

THE YEAR IN PALEOANTHROPOLOGY: 1990

In this first volume of *Paleoanthropology Annuals*, covering the calendar year 1990, we reprint 32 articles and excerpts representing highlights in this field. These articles cover subdisciplines as diverse as early primate paleontology and geochronology; hominoid systematics, paleobiology and paleoenvironments; human paleontology; Paleolithic archaeology; and Pleistocene stratigraphy and dating methods. Other topics which may be covered in future volumes include molecular evolution and functional morphology. Our terms of reference, however, will continue to exclude areas such as primate behavior and ecology, general evolutionary theory, and human adaptation. For reasons of space and economy it has obviously not been possible to reprint everything of major merit that appeared in 1990, but in this introduction we cite certain valuable contributions additional to those reprinted. Such supplementary citations are identified by the parenthetical date of publication appended. We follow a chronological sequence both here and in the volume as a whole. In terms of taxonomy we follow broadly the scheme adopted for the *Encyclopedia of Human Evolution and Prehistory* (Tattersall et al., 1988), but designate as the tribe Hominini all species on the human lineage subsequent to its divergence from the African apes. Hence our use of the adjective "hominin" for *Australopithecus* and *Homo* species (see also Groves, 1989).

One of the major controversies of the year concerned the origin of the primates and the status of the plesiadapiforms, generally considered early members of the order. Both Beard (1990a) and Kay et al. (1990) suggested that the paromomyid plesiadapiforms were most closely related to the living colugo, or "flying lemur," *Cynocephalus*, generally placed in the order Dermoptera. This conclusion, broadened by Kay et al. to the other plesiadapiforms, was based by Beard on postcranial evidence and by Kay et al. on interpretation of a new skull of *Ignacius*, which they describe as possessing an entotympanic bulla and an intracranial circulation resembling that of colugos. Szalay and Lucas (1990) suggested principally on postcranial features that both plesiadapiforms and colugos be included within Primates, with ranks equal to Euprimates. On the other hand, Gingerich (1989) has separated the plesiadapiforms off in the distinct order Proprimates. Beard (1990b) rejected this concept, while Gingerich (1990) continues to advocate it. The situation is complicated by the finding of Pettigrew

et al. (1989) that features of the visual pathways appear to link megabats to primates and perhaps to dermopterans too, while at the same time the well-established resemblances in molar morphology between plesiadapiforms and early euprimates continue to be compelling. Clearly the relationships among euprimates, plesiadapiforms, colugos, and megabats form a major area of continuing uncertainty in mammalian systematics.

Virtually nothing has been known up to now about the early Tertiary primate history of Africa. For this reason, the announcement by Sigé et al. of a primate member of the Thanetian (Late Paleocene; ca. 57–60 Ma [millions of years ago]) Adrar Mgorn fauna from Morocco is of particular significance. Gingerich summarizes most of the major implications of this discovery, and offers some additional observations. We might observe here that while *Altiatlasius* is interpreted as omomyid in their text, the cladogram presented by Sigé et al. (their Fig. 1) shows *Altiatlasius* plus the Simiiformes (i.e., Anthropoidea) as the sister taxon of Omomyidae. This effectively renders Omomyidae a paraphyletic ("wastebasket") taxon, a view that some authors have suggested but to which Sigé et al. do not subscribe in their text. Another unusual early primate find is that reported by Wang and Li (1990) from the Late Eocene of Jilin Province, northeast China. *Asiomomys changbaicus* is known by a mandibular corpus fragment with three teeth, and is reportedly of omomyine affinities. The very meaning of "Late Eocene" has recently been altered by redating of stratotype rocks in Europe and correlative horizons in North America. The strongest case was made by Swisher and Prothero, who used the new laser fusion technology to clarify Late Eocene through Early Oligocene mammalian faunal ages in Wyoming and Nebraska, and to date the paleomagnetic reversal that has been associated with this boundary in the deep sea record. This situates the Eocene-Oligocene boundary at about 34.0 Ma, about 3 Myr later than previously accepted. Similar if less convincing dates had already been reported from European contexts, e.g., by Odin and Montanari (1989).

