20 June 1958, Volume 127, Number 3312 SCIENCE

CURRENT PROBLEMS IN RESEARCH

Near Eastern Prehistory

The swing from food-collecting cultures to village-farming communities is still imperfectly understood.

Robert J. Braidwood

The Near East (or Middle East—I have no preference) is traditionally taken to mean the area that stretches from the Libyan flanks of Egypt to include all of southwestern Asia as far as the rim of the Baluchi Hills, which overlook the Indus Valley. The Indus itself, parts of Transcaspian Turkestan and Transcaucasia, and even Greece and the Sudan might also be included, but this is not usual. The geographic core of the area is the drainage basin of the twin rivers, the Euphrates and Tigris, and the highlands and plateaus which immediately flank this drainage basin (Fig. 1). In this sense, the Nile and Indus basins lie on the western and eastern boundaries of the core area, as do the Mediterranean, Black, Caspian, and Red seas and the Indian Ocean (*1*).

The Area and Its General Problems

Since all human prehistory is restricted to the Quaternary period, it is sufficient to say that the Pleistocene physiographic history of the area has been essentially one of superficial erosion and deposition, sometimes on a large scale (*2*). The area shows traces of such world-wide climatically determined features as high marine and river terraces and localized glaciation in the higher mountains, but the over-all structural geography and the positions of the major land masses and seas were essentially set in pre-Pleistocene times. It now appears that extreme climatic change during the late glacial to early postglacial range of time was not *the* important factor in the appearance of plant and animal domestication. C. E. P. Brooks' much quoted (*3*) "propinquity theory," which attempted to explain the appearance of food production through the concentration of men, plants, and animals in oases and river valleys as the Atlantic rain winds withdrew northward at the end of the last glaciation, is no longer tenable (*4*).

Unfortunately the geochronological details of Pleistocene events in the Near East may not yet be directly equated with those of western Europe, save in a most general way. This lack of intercontinental geochronological precision allows differences of opinion among prehistorians about how this or that range of Pleistocene artifacts in the Near East may be related to more or less similar types in Europe. Sometimes these disagreements have bearing on the construction of grand syntheses of culture-historical evolution (*5*).

For the prehistorian—for any culture-historian for that matter—the area was the scene of three great culture-historical events.

1) The earliest appearance (on present evidence, if we take the more probable geochronological long view) of the blade-tool tradition. This relatively sophisticated set of habits in the preparation of long parallel-sided flint tools seems to have been roughly coincident, in Europe, with the appearance of anatomically modern men, about 40,000 years ago. The Palestinian ("nonclassic" or "sapiensized") Neanderthals may be regarded as ancestral to modern men (*6*), and the blade-tools make a tentative appearance in the Syrian and Palestinian stratigraphy even earlier than do these unspecialized physical types. It is not impossible, therefore, that the general Near Eastern area was the focus of differentiation and eventual spread of anatomically modern man and of his earliest characteristic habits in the preparation of flint tools.

2) The earliest appearance of the settled village-farming community, based on small-grain agriculture and animal domestication, about 10,000 years ago. The word *agriculture* is here used in a more restricted sense than that given it by Sauer (*7*). This was Childe's (*8*) "food-producing revolution" par excellence, and its consequences were momentous. It is probably very difficult for us now to conceptualize fully (or to exaggerate) the consequences of the first appearance of effective food production. The whole range of human existence, from the biological (including diet, demography, disease, and so on) through the cultural (social organization, politics, religion, esthetics, and so forth) bands of the spectrum took on completely new dimensions.

3) The earliest appearance of urban *civilization*, first in alluvial Mesopotamia, about 5500 years ago, and only slightly later in Egypt. This is usually categorized archeologically by certain reclaimable artifactual criteria (*9*) such as cities, monumentality in art and architecture, public works, and writing, but the general social and cultural implications of the achievement were even broader (*10*). In fact, there is no general agreement with Childe in considering this step a further "revolution" on technological-economic grounds alone (*11*; *12*, p. 72). Civilization appeared as a special intensification of cultural activity which effective food production made possible, but it was not necessarily

The author is professor at the Oriental Institute and in the department of anthropology, University of Chicago, Chicago, Ill., and field director of the Oriental Institute's Iraq-Jarmo project.

the predetermined consequence of food production.

The subject matter of this article does not include the third event, which needs delineation of its own, requiring far more space than is available here. Nor shall I examine here the other experiments in the achievement of effective food production and of civilization which occurred, at slightly later times, in other parts of the world.

It will quickly become apparent that the reclamation and interpretation of the culture-historical evidence for Near Eastern prehistory is only in its infancy. The broad outline and the major problems are beginning to come into focus, and the research tools are being sharpened, but we still have a very long way to go. In the range of time we deal with here, each of the levels of culture involved required a very intimate balance with its environment. Superficially, it does not seem necessary for our own culture to maintain such a balance, due to vastly more sophisticated means of production, transportation, and distribution. But the expert in prehistoric archeology faces the duty of reclamation and interpretation in two realms: culture history and natural history. He will have been trained, more or less well, to cope with and be thoughtful about the evidence for culture history, and this in itself is a full-time job and more. But archeologists' excursions into natural history have usually ended in disaster; evidently competence in the biological and earth sciences also demands a full-time commitment! (*13*).

During our last (1954–55) field season in Iraqi Kurdistan, for work on the problem of the appearance of the settled village-farming community, we were enabled (*14*) to take out a skeleton team of natural scientists: a botanist, a geologist, a radiocarbon and ceramic-soils technician, and a zoologist. What we learned together, in daily communication in the area itself, about the reconstruction of an ancient environment doubtless marks a new departure in the study of prehistory. It is probably also worth saying that such teamwork between archeologists and natural scientists is not without contemporary importance. Both the Israeli and Iraqi governments are utilizing such teams in gaining knowledge about how ancient irrigation and land-usage patterns functioned (and eventually failed to function) in making their plans for modern land-reclamation projects (*15*). What is important for our present purposes, however, is that the archeologist (both in the range of prehistory and of conventional ancient history, for that matter) is faced with problems which have dimensions that go into sciences far beyond his competence. A joint attack on these problems, with at least some field participation and the establishment of easy communication with interested natural scientists, does pay off handsomely.

