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EIGHTY YEARS AFTER THE DISCOVERY OF THE TAUNG SKULL REVOLUTIONISED PALEOANTHROPOLOGY

ABSTRACT: When the Taung child's skull was found in 1924, it was the first-discovered specimen of Australopithecus. Raymond Dart, who revealed it to the world in 1925, faced much opposition from those many scientists who cherished other views on the pattern of human evolution. The dangers of the time factor being employed to support or reject Dart's claims for the Taung child are reviewed and examples are cited. An account is given of subsequent developments, such as the finding of more South African sites containing the fossil apemen; the geographical extension of knowledge about hominid-bearing sites to East, Central and North Africa; the impact of the critical new field of molecular evolution and its repercussions on the dating of the past history of the hominids; the emergence of taphonomy; the role of cladistics; and the problems of classifying fossils and making new genera and species, perhaps too many of them! The eighty years from 1925 to 2005 have seen the establishment and maturation of an essentially new scientific discipline. It is reasonable to claim that the past century has opened up knowledge of Man's Place in Nature, as Thomas Huxley could never have dreamed.

KEY WORDS: Hominids – Fossils – Molecules – Dating

Avant propos

The death of Professor Jan Jelínek on 3rd October 2004, has robbed the fraternity of paleoanthropologists of one of its most steadfast members. We shall remember him for many things – his original turn of mind, his innovative spirit, his persistent and creative work as editor-in-chief of *Anthropologie* and as founder of the Anthropos Institute in Brno, which I had the pleasure of visiting with him soon after it was established. My friendship with him goes back for at least forty years and my personal sense of loss is deep. It is a privilege to offer this article in memory of Jan Jelínek and as one small means of bringing him honour.

THE COMING OF TAUNG

One hundred years ago, no ancient hominid fossils had emerged from any part of Africa. Informed people were looking to the Far East as the original home of humankind. Twenty years later Raymond Dart, my predecessor in charge of the anatomy department at the Witwatersrand University, Johannesburg, announced the discovery of the Taung skull, the holotype of *Australopithecus africanus*.

His article appeared in *Nature* on 7th February 1925. Even without the benefits of television, the news of the discovery, and of Dart's claim that it represented a "missing link", caused a stir throughout the world. Fast and furious debates followed. Nowhere do they seem to have been faster or more furious than in Tennessee in the U.S.A. Within weeks the State Legislature enacted a ban on the teaching of evolution in Tennessee schools. To my mind that enactment was directly precipitated by the revelation of the Taung skull

and the widespread press and radio coverage that ensued. The Great Monkey Trial in Dayton, Tennessee, followed a short while later. John Thomas Scopes, a schoolteacher, was arraigned for breaking the new state law. The presidents of Harvard and Yale Universities, leading clergymen and a host of scientists offered to appear for the defence. The judge declined their help. The historical confrontation between Clarence Darrow and William Jennings Bryan was the highlight of the trial. Bryan placed his reputation, faith and biblical knowledge at the service of the prosecution. Darrow – the wits declared – made a monkey of Bryan. Scopes was convicted and sentenced to pay a paltry fine (\$100). Many years were to pass before radio broadcasting in the U.S.A. would venture to deal with evolution on the air.

In the first quarter of the twentieth century scientists believed that Asia had been the cradle of humanity. This was partly because Java had yielded the remains of Java Man, considered today to belong to the species *Homo erectus*. It had been found late in the nineteenth century and many scientists accepted it as an ancestor of modern humans. A few isolated teeth from China had given warning that there, too, had been an ancient form of mankind. In addition, as Peter Bowler has stressed, there was a pro-Asia sentiment and an anti-Africa bias: nobody wanted to believe that anything important had come out of Africa.

The second quarter of the twentieth century was heralded by the discovery of the Taung child skull about 100 km north of Kimberley. In late 1924 the skull was brought to Raymond Dart, who had just been appointed professor of anatomy at the new University of the Witwatersrand Medical School. From a hurried study of the skull, Dart made the startling claim that it belonged to a hitherto unknown kind of primate which he dubbed *Australopithecus africanus*. It was, he said, basically an African ape that showed a number of human-like features. The species it represented had apparently developed in a human direction. Dart claimed that it could be regarded as a "missing link". (This effete concept was based on a putative Chain of Being, of which all links were supposedly known save for that between humans and non-human animals.)

