ANNOTATIONS FROM THE LITERATURE

ANTHROPOLOGY

Walker A, Leakey RE, Harris JM, Brown FH. 1986. 2.5-Myr *Australopithecus boisei* from west of Lake Turkana, Kenya. Nature 322:517-522.

> ***Summary.*** This new find of two partial craniums of the homonid *Australopithecus* has been hailed as the most significant find in paleoanthropology since "Lucy" was discovered in 1974. The authors indicate that the features suggest a need for revision of traditional evolutionary patterns in the australopithecines — the assumed distant ancestors of modern man. The new find, which is not going unchallenged, promises to complicate an already confusing pattern for the assumed evolution of man.

CRETACEOUS EXTINCTION EVENT

Hutchison JH, Archibald JD. 1986. Diversity of turtles across the Cretaceous/Tertiary boundary in northeastern Montana. Palaeogeography, Palaeoclimatology, Palaeoecology 55:1-22.

> ***Summary.*** The Hell Creek and Tullock formations contain many turtles, and span the Cretaceous-Tertiary boundary. Over 3000 specimens were counted on a modified minimum number basis from 510 localities. At least 15 of about 19 Cretaceous genera and subgenera survive into the Paleocene. The magnitude of the change in diversity is less than or comparable to examples within the Tertiary. These data do not support a unique comprehensive extinction at the end of the Cretaceous as postulated on the basis of Iridiurn concentrations.

Sloan RE, et al. 1986. Gradual dinosaur extinction and simultaneous ungulate radiation in the Hell Creek Formation. Science 232:629-633.

> ***Summary.*** The number of genera of dinosaurs shows a progressive decrease, beginning below the Cretaceous-Tertiary boundary. Seven genera of dinosaurs are found in a channel fill with Paleocene (Tertiary) pollen and mammal fossils. This evidence is interpreted to show that dinosaurs did not suddenly disappear, but that they were declining before the end of the Cretaceous. This conclusion casts doubt on the end-Cretaceous asteroid impact hypothesis. The decline in dinosaur diversity is instead attributed, at least in part, to the rise of ungulate mammals, whose remains increase in diversity as dinosaur diversity

decreases. For reactions to this article and further discussion, see Letters, Science 234:1170-1175.

DATING METHODS

Taylor RE, Payen LA, Prior CA, Slota PJ (Jr), Gillespie R, Gowlett JAJ, Hedges REM, Jull AJT, Zabel TH, Donahue DJ, Berger R. 1985. Major revisions in the Pleistocene Age assignments for North American human skeletons by C-14 accelerator mass spectrometry: none older than 11,000 C-14 years B.P. American Antiquity 50:136-140.

Summary. This paper reports on significant revisions in dating the early human population in North America. Eleven skeletons, previously dated mainly by amino-acid dating to about 70,000(?) years, are redated by accelerator mass spectrometric analysis of radiocarbon to a maximum of 7900 years. Some examples include:

Original Dating (amino-acid and other techniques)		**Now Dating** (radiocarbon years)
70,000(?)-8300	revised to	3600-6300
>50,000-2800	revised to	4050-7900
28,000	revised to	1700-6300
26,000	revised to	3560
23,600-5800	revised to	1650-3850
60,000-22,600	revised to	3550

MOLECULAR CLOCKS

Ayala F J. 1986. On the virtues and pitfalls of the molecular evolutionary clock. Journal of Heredity 77:226-235.

Summary. According to evolutionary theory, comparisons of DNA and protein molecules should reveal the extent of evolutionary divergence between species. If most mutations are neutral, the rate of divergence should be relatively constant, especially when averaged over long periods of time. However, rates of evolution of different groups of molecules vary widely. A few sequences are known from organisms that range from closely related to very remotely related. One example is cytochrome c, which shows reasonably good clock-like behavior, despite some irregularities. Another example is the copper-zinc superoxide dismutase (SOD), which does not act like a good clock. More data sets are needed in order to determine which mode is more common. Until then, conclusions based on the accuracy of the molecular clock are to be viewed with caution.

Britten RJ. 1986. Rates of DNA sequence evolution differ between taxonomic groups. Science 231:1393-1398.

Summary. The mutation rates of DNA sequences during evolution can be estimated by comparing sequences in different species. This method is based on a belief that most point changes in DNA are selectively neutral. Time estimates are based on standard evolutionary interpretations from geology and paleontology. Divergence of DNA sequences can be estimated from measurements of the thermal stability of DNA duplexes formed between labeled DNA from one species and unlabeled DNA from a second species. Rates of sequence divergence are high for Drosophila, sea urchins, and rodents. Rates are low for anthropoid apes, and intermediate for prosimians. The high rates are about five times the lower rates. The rate of divergence has purportedly been reduced during primate evolution. Reduction of the rate is attributed to improvements in DNA replication or repair mechanisms in higher primates.

NATURAL SELECTION

Gould SJ. 1986. Of kiwi eggs and the Liberty Bell. Natural History 95(11):20-29.

Summary. The author, a leading authority in evolutionary thought, queries the peculiarities of the size of the kiwi egg. The kiwi, a flightless bird of New Zealand about the size of a hen, lays an egg that is about 25% of its body weight — an astounding and difficult task for the kiwi. Within an evolutionary context Gould rejects the "general strategy" of finding how this large-size egg benefits kiwis and thus results in survival. Instead he argues with supporting evidence that the small size of the kiwi compared to its egg represents a decrease in the size of the adult compared to its evolutionary ancestor. The argumentation is mainly from standard trends in relationship in egg size versus body size. However, benefit to the bird by the nutritional efficiency of a smaller-sized body is alluded to, making one wonder if this is complete emancipation from the "general strategy" mentioned above.

