bones (humeri) that correspond with and were responsible for the double-valleculated fracture depressions in the skulls of australopithecine and baboon skulls.
Semi-reconstruction (lower left) and complete reconstruction of the bust of an adult female *Australopithecus prometheus* carried out by the author with the technical assistance of B. Grobbelaar; its artistic investment was devised by his former student, Dr Ismond Rosen.

*(Dr Paul Keen)*

*Opposite page (bottom left)* Antelope cannon bone scoops from Makapansgat grouped about a sheep cannon bone apple corer from Herefordshire. The lower right fossil specimen shows how *Australopithecus* fashioned the scoop by fracturing the back wall of the bone with pointed end of another bone. Worn-down specimens above. *(bottom right)* Sheep thigh bones hit (the left one with the point of a stone tool, the right one on the wooden edge of a table) and then twisted between his two hands by James W. Kitching to break the shafts spirally.

*(Alun R. Hughes)*
An australopithecine family group in full face, semi-profile and profile views from left to right *Paranthropus* (male); *Australopithecus prometheus* (female); and *Australopithecus africanus* (infant).

(J. P. Vorster)
I had studied showed that *Australopithecus* could pulverize his fellows and other creatures in the same way as human beings.

They must have had human body poise and concentration!

The casts of the insides of several man-ape skulls found at Sterkfontein showed that they too had been shattered shortly before death by skull-smashing shocks. This was so violent in one case as to force a part of the frontal bones on the left side fully half an inch into the brain and to thrust the frontal bone on the right side under the temple bone. The attack could have been made from behind as the right side of the skull was more deeply indented than the left. A Y-shaped fissure ran across the back of another *Plesianthropus* cast. The contour of the cast bulged up on the left side between the two arms of the Y, the hillock showing the dents which the underlying brain had received on either side. The blow was administered from the right side (see Illustrations between pages 80 and 81).

But what weapon could they have used? It was this type of fracture, where the skull fragments or their cast was left billowing, as it were, between the two depressions, that put me on the right track. I called in my friend and colleague Dr. R. H. Mackintosh, professor of Forensic Medicine and a medico-legal expert, to check my interpretations. His attention was gripped from the outset by the hole in the top of the baboon skull that had been brought to me more than twenty years before by Miss Josephine Salmons—the skull basically responsible for my adventures with the ‘Missing Link’.

Of this skull, Mackintosh said, ‘I have had people hanged on evidence similar to that. Do you see the outer table of the skull? The only type of force that can wrench it outward in that fashion is one operating from within outwards—such as the sort of force exercised by a bullet emerging from the skull.’ He affected his most professorial manner and, his eyes twinkling, added dryly, ‘I take it we
can safely exclude bullets in this case. Now in their absence only a stick or a piece of bone used as a lever could have forced that outer table of the skull outwards."

I gaped at him, feeling as if I had been delivered a heavy blow with a cudgel. In the excitement of the moment I forgot my academic status and fell back on an expressive piece of Americanese I had picked up during my visit to the United States in the 'twenties.

'Mac,' I exploded, 'just how dumb can a guy get?'

It was an instant of blinding revelation. Although I had suspected from the beginning that the brain contents of the baboon skulls found at Taungs had been eaten, I imagined that this and other skull fractures had been caused by rock falls or by deliberate attacks with stones. Yet we had never found a stone in the grey australopithecine breccia. I had, however, vaguely noted the usual number of unrelated animal bones present.

I immediately started investigations to corroborate the fascinating theory that had sprung from Mackintosh's words and searched through my carefully hoarded collection of fossil bones. I picked out all those whose ends had double ridges which might fit into the Y-shaped depression of the skulls. I did not have far to look because the most frequent type of long bone found in the bone breccia was the humerus (upper armbone) of the antelope. The elbow end of these bones in all antelopes has two ridges.

Not only did the ridges of many of the humeri fit perfectly into the depressed fractures, but most of the upper armbone ridges of the antelopes had been broken before fossilization. Makapansgat had yielded the best display of these humeri with broken ridges, but the fossil baboons from both Taungs and Sterksfontein showed the same type of double-valleculated, bone-bludgeon fracture. As all three sites are about 200 miles from one another in various directions it was clear that bludgeoning was characteristic of all South African man-apes.

They were murderers and flesh hunters; their favourite
tool was a bludgeon of bone, usually the thighbone or armbone of an antelope.

Round holes in skulls and casts also revealed that they knew how to perforate as well as to club. After his visit to Choukoutien the Abbé Breuil said he believed that antelope horns had been employed as digging or piercing tools and I concluded that *Australopithecus* too had used sharp

![Australopithecines fighting with bone club and dagger.](image)

*[Australopithecines fighting with bone club and dagger.](image)*

[William Papas.]

penetrating tools, such as the ends of horns and the sharp ends of broken bones, as daggers. The openings on some of the skulls whose fringes were fractured outward or depressed inward demonstrated the finger and leverage work that had inevitably accompanied the extraction of the cranial contents for food.

The fragile, porcelain-thin skulls of infant baboons were emptied of their brains and then crushed in the hand and thrown aside as a human child might throw away a breakfast eggshell.
At the time I was making these investigations the *Journal of Anatomy* (October, 1947) published a long paper by Le Gros Clark, the man indirectly responsible for my belated curiosity. Entitled ‘Observations on the Anatomy of the Fossil Australopithecinae’, the paper said:

The resemblances which they show to man in the morphological features of the skull, dentition and limb bones are so remarkable that their zoological relation to the Hominidae can hardly be doubted. The fossils show first that in human phylogenesis the evolution of the limb structure proceeded at a more rapid rate than that of the brain . . . secondly, that while in their cerebral development, and therefore in the general proportions of the skull, they represent a level of evolution corresponding to that of the large anthropoid apes, they show no structural evidence of close relationship to the latter.

On the contrary, the advanced characters which are already very evident in their skull, dentition and limb bones indicate their position in the phylogenetic radiation of the Hominidae (human beings) rather than the Pongidae (apes).

In the following year Le Gros Clark was invited to New York to participate in the Third Summer Seminar of the Wenner-Gren Foundation to discuss the ‘new South African finds of *Australopithecus*’ and the Miocene finds in East Africa.

Following Le Gros Clark’s enthusiastic description, combined with further australopithecine discoveries at Makapansgat, the Viking Fund of the Wenner-Gren Foundation gave a grant in 1948 to Dr. S. L. Washburn to make a field trip to East and South Africa. As a result of Dr. Washburn’s African report the 1949 Summer Seminar of the Viking Fund asked Dean Alexander Galloway of Uganda and me to be their guests of honour.

With the permission of the Historical Monuments Commission I took with me to New York the actual fossils of the man-like apes found at Taungs and Makapansgat together with casts and reconstructions of those found at all the sites.

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According to the report on ‘The First Ten Years 1941–1951 as The Viking Fund, Inc.’, by the Wenner-Gren Foundation, ‘The animated discussion of these remarkable australopithecine finds marked the high point of all the seminars.’

Through the discovery of the back and front ends of the female adult skull, and the adolescent lower jaw which almost fitted the female upper jaw, it had been possible to prepare for the seminar a reasonable semi- and full reconstruction of the *Australopithecus prometheus* female bust, as well as those of the Taungs infant that had been made a quarter of a century earlier. In addition there were the pelvic fragments and an adolescent Bushman pelvis with replicas of the Makapansgat pelvic fragments fitted into it. There was also an adolescent chimpanzee pelvis for comparison. The theories I had formed in 1925 from the Taungs skull about the upright posture of *Australopithecus* had been justified by the pelvis from Sterkfontein and a second one from Makapansgat. For the first time direct comparison could be made between these bones and those of Bushmen, Pygmies and Bantu. As Dr. Washburn put it at the seminar, ‘It looks as though these creatures are human from the neck down and anthropoid from the neck up.’

Other scientists, including Dr. Gregory, said it was still a question as to whether *Australopithecus* was a distant uncle by courtesy, or a close relative of man. Dr. Gregory added: ‘However, the new African finds make it possible to link man definitely to the anthropoids.’

Others like Dr. Patterson did not think it extraordinary that the pelvis should be more advanced in its development than the brain. Paleontological evidence, he said, generally showed that the skull never led the other parts of the body in its evolution. Brains were an evolutionary afterthought.

When the zoological position of the Australopithecinae was discussed some said they were nearer to man than to the apes; others thought that man, man-apes and apes
represented three parallel lines of evolution, with the man-
apes closer to man than to the apes. Others, again, sug-
gested that the man-apes were an offshoot, perhaps less
specialized than the apes but not really on the way to man.
All agreed that their correct placing when finally deter-
mined should do much towards clarifying the overall picture
of human evolution.

The particular advantage of this seminar was the pre-
sence of Dr. George Barbour of Cincinnati University, a
geomorphologist, and Dr. Charles Camp, a paleontologist
from the University of California, both of whom had spent
a considerable time in South Africa the previous year. Dr.
Barbour had also worked with Père Theilhard de Chardin
at Choukoutien in China.

Dr. Barbour could testify on the comparability of the
Cave of Hearths with Choukoutien; similarly Dr. Camp
was able to discount ideas that the bone fractures he had
seen in the Taungs and Makapansgat fossils might be due
to rock falls. Dr. Camp gave his opinion that the broken
bone material could not be fully evaluated until more had
been learnt about the habits of hyenas. The remains that
these creatures were believed to accumulate in their dens
should be compared with the sort of bone heaps that primi-
tive men accumulated in their caverns.

The American visit had succeeded in bringing most
physical anthropologists to agree that *Australopithecus* was
an erect creature like man. There were some, however,
who felt that his small, quasi-anthropoidal brain made it
difficult for him to be admitted as an ancestor. They were
using the same type of argument that Dubois encountered
when he discovered *Pithecanthropus* sixty years earlier.

This emphasis on the importance of brain size in a
presumptive human ancestor was a doctrine whose general
acceptance was due principally to the teachings of my old
chief, Sir Grafton Elliot Smith, who had died on January
1, 1937. The brain of Piltdown man had been accepted as
corroborating his beliefs. But in 1949, when I was visiting
America, Dr. Kenneth Oakley and C. R. Hoskins were busy proving that the Piltdown fragments were probably no more than 50,000 years old instead of the 250,000 to 500,000 years that had been attributed to them previously. In spite of Piltdown Man's being thoroughly discredited, the argument about brain size continued for many years and, in fact, may still be maintained by a few. But I was satisfied after my American visit that the claims I had made twenty-two years before about *Australopithecus* were now accepted by the majority of anthropologists throughout the world.

On my return to South Africa I was eager to continue my studies into the weapons and tools of the man-apes but my hopes were dashed. On July 9, 1948, our generous benefactor, Dr. Bernard Price, died, and although he had believed that the sum he bequeathed would be adequate to further both the general palaeontological and the anthropological research work, death duties has so reduced the capital value of the bequest that the Board of the Bernard Price Institute for Paleontological Research was reluctantly compelled to discontinue the excavation in Makapansgat Valley at the Cave of Hearths.

I had proved to my own satisfaction that I had discovered a new age of man, a Bone Age which pre-dated the Stone Ages perhaps by hundreds of thousands of years, but a great deal of further factual information was obviously required before I could present my case to the world supported by such a mass of accumulated evidence as to be beyond all reasonable debate.
CHAPTER TEN

The Hyena Myth

By 1949 we had extracted just over 1000 fragments from the bone-bearing breccia of Makapansgat Limeworks, but the conclusions I had drawn about the Bone Age—which I had decided to name the Osteodontokeratic (bone, tooth and horn) Culture—were received with scepticism by most scientists who read the several modest papers I wrote based on them.

Perhaps the most surprising aspect to me in the history of my search for the Missing Link has been the refusal of experts in one field of science, like geology, zoology and archaeology, to accept the evidence of experts in other sister fields such as forensic medicine if it clashed with their early instruction or established beliefs. There are many other examples of this lack of mental elasticity, but perhaps none illustrates the adherence to traditional views better than the matter of localized fractures and bone accumulations found in caves.

To recapitulate, the first baboon from Taungs had a round hole in the top of its skull. In 1934 I had published pictures showing several similar broken baboon skulls from Taungs and Dr. Broom and Professor Schepers both corroborated my observation independently in 1946. Professor Le Gros Clark had been so impressed by the evidence of localized fractures and openings in these baboon skulls when he visited South Africa in 1947 that he urged me to make a statistical inquiry into the subject. I found the same sort of evidence at all three man-ape sites and
was careful enough to have my diagnoses of deliberately
broken skulls not only checked by Professor Macintosh, a
medical-legal expert, and by other competent medical men,
but to have them extend their check to other specimens
besides mine.

These were four competent medical men, other than
myself! Yet when I exhibited these same specimens to
Professor D. M. S. Watson, F.R.S., a distinguished paleon-
tologist, early in 1949, he discarded the entire evidence of
the baboon skull fractures on the grounds that more than a
century before Dean William Buckland had proved that
broken bones in caves were the work of hyenas; that
hyenas stacked bones in caves; and that they were can-
nibalistic.

My friends in South Africa who were familiar with the
habits of wild game laughed at the notion that hyenas were
cannibals, and gave no credence to the belief that hyenas
would gather together in their lairs as many bone frag-
ments as we had already collected from Makapansgat.

Experienced hunters told me that to their certain know-
ledge most South African Carnivora, such as the lion,
jackal and spotted hyena, generally avoid caverns and live
on the veld, killing their prey or scavenging for it and con-
suming it in the open country. The only animal with differ-
ent eating habits is the leopard, which frequently leaves its
kill high in the branches of trees. The leopard, in common
with the brown hyena, is attracted by the protection of rock
shelters and fissures, especially when the female is mother-
ing her cubs. But there was—and still is in some minds—
a deep-seated idea that hyenas habitually collect bones and
deposit them in caves.

I had found this idea to be almost ineradicable in America
during my 1949 visit, and it was still prevalent both in
England and on the continent of Europe. As late as 1938
the eminent Austrian naturalist, Dr. H. Zapfe, wrote a
great work on the so-called ‘cave hyenas’ of the Ice Age
in Europe and the prehistoric significance of the bone-eating
beasts of prey. Dr. Ralph von Koenigswald in Holland and Dr. Kenneth Oakley, the British paleontologist, were both still expressing the view that any carnivore, especially the hyena, might have placed the bones in the men-ape sites.

How could I vindicate the truth of my conclusion that the australopithecines had been responsible for stacking the bones of their prey in the caves after eating the flesh?

Clearly the first thing to do was to track down every story I could gather about the existence, real or supposed, of hyena lairs, to see if the animals had deposited bones in them. If there were bones in the lairs these must be collected and compared with the bones from Makapansgat to see if they were identical in type.

On his own initiative my chief laboratory assistant, Mr. Alun R. Hughes, wrote to the local newspapers asking everybody who knew or who had heard of such hyena bone-bearing lairs to let him know. The response was gratifying, although a few people wrote saying that they accepted unconditionally the belief that hyenas collected bones. Most of these stories of hyena bone lairs came from people who had explored the Kruger National Park, the game sanctuary created in the days of the Transvaal Republic by President Kruger when he realized that the country’s game was in danger of extinction. It is now South Africa’s biggest tourist attraction, visited annually by thousands of people who can travel its roads by car and watch the wild animals in their natural habitat.

I thought it would be comparatively easy to get access to the hyenas there but the administration wrote that it did not favour the digging-up of any of the supposed hyena lairs in the reserve. I was referred to Mr. W. A. Campbell of Durban, an elderly sugar baron and one of the greatest game conservationists in the country. Mr. Campbell owned Mala-mala, a farm which is continuous with the game reserve on the west side. He not only gave us permission to dig wherever we wished, but in August 1958 accompanied
my two assistants, Mr. Hughes and Mr. N. H. F. Haring-
ton, to a likely spot in the open bush country alongside the
Kruger National Park boundary, where there were nine
ant-bear holes, six of which were within an area approxi-
mately 86 ft. × 12 ft.

This region was most promising as it had been trampled
down so much by hyenas that it was relatively clear of grass
and small bush. Eight of the nine ant-bear holes were con-
ected by surface paths and the place had obviously been
occupied by hyenas over a long period—in fact, the day be-
fore their arrival hyena tracks had been observed in the
ground leading from the largest of these holes. It was esti-
mated from the tracks that at least half a dozen animals
were present and, in the belief that the holes intercom-
municated underground, some of the apertures were filled
in and an attempt made to smoke the hyenas out of others.
The animals were so little disturbed that they spent the
following night in the largest hole, as was shown by the
recent pad-marks and the unmistakable pungent hyena
aroma.

The hole led into a tunnel that took two Africans four
days to excavate completely. After descending three to
four feet, the tunnel levelled out to about three feet below
the surface except at the west and there it reached six feet
below ground level. The tunnel system had four branches
ending blindly underground.

Two of the branches were relatively short and the other
two long and wavy, while the total ground surface area was
approximately 44 ft. × 16 ft.

According to Mr. Campbell the tunnel mechanism had
first been made by ant bears. Then it was taken over by
wart hogs and was finally commandeered as a habitation
by hyenas. Hughes and Harington have since admitted
that because of the traditional belief and in spite of my views
they expected to find it strewn with bones and album grae-
cum (Greek white, the dry white dung said to be char-
acteristic of hyena lairs). To their surprise it contained
nothing except fleas, an odour of urine probably due to hyena pups, and the complete skeleton of a tortoise that had apparently fallen into the opening and been unable to find its way out again.

Although the entire area of about 190 ft. × 100 ft. around these nine ant-bear holes was carefully searched, all that was found was two land-snail shells, four small bone fragments and one pile of hyena droppings. Yet at a spot less than 500 yards from the excavated lair, a blue wildebeest had recently been killed, probably by a lion, and save for the large bones of the arm and thigh practically the entire skeleton was lying where the beast had been killed. The remains included the long bones of the limbs.

Another known favourite spot for hyenas on this farm was a granite outcrop. The sheltered space below the rocky overhang was meticulously searched for bones and excavated at the entrance, but neither bones nor droppings were found. A careful search within a radius of twenty yards produced another disintegrating but otherwise complete tortoise skeleton, the bones of a lower limb part, and four antelope bones. These were all more than five yards from the rock shelter. In other words, there were no more bones than one might expect to find anywhere around the game park.

The finding of complete tortoise skeletons so close to hyena lairs was of special interest because broken-up bone and carapace fragments of turtle and tortoise were found at both Taungs and Makapansgat. Here at Mala-mala the hyenas had not shown the slightest interest in, nor the capacity for breaking up, tortoises and leaving fragments of their skeletons in the vicinity of their lairs. Although Mala-mala is between 100,000 and 120,000 acres in extent, these were the only two hyena lairs known to exist upon it. This fact throws doubt upon whether carnivores have lairs at all.

Apparently hyenas go to earth only when they have their young, and then probably it is only the females which do so in order to farrow, suckle and feed the pups. It was obvious
from this search, at any rate, that the spotted hyena does not have a daily habit of laying up a store of bones and could not by any stretch of imagination be said habitually to collect them in prodigious quantities either in its lair or in the vicinity of its lair. On the contrary, it seems certain that the hyena habitually feeds where it finds its food and that the fragments left over from the feast are customarily found at or near the site of the kill.

Bone-accumulating by hyenas was a myth. Despite all the assumptions made about the way in which hyenas, bears and leopards built up deposits of bones in caverns, nobody living seemed actually to have inspected a lair critically, nor to have collected the bones from the lairs to institute detailed comparisons of the sort we were carrying out. Certainly we could find nobody who had excavated a known lair, nor anyone who had collected kills from the vicinity of hyena lairs in order to show what hyenas did or did not do in a state of nature. I was determined now to find out how and where Dean Buckland had picked up his theory, and why it had proved such a favoured one that it had become established as an article of scientific faith.

Dean Buckland was an English divine and the first holder of a Readership in geology at Oxford. In 1818 he was elected a Fellow of the Royal Society of London and president of the Geological Society of London in 1824 and 1840. In 1822 he presented a paper to the Royal Society* that is virtually the fountain-head of modern speleology, as the study of caves is known. When it was published in the Philosophical Transactions of the Royal Society the author was given an immediate award of the Copley Medal.

* Account of an Assemblage of Fossil Teeth and Bones of Elephant, Hippopotamus, Bear, Tiger and Hyena and Sixteen Other Animals discovered in a Cave at Kirkdale, Yorkshire, in the Year 1821; with a Comparative View of Five Similar Caverns in various Parts of England and Others on the Continent.'

His paper was republished the following year as a book with further observations on other caves in Great Britain, Germany and Southern Europe and was dedicated to the Lord Bishop of Durham. Called 'Reliquiae Diluvianae, or Observations on the Organic Remains contained in Caves, Fissures and Diluvial Gravel attesting the Action of a Universal Deluge', it went into a second edition in 1824.
In it Buckland described how he had found the bones of creatures such as rhinoceros and hippopotamus on the floors of various caves in Europe. As these animals were more characteristic of tropical Africa than of temperate Europe, it was obvious that that part of the world had once enjoyed a warmer climate. Since the broken bones included carnivorous creatures such as the tiger, wolf, fox and hyena, Buckland assumed that the carnivorous beast responsible for them must be the animal with the strongest jaws and the greatest reputation as a scavenger—namely, the hyena. To accept this theory, or suggestion as Buckland himself termed it, meant an acceptance that the hyena was not only carnivorous but cannibalistic. As wolves were known to eat those of their kind killed during attacks on travellers in snowbound countries like Russia, the idea of hyenas acting similarly did not appear unlikely either to him or to a generation of colleagues familiar with Napoleon’s retreat from Moscow.

Buckland had set out to prove that in the majority of these bone deposits the animals had been floated in by Noah’s deluge. He recognized, however, that in some places the animals had fallen in. In others where the bones were found in a badly broken condition and the number of bones and teeth were totally disproportionate to each other, the only alternative suggestion he could bring forward was that ‘they were collected by the agency of wild beasts’.

Buckland carried out his work at a time when the existence of man before the flood (prediluvial man) was suspected but unproven. The European world had been in an extremely disturbed state with the growth of liberal ideas following the American War of Independence, the French Revolution, the subsequent French Revolutionary Wars and the Napoleonic campaigns from 1799 to 1815.

Even in comparatively orderly England, Bentham and Owen among the philosophers, Shelley and Byron among the poets and Wesley and Whitfield in the church were warring against the established order of belief as embodied in the current forms of State, society and religion.

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This general revolt against accepted beliefs was already expressing itself in the world of science in the replacement of the creation story with the theory of evolution, first propounded in a generally acceptable form by Darwin in his *Origin of Species* (1859). Between 1825 and 1841, Father J. MacEnery, a Roman Catholic chaplain at Tor Abbey in Devonshire, dug up a number of flint implements in Kent's Cavern near Torquay alongside the remains of tropical animals such as Buckland had described. MacEnery realized that these implements proved the contemporaneity of man with the extinct creatures of the warmer climates, but Buckland refused even to entertain the idea. This would have involved believing in the existence of prediluvial man and, although the discovery at Kent's Cavern was verified by the independent researches of Mr. Goodwin Austin in 1840 and by the Torquay Natural History Society in 1846, the force of prejudice was so strong that the matter was not thought worthy of investigation.

Such facts afford a rough idea of the ignorance of the laity and the privileged position of Anglican clergy at the time when the hyena theory of broken bone accumulations was put forward by Buckland. As the gardens of the Zoological Society of London in Regent's Park were not founded until 1826, the only opportunity Buckland had of seeing hyenas before his paper was published in 1822 was in a travelling menagerie.

At most he could have examined them behind bars for a few hours and had a conversation with their keeper. On this information and stories culled from current travel literature from South Africa and the Near East, he built up his belief about their ability to crack any type of bone and their preference for living in caverns.

His own writings show that Buckland relied chiefly on the lurid 16th-century narrative of Ogier Ghislain de Busbecq (1522–1592), a Flemish author, for his information about hyena habits. Busbecq drew on his experiences as Ambassador of Ferdinand of Austria, king of the Romans,
to the Court of Suleiman the Magnificent at Constantinople in 1555.

Buckland wrote: 'Their habit of digging human bodies from the grave and dragging them to their den, and of accumulating around it the bones of all kinds of animals, is described by Busbequius, where he is speaking of the Turkish mode of burial in Anatolia and their custom of laying stones upon their graves to protect them from the hyenas.'

Busbecq also stated that 'hyenas are easily tamed and in many cases are docile, intelligent and affectionate'.

