In the pongid line

Ever since the 1930's anthropologists have been puzzled by the problem of assigning a taxonomic position to *Gigantopithecus,* an enormous extinct primate that may have weighed about 600 pounds.

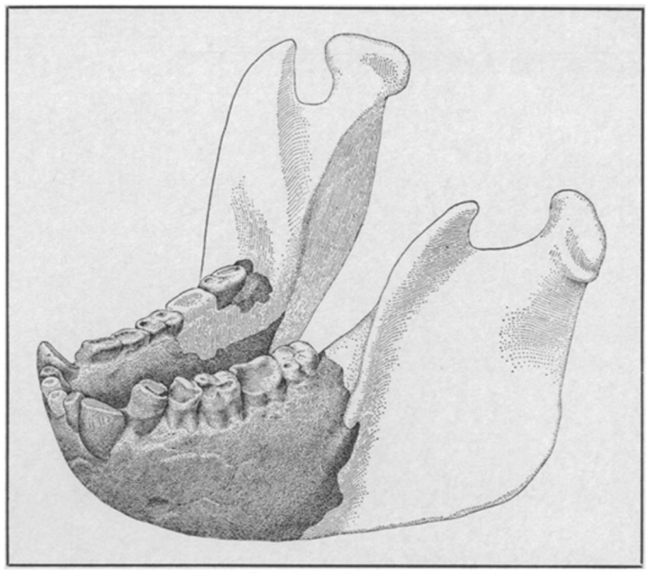
After the first fossils were discovered on sale as dragon bones in Chinese pharmacies in 1935, some anthropologists believed this primate to have been an ancestor of *Homo erectus.* But by 1960, Chinese investigators had turned up more than 1,000 *Gigantopithecus* teeth and several mandibles, and it became clear that the animal was most likely a middle Pleistocene primate, a contemporary of *Homo erectus* rather than an ancestor.

The question has remained, however, whether to consider *Gigantopithecus* a hominid primate, with close links to man, or an essentially ape-like primate, to be classified as a pongid. Its teeth and mandibles display hominid features, but so long as the ancestry of *Gigantopithecus* was unclear, it was impossible to decide whether such features implied a real hominid relationship or a case of parallel evolution.

Dr. David Pilbeam, an anthropologist at Yale University, believes he has the evidence to resolve the confusion. He proposes an evolutionary sequence for *Gigantopithecus* that definitely classifies it as a pongid. The man-like characteristics of the fossils, Dr. Pilbeam says, are simply a reflection of the living habits and environmental conditions *Gigantopithecus* shared with *Homo erectus.* In constructing his theory, Dr. Pilbeam worked with Dr. Elwyn Simons and Peter C. Ettel, also of Yale.

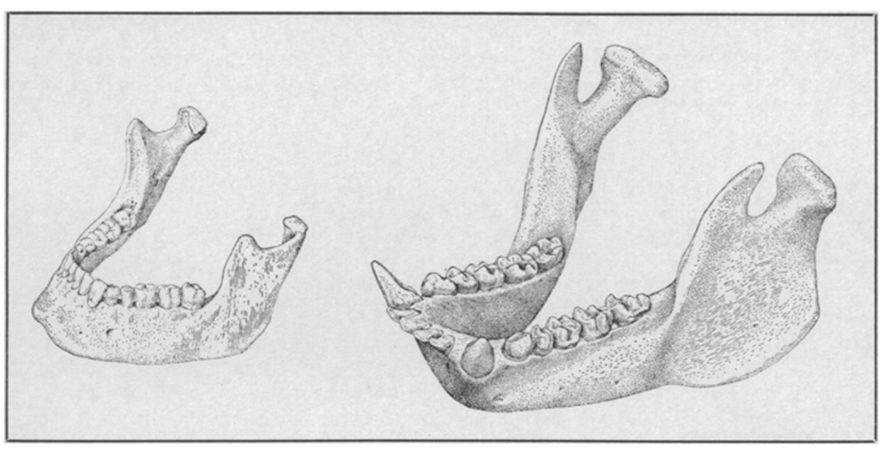
From the Chinese specimens, Dr. Pilbeam traces a line of ancestory going back to a *Gigantopithecus* mandible discovered in 1968 in Northwest India. As described by Yale University researchers last year, the Indian fossil belongs to the middle Pliocene, with an age of 5 million to 9 million years. From there, Dr. Pilbeam extends the line back to an Indian fossil tooth, dated at between 10 million and 12 million years and resembling both *Gigantropithecus* and *Dryopithecus.* Ultimately, therefore, the line of ancestry winds up with *Dryopithecus,* an early fossil ape that inhabited northern India in the late Miocene, perhaps more than 12 million years ago.

Using this lineage as a framework, Dr. Pilbeam explains the seemingly hominid features of *Gigantopithecus* as a result of a move on the part of *Dryopithecus* from a forest environment to an open-country habitat. In a nonforested habitat, these animals presumably would have been obliged to eat large quantities of small foods such as grains and seeds that require considerable grinding and chewing.



Jawbones of the Gigantopithecus, modern ape (below right) and modern man.

Drawings: Simons, Ettel/Scientific American



The evolutionary changes in the dental structure of *Gigantopithecus* are, in Dr. Pilbeam's analysis, exactly those changes that would aid grinding and chewing. The fossils show, for example, relatively small canines and incisors, suggesting that the animal had little need for grasping and cutting its food. The mandibles are large and extraordinarily deep, a feature that magnifies grinding power. The cheek teeth are crowded and worn from extensive use and the front lower premolars have become bicuspid to assist the molars in crushing and grinding.

"The development of *Gigantopithecus*' teeth," says Dr. Pilbeam, "was the same as you would expect for hominids, but the farther down the line you go the more different it gets." Hominids, he points out, never evolved a dental structure so specifically adapted to a grinding style of mastication. The mandibles of hominids are far less massive, and hominid teeth are arranged in a parabolic curve that permits the canines and incisors to function as a shearing blade.

Since hominids, represented by *Homo erectus,* and pongids, represented by *Gigantopithecus,* were apparently sharing an open-terrain environment at roughly the same time, Dr. Pilbeam speculates that the two were not eating quite the same diet. "Hominids must have been feeding on something special," he says, "possibly meat, possibly fibrous shoots."

If Dr. Pilbeam's classification of *Gigantopithecus* as a pongid becomes generally accepted, the fossil primate *Ramapithecus* (SN: 8/2, p. 97) presumably retains its title as the sole hominid ancestor from late Miocene times.

Consensus, however, is a rare event in this field of anthropology. Dr. Lucille St. Hoyme, a physical anthropologist at the Smithsonian Institution, doubts that the dental structure of *Gigantopithecus* or any other genus can be explained solely in terms of dietary patterns. "Anyhow," Dr. St. Hoyme says, "it all depends on how you distinguish hominids from pongids. I'm not sure you can tell the difference."