On the Origins of the Neolithic Revolution

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The late Frederick Zeuner's book, **A History of Domesticated Animals** (Harper and Row, New York, 1963. $12), is the first major book in English devoted to the history of domestication and domestic animals on a worldwide basis. As such it is of considerable interest to students of zoology. But it is also an important book in anthropology, for Zeuner is concerned with the manner in which man first came to domesticate his animals, the chronology of this event, and the subsequent place that animals assumed in varying cultural patterns. Zeuner is thus writing about one of the three or four major turning points in human history—the so-called "Neolithic Revolution" during which man first changed from a life of hunting and gathering to a life of food producing.

An understanding of the processes involved in this changeover have been slow in coming to anthropology and archeology. The Neolithic, or New Stone Age, which first appeared as a stratigraphic zone identified by the presence of polished stone axes overlying older chipped stone tools in Europe, was incorporated in this manner into the classification of the Danish archeologist Worsaae (in 1854) and into that of the British archeologist Sir John Lubbock (in 1865). The definition was purely a technological one, which used an innovation in the making of stone tools as a criterion for identifying a specific chronological position in a sequence. By 1872, with the discovery of the Swiss Lake Dwellings, the French archeologist de Mortillet was arguing for the inclusion of pottery, domestic animals, and agriculture as part of the operational definition of the Neolithic. The principles underlying these 19th-century classifications in archeology were borrowed from the "type-fossil" taxonomy of paleontology and geology. Yet, at the same time, anthropologists like Tyler and Morgan were discussing developmental stages in cultural evolution, deduced from the study of living nonliterate peoples. Both of these men, for example, recognized the existence of a stage between the hunting and gathering stage and civilization. This intermediate stage was often named "Barbarism" but was defined in different ways. "With the certain supply of food which can be stored till the next harvest, settled village and town life is established, with immense results in the improvement of arts, knowledge, manners, and government. Pastoral tribes are to be reckoned in the barbaric stage, for though their life of shifting camp from pasture to pasture may prevent settled habitation and agriculture, they have from their herds a constant supply of milk and meat" (Tyler, *Anthropology*, 1881). Lewis H. Morgan divided Barbarism into three "ethnical" periods: Lower Status of Barbarism (which began with the making of pottery by invention or adoption); Middle Status of Barbarism (which began with the domestication of animals); and Upper Status of Barbarism (which began with the manufacture of iron and ended with the invention of a phonetic alphabet—that is, Civilization) (*Ancient Society*, 1877). Thus, the anthropologists were already concerned with cultural patterns rather than simple temporal sequences as well as with the need to consider the origin of both pastoral and agricultural specializations. This latter concern gave rise to considerable discussion about which had priority—the domestication of plants or the domestication of animals.

The two schools of thought—typologically oriented archeology and culturally oriented anthropology—impinged upon one another in the early part of this century. By the 1920's typological archeology had reached a kind of interpretive impasse which was broken largely through the works of the late V. Gordon Childe. At that time he wrote that he had "absorbed the German concept of a culture, defined but not constituted by distinctive pottery and representing a people." In his *Dawn of European Civilization* (1925) Childe adopted food production as the criterion for the Neolithic in an attempt to endow the event with its functional economic significance. In 1939, in *Man Makes Himself*, Childe introduced the concept of a Neolithic "Revolution" and an "Urban Revolution" separating three stages of development which he named Savagery, Barbarism, and Civilization (Childe thus borrowed L. H. Morgan's original terms). More recently, Robert J. Braidwood has developed the terminology of Food Collecting. Incipient Cultivation, and Primary Village Efficiency to replace both the older typological terminology (Paleolithic, Mesolithic, and Neolithic) and the evolutionary terms of Savagery and Barbarism with terms which emphasize the economy (following Childe), but which also include the settlement pattern.