In corroborating this last statement I also discovered the fallacy of the brown hyena's collecting habits. Dr. Daan Marais, a final-year medical student (1955), kept a brown hyena as a pet at his home in Edenvale, near Johannesburg. At the age of eighteen months the hyena completely disposed of a calf's head, skin, jaws, teeth and all. Before it was two years old it was able to consume with ease an adult donkey's head in three days, the only left-over part being a part of the skin of the donkey's snout. By the time it was three years old, it was being given a donkey's head to eat every week. So powerful are the hyena's digestive juices that not a fragment of the bones or teeth swallowed could be detected by the naked eye in its pure-white faeces.

Dr. Marais and his hunting companions, Dr. P. J. van B. Viljoen and Dr. Uys Pienaar, a former lecturer in the Anatomy Department who is now with the Kruger National Park staff, are emphatic that no other carnivore will devour a hyena's carcass. They assure me that, on the contrary, they have frequently encountered the mummified carcasses of hyenas in the veld; the carcasses often lie untouched by bird or beast where they have been shot or cast aside from traps. This team has shot hyenas that have afterwards lain under their observation for a full week untouched by any animals other than vultures.

The most astounding of all Buckland's unwarranted conjectures was that hyenas are cannibals. This has been specifically denied by many reputable naturalists, not least
of all Col. J. Stevenson-Hamilton, for nearly forty years director of the Kruger National Park and undoubtedly one of the greatest practical naturalists of all time. In his book *Animal Life in Africa* (1912), he wrote: 'Hyenas will eat the flesh of any animal or bird except that of their own kind.'

This revulsion against eating hyena flesh was not experienced by human beings such as the ancient Europeans. However nauseating hyena flesh may be to hyenas and to other carnivorous creatures, man, the greatest of all scavengers, whether presapient or sapient, could cope with the flesh of any and every competitor—even if it happened to be his own flesh and blood. Hyena bones are associated with most anthropological discoveries. They were found with rhinoceros, human bones and fragments of pottery in an early discovery made in the cavern at Pondres, near Nîmes, Gard (France), by de Christol in 1829; almost a century later accompanying human implements of Mousterian (or Lower Aurignacian) type in Shensi, China; accompanying the remains of *Sinanthropus* at Choukoutien; and with *Australopithecus prometheus* at Makapansgat.

From the frequency with which hyenas appear in cave art and their remains accompany human bones, it is clear that early man, whether in Europe or Asia, approved of hyena flesh as much as of that of bears, dogs, cats, foxes, lynxes, wolves or any other Carnivora.

The ancient Egyptians of the Fourth Dynasty (2900–2750 B.C.) kept hyenas as domestic animals or a kind of game, while at the time of the pyramid builder Chefu (2898–2875 B.C.) the hyena is registered as an item of food in two lists. In Europe, from Mousterian times onward, prehistoric human deposits contain bones of hyenas, wolves, foxes, bears, weasels, otters, tigers and any other available carnivore. Our European ancestors had few if any meat taboos.

Buckland apparently overlooked the fact that wolves were of particular public interest not only in Abyssinia but also in Europe, especially during the 16th century.
when Busbecq was writing. It was during Buckland’s life, at the beginning of the 19th century, that the operations of ‘resurrection men’ who dug up recently buried bodies to supply medical schools with material for dissection, were at their zenith. The brothers Grimm and Hans Andersen were curdling the blood of educated European nursery children with their folklore and fairy stories of bone-grinding ogres. Body-snatching became such a real nightly terror that those able to afford it adopted every measure they could to protect the graves of their recently deceased relatives, not only in England but throughout contemporary civilized Europe and America.

In this social environment the legend of hyenas collecting enormous piles of human bones struck so realistic a note that it was acceptable to the Royal Society of London as evidence, although Busbecq’s account had gathered the dust of three centuries. But Buckland carried the bone-carrying theory even further.

Although Busbecq had said that the hyenas brought the bones only to the vicinity of caverns, Buckland’s imagination had them carrying the bones completely underground into the remotest depths of the Kirkdale limestone caverns.

Buckland’s story would most likely have died a natural death if Charles Lyell (1797–1875) had not been his most brilliant pupil. His master’s lectures attracted Lyell to geology and his Elements of Geology were Charles Darwin’s preferred reading on H.M.S. Beagle and became such a standard work on stratigraphical and paleontological geology that it was published six times in Lyell’s lifetime.

Lyell not only accepted Buckland’s hypothesis about the hyena’s bone-carrying and cannibalistic habits but he included all Carnivora as bone carriers. According to Lyell, all these creatures apparently spent their spare time stacking up bones in caves. His acceptance became a basic postulate of anthropological and geological belief from that time onward, despite the misrepresentation it involved. In Europe it became so generally accepted that
bears and hyenas, leopards and lions, sabre-toothed tigers and all sorts of carnivores collected bones that the Abbé Breuil’s brilliant work on *The Bone and Antler Culture of Sinanthropus at Choukoutien* was utterly neglected until my own detailed description in 1955 of *The Osteodontokeratic Culture of Australopithecus Prometheus* caused the scientific world to have second thoughts.

One voice alone was raised in all these years but it was a futile protest. Robert Knox, the Edinburgh anatomist to whom the notorious body snatchers and murderers Burke and Hare subsequently sold their smothered corpses, went to South Africa as a medical assistant in 1817. On his return to England in 1822 he wrote an article protesting against Buckland’s theory, because while in South Africa he had visited numerous hyena lairs without finding their supposed bone heaps. He had witnessed many kills upon which hyenas and other carnivores had feasted, and found that most of the skeletal parts had been left lying in the open veld in the vicinity of their sites of killing.

But Knox’s* paper was published in an obscure scientific journal and was not brought to light until July, 1955, when I first announced and described the characteristics of the bone, tooth and horn culture at the fourth Pan-African Congress on prehistory at Livingstone. At that meeting one of my former students and colleagues, Dr. L. H. Wells, Reader of Anthropology at the University of Edinburgh and now Professor of Anatomy at the University of Cape Town, drew our attention to Robert Knox’s paper. He attributed its neglect not only to the obscurity of the journal in which it was published but also to the opprobrium which the name of Knox and his reputation suffered as a result of that unfortunate link with Burke and Hare.

The year 1955 was a significant one for my team and for me in regard to Makapansgat. The death of Dr. Bernard Price and the subsequent withdrawal of funds had

made a full-scale search for the bones impossible, but Mr. Hughes spent every available week-end and holiday at the limeworks site; while my wife and children—who had become as keen on unravelling the bone culture as I was—accompanied me on these fossil-hunting trips whenever we could get away.

In 1955, however, the Wenner-Gren Foundation gave a valuable grant of 3000 dollars, which made it possible to have teams of African workers at the site every day during the winter months, sorting the bone-bearing breccia from hundreds of tons of dumped lime.

During the preceding ten years, the part-time workers at the limeworks dump had systematically sorted out some fifteen tons of bone-bearing breccia. In the years following the aid from America, firstly from the Wenner-Gren Foundation and from the 9000 dollars subsequently donated most generously by the Wilkie Foundation, we were able to step up the recovery of breccia so greatly that we produced more in a year than during the whole of the previous ten years. At the time of writing, we have collected ninety-five tons of breccia of which about one-third is grey breccia containing roughly 5000 osteodontokeratic fragments to the ton, making a probable total of 150,000 fragments.

It would not be overstating the case to say that without this enthusiastic, practical support from America I would never have been able to carry out my part in the eternal search for man's ancestors.
CHAPTER ELEVEN

The Bones Tell their Story

When an African tribal native wants a glimpse into the future he gets the village witch-doctor to ‘roll the bones’ for him. No self-respecting witch-doctor is ever without certain wild animal bones which he carries in a leather pouch and which, when he is hired, he shakes in his hands and casts on the ground with weird incantations in much the same way as a keen dice player implores the little ivory cubes to ‘buy new shoes for poppa’. The future is told according to the way and directions in which the bones fall—and like most people who have lived a long time on the African continent I have encountered remarkable stories and instances of how uncannily accurate some of these gentlemen have been in their predictions.

In this chapter I intend to ‘roll the bones’, not for a glimpse into the future but for the purpose of looking back a million years. There is nothing mystical about the way in which I got the bones to tell the story of the australopithecines’ hunting and dietary habits; rather it is a story of painstaking sorting and hammer-and-chisel work by my team of helpers, combined with scientific deduction and research which culminated in the publication in 1957 of the first detailed analysis of the 7159 fragments of bone, tooth, and horn extracted by 1954 from the Makapansgat breccia, and a comprehensive account of the culture practised by the australopithecines who once lived there. The primary place of animal bones and their persistent rôle
in all the subsequent stone cultures of mankind was also pointed out.

This was rather a bold undertaking for many reasons. In the first place it had been argued at the New York (1952) Symposium that the Australopithecinae were probably eaters of monkey brains but this fact did not of itself prove that they manufactured tools. Baboons had been seen using pebbles to kill and open up scorpions but that did not mean we have to call them implement-makers.

The previous year Dr. Kenneth Oakley had written a paper in which he tried to define man. He accepted the proposition that the australopithecines walked upright and had brains mostly no larger than gorillas and a dentition of essentially human form. He even conceded that a human child is usually beginning to talk at the age of two years, when a brain capacity of 650 c.c. is well within the normal range. So we could not assume that an adult Australopithecus with a brain of that size was incapable of speech; nevertheless he still baulked at calling them human.

If deliberately chipped stones (i.e. lithic* artefacts) had been found in the cave lairs of Australopithecus he would hesitate less to accept him as human. He needed evidence not of the use but of the manufacture of stone tools before he could define a creature as man.

The Sterkfontein valley was rich in Australopithecinae; we knew what they looked like; and their presence at Makapansgat had been established in 1947. Their upright posture was proven by the pelvic bones found in 1948 (a discovery corroborated by finding a second, probably female adolescent, hipbone fragment in 1957). This was valuable information, of course, but the startling event to me was that this site, which we had deduced twenty-two years previously to be human, had been proven in 1947 to be australopithecine.

This astonishing incident had entailed the re-casting of my opinions. In 1925 I had deemed Australopithecus to be

* From Greek lithos, stone.
an ape. He was certainly an advanced ape, daring to simulate mankind in forehead, dentition, upright posture, terrestrial and cave-dwelling habits and in his adaptation to life in the temperate zone of the earth and to a diet principally carnivorous. He was human also in his frailty, his defencelessness and in his ability to live on small game.

These facts had entitled me to describe the group of creatures he represented as intermediate between living apes and primitive mankind. These same facts about the Taungs infant had been corroborated by the adults of Sterkfontein, Kromdraai, and Swartkrans as well as by their infants, and by the discovery of limb and pelvic bones as well as skulls.

But the Makapansgat Limeworks was quite a different kettle of fish. Previous to 1945 it had never been regarded as an australopithecine site; the remains of the beasts killed and eaten there were plenteous: not little creatures but huge ones, and thick structured; formidable too: buffalo and sabre-toothed tiger; and puzzling in addition: giant porcupine and turtle. The faunal remains were as varied as in human deposits and the amount of bone-breccia literally staggering. It was impossible any longer, if Australopithecus were responsible for these evidences, to call him an ape. He was human, proto-human, at least; first among mankind perhaps, but certainly no longer ape. My chemist consultants twenty years earlier had reported carbon in the bones or the material surrounding them; it was on this fact and the huge animals and the vastness of the bone deposit that I had based my diagnosis of the site as human. I was sure that here was the earliest known man.

By 1952 it was becoming clear to me that the bones of australopithecines had just about reached their limit of usefulness in helping others to decide whether these creatures were apes or men. Doubts were being thrown on the usefulness in this regard of even the hipbones and the teeth. If the australopithecines really did, as we found in 1949, use antelope armbones as bludgeons, perhaps Oakley's
suggested difference between tool-using and tool-making would help, and an exhaustive statistical analysis might even decide the matter.

It was obvious at the New York Symposium that people were going to give up the anatomical struggle and to substitute the cultural uniqueness of man—for his previously argued anatomical distinctiveness. Even anatomists were using the absence of a stone culture as an argument against australopithecine claims of proximity to mankind.

As far back as 1948 the late Dr. Franz Weidenreich had taken Schepers to task for reasoning from endocranial casts that the australopithecines were erect, had used sensitive hands for skilled movements, had an improved understanding of their visible, palpable and audible environment and had a cortical forebrain development capable of letting them communicate the acquired information to their families, friends and neighbours. Later in the same year Weidenreich concluded that studies made on skeletons alone would never enable individuals to make statements about the mentality of the individuals concerned or about mental changes or progress over a period of time. ‘Cultural objects’, he said, ‘are the only guide so far as spiritual life is concerned.’

In 1954 Zuckerman, too, applauding Weidenreich’s supposed *reductio ad absurdum* ‘that the australopithecines are hominids even if their morphology reveals them as apes’, dismissed as ‘groundless such arguments about the hominid status of these creatures as have been based upon the internal conformation of the cranial cavity’. To this anatomist, as to Weidenreich, what had conferred fitness upon man was the use to which he put his brain in fashioning tools: his exosomatic as opposed to his endosomatic evolution.

Straus, also a year earlier, while recognizing that some Australopithecinae had endocranial volumes exceeding the arbitrary ‘Rubicon’ of 750 c.c. — which Sir Arthur Keith had tried to set up between the brains of apes and men—still
demanded culture as the criterion. He was ‘unable to conceive of such a custom, as deliberate tool-making unless it is socially heritable’. For him the word *culture* implied only ‘social inheritance from one generation to another. This, in turn,’ he said, ‘implies an effective means of communi-
cable symbolism or language.’ In brief, they wanted stone tools.

There was little prospect of finding evidence of language at Makapansgat but a statistical analysis of the bone frag-
ments might display purposiveness and therewith *culture* and its social inheritance from one generation to another. If they were so close to man, it seemed reasonable to expect that the Australopithecinae could at least sling stones. How-
ever, nowhere that *Australopithecus* was found had any-
one succeeded in uncovering any stone pebbles, chipped
or unchipped. In all of the fourteen years’ work at Mak-
pansgat up to 1959 not a single stone has come out of
the grey australopithecine breccia, though at least seven
tons of it have been developed with hammer and chisel in
our laboratory to find all the bone, stone and other hard
objects it might contain.

Archaeologists have concentrated their attention so
much upon stone implements for the past couple of cen-
turies that it has become customary for them to imagine
that stones were the first material man used for making
tools. Although people had come to recognize that man had
been a hunter for the better part of 1,000,000 years, it was
assumed that he had never had the sense or ability to use
teeth or tusks as tools or to employ bones and horns (and
then only as tool parts) until the Upper Paleolithic, or
literally, ‘Old-stone’ period, i.e., about 25,000 years ago,
when in Europe he started wearing teeth vertebrae and
shells round his neck and other parts of his body. The con-
cept of a Bone Age had never been properly investigated
and was not thought of as being Pre-Stone. Just before the
Second World War (1939) the Abbé Breuil produced a
splendidly illustrated monograph on the ‘bone and antler
industry’ accompanying the lithic stone artefacts found with Peking Man at Choukoutien.

When the Abbé and Père Theilhard pointed out the bone and antler industry at Choukoutien, their colleagues dissociated themselves from Breuil’s interpretation (presumably because of their adherence to the hyena theory of bone collecting) even though, as in Europe, the critics were confronted with the remains of man himself in the same deposits as the hyenas’ bones. Consequently even then the bone, tooth and horn material at Choukoutien was either not collected at all or collected without any archaeological aim. Breuil himself had for examination less than half of what was salvaged under these unsatisfactory auspices. Despite the resistance he met, he published his crucial monograph. In it he wrote:

We are apt to think because stone tells us nearly all we know of old Paleolithic times that other materials played only a very minor part. . . . Lions and other felines and carnivores [sic] had their teeth and claws, grass eaters their horns and antlers; what more natural than to try to steal their arms and to turn them against their owners?

A hunter from his first days, Man had also the skeletal remains of his victims, which he soon cleared of their flesh, unless this was done by carnivores or natural agencies. Long unbroken bones easily made excellent clubs, with handles unlikely to break; certain naturally pointed bones could prick and pierce; others wide, flat and thin, could be used as shovels; some hard and short would make excellent blocks or anvils; longer ones excellent levers.

When to extract the marrow, like the hyena, but using a hammer stone, Man broke these long bones, he had differently shaped flakes, some with their epiphyses (i.e., the ends of the bones as opposed to the shafts) often useful for gripping; other flakes of the diaphyses (or shafts) with more or less sharp edges, had ends capable of serving as chisels or pointed tools.

Bone must have abounded everywhere; it was hard, elastic and solid. Why should Man not have used it, above all in the regions where stone was difficult to flake and scarce?
Certainly in every age, alongside his stock of stone tools, even in the days of an evolved bone industry, which was first developed but not invented in Upper Paleolithic times, utilized bones played a great part, though it is only fairly seldom that they have been well enough preserved for their use to be obvious. [Definitions within brackets mine.]

Unfortunately the specimens from Choukoutien were, as recorded earlier, lost in the hostilities of 1937. Consequently Breuil's illustrations are the only records available today for comparing the earliest known osteodontokeratic artefacts of admitted mankind with those of Makapansgat. Most of the categories of bone, jaw and horn core tool claimed by Breuil as human artefacts are matched by the bone fragments from Makapansgat. Consequently Breuil's claims vis-à-vis Peking Man apply equivalently to *Australopithecus prometheus*. Peking Man had natural picks at his disposal in the detached antlers of *Pseudaxis grayi* (a kind of antlered deer); *Australopithecus* discovered picks by employing an entire antelope cranium with either one or both horns still attached.

Oddly enough it was the sixteen-inch elephant thighbone accompanying Piltdown Man that used to be cited as the earliest piece of evidence that very early man had used bones as well as stones. Its unusual appearance was always a bar to its general acceptance as an implement—quite rightly so, as in 1955 it was also discovered to be a forgery just like the skull and jaw.

The state of knowledge about osteodontokeratic tools prior to the discovery of Peking Man was summarized in this way more than a generation ago by MacCurdy:

A rude industry based on the use of bone first made its appearance during the Mousterian epoch (20,000–40,000 years ago). In 1905 Henri Martin reported the discovery at La Quina of bones (chiefly metacarpals and metatarsals) that bore marks of having served as chopping blocks or for the retouching of flint instruments. The following year, Pittard found at Les Rébières not only metacarpals, metatarsals, phalanges and
fragments of diaphyses that had served as chopping blocks, but also rude pointed bone tools.

MacCurdy recalled too that similar crude bone tools had been found by Bächler in the caverns of Wildkirchli and Drachenloch, Switzerland. The Mousterian hunter had improvised a bone tool consisting of a cave-bear fibula for skinning and preparing the hide of the cave-bear. The bone was broken obliquely near the centre and the broken surface polished for, and by, use.

Bächler found thirty-one specimens arranged on a flat stone so as to bring the handles at the same end of the pile. Some of the specimens had seen service, as indicated by the wearing down of the broken end to a facet with an angle of from thirty-two degrees to thirty-six degrees.

Bone splinters and canines of the bear, split longitudinally, were utilized as pointed implements. The innominate (hipbone) was made to serve a variety of uses through the removal of the distal end of the iliac, pubic and ischial portions; the margins of ten bear marks of use. Such a tool admits of service as a skin-scaper or as a vessel for holding water, blood or oil (lamp). Specimens of this kind occur by the hundreds at Drachenloch, as many as twenty-five or thirty having been found in a single heap. They were also found at Wildkirchli!

Basing his theory on the remarkable interglacial bone-accumulation discovered in the Alps of Switzerland and Austria since 1912, O. Menghin postulated (1937) for primitive mankind a third great cultural cycle 'without any relations either to hand-axe or flake industries'.

Menghin said that the discoverers of this culture were Bächler in St. Gallen, and Hörmann in Die Peterhöhle. The sites are caves inhabited by cave-bear hunters; they contain fireplaces which suggest ceremonial treatment. Stone implements are present, but are rare and are nothing but split stones, 'which nobody would take for artefacts were they not found in connection with coal and ashes'.

Menghin points out that the same sort of culture extends north-east into the plains of Czechoslovakia and Silesia as
the work of Franz (1936) and Zott (1934) has shown, and believes ‘that it had its source in the northern part of Eur-
asia, where, as in all later prehistoric periods, a strong pre-
dilection for bone utilization can be observed’.

In 1956 my curiosity about Bächler’s researches was so intense that I had microfilms of his work on Wildkirchli
(1906) and on Das Drachenloch (1921) sent to me. Bächler remarked on the contrast he found between the
lack of bone tools and the numerous lower jaws and ace-
tabular cavities of cave-bears’ hipbones. The peripheral
parts of the bones forming the latter had been removed.

Whether the jaws had served as weapons and the ace-
tabular sockets as drinking utensils were questions that he
felt remained undecided but which a greater body of mater-
ial might ultimately solve. Many other bones, as for ex-
ample the fibula (splint bone on the outer side of the leg),
had been abruptly broken off, pointed, and subsequently had
the broken surface smoothed. To Bächler the mystifying
part of the Wildkirchli deposit was the enormous number
of bones broken to pieces without any evidence that they
had been broken by stones held in human hands. As they
had no marks of cutting or hitting, could it be, he asked,
that another method had been used, such as simply smash-
ing them on stones?

The much more elevated and carefully excavated
Drachenloch site, 2445 metres above sea level, added
evermously to Bächler’s knowledge when he investigated
these Alpine cave-bear caverns fifteen years later. He found
that the skeletal parts of the bears—especially their skulls
and the adjacent first and second cervical vertebrae—had
been systematically stored between the walls of the cave
and low walls of stone built parallel to it, and also inside
four-sided stone chests of undressed stone. This and the
systematic employment of skeletal parts as tools led him to
present a thorough description of these remarkable dis-
coveries about decapitated bears, primitive ritualistic cults
and the almost complete collection of skeletal tools used by
the cave dwellers. Cave-bear bones constituted 99.5 per cent of the faunal remains.

One of the most important features of Drachenloch, the highest site of human occupation in Europe, is the complete absence of any of the great cats—such as the cavern lion and panther—and also of hyenas. The bone deposit can have been due, therefore, only to primitive man.

The curious feature to me about Bächler’s painstaking and profound contribution to our understanding of early European man was that, while his revelations about decapitation and the primitive bear cult had been wholeheartedly accepted, those on skeletal implements had been almost totally ignored.

Zotz’s (1934) brief popular account of the Silesian caves and their Ice Age inhabitants includes mention of a gashing or slashing tool (Hiebwaffe) formed by a cave-bear’s lower jaw. He points out that this made a murderous weapon because of the great canine. Through frequent use it was always splintered, worn down or broken away. Man opposed the cave-bear with his own weapons and many men were doubtless torn to pieces by the cave-bears’ canines before they conceived the idea of abstracting the defeated creatures’ most dangerous weapon for their own use.

Zotz regarded the acetabular cavities of innominate bones as grease and fat containers, and the hollow regions of bears’ skulls as bowls. He visualized a dagger-shaped skinning tool made from bone, spatulate bone tools and a worked canine tooth, as well as a rib fragment perforated at one end. Unfortunately, like Bächler he gave no statistics of the relative incidence of these fragments.

In his cautious analysis of 1936, Franz questions whether there could have been one thousand bears slain at Drachenloch. At Krummau his colleague Liebus could find evidence of only about one hundred animals in all and Franz was willing to concede that only three bone specimens were genuine artefacts. Smoothed and worn away though the edges of other bones might be, he attributed their state to
the action of moisture and acids in the soil or to the activities of rodents. Franz was nevertheless satisfied that the breaking of bones at Krummau had been done by human beings.

Franz's collaborator A. Liebus (1936) drew attention to certain facts that proved the Krummau bones had unquestionably been gathered by Man. Quite apart from the fact that they included remains such as mammoth and rhinoceros—which could not be regarded as hyena prey because of their size and strength—he found it extraordinary that there were no trunk remains whatever, with the exception of a hare sacrum, a rhinoceros thoracic vertebra and a few rib fragments. However, in his opinion, the clearest evidence lay in bones marked by fire and the split bones—especially those scooped out with tools for their marrow—which showed an impressive regularity in the removal of their joints and processes. In addition, there was an unusual mingling of old and young beasts.

Franz noted the preponderance of teeth and extremity bones as far as the hyena remains were concerned and correctly deduced that the hyenas had been deliberately hunted. The hyenas had been either consumed or completely used up in some fashion because their bones had been smashed up just as completely as those of the other creatures.

