On the Antiquity of Man

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Man is now lord of the earth and of the beasts and flowers, but he took millions of years to achieve his dominion. Two events more than others made man capable of his exercise of power.

1) A slowly achieved adaptation of man himself increased his potentialities far beyond those of other animals. The first step was man's gradual assumption of the *erect posture*. This put him on his peculiarly successful evolutionary path. It freed his hands and opened the way for the development of the central nervous system which made man unique in his capabilities.

2) A late revolution in man's control of his environment gave him the opportunity to exploit his special capabilities. This was the domestication of plants and animals, the *"food-producing revolution."* It freed man from day-by-day hunting and gathering and permitted the development of civilized communities.

From contemporary investigations we know that the food-producing revolution is recent, while the earliest known forms of man are unexpectedly old. A good many bones have recently been added to the previously scanty fossil record of early man. Potassium-argon dating of these fossil finds indicates that man split off from his common ancestry with the apes and began to assume hominid characteristics more than two million years ago. Yet the earliest civilization, in Mesopotamia, did not arise until nearly 3000 B.C. During almost the entire interval, man lived from hand to mouth, enjoying little greater comfort or safety than his earliest hominid ancestors.

Earliest Known Man

Though evidence concerning still earlier precursors is beginning to accumulate, *Australopithecus* is the most ancient established representative of the *Hominidae* family.

Discovery and Reception of Australopithecus

Australopithecus was named and described by Professor Raymond Dart in 1925 on the basis of a juvenile skull found in the Harts Valley in South Africa (Dart, 1925). The full story of the important find is told in Sir Arthur Keith's *New Discoveries Relating to the Antiquity of Man* (1931).

Though he cautiously called his new fossil type *Australopithecus* ("Southern Ape"), Professor Dart, in commenting on the skull, daringly attributed to the creature extremely advanced capabilities. He surmised, from the forward position of the foramen magnum, that *Australopithecus* walked upright. This meant to Professor Dart that

> a greater reliance was being placed by this group upon the feet as organs of progression, and . . . the hands were being freed from their more primitive function of accessory organs of locomotion. Bipedal animals, their hands were assuming a higher evolutionary rôle not only as delicate tactual, examining organs which were adding copiously to the animal's knowledge of its physical environment, but also as instruments of the growing intelligence in carrying out more elaborate, purposeful, and skilled movements, and as organs of offence and defence (Dart, 1925).

Fellow paleontologists were offended by Dart's claims. They were inclined to place *Australopithecus* in the same group or subfamily as the chimpanzee or gorilla (Keith, 1925). (The other conspicuous error of modern paleontologists was their endorsement of the Piltdown fraud.)

Further Australopithecine discoveries were delayed for 16 years. Doctor Robert Broom and coworkers then began to find, in the Transvaal, not only skulls and teeth, but also pelvic structures and portions of extremities (Broom, 1947). Their finds proved that *Australopithecus* had proceeded far along the hominid line of development. As Australopithecine material accumulated, Sir Arthur Keith wrote: "I am now convinced, on the evidence submitted by Dr. Robert Broom, that Prof. Dart was right and that I was wrong; the Australopithecinae are in or near the line which culminated in the human form" (Keith, 1947). The first Pan-African Congress on Prehistory, held in Nairobi in 1947, was largely devoted to a vindication of Dart's point of view.