The Jebel Qatrani deposits of the Egyptian Fayum have generally been regarded as of Oligocene age. However, in light of this younger date for the base of the Oligocene, a recently discovered older fauna at the base of the formation is now regarded as of later Eocene age. From the new L-41

Fayum locality, Simons (1989) described two new primate taxa, *Proteopithecus* and *Catopithecus*. A crushed skull of the latter was reported during 1990 by Simons, who argued that it revealed continuous postorbital closure and the lack of a metopic suture. These features led him to consider *Catopithecus* as the earliest known anthropoid, while its conservative dentition appeared to ally it with *Oligopithecus*. Three important collections of papers relevant to anthropoid primate evolution, localities, and chronology appeared during the year. Fleagle and Rosenberger edited a special issue of the *Journal of Human Evolution* (vol. 19, nos. 1–2) on “The Platyrrhine Fossil Record,” with 9 articles on geochronology, faunal evolution, the Pinturas locality, and reviews of almost all known extinct ceboid groups. Lindsay, Fahlbusch, and Mein (1990) edited the proceedings of a NATO workshop, *European Neogene Mammal Chronology*. Thirty-five papers were devoted almost entirely to the history and dating of Miocene and Pliocene mammals in Europe, although correlations to China, India, Africa, and North America were included. Three papers considered the age and ecology of hominoid faunas in Turkey. A more extensive treatment of that topic was provided by the special issue of the *Journal of Human Evolution* (vol. 19, nos. 4–5) on “The Miocene Hominoid Site at Pasalar, Turkey,” edited by Andrews. Eighteen articles reported interim results on the geology, age, paleoecology, taphonomy, and mammalian fauna of this site, while Alpagut et al. (1990) described the hominoid fossils themselves (over 650 new specimens) and argued for the presence of two species referred to cf. *Sivapithecus*.

Several other significant new finds of Miocene hominoid fossils were reported during 1990. Among these was the front part of a cranium from the new 9–10 Ma site of Xirochori in Macedonia, northern Greece. Its describers, de Bonis et al., allocated this specimen to *Ouranopithecus*, well known from the nearby site of Ravin de la Pluie, and concluded that *Ouranopithecus* represented the forerunner of *Australopithecus* and *Homo*. They based this view on the presence in the new face of a wide interorbital spacing, and, as previously reported, a subnasal morphology similar to that seen in African apes. Several commentators (Andrews; Delson and Schwartz, cited in Bower) disagreed with this proposition, pointing out that it appears to be based on retained primitive characters. Most paleoanthropologists would prefer to place *Ouranopithecus* as an early offshoot of the lineage leading to *Sivapithecus* and *Pongo*. Chinese specimens now termed *Lufengpithecus* (Wu, 1987) were restudied by Schwartz (1990), who argued that this genus was also a member of this clade despite its wide interorbital spacing. On the other hand, Pilbeam et al. described new fossil humeri of *Sivapithecus* from the Pakistan Siwaliks that did not preserve all of the diagnostic morphology of living

great apes. They concluded that either *Sivapithecus* and *Pongo* do form a monophyletic unit, but orang and African apes evolved certain shared humeral characteristics independently, or *Pongo* and *Sivapithecus* resemble each other convergently in palatofacial morphology. These finds throw open once more the question of which characteristics may be regarded as diagnostic of Hominoidea.

Flynn et al. synthesized and reviewed the results of over a decade of intensive work on the magnetostratigraphy, geochronology, and biostratigraphy of the Pakistan Siwaliks. The new Siwalik dating allowed these authors to correlate the Potwar localities with the approximately coeval Ngorora sequence of East Africa, also redescribed and redated by Deino et al. (1990), with a precision approaching 0.1 Myr over the period of 13 to 10 Ma. In the Siwalik context, *Sivapithecus* has a clearly defined chronological range, unrelated to changes in lithology, between 12.5 and 7.4 Ma. These dates are coincident with two major faunal turnovers, the latter also coinciding with a dramatic change from a forested to a grassland environment. The exquisite precision of the single-crystal laser-fusion dating technique was exploited by Deino et al. (1990) to date an Ngorora premolar assigned to *Proconsul*, the last known occurrence of this genus, at 12.42 ± 0.03 Ma.