Pleistocene Prehistory of the Near East

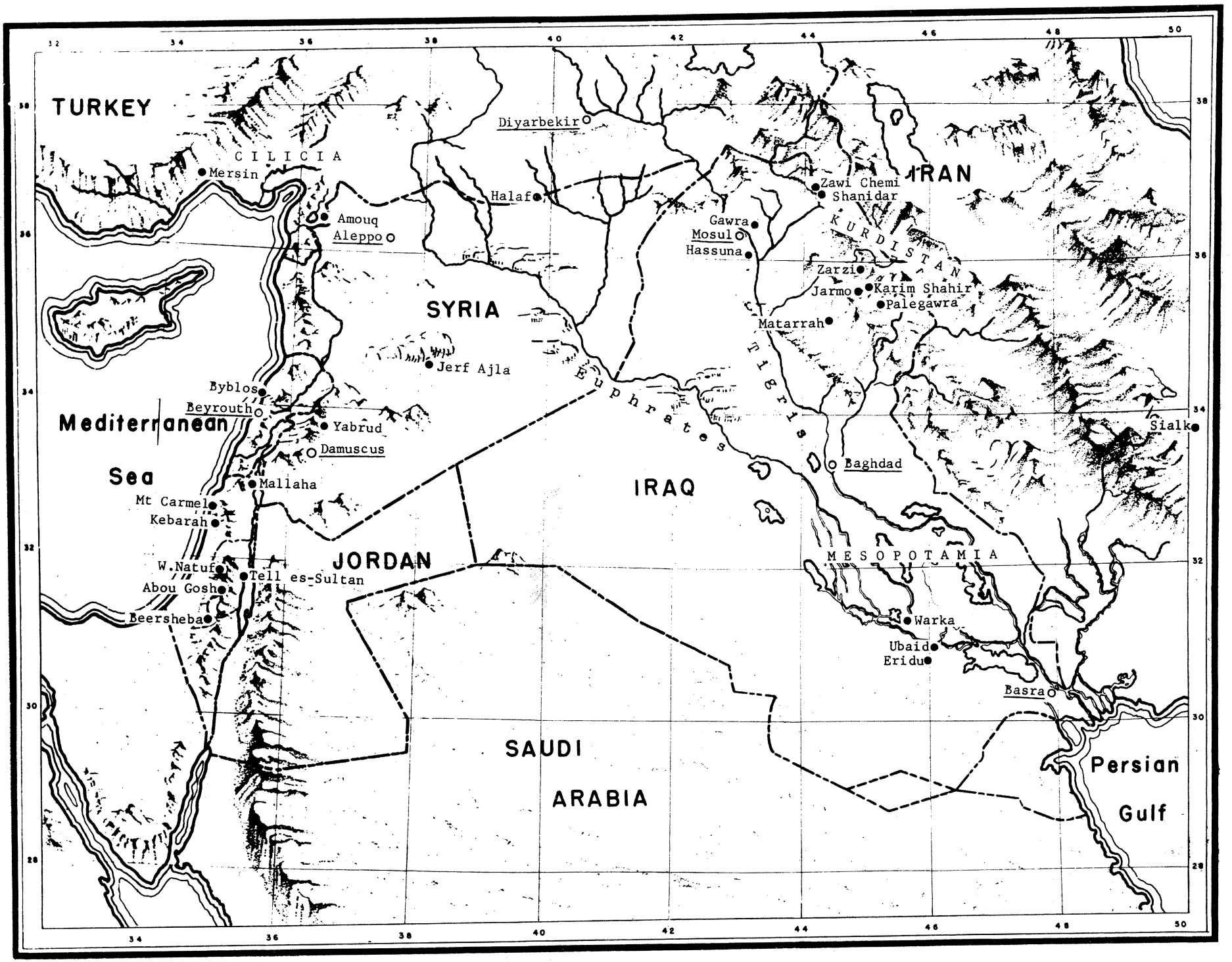
The basis for subdivision of earlier Pleistocene times is somewhat confused, but a working definition might be that the lower Pleistocene proceeds from the end of the Villafranchian fauna to the end of the Mindel glaciation. The middle Pleistocene runs thence to the end of the Riss glaciation, and the upper Pleistocene runs from the Riss/Würm interglacial to about 10,000 years ago. Fleisch (*16*) assigns a few rolled flint tools to the +45-meter marine terraces near Beyrouth, Lebanon (which some authorities take to be late lower Pleistocene), but a general lower Pleistocene occupation of the Near Eastern area is not yet evidenced. Even middle Pleistocene flint-tool occurrences, again on marine terraces of the east Mediterranean littoral and on the highest Nile terraces yet examined, have only geological (not archeological in the sense of "living site") context at best. There is little question but that men, who prepared their flint tools according to the persisting habits of both the core-biface and flake-tool traditions (*17*, *18*), had already arrived in the Near East by middle Pleistocene times, but we have, so far, little knowledge of their culture history. Really early traces of Pleistocene men, such as have been found in southern and northwestern Africa, have not yet been noted in the Near East.

In the geochronological long view (see above, and *5*), the archeological sequences in several caves near the east Mediterranean littoral began to be deposited early in upper Pleistocene times, if not with the recession of the Riss glaciation itself. An excellent sequence from fossil springs in the Kharga Oasis west of the Nile (*19*) parallels the littoral sequence in its earlier ranges, and the tools from the Nile terrace fit this same picture in a general way. On both sides of Suez there were fluctuations in utilization of various types of tools: coarse flake-tool industries (Tayacian), developed core-bifaces (Acheulean and Micoquian), and developed flake tools (Levalloiso-Mousterian, and so on). Clark Howell's (*20*) detailed synthesis of these developments will soon be available.

Three remarkable things appear in our present knowledge of the earlier portion of upper Pleistocene times in the Near East. The first is the tentative occurrence of the blade-tool tradition, in the Tabun cave on Mount Carmel, in contexts which include Acheulean core-biface tools; blades also appear in the Yabrud cave near Damascus soon thereafter. The second is the appearance, in the just-subsequent Levalloiso-Mousterian levels on Mount Carmel and in nearby caves, of fossil men who show a trend toward anatomically modern morphology (*6*). The third is the apparent long persistence, in Egypt and its environs, of the Levalloiso-Mousterian industries, after—at the end of the earlier subphase of the upper Pleistocene—the blade-tool tradition had taken over in southwestern Asia. If the geochronology is as we expect, the early appearance in southwestern Asia of the blade-tools and of human beings with anatomical tendencies toward modern man (at a time when "classic" Neanderthal man was flourishing in western Europe) makes this area a focus of some interest. There is not, of course, complete agreement that either the blade tools or anatomically modern men did first appear in the area (*6*). The long persistence and diminution in size of Levalloiso-Mousterian tools in Egypt remain inexplicable in the light of our knowledge of southwest Asia, but this trend parallels what happened in the rest of Africa. There is some promise that work in caves in Libya (*21*) may help elucidate the Egyptian situation, which is still poorly known for later upper Pleistocene times.

Traces of the earlier aspects of the upper Pleistocene are now being recovered in Iran and Turkey and in the Tigris-Euphrates basin. A typologically quite

Fig. 1. Map of the core area of the Near East in prehistoric times, showing the positions of sites for which radiocarbon determinations are available and of certain other key sites. Modern cities are underlined and designated with an open circle (for example, ○ *Baghdad*). The "hilly-flanks" natural habitat zone follows an arc from Kurdistan to north of the city of Diyarbekir, to Cilicia, and thence down the Syro-Palestinian littoral.



1421

20 JUNE 1958

early open site, Barda Balka in Iraqi Kurdistan, worked by the Iraq-Jarmo project staff for the Iraqi Directorate General of Antiquities (*22, 23*), yielded tools of the earliest of the standardized traditions—the pebble tools—along with upper Acheulean core-bifaces and a flake-tool facies. Howe compares the industry, on typological grounds, with so-called "lower paleolithic" occurrences in both northwest Africa and in the Punjab, and Wright suggests that its geochronological position is probably contemporaneous with the onset of the Würm glaciation. Core-bifaces and earlier aspects of the Levalloiso-Mousterian flake tools are reasonably common surface finds in the core of southwestern Asia, as they are on its Mediterranean littoral. The cave sequences in the interior, with the exceptions of the core-bifaces at the bottom of Jerf Ajla, near Palmyra (*24*), begin with a developed Levalloiso-Mousterian industry. This industry, first discovered by Garrod in Iraqi Kurdistan in 1928, has since been tested in several caves by the Iraq-Jarmo project (B. Howe, *23, 25*), and Solecki (*26*) has recovered the remains of several fossil men in the same horizon at the Shanidar cave. It appears to at least some human paleontologists that the physical types involved are of the Mount Carmel rather than the European "classic" Neanderthal type.