Questions of Priority

With the coining of the term *Neolithic Revolution* and the general growth of anthropological thinking in archeology, attention has turned increasingly to that "revolution" and its origins. The old association of four elements (ground stone, pottery, domestic animals, and plants), which for so long had been considered a chronological indicator, began to fall apart as a meaningful unit for the early stages of the process. Excavations in the Natufian of Palestine in the 1930's showed that stone-grinding techniques had been developed before pottery and probably before food production. Braidwood's excavations at Jarmo, Ralph Solecki's at Shanidar Cave in Iraq, and Kathleen Kenyon's work at Jericho (in the 1950's) seemed to show the priority of food production and permanent settlement over pottery. The old questions arose again—which came first, domesticated plants or domesticated animals, and when did pastoralism arise in relation to the establishment of agriculture? The traditional views had been founded

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on the thesis that pastoralism arose as a secondary development based on a mixed economy of stock-breeding and agriculture or that it grew up directly from contacts between hunters and animals. In either event it was commonly considered to have been a conscious act on the part of man. The motivation behind the act was considered as religious (Hahn) or as economic (Hilzheimer). Current research, however, is making it clear that the problem is far more complex than these simple questions suggest. There may be, in fact, no priority of plants over animals; they may have been domesticated separately in both space and time. Nor is there any longer a question of simple priority between plants and animals: the domestication of each species is now seen as a problem in itself.

Zeuner's approach to the question of how and why domestication occurred is to admit the possibility of both religious and economic motivation but to suggest that the process was a slow one brought about by social and psychological factors quite as much as by conscious acts. "Domestication," says Zeuner, "presupposes a 'social medium.' As a rule the social evolution of a species must have reached a certain level before domestication becomes possible. . . . Animals which naturally entertain social relations with members of their own species are more ready to do the same with members of other species." It is no accident, therefore, that most domestic species are gregarious animals. Zeuner, in presenting this view, specifically disagrees with Childe's use of an environmental shift at the end of the Pleistocene as the impetus for domestication. Rather, it is "rooted in the natural contacts of man and beast." Presumably these contacts, which certainly existed in the Pleistocene, did not prove effective until a certain point in man's cultural development, but Zeuner leaves for others the exploration and discussion of the problem of why domestication did not occur at an earlier time. He hints at the direction of his thinking, however, when he comments that domestication, "the interplay of biology and deliberate acts," is tied to permanent settlement.

This comment would seem to imply a slight bias in favor of an agricultural priority, but elsewhere he points out that, of the following three methods used in keeping animals, only one is dependent on the cultivation of plants: the keeping of animals in herds in natural pastures; the keeping of herds in agricultural fields; and the keeping of nonherd animals. The dependence of stockbreeding on agriculture is further weakened, at least for the moment, by the tentative identification of domestic sheep around 9000 B.C. (at Zawi Chemi Shanidar by Dexter Perkins). That man had begun to use grasses is indicated by the lustrous-edged sickle blades found at the site, although no certainly domesticated plants are in evidence. These sickles suggest that a food-collecting technique may be involved which, in its effects on the local fauna, was independent of the actual domestication of plants.

We come then to the question of place and time in connection with domestication. In his book, Zeuner provides worldwide coverage and discusses both major and minor domesticated animals in a general way, but the volume is limited rather strictly to Europe and the Near East in discussing the question of the origins of food production. The point should be made here most emphatically that, although there is a legitimate stage of food production on a worldwide scheme that can be defined on a high level of generalization (with a low level of content), there are, in fact, when it comes down to the operational level of definition in archeology and anthropology, a whole series of "Neolithic" patterns that involve local fauna and flora. It is true that a generalized grassland complex of wheat, barley, sheep, goat, pig, and cattle spread over much of central Eurasia, but it is also true that other complexes have developed in other environments, such as the Sudan, Tropical Africa, Southeast Asia and the like.