A new approach to deciphering primate paleoenvironments is exemplified by Ciochon et al.'s examination of the teeth of *Gigantopithecus blacki* for opal phytoliths bonded to their surfaces. Phytoliths are siliceous particles found in many types of plant tissues but most markedly in bamboos and grasses; many can be identified to the family and even the genus of the parent plants. In this instance, the examination of four *Gigantopithecus* teeth showed conclusively that these megadont hominoids ate both grasses (possibly bamboo) and fruits. The technique shows great promise for future research.

Other new approaches were brought to bear during the year on the problem of the timing of developmental sequences in early hominins. Bromage¹ continued his analysis of growth patterns in *Australopithecus* and early *Homo* by studying the microanatomy of facial surfaces in order to detect patterns of bone remodelling. He determined that while *Australopithecus* and perhaps early *Homo* retained the pattern seen in great apes, *Paranthropus* showed a distinctive pattern in some ways reminiscent of later *Homo*. Mann et al., responding to previous work by Bromage, B. H. Smith, and others, surveyed the complementary evidence from tooth development and also concluded that at least robust australopithecids resembled modern humans in this system. However, they offered a number of caveats concerning the procedures previously followed by many authors investigating this complex process.

New data on Plio-Pleistocene vertebrate faunas in the Western Rift of Uganda and Zaire indicated that this area has the potential for major discoveries in the future. Pickford et al. (1990) sorted out the "Kaiso Beds" of the Lake Mobutu basin into 6 formations, with 41 new localities ranging in age from Late Miocene through highly fossiliferous mid-Pliocene beds to Early Pleistocene levels with Oldowan and Acheulean industries. A multi-authored report on the Semliki Expedition edited by Boaz (1990) summarized 7 years' work in the area between Lakes Mobutu and Edward in Zaire. Two main levels were found, an older sequence correlative to Shungura F-G (2.3 to 2.0 Ma) with a diverse large-mammal fauna and Oldowan-type tools, and the Semliki Terrace (i.e., Ishango) deposits, with human remains dating from perhaps as much as 25 Ka to 7 Ka. Probably the most intriguing aspect of the Western Rift deposits are sedimentological and invertebrate indications that the environment here was consistently forested, not semi-arid as in the case of the coeval sites in Kenya, Ethiopia, and Tanzania.

Picq examined gnathic morphology and dental wear in *Australopithecus afarensis*, concluding that the diet of this species included large quantities of leaves and a variety of tough food resources (such as underground plant storage organs), possibly collected on the savanna. Bacon (1990) studied the proximal femur of the same species in the context of other anthropoids. She concluded, in contradiction to the work of Tardieu (e.g., Senut and Tardieu, 1985), that both the larger and smaller Hadar femora resembled those of *Homo*.

Three other controversies were raised, if not settled, during the year. Suwa created a stir with his claim that the upper premolar associated with the cranium KNM WT-17000 is a P⁴, rather than a P³, as originally described. The resulting relative size of the anterior vs. posterior dentition in WT-17000 separates this specimen from both species of later robust australopithecids. Trinkaus and Long contested Susman's (e.g., 1988) claim that new hand bones from Swartkrans indicating a high degree of manual dexterity could be identified as those of *Paranthropus robustus*. They allocated these specimens instead to *Homo erectus*, also known from the site. Falk (1990) put forward her "radiator" theory of human brain evolution, whereby the need to cool the brain in an upright biped placed constraints on brain enlargement that were resolved in a unique fashion in the lineage leading to *Homo*. Several aspects of this hypothesis, including Falk's continued support of a "two-species" model for Hadar and Laetoli, were discussed by 26 commentators on her paper.