In the world of science, an international reputation may sometimes rest on a single momentous discovery. In other cases lifelong achievements add up to a distinguished record, even though no single breakthrough has been of such brilliance as to bring global recognition on its own. Dart falls into the first category, for his revelation and appraisal of the Taung skull brought deathless renown to the man, his University and South Africa. In one blinding moment the roots of the human tree were plucked from Asia and transplanted to Africa. Not only did Dart's view of the Taung child effect a geographical revolution in our thinking about human origins, but it compelled a re-think about the kind of creature which filled the role of a "missing link".

Robert Broom supported Dart's theory and went even further. Broom proposed in 1933 that the genus and species should be admitted to the human family, then called the hominids.

Dart's claims for the Taung child were generally rejected. Most scholars said it had no bearing on human origins. Dart's critics asserted that the child was in the wrong continent; it was too young for scholars to be sure what kind of adult it would have grown up into; it was held (on insubstantial grounds) to be geologically too recent for it to have been an ancestor of humans; the name *Australopithecus* was a hybrid of Latin (*australis*) and Greek (*pithekos*) and this was unacceptable to some classical scholars; Dart was too young and inexperienced, and too heretical for his claims to be taken seriously. He was the wrong man – or so it was held.

What was more, the Taung skull was curiously commingled of an apish small brain, human-like upright posture and small canine teeth. This blend was diametrically opposite to the kind of ancestral anatomy that many theorists had envisaged. They had predicted an ancestor in whom the brain had enlarged early in human emergence, whilst the posture and teeth were supposedly humanised late. This prevailing image was strongly held, even though there were no fossils showing such a combination of traits. So strongly was this image supported that an attempt was made to fabricate such a skull. In the notorious Piltdown forgery a recent human cranium with a large brain-case and an apish lower jaw (of orang-utan) were doctored, stained and salted into a gravel pit at Piltdown in East Sussex, England. Those who strongly supported the ancestral place of the Piltdown skull were forcefully opposed to Dart's view of the place of *Australopithecus*! Taung and Piltdown could not both be human ancestors (Keith 1915, 1946, 1948).

So Piltdown was a serious deterrent to the acceptance of Dart's and Broom's claims.

TIME AND THE INTERPRETATION OF THE FOSSILS: CAUTIONARY TALES

The first cautionary tale goes back to Dart's (1925) claim that the Taung fossil child, called by him *Australopithecus africanus*, was a South African ape which showed morphological changes in a human direction. From 1925 and up to 1947, Keith was strongly opposed to Dart's interpretation. One of the cardinal reasons cited by Keith was that the fossil was too young in geological time to have been an ancestor of humans. Keith's reasoning was based on stone tools that had been found in a riverbed below the limestone tufas from which the Taung skull had been recovered. Keith assumed that the fossil skull in the tufa and the stone tools in the riverbed were contemporaneous. From this assumption, he inferred that *Australopithecus* was contemporary with tool-making humans. Since humans and their ancestors could not be coeval, the species to which the Taung child belonged, said Keith, could not have been ancestral to the human species. Thus, a conception of time – which we now know to have been an erroneous one – helped initially to disqualify *A. africanus* from ancestral status.