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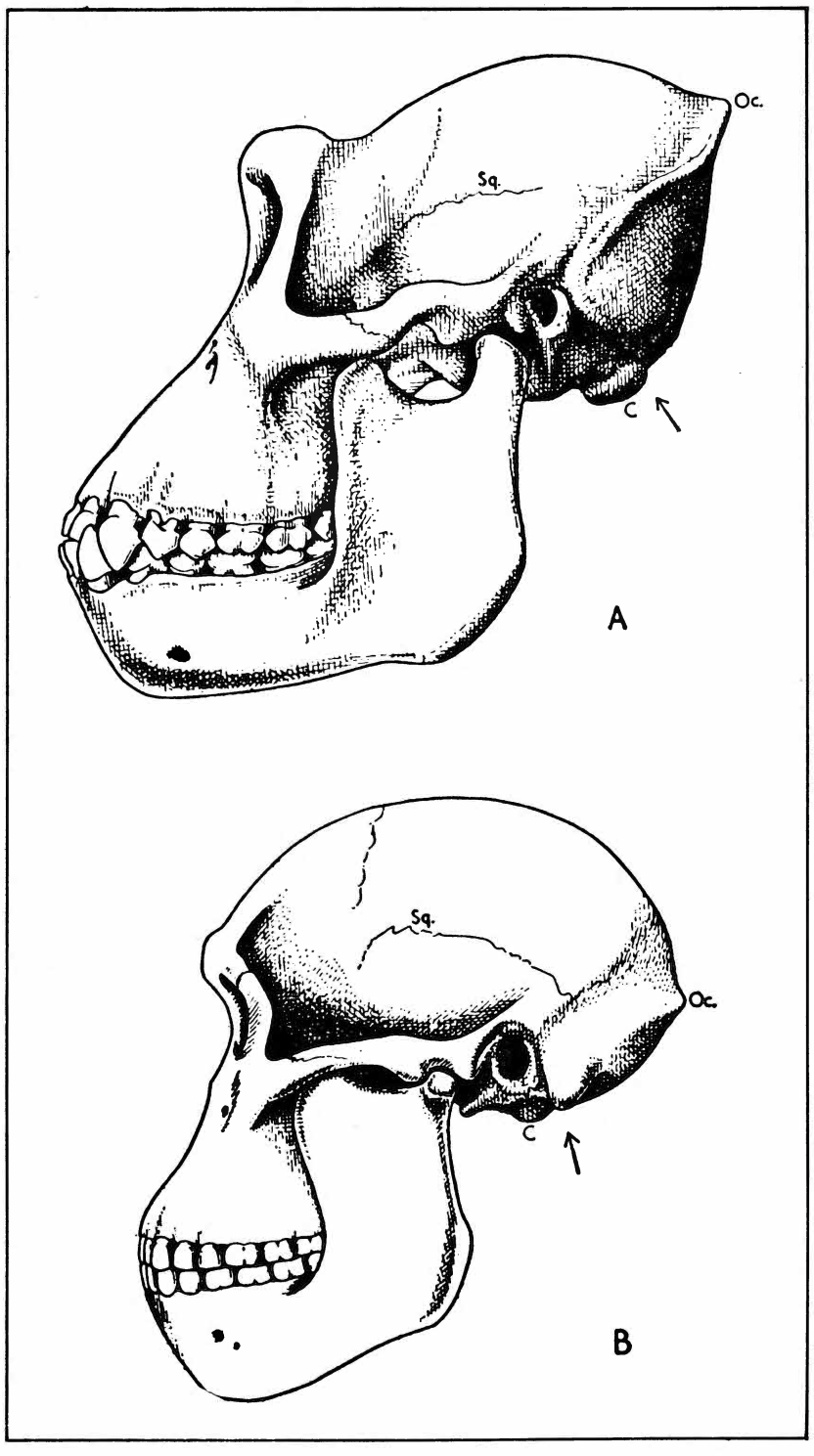

Fig. 1—The skull of a female gorilla, A, compared with the skull of *Australopithecus,* B. Note in *Australopithecus* a lesser degree of prognathism and of supraorbital torus, a more rounded vault, a low-set occipital protuberance, and a more vertical axis of the foramen magnum (arrow). (From W. E. Le Gros Clark, 1964. Courtesy of University of Chicago Press.)

Remains of *Australopithecus* have been found only in South and East Africa. The greatest antiquity established by potassium-argon dating is 2.5 million years. By contrast, evidence of *Homo erectus,* who appeared 500,000 years ago, has been found in South and East Africa, Palestine, and the Far East (Java and Peking man).

Comparison of Australopithecus with the Anthropoid Apes

Detailed description and evaluation of *Australopithecus* and other fossil hominid types can be found in two small books by Sir Wilfrid E. Le Gros Clark entitled *The Fossil Evidence for Human Evolution* (1964) and *Man-Apes or Ape-Men?* (1967).

Most helpful in demonstrating the differences between *Australopithecus* and the apes have been comparisons of the skull, teeth and bony pelvis.

1) *Skull.* In the earliest divergence of the hominid from the pongid (anthropoid ape) line, paleontologists expected the brain to have led the way. This preconception prevented them from giving hominid status to Professor Dart's *Australopithecus,* for the cranial capacity of *Australopithecus* is similar to that of the largest gorillas (only 600 cc). But, though cranial capacity is similar, cranial configuration shows striking differences (Fig. 1). In *Australopithecus* the supraorbital torus is less conspicuous, the cranial vault more rounded, the external occipital protuberance set lower, the location of the foramen magnum much farther forward, the axis of the foramen magnum more vertical, and the face less prognathous.