Each of these environmental zones offered its own potentialities and problems, and there is no good evidence to indicate that the domestication of local forms in these areas was necessarily dependent upon the Near East. It is possible that in many cases domestication was inspired by stimulus diffusion, but the argument is more from lack of evidence than from supporting fact. As Zeuner admits, the Near East takes priority in the discussion by virtue of the amount of work done there and by virtue of the known antiquity of some of the evidence. Yet his very argument, suggesting as it does that "the habits of man on the one hand and of certain animal species on the other made the appearance of domestication almost inevitable," implies that chronology ceases to be a relevant factor once the appropriate level of social behavior had been reached on both sides. Domestication could, in theory, occur again and again at any point where man and the appropriate animals were in contact. Since the range of such animals as wolves, pigs, and the various types of cattle is not restricted to the Near East, there is every possibility that there is no single area of origin for "domestication" but only local points of origin for the domestication of specific species or breeds.

Symbiotic Social Relations

What are the social relations that link man and animal? In the first section of his book Zeuner reviews them as a series of voluntary symbiotic associations based on a guest-host relationship. Thus, when the guest is the exploiting species, we have scavenging, robbing, and social parasitism, but when the host is the exploiting species, we have feeding, taming, and domestication. These relationships are illustrated with examples which are drawn from throughout the animal kingdom and which involve numerous species other than man. Domestication itself is seen as passing through five stages—loose contacts; confinement with breeding in captivity; selective breeding to obtain certain characteristics; planned development of breeds; and gradual extermination of wild ancestors. Zeuner groups the major animals into those he considers domesticated in the pre-agricultural phase (dog, reindeer, goat, and sheep); in the early agricultural phase (the crop robbers: cattle, buffalo, gaur, banteng, yak, and pig); those domesticated primarily for use in transport and labor by forest zone agriculturalists (elephant), by secondary nomads (horse and camel), and by riverine civilizations (ass and onager); the pest destroyers (mongoose, ferret, and cat); various rodents, pets, New World species, and experimental domesticates (hyaena, fox, gazelle, and ibex); and finally birds, fishes, and insects.

A short chapter is devoted to the effects of domestication on size, color, skull, skeleton, hair, and soft parts. Most important is the fact that many of the characteristics—color, hair, and fat concentration—that were valued so highly in historic times were not present

at the time of domestication and cannot in themselves, therefore, have been the cause of domestication.

As Zeuner points out in his preface, he worked on the book for 13 years, but he was not entirely successful in evening out the coverage; his consideration of the New World material is clearly less extensive than that of the Old. Nevertheless, the book is a basic reference source and a pioneer work in English. It will serve as an introduction to the whole field for the student and as a summary for the interested layman. The extensive bibliography provides a full introduction to the published literature, although specific comments in the text are not specifically documented—no doubt a fault of the publisher rather than the author. (The serious reader will find assistance in dealing with the published literature in *An Annotated Bibliography on the Origin and Descent of Domestic Mammals 1900–1955*, a useful volume edited by Shimon Angress and Charles A. Reed.)

In the preface, which was signed in 1962, Zeuner expresses the hope that his book will stimulate further work and that he will learn from his critics. Zeuner's death leaves the learning process to those who follow in the footsteps that he has so laboriously and carefully marked out. Certain annotations to these footsteps, particularly with respect to Europe, have already appeared in a review by E. S. Higgs in *Antiquity* (March 1964). With respect to the Near East, several others are in order in view of the current studies undertaken by Charles A. Reed, Dexter Perkins, and Kent Flannery and recently recorded by Reed in *Zeitschrift für Tierzüchtung und Züchtungsbiologie* [**76**, 31 (1961)]. Of course, Zeuner had completed his text when the latter was published.

The Natufian "Dog"

Zeuner's first group of domesticated mammals in the Near East include those that he sees as having been domesticated prior to the full development of agriculture—the dog, goat, and sheep. The earliest of these was the so-called Natufian dog of Mt. Carmel (and also Shukbah Cave) in Palestine. But independent studies by Reed and Clutton-Brock have since shown that this "dog" was in fact a Palestinian wolf, and its removal from the Mesolithic leaves only the unstudied "dog" from Belt Cave, Iran, which is dated about 9500 B.C. Thus the earliest undisputed dogs in the Near East come from prepottery Neolithic Jericho dated 6000 to 7000 B.C., about the same time that dogs appear in northwestern Europe. In the latter area they are clearly "Mesolithic" in date, while at Jericho they are almost certainly already associated with early agriculture. At any rate the great antiquity of the dog in the Near East is much reduced, and although it is still possible that the Belt Cave remains will be confirmed or that other remains will be found, we cannot say at the present time that the dog is much older than 7000 B.C.