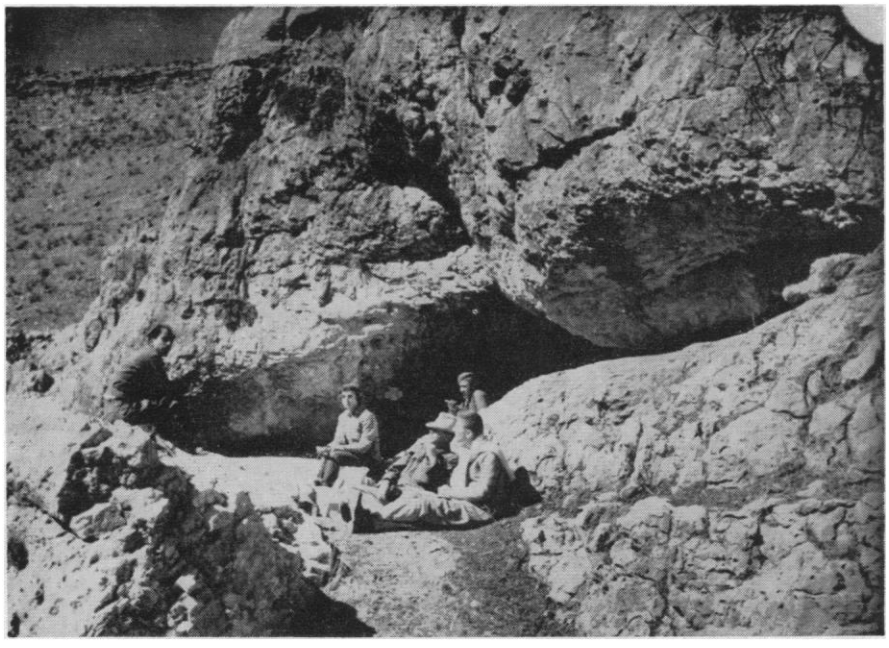


Fig. 2. Site of the Zarzi cave (late or food-collecting era of the food-gathering stage) in the intermontane valley south of the Dukan Gap, Iraqi Kurdistan.

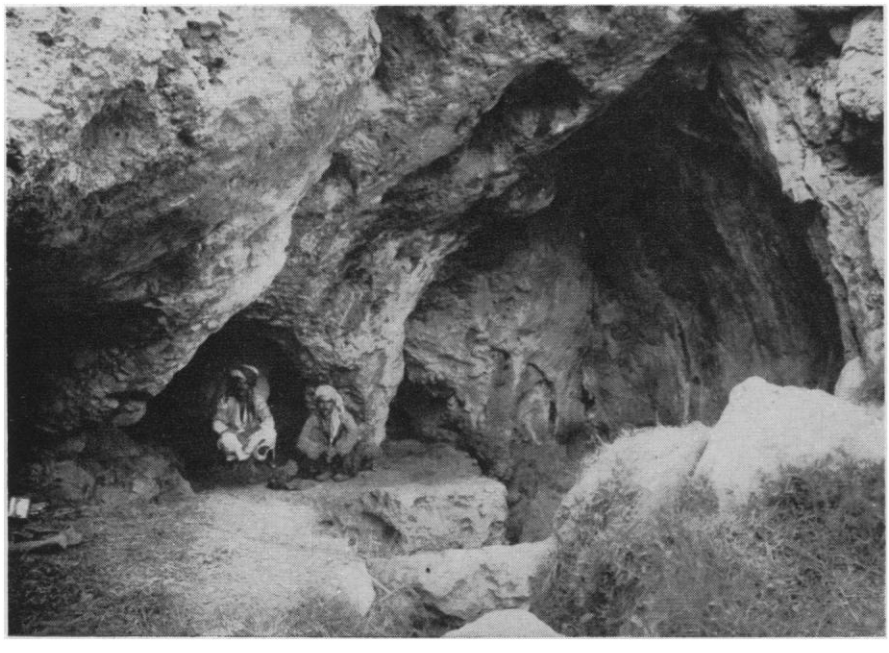


Fig. 3. The Palegawra cave (late or food-collecting era of the food-gathering stage) in the Bazian intermontane valley, Iraqi Kurdistan.

As time went on in the upper Pleistocene, blade tools began to make a more persistent appearance in the higher levels of the caves along the east Mediterranean littoral. The now developed Levalloiso-Mousterian flake-tool industry began to include blade-tools and a peculiar long, thin flint point, and this horizon is the earliest of a six-phase developmental scheme, proposed by Neuville and followed by Dorothy Garrod (*27*), although the latter prefaces the scheme with a "phase 0." The details of this "upper paleolithic" sequence are not critical for our present purposes; it is enough to say that the Levalloiso-Mousterian industry is completely superseded by the developing blade-tool industries and that microbladelets (microliths) presently appeared. Garrod believes that the sixth or Kebaran phase was immediately followed by the Natufian; this point is not completely clear from the evidence, but I do feel justified in considering the Natufian postglacial in time.

The general cultural picture is still not so well known as that for the roughly equivalent range in western Europe. It does, however, suggest the same transition from an earlier, more "natural" food gathering to a more intensified collecting type of activity. Two interesting remarks of Garrod's might summarize this six-phase range; (i) the climate and fauna of the littoral changed very little in latest upper Pleistocene times, and in the immediately succeeding range—which Haas (*28*) assesses as being essentially modern; and (ii) with the speeding up of change and development, detailed similarities between the blade-tool sequences of western Europe and the Near East need not be expected, as cultural evolution now starts to outstrip diffusion (*29*).

Strangely, there is not yet a radiocarbon date for this late glacial range in the littoral.

Even within the interior of southwestern Asia, there were blade-tool industries differing from those of the littoral. In Iraqi Kurdistan (Figs. 2 and 3) the Zarzian "extended Gravettian" industry, with microliths (*23, 27, 30*), is known now to be prefaced at Shanidar by the

earlier Baradostian industry (*26*, *30*). The Baradostian has two radiocarbon dates (*31*): 29,500 ± 1500 years (sample W-178), and older than 34,000 years (sample W-180). The base of the Zarzian at Shanidar is dated at 12,000 ± 400 years, or about 10,000 B.C. (sample W-179). A new date of about 8650 B.C. (sample W-667) for the upper part of the Zarzian at Shanidar is now announced (*31a*). Howe finds it increasingly impressive, as more caves are tested in Kurdistan, that no post-Zarzian materials have appeared in caves (save the oddments left by occasional transients). Evidently the transition to year-around open-settlement living immediately followed the Zarzian range. Reed's (*23*) preliminary examination of the faunal remains from several Zarzian horizons has convinced him that an essentially modern climate had already been established.

On the eastern flank of the core area, in Afghanistan, the Kara Kamar cave has yielded blade tools and steep scrapers with radiocarbon dates comparable to those of the Baradostian (*24*), but a developmental sequence in the area is not yet available. To the west, in the Libyan cave in Haua Fteah (*21*), on the other hand, blade tools appear to have arrived late; this seems to be in keeping with the curious flake-tool conservatism noticed earlier for Egypt.

