NEWS AND VIEWS

Palaeoanthropologists at Odds

PALAEOANTHROPOLOGISTS are notorious for the openness of their disagreements, and it is therefore no surprise that Dr David Pilbeam of Yale University adds fuel to old controversies in this week's issue of *Nature* (page 1335). Pilbeam is one of three palaeontologists—the others are Professor Elwyn Simons and Dr L. S. B. Leakey—who has made particular studies of the Pre-Pleistocene members of the family Hominidae during the past few years, and one of his principal points of attack is directed against Leakey's conclusions about taxonomic status of the fossil primate genera *Dryopithecus*, *Sivapithecus*, *Ramapithecus* and *Kenyapithecus*. As well as being a reply to some of Leakey's recent articles in *Nature*, however, Pilbeam's arguments bring out only too well the gaps in the fossil records of early hominids and the lack of agreement between palaeoanthropologists over the precise morphological definition of a hominid. Only when this definition is made can there be agreement over the point at which a fossil primate has sufficient morphological characters to be considered more man-like than ape. But, with surprises in the fossil record still probably in store, it is doubtful whether even a definition could be uncontroversial.

On one point, however, Pilbeam more or less agrees with Leakey. This concerns the hominid status of *Ramapithecus*, remains of which have been found in Miocene and Mio-Pliocene deposits in Kenya and India. Pilbeam does not accept completely that *Ramapithecus* was a hominid, because no post-cranial remains have yet been found to show how upright a stance it had; but he goes so far as to suggest that even if such material were produced to show that it was in fact not a bipedal walker, he would probably press for the retention of the genus in the Hominidae. This opinion is not likely to find favour in all anthropological circles.

In 1962, Leakey announced the discovery of a fossil primate about 14 million years old from the late Miocene of Fort Ternan in Kenya, which he described under the name of *Kenyapithecus wickeri*. In previous articles both Pilbeam and Simons have argued that this form is none other than *Ramapithecus* and specifically synonymous with *R. punjabicus* from India. Leakey has stood his ground and argued that the two are not synonymous and that *Kenyapithecus* is a valid genus. In this issue of *Nature*, Pilbeam, while sticking to his view that *Kenyapithecus* is the same genus as *Ramapithecus*, withdraws his earlier assumption that the two are the same species. Disagreements aside, the information now available about the two forms does definitely seem to suggest that there was a faunal link between Africa and Eurasia in late Miocene times.

Much of Pilbeam's article, however, concerns the fossil primate material from the early Miocene of Kenya, which Leakey claims to be the earliest known hominid and which he has named *Kenyapithecus africanus*. Pilbeam has disagreed with Leakey over this on other occasions and it is not surprising that he again argues at some length that *Kenyapithecus* is invalid and that Leakey's remains, on the evidence of dental and maxillary material, belong to the dryopithecine group and are therefore pongid and not hominid. In other words, he asserts that Leakey has not found the earliest hominid. At this stage, perhaps the only safe conclusions are that negative assertions are easier to accept than positive assertions—and that it is unlikely that this controversy will rest for very long.

PHYSICAL METALLURGY

Limitations of Frontier Guards

from our Materials Science Correspondent

BECAUSE engineering metals are polycrystalline, their strength, ductility, formability, recrystallization, immunity from contamination—the whole gamut of their properties, in short—depend on the number and nature of the boundaries between the constituent crystals or grains. Accordingly, metallurgists have an unquenchable interest in grain boundaries, and particularly in the nature of their interaction with impurities. A brilliant paper has just been published by Ashby and Centamore (*Acta Metallurgica*, **16**, 1081; 1968) which is sure to stimulate much research in this field. The paper is concerned with the dragging of small oxide particles by migrating grain boundaries in copper.

The story starts with the demonstration in 1963, by Barnes and Mazey at Harwell, that helium-filled bubbles in irradiated copper are able to move through the solid metal in a temperature gradient, which provides the driving force for the motion. In a sequence of electron microscope stills the bubbles are seen to move just like gas bubbles rising in a glass of beer, with the essential difference that the copper is and remains solid. Shewmon, and Speight and Greenwood, agree that metal diffuses along the bubble wall in counter-flow to the direction in which the bubble is migrating.

Ashby, working at Harvard, has for some time been interested in the possibility that solid inclusions in metals, which in a sense are merely stuffed bubbles, may also be capable of migrating through the solid metallic matrix. This would be of distinct practical significance, because dispersed particles in metals are of ever-growing importance in conferring high strength, especially at high temperatures. A part of the importance of particles in strengthening metals comes from their ability to inhibit grain boundary migration. Thus extruded "thoria-disperse nickel" owes its strength largely to a high concentration of dislocations locked in position by the thoria particles, and if new grains could grow into this deformed structure, the