Franz and Liebus failed to deduce from the isolated teeth and the broken jaws what Zotz deduced the following year from Kitzenloch in Silesia, namely that Carnivora were valuable to human beings because of their natural armament. To the student of the Australopithecinae the importance of the data assembled by Liebus is that it demonstrates the similarity between an unquestionably human bone deposit and the Makapansgat deposit.

One of the peculiarities of the Makapansgat deposit is the amazing absence of vertebræ. At Krummau only eight vertebral fragments were reported; and although Liebus recognized this absence of trunk remains as fantastic neither he nor his colleague Franz drew the corollary drawn by
Zotz from the bone magazines at Kitzenloch that, customarily, the heads had been cut off flush at the neck junction and carried home because of their tool-providing value. Clearly at Krummau, however, as at other European sites, the osteodontokeratic needs of people who used stone artefacts was still very considerable even during the last Ice Age.

A new approach was essential to break down the blank wall of prejudice that I knew would face me when I wanted to show in 1955 that the man-apes had actually had a bone culture. Would the statistical method succeed in showing it? It had already involved ten years of labour, first of all in sorting the dumps and then getting the bone fragments out of the breccia at the bench; but it was necessary to go further than Breuil or my other predecessors had gone. Every piece of broken bone found must be traced, as far as was humanly possible, to the bony source from which it had been derived. Only in this statistical way would it be possible to see whether the treatment of each bone had been haphazard, as by carnivores, or systematic as by human beings. Also, if systematic, what had been the manner of approach: casual and crude or orderly and skilled, and therefore capable of being designated a culture?

This work of sorting the fragmented bones from Makapansgat, hopeless as it looked, was aided by the use of the temporary army huts that had housed our fossils and also had served as the workshop of my European and non-European assistants. We at least had space and disused trestle-tables, some that I had kept ever since 1923 and that had been used by the post-war influx of returned soldiers who had come to the university as medical students. Here we were able to sort thousands of fragments into like bones, according to their sizes. The majority, 92 per cent, were antelopes, which demonstrated that this Australopithecus family, like all primitive human beings, were characteristically hunters of game animals of Bovidae, and by preference ate venison. Makapansgat showed
A diagram displaying the overlapping ranges in brain size or cranial capacity of living apes (gibbon, orang, chimpanzee and gorilla), man-apes (australopithecines), ape-men (pithecanthropines), Neanderthal Man and Modern Man.
that the ancient Levitical injunction, 'Whatsoever parteth the hoof, and is cloven-footed, and cheweth the cud, that shall ye eat', was based on very much more ancient, australopithecine precedents.

The ten years that had elapsed since the visit of the students' party in 1945 at Makapansgat, had resulted—through Mr. Alun R. Hughes' steady sorting of the dump, and Mr. James Kitching's preparation of the breccia with the aid of such African native staff as could be employed—in the collection of less than 20 tons of bone-bearing breccia from 5000 tons of the dump. A little over a ton—we thought it much more at first—of this breccia had yielded the 7159 osteodontokeratic fragments and they represented parts of at least 483 creatures; so we knew that the remainder of the breccia already collected would bring the number of beasts up to thousands.

The antelopes were graded, on Dr. H. B. S. Cooke's suggestion, as large (like kudu, eland, buffalo, roan and sable), medium (like nyala, impala, springbok and water buck), small (like steinbok, klipspringer and reedbuck) and very small (like the red and blue duikers). I was lucky in this work to have the devoted help of two women (for the first batch of a thousand or more Miss Margaret George and for the remainder later on Mrs. Hertha Erikson) as well as the Kitching brothers (James, Ben and Scheepers) and Mr. Hughes.

The other 8 per cent, the non-antelope fragments, were much fewer, but exceedingly important. In the first place the thousands of bones had shown that we were not dealing with any paltry deposit; it was a deliberate programme of bone gathering that had been followed and it had extended over many years. In the second place, since we found both hyenas and giant porcupine as well as ordinary porcupine skulls and jaws and teeth in a very damaged state, it was evident that creatures other than hyenas or porcupines had done the collecting.

In this other 8 per cent, in addition to the hyenas and
porcupines, were the bones and skulls of water turtles. These, like the crabs at Taungs, showed that *Australopithecus* at Makapansgat, like his brethren at Taungs, hunted in streams and knew how to break open with a club or stone a turtle or tortoise-shell case. This a hyena does not and cannot do.

From eggshells and the skulls of birds such as the shrike, guinea fowl and buzzard or marabou stork, it was plain that the Makapansgat australopithecines delighted, like baboons, gibbons, in bird nesting: and also in driving carrion birds away from their prey, or clubbing them when they were so gluttonously full that they could not fly away.

So, too, in disputes over prey they had probably clubbed the hyenas and the wild dog, jackal, leopard, sabre-toothed tiger, and other carnivores, both medium and small, whose broken skulls are found at Makapansgat. The giant rodent moles and spring hares found at Taungs could have been captured only by digging them out of their burrows. The 2 hares at Makapansgat thus indicated manlike speed; and the 8 porcupines, including two giant specimens, revealed the capacity to deal with prickly problems.

Clearly too the australopithecines, like all primitive human beings, took fleshy food wherever they found it. In these 7000-odd bone fragments were the remains of at least 39 large bucks of kudu and roan antelope size, 126 medium of wildebeeste proportions, 100 small ones of the gazelle order, and 28 of the tiny duiker type.

In that material also are remains of 4 fossil horses, extinct relatives of the zebra; 6 chalicotheres (an extinct type of tree-browsing creature with split toes like bear’s claws for dragging down branches), 6 fossil giraffes, 5 rhinoceroses, a hippopotamus, no less than 20 wart-hogs, and 45 baboons. No creature except man was so wide-ranging a hunter in stream or tree, above earth or underground; catching reptile, bird, rodent, carnivore, primate and ungulate alike. The animals they caught were generally young or the old, those most
easily overpowered; but it would be an error to under-rate the manlike skill implied by the versatility displayed by the animals they captured and whose parts they had brought to their caverns.

Just as the hyena was their most popular carnivorous prey, so among the rodents they specialized in porcupines despite their quills, probably because they needed their quills as well as their flesh. Among the primates they concentrated on baboons; of the ungulates (other than antelopes) they liked wart-hogs best of all.

These statistics disposed of the idea that the deposits might be due to hyenas, because hyenas, as we saw in the previous chapter, are not cannibals; they are not the prey of any carnivorous creature except early man; they cannot fish in streams for water turtle, nor do they smash up tortoise shells. They do not climb trees after birds' eggs and nestlings; they do not and cannot prey upon spine-covered porcupines, especially giant porcupines. The only creature known to do all these things was man.

The principal part of the body the midden-making australopithecines wanted in these non-antelope creatures was the skull: 82.5 per cent of the fragments are cranial. The parts of the skull they seized upon were, first of all, the lower jaw, and second, the upper jaw. Another obvious proof that the australopithecines were head-hunters was that only one neck vertebra (a baboon atlas) of these 140 non-antelope creatures had been found. The heads had manifestly been cut off sharp at the junction of the skull with the neck; the bodies of the animals other than antelopes may have been left to rot in the veld.

The anatomical feature that the upper and lower jaws of hyenas, baboons, wart-hogs and porcupines have in common is long, sharp teeth (lacerating canines or chisel-like incisors) such as will rip open a belly or tear out the eyes of an enemy. The ancient hunters were apparently after the tusks and teeth of these creatures for cutting tools.

Darwin (1871) tells the story of a female baboon, kept
under confinement by Brehm in North Africa, which ‘had so capacious a heart that she not only adopted young monkeys of other species, but stole dogs and cats, which she continually carried about. . . . An adopted kitten scratched this affectionate baboon who certainly had a fine intellect, for she was much astonished at being scratched and immediately examined the kitten’s feet and without more ado bit off the claws.’

Australopithecines skinning a wart hog. [William Papas.]

The Makapansgat australopithecines had both the baboon’s wit to recognize those portions of their antagonist’s anatomy in which their strength and fury lay, and the manual skill to hack and saw off the offending parts to deprive them of their power. Most importantly, they possessed the intellectual capacity to turn those parts against their aforesaid owners.

No better illustration of these abilities has been found than in the horse (zebra type) remains. There, apart from the cranial fragments, we find no vertebrae nor any portion of the limbs above the hock. The australopithecines wanted only the distal part of the hindlimb, the part with the ‘kick’ in it. Similarly with the chalicotheres, the tree-browsing creatures with split-clawed hoofs; 6 of them are represented in the deposit, but of bones other than cranial
fragments we found only one claw. With the antelopes, too, of all 293 represented (39 large, 126 medium, 100 small, and 28 very small) the parts of the legs below the ankle and wrist joints were taken into the cave by the hundreds, but only 4 of the hoof phalanges are left to tell the tale of what they were used for. Obviously the parts below the hocks would have been relatively useless as food; they were desperately needed as tools, firstly as double-ended clubs. The australopithecines were not only decapitators but professional hockers (or hamstringers) as well. Other uses for the cannon bones below the wrist and hock I discovered later, as described in Chapter 13.

Australopithecines clubbing griquatherium. [William Papas.]

The most numerous of all skeletal fragments found at Makapansgat are the 369 lower jaws (mandibles) of antelopes; the next most frequent are the 386 double-ridged, lower ends of humeri (upper armbones). Clearly it was no accident that, as we had discovered years before, baboon and australopithecine skull fractures and the double-ridged humeri bore a reciprocal relation to one another. But this still greater frequency of lower jaw fragments was quite unexpected.

The angle of the antelope half mandible, if swung by its front end, can cut like a scimitar through flesh and
shatter a skull in the same way as a shoulder blade (see Illustrations between pages 112 and 118). The incisor teeth, or the broken front end of an antelope's lower jaw, can penetrate an animal's belly like a sharp sword point; but the greatest service such a jaw can render with its succession of serrated teeth is to saw through skin, flesh or wood.

The smaller the antelope, the narrower the saw blade formed by its molar-premolar series of teeth, and the closer it approximates the most fundamental of all human tools with a linear edge—the schoolboy's pocket-knife and housewife's carving knife. Of the smallest types of antelopes such as the duiker, no vertebrae or limb bones of any sort were found, only skull fragments; and of these 74 skull fragments, no less than 53, or nearly 72 per cent, were these narrow little knife blades (see Illustration between pages 112 and 118).

The upper jaws of antelopes, unlike those of carnivores, are not furnished with ferocious fangs, but the dental arcades in their palates form a regularly serrated broad arch. This makes as perfect an abrasive surface as primitive humanity required down to Mousterian and later times. Right down to modern days, among the Bavenda and Bapedi tribes of the Transvaal, the palatal tooth series of oxen are employed in the scraping and softening of skins. There is little likelihood that the Australpithecinae used skins for clothing, but they needed implements to scrape meat off bones and fat off skins for food. The hundreds of isolated maxillary teeth, like the hundreds of mandibular teeth found in the breccia, show that these natural scrapers and saws experienced the hard use that justifies their profuse occurrence in the deposit.

The individual function of each of the antelope bones in the hunting work and domestic economy of these man-apes can be studied in various papers. It was obvious to me from the Makapansgat bone heap, when analysed in this detailed way, that skeletal parts of animals, having been adapted by nature to destructive ends, were in themselves
a complete answer to the early hunter’s prayer for tools. Stone was far from being the indispensable tool material that archaeologists had assumed it to be. Why then had stone been so regarded for the past couple of centuries.

Interest in stonework was forced upon archaeologists by the bitter conflict of the nineteenth century when stonework alone proved acceptable to doubters who had strenuously opposed the idea that prediluvial men had lived at the same time as prediluvial animals. Once stonework became accepted as respectable evidence of early man’s existence, it was far easier to demonstrate variations and technical advances in that lasting material than in other less permanent, even if more important, substances such as bone, horn, and wood. So the classification of primitive human culture in terms of stone was no more avoidable than the classification of early civilization in terms of similarly durable potsherds.

But the ponderous nomenclature of stone cultures, which is largely geographic, has no greater functional relationship to man’s culture than the typological classification of potsherds has to early civilizations. For, as Lewis Mumford (1956) wrote recently:

Up to now historians and anthropologists have largely followed Carlyle in defining man as a tool-using animal . . . but it was actually a one-sided definition since it focused attention on material remains of early culture and left out of account non-material elements that may have had more weight, such as symbols, patterns of conduct, and the organization of knowledge. This long-favoured view with its division of early cultures in eolithic, paleolithic, mesolithic and neolithic, solely on the basis of their stone implements, did not even have technical validity. For one thing, it ignored the fact that the larger part of man’s early technical equipment was probably made of perishable organic materials—sinews, hide, hair, guts, rushes, wood, and gourds many of which, incidentally, are still in use among primitive peoples.

The implemental needs of sapient human beings, even
after the discovery of watercraft within the last few thousands of years, were still being extensively, and in some cases almost completely, met by tools fashioned from bones, teeth and horn substances in conjunction with other naturally occurring substances such as wood, shell and skin.

Of course it is not necessary to go back even as far as 20,000 years—let alone the nearly one million years which Australopithecus represents—to show how man the hunter has never ceased to use the skeletal parts of his animal prey both as tools and as personal adornments and good luck charms.

The art of systematically perforating hard objects and stringing them together was apparently not mastered until the Aurignacian period about 25,000 years ago; but once it was, the canine and incisor teeth of stag, elk, wolf and lynx and even human molars were used for this purpose. The custom of perforating teeth—whether those of carnivores and ungulates in Africa, of crocodiles among the Igorots of Luzon in the Malay Archipelago, or of kangaroos in Australia—and forming charmed necklaces of the teeth has persisted into recent times.

In New Guinea and Borneo the tusks of wild boars are used not only as ornaments and charms but also as tools. Ratzel (1896) illustrated a magnificent set consisting of 'nose-ornament, breastplate and arm-ring of boars' tusks from New Guinea (Christy collection'). A.C. Haddon (1901) also gives instances of Papuan boar tusk employment; first, by the old chief of the village of Atsiamakara in the Astrolabe Range for 'whittling saplings into spears', and second, by a man at Inawa in the Mekeo district for 'cutting arrow points'. Haddon bought both these tusks and they are probably in the Cambridge Ethnology Museum today.

Haddon also recorded seeing 'five abnormally curved boars' tusks, some crystals and other objects including one or two stone hooks' hanging up with the siap (or
charms) suspended from the verandah roof of an old headhunter’s house in the Lalak village of Long Tru on the Tingar tributary of the Baram river in Borneo.

The central part played by pigs and their tusks in the megalithic rites of the New Hebrides Islanders forms one of the major themes in Layard’s (1942) study of the originally cannibalistic culture of Malekula. Spears tipped with human bones, especially when poisoned, have particular significance. The last cannibal feast on Vao was in 1892 but there is little doubt that human sacrifice still occurs in the interior of Malekula, although the specially raised boars with circled, double-circled and triple-circled tusks are regarded as substitutes.

In this sacrificial cannibalistic act all male members of the community participated and ‘joints such as arms and legs were—and still are—sent round by the Bush folk as complimentary gifts to other villages in order that they too may partake. The thighbones were split open and, after the marrow had been eaten, were preserved for use as knives for cutting up the pudding in which future victims were cooked.’ The Curator of the Cambridge University Ethnology Museum sent to me for examination a spatula made from the longitudinally sawn proximal half of a pig femur from Malekula.

In her work on The Technology of a Modern Stone Age People in New Guinea, Beatrice Blackwood describes a dagger-like awl from the distal half of the tibia (shinbone) of the cassowary, a large East Indian bird allied to the emu.

It differs from the large bone daggers common among the Purari River peoples and in other parts of New Guinea which are usually made from the proximal half of the tibia, are larger and stronger and ground to a much sharper point. Although it may on occasion be used as a weapon, this implement is mainly regarded as a piercing tool for making holes through anything hard or thick. For lighter work there are awls made from the fibulae of wallabies. . . . The smallest piercing tools are made of the phalangeal bones of the flying fox; some of these are
very fine and are needle sharp. They are used for very delicate work such as the lancing of boils.

Miss Blackwood also records the making of ‘a very useful blunt-ended tool from the distal half of the fused metatarsal (the part between the ankle and toes) bone of the cassowary’ and the employment of pigs’ tusks ‘as planes, in smoothing bows, arrows etc., preferred by some workers to flint chips for such purposes’.

The sacrificial knife from Easter Island in the Berlin Museum is simply the hafted lower jaw of a large fish with low serrated teeth. Among the Malays the saw of the saw-fish was used as a weapon; and according to Ratzel the fitting of the Gilbert and Kingsmith Islanders’ swords, clubs, spears and partisans, which were fitted with linear rows of sharks’ teeth fastened on with strings of coconut fibres twisted with human hair, developed from the Malay implement.

At any rate murderous saw-like weapons of this sharks’ teeth type are found in Polynesia and Micronesia generally and were developed to a truly frightful effectiveness in the Society Islands and Hawaii. The Berlin Museum possesses a club from Yap that is made from the bones of a whale, set with rays’ spines.

Nor is the recent use of skeletal tools confined to these Pacific regions. Among the numerous bone implements and ornaments found in the Arctic whale culture H. Larsen and F. Rainey, in 1948 found, in addition to sophisticated harpoons, needles, awls, bodkins, ice goggles and scoops made from bone and ivory, shovels made from whale scapulae, picks and mattocks made from walrus tusks and penis bones and, most significant, four specimens of brown bear mandibles with the bodies perforated for suspension.

The facts outlined in this chapter should be adequate to show that the needs of human beings for implements have always been, even after the discovery of stone and of metals, of far too diverse a character to be met by stone or metal alone.
The archaeologists' terminology of Stone (or Lithic) Ages and Metal (e.g., Bronze and Iron) Ages had become so ingrained in all our modern historic and prehistoric thinking that man's still more remote Osteodontokeratic (or Bone, Tooth and Horn) Ages had almost escaped recognition. Their ancestral importance is shown not only by the complete dependence of *Australopithecus* upon them but also by their persistence through the lithic and metallic phases of human experience.
CHAPTER TWELVE

Of Monkeys and Men

My choice of the name *prometheus* to add to the already difficult name *Australopithecus* created almost as much agitation as had my original naming of the man-ape in 1925. My choice of Prometheus was in honour of that heroic Greek figure who stole fire from heaven. The name of this divine Path-opener emphasized the humanity that I now attached to the creatures which had previously been regarded as advanced apes; and secondly it ensured that the story of fire, which had emerged from my first contact with the site, would be kept alive.

People, too tired to return to their Greek mythology, tend to forget that the name Prometheus signifies ‘forethought’ as that of his brother Epimetheus denotes ‘afterthought’. It was the indiscretion of Epimetheus in accepting Pandora as a gift from Zeus against the advice of Prometheus that led to Pandora’s opening the box in which Prometheus had concealed all the evils which might torment mortals in life.

Prometheus gave man far more than fire; he brought all culture: domestic animals, navigation, medicine, prophecy, mathematics, astronomy, metal working and all the arts.

Whether the Makapansgat australopithecines actually used fire or not, in my opinion they deserved the epithet *A. prometheus* because of their forethought: the great progress they had made as compared with *A. africanus* of Taungs in the human art of cavern life, the human skill
they had achieved in their hunting to be able to kill not only birds and water turtles but also pigs and carnivores (like hyena, jackal, sabre-toothed tiger and leopard) as well as horses and giraffes, hippopotamuses and chalicothere and at least 14 different species of antelopes ranging in size from the gentle little duiker to the massive sable, eland and kudu, to say nothing of their strictly human ability to wield bones and horns as bludgeons and daggers. The appellation has been more than justified by the further achievements of *A. prometheus* as revealed by the succeeding discoveries at Makapansgat.

Dr. Kenneth Oakley has questioned in several papers whether *Australopithecus prometheus* ever did use fire because up to now we have not been able to repeat finding large amounts of carbon reported by the chemists in 1925, although many tests have been made on samples since that time. Minute traces of carbon have been found but not enough to be regarded as diagnostic of regular hearth making.

On the other hand, it is well to remember that bone itself consists of inorganic salts. The carbonaceous matter bone contains is blood, jelly, oil, and such-like organic matter. When bone has been thoroughly burnt or subjected to great heat the carbon is completely driven off. The bone need not lose its form even when deprived of its organic constituents and thus of all its carbon. In other words, the presence of carbon may be useful as an indicator if found, but its absence is not a proof of the absence of fire.

We also have to consider whether using fire would imply anything unusual in terms of human intelligence at the outset. Mrs. N. Kohts (1985) who investigated the male infant chimpanzee Joni (from the age of one and a half to four years between 1913 and 1916) and later studied comparatively her own son Roody (from birth to the age of four years between 1925 and 1929), found that, 'Both were greatly attracted by fire and had to be stopped in their attempts to reach it. They seemed to be deeply
stirred by the lighting of candles or the firing of a stove, while the switching on of an electric light appeared to be a source of everlasting enjoyment."

Apart from this instinctive attraction which light exerts, fire adds flavours that are appealing to apes. Merfield's (1956) chimpanzee Bo-Bo was a confirmed chain-smoker: "If she could get a second cigarette, she lit it at once from the stub of the first." Dr. A. S. Brink (1957) has reported the spontaneous development of the same chain-smoking habit in Tyrus, a chimpanzee in the Johannesburg Zoo. In his valuable article on 'The Spontaneous Fire-Controlling Reactions of Two Chimpanzee Smoking Addicts' Dr. Brink has not only recorded the instructive fire-controlling abilities exhibited spontaneously by two chimpanzees, Bango and Tyrus, but has also pointed out that their reactions contribute to a better understanding of how burning or burnt things came to interest mankind. His remarks on the matter are so relevant to the problem of how man obtained fire that some are worth quoting at length.

Both these chimpanzees, as well as Merfield's Bo-Bo, learnt to light their own cigarettes and so to handle a smouldering mass without hurt to themselves merely by observing and copying spectators, an ability which, whether taught or not, is generally considered to be confined to human beings.

Dr. Brink said of Tyrus and Bango:

Their ability to transfer fire from one object to another by means of inhalation without deliberately being taught to do so, and the extreme care they have spontaneously taken to extinguish cigarette-ends, especially the presence of mind displayed by one of them (Bango) to prevent the spread of fire, are manifestations of an intellectual appreciation of the nature of fire and the control of it beyond that of any creature save man.

The spontaneous recognition by both chimpanzees that water or moist objects assist in killing or extinguishing fire and their spontaneous fire-killing and fire-carrying feats demonstrate the
innate ability of some chimpanzees to control fire to a degree far beyond what has hitherto been appreciated.

The ability of both chimpanzees to hold a smouldering cigarette in reserve for some time for lighting purposes, and of Bango especially to remember that, somewhere in his cage, he still held in reserve a cigarette that was dead but which he could resuscitate with the aid of a newly acquired burning cigarette end, is also of the greatest importance. It displays their ability to store objects against future use as tools. It is not uncommon for animals such as rodents and carnivores to hide food and later, after greater or lesser intervals of time, to retrieve it, in time of need, from its hiding place, but both these chimpanzees have held fire in reserve. They have exhibited the ability to plan for action with tools at a time somewhat removed into the future.

But Dr. Brink’s appreciation that a craving inspired this fire-control is of even greater importance. Bango’s anxiety to locate a dead cigarette shows vividly the power of his craving for a hot, smouldering, smoking object. This power can evoke memories in chimpanzees and elicit from them an appropriate series of behaviour reactions. The craving has had the magical effects of:

(a) causing the chimpanzees to master the instinctive dread of fire.

(b) stimulating their memory so as to cause them to preserve lighted objects for future use and to lay aside objects which can be ignited by themselves with the fire held in reserve.

(c) evoking the sequence of events recounted above, where Tyrus awakened by means of breathing the embers of an almost moribund fire and rekindled it anew in the cigarette he lit thereby.

The significance of these facts for appreciating how the systematic employment of fire could arise through its satisfying some craving of a proto-human folk is self-evident. The lust spontaneously awakened in meat-loving human beings by the smoking savour of accidentally roasted flesh and its incendiary consequences was graphically described by Charles Lamb in his
The natural osteodentokeratic (bone, tooth and horn) tools of *Australopithecus*.

*Upper row*: Two gazelle horns and ulna (daggers and digging tools); humerus (club and knife).

*Second row*: Two lower jaws (knife and saw).

*Third row*: Upper jaw (scraper) and hyena lower jaw (slitting tool).

*Bottom*: Scapula or shoulder blade (ax).

All except slitting tool come from antelopes.