There are other examples in which the relative prominence accorded the time factor played an important role in the interpretation and classification of fossils. A classical example relates to Member 4 of the Sterkfontein Formation from which Broom in 1936 obtained the first adult australopithecine. He named it *Plesianthropus* though Dart, Robinson and most others considered it belonged to the same genus, *Australopithecus*, as the Taung child. On slender evidence based on associated fauna, Broom considered Sterkfontein Member 4 to be Middle Pleistocene and about 250,000 years of age. Hence he inferred it was too young to have been ancestral to the human species. Here again, time – and once more a faulty estimate of the dating – and the interpretation of the fossils were assumed to be indissolubly linked. This instance was aggravated when H. Silberberg in the early 1940s found an archaic hyenid, placed by Broom in the genus *Lycyaena* but later reclassified in *Chasmaporthetes*, in a deep part of the Sterkfontein sequence. Broom opined that this genus was a Pliocene hyenid and he jumped to the conclusion that it was of the same age as the Sterkfontein australopithecine. He thus felt obliged to push the Sterkfontein (Member 4) hominids further back in time, because of their supposed contemporaneity with the putatively ancient hyenid. Now *A. africanus* was welcomed by Broom as being old enough to have been a human ancestor! Once more, time and the interpretation of fossils were intertwined. Again, there was a fundamental error in the reasoning. The assumption that Silberberg's hyenid was of the same stratigraphic provenience as the *A. africanus* fossils was not correct. The hyenid in fact stems from Member 2, which has recently been shown to be about 3.3 mya (Partridge *et al.* 2003), and thus has no bearing on the age of *A. africanus* in Member 4.

THE THIRD QUARTER OF THE TWENTIETH CENTURY

The third quarter of the twentieth century brought changes of many kinds.

First, many more South African hominids were discovered, and there were now six sites that had yielded australopithecines.

More South African sites

Later, new South African sites – Sterkfontein, Cooper's B, Kromdraai, Makapansgat and Swartkrans – gave the world a rich variety of early hominid remains, all characterised by signs of upright bipedalism with small brains and with front teeth, including the canines, relatively small as compared with those of the African great apes. There were different kinds of ape-men in southern Africa. Not all of the fossils were cranial and dental: there were postcranial bones, including limb-bones, pelvis and vertebrae. Their morphology confirmed what Dart had claimed from the base of the cranium in the little child of Taung – namely

that these early ape-men were bipedal and thus humanlike in posture and locomotion.

The first site to yield an adult australopithecine was Sterkfontein, a short distance north-west of Johannesburg. There, in 1936, twelve years after the recovery of Dart's child, Robert Broom (1936) collected the first of a number of crania which showed the suite of features that characterised the Taung child. In the period from 1966 to the present, the site of Sterkfontein yielded over 600 hominid specimens in a systematic excavation which I organised and led for 37 years. So large a fossil sample has enabled us to make studies of the population biology of *A. africanus*. No longer need we be content with a single specimen, or two or three, but we are able to study a fossil population, with sex differences, age changes, and individual traits. *A. africanus* is one of only a few fossil species where this is possible.

Extension to East Africa

Secondly, the scene of discoveries, hitherto confined to South Africa, extended to East Africa.

After World War II, a number of investigators, chief among whom were Louis and Mary Leakey, discovered that ancient hominid remains were to be found up and down the Great Rift Valley (Leakey *et al.* 1964, Leakey 1971, Leakey *et al.* 2001). A plethora of new sites came to light in Tanzania, Kenya, Ethiopia and, more recently, Malawi in the southern part of the Rift Valley and the Chad Republic far to the north west. It was clear that the remarkable claimants to being early hominids were not a southern African aberration, but a pan-African revelation.

Such famous sites as Olduvai and Laetoli in Tanzania, Koobi Fora in Kenya, the Awash Valley in Ethiopia, became as well known in the community of paleoanthropologists as the earlier-discovered sites from South Africa. What is more, the rocks of East Africa preserved even older remains than the earliest (3.3 million years) so far revealed in South Africa. East African hominid remains had come to light in deposits dated to 3.7, 4.2, 4.4 million years ago, while in 2001, most ancient, reputedly hominid remains were revealed in Ethiopia, dated to 5.2 to 5.8 million years (Haile-Selassie 2001), and in the Tugen Hills of Kenya to 6.0 million years (Pickford, Sentut 2001) and in the Republic of Chad to 6.0–7.0 mya (Brunet *et al.* 2002).

While not all of the newest finds have yet been published in detail, nor have all of them been corroborated by the community of paleoanthropologists, nevertheless these remarkable finds point to a story of human evolution that is nearly twice as old as the most ancient hominids yet found in South Africa.