To end decades of controversy, a formal definition of the Pliocene/Pleistocene boundary was adopted in 1987, based on a physical reference point in marine deposits at Vrica,

Calabria (southern Italy). The boundary level is identified with a worldwide cooling in marine environments just above the top of the Olduvai Event, and has been recognized in continental vertebrate faunas at the top of Zone MN-17 in the newly re-characterized mammal zonation of Mein (1990). This falls between the classic sites of Senèze (France) and Venta Micena (Spain). Combourieu-Nebout, Semah, and Djubiantono show that the same stratigraphic section at Vrica also contains pollen evidence for a simultaneous sharp change in Italian continental vegetation communities related to the Eburonian glacial episode of the North Sea basin. This level is dated to ca. 1.65 Ma in conventional dating schemes, but Hilgen (1990) reported work in progress at Utrecht on "orbital tuning" of the time scale by comparison with periodic climatic cycles. This appears to indicate that the entire radiometric time scale in the later Cenozoic may be too young by about 6%. With a revised age for the Olduvai Event, the new value for the Pliocene/Pleistocene boundary would be about 1.81 Ma. "Orbital tuning" would also revise Jaramillo reversals to 1.02 and 0.95 Ma, and the Brunhes/Matuyama boundary to 0.77 Ma; both paleomagnetic events are currently candidates as markers (if not definitions) for an Early Pleistocene/Middle Pleistocene boundary.

In an interesting analysis of wind-borne dust particles in Pacific Ocean cores, Rea (1990) reported that grain size of continental dust varies with tradewind intensity with a 31-kyr major frequency. Flux (quantity), however, varies with aridity on a 100-kyr major frequency corresponding to glacial maxima. The change to more severe climatic conditions in the early mid-Pleistocene is very clear, with winds intensifying at 875 Ka (in the Imbrie et al., 1984, orbital time scale), distinctly preceding the deep ocean and cryosphere changes at 855-848 Ka. The MBCE (Mid-Brunhes Climate Event) at ca. 300 Ka is related to the formation of the permanent Arctic Ocean ice cover; continental (but not cryosphere or ocean) environments were thereafter more unstable, with more rapid, lower-amplitude changes.

In Africa, single-crystal ⁴⁰Ar/³⁹Ar dating by Deino and Potts provided new control for the 14 stratigraphic members of the Ologesailie Formation. In this context, abundant new Acheulean tools and associated animal remains from Member 1 at the base of the formation are closely dated to 0.992 Ma, while those from the classic site in Member 7 are constrained between Member 5, at 0.974 Ma, and Member 9, at 0.747 Ma. Other Acheulean sites occur up to the top of the formation, dated at 0.493 Ma. Cornelissen et al. (1990) reported a multidisciplinary analysis of the Kapthurin Formation of the Middle Pleistocene of Kenya. Two hominid mandibles and an apparent sequence of Early Paleolithic archaeological assemblages derive from

the middle part of the Formation, for which a new basal date of 0.58 Ma was obtained. Previously reported capping dates (ca. 0.25 Ma) could not be confirmed.

Feldesman et al. have continued their investigation of stature in Middle and Late Pleistocene *Homo*. They found a remarkably consistent ratio of femur length to height (roughly 25%) in a wide variety of modern populations. Arguing that the simplicity of this relationship made it at least as useful as more complex regression analyses, they applied it to a number of fossil specimens. Clarke expanded upon his previous analysis of the later Middle Pleistocene Ndotu cranium from Tanzania, presenting a detailed description and noting resemblances to the Steinheim specimen from Europe. He also noted the considerable differences between east Asian *Homo erectus* and the earlier African material usually allocated to that species. Weighing the status of various possible nomina, he applied the name *Homo leakeyi* Heberer to the African specimens, which he considered to represent a species ancestral to *Homo sapiens*. Rightmire (1990) offered an alternative interpretation, including all African and early Middle Pleistocene hominins in *Homo erectus*. He provided detailed descriptions of most African and some Asian members of this taxon. Jia and Huang (1990) discussed the history of excavation and study of *Homo erectus* at Zhoukoudian from the Chinese perspective, with copies of many interesting documents and photographs.