*(Alan R. Hughes)*
The author displays the damage James W. Kitching did with two comparatively slight blows of a young ox's shoulder blade (seen in right hand) on a pig's head fresh from the abattoir (cleaned skull in left hand). The sharp edge split the skull and the blunt border smashed the snout.

A fossil bush pig from Makapansgat whose skull had been split similarly by an axe blow across the eye sockets.

(G. Walters)

A block of grey breccia with five useful tools stacked together: a gazelle horn core with butt lying on the bayonet-sharp shaft of an arm-bone whose pointed end lies in turn on an ulnar dagger. On the left of these pointed tools are a rib for levering and a calcareous or heel (hock) bone for pounding. *Inset*: Enlargement of the humeral shaft to show its trimmed point.

(*Alun R. Hughes*)
A. Fifteen pairs Kalkbank left, Makapansgat right in each pair of double-ridged fossil antelope arm bone fragments arranged to show the exactitude of the comparison in the treatment this bone received at Kalkbank (15,000 years ago) and Makapansgat (about 800,000 years ago).

Left, Five pairs of distal end fragments.
Right, Five pairs of proximal end fragments.
Centre, Five pairs of humeral blades and clubs.

(Ahm R. Hughes)

B (below), A copy of Plate XIII of Breuil's Bone and Antler Industry of Choukoutien, included for comparison.

(Ahm R. Hughes)

(Above) A bone gouge made from an emu thigh bone being used by an Australian aboriginal on the Gulf of Carpentaria to fashion a wooden water vessel.

('Journal of the Royal Anthropological Institute')
dissertation on roast pig in *The Essays of Elia* well over a century ago. Since the craving for the stimulant and sedative effects of cigarette smoke can produce such phenomenal fire-controlling reactions in vegetarian chimpanzees it is patent that the appetite-stimulating and hunger appeasing qualities of charred, smoking flesh would of itself have been adequate to elicit whatever fire-controlling reactions were necessary in prosecuting the predaceous existence of creatures like South African man-apes! Their bodies were little if at all larger but their brains were twice as big as those of average living chimpanzees and their bodily skill, visual activity, manual dexterity and mental ingenuity must therefore have been correspondingly greater.

If man did not use fire before the Middle Pleistocene period represented by Peking Man at Choukoutien and if fire was employed by man for the first time in Africa less than 100,000 years ago, as Oakley believes, the presence or absence of evidence that fire was actually used by *A. prometheus* at Makapansgat would be useless for the purpose of determining whether or not he was human. Men do not lose their humanity if they live on raw meat or eat biltong; nor is the use of fire or burnt flesh a greater discovery than the use of bones as tools.

In America William L. Straus Jr. was still arguing in 1948 that the upper armbone fragments of Broom’s Kromdraai man-ape, *Paranthropus*, found in 1938, was no more like that of a man than that of an ape; and that, on the whole, it was closer to that of a chimpanzee. In 1949 he and Howard M. Kern Jr., were busily showing that the piece of Sterkfontein thighbone that Broom and Le Gros Clarke deemed human closely resembled that of some monkeys. From these disputes between experts it is patent how close in form are some of the bones of living monkeys as well as living apes to those of human beings, especially if they are primitive human beings.

In other words it was becoming obvious how true Darwin’s (1871) prophecy was that ‘in a series of forms
graduating from some ape-like creature to man as he now exists, it would be impossible to fix any definite point when the term “man” ought to be used.

According to Darwin, whether primeval man deserved to be called man ‘when he had little or no cultural objects and these only of the rudest kind, and when his power of language was extremely imperfect’ would necessarily depend on what definition we employ. If anatomical means of separating man from apes had become useless then fire-burning might conceivably be used in such a definition; but nobody can say today that all the fossil types recognized as human were fire-users. In fact, Oakley himself thinks that many early men had no knowledge of fire whatsoever.

While these wranglings about the humanity of Australopithecus and my choice of the word prometheus were going on, a discovery of the first magnitude was made by Dr. C. K. Brain. For years I had tried to interest geologists and archaeologists in the rubble beds exposed in the wall at Makapansgat from which an immense cone had collapsed and which could be viewed either by scrambling to the top of the the cone or from the fringe of the yawning chasm from which it had fallen.

So I was overjoyed when, in 1954, Brain wanted to apply his detailed soil-testing technique through every foot of the breccia profile at Makapansgat as well as at Sterkfontein—although I did not expect for a moment that he had eyes for stone implements as well as soil. The complete absence of stone tools from the Makapansgat grey breccia, the apparent sterility of the collapsed cone as far as bones were concerned and the lack of any stone tools from every other known man-ape site had been the best evidence up till then that the man-apes had preceded the Stone Age entirely.

On his return Brain reported that he had found 129 trimmed, utilized or damaged stones in the 18-ft. red, gravel-bearing sandy layer 25 ft. above the small austra-
lophitecine-carrying grey breccia and the stalagmitic lime below it.

'I have taken these to Professor van Riet Lowe,' he told me, 'and he said as soon as he saw them that some were undoubtedly Kafuan pebble stone artefacts.'

'I think he must be mistaken—it sounds impossible,' I told him. 'But let's have a look at them.'

I raced round to the late Professor C. van Riet Lowe's room in the University to find that he had been trying to raise me on the phone. He had separated 17 pebbles from the others and declared emphatically, 'I'm absolutely satisfied that these are pebble stone tools of the Kafuan type which I've already described from the highest gravel terraces of the Kafu and Kagera Rivers in Uganda.'

Van Riet Lowe was the recognized authority on this subject so neither I nor anyone else was likely to argue but still I could scarcely believe it. Such a thing had never been heard of before. It had been sensational enough when van Riet Lowe had found tools of the Old Stone Age type in 1936 in the Cave of Hearths, but the pebble culture was twice as ancient as the Old Stone culture and had never been found in a sealed site like this inside a cave deposit.

He must have seen my doubts as he said, 'Well, let's compare these with the pebbles I brought back from Uganda and Tanganyika.'

We soon saw that the pebbles from Makapasangat were indeed identical with his specimens, and when he described the tools and the continent-wide vista they opened up it was as if we were standing at the threshold of stone-tool making. True, many of them were of non-resistant dolomite but others were quartz and quartzite. The discovery of pebble tools had opened up, in a blinding moment of revelation, the astonishing prospect that we had in our grasp in this single South African valley a continuous story of human handiwork in stone and a consecutive chronology of mankind from the dawn of the Pleistocene right up to the present day.
Pebble stone tools from the red (Phase 2) australopithecine breccias of Sterkfontein and Makapansgat. [After Prof. C. van Riet Lowe and Dr. R. J. Mason.]
The British Broadcasting Corporation requested Professor van Riet Lowe to make a three-minute broadcast on the discovery on February 14, 1955, after a public announcement of the discovery.

In his short address he made an admirable summing up of the importance of the find in the last radio address of his life which is quoted as he gave it:

Barely a mile separates the first from the last of eight known and partially explored caves that lie within the narrow confines of the Makapansgat valley; less than 200 miles north of Johannesburg. Deposits of fossil bones show that all the caves were occupied or visited by wild animals or that their remains were taken into the caves at some time or another during the past million years—which is the span normally allotted to man from his earliest prehistoric appearance to the present. One of the caves is known to have been occupied by man-like apes and no less than three by prehistoric Stone Age men at various times and in various stages of development.

Each individual cave reveals part of the dramatic development of man's ape-like predecessor or of man himself; and one of the prehistorian's problems is to link occurrences in one cave with those of another in order to reconstruct the major sequence of events. The most interesting cave is known as the 'Cave of Hearths'. It has revealed an almost unbroken record of possibly a hundred thousand years of human activity.

With the generous financial support of the New York Wenner-Gren Foundation for Anthropological Research, the systematic excavation of key sites such as the Cave of Hearths will soon be intensified, and we may look forward to further important announcements as the work proceeds. In the meantime the latest discovery, which was first announced in London recently, of the oldest recognizable man-made stone implements in deposits immediately over remains of man-like apes is one of the greatest significance. It narrows the gap between ape and man as it has not been narrowed before: it reduces the geological horizons between which missing links are to be sought in a manner that anthropologists could not previously have visualized; it increases the importance of South Africa as a field for the study of man's emergence from the animal kingdom and his
gradual development in prehistoric times, and finally, it indicates more clearly than ever that in coming to Africa, Europeans are in reality merely returning to the home of their ancestors.

At the time of Brain’s discovery in 1954 there was no evidence that *Australopithecus* accompanied the pebble tools, but in April, 1955, Mr. Alun R. Hughes found a small fragment of an australopithecine maxilla (upper jaw) while he and Dr. Revil J. Mason, assistant archaeologist in the Union Archaeological Survey, were extracting several thousands of pebbles from the stratum where Dr. Brain had first found them. Thus for the first time we had evidence that the australopithecines had persisted during the entire period represented by the Limeworks breccia. Simultaneously the likelihood arose that *Australopithecus* had learned how to make stone tools too and that the transition culturally from a bone, tooth, and horn (or osteodontokeratic) culture to the use of pebble stones would indeed be disclosed.

But the principal thing that the osteodontokeratic culture had done up to that time was to clear up a lot of mysteries. It was patent that a pebble stone culture, such as was found in the more recent stratum of Makapansgat Limeworks, would be an ineffectual substitute for an osteodontokeratic culture such as had been found in the grey breccia down below it. Pebbles are doubtless excellent for hurling and, when trimmed or split, could be efficient tools for skinning animals, pounding bones or scraping wood, but they would scarcely be as effective even as some lower jaws with their teeth for cutting skins and sawing through flesh and tendons.

However competent as a projectile or a knife, no pebble tool could lengthen the arm’s reach or be as dangerous a weapon at close quarters as a club formed by the long bones (femur, tibia, humerus or radio-ulna) of an antelope, or by parts of limbs lying distal to the wrist and the ankle (or hock). A pebble tool could not slit open a belly with the efficiency of the lower jaws of hyenas, wart-hogs, baboons

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or porcupines, nor could a pebble tool split a skull as deftly as a scapula (shoulder blade) or the angle of an antelope’s lower jaw. It would be absurd to think a pebble tool could be plunged between the ribs into the thorax (or chest) of an antelope or sabre-toothed tiger and reach its vitals as could an ulna, a split cannon bone, broken long bone, or even a long sharp horn. A pebble tool would be valueless as a cup or container of fluid and it could not bear comparison with horns or any split or broken long bone for digging in the earth. A pebble tool would, of course, be utterly useless compared with ribs, bone slivers, horns and porcupine quills for getting delectable little food objects out of nooks, crevices and crannies.

A peculiar thing that had particularly arrested my attention during the bone-fragment analysis was the frequency with which similar objects were found together, such as a lot of bone-flakes all piled together in a single piece of breccia along with a split wart-hog’s tusk. Similarly, several antelopes’ heads would be found in the same breccial block; or pieces of bone or whole bones would be found lying inside the cavities of other broken bones.

This indicated to me that Australopithecus had made a practice of stacking useful tools together and of deliberately thrusting solid objects into cavities, but I contented myself with merely mentioning it in my memoir. Then on my way back from the International Congress on Anthropological and Ethnological Sciences in Philadelphia (September, 1956), which I had been privileged to attend by the generosity of Mr. Leighton A. Wilkie of the Wilkie Foundation in order to speak about the osteodontokeratic culture, I had an opportunity to see the attractive australopithecine display at the British Museum of Natural History at South Kensington in London. There, to my astonishment and pleasure, among the bone fragments from Makapansgat I beheld the most striking example of this very business that has come to light (see Illustration on following page).
A gazelle horn core wedged in the split shaft of a large antelope's thigh bone [after the original in the National History Museum, South Kensington].
[AAfter Miss C. Wybrants.]
It was a gazelle horn-core that had been rammed down to the butt (where it had previously attached to the skull) into the lower half of the shaft of the broken thighbone of a great antelope such as an oryx. It was easy to see how the significance of the object had been missed; because, owing to the damage the fragment had suffered during the mining, only the base of the horn-core and a small part of the thighbone were present. But, when the missing parts have been restored by the artist, as in the accompanying text figure, anybody can see that some mischievous or inventive young promethean Australopithecus had rammed this gazelle’s horn-core into the oryx’s thighbone so vigorously that it had split the bone and become so tightly impacted that it could not be extracted afterwards. Is it possible that for some such stupid misdemeanour the adolescent Australopithecus met his sudden end? At any rate, the horn-core lies so firmly there, cemented within the split femur by calcite, that the preparator, to whom the breccia had been handed for development, could not separate them without fracturing further the already split but still encircling bone.

The advantage of this specimen is that it gives anybody visiting London a chance of seeing solidified in stone an excellent example of a feat with bone and horn that certainly could not be performed either by a hyena (or any other carnivore) or by a porcupine (or any other rodent) or by any other supposed bone-accumulator lacking the manipulative skills and explorative curiosity characteristic of man.

This business of digging and aperture-exploration is one of the respects in which apes come very near to man. In her remarkable comparison of an infant chimpanzee with her own son, Mrs. Kohts (1935) said:

Indeed, any description of stick seemed to fascinate both infants; on finding a stick Joni [the chimpanzee] would invariably start to use it for digging in the ground, banging against the floor, reaching at hitherto unattainable objects or making
threatening gestures. . . . *Roody* [her son] could never pass a stick without saying 'nice stick' and used to bring home tremendous amounts of long wooden objects of every conceivable description. . . .

Many common traits could again be observed in the destructive games of both infants. Such forms of activity as throwing, tearing, and breaking seemed indeed to provide both subjects with a peculiar form of self-contained pleasure. In fact most playthings used to leave their hands with some other trace of destructive activity, usually in the form of tooth imprints or purposeful breakage.

Nearly everyone knows that a child on putting his finger into a hole will try to do his utmost to enlarge the aperture as far as he can, but, with *Joni*, every contact with an easily breaking object inevitably ended in the complete disintegration of the item in question.

Winifred Felce (1948) gives an amusing account of Resi, a young female orang-utan in the Zoo at Munich who amused herself making punctures in their cart tyres with little sticks and rousing the sleeping kangaroos.

This infantile interest of apes in sticks and in breaking them is not simply aggressive and destructive; it is essential to the constructive habit of nest-making in trees, which is common not only to both chimpanzee and gorilla in Africa but also to the orang-utan in Asia. Nor is the instinctive penetration of apertures by apes merely destructive.

Fred. G. Merfield (1956), the celebrated African wild game hunter, relates how when tracking the rare bongo antelope in the Yaoundé forests of the French Cameroons he came one day upon 8 noisy and highly excited chimpanzees—6 almost full-grown—sitting in a circle at the edge of a small clearing. He says:

Watching through my binoculars, I could see that the chimps were sitting round the entrance to one of these *ground-bees* nests. Each ape held a long twig, which it poked down the hole and withdrew coated with honey. There was only one hole, and though for the most part they took turns at using their twigs,
quarrels were constantly breaking out, and those who had licked off most of their honey tried to snatch the newly coated twigs. We watched them for over half an hour at a range of fifty yards, before creeping away as silently as we had come, so as not to disturb the party. This is one of the few examples I have known of a wild animal employing a tool.

Merfield also relates how his tame Choga chimpanzee Bo-Bo removed ‘jiggers’ (the tiny fleas that burrow and form a sac-like swelling under the skin of the feet) with a fine splinter of a bamboo, with such speed and ‘was so skilled at it that natives would queue up for attention. Dr. Bo-Bo’s evening surgery was a sight to be remembered.’

The manual dexterity of chimpanzees is capable of being trained to the point where they can even thread a needle. It has also been reported that the mountain gorillas of Uganda have been observed following the same type of practice as chimpanzees in the Cameroons, thrusting in this case not twigs, but grass stems into the nests of the ground-bees.

Even the stacking of similar objects together seems also to be a pre-human trait. Mrs. Kohts’ chimpanzee Joni would spontaneously match coloured plates and often select by preference a number of blue plates for playing with. Amidst those of different sizes he would take the small, round ones. Similarly, when manipulating cards ‘he selected all the cards of one colour and put them aside into a separate group’. Miss Jill Donisthorpe has reported that the mountain gorillas at Kisoro in the Kigezi district of Uganda make a collection of bamboo shoots or some other food stuff, carry them off to a prepared sitting or resting place, eat the preferred parts and then place the rejected portions in a comparatively neat pile alongside their feeding place.

But let us return to Australopithecus and his tools and what they signified in respect of human evolution. When proto-man began to employ pebbles for cutting as well as hurling or pounding they could not meet his penetrating and stabbing (or digging), cleaving (or chopping)
and slicing (or sawing) needs as well as osteodontokeratic tools did. Not until man had learned to fashion stone tools sufficiently sharp-edged and sharp-pointed to be permanently substituted for tusks and antelope horns could stone begin to replace bone. Consequently, osteodontokeratic tools continued to be used along with stone tools down through the ages. Stone tools, however sharp or massive and useful as missiles, could never become substitutes for bones and branches as clubs until they became hafted to bone or wood. At the outset split pebbles could only assist man to fashion better clubs from wood than proto-man could find naturally in bones.

There were also among osteodontokeratic tools primal tools, such as palatal scrapers and mandibular saws, for some of whose uses Stone Age man apparently never found entirely suitable lithic substitutes. As we have seen Papuans still prefer to this day to use boars’ tusks for whittling saplings into spears; and wooden spears hardened in the fire were the Strandlooping Hottentot’s principal weapon when Europeans first came to South Africa 500 years ago.

The fact that pebble tools could not meet all the implemental needs of proto-humanity demonstrates the futility of imagining with William L. Straus Jr. (1955) that tool-making ‘represents the greatest distinction of man’ or with Oakley (1951) that ‘tool-making as distinct from using’ might be employed to distinguish the Australopithecinae from the later members of the Hominidae. The unjustifiable presumption in both these statements is that tools were not made until some of them were fabricated from stone. It would be just as reasonable to suppose that Metal Age man differed mentally from Stone Age man, or that Atomic Age man differs from horse and buggy man as to hold that the making of tools from pebbles necessarily implied a cerebral revolution in bone-, tooth-, and horn-using humanity.

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CHAPTER THIRTEEN

Man's Painful Progress

The most positive proof that Australopithecus was a deliberate and skilled maker of tools and not a casual collector of bones came my way by the sheerest accident less than two years ago. It was a discovery which also illustrated how little man had progressed between Early Pleistocene times and the Middle Stone Age—a gap of some 975,000 years. All he had added to his knowledge during that time was how to shape certain stone tools and, as will be seen, bone implements still played a major rôle in man's culture as recently as 15,000 years ago.

In 1950 Mr. J. Stander, then postmaster at Pietersburg and one of that band of enthusiastic archaeologists who so often blaze a trail for scientists, collected a quantity of bones and quartz flakes at a site at Kalkbank, about 70 miles north-west of the Makapansgat Valley. He found them in some eroded clay about 20 yards away from a well that had been sunk many years before to provide water for a farm.

Four years later the site was excavated by Dr. Revil J. Mason who found that it was of Middle Stone Age and had been occupied, perhaps for only brief periods and seasonally, by hunters in what had apparently been marsh or vlei. This was subsequently confirmed when the remains of at least forty-eight beasts, mostly antelopes and wart-hogs, were recovered.

Fortunately Dr. Mason preserved every bone fragment from his excavation and early in 1957 my attention was
drawn to three huge giraffe bones he had gathered. To judge by the hacking that had been done to split them and the obvious marks of chopping tools they had been split by a hafted stone axe.

When preparing the memoir on the Osteodontokeratic culture at Makapansgat I had paid particular attention to bone flakes that were pointed and blunted as though by use; and I had noted that the antelope cannon bones in particular lent themselves to longitudinal splitting and the forming of flakes. Photographs were inserted in the memoir to illustrate these facts and to show that the percentage of sharp and blunted long flakes of this sort was too high to be due to sheer chance.

We had been searching for bone material from human sites as well as hyena lairs and had extracted all the bones and teeth from the exceedingly hard breccia that came from the Cave of Hearths when I learnt that the rest of the Kalkbank bones were still packed away in the boxes used to transport them. They were covered with the clay from which they had been extracted, but when washed and dried it was soon obvious that the Kalkbank cannon bones had been split in the same fashion as those found at Makapansgat Limeworks.

This astonishing piece of good luck opened up all sorts of possibilities. Dr. Mason could state that the particular phase of the Middle Stone Age tools found at Kalkbank was identical with a certain stratum in the Cave of Hearths for which a carbon isotope dating of 15,000 years before the present day had been given by Professor W. F. Libby of Yale University.

So we were not dealing with bones that had been split by Australopithecus nearly a million years before but with bones split by Homo sapiens just about 15,000 years ago and only 70 miles away from Makapansgat. Here was an opportunity, provided there were enough bones and flakes, for comparing the industry not of primitive man but of primitive modern man with that of promethean protoman.
Now our efforts in tracking down the fragments and slivers of bone to their bony sources looked as though they might be rewarded. From a lifelong experience of farm work and fossil hunting and with a decade and more of intensive work with living and fossil animals and their bones, complete and fragmented, Mr. James Kitching had developed an incomparable ability to recognize the bony source of virtually any flake of reasonable size. Where we had previously been content to establish the source of more or less complete ends and shafts of bones, we now decided when possible to track every Kalkbank flake to its source.

Of the 3619 osteodontokeratic fragments actually identified at Kalkbank, 1041, or nearly a third, were skull fragments, as at Makapansgat. Only 847 were from bones behind the skull. The bone structures of a further 1101 flakes were recognizable; the rest were too fragmentary to be identified.

Of the 3619 fragments 24.95 per cent had been gnawed by porcupines, so we had disposed of another old red herring about bone collecting! It was obvious that gnawing by porcupines did not turn a human bone-heap into a porcupine bone-collection. The Kalkbank people had gathered and split the bones and later on the porcupines had come along and gnawed a quarter of them.

Of the 1,041 cranial fragments 27 were carnivore teeth (13 hyena, 8 lion, 6 leopard); 153 were horse teeth (99 the extinct E. capensis and 114 Burchell’s zebra); 63 were either horse or bovid skull fragments and 275 were definitely bovid, i.e., antelope (viz. 70 horn-cores and 205 teeth); and 522 wart-hog (88 skull fragments and 434 teeth). Of the 1041 some 131 skull, teeth, and horn-core fragments, i.e., 12.6 per cent, had been gnawed by the porcupines.

The horn fragments were large enough to prove the presence of large forms like the buffalo, wildebeest and hartebeest, and of medium types such as the impala, waterbuck, springbok and blesbok amongst the Bovidae. Antelopes
accounted for 742 out of 847, i.e., 88 per cent of the post-cranial bones, and of the antelopes those of medium size were the most frequent. At Makapansgat almost 92 per cent of the identified fragments were antelope and the most numerous at Kalkbank also were those of medium type; but bones of small antelopes were also present and to a larger extent than those of large antelopes. So the great similarity of australopithecine and human dietary habits was apparent.

From the teeth and bones it was manifest that the least number of beasts killed at Kalkbank by Middle Stone Age man was 40: 14 Bovidae (1 extinct buffalo, 3 hartebeest, 5 wildebeest, 1 impala, 2 waterbuck, 1 springbok, 1 blesbok); 10 horses (4 fossil E. capensis and 6 E. Burchelli); 8 pigs; 2 rhinoceroses; 1 giraffe; 2 hyena, 2 leopard and 1 lion. There were no teeth or other skull parts of the small or very small antelopes but there were some body bones of the small or reedbuck type.

There were only 4 body bones that came from carnivores and they were all forearm and elbow bones or ulnae, which was consistent with the probability that the ulna was still being used by Kalkbank man as a dagger. Only 33 bone fragments (of which 15 were phalanges) came from pigs; only 6 (of which 4 were vertebrae and the other 2 humerus and tibia) were contributed by rhinoceros and only 3 had come from giraffe. The most popular animal other than antelopes were horses (61 fragments) and once again, as at Makapansgat, it was the distal hindlimb and forelimb fragments that predominated: the parts with the hooves, or ‘kicks’, in them.

Actually a few more large pieces of forearm (radius) antelope bones (104) were found than of armbones (humerus) (90) but the biggest numbers of antelope bone fragments of a particular type were those of the distal end of the humerus (55) and of the proximal end of the radius (54).

We do not need to go here into any greater detail about
the incidence of the various bones and animals found at Kalkbank and Makapansgat. The two sites clearly resembled one another in the predominance of skull remains, especially jaws and teeth; and also in the highly selective character of the bones from parts of the body behind the skull. The matter of greatest importance, however, is the comparability of the antelope long bones found at both sites and the similarity of the treatment they received, as now revealed by the Kalkbank bone flakes.