So far, all of the East African and Central African discoveries have been close to the Equator and between the Tropics to north and south. On the other hand, the South African finds have come from south of the Tropic of Capricorn and thus they represent sub-tropical populations.

New information about the great apes

Thirdly, revealing data were being amassed about the anatomy and behaviour of the living great apes, chimpanzee and gorilla of Africa and orang-utan of Asia. For example, when metrical data on especially, the teeth of modern great apes were analysed by modern statistical techniques, such as multivariate and canonical methods, their relationships to the early hominids could be shown more clearly.

The rise of molecular evolution

Fourthly, a new approach arose: molecular evolution. It was to play a serious role in a field previously dominated by bones and stones. Molecular biological analyses made the inference that hominids and chimpanzees shared a common ancestry. They inferred that the splitting of the postulated last common ancestors into at least two derivative stems, those leading to humans and to chimpanzees, took place late in the Cenozoic, between 7.0 and 5.0 million years ago.

New methods for the dating of the past

The dating of the past has exercised many scholars' minds for a long time. In 1945, I led an all-student expedition to Makapansgat in the Northern or Limpopo Province of South Africa. My colleagues and I brought back to Johannesburg some fossil baboons and monkeys. Our mentor, Dr. Robert Broom, identified a new genus and species among them. Always a friend of the press, he published a news story about our discovery: it appeared under the heading, "Students discover 300,000-year-old secret". The 300,000 year dating was simply a guess! Later work on that deposit showed that the stratum from which the primates had come was dated 3.1–3.2 my! Broom's guess of 1945 was, however, in keeping with the prevailing ideas of the day, namely that the time of man on earth was about one million years.

In the third quarter of the twentieth century, new methods for the dating of fossils were introduced, such as the use of radio-isotopes. The new era dawned with dating by the potassium-argon technique of a very robust hominid cranium which Mary Leakey found in the Olduvai Gorge, Tanzania, in July 1959: its dating of 1.75 million years ago was received with amazement. It sparked a search for older datable hominid fossils.

The date of 1.75 million was the approximate age of *Australopithecus boisei* and also of *Homo habilis* with the accompanying Oldowan stone industry. Libby (1955) had a little earlier introduced the carbon-14 dating method, but because of the limited half-life of carbon, that method could date deposits back to only about 40,000 years – that is, within the Upper Pleistocene. The new radio-isotopic methods used elements with a much longer half-life. It was the beginning of a new era in the dating of fossil hominids.

New methods for the analysis of fossils

Strikingly different research strategies are followed by human biologists in studies on living human beings,

from those pursued by paleoanthropologists. Growth data are usually "cleaned", especially in the case of outliers (Cameron 1984; S. Kgampe – pers. comm.). Outlying values may be eliminated from the series for a particular metrical character, if the values are statistically improbable. Allowance is made for a specific omission by, say, a subject's failing to attend a measurement session, or for observer error. With fossil data, an outlier may be re-observed or remeasured. Outlier status may refer to a single trait, such as endocranial capacity, tooth crown size, or dental enamel thickness, or to a cluster of traits. If, after re-checking, the value is the same, it would in the normal course of events be most reasonable to accept the outlier value as extending the sample range. This is especially important for fossil taxa based on very small samples. What we find in practice, however, is that specimens with outlying values in a group of fossil hominid specimens are often taken to connote membership of a different species. This paleontological style leans heavily on morphological typology. In contrast, the procedure in modern growth studies is based on the biological population. More biology and less typology are likely to improve the status of paleoanthropology over its present parlous dependence on typology.

We are left wondering: is the multiplication of apparent hominid taxa in the late Pliocene a biological phenomenon, following several speciation events, or is it based on diversification into a number of variants without speciation? By the latter mechanism more polymorphy and polytypy could have become an alternative mode of evolution. On the other hand, is the proliferation of new taxa unwarrantable because it is possibly founded on a sampling and analytical artefact? If it is the latter, a more biodemographic and statistical approach would likely give an alternative picture, in which there are fewer species with more intraspecific variation. Polytypy characterises modern *Homo sapiens*, which has diversified into numbers of populations, but with no accepted recent speciation. If we use modern humans as our model, it is fair to ask: how long has this kind of differentiation been the mark of evolving hominids? Is it a peculiarity of the end-of-lineage hominids, or has this pattern of evolution had a long history? For many years I have regarded many of the fossil hominid variants as products of polytypic evolution, or of Julian Huxley's reticulate evolution. I believe that this mode of evolution has characterised hominids at least since *Homo* emerged ca 2.4 mya. Inevitably on this view, fewer species would be recognised.