2) *Dentition.* Unlike the anthropoid apes, *Australopithecus* has small canines and incisors, no gap between canines and incisors, canines flush with the other teeth, and an evenly curved dental arcade (Fig. 2). The palate and teeth of *Australopithecus* look remarkably

like those of modern man, though the size of the structures is considerably greater in *Australopithecus.*

3) *Pelvic Structures.* In anthropoid apes the pelvis is very shallow from front to back. Viewed from the front it is widely splayed. The pelvis of *Australopithecus* is very deep from front to back, allowing for insertion of muscles which help in maintaining the erect posture (Fig. 3). The Australopithecine pelvis is hard to distinguish from that of modern man.

Because of the modernity of the Australopithecine pelvis, it is now believed that assumption of the erect posture led the way, as postulated by Dart, in the development of greater capabilities by the *Hominidae,* as opposed to the anthropoid apes.

A Greek account of the creation anticipated this recent scientific judgment. Epimetheus exhausted himself providing special talents for other creatures and could think of nothing advantageous for man. Called in to complete the creation, his brother Prometheus gave man the gift of *walking upright,* like the gods (Hamilton, 1963).

The Food-Producing Revolution

About 12,000 years ago a rapid elevation in man's style of life began. It came about through the domestication of plants and animals—called the "food-producing revolution" by Professor R. J. Braidwood (1967).

Sites and Times, Old World and New

The earliest efforts to trace and understand the food-producing revolution of the Old World were made by Braidwood. He reasoned that the transition from food-gathering to cultivation must have begun on the "hilly flanks" of Mesopotamia. On the hilly flanks (in contrast to the arid alluvial plains of the "cradle of civilization"), there was enough rainfall for non-irrigative farming; wheat and barley, the first grains to be domesticated, grew wild; sheep, pigs, dogs and cattle were part of the natural ecology.

Working with paleobotanists, Braidwood found at Jarmo (fl. 6750 B.C.) barley, the two primitive kinds of wheat, flint sickles, mortars, ovens, stone bowls and evidence of animal domestication. The wheats were divided half and half between wild and domesticated forms. Thus, Jarmo appeared to exemplify a very early stage in the food-producing revolution. Braidwood's hilly flanks hypothesis seemed confirmed.

Later research in Syria, Turkish Anatolia, Iran and Jericho upset Jarmo's priority. Jericho, at 1100 feet below sea level and dating to before 8000 B.C., was already a large village with a dependable food supply long before Jarmo was occupied. The precise