There are doubtless at least several disconformities (for which industries have yet to be discovered and intercalated) in the archeological sequences of the Lebano-Palestinian littoral and of Iraqi Kurdistan. These are, so far, the only areas known in any detail. While there is a gratifying increase in the attention now being given to the climatic and environmental history of the late Pleistocene to early postglacial time range in the area (H. E. Wright, Jr., *23*; *32*), it appears increasingly certain that much more effort will have to be given to the reconstruction of the natural history of the region. It might be said in this connection that a liberalization—in the interest of prehistory, of the national antiquities laws of some of the countries in the Near East would stimulate more field research. Many of these laws had as their purpose the very justifiable prevention of exploitation, by foreigners, of spectacular sites of the historic range, but the laws have been applied to the detriment of prehistorians and their colleagues in the natural sciences (who need to study materials in their home laboratories) (*33*). But enough is already known of parts of the area to suggest that, at least in its upper Pleistocene range, it will yet yield answers to many of the more meaningful questions about how man became what he was ten thousand years ago.

Fig. 4. The Karim Shahir open site (era of incipient cultivation) in the intermontane valley of Chemchemal, Iraqi Kurdistan, above white bluff, center.

Postglacial Prehistory

There is increasing agreement among some geologists (*34*, *35*) that the late glacial to early postglacial time boundary, in what is now the North Temperate Zone, is to be set at about 10,000 years ago, or 8000 B.C. (*36*). There is also an increasing number of radioactive carbon dates for sites in the era of the settled village-farming communities in the Near East which show that this era must already have been established by about 9000 years ago, or 7000 B.C. Between the earliest village sites known to us and such terminal Pleistocene industries as the Kebaran and the Zarzian, mentioned above, there are clear hints of a range of materials probably best conceived of as the traces of incipient cultivators (*37*). If Solecki's single radiocarbon date for the beginning of the Zarzian is essentially correct (sample W-179, 12,000 ± 400 years before the present) and some time is allowed for the flourishing of this industry [as the newly announced date of sample W-667 suggests (*31a*)] and of its possible Kebaran equivalent, then the sites (Fig. 4) of the incipient cultivators probably were in use about 10,000 years ago, or 8000 B.C.—at the onset of early post-glacial times. Within a thousand years, this experimental cultivation and—in the Kurdish area, at least—year-around life in the open were succeeded by the settled village-farming community.

The chronology suggested in the above sketch—the correctness of which is not yet guaranteed—could not have been given prior to January of 1958 and depends primarily on a new but modest-sized cluster of radiocarbon dates, from samples in northern Iraq and from two sites on the littoral, counted by Meyer Rubin of the U.S. Geological Survey in Washington (*38*). Unfortunately, all the problems of the "geobiochemical" contamination of radiocarbon samples, before they reach the counter, beset the use of this and several other series of radiocarbon dates from the Near East. In Figs. 5 and 6 are plotted the available radiocarbon dates for the Near East [save for samples W-667 and W-681 (*31a*)], each date being shown as a time-bar to indicate the counter's plus-minus factor. It is clear that at the present moment (and this will be true until many more samples are counted, from many more different sites), the available fabric of radiocarbon dates can give us no more than a *general* indication of the late prehistoric time ranges of the area. This will throw us back primarily upon our old-style typological assessments of the comparative archeological stratigraphy (*39*) of the various sites in the area. To these assessments we may then add our own judgments of the dating probabili-

ties based on the general pattern of the radiocarbon dating fabric. For the Near East, at least, the cutting edge of radiocarbon dating as a research tool is still blunt because of our difficulties with the "geobiochemical" contamination factor. Understanding of this contamination factor will demand competences in a middle ground lying between archeology and nuclear physics, which badly need to be developed.

The chronological sketch at the beginning of this section was made by selecting a cluster of three radiocarbon dates (samples W-607, -651, -652) of about 8500 years ago, or 6500 B.C., as the probable true general date (out of a series of 11) for the early village site of Jarmo (Figs. 7 and 8) in Iraqi Kurdistan (*11, 17, 23*). Jarmo was a single-phase manifestation which cannot have had a time duration of more than a few hundred years (*40*). The next phase of the early village-farming community era, in terms of comparative archeological stratigraphy, as seen at Matarrah (sample W-623) and Hassuna (sample W-660) in the up-

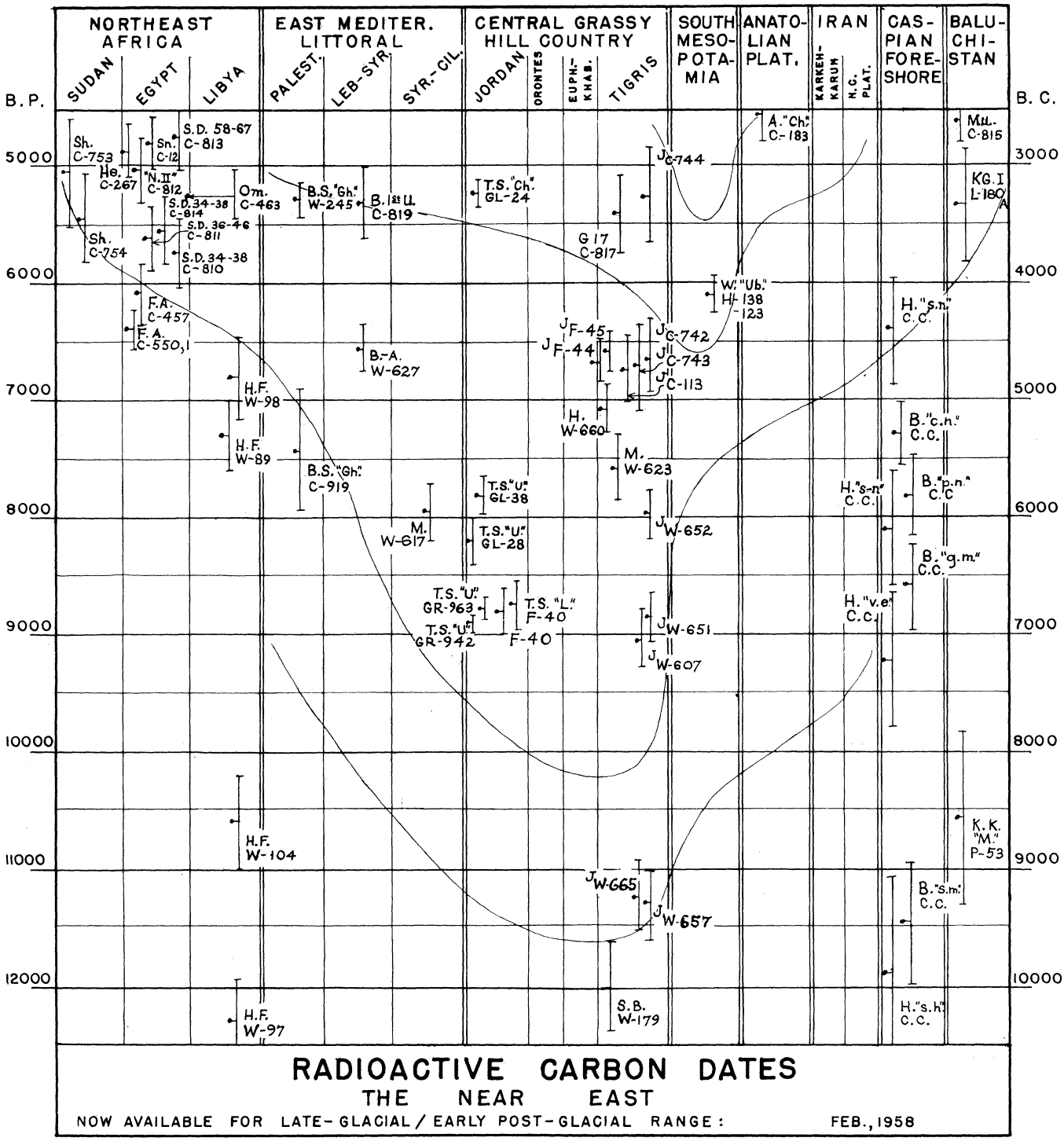


Fig. 5. Summary of the positions, in time and general geographical region, of the now available radioactive carbon dates in the Near East, for the range from circa 5000 to 12,000 years ago. The curves suggest levels or eras of food-getting practices, as shown in Fig. 6. Most of the archeological sites involved are shown in a previously published table (*53*). See also Solecki and Rubin (*31a*). A key to these dates appears in Table 1.