The sheep, on the basis of statistics found at Shanidar Cave and at the nearby site of Zawi Chemi Shanidar, now appears to have been domesticated by around 9000 B.C., well before the earliest evidence for either the dog or the goat. It is clear, therefore, that each of these animals has had a separate history. For one of them only, the sheep, is there evidence that domestication preceded the development of agriculture, as Zeuner proposed. This latter fact is important, since it allows the possibility of a specialized cultural pattern, based on herding, hunting and collecting, and nonpermanent settlement, prior to the establishment of settlements of cultivators. The domesticated goat is found in prepottery Neolithic Jericho and Belt Cave. Its presence at opposite ends of the Near Eastern area suggests a much greater antiquity for its actual domestication.

The domestication of the goat opened up mountain and dry steppe areas to denser human occupation by virtue of the goat's ability to live on sparse vegetation. Zeuner dates the goats at Jericho to 6000 to 7000 B.C., but he uses the now discarded dates of 4790 and 4970 B.C. for the context of the same animal at Jarmo. Braidwood now uses 6500 B.C., a dating which is supported by typology and by radiocarbon dates from Tepe Sarab in nearby Iran. 6500 B.C. is a reasonable date in relation to the domestic goat remains in the "Mesolithic" at Belt Cave in northeastern Iran, dated to 6620 B.C. by C. S. Coon in his final statement on the subject in *The Seven Caves*. Zeuner's general opinion is that the sheep was probably domesticated for its meat, since wool and fat deposits developed later. He tentatively suggests that the goat may have been domesticated for its milk and that it was later displaced in that capacity by cattle.

Crop Robbers—Pigs and Cattle

The domesticated animals of group II, which includes pigs and cattle, are classed as crop robbers, and it is suggested that domestication of these animals took place after cultivation began and permanent settlements were established, for remains of these animals have been found only at permanent settlements. This conclusion is probably correct, but one should remember that virtually no other types of sites have been investigated for this period. Since Zeuner wrote, Kent Flannery's work on the Jarmo pigs has shown that this group of animals was in fact domesticated and that domestic pigs at Jarmo were introduced, with pottery, late in the occupational sequence. Thus, they quite clearly follow goats and sheep locally in time, but, like pottery, they must have a longer history elsewhere in the Near Eastern area. The pig was used as a source of meat, fat, bristles, skin, and tusks and was useful as a scavenger as well as for trampling seed into the fields. Zeuner is of the opinion that its domestication occurred repeatedly from local wild stock.

Cattle present a more difficult question for, although they appear sporadically in sites from Hassuna times on, they have rarely been studied in detail, and it is difficult to prove when they were domesticated. In general the absence of a known small wild form, the frequent reduction in size of domestic animals, and the presence of bones of small cattle at several Halaf period (about 5000 B.C.) sites (Banahilk and Tell Aswad), and the presence of "cattle bones" at Tell Mefesh and Ras Shamra lead Reed and Bate to agree on the probability of their being domesticated. Zeuner suggests that, after the dog, the domestication of cattle was the most important step ever taken to exploit the animal world, since they require considerable attention from, and organization of, the community. He suggests that their economic use for milk and hides may have been a prime motive. Higgs, in his review, points out that new evidence of cattle in the shrines at Neolithic Chatal Huyuk in Turkey reinforces the idea of a religious origin. The extensive use of the buchranium motif on Halaf pottery and the later bull-leaping and general symbolism of the bull may have descended from some such early religious usage. Equally important, as Zeuner points out, was the use of cattle as a

beast of burden and, subsequently, of traction. The early harness seen on the onagers of Mesopotamia appears to have been borrowed from the equipment designed for cattle. The development of the wheel and plough was also closely connected with the domestication of cattle. Thus, the foundations for the establishment of higher cultures were laid down.