The first and entirely unexpected fact was that of the 1101 flakes traced to their bony source, 456, or over 40 per cent, were upper armbone (humeral). Less than half that number (217) came from shinbone (tibia), while the cannon bones (183 metatarsal and 67 metacarpal) together yielded 250, the forearm bone (radius) only 108 and the thighbone (femur) only 83.

This unexpected prevalence of humeral flakes led us back to a similarly detailed study of the bony sources from which the Makapansgat flakes had been derived. Meanwhile, after the 7159 bone fragments had been analysed in 1954 we had been able to expand our programme of recovery considerably through the generous financial assistance of Mr. L. A. Wilkie from the Wilkie Foundation, as well as of the University of the Witwatersrand and the Council for Scientific and Industrial Research.

By 1957 the number of Makapansgat bone, tooth, and horn fragments had increased to over 28,000. Among these were 10,509 bone flakes produced before fossilization, but 5790 of these flakes were so small or fragmentary that they had to be discarded. The remaining 4779 (i.e., 45·5 per cent) were scrutinized carefully. Of these 2168 were still too small or uncertain to be traced to their bony source; but 2611 (or 64·8 per cent) of the 4779 flakes produced before fossilization were traceable and were distributed as follows: 1206 (or 46·2 per cent) were humeral; 545 (or 20·8 per cent: 410 metacarpal, 135 metatarsal) cannon bone; 880 (14·6 per cent) radial, or forearm bone;
287 (or 11.0 per cent) tibial, or shinbone; and 193 (7.4 per cent) femoral, or thighbone.

In other words just as at Kalkbank so at Makapansgat, the humerus (or upper armbone) proved to have been the chief source of bone flakes; and the humerus had been followed numerically by the cannon bone (though the metacarpal had been more popular at Makapansgat than the metatarsal), radius and tibia (but the tibia had become a much more popular bone even than the cannon bones and radii for flakes at Kalkbank). Finally the thighbone or femur had proved least used for flaking at both places, probably because of the outstanding value of the femur as a club when intact and its destruction or loss from both sites.

Earlier we had had plenty of experience, when investigating the baboons and the australopithecine brain casts, of the use of antelope armbones as double ridged-clubs. But at Kalkbank it had become obvious that the club or pounding end of the bone was only part of a much bigger tool story. The other or shaft end of the bone had been broken deliberately in a spiral fashion and sharpened. The sharpening was of two kinds. Either it had a spirally running, blade like sharpness—often blunted by much use—or the front and back parts of the broken shaft had been chipped so as to produce a double-pointed perforating tool.

But the most unexpected thing was the overwhelming number of flakes at both sites that had been derived from the armbones (humeri). We would never have discovered this preponderance of humeral flakes over flakes from other bones at Makapansgat if our attention had not been struck by the great number of armbone flakes at Kalkbank.

It was in these indirect ways that we were forced by the Kalkbank facts to learn that Australopithecus at Makapansgat had not been just a casual user of bones in their natural state as clubs and daggers and saws but had been the inventor of tool-making techniques: he had made the tools he wanted by splitting bones according to definite plan.
More than that, these tool-making techniques of Makapansgat were the same as those practised by sapient man at Kalkbank only 15,000 years ago. The antelope femur at South Kensington split by the gazelle horn (see Illustration between pages 112 and 113) assumed added significance.

This is so important and revolutionary a matter that I am including a couple of pictures to demonstrate the exactitude of the comparisons to be drawn between the use of corresponding bones at Kalkbank and Makapansgat. In the first picture (see Illustration between pages 112 and 113) humeral fragments from both sites have been photographed side by side to enable readers to compare, fragment for fragment, the bones extracted from these two places so closely situated geographically, so intimately related culturally, but so vastly separated temporally.

There are thirty humeral fragments in the picture (15 from Kalkbank and 15 from Makapansgat), arranged in pairs, each alongside its fellow (the Kalkbank specimen on the left of each of the fifteen pairs, the Makapansgat specimen on the right). On the extreme right of the picture are five pairs of pieces struck from the top or proximal end of the humerus from both sites. On the extreme left of the picture are five pairs of roller-like, humeral distal ends in similar states of degradational use from both sites.

The central part of the picture is devoted to a series of longer distal ends that include parts of the shaft of the bone, to demonstrate firstly that antelopes from the large to the small type provided this humeral type of tool at both sites. Secondly, it shows that in these tools the distal end served as a pounder or club while the broken or shaft end provided at both sites either pointed and penetrating or blade-like and spiral edges of identical character. Thirdly, the picture as a whole indicates that either entire or at any stage down to its splitting or complete degradation, the humerus formed a double-ended or combined pounded and slitting tool. Nor is there any doubt that a relatively large number of humeral distal ends and flakes was found at both
Makapansgat and Kalkbank because this double-ended tool was the most generally serviceable of all human domestic tools for about a million years—a sort of combination knife and rolling-pin.

It was therefore fascinating to find that in 1939 the Abbé Breuil had illustrated distal ends of humeri with shafts spirally broken and trimmed in exactly the same way in the bone and antler industry of the Choukoutien *Sinanthropus* site in China. Then—as if to point the moral—while I was comparing these Kalkbank and Makapansgat bones I received from Lisbon the publications of the Portuguese Geological Services whose 1947 volume contains Breuil’s and Zbyszewski’s revision of the Mesolithic industries of Muge and Magos. These industries contained distal humeral ends with pointed shafts and blade forms of humeral origin exactly similar to those recovered from Makapansgat.

In the illustrations (between pages 160 and 161) the reader will see in the Kalkbank series some relatively complete cannon bones, chiefly metatarsals from the hindlimb, that demonstrate how the bones were split longitudinally by a blow on the proximal end (i.e., the end nearest the body: bottom end in the picture); and also the sorts of flakes that resulted according to the expertness of the work. On the right is a metatarsal where the splitting was done so as to produce a poniard-like point, the intact proximal half being preserved in this way to serve as a hilt or hand-grip. The various types of pointed and chisel, or bladed tools resulting from the various flakes secured by splitting cannon bones longitudinally are self evident.

*Australopithecus prometheus* also split bones longitudinally but we do not know the implements with which he split cannon bones and radii in the long axis. Were they the shoulder blades or lower jaws of antelopes? Or were these cannon bones split longitudinally with bone-slivers or horn-wedges, such as the one found in the femur shaft at the British Museum? A large number of partially broken fossil
cannon bones shows that one procedure was to give repeated blows on the back of the bone near the lower end; when broken, it made a split-shafted digging tool that could be split or trimmed away progressively toward the top end. The numerous worn examples demonstrate how they have been used.

When Mr. Trevor Jones visited us in October, 1958, he succeeded in repeating in fresh bones these appearances of the fossil bones; but to do what the man-apes had done he had to pound the back of the bone 30 to 40 times with another bone (see Illustration between pages 160 and 161).

Some basic reason doubtless lies behind the facts that the shinbone came to be preferred to both cannon bones and radius for making bone tools at Kalkbank and that among the Kalkbank cannon bones the metatarsal was selected before the metacarpal. The radius, which at Makapansgat ranked in importance far beyond the shinbone for splitting and flaking and in this respect was apparently three times as useful there as metatarsals, had shrunk in significance at Kalkbank to such a degree that its flakes were numerically inferior to those of the metatarsal and were not greatly increased beyond those of the thighbone.

These alterations in the relative usage of particular long bones may be bound up with a preference for the shinbone arising from the knowledge of hafting, which had presumably been acquired well before Kalkbank times but is unlikely to have been known to the Australopithecinae. They apparently did not use stone, indicating that the need for clubs in those early australopithecine days was probably so great that they had to use all the bones of the hindlimb, the thighbone and the shinbone as well as the part below the hock as clubs. By Kalkbank times too, if men had not learnt how to prepare knobkerries with the aid of their repertoire of stone tools they would scarcely deserve the name *Homo sapiens*.

Discrepancies of this sort between the relative proportions of the bones used and the types and sizes of animals
selected for the purpose of tool-making will doubtless become better understood when adequate special attention has been directed to these matters by similar comparative analyses.

The fundamental fact that this investigation revealed was that these creatures, originally regarded even by myself in 1925 as apes, had now proved themselves beyond all doubt to be human. They had invented, practised and handed on to their sapient human posterity the deliberate manufacture of tools. They not only had culture; they had devised the saws, scrapers, axes, poniards and digging tools that served mankind until very recent times.

Through the consistent preparation of tools from bone they had been the inventors not only of difficult techniques of splitting bones but of the basic technique of flake-trimming upon which the whole business of stone flaking and trimming was later based. In order to illustrate this aspect of their experience Miss V. de Wet, under the personal supervision of Dr. Revil Mason, has drawn for me the series of 8 selected bone flakes that are shown in the accompanying Illustration.

It was inevitable that through the deliberate and regular use of bones as tools the Australopithecinae would chip and break the ends and that some intelligent individual capable of concentration, and practising the techniques revealed in these pictures, would learn how to split bones progressively and how to keep their edges sharpened by progressive flaking.

In these specimens encountered during the analysis of the Makapansgat flakes the secondary trimming of margins of bone ends in order to produce either a rounded or a pointed (burin) type of tool occurred too frequently for it to have been a matter of chance. Further, the repeated occurrence of a linear succession of negative bulbs of percussion, that look like tooth marks along the flakes, demonstrates either the regular repetition of the same deliberate flaking procedure or the splitting of the bone
Bone flakes from Makapansgat drawn to show the marks of other bones and, apparently also, teeth used in trimming and splitting them.

[Miss V. de Wet.]

by the single impact of some serrated osteodontokeratic object like a row of antelope teeth.

After carrying out the comparison between Kalkbank and Makapansgat, I decided to get busy with each limb
bone in order to find out what *Australopithecus* really did with them.

This is not the sort of thing one can settle alone, and in the course of the work done so far I have had help from many sources, as the following brief account will show. It would also be quite wrong to run away with the idea that we now imagine we know all about it. We realize that we are only on the fringe of a big problem, but at least we have some clues—clues which show some of the lines along which the mind of *Australopithecus* was working in that distant past.

In the first place there was the mystery of the spirally running blades found made from arm, thigh and shinbones. How were they made? I used to ask James Kitching this so often that after clearing the mutton off the roast one Sunday he brought the thighbone to our laboratory. He gave the sheep’s thighbone a sharp blow with a pointed stone implement. Then, holding the top end in one hand, he twisted the bottom end counter to it and produced a beautiful pair of spirally running blades, one on each of the two resulting fragments, as can be seen in the Illustration between pages 80 and 81.

Another Sunday gave him the chance for a second experiment. He did not bother to get a stone implement this time; he simply struck the shaft on the edge of the kitchen table and then twisted the thighbone as before. The result is seen in the same Illustration.

Comparison of the two results shows that the more localized ‘point of impact’ of the stone tool produced a better spiral blade than the broader blow on the shaft on the wooden table edge. But the first important result was that we now knew spiral-bladed tools could be produced only by *twisting bones with two hands, in contrary directions*, after they had received such a blow. In other words the tool maker was the creature with the human sense to use his two hands working in opposition to each other.

The manner of making spiral knives at one end of long
bones like the humerus, femur and tibia, and pounders at the other end, was now clear. There were of course innumerable points to settle in order to explain the different forms these bones present but the first hurdle had been cleared as far as these spirally broken bones were concerned.

But the bones that had worried me longest and most were the cannon bones: the metacarpals and metatarsals. In the antelope they correspond with the longer bones that run between our wrists and fingers and between our ankle bones and toes.

Many of these cannon bones had been split down the long axis as though by a blade of some sort, like a shoulder blade or the lower margin of an antelope's lower jaw. But others had, by breaking through the back wall of the bone, been hollowed out into a form of scoop such as can be seen in the Illustration between pages 80 and 81.

One day in December, 1958, when I was showing a party a series of these scoops—or digging tools as I called them—one of the visitors, Mr. J. W. F. Hampton, said, 'Apple corers!'

When I asked him what he meant he said, 'Oh, they remind me of the apple corers they used to make from sheep bones in Herefordshire for the old people who had lost their teeth but liked their apples crisp. They worked around the cores of their apples with them, then crushed the fruit and swallowed it as pulp. We used to have one of them at home. My dad made it away back about 1890.'

I asked him to let me see this relic and when he visited his parents, who lived at Rustenburg 75 miles from Johannesburg, his mother found it among her knitting needles in her workbasket. He brought it along to be photographed with the ancestral types made by Australopithecus the better part of 1,000,000 years ago (see the Illustration between pages 80 and 81). I was amazed to find the two implements almost identical!

The habit of making apple corers from the cannon bones of sheep tended to die out when artificial dentures became
common on the border between England and Wales. Nowadays if you want apple cores you can get metal ones in the ten-cent stores. But it was a bit of a shock to me to realize that people in England down to the twentieth century were following the same kind of bone tool that had been used and apparently also invented by Australopithecus. It was obvious that in these scoops we had a model that had had the lengthiest run of any utensil human brains had contrived. The spiral blade and pounder had surrendered to the kitchen knife and rolling pin much earlier than the apple corer.

Some of the australopithecine scoops were made from much wider antelope bones and are worn right down to the base as our Illustration shows. Some are highly polished too as though well oiled and rubbed. They did not fall very satisfactorily into my digging tool category but this 'apple-pulping' business seemed to explain many domestic issues. It had enabled us to recognize the earliest known utensil contrived by human intelligence.

(Not that Australopithecus had any apples; but he had flesh and fat that he needed to pulp, and fluids like mashed brains and livers, blood and milk to convey to mouths. And he had infants to feed and perhaps toothless old men and women.)

As the New York Times (Sunday, March 22, 1959) reporter put it in his cable from London about these earliest-known spoons the day after the first announcement of their discovery was made in Nature: 'Prehistoric ape men were kind to their old folk and spoon-fed their children.'

(Dr. Anthony J. Arkell of the Department of Egyptology, University College, London, has kindly drawn my attention to the spatulae from the Nile Valley he described in the Proceedings of the Prehistoric Society, 23: 234–6, 1957. Two of these came from Egyptian tombs of the third millennium B.C.; another is typical of several excavated at the Neolithic site of Shaheinab near Khartoum in
the Sudan; the fourth is *certainly fossil*, according to Dr. Kenneth Oakley, and possible Paleolithic, having been found in the Qua Badari district in Middle Egypt with well-mineralized bones deemed by Professor Douglas Derry to be of Pleistocene age.)

I have seen John Higgs' account and pictures of similar apple scoops in boxwood and bone (in *The Countryman*, Vol. 53: 349) from Kelmscott and Filkins in Oxfordshire and have been informed that another sheep cannon-bone scoop lies in the Castle Museum at York. The pewter and porcelain pap boats used for feeding slops to children and invalids were the obvious offspring of this earliest and most persistent of all known human utensils.

Fortunately I had gathered the scoops together and among them the metacarpal cannon bone (on the right of the specimen from Herefordshire in the same figure). The back wall of the bone had been crushed in as though by a blow with a shoulder blade or jawbone along the length of it.

This is what I suggested to Trevor Jones during that October visit in 1958. A long time had passed since the 1930's when he was a science student and had described the baboons that subsequently led Dr. Robert Broom to Sterkfontein. Today he is a prominent orthopaedic surgeon in Salisbury, Southern Rhodesia, but still deeply interested in anthropology.

When I gave him my opinion about the crushing agent he ran his finger along the gutter in the bone and smilingly disagreed.

'Just feel that furrow, Professor,' he said. 'Anyone who has hammered and chiselled as many bones as I have would know that the only way to make a jagged furrow of that sort would be by striking it many times with a pointed tool.'

Again I wondered why I had been so unobservant as to miss so obvious and crucial a point. The advantage of his experience was too good to lose. We sent to the local abattoir for limb bones. Trevor had to take off his coat and get
to work under laboratory supervision again after nearly a quarter of a century.

The African Laboratory assistants were amused but they too had to work, for the skin and flesh, the ligaments, tendons and periosteum had first to be removed before the green bones could be pounded with other bones. Our combined respect for *Australopithecus* mounted as we recalled that he had no steel scalpels and knives to help him: only blades from twisted bones that had also to be first cleared of flesh, ligament and tendon. His saws and blades were made from the lower jaws of antelopes.

It took eight of us hours where it must have taken *Australopithecus* days after first killing his beasts. However, the bones were finally cleared and the pounding began. We used the cannon bones of sheep, goat, pig and ox and, as Trevor struck them with the articular ridges on other cannon bones or the pointed extremities of other long bones, we counted the blows and recorded them upon the bones themselves.

As we had not obtained a single stone tool in seven tons and more of the australopithecine grey breccia from Maka-pansgat we knew that the pounding work must have been done by bone upon bone. It took thirty-odd blows to make a hole or split off a flake, though we were using the bones of young sheep, goats and pigs. Smashing the hole and breaking through one bone took no less than 140 and another 110 blows (see the Illustration between pages 160 and 161).

The persistence of the blows was important, not the number struck. What seems to me significant now is that we had had to go back to the bone piles *Australopithecus* had left at Makapansgat in order to find out how his toothless infants had been weaned from their mother's breasts; that we had learnt it through a tool that had been made in Britain to assist toothless old people; and that we had discovered how it was made through the assistance of an orthopaedic surgeon.
Australopithecus lived a grim life. He ruthlessly killed fellow australopithecines and fed upon them as he would upon any other beast, young or old. He was a flesh eater and as such had to seize his food where he could and protect it night and day from other carnivorous marauders. His own body and those of the members of his own family group could fall prey by day or night to any other hungry predator, whether prowling leopard or furtive hyena. Life was bought at the price of eternal vigilance.

Yet he commanded the respect of all his natural enemies then and earned all the esteem his descendants are likely to bestow upon the phase in their progress that he typifies. For he learnt through his own dental deficiencies to arm himself with weapons of warfare against his fellows and creatures of the chase and to provide himself with utensils that overcame the deficiencies of his infants and promoted their nutritional welfare. In so doing he not only discovered natural fluid containers such as horn and the like, but fashioned them deliberately from bones.

While examining the cannon bones I ran across another example of australopithecine insight in the form of intentional slitting tools, substitutes for the teeth that sooner or later were wrenched out of rodent or carnivore jaws. Unfortunately my Bantu assistants do not always see the potential significance of the bones they are digging out of the breccia, so two of the specimens in the illustration are damaged. But along with the one that happily escaped, the two others illustrate the intended tools clearly (see the Illustration between pages 160 and 161).

The space between the pulley-like articular ends of these antelope cannon bones had obviously caught the fancy of Australopithecus because in the one that escaped a sliver of a cranial bone with a bevelled or naturally sharpened blade-like edge had been wedged.

Alerted by this unusual occurrence I searched through those cannon bones whose inter-articular spaces had not been entirely cleaned out and found the two others pic-
tured here with it. In the upper right specimen can still be seen in section the remnant of a tooth wedged in it. In the lower right specimen there can similarly be seen part of the bone sliver that occupied it.

In conjunction with the large number of cannon bones which I then noticed had had their inter-articular spaces distorted, or seriously worn down or cracked and even broken off before fossilization, these three specimens left no doubt in my mind. The australopithecines had taken advantage of the greater width of the hinder and upper, as compared with the narrower front and lower part of these spaces to insert teeth or suitable bone flakes from other animals and by wedging them there to construct substitute ripping or slitting tools.
CHAPTER FOURTEEN

How Man Got Off His Knuckles

An American friend once asked me: 'What made Australopithecus tick? Was there a single factor, or were there many that led to this creature's breaking away from the apes?'

'Any reply would only be theorizing,' I answered. 'The ancestors of Australopithecus left their fellows in the trees of Central Africa through a spirit of adventure and the more attractive fleshy food that lay in the vast savannas of the southern plains.

'Australopithecus shows that the adoption of the erect posture was the first step towards humanity. The dominant factor promoting the upright body was our ancestors' finding that they could kill their prey and protect themselves much more efficiently with the aid of a club held in their hands than with their teeth.'

All that anybody needs to do—and incidentally will find very useful—in order to sympathize acutely with the types of physical experience these habits involved is to start doing and to continue to do some of those things with their left hand that they have been accustomed to do with their right.

Some time during the Miocene period—about twenty million years ago—these ancestors of the australopithecines left the jungle to start their long southward trek. They apparently preferred swinging sticks around themselves to swinging themselves from trees. Even at this stage they must have mastered the upright posture somewhat better than have living apes, who know how to do
a lot of things with sticks when squatting but not when on their feet. Apes also frequently find it convenient to run on their hind legs but can sustain it only for short periods. Oddly enough, among the modern apes it is the gibbon, the lowliest form, who has the straightest lower limbs, uses the upright position most and can sustain it for the longest periods. Like the gibbon, who catches birds on the wing, the ancestors of *Australopithecus* had a taste for flesh. This taste must have been so developed that they left the trees to search for the more accessible ground-loving animals.

On their journey south, they must soon have found themselves at a disadvantage searching for likely food and avoiding their natural enemies in the long grass of the savannah. The best way of overcoming this difficulty would have been to stand upright and still for long periods to survey the entire horizon. A terrestrial ape that achieved this habit and lived by hunting would automatically have a great advantage over its prey, and it seems that this physical advantage lay behind australopithecine evolution. Such habits would imply that the greater advantage would lie with those skilful creatures best adapted to spending longer and longer periods on their hind legs.

But upright posture also had a distinct disadvantage for such creatures. It left the whole belly wall, the weakest and most sensitive parts of the body, prominently exposed to attack, while it lifted the individual’s most potent natural weapons, his front claws or fingernails and his long teeth, away from the area of vulnerability, and utterly disturbed his previously stable four-footed bodily equilibrium. As the brain of these creatures was no bigger than an ordinary ape’s, it can hardly be said that they reasoned out a method of defence. It seems most likely that preferring meat to fruit they instinctively carried in their free hands any useful stick or bone they found with which to protect themselves.

As the australopithecine forerunners placed increasing
reliance on upright posture, the whole mechanism of their bodies was correspondingly changed. The respiratory system especially and the lower limbs were so strengthened that the standing position was no longer exhausting and the creatures could breathe easily while their hands were busily engaged. In living apes which have some manual task to perform, for instance, peeling a banana, the sitting position is customarily adopted.

As is illustrated in human babyhood, the all-fours position is the natural one. After his first gasp of breath at birth perhaps the greatest physical achievement in any human being’s life is the moment when he has mastered balance and breathing sufficiently to stand steady on his own two feet. I have watched many babies thrilling with this first triumph, and have noted as most parents must have done the ecstatic cries of satisfaction, stampings of feet and flinging of hands which follow—a satisfaction whose clamant demonstration can only be understood by those who realize the imperative nature of the hereditary urge behind the achievement.

Conversely, when working among the Bush people of the Kalahari Desert in 1937 I noticed how on every possible occasion these small, wizened, Stone Age folk reverted to all fours and could achieve amazing speed when running about on hands and feet. They do this mostly when playing games which form part of their daily routine and in which people of all ages participate. The favourite games are re-enactments of their hunting methods. A few skilled players on all fours take the part of the grazing and hunted antelopes but everyone from the oldest to the youngest participates in the hunt, imitating on all fours the crouching, slithering, yet hiding and approaching huntsmen until the attack is made and all dash in with their imitation lances to the kill.

In 1871, Darwin expressed the idea that the principal factor that transformed the ape into a human being was the assumption of the erect attitude:

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If it be an advantage to man to stand firmly on his feet and to have his hands and arms free, of which, from his pre-eminent success in the battle of life, there can be no doubt, then I can see no reason why it should not have been advantageous to the progenitors of man to have become more and more erect or bipedal. They would thus have better been able to defend themselves with stones or clubs, to attack their prey or otherwise to obtain food. The best built individual would in the long run have succeeded best, and have survived in larger numbers. If the gorilla and a few allied forms had become extinct, it might have been argued, with great force and apparent truth, that an animal could not have become gradually converted from a quadruped into a biped, as all the individuals in an intermediate condition would have been miserably ill-adapted for progression. But we know (and this is well worthy of reflection) that the anthropomorphous apes are now actually in an intermediate condition and no one doubts that they are on the whole well adapted for their condition of life.