Another evolutionary philosophy has come into the picture in the last fifty years: it is cladistic analysis. Willi Hennig's (1950, 1966) excellent idea was that, in order to classify different forms of life, the choice of morphological characters should not be random or opportunistic; but it should be based on those traits which are derived or apomorphic, not on those which are primitive or plesiomorphic. Cladistics is thus essentially phylogenetical systematics. A similar strategy was put forward apparently independently by LeGros Clark (1955): he distinguished

between primitive (or generalised) traits and divergent (or specialised) traits – using both terms in an evolutionary sense.

The polarity of each character has to be determined – that is, whether it is plesiomorphic or apomorphic in the group under study. Error arises if the polarity of a trait is determined incorrectly or without sufficient rigour. From a cladistic analysis one derives a cladogram that depicts the relationships among the study taxa. The cladogram is not an evolutionary tree (Eldredge, Cracraft 1980), which specifies ancestral and descendant species in a phylogeny. The building of evolutionary trees tends to have taken place by the introduction of novelty, only or mainly at nodal points deemed to coincide with speciation events. On this phylogenetic species concept, at each nodal point, a new species, or two new species, are said to arise. The more faithfully a paleoanthropologist adheres to cladistic principles, the more speciation events does he/she seem to recognise. Thus, what Simpson (1963) and others called taxonomic "splitting" has become the order of the day in the current era, when cladistics is the fashionable approach to classification and phylogeny construction. The multiplication of species was not a requisite feature of Hennig's mode of analysis, but as employed today, it has become a widespread byproduct of cladistic analyses, for the number of proposed species to be multiplied.

These two evolutionary philosophies may be expected to favour respectively fewer and more species. The three genera and six species of hominids claimed to be present in Africa, synchronically near the end of the Pliocene, should be viewed critically against this background.

The rise of taphonomy

Seventhly, in the emergent field of taphonomy, scholars tried to find out how animals alter and accumulate bones – and also the effects on bones of physical agencies like water, ice, the sun's radiation, burial and exposure. Among those who made such studies was C. K. Brain of the Transvaal Museum. He showed that carnivores had probably accumulated the hundreds of thousands of broken bones at the apemen sites.

THE FINAL QUARTER OF THE TWENTIETH CENTURY

In the last 25 years of the twentieth century, new dating, new use of cladistics and new molecular data re-modelled the approach and methods of paleoanthropology. Emphasis was laid on ecology, taphonomy, demography and better statistical methods with which to analyse bone and tooth measurements. Novel techniques like CAT-scanning were applied to old bones. At ground level, the search for more fossil hominids continued unabated. Bigger samples were needed, in order to compare the features of young and old, male and female. This was necessary in order to draw a line between variations within a species and those between

different species. Then there was the driving quest for ever older remains to take us nearer to the alpha point when the last common ancestors of apes and hominids had split into two or more lineages.

South Africa generates new treasures

In South Africa, only four early hominid sites were known before World War II. They were Taung (1924), Sterkfontein (from 1936 onwards), Kromdraai (from 1938), and Cooper's (from 1938). Two more hominid sites were added after the Second World War: Makapansgat (from 1947) and Swartkrans (from 1948). Two of these six sites have proved so fruitful that we have continued to excavate them – Sterkfontein (until the present) and Swartkrans (until 1989 but recently re-opened), while excavations have been resumed at Kromdraai, Makapansgat, Taung and Cooper's.