Ass, Onager, Camel, and Elephant

Zeuner's third group consists of mammals domesticated primarily for transport and labor. In the Near East there is the ass, the onager, the camel, and the elephant. The latter was known from the Middle Euphrates and Khabur down to the eighth century B.C. and, at that time, was one of the major sources of ivory, although it was never domesticated. In the Indus Valley, however, seals on which elephants seem to wear some kind of covering indicate that the elephant may have been domesticated as a work animal. The domestication of the onager in the third millennium in Mesopotamia is established by the bones found at Tell Asmar and by representational art. The original identification of onager bones in Shub-ad's tomb at Ur is now discounted. Zeuner suggests that the use of onagers was given up following the introduction of the horse from Central Asia or southern Russia in the second millennium. He does not mention the gold fillet from the Early Dynastic Cemetery at Ur (on exhibition in the University Museum of Philadelphia) which shows a man riding astride an equine of some kind. Asses were domesticated in Egypt and spread eastward, occurring in Mesopotamia in the third millennium B.C. The domesticated horse apparently was known between 3000 and 2500 B.C. but did not appear in the Mesopotamian area in quantity until the first quarter of the second millennium when the two-wheeled chariot was widely adopted. The dromedary camel was domesticated in Arabia by at least 1800 B.C. and the Bactrian in Central Asia by at least 1000 B.C.

Zeuner's New Hypothesis

From this general discussion, which Zeuner has documented with numerous illustrations drawn from life and from art and with references to specific sites, it may be seen that he has in effect also provided us with a new hypothesis about the stages of the early food producing "Revolution." This now appears not to be a "Revolution" at all, except when it is viewed as part of the total range of human history. The "abrupt jump" into food production appears to cover a range of some 4000 years—from 9000 B.C. to 5000 B.C.—which may well prove to be a minimum. In any event, it is equal to four-fifths of the period in which writing has existed! At the same time the evidence indicates that the changes which led to the establishment of the final village community were complex in nature, involving different localities, different plants, different animals, and different technological innovations, all progressing at different speeds. It was only with the general acculturation of communities within the general Near Eastern region to one another's advances that the level of Primary Village Efficiency was reached. The steps proposed by Zeuner, insofar as animals are concerned, are (i) the domestication of the dog as an aid to hunting; (ii) the cultural control of herds of sheep or goat; (iii) the domestication of plants and the beginning of settled life; (iv) the domestication of cattle; (v) the invention of plough and wheel; and (vi) the domestication of the transportation animals. Thus, we are presented with a fresh basis of discussion for problems of zoology, anthropology, and archeology, which, despite their long history, remain to be solved.

Soviet Propaganda: Its Techniques, Doctrines, and Practices

Daniel Lerner

Frederick Barghoorn's new book is assured of a *succès de scandale*. His arrest in the U.S.S.R. on 31 October 1963 created an international incident, and his detention during the first 16 days of November made him a *cause célèbre*. Deeply identified with this cause were governmental officials, newsmen, and academics concerned with Soviet-American cultural exchanges and propaganda barrages—and these are the primary audience for his book—**Soviet Foreign Propaganda** (Princeton University Press, Princeton, N.J., 1964. ix + 329 pp. $6). No conjunction of subject and author could be more topical.

Be it noted that Barghoorn has done nothing to promote or profit from the publicity that encircled him. From the moment of his release he has conducted himself modestly and moderately. He continues to do so in this study, which was completed before his arrest. If the recent publicity brings him a greater measure of fame and fortune than comes to most academic scholars, it should be acknowledged that Barghoorn deserves the fallout from his *succès de scandale*.

For on the question that is more important to readers of this journal—Does his book merit the more durable success earned by good scholarship?—the answer is yes. Indeed, this book confirms Barghoorn's stature as a leading scholar on the Soviet system of international communication. It focuses the findings of two decades of sustained and serious investigation, as reported in such earlier works as *The Soviet Image of the United States* (1950) and *The Soviet Cultural Offensive* (1960), in a keen analytical exposition of current policy and practice in Khrushchev's U.S.S.R.

Barghoorn begins with an exegesis

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