Elliot Smith realized after the Taungs discovery that the determining factors in causing the separation in Miocene times between Man’s ancestors on the one hand and the gorilla and chimpanzee on the other must be the differences in the environmental and dietary conditions to which they became exposed after parting company. He actually said that in the group leading to Man the brain growth had reached a stage where the more venturesome members—stimulated by some local failure of their arboreal food supply or by sheer curiosity—sought new sources of food on hill and plain. *Australopithecus africanus*, having been found on the Kalahari desert fringe at Taungs, provided objective evidence of fossil apes with habits in sharp contrast to those living arborealized anthropoids who are tied to a predominantly vegetarian diet amidst tropical forest conditions.

I had called the Taungs lair a kitchen-midden back in 1928 and Broom in 1946 was inclined to agree with this opinion, because all the baboon skulls he had found there had depressed fractures on the top of the head, such as I had illustrated in an article in 1934. He suggested that the
australopithecines could have captured antelopes only by hunting in packs, surrounding them at waterholes and killing them with sticks and stones. But neither Broom nor Schepers was paying attention in 1946 to the means whereby the man-apes had subsisted in South Africa. The question really had not arisen in acute form until we knew in 1947 that the Limeworks site in Makapansgat Valley was an australopithecine site and not (as I had assumed from the large size of the bones and the chemists' report of the presence of free carbon in 1925) a primitive but much more recent type of human deposit.

Makapansgat now showed that we were dealing with something man-sized. The animals slain by this man-ape were neither all small nor slow; they were huge and active. There was the grotesque split-toed, extinct tree bear (chalicotherium), the extinct horse (hipparion), the extinct giraffe (griquatherium), the rhinoceros, hippopotamus, pigs (both ordinary size and gigantic) and eighteen species of antelopes. Eight of these antelopes were certainly distinct, three were forms already known elsewhere while the other five were quite new to science. Three species belonged to extinct genera and one to a genus now not represented in Southern Africa as Drs. Cooke and Wells pointed out in 1956.

In previous chapters I have talked about the various theories put forward by other scientists when I said that Australopithecus had been responsible for killing the creatures represented at Makapansgat. The probable weapons had to be found, and we had to find out whether the Makapansgat Limeworks was a really ancient deposit or not. Of course, there was no question but that the baboons there resembled those from Sterkfontein, so they must be more or less equivalent in age. Fortunately we had in Dr. C. K. Brain a young man who was prepared to spend several years making a detailed soil analysis foot by foot through the entire stratification represented by the pink and red breccias at all the cave sites.
His work was not completed until 1955 and was published in full detail at the end of 1958, but he showed that the different sites represented a succession of ages, Sterkfontein and Taungs being the oldest, then Makapansgat followed by Kromdraai and Swartkrans.

Apart from these basic issues there were the equally big problems of what the brains of these proto-men were really like, and how they had come to be erect. This will entail our facing some very candid facts about human nature in general whether we like it or not: namely that we are all at heart killers. Cain killed Abel. We love thrillers and our newspapers revel in crime which at theatres goes by the name of tragedy.

Killing big animals like those at Makapansgat for prey is a distinctively human habit. All prehistoric men and the most primitive of living human beings are hunters, i.e., flesh eaters. The human carnivorous diet ranges from grubs and insects to the most formidable of big game.

‘Meat-eating is, one might say, as old as man,’ Kenneth Oakley said at the International Symposium on Anthropology in New York (1952). ‘It is probable that any Pliocene hominids living in country like the African savannah would have become addicted to flesh-eating in times of drought; and I make this suggestion remembering the analogy of the baboons in South Africa, which in times of drought particularly prey on lambs and other animals of similar size, using their powerful canine teeth as offensive weapons and acting in bands.’

He reminded the audience that gorillas in captivity quickly develop a liking for meat; that the Australian aborigines are by choice meat-eaters; that accumulations of meat bones were very conspicuous in Paleolithic cave sites from Choukoutien onwards; and that there were quantities of broken meat bones.

The unpleasant fact which the symposium did not discuss was that man’s taste for flesh is so great that human beings, whether in prehistoric (Pithecanthropus–Sinanthropus)
or recent times and whether driven by need or not, have practised anthropophagy i.e., either real and regular or alternatively ritualistic cannibalism. ‘One of the strongest reasons for considering anthropophagy as having widely prevailed in prehistoric ages is the fact of its being deeply ingrained in savage and barbaric religions,’ according to the author of the article ‘Cannibalism’ in the 9th edition of the Encyclopaedia Britannica. Every South African is familiar with the cannibalism associated with ritual murders among the Bantu. The central ritual of the most highly organized religions pivots around a sacrificial victim whose body is eaten and whose blood is drunk symbolically.

Carlyle frankly recognized cannibalism as a fundamental primeval human characteristic when he said (Sartor Resartus, Bk. 1), ‘Reader, the heaven-inspired melodious Singer . . . has descended like thyself, from the same hair-mantled, flint-hurling aboriginal Anthropophagus.’ Through Herodotus, Strabo and other writers, the Greeks and Romans were familiar with contemporary peoples who, like the Scythian Massagetae north-east of the Caspian Sea, regularly killed old people and ate them. Marco Polo and other travellers informed Europeans of cannibalistic practices among the wild tribes of China, Tibet and elsewhere. Cannibalism is found in its simplest form in Africa, where the majority of cannibal tribes eat human flesh because they like it (article ‘Negro’: Encyclopaedia Britannica, 14th ed.). Human flesh was habitually exposed for sale in the market place in West Africa; some tribes sold the corpses of their dead relatives for consumption as food. Cannibalism prevailed until recently over a great part of West and Central Africa, New Guinea, Melanesia (especially Fiji), Australia, New Zealand and the Polynesian Islands, Sumatra and other East Indian Islands, South America and formerly in North America. Cannibalism from necessity is found not only among Fuegian or Red Indian tribes but also among civilized races, as the records of sieges and shipwrecks show (article ‘Cannibalism’: Encyclopaedia Britannica, 14th ed.).
The close affinity between the widespread if not universal human practices of cannibalism and head-hunting, or the beliefs in lycanthropy (transformation into wolves), cynotherapy (the therapeutic eating of dogs) and the concept of metampsychosis (or transmigration of souls) illustrates the predominant place that the consumption of flesh in general and of human flesh in particular, has assumed in human life and thought whether profane or religious.

The creatures that have been slain and the atrocities that have been committed in the name of religion from Carthage to Mexico, the hecatombs of animals that have been sacrificed from the altars of antiquity to the abattoirs of every modern city, proclaim the persistently blood-stained progress of man. He has either decimated and eradicated the earth’s animals or led them as domesticated pets to his slaughter houses.

The loathsome cruelty of mankind to man is the inescapable by-product of his blood-lust; this differentiated human characteristic is explicable only in terms of man’s carnivorous and cannibalistic origin. As Robert Hartmann (1885) said:

It is well known that both rude and civilized peoples are capable of showing unspeakable, and, as it is erroneously called, inhuman cruelty towards each other. These acts of cruelty, murder and rapine are often the result of the enexorable logic of national characteristics; and, unhappily, are truly human, since nothing like them can be traced in the animal world. It would, for instance, be a grave mistake to compare a tiger with a bloodthirsty executioner of the Reign of Terror, since the former only satisfies his natural appetite in preying upon other animals. The atrocities of the trials for witchcraft, the indiscriminate slaughter committed by the Khonds, the dismemberment of living men by the Battas, finds no parallel in the habits of animals in a savage state. And such a comparison is above all impossible in the case of anthropoids, which display no hostility towards men or other animals unless they are first attacked. In this respect the anthropoid ape stands upon a higher plane than many men.

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The blood-spattered, slaughter-gutted archives of human history, from the earliest Egyptian and Sumerian records down to the most recent unspeakable atrocities of World Wars I and II, accord with universal cannibalism, with systematized animal and human sacrificial practices or their substitutes in formal religions, and with the world-encircling practices of head-hunting, scalping, body-mutilating and necrophilic practices of mankind in proclaiming this common blood-lust differentiator, this mark of Cain, that separates man dietetically from his anthropoid relatives. This predaceous habit allies man with, but has enabled him to utterly outstrip, the deadliest of Carnivora.

Darwin scarcely dared to envisage these sinister aspects of human evolution, with which recent facts have made us increasingly familiar; but he said:

The same high mental faculties which first led man to believe in unseen agencies, then in fetishism, polytheism and ultimately in monotheism, would invariably lead him, as long as his reasoning powers remained poorly developed, to various strange superstitions and customs. Many of these are terrible to think of—such as the sacrifice of human beings to a blood-loving god; the trial of innocent persons by the ordeal of poison or fire; witchcraft, etc.—yet it is well occasionally to reflect on these superstitions for they show us what an infinite debt of gratitude we owe to the improvement of our reason, to science and to our accumulated knowledge.

Darwin could not guess that within a century science would give birth to poison gases, wholesale human slaughter and atomic obliteration. He cited Roman gladiatorial shows, slavery, scalping, head-hunting, infanticide, love of inflicting torture and indifference to suffering, as indications of a low state of moral sense among both civilized and primitive peoples; but he failed to deduce from these observations that man had inherited these qualities from his predaceous ancestry. Yet, whether cognizant of the wider implications of his comments or not, Darwin
had dared to picture not merely men but also their progenitors as hunters of prey.

Further, if Darwin’s reasoning be correct, man’s erect posture is itself the concrete expression of his signal success in preying. It emerged through and was consolidated by the defensive and offensive stone-throwing and club-swinging technique necessitated by attacking and killing prey, which he could do only in the standing position. Darwin realized that dependence on the use of weapons could not occur without causing correlated bodily changes: ‘As they (the early male forefathers of man) gradually acquired the habit of using stones, clubs or other weapons for fighting with their enemies or rivals, they would use their jaws less and less.’

So Bartholomew and Birdsell were fully justified when they pointed out in 1953 that man might reasonably claim to be the only mammal continuously dependent on tools for survival; and that ‘this dependence on the learned use of tools indicates a movement into a previously unexploited dimension of behaviour and this movement accompanied bipedalism.’

Trotter had expressed similar thoughts in 1929 in another way when he said:

The upright posture changes the whole mechanics of attack and defence from the front of the animal and thus being no longer available as a foundation for offensive and defensive structures the cranium is at last and finally safe from them . . . limitation in the movements of the mandible necessarily ensued. With a poised instead of a slung skull, the mouth can no longer be opened freely enough for the aggressive use of fangs.

The erect posture in proto-men is therefore inconceivable without the concomitant and persistent use of tools. The australopithecines had no fangs and consequently would have been incapable of hunting unless they had used tools. Bartholomew and Birdsell explained it thus:

Even man’s unique vertical bipedal locomotion, when compared with that of quadripedal mammals, is relatively ineffectual.
and this implies that a significant nonlocomotor advantage must have resulted from even the partial freezing of the forelimbs. This advantage was the use of the hands for efficient manipulation of adventitious tools such as rocks, sticks, or bones. Of course the terrestrial or semi-terrestrial living primates have their hands free when they are not moving, but only man has his locomotion essentially unimpeded while carrying or using a tool. Man has been characterized as the ‘tool-using animal’ . . . Rather than say that man is unique in being the ‘tool-using animal’, it is more accurate to say that man is the only mammal which is continuously dependent on tools for survival. This dependence on the learned use of tools indicates a movement into a previously unexploited dimension of behaviour, and this movement accompanied the advent of bipedalism. With the assumption of the erect posture regular use of tools became obligatory; the ability occasionally to use tools must have preceded this in time.

The accurate use of bludgeons and missiles, i.e., hitting and throwing for the purpose of killing, was the only habit capable of shifting the weight of apes from their knuckles and buttock bones onto their feet. When describing the adolescent pelvic bone fragments found at Makapansgat four years earlier I pointed out that the only suitable base for the torsional bodywork involved in striking and pitching was the human type of lower limbs. Each lower limb is completely extensible and each is linked at the bottom to a foot—operating on its three corners, of big toe, little toe and heel—through an exceedingly mobile ankle joint. The sturdy lower limbs resulting from this body-torsional mechanism are essential as a solid base for hammering and hurling.

Anatomically and physiologically this is important, not so much because it implies the capacity to leap sideways, as because it implies the vastly more significant ability to stand still by immobilizing the feet; clutching tools and weapons operate from the fixed rock-like base of the feet as an intellectually operated mechanical whole.

Sir Walter Scott painted a graphic poetic picture of bel-
ligerent upright man in that posture in the stirring passage from *The Combat* which most Victorian and Edwardian schoolboys thrilled to read and knew so well:

Fitz-James was brave. Though to his heart
The life-blood thrill’d with sudden start,
He mann’d himself with dauntless air,
Return’d the chief his haughty stare.
His back against a rock he bore,
And firmly placed his foot afore:
‘Come one, come all! this rock shall fly
From its firm base as soon as I.’
Sir Roderick mark’d, and in his eyes
Respect was mingled with surprise,
And the stern joy that warriors feel
In foemen worthy of their steel.

*The Lady of the Lake*

(Canto 5 st. 10).

Fred G. Merfield (1956) has described the gorilla’s postural reactions to potential menace. That celebrated hunter says:

I had no wish to shoot or capture any of my family, of whom I quickly became very fond, but I took the opportunity of testing their reaction to my presence. When I showed myself at close quarters the result was always the same. The Old Man stood erect and stared at me, screamed and beat his abdomen—not his chest—with his open hands in a rolling movement. When I showed signs of advancing he dropped on all fours and charged, screaming and showing his teeth as he came. I know of no other animal more terrifying than an angry charging bull gorilla, and it is little wonder that hunters sometimes lose their nerve and run away. I took care to face the Old Man in an open clearing, where I could see what he was up to, and I held my rifle ready knowing that I could drop him with a brain shot if he came too close. I was sufficiently confident of this to resolve to let him approach within fifteen yards before firing, but to my surprise, although he must have charged me a dozen times, he never came nearer than twenty yards. At that distance, he wheeled round and returned to his family, scolding me as he went. Then
if I moved forward he charged again, and the whole performance would be repeated two or three times. When this failed to scare me off, the family retreated at such a speed that it was difficult to find them or catch up with them again.

I began to realize that the Old Man’s threats and charges were pure bluff, and this was abundantly confirmed by later experiences. With the possible exception of a few bad-tempered or wounded individuals gorillas will not attack a man who stands his ground. However, if the man’s courage should fail him and he turns to run away, the gorilla will chase him and inflict terrible wounds with his hands and nails. I have seen the flesh stripped from the backs and buttocks of natives in this way, but I know of only two occasions when a gorilla used his teeth to inflict injuries. In one case a native hunter who had tripped over a root was bitten through the ribs and died a few days later.

This dependance of the gorilla upon bluff charges for scaring off enemies described by Merfield has been amply corroborated by Mr. W. M. Baumgartel, Miss Jill Donisthorpe and many other observers of mountain gorillas in the Kisoro Gorilla Sanctuary in south-western Uganda during the past two years of sustained contact with several groups.

Living anthropoids, lacking bipedal stability, have developed so little skill and accuracy in wielding or propelling objects to strike other creatures either in offence or defence, that they all finally have to rely on their teeth or nails (to which some human beings also revert in extremity) rather than on fists, throttling fingers or the impact of weapons held in their hands, when struggling at close quarters.

Man, on the contrary, has made such persistent use of his hands and his whole torsional strength in the erect posture that he can use his fists deftly and precisely as weapons, either open as in slapping and cuffing or closed as in punching, pounding and boxing. Man is the only fisted creature on earth. Nowhere is man so destitute of intelligence as to be ignorant of the added effectiveness, both in offence and defence, of objects such as sticks, stones and bones
held in his hands. He also knows instinctively the increased advantages, in terms of power and precision, of standing firm and still using the added height of his erect posture and the force of gravity in hitting with bare fists or weapons, and in hurling projectiles.

This accuracy in hitting and hurling which apes lack but which men universally possess is an inherited instinct. It demands no greater intelligence than human microcephalic idiots, with less than australopithecine endocranial capacities, can command.

What it does depend upon is the short and enlarged pelvis of basin form, such as human beings and also Australopithecinae possessed, which is capable of rotating during the body swing on the top ends of the two columnar lower limbs. These in their turn move about powerful ankles above feet that have planted heels and big and little toes capable of gripping the ground firmly. With this stable type of double-columnned understructure the elongated human flanks can bend laterally or rotate upon the pelvis, as well as flex and extend, while the arms swing; and the poised head can move freely and co-ordinately upon its lengthened neck in any direction on this fantastically flexible torso.

All of these co-ordinated movements of the slender upright human type of body, head, neck, and arms are required for the performance of accurate hitting or dextrous hurling. Above all the divergence in accuracy or skill between apes and man in hitting and hurling depends upon the acquisition by human beings of a brain capable of co-ordinating with the movements of the hands and eyes a series of postural body reflexes.

By 1950 the fossil discoveries bearing upon human prehistory, especially those in South Africa, had provided so much food for thought that the Cold Spring Harbour Symposia on Quantitative Biology (vide Demerec) in that year were devoted to the evolution of man. There 37 European and American scientists read authoritative papers which
have been described (Newman, 1956) as ‘the best single source on many aspects of biological anthropology.’

Summarizing the situation as chairman of the second symposium on ‘Origin of the Human Stock’, Dr. W. W. Howells said: ‘All this South African material since 1925 has constituted a sort of creeping barrage, driving the anthropologists from the notion that the australopiths’ (as he called them) ‘were just another kind of ape, to the acceptance of the fundamentally important fact of their bipedal adaptation.

‘Where did this bring us,’ he asked. ‘How are our views affected by what has happened?’ Whatever might be thought about whether or not they were the actual ancestors of man, he maintained that they were nevertheless the key to our understanding of human race history. They had broadened our knowledge of the apes so that many disputes as to where the human line should be joined to them and similar views seemed inconsequential.

‘The australopiths show the upright posture in what was probably a fulfilled, if not perfected stage and illustrate the meaning of it in creating a systematic division among the apes, giving rise to what may have been a major group, of which we happen to be the only survivors. At any rate, for human evolution there can no longer be any doubt that we know the fundamental point of change, and its general nature.’

Then he went on to say: ‘We have reached the point where some terms, especially “human”, “ape”, “anthropoid” and “man-ape”, are actually embarrassing, except as applied to living forms, or in the case of the last, to the South African australopiths. . . .

‘With the australopiths technically becoming men, any dividing line above them has now become difficult to find. As in the past, we can simply take Pithecanthropus as the most primitive specimen we know of. But definite criteria do not at the moment exist for setting him and the rest apart from the South African fossils.’

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At the third symposium on ‘Classification of Fossil Men’, the Harvard paleontologist Ernst Mayr said, ‘After due consideration of the main differences between modern man, Java man, and the South African ape-men, I did not find any morphological characters that would necessitate separating them into several genera. Not even *Australopithecus* has unequivocal claims for separation. This form appears to possess what might be considered the principal generic character of Homo, namely upright posture, with its shift to a terrestrial mode of living and the freeing of the anterior extremity for new functions which, in turn, have stimulated brain evolution. Within this type there has been phyletic separation resulting in Homo sapiens.’

He claimed that the various genera into which primitive human types had been divided had no zoological validity whatever because they all, including *Australopithecus*, were essentially members of a single line of descent. He went on to say:

‘The morphological differences between *Pongo*, the genus to which the chimpanzee and gorilla belong, and *Homo* are so slight that there seems to be no justification for placing them in separate families. There is even less justification for placing South African man in a separate subfamily, the Australopithecinae. The most primitive known hominids, those of South Africa, combine certain typical hominid characters, such as upright posture, with others that are usually considered simian, such as small size of brain and protruding face. It is noteworthy, however, that these hominids, even at this primitive stage, lack certain other simian features that were formerly considered primitive: powerful canines, large incisors, a sectorial form of the first lower premolar, an exaggerated development of the supra-orbitals, a simian shelf and powerful brachiating arms.’

To some scientists these facts indicated that the human stock had arisen at a very early stage and in an isolated position, but Mayr disagreed. In his opinion, these characteristics of the living apes were merely responses to their
highly arboreal mode of life, which each of the ape lines leading to the gibbon, orang, chimpanzee and gorilla could have made independently. 'Man may be more closely related to the gorilla-chimpanzee group than this is either to the orang or to the gibbons', he said. 'When the *Homo*-line acquired upright posture it entered a completely different adaptive zone and became exposed to a severely increased selection pressure. This must have resulted in a sharp acceleration of evolutionary change leading to the well-known differences between man and the living anthropoids.'

This was putting into cold systematic phraseology what I had expressed exactly a quarter of a century previously when I wrote:

In anticipating the discovery of true links between the apes and man in tropical countries, there has been a tendency to overlook the fact that in the luxuriant forests of the tropical belts Nature was supplying with profligate and lavish hand an easy and sluggish solution, by adaptive specialization, of the problem of existence in creatures as well equipped mentally as living anthropoids are. For the production of man a different apprenticeship was needed to sharpen the wits and quicken the higher manifestations of intellect—a more open veld country where competition was keener between swiftness and stealth, and where adroitness of thinking and movement played a preponderating rôle in the preservation of the species. Darwin has said 'no country in the world abounds in a greater degree with dangerous beasts than Southern Africa,' and, in my opinion, Southern Africa, by providing a vast open country with occasional wooded belts and a relative scarcity of water, together with a fierce and bitter mammalian competition, furnished a laboratory such as was essential to this penultimate phase of human evolution.

Continuing the explanation of his radical reassessment of time-honoured beliefs, Mayr said, 'Denying the genus *Homo* family rank is based on purely morphological considerations. It does not take into account man's unique position in nature. Man has undoubtedly found an adaptive
plateau that is strikingly different from that of any other animal. There are some who feel that there is only one way in which to emphasize this uniqueness of man, namely, by placing *Homo* into a separate family. The conventional standards of taxonomy are insufficient to decide what is correct in this case.

'From the purely biological point of view man is certainly at least as different as a very good genus. We have thus the evolution of a new higher category in the geologically short period of one to two million years.'

Mayr then went on to examine how many species of men there were in the genus *Homo* and said:

'Modern man is comparatively homogeneous because there is much interbreeding between different tribes and races. Still we find in close neighbourhood to each other such strikingly different races as Bushmen and Bantu in South Africa, or the Congo Pygmies and Watussi in Central Africa, on the Veddas and Cingalese in Ceylon. There is much indirect evidence that primitive man was much more broken up into small scattered tribes with little contact with each other, intensely subject to local forces.

'It seems possible, if not probable, that the various South African finds, *Australopithecus, Plesianthropus* and *Paranthropus*, might well be age or sex groups of a few related tribes, notwithstanding Broom's (1950) assertions to the contrary.'

So Mayr swept away all these names and made three species of mankind: the living *Homo sapiens*, the *Pithecanthropus* type, *Homo erectus*, and the South African ape-men, *Homo transvaalensis*. Neanderthal Man had been revealed by the discoveries at Mount Carmel as interbreeding with sapient man so it was difficult to make him a separate species; his different manifestations in Europe, Africa and Asia were either ancestral to, or displaced by, the sapient races living there today.

Mayr was quite prepared to believe that the various South African types of man were not contemporary, but
Antelope cannon bones split by sapient man at Kalkbank in the Central Transvaal about 15,000 years ago.

(Alun R. Hughes)

Antelope cannon bones split by Australopithecus at Makapansgat about 1,000,000 years ago.

(Alun R. Hughes)
(Above) Cannon bones of sheep and goat broken by Trevor Jones with the ends of other bones.

(Alyn R. Hughes)

Three antelope cannon bones from Makapansgat with flakes of bone (left and right lower) and a tooth (upper right) wedged between their distal articular processes to serve as slitting tools.

(Alyn R. Hughes)
Gouge and chisel tools from Kalkbank made by splitting antelope metatarsal bones and showing subsequent gnawing by porcupines.
Professor Dart developing a block of pink breccia found by James W. Kitching in December, 1958, and containing an Australopithecus skull, a baboon skull, and two baboon lower jaw fragments.

(Alyn R. Hughes)

Weighing and stacking the bone breccias recovered from the limeworks dumps.

(Alyn R. Hughes)
according to him there was nothing in the evidence to prove that there was more than one species involved. A more important question was whether this South African type of man *Homo transvaalensis* was ancestral to modern man or merely a specialized or aberrant sideline.

The principal objection raised was that he showed a combination of characters that 'should not' occur in an early hominid. People who have that idea believe that missing links should be half-way between the forms they connect and that they should be half-way in every respect.

*Australopithecus* was certainly not half-way; he was amazingly like modern man in upright posture, pelvic structure and other features, while he was very simian in his massive mandibles, large molars, projecting muzzle and small brain. This peculiar combination of characters found in *Australopithecus* was due to different features evolving at different rates; one type does not change into another type evenly and harmoniously; some features run way ahead of others.