Among new finds of earlier Middle Pleistocene age in Europe, Defleur et al. (1990) reported an assemblage of mode 1 (Oldowan-like) artifacts at Vidauban, in eastern Provence. Piperno et al. (1990) described a partial human femur in association with Acheulean "living floors" and fauna at Notarchirico, southern Italy, dated by U-series to about 360 ± 150 Ka (assuming an open system model). Other studies in this time range focussed on taphonomic interpretations. Villa summarized the striking evidence for human exploitation of elephant populations at the Spanish mid-Middle Pleistocene site of Aridos and compared this to recent interpretations of the nearby Torralba site which indicate at most marginal scavenging. Andrews (1990) reported the results of his long-term investigation of small-mammal taphonomy, especially at the Middle Pleistocene faunal site of Westbury-sub-Mendip, Wales. This work will be a standard reference both for methods in taphonomy and paleoecology and for comparisons with archaeological remains of similar age.

Paleoclimates received considerable attention during the year. The sequence and extent of montane glaciations in the eastern and central African highlands, reviewed by Rosqvist (1990), can be tied to the well-calibrated history of human evolution and environmental change in Africa. The dating of glacial deposits in African mountains affords consider-

able detail about conditions during the "Little Ice Age" and the end of the last glaciopluvial phase, which affected patterns of prehistoric agriculture and pastoralism, as well as confirming major excursions of glacial ice at about 100 Ka, 300 Ka, and 500 Ka, in synchrony with glacial maxima in high latitude areas. The depression of tropical climate zones during these glaciopluvial intervals has been linked to retreat of open woodland and savanna biomes to lowland refugia, and their replacement by montane forest in the interior plateau.

The history of sea level during the Pleistocene, and by inference of world climates, is recorded in detail by the elevation changes in coral reefs on tropical coasts. Reefs built during the last glacial are now under water, but cores off Barbados were used by Bard et al. to date sea levels back to 130 Ka, using the new technique of thermal-ionization mass spectroscopy to measure uranium-series isotopes. Two drastic surges in meltwater were recorded, at 14 and 11 Ka, and the last deglaciation (in terms of ice volume) clearly began at 19 Ka, about 3 kyr earlier than previous estimates. Orbitally tuned oxygen-isotope curves check closely with the dating, confirming that the last interglacial ended at 120 Ka, and that the isotope stage 5c climate maximum peaked at 101 Ka; both changes followed about 3 kyr after the related points on the insolation curve.

Van Campo et al. (1990) compared oxygen-isotope, planktonic foraminiferal, and pollen paleoclimatic curves from cores off South Africa for the last 135 kyr, and found that all three media agreed within 0.5°C on paleotemperature history; the maximum change in mean annual temperature between glacial and interglacial climates during this period was about 3.5°C. Paleoclimates in the loess stratigraphy at Achenheim (Alsace), evaluated in terms of land snail ecology by Rousseau and Puisségur (1990), also supported the correlation between marine and continental paleoclimatic models over the last 350 kyr.

Middle Paleolithic humans and artifact assemblages were the subject of a variety of contributions. Rak compared the pelvises from the Israeli sites of Jebel Qafzeh and Kebara, identified respectively as modern human and Neanderthal, and found them to fit perfectly their respective morphotypes. He interpreted these differences and the greater age of the Qafzeh specimens as supporting an ancient division between Neanderthal and modern lineages. Stringer et al. (1990) looked at cranial and dental development in Neanderthals, particularly as reflected in the infant Devil's Tower remains which they concluded do indeed represent one associated individual. They found an ontogenetically early appearance of the skeletal robustness observed in Neanderthal adults, but found no support for prolonged gestation in this group. Trinkaus and Tompkins (1990) reviewed the difficulties involved in reconstructing life-

history parameters for extinct humans such as the Neanderthals, but hazarded nonetheless that longevity, at least, probably continued to increase among our precursors right up to the emergence of modern humans. Schott (1990) discussed the 1987 find of a partial neurocranium (both parietals, occipital and right temporal) in a gravel pit near Reilingen, southwestern Germany. Although the associated fauna is mixed (hippo and rhino indicating warm, mammoth a cooler interval), it suggests a late Middle or early Late Pleistocene age. Archaic features of this little-known specimen have led some workers to include it in *Homo erectus*, in the sense in which the Steinheim cranium would be classified as this taxon, but Schott noted (after K. D. Adam) that the great expansion of parietal bosses is a more modern feature. Schott did not come to a definite conclusion about the taxonomic identity of the fossil, but he rejected its placement either in *H. erectus* or as an intermediate between that species and *H. sapiens*.