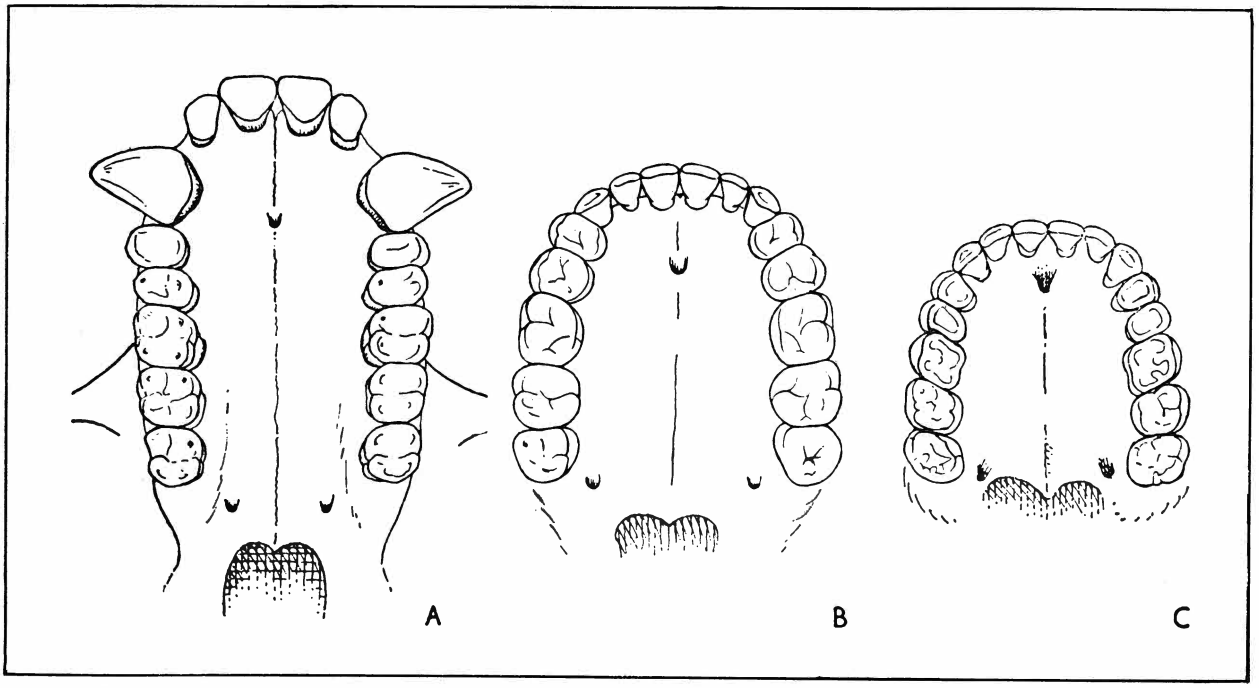

Fig. 2—The palate and upper dentition of a male gorilla, A; *Australopithecus,* B; and Australian bushman, C. Note in *Australopithecus* the relatively small canines and incisors, the absence of a diastema, and the evenly curved dental arcade. (From W. E. Le Gros Clark, 1964. Courtesy of University of Chicago Press.)

locale in which the Old World food-producing revolution took place remains undetermined.

The food-producing revolution took place independently in the Old and New Worlds. Plants and animals resulting from this revolution in Ancient America show little overlap with plants and animals domesticated in the Old World.