Mayr saw two trends in human evolution. First, a continuous phyletic evolution in time, starting in hominids with the most simian form and ending in modern man. Second, a centrifugal force which produced races and subspecies through local and geographical variation, much as we see variations in *Homo sapiens* today.

'The branching off of *Homo* from the other anthropoids was a case of orthodox speciation distinguished only by the fact that the new species simultaneously reached a new adaptive plateau. It is now evident, as has been stated by many authors, that a change in the mode of locomotion and a corresponding alteration of the entire organization of the body, in other words, the assuming of the upright posture, were the essential steps that led to the evolution of *Homo*. This evolutionary trend apparently affected first the pelvis and posterior extremities, followed closely by the anterior extremities. The corresponding re-organization of the skull apparently lagged behind . . . South
African man was presumably already a user of tools, and the first use of tools may be coincident with the evolution of South African man.

I was unaware of Mayr’s forthright views and of the profound effect that his statement had upon his audience until 1956 when I met him at Harvard and received a copy of his paper.

‘To recognize only three species of *Homo*, of which one is assigned to the Australopithecinae and another to everybody from Neanderthal Man to ourselves, is a very sudden jump, from one, old extreme to an opposite new extreme,’ said Dr. Adolph Schultz, at that time Professor of Anthropology at Johns Hopkins University. Significantly he added, ‘The latter is more consistent with general usage in modern systematics.’

Dr. S. L. Washburn agreed about abolishing most of the genera but felt it would be well to keep the generic names *Australopithecus* and *Homo* to distinguish between the small-brained man-apes and large-brained, tool-using man.

Mayr replied that the differences between lower primates (galagos and lorises) and monkeys and between monkeys and baboons were greater than those between man and apes. As for brain size and tool use there had apparently been a continuous development from the man-apes to man. Java Man was so completely intermediate between South African man and modern man that generic separation was questionable.

In refusing to separate *Australopithecus* from man, Mayr had in effect gone farther in recognizing the humanity of these creatures than even I had dared to go. He had launched an attack on the whole method adopted up to that time by physical anthropologists of separating any of the types of primitive men from one another generically.
CHAPTER FIFTEEN

Could Australopithecus Talk?

My students and other people have often asked me if the man-apes could speak. Of course there is no direct evidence about any fossil creature's capacity to speak, nor even of civilized human being's ability in that field, until we find actual words carved in wood and stone, or impressed on clay tablets or written on paper.

Men could not make words and letters that meant anything until they had learnt to make tools for drawing lines and cutting them in hard substances. The first inkling we have of human beings sufficiently advanced in tool knowledge, or interested to do such things as draw and carve, is in the Aurignacian period some 25,000 years ago. The ability to make meaningful marks of this sort came in only with modern man.

At the outset men did not use their knowledge of colouring matter and sharp tools, even in Aurignacian times, to make lines that represented either letters or words. They merely shaped bones with small sharp-edged stone tools into harpoon and needle points and made outlines of hands on cave walls with pigments as crude as children might make today.

Only very recently, comparatively speaking, do we find the first true writing in the hieroglyphs of Egypt and the pictographs of Sumeria. They are not older than some 5,000 years.

Modern man spent 20,000 long years drawing and being dominated by his pictures before he began writing
sentences composed of words and becoming subservient to them. His paintings improved in beauty and colour combination to such an extent that we have no difficulty in recognizing the creatures the Late Paleolithic artists desperately wished to depict. They decorated the handles of the implements they used with skilfully engraved animals or carved images of them. They also modelled realistic bison and other food animals from the clay of their cavern floors.

Most, if not all, of this early artistic pictorial work had an extremely practical purpose. The men who did it in southern France and in Spain were often geniuses and must have been looked upon as supremely gifted people by their friends and associates. Their imagination and skill were presumably as much beyond the average in their community as those of skilled artists are today beyond their fellows. The prehistoric artists, or those who needed their services, appear to have been leaders who were looked upon as having magical powers over the creatures depicted. There is plenty of evidence to show that, as with the images and paintings in modern temples and cathedrals, rituals were observed in the caves adorned with these paintings and figures. The rituals were calculated to increase the food supply and material welfare of the people possessing these earliest works of art.

Gradually over the succeeding thousands of years, as various brilliant investigators of the French and Spanish caverns and their concurrent cultures have shown, the artistic work in the European caves became less and less naturalistic or realistic, and more and more formalized and emblematic. Some people have therefore described the later painting work as decadent or degenerate. Others have come closer to the truth, in my opinion, by recognizing that the less natural the representation of animals and objects, the more symbolic and recondite such figures become. Thus in pictographs and hieroglyphs or finally in individual syllables and letters, fewer and fewer lines
became necessary to convey the intended ideas, and people had to learn and remember their meaning. Meantime the ideas the figures signified were known only to the initiated few.

At any rate whatever the gradual course of events during those 20,000 intermediate years leading to written sentences, it was not until the leaders of considerably larger settled communities had learnt the rudiments of hieroglyphs in Egypt and of pictographs in Mesopotamia, just about 5,000 years ago, that the steady and serious pursuit of writing began. It was then done only by priests and scribes for kings and gods.

It is salutary to remember that, although writing has been going on for the last 5,000 years, very few people were capable of doing it until quite recently. There are millions of human beings alive today who still cannot write. A further arresting thought is that less than two centuries ago only the very privileged few, even in the most civilized countries, could sign their own names, let alone express their thoughts in writing. The disappearance of illiteracy is a very recent aim of humanity, the outcome of which is beyond modern imagination to comprehend. As Carlyle said, ‘Man had not a hammer to begin, not a syllabled articulation; they had it all to make—and they have made it.’

So too Haeckel called his suppositional human ancestor *Pithecanthropus alalus* i.e., ‘the inarticulate ape-man’! But Dubois who discovered *Pithecanthropus* in Java, as well as Sollas, Elliot Smith and Arthur Keith and most of the past generation of physical anthropologists, believed that lack of speech principally separated apes from man; and that *Pithecanthropus* had crossed this hurdle and had achieved the faculty of speech. As Elliot Smith put it: ‘The acquisition of speech was, in fact, an essential part of the process of transforming an ape into a human being.’ I came to doubt this very much 20 years ago simply because of the relative recency of writing and of cave painting. For how
would people convey ideas to a community without putting pictures of the objects in front of them?

A brilliant American historian called Teggart pointed out 40 years ago that names came into existence only as occasion demanded. He said, 'Before "plowing", "sowing" and "reaping" could have been named these actions must have been performed and recognized.'

This truth to my mind is axiomatic. There could be no language of agriculture until there were farming tools and actions done with them. Until there were boats and nets, harpoons and similar hooked fishing tools and lines to fish with, there was no language of fishing.

None of these fishing tools had been invented before Aurignacian times. Neanderthal man was a hunter pure and simple and we can be sure that he had no vast vocabulary of words such as we have inherited; for most of its concepts are derived from the water life of fishermen and the much later land life of farmers and domesticated animals. The nearest approach to the restricted content of ideas in the early hunter's vocabulary that we can imagine is the very limited and highly concrete language of a hunting folk such as the South African Bushmen. They have no numbers beyond two and many. Their language centres around the names and actions of the animals they hunt and the plants that give them tinder for fire, fluid and nourishment; about the parts of their own bodies and those of the animals they slay and the simple tools with which they do it.

But the Bushman, concrete as his language is and restricted in its content of ideas, enjoys a conceptual world far more expansive than Neanderthal Man's. The Late Stone Age life of the Bushmen includes wall-paintings, weapons such as bows and arrows, and ornaments like ostrich-shell beads and shells of various sorts, such as came into the experience of Europeans along with wall-paintings. The Middle Stone Age life of Kalkbank Man in South Africa as recently as 15,000 years ago was far more primitive culturally than that of the Bushmen. His language
must have been correspondingly fettered in its content of names for the crude bone and stone tools he used and the restricted actions he was able to perform with them.

Since Neanderthal Man of 50,000 and even 150,000 years ago was culturally so much more impoverished than the living Bushmen or the fossil men of Kalkbank we are entitled to doubt whether the language requirements of Neanderthal Man were sufficiently exacting to demand more than the ‘moo-moo’, ‘ba-ba’ sort of language that we all went through when we were children. Such an onomatopoetic stage of language, adequate for giving warnings and signals and for indicating the sort of creature engaging the attention of one’s companions, coupled doubtless with the gestures and mimicry essential for indicating one’s intention with regard to it, was probably adequate for the hunting type of life such as we now know mankind possessed for hundreds of thousands of years from australopithecine times onwards.

Kalkbank Man had made considerable use of stone for tools and his splitting of bones to form tools is quite skilful. In other respects it is fantastic how closely the osteodontokeratic objects found with Kalkbank Man resemble those fashioned by *Australopithecus prometheus* hundreds of thousands of years earlier.

We must also remember that both at Makapansgat and Sterkfontein in the more recent strata, pebble stone tools are found alongside australopithecine remains. People have suggested that some more advanced type of man may have made these pebble stone tools. A type more advanced than Late Stone Age Man was not needed to make tools of copper, or to substitute bronze tools for copper tools, or iron tools for bronze and so on.

Each of these technical advances in tool-making certainly demanded the arrival of inventors or more skilled craftsmen. They needed one or more persons with novel ideas and the ability to carry them out and to demonstrate them to others who had sufficient sense to copy them and
perhaps even to improve upon them. But where folk are already using tools the ultimate emergence of people with slightly better tool-making abilities is not surprising.

What is devastating to contemplate though, is: first, that a complete armamentarium of osteodontokeratic tools had been invented by *Australopithecus*; and second, that there was so little improvement upon their basic tool inventions until Aurignacian times (for about three-quarters of a million years).

We are all impressed with the symmetrical beauty of some stone tools. Once stone tools came into the picture such inventive genius as human beings were to display seems to have been concentrated upon skill in doing stone work. In addition they made the wooden spears, clubs and other wooden tools that they would be able to fashion more easily with the aid of stone tools but which have mostly vanished because of wood’s perishable nature. But it was always the same old hunting routine.

Unless some fantastic change of which we are ignorant took place in human mentality when stone tools became added to, or were substituted for, some part of the australopithecine osteodontokeratic outfit, there is no technical reason for imagining that *Pithecanthropus*, or even Neanderthal Man, had any greater cultural demand for articulate speech than *Australopithecus*.

The lack of an articulate form of speech does not mean that these human hunters had no means of communicating with one another. In his book on *The Infancy of Speech and the Speech of Infancy* Leopold Stein (1948) pictures pithecanthropic man as probably emitting ‘all kinds of roaring, howling, yelling, hooting, screaming, whining, moaning, groaning and other sounds in accordance with the given situation’. To these natural alterations of the human voice under the stress of various emotions, there became added numerous meaningful modulations of the voice. These variations in the initiation, interruption, and repetition of sounds as well as onomatopoeia and babble doubtless
preceded by ages the acquisition of articulate speech. Such a vocal communication system could serve more than adequately the needs of the human hunting family group and is comparable to the yodelling of mountaineering folk.

Some scientists imagine that collaborative hunting demands articulate speech. Lions, wolves and other carnivorous creatures that collaborate in hunting have no need of articulate speech. What successful collaborative hunting needs is not speech but silence and stealth, the suppression of noise: alerting signals certainly, but a minimum even of these and probably onomatopoeic if they are vocal, and then silence till the signal of attack is given.

There are other scientists who think that deliberate tool-making and the transmission of techniques of tool-making demand articulate speech. To my way of thinking, the social inheritance of tool-making skills depended on example, observation and imitation.

In her fascinating little book on *Apes: An Account of Personal Experiences in a Zoological Garden* Winifred Felce (1948) gives an amazing illustration of instinctive example and imitation at work without articulate speech amongst apes in nest-building.

Toni, an infant male orang, arrived at Munich Zoo at the age of about one year, hairless and so emaciated and small that he could be slipped inside the breast of a coat and carried without detection. He learned to stand upright and to walk upon his flat feet with his toes extended like a human being instead of curling the toes inwards as apes ordinarily do. He also learnt to jump from a height landing on his feet and keeping his balance without touching the ground with his hands as apes customarily do. The author says:

It was Toni who set fashions among the ape children and started all the new games. When a certain game became fashionable it was played to the exclusion of almost every other game for weeks on end...
One day Toni built a proper orang nest in the trees. In their native forests the orangs build nests in which they sleep. It is interesting that Toni should have known how to do this, since he must have left the forest when too young to remember how his parents built theirs and his knowledge must, therefore, have been purely instinctive.

The nests are built by bending back and intertwining slender living branches and making of them a firm framework or platform which is then lined and reinforced with smaller broken-off wood. The finished work looks something like a big crow's nest, but it is better constructed and some of the nests resisted several winters' snow and wind.

Toni built particularly good nests and he could lie in them as in an armchair. The whole business was completed in about a quarter of an hour, though he improved and added bits occasionally. The little chimps were fascinated and, after watching excitedly, went off to try to make one of their own.

They built quite nice nests but not such good ones as Toni; theirs were rather untidy and jerry-built and easily fell to bits. Toni would come sometimes and improve them, and sometimes they would persuade Toni to relinquish one of his to them. The chimpanzees built theirs together as combined efforts, but Toni did not encourage them to help him: whether building for them or for himself, he preferred to work alone.

We are apt to forget the mute aspects of imitation. The clever things higher primates do in a state of nature and the brilliant performances of domesticated animals, whether horses or dogs, elephants or apes, inculcated on farms and in circuses as learned behaviour, do not require a knowledge of articulate language on the part of these teachable animals. We are inclined to overestimate the extent to which articulate language is necessary in the business of learning to make tools and to use them.

We learn to speak at so early an age and are so dependent on speech every day of our lives at home, at school and at work and play that we are unable to imagine human beings without an articulate language. Consequently we find it difficult to picture people so primitive as to have
tools and yet be able only to babble about them in an incoherent sort of fashion.

Scientists generally believed that the use of tools and the discovery of language by mankind are closely interdependent. Over thirty years ago Miss Grace de Laguna (1927) was pointing out quite rightly that ‘although the use of clubs and missiles had an instinctive basis their successful employment is based on intelligence and is an acquired art’.

She stated too that language was necessary for coordinating the intelligent behaviour involved in the use of tools; that neither tools nor language could have developed far without the other; that, in brief, language is a correlative to the tool.

It has been recognized for nearly a century that gesture-language preceded picture-making and speech. ‘Gesture-language is a natural mode of expression common to mankind in general,’ as Tylor (1865) put it, and ‘gesture-language is essentially one and the same in all times and all countries’. A succession of students of language have also striven to point out during the last century that the basic words in existing languages have arisen from sounds naturally accompanying the gestures used by human beings while using tools.

When J. and Cathy Hayes* kept Viki, the young chimpanzee, they noted that she also used gestures to communicate her desires to them. At first she simply led them where she wanted them to go, later on she put their hands on the objects she wanted them to manipulate and often moved their hands in the manner suggesting the action to be performed. ‘She used movements of her own hands to indicate an activity only rarely—as in the case where she wanted to help with the ironing but she was forbidden to use the iron. She moved her empty hand back and forth above the ironing board, apparently to show what she wanted.’


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The gestural language of apes is limited manually, posturally and spatially. As L. A. White said of the chimpanzee: ‘Out of sight out of mind’ characterizes his mentality. Viki made relatively little use of gestures of the hand alone, without making contact with an object or person. She pointed to things nearby that she wanted but seldom to the door across the room, for instance, though she responded appropriately when the Hayes did so.

We saw from Mrs. N. Koht’s candid studies of Joni, the male chimpanzee, and her own son Roody from birth to the age of four years that a lighted candle or a burning stove is as fatal an attraction to a chimpanzee as to a human infant. Especially inviting is a puddle or a basin or tap of water. Sand or the strewning of it, mud or clay and the kneading of them, stones and the flinging of them, sticks and the breaking of them are automatic attractions and reactions for ape and human infants. Both infants spontaneously tested twigs and straws for sharpness by prickling their own skins, and employed them as dilational contrivances.

All semi-open apertures seemed especially tantalizing. Under this head came stoves, dampers, pockets, various receptacles, human nostrils, ears, etc. The searching eye or the exploring finger would always try to penetrate the orifice; indeed there seemed to be not a single nook or recess in the whole premises which Roody and Joni had not tactually or visually explored at some moment or other.

They banged sticks on floors and made threatening gestures with them, used them to knock down objects and draw distant objects towards themselves.

Just as the purposeful adult constructions of apes and human beings are related to youthful destructiveness, so their exploratory knowledge of their bodies and their gestural activities with tools anticipate speech. Chimpanzee infants display selectiveness by discerning similarities in objects they choose to play with, just as adult gorillas collect articles of the same sort for a meal which they carry off to
a suitable spot to eat, and then lay aside the refuse in neat piles.

In other words the ape Joni, like the human infant, had
generalized notions and readily substituted some more or
less suitable contrivance for the needed instrument. He re-
placed sticks by pencils, ink by syrup, water, or milk, a
hammer by a stone or his own fist, a serviette or handker-
chief by a piece of paper. He would apply any key to any
keyhole.

Miss Felce’s female chimpanzee Nanni
used to borrow a spoon and try to unlock the door with it.
One day I gave her my keys. She tried them successively until
she found the right one with which she opened the door. I called
her not to leave us and she contented herself with opening the
door, shutting it and, re-opening it. After that one glance at
the bunch of keys sufficed for her to select the right one.

In short, apes display through intelligent substitution
and the faculty of at least elementary abstraction, the
ability to put two or more things together purposively.
Their gesture language of ‘attracting attention’ by manual
contact, of ‘request’ by putting their hand to the mouth,
and of ‘rejecting’ by turning face and head aside is virtu-
ally identical with that of a human child.

Mrs. Kohts also lists seven vocalizations of vowel sounds
common to both infants, in addition to panting, sneezing,
coughing, grunting, snorting, deep yawning and crying,
the last seven being listed in decreasing order of similarity.
Both infants imitated a dog’s bark, the ape’s imitation be-
ing the better; both reproduced such sounds as stamping
their feet, banging their hands and smacking their lips.

But it is the postural control animals have over the move-
ments of the individual parts of their bodies that determines
the amount of variation and skill with which they can use
tools and also the skill with which they can express their
emotions and communicate their intentions by mimicry, i.e.,
bodily movements and attitudes, and by gestures, i.e.,
manual movements and facial expressions. It is through
bodily control that dancers and actors can convey wordlessly such a world of meaning in play, ballet and mime.

The similarity between all human races in tastes, dispositions and habits, according to Darwin, 'is shown by the pleasure they all take in dancing, rude music, acting, painting, tattooing and otherwise decorating themselves: in their mutual comprehension of gesture-language, by the same expression in their features, and by the same inarticulate cries, when excited by the same emotions.'

These gestural and vocal similarities between human races are dependent for their variety and skill upon man's erect posture and the simultaneous liberation thereby of his chest, lungs, throat and lips which enables him to give full voice to his feelings through sound; and the concurrently achieved freedom of his hands to hold implements and to make meaningful gestures with them.

The upright posture, as was stressed in the last chapter, caused widespread anatomical and physiological divergences. The viscera had to be suspended from the diaphragm as well as the backbone and to be supported not only by the belly wall but also by the pelvis. The chest had to be widened and the mechanism of respiration transformed to meet the exigent demands of a much more intensive and active use of the body under the conscious control of the brain. The backbone, instead of being a simple arch between the fore and hindlimbs as in quadrupeds, developed new kinks in the loins and the neck. The trunk musculature was remodelled to meet the needs of short but mobile upper limbs, a head poised on a flexible vertebral column, and a restless pulsating chest above a sensitive and powerful belly wall rotating on the fixed pelvis set on stout massive lower limbs. Every bone and muscle, joint and viscus of the trunk was affected by this change in body orientation as well as those of the limbs. These changes were a pre-condition of speech.

Human beings are proud of their erect posture; it marks them off from other animals; it has performed the feat of
lifting them up physically above the ground onto their feet and toes and is thus symbolic of their gyrational superiority. To appreciate how man mastered speech we must return to the upright posture.

Toe-spinning mobility and flexibility were bought at a great price; that price is instability. A body standing on two feet is naturally less stable than one standing upon four, but the added height and power afford a wider horizon and a greater potentiality in terms of manual skill provided the willow-like column can be kept equilibrated.

The infant chimpanzee cannot walk upright for more than three or four steps at a time and even so must constantly use his arms as balances to maintain the temporary bodily equilibrium. He stands upright fleetingly only to survey his surroundings in a new or perhaps dangerous locality from a greater elevation. That gait is quickly abandoned for the greater stability and speed of walking and running on all fours.

At the age of three years the human infant spontaneously walks and runs about freely for one-and-a-half to two hours on end without lassitude. This instinctively won equilibrational ability allows him to carry, drag, or manipulate and brandish objects in the erect posture that a chimpanzee of that age prefers to carry in his mouth or drags along in one foot. It is only the human child who can balance the body so as to hop or jump and pivot the body peglike upon one foot and thus put the whole weight and length of his body as well as his voice and his indomitable will power behind the work of his hands.

The perfection of this voluntary bodily control that makes these equilibrational feats possible is dependent upon exercise and practice, and especially upon a voluntary control of the breathing apparatus. Without this breath control the human voice could not be modulated and regulated to the degree that is essential for speech.

We have seen that the Australopithecinae also were upright. They had in addition a whole armamentarium of
tools which they not only made but which they also used customarily to club or pound, cleave or split, stab or dig, slash or tear, skin or flay, slice or saw, scrape or scratch, probe or explore, hurl or throw. Consequently they must have been carrying out daily a host of correspondingly meaningful movements with those tools.

Gestures acquire meaning when they re-enact and thus symbolize such meaningful tool actions. A dog knows when a raised hand is menacing or friendly; he appreciates very vividly the difference in symbolism of the manual movements employed in flinging a stone or offering food. Any concurrent gesture attains specific significance automatically when it occurs regularly and repeatedly in the course of using tools purposefully, e.g., stabbing, skinning, twisting, digging.

The purposeful capacities of australopithecine osteodontokeratic tools was shown firstly by the wounds they made; secondly by their selective nature: the deliberate gathering of cranial remains for horns, teeth and jawbones and the specialized interest in particular skeletal elements such as armbones, cannon bones and hooves.

Finally their purposiveness was proven by the fact that the basic discoveries of the osteodontokeratic culture, once made by Australopithecus, persisted throughout human cultures until superseded, and then only in part, by the successive discoveries of stone and metals.

But the tool equipment of the Australopithecinae would be meaningless unless their posture, bodily control, limb movements and vocal control were comparable with those of human beings. We must therefore either concede with Dubois, Sollas, Elliot Smith and Keith that they had articulate speech or agree with Pumphrey, J. B. S. Haldane, Paget, Stein and others that they and all primitive human hunters were inarticulate. Articulate speech came only about 25,000 years ago and was preceded by about 1,000,000 years of gesture and babble.
CHAPTER SIXTEEN

How the Past Reveals the Future

There are still many people, educated ones among them, who cannot see why we should probe into our ancestral past.

'What is the point of it?' they ask. 'How does it benefit mankind?'

Perhaps it is because man has grown so self-centred and clever and progressed so rapidly during this century that it is mentally difficult, if not revolting, for civilized people to look back upon their primate past. The late Professor E. A. Hooton of Harvard University called monkeys and apes, 'Man's poor relations'. The general attitude of many of his fellow Americans to the remote primate past of mankind seems to have reminded him of the snobbish behaviour of some socially successful folk. Their lowly origin offends their new-fangled ideas of what is fitting to their present estate.

Yet if some footling human beings had not been courageous enough to forget their social status and study in deep humility the lowliest living creatures as well as the primates (and also their dead bodies and internal parasites, as well as those that crawl over them and the foulest diseases that destroy them) civilized human beings would certainly not be able to live as they do today. The study of the repulsive and the filthy is usually more vital to our welfare than that of the attractive and the clean if humanity is to obtain the understanding needed for survival.

The prime advantage of understanding what some
regard as the worst of their own past is that only thereby can we begin to measure the progress we have made and the potentialities of humanity’s future. In 1650–54 the Irish archbishop James Usher published the *Annales Vateris et Novi Testamenti* in which as the *Encyclopaedia Britannica* informs us, ‘he propounded a now disproved scheme of Biblical chronology, whose dates were inserted by some unknown authority in the margin of reference editions of the Authorized Version’. According to Usher’s dating, the world was created in 4004 B.C. and apparently on October 4.