per Tigris piedmont and at Mersin (sample W-617) on the Cilician coast of Turkey, seems to cluster at between 500 and 1000 years later, say at about 5750 B.C. Since each of the pertinent phases, on the sites mentioned, will probably have had durations of several hundred years, no essential gap between the Jarmo phase and the Matarrah-Hassuna and Mersin phase need be postulated. The group of five Jarmo dates (samples C-113, -742, -743, and F-44, -45) will not work if the Matarrah, Hassuna, and Mersin dates are correct, since Jarmo clearly precedes the pertinent basal materials of these sites in terms of comparative archeological stratigraphy and has several categories of technological

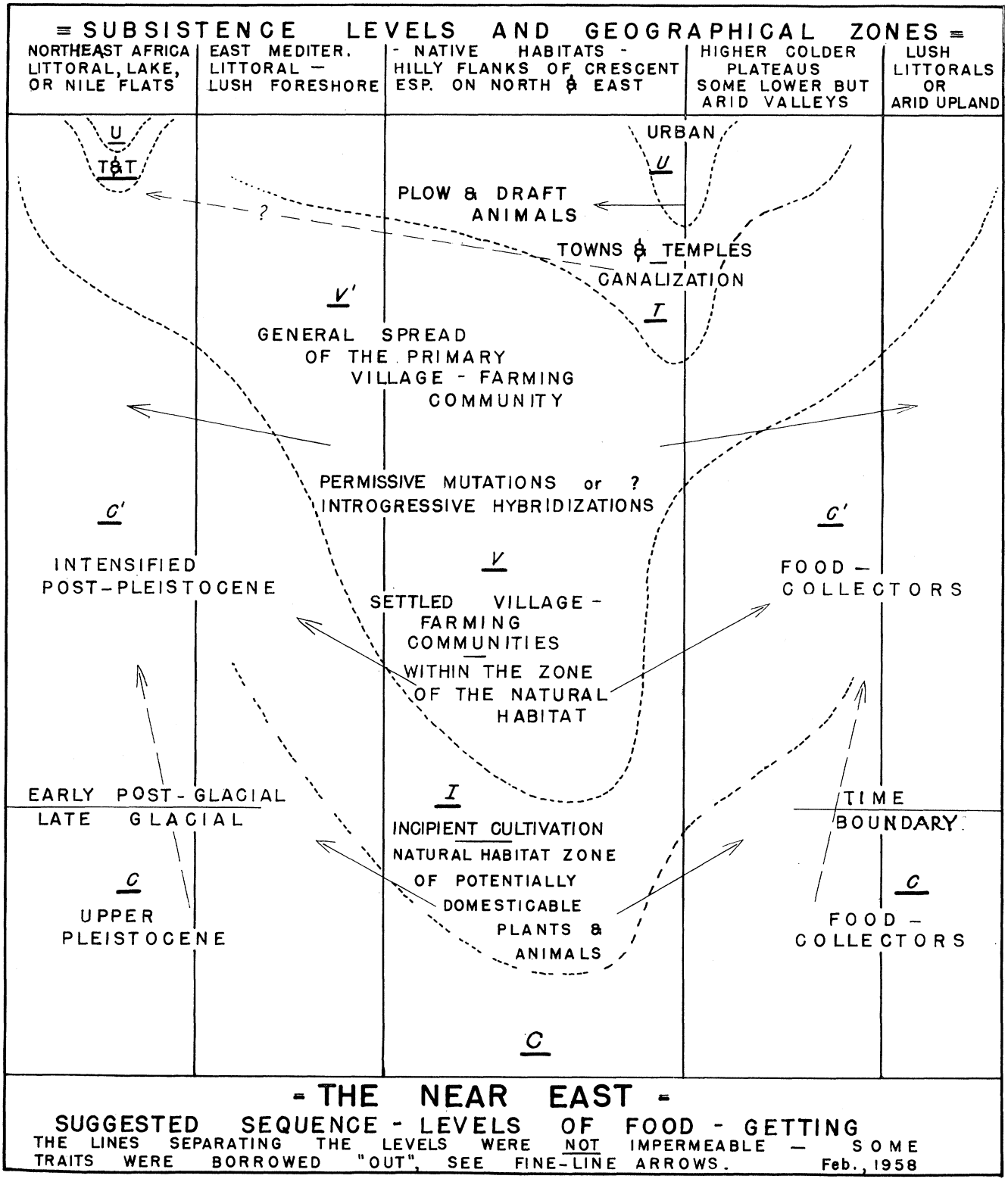


Fig. 6. Summary of the levels or eras of food-getting practices in the Near East with respect to the times and geographical regions shown in Fig. 5: *C*, food-collecting; *C'*, intensified food-collecting; *I*, incipient cultivation; *V*, village-farming communities; *V'*, intensified village-farming communities; *T* + *T*, towns and temples; *U*, urban communities.

descendants in Matarrah and Hassuna. The two earliest Jarmo dates (samples W-657, -665), of over 11,000 years ago, are simply not conceivable in terms of comparative archeological stratigraphy as we now understand it. Jarmo must lie near, but not at, the very beginning of the era of village-farming communities; in my judgment this beginning should be put at about 7000 B.C.

It should be made clear that Jarmo is *not* conceived of as *the* spot where the village-farming community level of existence came into being—we do not even believe that there ever was one single such spot—but only that Jarmo represents the earliest example of settled village life which the accident of its prior discovery has allowed us to use as a basis for description (*41*). To my mind, however, it is not an accident that Jarmo was found in the hilly-flanks zone of the "fertile crescent." This zone of upper piedmont and intermontane valleys, stretching at least from Syro-Cilicia into Iran, flanking the Taurus-Zagros arc and still receiving ample rainfall, appears increasingly to have been *the* natural habitat of the potentially domesticable plants and animals (*4, 11, 23*).

There is a complication. Early in 1956, the excavators of Tell es-Sultan (usually taken to have been the site of Joshua's Jericho), in the Dead Sea Valley in Jordan, published a pair of radiocarbon dates (samples GL-28, -38) for the second phase above base in that site (*42*). More recently, two further dates for the same level (samples GR-942, -963) have become available, as well as a pair of dates for the first phase which parallels the latter ones (*43*). From the point of view of comparative archeological stratigraphy, the two basal phases of Tell es-Sultan are enigmatic, and there is now word (*44*) that the "first" phase may in fact have been preceded by some simpler materials. There is clear evidence of considerable architectural complexity in the basal layers, which include thick stone-founded fortifications, with a tower, and formed mud-brick house walls, but the remainder of the catalog of materials is relatively primitive and includes neither pottery nor metal objects. Taking her cue from the relatively large area of the site and its architectural complexity, Kathleen Kenyon (*45*) used the words *urban* and *civilization* in describing its cultural level, and these implications were strongly contested by Childe (*46*) and Braidwood (*4, 47*). Also, in view of the then avail-

Table 1. Radiocarbon determinations used in Fig. 5.