Rolland and Dibble combined their independent analyses of variability in Middle Paleolithic artifact assemblages to argue that lithic reduction sequences, raw material availability, and local environment were more significant in explaining variability among Mousterian assemblages than the classical factors of style and function. A similar conclusion was reached by Barton (1990). Conard (1990) examined a different aspect of Middle Paleolithic variation, the presence in northwestern Europe of blade-dominated assemblages dating to 80–115 Ka at sites such as Rheindahlen and Tönchesberg in Germany, Seclin in France, and Rocourt in Belgium. Conard suggests that these assemblages were produced by Neanderthals; however, further comparison with the eastern Mediterranean pre-Aurignacian would seem to be in order, and relevant human fossils are eagerly awaited. Chase reported new finds from La Quina which suggest the use of bone implements for lithic retouch (generally considered unique to modern humans) by European Neanderthals. Stiner (1990), on the other hand, reported a clear-cut distinction between patterns of faunal mortality in Middle vs. Upper Paleolithic assemblages in Italy.

In 1990, once again, the origin of modern *Homo sapiens* was the center of active debate. Several collections of papers on this topic appeared or were distributed during the year. Trinkaus (1989a) included articles on both human paleontological and archeological interpretations, and the introduction (Trinkaus, 1989b) serves as a good survey of the problems involved. Bräuer and Smith (1990) has not yet reached us, but Bräuer and Rimbach discuss many of the results from that volume in the article reproduced here. Multivariate analyses of Late Pleistocene and modern human crania emphasized both the differences between Neanderthals and all modern humans, and the cranial affini-

ties between modern African and European populations. These authors thus rejected the hypothesis of regional continuity in Europe in favor of an African origin for modern Europeans. On the basis of extensive multivariate comparisons of modern cranial series from around the world, Howells evaluated the position of Neanderthals and other fossil human groups vis-à-vis modern peoples. In his discussion (the only major portion of a long monograph that space allows us to reproduce here), Howells reported that Neanderthals are strongly discriminated from all modern human populations, which in themselves compose a rather homogeneous group. He found no support for the hypotheses of separate derivation from *Homo erectus* of modern geographic variants, of a specific common ancestry for Australians and east Asians, or of a subsaharan origin for all modern humans.

Two papers by Grün and colleagues further supported the great age of modern human morphology in southern Africa. Grün, Beaumont, and Stringer dated herbivore teeth by Electron Spin Resonance (ESR) analysis of uranium decay products to give stratigraphically consistent ages through the full Middle Stone Age (MSA)–Late Stone Age (LSA) sequence at Border Cave, South Africa. Two early modern human remains (BC3, partial infant skeleton, and BC5, adult mandible), both in situ with MSA artifacts, were dated to 50–65 and 70–80 Ka, respectively, while two others (BC1, BC2) were “certainly younger than” 90 Ka. A companion study at Klasies River Mouth by Grün, Shackleton, and Deacon, using both ESR (on mammal teeth) and oxygen-isotope stratigraphy, placed the earliest levels, with MSA 1 culture and modern human remains, at or older than the level of isotope stage 5b, between 95 and 84 Ka. Dating from both sites suggests that the Howiesons Poort MSA lithic industry dates from about 45–?70 Ka, and that the MSA/LSA transition was at about 35 Ka, both younger than previous estimates.

Blackwell et al. published bad news from a controlled test of amino acid racemization rates. The samples were stratigraphically controlled mammalian bones and teeth from a radiometrically dated sequence in Abri Vaufrey extending between 114 and 101 Ka. The authors found that the racemization stratigraphy in these samples was far too variable either for relative dating or for correlation, apparently due to localized differences in diagenesis. Brooks et al., on the other hand, reported that proteins in ostrich eggshell (OES) fragments, found in sites from many regions of the Old World, resist diagenesis far better than those in teeth and bones. Under average conditions, the racemization curves in OESs are a reliable dating method for at least the later Pleistocene, with cooler climates offering a significantly greater range.