Comment. The significance of this paper lies in the presentation of a good case for degeneration instead of the usual progress approach to evolution. A different approach such as this lends support to the argumentation that evolutionary theory is so broad that most kinds of data can be fitted into it. It is thus beyond scientific evaluation.

Hsü KJ. 1986. Darwin's three mistakes. Geology 14:532-534.

Summary. Darwin's three mistakes were that

1. he dismissed mass extinctions as artifacts of an imperfect geologic record;
2. he assumed that species diversity, like individuals of a given species, tends to increase exponentially with time; and
3. he considered biotic interactions the major cause of species extinction.

Those mistakes led to the theory propounded in his book (*The Origin*), which has been adopted by many as the scientific basis of their social philosophies.

Hsü downplays the importance of natural selection, preferring collisions with extraterrestrial bodies as an explanation for species extinctions.

Seeley RH. 1986. Intense natural selection caused a rapid morphological transition in a living marine snail. Proceedings of the National Academy of Sciences (USA) 83:6897-6901.

Summary. The intertidal snail, *Littorina obtusata*, lives in New England. Shells collected in northern New England between 1871 and 1900 were high-spired with thin walls, whereas shells collected between 1982 and 1984 were low-spired with thick walls. The change in shell shape is attributed to selection by the predatory crab, *Carcinus maenas*, which expanded its range into northern New England about 1900. This study provides an example of rapid morphological change not involving speciation.

PALEONTOLOGY

Beardsley T. 1986. Fossil bird shakes evolutionary hypotheses. Nature 322:677.

Summary. This news note reports on the find of two crow-sized birds in the Triassic Dockum Formation in Texas. The significance of this is that this is estimated to be some 75 million years earlier than *Archeopteryx*, the classic part-reptile, part-bird assumed ancestor of more modern birds. The new fossil find is said to have more modern bird-like features than *Archeopteryx*, but also has several reptilian affinities.

PHILOSOPHY OF SCIENCE

Medawar P. 1986. The limits of science. Oxcord: Oxford University Press. 103 p.

Summary. This book is not at all what its title implies. It is basically an apology for science. This popular author has presented a well-written insight into scientific thinking including some downgrading of other systems of thought. The book is useful is gaining insights into the philosophical stance of a scientist with a naturalistic faith.

PHYLOGENY

Cartmill M. 1982. Assessing Tarsier affinities: is anatomical description phylogenetically neutral? Phylogenie et Paleobiogeographie. Geobios Special Memoir 6:279-287.

Summary. This article illustrates how thoroughly a prevailing paradigm can permeate even a simple descriptive process such as anatomy. Three principal schools of thought concerning the assumed phylogenetic (evolutionary relationships) of the monkey-like Tarsier mammals are discussed. Interestingly, all three schools of thought use the anatomy of the ear to support their particular hypothesis. The article points out that anatomical terminology can incorporate phylogenetic bias. From the abstract:

> *Describing the ear region in different terms yields different phylogenetic reconstructions, because each terminology defines a unique morphological space in which the morphologies of various primates assume different configurations connected by different minimal paths. It is probably not possible to eliminate phylogenetic bias from the analysis of complex anatomical features.*

SEDIMENT SOURCE

Drewery S, Cliff RA, Leeder MR. 1987. Provenance of Carboniferous sandstones from U-Pb dating of detrital zircons. Nature 325:50-53.

Summary. This paper discusses the origin of some of the massive (up to 5 km thick) Carboniferous sedimentary deposits in western Europe. The paper favors a simple direct source from the Precambrian (Archean) to the north without going through much of the recycling one would expect during the assumed extended Proterozoic and early Paleozoic times.

Comment. Such data fit well with the concept of a single world catastrophe.

SPECIATION

Chesser RK, Baker RJ. 1986. On factors affecting the fixation of chromosomal rearrangements and neutral genes: computer simulations. Evolution 40:625-632.

Summary. Computer simulation models were used to determine which factors are favorable for the stochastic (random) fixation of chromosomal mutations within small isolated populations. Results indicate that the conditions important to fixation are: small founder (beginning) population (5 or 10), low interference with fertility, and numerous offspring. Random processes are not adequate to explain fixation if populations are greater than about 20, if fertility is substantially reduced, or if the number of offspring is low. When population size is reduced to 5 or 10 individuals, the extinction rate may exceed 40% or 30%, respectively.

Mayr E. Uncertainty in science: is the giant panda a bear or a raccoon? Nature 323:769-771.

Summary. The taxonomic status of the giant panda has been controversial. Is it more closely related to the lesser panda or to the bears? It was originally described as a bear, but almost immediately placed with the raccoons and lesser panda. Several lines of evidence seem to favor the giant panda as a bear. These include anatomical, paleontological, chromosomal, and molecular studies. However, the giant panda and lesser panda do show certain similarities. These include their present distribution, their feeding behavior, and their hemoglobins. Mayr argues that their distributions may be explained as the result of historical accident and their feeding similarities may be due to similar diets. Further, according to Mayr, similar hemoglobins may be the result of convergence due to similar selective pressures, or may be the result of a recent change in the main group of bears. More data are needed, specifically the hemoglobins present in the South American spectacled bear and in the various members of the raccoon family.

Comment. Mayr argues that selective pressures on hemoglobin have been conservative in the case of man and chimpanzee, "but in the case of the bears it might well have been centrifugal [diversifying]." The plasticity of this logic is pointed out in a letter by G. W. Warr (Nature 324:508), who states that "faith in natural selection alone can explain all in these sermons from the pulpit of neo-darwinism." Warr's comment is illustrative of the intensity of the present debate concerning the importance of selection in evolution.