Sample	Description	Age (yr)
	Chicago dates (59)	
C-12, Sn.	Sneferu tomb	4802 ± 210 (av.)
C-113, J.	Jarmo village (I-7)	6707 ± 320
C-183, A. "Ch."	Alishar "chalcolithic"	4519 ± 250
C-267, He.	Hemaka tomb	4883 ± 200 (av.)
C-457, F.A.	Fayum A village	6095 ± 250
C-463, Om.	el-Omari village	5256 ± 230
C-550/1, F.A.	Fayum A village	6391 ± 180
C-742, J.	Jarmo village (I-7)	6606 ± 330
C-743, J.	Jarmo village (II-5)	6695 ± 360
C-744, J.	Jarmo village (II-2)	5266 ± 450
C-753, Sh.	Shaheinab village	5060 ± 450
C-754, Sh.	Shaheinab village	5446 ± 380
C-810, S.D. 34-38	Predynastic tombs	5744 ± 300
C-811, S.D. 36-46	Predynastic tombs	5619 ± 280
C-812, N.II	Predynastic tombs ("Nagada II")	5020 ± 290
C-813, S.D. 58-67	Predynastic (?) tombs	4720 ± 310
C-814, S.D. 34-38	Predynastic tombs	5577 ± 300
C-815, Mu.	Mundigak "bronze age"	4580 ± 200 (av.)
C-817, G-17	Tepe Gawra 17 +, Ubaid	5400 ± 325 (av.)
C-819, B. 1st U.	Byblos, "first urban"	5317 ± 300
C-919, B.S. "Gh."	Beersheba "Ghassulian" village	7420 ± 520
	Caspian Foreshore dates (24)	
CC-B. "c.n."	Belt cave "ceramic neolithic"	7280 ± 260
CC-B. "p.n."	Belt cave "preceramic neolithic"	7790 ± 330
CC-B. "g.m."	Belt cave "gazelle mesolithic"	8570 ± 380
CC-B. "s.m."	Belt cave "seal mesolithic"	11,480 ± 550
CC-H. "s.n."	Hotu cave "software neolithic"	6385 ± 425
CC-H."s-n."	Hotu cave "sub-neolithic"	8070 ± 500
CC-H. "v.e."	Hotu cave "vole-eaters" (3 skeletons, 2 samples)	9190 ± 590 9220 ± 570
CC-H. "s.h."	Hotu cave "seal-hunters"	11,860 ± 840
	Davy-Faraday dates (43, 60)	
F-40, T.S. "L."	Tell es-Sultan lower ("hog-backed brick") phase, two different pretreatments	8725 ± 210 8805 ± 210
F-44, J.	Jarmo village (II-5)	6650 ± 170
F-45, J.	Jarmo village (I-8)	6570 ± 165
	Geochronological Laboratory London dates (42)	
GL-24, T.S. "Ch."	Tell es-Sultan "chalcolithic"	5210 ± 110
GL-28, T.S. "U"	Tell es-Sultan upper ("plastered floor") phase	8200 ± 200
GL-38, T.S. "U"	Tell es-Sultan upper ("plastered floor") phase	7800 ± 160
	Groningen dates (61)	
GR-942, T.S. "U"	Tell es-Sultan upper Tell es-Sultan "chalcolithic"	5210 ± 110
GR-963, T.S. "U"	Tell es-Sultan upper ("plastered floor") phase	8785 ± 100
	Heidelberg dates (62)	
H-138/123, W. "Ub."	Warka, basal "Ubaid" town	6070 ± 160
	Lamont dates (63)	
L-180A, K.G.I.	Kili Ghul Mohammed village, I	5300 ± 500
	Pennsylvania dates (64)	
P-53, K.K. "M."	Kara Kamar cave "mesolithic"	10,580 ± 720
	Washington (U.S. Geological Survey) dates (65)	
W-89, H.F.	Haua Fteah cave (evolved blades and microliths)	7300 ± 300
W-97, H.F.	Haua Fteah cave (evolved blades and burins)	12,300 ± 350
W-98, H.F.	Haua Fteah cave ("primitive 'Neolithic' ")	6800 ± 350
W-104, H.F.	Haua Fteah cave (compare W-97)	10,600 ± 400
W-179, S.B.	Shanidar cave, B (basal "Zarzian")	12,000 ± 400
W-245, B.S. "Gh."	Beersheba "Ghassulian" village	5280 ± 150
W-607, J.	Jarmo village (PQ-14, 2.5 m)	9040 ± 250
W-617, M.	Mersin village (basal layer)	7950 ± 250
W-623, M.	Matarrah village (VI-4)	7570 ± 250
W-627, B-A.	Byblos A village	6550 ± 200
W-651, J.	Jarmo village (II-4) (1950-51)	8830 ± 200
W-652, J.	Jarmo village (I-7a) (1950-51)	7950 ± 200
W-657, J.	Jarmo village (PQ-14, 2.25 m)	11,240 ± 300
W-660, H.	Hassuna village (5th level)	7040 ± 200
W-665, J.	Jarmo village (N-18, 2.0 m)	11,200 ± 200

able radiocarbon dates for other roughly comparable materials in the Near East, which were all considerably later, Kenyon was forced to see the Tell es-Sultan material as something which developed without respect to the chronological and developmental framework of the area in which it lay (*48*).

With earlier radiocarbon dates now available elsewhere, this view is no longer necessary. My own tendency, in assessing the dichotomous complexity and primitiveness of the Tell es-Sultan catalog, along with the peculiarity of the ecological niche in which the site lay (some 900 feet below sea level, in an arid valley), is still to suspect that there is some "geobiochemical" contamination in the radiocarbon samples. The site lies in an area of tectonic activity, and faults have been noted, both in the site (*49*) and near it (*50*), as well as upward seepage of radioinactive natural gases (*51*). The contamination possibility, however, clearly calls for competences in assessment which the archeologist does not possess. In addition, on the archeological side, there would certainly not be general agreement with Kenyon's reading of the comparative archeological stratigraphy of her site.

The controversy has been of some culture-historical importance for the reason that Kenyon and her colleagues (see *4*) have raised again the old issue of the "propinquity theory" for an oasis origin of agriculture and animal domestication. In spite of its arid, below-sea-level situation, Tell es-Sultan does lie adjacent to an excellent fresh-water spring. But the evidence for the origins of domestication —while still limited and badly in need of further bolstering—has increasingly pointed rather toward the upper piedmont and intermontane valley zone of the "hilly flanks of the crescent." This not only appears to have been the natural habitat for the potentially domesticable wild plants and animals but also seems to have had no important climatic variation since later upper Pleistocene times. While to take this view may be to ignore certain minor depositional features, especially in the first millennium B.C., which may have been climatically determined (*52*), one does feel justified in making a general assessment of the environmental situation of some 10,000 years ago in terms of the present situation. In fact, it is not clear that, in the core area of the Near East, the late glacial to early postglacial time boundary was at all an "event" in climatic or environmental terms. Some allowance must naturally be made for the loss of vegetation through overgrazing and charcoal burning, and for the extinction of certain wild animals (hunting from Ford model T's finished off the onager about 1928!). Our reconstruction here is founded on the proposition that the available evidence does locate the natural habitat in the hilly flanks zone, and that domestication took place within this natural habitat.

