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—NEWS AND VIEWS—

Palaeoanthropology

Primate and human phylogeny

from Eric Delson

IT WAS heartening for an advocate of the merits of cladistic analysis, to see at a recent conference* just how widely it is now being used in the study of primate and human evolution. The purpose of the meeting was to provide a review of the main points of contention and consensus, often pairing proponents of both sides of an argument, an arrangement that led to lively debate on theoretical aspects of evolutionary tempo and mode as well as on the details of presentations.

One focus was on the evolution of the anthropoid or 'higher' primates. L. Aiello (University College, London) reviewed the evidence for a close phyletic relationship between tarsiers and anthropoids, which has been strengthened by work on several body systems in recent years. She supported the concept of a monophyletic (single-origin) Haplorhini for these groups, as did A.L. Rosenberger (University of Illinois, Chicago). He proceeded to the question of whether all monkeys and apes are descended from a single tarsier-like protoanthropoid or whether the New World platyrrhines have a pre-anthropoid ancestor separate from the Old World catarrhines. By demonstrating the homologous nature of novel (derived) cranial structures in all anthropoids, he provided clear support for the concept that anthropoids represent a clade, not a poorly associated grade of primate evolution. In one of the few new concepts presented at the meeting, Rosenberger offered a unified model for the evolution of anthropoid postorbital closure and facial/neurocranial attachment: increasing masticatory forces in an early haplorhine with a narrow interorbital septum required buttressing, which was provided by the complete postorbital sep-

ture and fusion of the frontal bone and mandibular symphysis.

Several of the best papers came from researchers who reviewed areas outside their own narrow expertise. Thus, palaeontologist P. Andrews (British Museum, Natural History) summarized the molecular biological evidence bearing on hominoid (ape and human) relationships, concluding that the majority of approaches have been essentially phenetic. Immunological and DNA hybridization studies reveal similarities among taxa studied, but whether they are derived or even homologous similarities is unclear; studies of genome sequence data appear more promising. A. Friday (University of Cambridge) concluded from new statistical analyses of mitochondrial DNA sequences in living hominoids that chimpanzees may have had an ancestor in common with humans slightly more recently than either did with gorillas; however, the alternative tree, which has chimpanzees closest to gorillas, was hardly less parsimonious. In discussion, several workers played down the likelihood of a simplistic, linear 'molecular clock' for dating the divergence points identified from the many approaches now employed.

Dental evidence figured strongly in several reports. L. Martin (University College, London) summarized his studies (*Nature*, in the press) of enamel growth and ultrastructure in hominoids. Thick molar enamel caps probably characterized the common ancestor of the great apes and humans, but thickness was reduced in the lineage leading to chimpanzees and gorillas. The rate of enamel deposition slowed in the ancestor of these animals and in the orangutan clade which split from the chimp/gorilla/human line some 15 million years ago. There is some argument whether to recognize each of these clades as a full family or as a subfamily of Hominidae,

with support fading for the previous classification of a strictly human lineage in Hominidae and all apes in Pongidae. In a timely reminder that detailed morphological analysis is required to test evolutionary hypotheses, P. Butler (Royal Holloway College, London) suggested examination of dentine morphology to provide a partially independent source of data and opined that the ancestry of the enigmatic Italian Miocene catarrhine *Oreopithecus* might be sought in relatives of the Early Miocene East African *Rangwapithecus*.

The relationships of *Australopithecus* species to each other and to the origin of *Homo* were at the centre of debate in sessions on human evolution. F.E. Grine (State University of New York, Stony Brook) finds that the deciduous dentition of australopiths reveals a 'robust' clade within which the Kromdraai type sample of *A. robustus* can be separated from the more derived *A. crassidens* and *A. boisei*. M.C. Dean (University College, London) reported a number of derived features shared by *Homo* and robust australopiths (*Paranthropus*) not seen in apes or *A. africanus* (and *A. afarensis* where known): early eruption of relatively small incisors and similarities of cranial base flexion and temporal rotation are the most important. B. A. Wood and A. T. Chamberlain (Middlesex Hospital Medical School) could not easily determine the relationships of *A. africanus* in a 'cladistic' morphometric analysis of australopith and *Homo* crania, but *A. afarensis* was placed closer to the robust species. These results and those of Olson (in *Ancestors: The Hard Evidence*, ed. E. Delson, Liss, in the press) suggest to me that the mosaic pattern of early human cranial evolution is not yet fully deciphered: some features of *A. afarensis* presage the robust australopiths, as do some of *A. africanus* (see Rak, Y., *The Australopithecine Face*, Academic, 1983), but in other ways the latter species shares derived features with *Homo*. Perhaps Wood and Chamberlain's more parsimonious tree, with *afarensis* linked to the robust species and *africanus* to *Homo*, is less absurd than it might seem at first glance.

C.B. Stringer (British Museum, Natural History), who usually studies fossil varieties of *Homo sapiens*, bravely trained his sights farther back in time to provide support for the previously under-appreciated view that more than one species might be hiding among specimens allocated to *H. habilis*. He reported the greater similarity to later *Homo* of the supposedly-female, small-brained specimens (ER 1813, OH13) than of the larger-brained 'males' (ER 1470), especially in characters usually associated with male individuals. Thus, increasing recognition that great sexual dimorphism is to be expected in earlier human groups must be tempered with an appreciation of inter-individual and inter-regional (as well as temporal) differences in evaluating the observed variation and discerning evolutionary relationships and patterns. Only by

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assessing the evidence for each source of variation in combination with that for homologous shared-derived features can the complexity of human lineage splitting and adaptations be resolved.

The diversity of viewpoints presented at this meeting and at several similar gatherings over the past year, as well as the recovery of new fossils of early apes and humans (not to mention skeletons of *Homo erectus*) in Africa and Asia during the same interval, testify to the renewed vigor of modern palaeoanthropology. Just 60 years ago, *Nature* published Raymond Dart's account of *Australopithecus africanus*; to bend a phrase, we've come a long way from the Taung baby. □

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