In the 1990s, three new hominid-bearing sites in South Africa were revealed: Gladysvale (from 1992), Drimolen (since 1993) and Gondolin (from 1997). In the quantity of hominid fossils, Sterkfontein is the richest of the nine South African sites. Indeed, one of the strata of the Sterkfontein Formation, Member 4, has given us the most extensive population of any single early hominid species, *Australopithecus africanus*. The second richest of the nine South African sites, Swartkrans, has given up a trove of specimens of another kind of apeman, *Australopithecus (Paranthropus) robustus*. In addition to apemen, Sterkfontein, Swartkrans and Drimolen have yielded remains of early *Homo*, a contemporary of the later apemen.

The most exciting newer site of the 1990s is certainly Drimolen. In the hands of Andre Keyser and Colin Menter, it is proving exceptionally rich in robust australopithecines, with signs of contemporary early *Homo*.

At several of these apeman sites, the later deposits contain stone tools. In Member 5 of Sterkfontein, for instance, Kathy Kuman has shown that two different stone industries are present. One is the Oldowan (a name given by Louis and Mary Leakey to similar tools from Olduvai Gorge in Tanzania). The second industry in Sterkfontein Member 5 is known as the African Acheulean and it has been widely found from Stellenbosch to Algeria. Sterkfontein is the only place in the world where the Oldowan and Acheulean are preserved in a stratified sequence in a sealed cave deposit.

The early *Homo* fossils and stone tools in South Africa, as well as the robust australopithecines, are dated to less than 2 million years ago. On the other hand, *A. africanus* is dated from about 3.2 to about 2.1 million years ago.

"Little Foot": A very ancient, virtually complete hominid skeleton

Member 2 in the Sterkfontein Formation is much deeper than Member 4 with its wealth of *A. africanus* fossils. In 1973, I took the first steps towards an excavation of the very ancient Member 2. By 1978, Alun Hughes and I were

provided by Randfontein Estates Mine with the means to winch to the surface bone-bearing breccia from the floor of what we called Silberberg Grotto. In 1980, working through some of these fragments from Member 2, David Molepole found and extracted four foot-bones. These were labelled and put in a box along with remains of monkeys and small antelopes. Molepole recovered a further eight foot- and leg-bones and Hughes brought these to the Anatomy Department. Like the four in the Sterkfontein store, these languished unidentified for fourteen years.

Molepole's four foot-bones were re-discovered in the box by Ronald Clarke in 1994. He and I studied the remains of "Little Foot" and published an account of them in *Science* in 1995. We pointed out some unexpected features of the foot. It combined the hallmarks of a two-legged, ground-dwelling creature with those of a tree-climbing primate, whose foot could grasp a branch as a hand can do. Interestingly, while Clarke and Tobias (2002) found that the medial pillar of the foot was human-like proximally and ape-like distally, Kidd and Oxnard (2005), using a multivariate analysis, confirmed that the foot contained ape-like and human-like qualities, but they reported the ape-like morphology proximally and the human-like structure distally! Clarke went on, in 1997, to re-discover the other eight bones, some from the same left foot and leg, and several from the opposite leg. Clarke was now presented with matching left and right feet and legs. He was convinced this meant that there must be a skeleton in the rock. In the Member 2 breccia, two of our Sterkfontein team, Stephen Motsumi and Nkwane Molefe, found the broken end of the shaft of a shin-bone or tibia, on to which one of Molepole's fragments of 1980 fitted perfectly. As this piece of tibia was embedded in undisturbed cave earth of Member 2, Clarke now had the proof that "Little Foot" stemmed from Member 2.

To prove Clarke's hunch about the rest of the skeleton, he and Motsumi and Molefe chipped away at the *in situ* breccia, through most of 1997, 1998 and 1999. They laid bare much of a virtually complete skeleton in Member 2 (Clarke, 1998, 1999).

The skeleton lies in breccia sandwiched between layers of flowstone. Happily, Tim Partridge of the University of the Witwatersrand and John Shaw and David Heslop of the University of Liverpool, England, discovered that clearcut paleomagnetic signatures had been imprinted in the layers of flowstone. This led them to place the skeleton, with great confidence, between 3.30 and 3.33 million years ago. This figure of three-and-a-third million years is at present the best estimate of the skeleton's age.