Fig. 7. Air view of the village-farming community cite of Jarmo, in the intermontane valley of Chemchemal, Iraqi Kurdistan. The base exposed in the cut at the extreme right is virgin soil; the grid squares in the center were for the purpose of exploring the village plan in the uppermost levels. [Courtesy of Iraq Petroleum Co., Ltd.]

There are, of course, more excavated sites upon which to base our reconstruction than those which are indicated in Fig. 5 (*53*). But there are by no means enough. Our knowledge of the potentially rich (from the point of view of natural habitat) districts of Iran, Turkey, and Syria is almost, if not completely, blank, and little has been done in this range of interest in Egypt in some years. This situation reflects in part the prevailing unfavorable circumstances discussed above for making an up-to-date prehistoric excavation (Fig. 9) and in part the great cost of mounting a well-rounded expedition (with a proper staff complement of natural scientists). Hence the reconstruction may be, to a degree, an artifact that reflects the incompleteness of the record. A fairly recent assessment of much of the area is available (*37*), and it will therefore not be necessary to name too many of the sites involved.

Incipient Cultivation

Figure 6, which was developed as an overlay on Fig. 5, indicates how the principle of sloping horizons (*12*, p. 34) for the successive eras must be involved in thinking about the subregions of the Near East. I have suggested above the general picture given by the archeological materials for the range of Pleistocene times in the Near East. The means of obtaining food during the whole range was through gathering or collection; the range is usually referred to as the food-gathering stage. If the stage had substages or eras, the last of these was one of more intensive collection—a more intimate "living into" a given environment. We noted that the Kebaran of Palestine and the Zarzian of Iraqi Kurdistan appear to have terminated this era, sometime after 10,000 B.C. [The newly announced date of the upper part of the Shanidar Zarzian is about 8650 B.C. (*31a*).] The data

in Fig. 6 suggest, however, that food collection was continued in areas adjacent to the central core of the Near East, and certain materials in caves on the Caspian and Libyan foreshores suggest even further intensifications in collecting activities. In connection with these peripheral areas, the notion of a "mesolithic" stage has been advanced, as in the case of northwestern Europe, to describe archeological materials showing cultural readaptations—still on a food-collecting level—to the post-glacial environment. The notion will gain validity only if a significant environmental change can be shown to have occurred.

It appears increasingly doubtful, however, whether this or any other meaningful concept of "mesolithic-ness" can be applied to the core area. In Iraqi Kurdistan, the next materials (following the Zarzian), from Karim Shahir and comparable sites, which are simple open-air establishments, suggest an incipience of cultivation. One of these open sites, Solecki's Zawi Chemi (*26*), now has a newly announced radiocarbon date of about 8900 B.C. (*31a*, *41*). In Palestine, these are paralleled by the Natufian materials, still primarily in caves but perhaps slightly more convincing as evidence of an era of incipient cultivation. An important Natufian open-air site has just been announced for northern Palestine by Jean Perrot (*54*). This era prefaces the swing from the food-gathering to the food-producing stage. Its catalog includes some suggestion of animal domestication, some authorities claiming domestication of the dog. There are flint sickles for reaping, crude milling stones for grinding seeds, and celts; the latter may have been used as either hoes or axes, or as both. Further delineation of this era is very badly needed, and since the era was one of transition and, doubtless, of making-do with some old tool types, it will be an exceedingly difficult one to substantiate fully. The era is still characterized by flint blade tools and microliths. The probability is that the natural scientists will do better here than the conventional archeologists.

Village-Farming Communities

Next, in the core area, comes the first phase of fully settled village sites, of which Jarmo is simply the earliest example which happens so far to have been found. In the next phase of the village-farming community era, which rather quickly succeeds the Jarmo phase, there are at least five regionally different village assemblages (catalogs of artifactual materials): those of Hassunan type in the upper Tigris piedmont, those of the Amouq A-Mersin type of Syro-Cilicia, those of the third (?) Tell es-Sultan-Abou Gosh type in inland Palestine, those of the Fayum A type in Egypt, and those of the Sialk I type in northern Iran (*11*, *37*). Unless the radiocarbon dates on the Fayum A of Egypt (samples C-457, -550/1) are wrong—and more samples should be counted—the principle of the sloping horizon is clearly involved. This, of course, has a bearing on the actual chronological position of the Tell es-Sultan materials.

The earliest of the village-farming communities appear to have clustered still within the natural habitat zone of the upper piedmont and intermontane valleys of the "crescent," where the wild wheats, barley, sheep, goats, pigs, cattle, and some kind of equid were all at home in nature. It has been suggested that the development was bound to this zone until permissive mutations (*55*), or introgressive hybridization (*56*), operated, especially on the plants, to allow the domes-