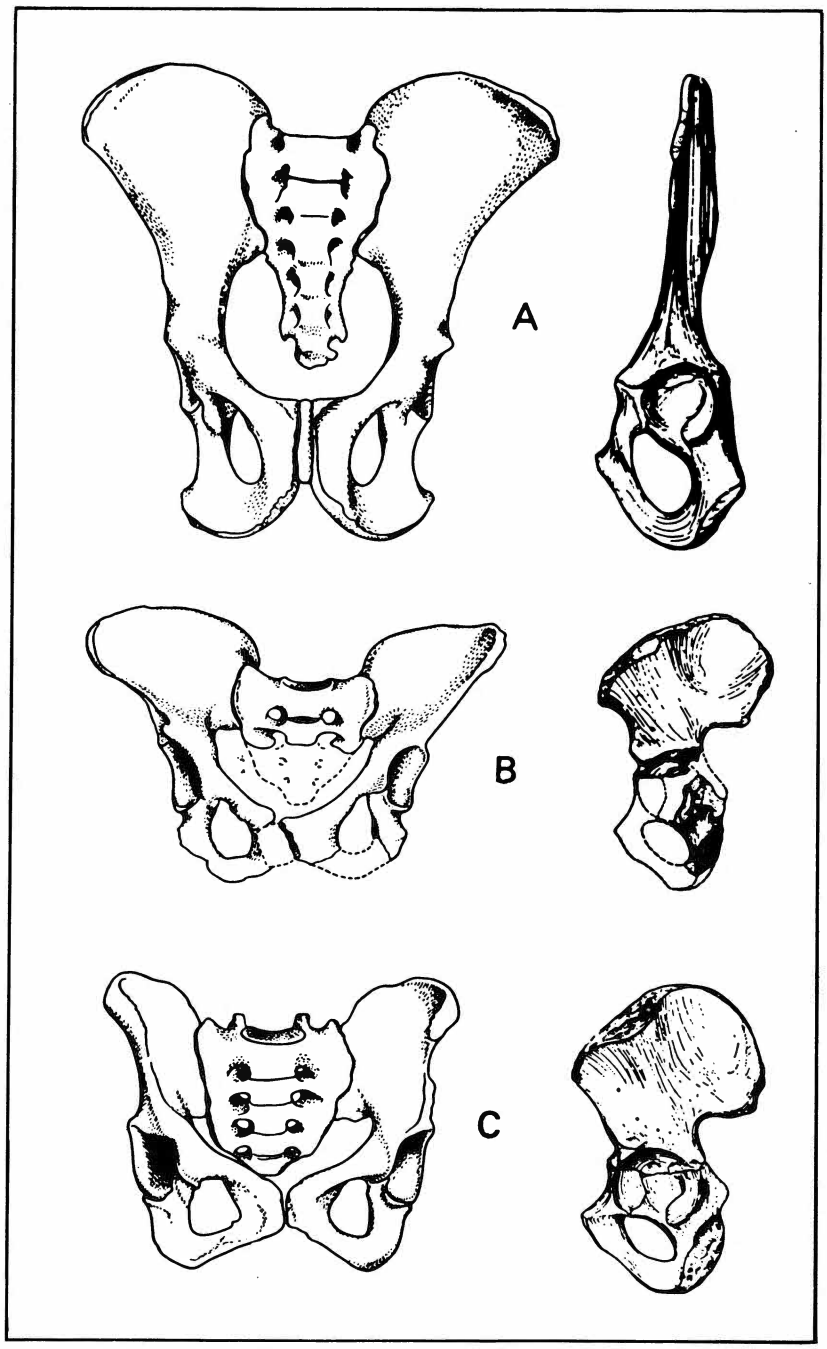

Fig. 3—The pelvis of a chimpanzee, A; *Australopithecus,* B; and Australian bushman, C. Note in *Australopithecus* the depth of ilium, the sharply angulated sciatic notch, and the strong development of the anterior inferior iliac spine. (Adapted from W. E. Le Gros Clark, 1964. Courtesy of University of Chicago Press.)

Cotton was grown and the dog domesticated in both hemispheres, but ancient Peruvians cultivated maize (corn), beans, squashes, peanuts, sweet potatoes, many varieties of "Irish" potato, pineapple, avocado, guava, tobacco and numerous other plants not found in the Old World. The first animal domesticated in Peru was the guinea pig. Stone tunnels were incorporated into prehistoric Peruvian dwellings as quarters for the guinea pigs, who were fed principally on anchovies (Lanning, 1967). Modern Peruvian householders continue to breed and eat guinea pigs.

By the fourth millennium B.C., the Coxcatlan people in the Tehuacan Valley of Mexico possessed domesticated chili, squash, maize, beans and gourds (MacNeish, 1964), and in the Chilca Valley on the central coast of Peru gourds, cotton and beans were being cultivated.

No one center in the New World is singly credited with the domestication of plants. Instead, it is felt that corn was domesticated in the Tehuacan Valley, pumpkins in northeastern Mexico, sunflowers in the southwestern United States, and potatoes and lima beans in the highlands of South America (MacNeish, 1964).

How the Wild Wheats Were Domesticated

The way in which the wheats became domesticated was made clear by the Danish paleobotanist, Hans Helbaek, working with Professor Braidwood.

The wild wheats first domesticated were emmer and einkorn. In the dominant forms of these wheats the spike axis holding each tuft is brittle, as are the articulation points which connect the individual spikelet with the spike axis. But in the wild wheats there is also a recessive form which has a tough spike axis. Spikelets from the dominant form are released individually and are transported readily

by wind and animals. Grains from the tough spike recessive form fall with the spike in one spot. Almost all such grains perish in the competition for survival.

In harvesting the wild wheats, man accumulated more and more of the tough spike recessive types. Eventually *only* the tough spikes were recovered. In the words of Helbaek: "This was the actual act of domestication, as the tough-axis cereals were no longer able to exist without the agency of man. They had become the serfs of man, but at the same time man had become the servant of the cereals, having made his new mode of life dependent upon them" (Helbaek, 1959).

An analogous dependence on man came to pass in the development of maize, whose evolution was clarified by Mangelsdorf and his associates (Mangelsdorf, MacNeish and Galinat, 1964). Unlike ancient maize, whose grains were individually housed, the entire ear of modern corn is inescapably wrapped in the husks. Thus, "cultivated maize has no mechanism for the dispersal of its seeds and hence is no longer capable of reproducing itself without man's intervention" (Mangelsdorf, 1965).

Effect of the Food-Producing Revolution

Prior to the food-producing revolution man had already become entirely modern in physique and intellect. His paintings in the caves of France and Spain excite our wonder and admiration. Yet he remained dependent on the daily kill or catch and the basket of recently gathered food.

Development of high-yield cultivable grains and manageable herds gave man a year-round food supply. The period which followed was one of astonishing social acceleration. A span of less than 10,000 years separates the hunter and gatherer from the highly developed civilizations of Mesopotamia and Egypt.

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