In those seventeenth-century days witchcraft was rife, chemistry was still alchemy. A century had to pass before the constitution of the atmosphere was discovered. Geology too was mythical until Buffon, Hutton and Playfair in the eighteenth century began to display the succession of stratified rocks and their fossils. Even during the nineteenth century, after the theory of evolution had been accepted by leading biologists and geologists, physicists of eminence like Lord Kelvin were unable to extend to the earth a period of existence adequate for the evolutionary changes to take place.

As Dr. Loren Eiseley has shown in *Darwin’s Century*, it was not until 1903 that Paul Curi and Labord demonstrated that radium steadily maintains its temperature above its surroundings.

Kelvin’s conception of the sun as a sort of figurative coal pile dwindling toward extinction was swept away; his harsh calculations (based on the previously supposed rate of cooling of the earth and the sun) became meaningless. . . . The way lay open for an enormous extension of the antiquity of the earth—an antiquity that would have delighted and astounded Darwin. The long tyranny of the physicists was over: the oncoming cold had been a phantom.

By 1931, through the exact knowledge accumulated by physicists and mathematicians about the transformation of uranium and thorium into lead, a band of geologists under
Adolph Knopf of Yale University was able to publish the first book that dealt with *The Age of the Earth* in terms of knowledge instead of guesswork. Radiation and stratification showed that the age of the earth had to be reckoned not in thousands of years nor in scores of millions of years, but in thousands of millions of years.

This technique gave accurate figures for the gross periods of geological time but it did not help with the finer question of recent historic and prehistoric dating. For that we had to await the arrival of the Geiger counter and the atomic bomb. Within the last decade, however, Willard J. Libby has discovered and applied the Carbon 14 method. By its means, recorded history that goes back for only 5,000 years before the present in highly favoured places such as Egypt and Mesopotamia has been clocked with unexpected accuracy. From this information reliable datings are provided for any carbonaceous material—such as wood, charcoal, bones and shells from man’s fireplaces and waste heaps, or peat and other contemporary plant life—back to 25,000 years ago, and in favourable cases even to 40,000 years B.P., i.e., before the present. Man’s refuse heaps suddenly became far more informative than his works of art.

Until last year no dating technique was known to fill in the broad gap between 40,000 and 1,000,000 years ago, i.e., between the point where carbon dating failed us and the time when the Pleistocene, or recent, or human, geological period was believed to have begun. Then Drs. Evernden, Curtis and Kistler of Berkeley, California, announced their successful application of the potassium-argon technique to sanidine crystals in the tufas of volcanoes that erupted at different times during the Pleistocene. These appallingly destructive volcanic incidents, as at Pompeii and Herculaneum, were shown then to hold out our greatest hope of accurate dating knowledge through man’s earlier prehistory.

So far this new technique has not been applied to any of
the volcanic tufas related to fossil-bearing beds in Africa; but on the dating gained from applying it to volcanic tufas in Europe and America, the authors state that it is reasonable to consider the earliest or Donau glaciation in Europe to be 900,000–1,000,000 years old. The Australopithecinae probably lived during the first quarter of this period i.e., 750,000 years or more B.P.

When people who are dressed in their best, with all the comforts of modern civilization behind them, watch the antics of chimpanzees or gorillas in zoos it is not surprising if they imagine the gap between themselves and the apes to be so terrific as to be impassable.

The shock that brought illumination to Darwin was rounding Cape Horn and seeing there the savage Tierra del Fuegans living naked in the sleet and snow and eking out a wretched existence on shellfish. He said in *The Descent of Man*:

The astonishment which I felt seeing a party of Fuegans on a wild and broken shore will never be forgotten by me, for the reflection at once rushed to my mind—such were our ancestors. These men were absolutely naked and bedaubed by paint, their long hair was tangled, their mouths frothed with excitement, and their expression was wild, startled and distrustful. They possessed hardly any arts, and like wild animals lived on what they could catch, they had no government and were merciless to anyone not of their own tribe.

The gap we have been considering here is not that between apes and Fuegans; it has been reduced to that between apes and australopithecines. Yet even as he looked at Fuegans, Darwin knew that man owed his prominence over other animals not to his fol-de-rols of civilization, his ships handed down from an unknown past and the steam engines that were then revolutionizing Europe’s social economy. His ascent was not even based on his culture, his language or on his so-called morals.

These were recent veneers that followed inevitably upon other, much more remote and far more basic human
achievements: upright posture, the stability of his feet and lower limbs, wide-ranging sight that came from the improved poise of a well-swivelled globular head above an erect vertebral column, the hard-won freedom of the clever upper limbs, and the consequent delicacy of man’s hands and their skilled manipulation of tools. These we have now seen *Australopithecus* already possessed.

Darwin knew that language too was only an advanced form of the universal ability of all higher animals, whether bees or ants, birds or mammals, to express their emotions and to communicate with one another. Man’s expanded brain itself, which had invented speech, became possible only through prior development of all these preceding physical faculties. Man differed from animals not in kind but in degree.

A century of positively directed Darwinian thought in terms of evolution had thus revolutionized man’s knowledge not only about himself but about all living things and about the unbounded universe. Zoology and botany, the geographical distribution of animals and plants, their development or embryology, their nervous systems or neurology, their transitional forms and their vestigial structures from that time onwards, were endowed with meanings that only aeons of time could explain.

Geology, from the composition and structure of the earth’s basement rocks to the fossil-bearing strata with which they are clothed and the volcanic eruptions belching forth and shattering them, has shown that each of these had an evolutionary life all its own: a vast anthology of histories to be written only by man’s patient toil and study. Chemistry was only the earth’s anatomy, the elements and components to which the molten earth had been reduced; and physics merely the earth’s physiology, the forces that move alike inanimate objects and animate creatures, and phenomena such as heat and light, colour and movement, which were at first only physiologically appreciated. The hidden forces of magnetism and electricity, innate in the
earth’s components, became discerned through gross movements.

Evolutionary concepts invaded every field of science but they had been intruding long before Darwin and overwelmed thereafter every branch of human thought. Custom and law, magic and medicine, archaeology and history, philosophy and religion; all human knowledge had evolved. Despite the antagonism Darwin encountered and the heresies he had taught, he was honoured by his old university, Cambridge, with an honorary LL.D., in 1877 and buried finally in Westminster Abbey in 1882.

Neanderthal Man had been discovered in 1856, three years before The Origin of Species was published. Although claimed by Professor Schaafhausen at Bonn as proving that modern man had arisen from an inferior type of being, Neanderthal Man was dismissed as a deformed and arthritic subject of rickets, a Cossack from the Napoleonic Wars, an old Dutchman, a Celt, or as a plain idiot.

The controversy about Neanderthal Man became intensified after Darwin’s book appeared; but steadily the same sort of skull or very similar ones have turned up at Gibraltar, Valencia and elsewhere in Spain; at Le Moustier, Chapelle-aux-Saints and elsewhere in France; at La Naulette and Spy in Belgium; at Saccopastore and Monte Circeo in Italy; at Mount Carmel and near the Sea of Galilee in Palestine; and also in Russia, Uzbekistan and Persia.

Away east in Java on the Solo River and south of the Sahara at Broken Hill in Northern Rhodesia and even at the extreme south of the African continent at Saldanha Bay essentially similar types of mankind have been found. They had retreating foreheads, great eyebrow ridges, a generally flattened skull and forward-projecting or elongated muzzle-like faces. They populated the entire land mass from Germany to Cape Town and from Java to Spain before and during the coming of modern man in the era 25,000–50,000 and perhaps even 100,000 years ago. It
was not Darwin alone but the vast train of archaeologists, geologists and anatomists preceding and following after him that has expanded the Biblical story of man's coming and dispersal over the earth with these Neanderthal facts sketchily summarized here.

The repeated discoveries of Neanderthal Man showed that primitive man lived along with the last Ice Age fauna in Europe; but the thirty-year-old controversy about Neanderthal Man faded into insignificance when Dubois brought back *Pithecanthropus erectus* to Europe. This very small and shallow skull cap with the extremely flattened and projecting eyebrows, was still not accepted by some scientists as a transitional form between man and ape. Most German scientists said it was only a giant gibbon.

As with Neanderthal Man, so there have been repeated discoveries of *Pithecanthropus* but, as yet, not quite so many of the same, or extremely closely related specimens of this still more primitive type of mankind have been found—by Dr. Ralph von Koenigswald and his helpers in Java; by the late Dr. Davidson Black and his colleagues at Choukoutien in China; and by Dr. Camille Arambourg at Ternaffine in Algeria.

In Algeria the pithecanthropine jaws were found along-side stone tools of the old Stone Age, or hand axe type. In China the skulls and jaws were accompanied by more crude stone tools and the great array of osteodontokeratic tools described by the Abbé Breuil, which were similar to those found later at Makapansgat.

From the extinct beasts found accompanying the various types of *Pithecanthropus* in Java, China and Algeria and from the depth and situation of the deposits where they were discovered, we know now that they belong to the Middle Pleistocene period.

Scientists now accept without question that nearly a quarter of a million years before Neanderthal Man spread over almost the entire Old World a still more primitive, flat-headed pithecanthropine form of mankind
had been dispersed across the Old World from Algeria to Java and China. Before the Second World War there were found near Lake Eyassi in Tanganyika fragments of a skull claimed by German scientists to belong to the same human group. Thus it is virtually certain that the pithecanthropine phase of humanity was just as widespread throughout the Old World as the subsequent, but much later, Neanderthal phase. Anthropologists will be on the alert during the next century to fill in our knowledge about how widely *Pithecanthropus* ranged.
## FROM MOLTED EARTH TO LIFE

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## RECENT AND HISTORIC

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## PRIMATE EVENTS IN THE PERSPECTIVE OF TIME

- HOMINID<br>- AFFINITY<br>- MYTHOS
Right, australopithecine, *pithecanthropine*, neanderthaline and sapient.  [Dr. A. S. Brink.]

What Taungs and the other man-ape sites have done is to extend that bewildering story by proving that South Africa was peopled by australopithecine proto-men at a time twice as ancient as the *Pithecanthropus* era; and by showing that these South African proto-human brains were only as big as those of gorillas. Some small pieces of lower jaw and teeth that have been found in Tanganyika* and even in Java may also belong to the australopithecine type. *Australopithecus* too may have been as widely dispersed as

* See footnote, page 238.
*Pithecanthropus* and Neanderthal Man subsequently became. Many more investigations will have to be made elsewhere in Africa, Europe and Asia during the next few generations before people can expect to know precisely the geographical distribution of *Australopithecus*.

Our minds may stagger at the idea of the hundreds of thousands of years that separate living men from their australopithecine ancestors; but this steadily unfolding story shows that the origin not merely of Tierra del Fuegans and Bushmen but of all living men goes back through these brutish, blundering phases of prehistoric man to that ancestral stage when human brains were no bigger than those of living microcephalic human idiots or of living apes.

Further back than *Australopithecus* in the tracing of our physical and mental ancestry the human story becomes so intimately associated with that of the apes themselves that not even the greatest living experts yet know how to separate them from one another. In the process of elucidation which is bound to continue the experts can merely differ about details, much as they have differed about details at every stage of this most contested of all stories: over Neanderthal Man, over *Pithecanthropus*, and more especially over *Australopithecus*.

But through the trivial differences that have separated the experts over *Australopithecus* we have at last reached 'rock bottom' in the ape-to-man sequence. In South Africa we have come to types so little advanced beyond apes in cranial and dental structure that a few diehards still prefer to say that there is either no physical difference at all between man-apes and apes or so little that it has no significance. They have given up the struggle to find physical criteria of difference between apes and earliest man and have demanded not anatomical features but extra-corpo real, external evidence, such as tool-making, to demonstrate progress in the human direction.

That is what has made Makapansgat a crucial site, and
explains why it was essential for us to sort through the entire rubble, the dumps scattered all over the hillside. It has taken 14 years and a lot of money to do that salvage work. The information gleaned is the test of whether it has been worth the sustained effort.

Sorting the dumps was only the prelude to the unceasing hammer and chisel work on the fossil-bearing slabs of rock. The comparison of the thousands of bone, tooth, and horn fragments from Makapansgat with thousands of bone, tooth, and horn fragments from Kalkbank has opened up new frontiers in archaeology. Through the technical work these proto-men did on bones, workers will be able to trace the emergence of men’s culture both previous to *Australopithecus* as well as subsequently.

The importance of the investigations made by the patient workers in Europe, whose collections of worked bones have been neglected or actually spurned, is now apparent. The pioneering work carried out by the Abbé Breuil at Choukoutien, without which it would have been impossible to show the cultural correspondence between *Australopithecus* and the pithecanthropines of Peking, known as *Sinanthropus pekinensis*, is now seen to have been a monumental contribution to understanding human culture at the pithecanthropine phase.

In this way a continuous and coherent story of man’s emergence both physically and culturally is coming to light. Incidentally, the coherence of the story has provoked the exposure of the Piltdown phantasy and led indirectly to the understanding of the horrible hoax that had been perpetrated and to the elaboration of valuable techniques to ensure the reliability of anthropological evidence.

The South African man-apes have also caused and are continuing to cause an immense expansion of our knowledge of the structure of the living apes, both adults and infants. They have also shown how essential for understanding human beings is a more intimate and detailed knowledge of the living apes and indeed of all men’s near
relations, the primates, instead of information derived from the behaviour of rats and mice.

A few of the fascinating facts already elicited from the early comparative studies in the field of behaviour have been incorporated in this story. These behaviour studies are only in their infancy. They have been confined chiefly to zoos, laboratories and private homes. Little has been done out in the open in the primates' natural groupings, family life and forest environment.

The continuous contact with gorillas established by Mr. W. M. Baumgartel and his assistants, first Miss Rosalie Osborn and then Miss Jill Donisthorpe, with the aid of Reuben and his fellow Bantu trackers, over a twelve-month cycle (1956–57) on the slopes of the volcanoes in the south-western corner of Uganda has thus been of signal importance. The best we can do today in the way of reconstructing the early group or social habits of mankind is to compare what we can legitimately deduce about australopithecine life and habits in the dolomite caves with what we discover about the state of actual anthropoid group life in the forests of Central Africa.

The greatest questions man has ever posed or is ever likely to pose are these questions we have been attempting to answer: Whence has man come? How was he made? How did he come to differ from other creatures? How is it that he at first learned so little and then came, as it were in a series of sudden spurts, to know so much about the world and himself while other living creatures were content simply to live and to remain ignorant?

A few thousand years ago when urban civilizations were first established kings were gods and priests formulated theocratic answers to these questions. The sacred writings of the world's great religions enshrine various modifications of these early ponderings and answers. Only during the last century—and especially since Dubois’s explosive discovery of Pithecanthropus in 1893 and the dating of the world’s rocks by radio-active clocks—has it been
possible to give scientific facts and so to answer these profound questions with more precision than our ancestors could.

But the answers of today, however up-to-date or prophetic they may prove to be, can be regarded only as provisional compared with the detailed knowledge that will accumulate as the world’s scientists continue to wrestle with them here and in space during the century that lies before us.

The facts from South Africa, precious and informative as they are, came to us accidentally through a series of lucky breaks, which by good fortune and the personal interest of three intelligent men of means, Dr. Bernard Price, Axel Wenner-Gren and Leighton A. Wilkie, a small band of local scientists has been able to follow up as hobbies alongside other routine life-tasks.

Can we imagine what will happen when these subjects become not hobbies, but the serious government-subsidized pursuits of an adequately organized, specially trained personnel? When ignorance and illiteracy have been liquidated upon the earth, all men and women will be sufficiently educated to understand their prehistoric past and their physical structure, their physiological functioning, their psychological constitution and the quaint behaviour of themselves and their adolescent fellows today and aforetime.

It has been said that to know all is to forgive all. Certainly when we know that men have not yet ceased from being murderers and killers for the past million years we have a better understanding not only of our human history but of our fellows’ natures as well as of man’s national and international madnesses. We can appreciate more fully with what dark forces externally and internally man has contended both individually and collectively from the time he first became conscious of the power of the weapon, in order to become and to stay as civilized as we happen to be. We can understand better why men and women generally
mistrust one another and why nations and peoples perpetually guard against one another a security still ensured only by the terror of their weapons.*

‘Man, if he compare himself with all he can see,’ said Colton over a century ago, ‘is at the zenith of his power; but if he compare himself with what he can conceive, he is at the nadir of his weakness.’

* The late Sir Arthur Keith (1948) described at length how the Australopithecines or Dartians, as he called them, ‘spread slowly abroad, and so laid the foundation of humanity throughout the Old World’ in *A New Theory of Evolution*. This prediction has recently been spectacularly confirmed by Dr. and Mrs. Leakey’s discovery of the new Australopithecine, *Zinjanthropus boisei*, in Tanganyika nearly 2,000 miles north of Taungs. That discovery also corroborates the finding of stone implements with the South African Australopithecines (see pages 162-6).
EPILOGUE

‘You dare not leave your readers there,’ said my collaborator. ‘They know you’ve left your chair in the university; they will assume you have thrown up this sort of work, that this is your swan song and now it’s good-bye to all that.’

‘That’s absurd,’ I said, and we went on to discuss what the future holds for me.

The Wilkie Foundation is relying on me to carry through the story of early tool evolution as far as the South African man-ape sites can take it. The South African Council for Scientific and Industrial Research and the Research Committee of the University of the Witwatersrand supplement the work financially. Two years ago, to secure its continuity in my lifetime, the University Council passed a special resolution undertaking to maintain the work itself if any of the outside supports failed. The principal and my colleagues have just taken the unprecedented step of giving me a laboratory in which to store the most precious fossils and to continue working for as long as I am able after retirement. How can I stop?

Just before last Christmas James Kitching brought back from Makapansgat a block of pink breccia about a cubic foot in size on which I was working when the picture between pages 160 and 161 was taken. The skulls of a baboon and an Australopithecus were already visible side by side and between them parts of the lower jaws of two baboons.

‘It’s strange,’ I said, ‘that we started off this book a year ago with Australopithecus from the pink breccia of Taungs first heralded by a baboon and now, just as we
come to its close, here is a troop of them all arriving together from the pink breccia of Makapansgat. It's as if they were saying, "Here we are. You cannot leave us." Perhaps it's symbolic."

Then we talked about how this latest find had opened up an endless vista of further work. The Wilkie Foundation's support had enabled me to keep the working party sorting the dumps for nine months during 1958. They had swept up the hill right to the mouths of the quarries, removing in that time 14,270 tons of waste and recovering 63.3 Cape tons of bone-bearing breccia, chiefly of this pink sort.

That year, too, for the first time we had been able to separate all the breccia collected hitherto according to colour and bone content and, by weighing all that was in the field, get a clearer idea of what fourteen years' work had put into our hands to analyse.

With the seven tons of grey breccia already developed we had collected over 95 tons of breccia, 35 tons of which were grey and 60 tons varied in colour from pink to red. The grey was the richest in lime and bones, carrying about 5,000 bone fragments to the ton. The soil-contaminated pink and red breccia progressively diminished in bone content. In fact, until stone implements were found in the most recent gravelly part of the deepest red cave filling and Dr. Mason and Mr. Hughes came across a few bone fragments—one of which was a piece of the upper jaw of an *Australopithecus*—we had imagined that that part at least was sterile.

Some of the earliest or oldest pink breccia just above the white stalagmitic lime is almost as rich in bone as the grey breccia in the lime, but by the time you reach the top or eroded surface of this lime-consolidated pink breccia (where this 5 to 40 foot-deep deposit of pink breccia is exposed as a planed area of about 149,000 square feet on the hillside) the bone content is much more sparse, but still appreciable. Out of this pink breccia has come most of our fossil baboon specimens.
The block of the pink breccia I was showing my collaborator is the first of it that has yielded an *Australopithecus* and it is the most complete australopithecine skull yet found at Makapansgat. We know that the block in which it lies had been right at the very top of this eroded hillside area of pink breccia because the entire face back to the last molar teeth and the entire front end of the skull had been eroded away.

But that single block had told us from its position and for the first time that this entire unexcavated, lime-consolidated, pink-tinted piece of hillside is a potential source of *Australopithecus* and his prey. To put it briefly not 95 but over 30,000 tons of breccia remain to be mined and removed from this site alone.

My persistent interrogator said he fully realized that a programme of mining, sorting and chisel work lies in front of South Africans at Makapansgat, Sterkfontein and Taungs and that it might not be completed for generations to come. But what did I intend to do? What were the great unresolved issues that should be tackled now?

I confess that I have been the complete opportunist ‘taking up that I laid not down, and reaping that I did not sow’. Such questions should be posed to somebody with a great life purpose. I am really a detective. I sought nothing. I happened to be curious about anything and everything quaint or mysterious that human beings have done in the past or are still doing today. So those who knew this trait brought along to me the things that interested or puzzled them and we simply talked about them and followed up together whatever clues we had. I suppose I will continue doing the same sort of sleuth work as long as my brain is active and as long as others think it worth while helping me to do it.

I may be asked how it is possible in following the feckless hobby of an amateur detective to know where the trail will lead or what will prove the most valuable clue in the solution of human mysteries? Usually what helped
me most was the general agreement of a lot of other people that I was on the wrong track! Knowing the fallibility of human opinion, especially popular opinions or dogmas adopted without satisfactory reasons, it generally proved valuable to explore the reverse of the accepted view.

The ransacking of the hillside at Makapansgat and the collecting of tons of breccia was not my crazy idea. Only Hughes had the temerity and the courage to start tearing down a hillside. But he thought it might be worthwhile and I encouraged him, with the results we have seen.

Coincidence also played a large part, as instanced by the discovery of the australopithecine tool used as a 20th century apple corer.

Modern medicine has made us long-lived, but work as one may, there is still not enough time to discover the whole of the human story. For my part, I am content to have participated in the opening of a few of the African doors into prehistory.

Since Vasco da Gama rounded the Cape and opened up to Europe the spices and jewels, the cultures and glamour of the Orient, the world's circulating riches have floated ceaselessly around the rim of listless, sleeping Africa. After Livingstone and Stanley had awakened the slumbering giant, Africa's protective net of tropical diseases was torn away and she showed herself to be the world's most heavily dowered princess, with diamonds, gold, platinum, uranium, copper, tin cobalt, nickel, tungsten—in fact, almost every desirable treasure known to men.

What Asia has had 5 centuries to accustom herself to has happened to Africa in a lifetime. Her primitive Iron and Stone Age cultures have suddenly been summoned to adjust themselves to this atom-splitting, space-adventuring era in one generation.

In 1923 when I reached Johannesburg there was no university between our pioneer plant and Cairo. Today Pretoria and Bloemfontein, Stellenbosch and Cape Town,
Durban, Pietermaritzburg, Grahamstown and Potchefstroom, provide the Union with a network of universities. Others are dotted across the continent at Salisbury, Elizabethville, Leopoldville, Kampala, Khartoum, Ibadan and Dakar.

Then such roads as existed made a main-line trip to Pretoria 35 miles away a spring-smashing, pot-hole adventure in a 'Tin Lizzie'. Today the continent is crisscrossed by networks of air-lines and bus-routes, railroads and waterways. The proliferating population and the triumphant march of mechanized agriculture threaten the rapid extinction of Africa's few natural game reserves. Only their potential income as tourist attractions spares a little longer humanity's last documents of the earth's vanishing animal population other than pullulating mankind and his fleshy food reserves.

Because these African records of both her human and her animal past are slipping away so relentlessly and inevitably, former students and colleagues led by Professor P. V. Tobias have decided to establish an Institute of Man in Johannesburg linked with my name to preserve what can still be rescued of Africa's present as well as her fossilized past.

Of the things threatened with eradication none is more precious as far as human history is concerned than the Pygmies and Bushmen among the African peoples and cultures, and the chimpanzees and gorillas among our nearer primate relatives. To study them is the prime responsibility of scientists in Africa. The only part of the world where these apes are accessible in territory still under British administration is Uganda. One can only hope that if and when the sanctuaries set aside for them become the responsibility of wholly African governments these animals will be preserved for their own welfare as well as for the pleasure and instruction of humanity.

To promote objectives of this living nature as well as to reconstruct the hidden relics of the Pleistocene era that
lie underground are the purposes of the Institute. Should they be realized, all that has been collected so far would be but an element in the vast mosaic of African mankind, and my work hitherto and what still remains for me to do merely an overture to the far vaster themes that lie ahead.
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