Archaeological aspects of the debate on the origin of modern humans included analyses of the earliest European Upper Paleolithic assemblages and their relationship to possible Middle Paleolithic precursors. Palma di Cesnola (1990—see footnote 1) summarized understanding of the Uluzzian industry of Italy, which includes typical Mousterian pieces alongside blade tools and bone points. Brief comparisons with Aurignacian and Mousterian assemblages did not permit any larger conclusions about the origin of this industry, however. More detailed analyses of this general problem appeared in Farizy (1990), not seen by us but ably reviewed by Perlès (1990). Numerous articles in this data-oriented symposium volume discuss, among other topics, whether “transitional” industries from across Europe were the result of transformation of Mousterian complexes through contact with Aurignacian peoples, or of parallel episodes of replacement. The archetypal such “transitional” industry is, of course, the Châtelperronian. In a broadside against what they see as a parochial tendency to treat the western European Paleolithic record in isolation, Otte and Keeley flatly characterized this industry as “almost entirely Middle Paleolithic,” and emphasized the importance of cross-comparison of local chronologies in the elucidation of population movements and technological transmission. Other reassessments of the later part of the Paleolithic record in Europe included Rowley-Conwy’s survey of the evidence for Paleolithic domestication, principally from studies of healed fractures in reindeer bones and atypical wear on horse teeth. His findings provide little support for

the idea of substantial domestication of either mammal during Paleolithic times. Clottes (1990) reviewed the Late Magdalenian record of decorated caves in the Franco-Cantabrian region, showing how accumulating knowledge has rendered untenable some of the regularities perceived by Leroi-Gourhan in the development of Upper Paleolithic parietal art. In proposing the abandonment of the concept of a unitary Magdalenian IV style, Clottes laid the groundwork for an advance in our understanding of variability and succession in late Upper Paleolithic parietal art styles. On the other side of the Atlantic, Lynch (1990) reviewed the evidence for early human occupation of the Americas, and concluded that firm evidence is still lacking for pre-Paleoindian (Clovis) settlement of the New World.

In addition to individual articles it seems appropriate to mention here several texts and other works that appeared during the year. Martin (1990) and Conroy (1990) published quite different general texts on the evolution of primates, while Aiello and Dean (1990) adopted a novel approach to the morphological basis of human evolution. Spencer (1990a) retold the Piltdown story from a historical perspective, suggesting Sir Arthur Keith as his candidate for the brains behind the forgery; a companion volume (Spencer, 1990b) reprinted numerous documents pertinent to the episode. Sperber (1990) edited a festschrift for Phillip Tobias that included a wide variety of contributions, notable among which are valuable reports on the Taung fauna by Cooke (1990), and on newly reconstructed South African australopiths by Clarke (1990).

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New York; August, 1991

FOOTNOTE

1. We should note that although the cover date of the journal issue in which Bromage’s article appears is December 1989, the actual publication date (as documented in the succeeding issue) was January 1990. Other journals, especially *L’Anthropologie*, were delayed in publishing the 1990 issues. All articles reprinted here appeared during the calendar year 1990.

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SERIES FOREWORD

The series *Paleoanthropology Annuals* is designed to make available to a wide audience a selection of those works published during the year which the Editors consider to have been the most significant in this field. For this series, paleoanthropology is considered in a broad sense as the discipline of human evolutionary studies, centering on human paleontology and Paleolithic archeology, but also including geological and taphonomic studies of sites yielding human fossil and cultural remains, as well as some studies of primate evolution.

The Library of the American Museum of Natural History affords us the opportunity to see almost all of the available publications in paleoanthropology, but we encourage supplementary suggestions from colleagues worldwide. From the sources available to us, we select a range of technical (and popular) articles and book chapters as candidates for inclusion in the next Annual. To allow for late-appearing items, we will consider any work received by the end of January. Occasional publications in languages other than English will be translated for inclusion.

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