These are the oldest fossil hominid bones yet found in South Africa. Moreover, this is the oldest hominid skeleton, with skull, ever discovered. It is the first ever discovery of such a complete *Australopithecus* skull and skeleton. It seems justified to claim that in its completeness, morphology and antiquity, the new Sterkfontein skeleton is the most important ancient hominid skeleton yet discovered in South Africa and probably in Africa. When I started working towards the excavation of Member 2 in the 1970s,

I was convinced that a hominid would be found in that ancient stratum and I said so at the time. Not in my wildest flights of fancy, however, could I foresee what a magnificent specimen Clarke, Motsumi and Molefe would present to the world from that layer.

There are flowstones and layers of breccia deep to the new skeleton. These layers are well within the Gilbert phase of Reversed Geomagnetic Polarity. Down there we are grovelling in the depths of time, close to, or even older than, 4 million years ago! I am firmly persuaded that hominid fossils are waiting to be revealed there in the deepest parts of the Sterkfontein Formation.

There is a nice symmetry about the earliest and the latest discoveries made in South Africa. The finding of the Taung skull in 1924 wrought a revolution in hominid evolutionary studies. As Broom (*Cape Times*, 25 February 1925) said, it was "one of the greatest discoveries in the world's history...that may yet rank in importance with Darwin's *Origin of Species*." Seventy-five years later, after the ongoing excavation that my colleagues and I conducted at Sterkfontein from 1966 to the present had brought to light over 600 early hominid fossils, the Member 2 skeleton appears set to close an important gap between the South and East African australopithecines. It provides, for the first time, a faithful linkage between an identifiable apeman skull and the rest of the skeleton.

OF MAKING NEW GENERA AND SPECIES THERE IS NO END

Human evolutionary studies have recently been bedevilled by a spate of new and revived names for hominids. Anyone interested in the field is likely to be frightened off by the confusing welter of names. On one recent count, there were as many as twenty hominid species grouped into at least 4 or 5 genera. Some defend this situation by saying that the hominids have been under-classified and all of these species are needed. Others, including myself, stress that such a classification takes too little account of variation within species.

There is another schism – between those who base family trees on old bones, and those who base them on the DNA of living forms. By comparing DNA of living species, they judge how closely related genetically two or three groups are to one another. The molecular excavators can calculate when related living creatures probably diverged from their last common ancestors.

Many scientists who work with fossils create more and more species and even genera of hominids. They are known as "splitters". On the other hand, molecular evolutionists have been zealously "lumping" species and genera into fewer and fewer units.

I cannot here resolve this thorny problem: but it is imperative to draw attention to these two opposing trends. Neither the fossil fellows nor the molecular mortals have a monopoly of the truth. As long ago as 1975 some of us

started working towards a reconciliation between the two schools of thought. The quest continues but the situation has not yet been tidied up sufficiently. This is one rather messy area that the twentieth century has handed on to the twenty-first.

Even the way in which we classify animals and plants needs to be looked at again. Our system is based on one devised by that arch-classifier of everything, Linnaeus, the great Swedish naturalist. Loren Eiseley (1959: 19) of Philadelphia described him as "a phenomenon rather than a man". His was a nature replete with "a Whitmanesque love of the incredible variety of life... He was the naming genius *par excellence*, a new Adam in the world's great garden, drunk with the utter wonder of creation." We often forget that Linnaeus devised his System of Nature to classify *living* plants and animals. When we try to apply the same system of naming names to fossil populations, we run into trouble. A new method called Numerical Taxonomy has been offered like a thread of Ariadne to guide us through the Labyrinth, but even it has not helped us to escape the Minotaur!

The author's sympathies lie with a simpler approach to the classification of humankind, past and present. In this respect, Jan Jelínek was in my opinion correct when he stressed intraspecific variability and declined models shaped on inordinate speciation: here was a man who had no difficulty in allocating *Homo erectus* to a subspecies of *Homo sapiens*, a view this author supported at the Pithecanthropus Centennial Meeting in Leiden, The Netherlands (Tobias 1995).

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