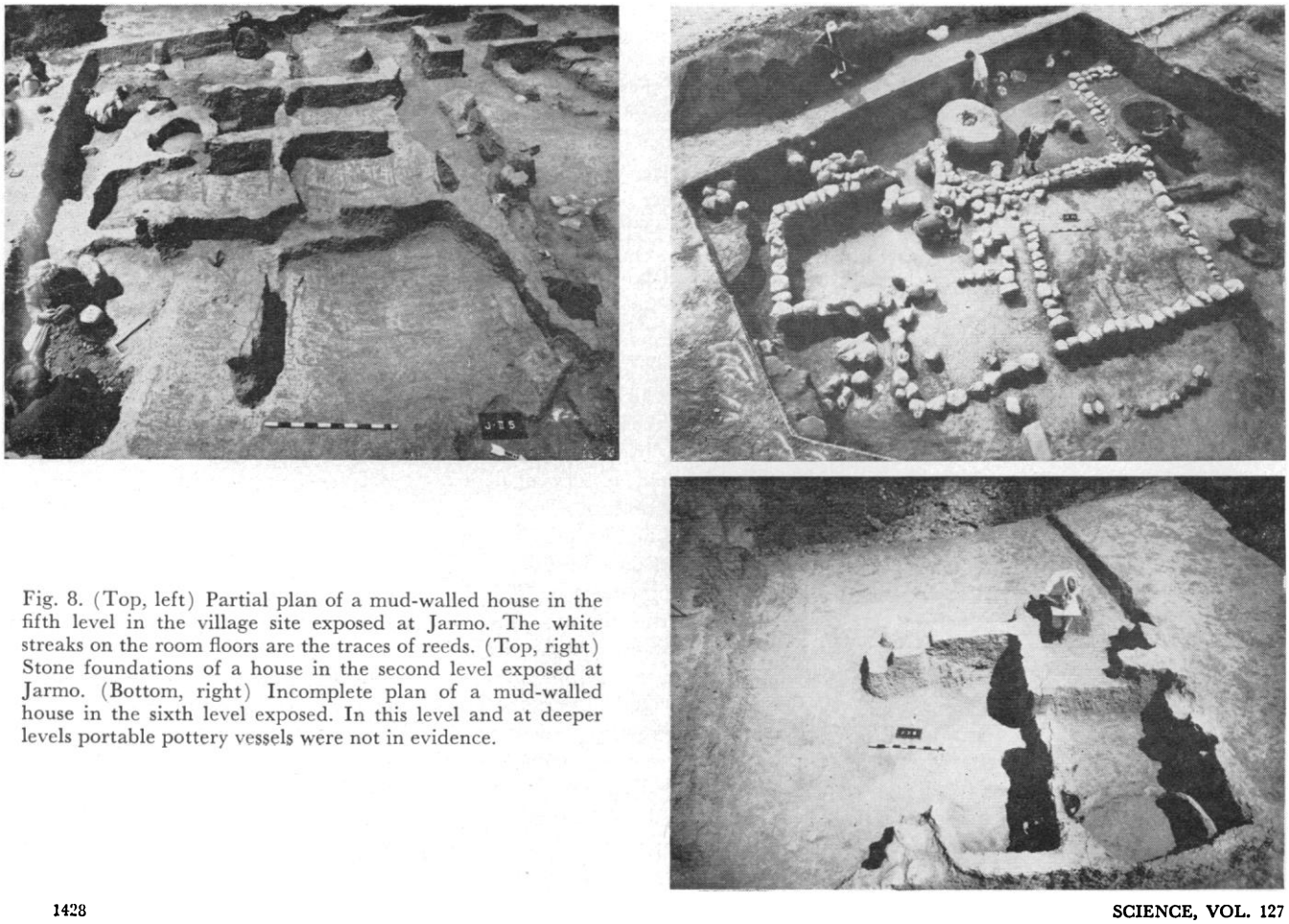


Fig. 8. (Top, left) Partial plan of a mud-walled house in the fifth level in the village site exposed at Jarmo. The white streaks on the room floors are the traces of reeds. (Top, right) Stone foundations of a house in the second level exposed at Jarmo. (Bottom, right) Incomplete plan of a mud-walled house in the sixth level exposed. In this level and at deeper levels portable pottery vessels were not in evidence.

Fig. 9. (Left) Konservator Hans Helbaek of the Danish National Museum, Abullah Said Osman, field superintendent of the Oriental Institute's Iraq-Jarmo project, and Mrs. Robert Braidwood examine a wheat field in the Chemchemal valley. (Right) The "division" of antiquities excavated at the village site of Jarmo. H. E. Dr. Naji al-Asil, director general of antiquities for the Iraqi Government, is in charge.

ticates to be removed from their natural area. The curve in Fig. 6 is inflected to suggest more general spread after this had taken place (*57*).

One consequence of this spread was the diffusion of the wheat-barley-sheep-goat-cattle complex, and much of the generalized cultural know-how which had developed with it, to the boundaries of the Near East and far beyond, wherever the environmental situation allowed such spread. We have hints, through radiocarbon dating, that the new way of life had extended well up the Danube Valley by about 4000 B.C. (*46*) and that by 2500 B.C. it had pretty well covered Europe. It also went eastward; wheat, at least, was being grown in China by at least 1500 B.C., although it does not appear to have been the earliest domesticated plant there. A different consequence of the spread from the hilly-flanks zone of the natural habitat—given the mutations or hybridizations—was the apparent "fingering" movement of early farmers down the mud flats of the Tigris and Euphrates into classic southern Mesopotamia (*11*). This probably took place toward the end of the Hassuna phase or early in the succeeding Halaf phase. It is our suggestion that the principles of canalization were learned on these mud flats; canalization made the occupation of classic southern Mesopotamia by farmers feasible. The data in Fig. 6 suggest that a new era arose on this basis in southern Mesopotamia, and one radiocarbon date (sample H-138/123) indicates that this era was well under way by 4000 B.C. This was an era which is archeologically manifested by town-sized settlements, temple structures of some degree of monumentality, metallurgy as a specialized craft, and evidently (since they are already present at the beginning of the next era) the use of draft animals and the plow. Even in the first or Ubaidian phase of this era of towns, the strength of the new cultural potential of southern Mesopotamia is suggested by the *oikoumenē* of the spread of its painted pottery style—from the Mediterranean coast to the rim of the Anatolian plateau to the uplands of Iran (*17*).

This is the place to end our survey; the next era is that of the appearance of urban civilization in southern Mesopotamia, about 3500 B.C., followed by the beginning of the Egyptian dynasties around 3000 B.C., and by that time prehistory per se is theoretically ended in the Near East.

Conclusions

In summary, it needs to be repeated once more that what is offered here is only one prehistorian's interpretation of very incomplete evidence. For late upper Pleistocene times especially, much more must be learned of the environments which were available, of the human physical types (only one juvenile example and various fragmentary bits exist), and of the different cultural levels. Only snatches of evidence are now available for the era of incipient cultivation, which prefaced the great swing from the food-gathering to the food-producing stage, and very sophisticated environmental reconstructions will be necessary before the cultural achievements of this era can gain meaning. The same holds particularly for the earlier phases of the era of the settled-village–farming community. In reconstructing the general culture history of the Near East, for late glacial to early postglacial times, the concept of sloping horizons appears to be a useful one. It also appears that the zone of the natural habitat may have been a focus of "nuclearity," and that some eras and phases of cultural development may have been manifested there but not elsewhere (*58*).

It must be obvious how much the prehistoric archeologist needs the aid of his interested colleagues in the natural sciences. First and foremost, however, the prehistorian's business is with men—with the anthropology of extinct cultures. He needs to discover all he can about the plants and animals that lived with the men, but the plants and animals did not domesticate themselves. Men domesticated them. The prehistorian is very much aware of the innumerable "how" and "why" questions which still confront him. In the Near East, it is simply a matter of his requiring much more information from the good earth, and some help in interpreting it.

References and Notes

1. A good general geographical treatment of the area is W. B. Fisher, *The Middle East: A Physical, Social, and Regional Geography* (Methuen, London, ed. 2, 1952).
2. See H. E. Wright, Jr., *Sumer* 11, 83 (1955).
3. See V. G. Childe, *New Light on the Most Ancient East* (Routledge and Kegan Paul, London, ed. 4, 1952), p. 15.
4. R. J. Braidwood, *Antiquity* 31, 73 (1957).
5. Compare F. Bordes, *Anthropologie* (*Paris*) 59, 486 (1955) with D. Garrod, *Bull. Soc. préhist. franç.* 54, 439 (1957) and the general discussion by F. C. Howell in *Trans. Intern. Neanderthal Centen. Congr.*, in press.
6. F. C. Howell, *Am. J. Phys. Anthropol.* 9, 379 (1951); *Quart. Rev. Biol.* 32, 330 (1957); *Trans. Intern. Neanderthal Centen. Congr.*, in press. There is not yet, of course, complete agreement on this score, nor—Howell would maintain—complete understanding of the morphological positions of Swanscombe and Fontéchevade and of the full implications of the

liquidation of Piltdown. For the older viewpoint, see, for example, M. Boule and H. V. Vallois, *Fossil Men: A Textbook of Human Paleontology* (Thames and Hudson, London, (1957).
7. Compare R. J. Braidwood and C. A. Reed, *Cold Spring Harbor Symposia Quant. Biol.* 22 (1957) with C. O. Sauer, *Agricultural Origins and Dispersals* (American Geographical Society, New York, 1952).
8. V. G. Childe, *Man Makes Himself* (Mentor, New York, ed. 3, 1952).
9. ———, *Town Planning Rev.* 21, 3 (1950).
10. H. Frankfort, *The Birth of Civilization in the Near East* (Indiana Univ. Press, Bloomington, 1951); R. Redfield, *The Primitive World and Its Transformations* (Cornell Univ. Press, Ithaca, N.Y., 1953).
11. R. J. Braidwood, *The Near East and the Foundations for Civilization* (Univ. of Oregon Press, Eugene, 1952).
12. G. R. Willey and P. Phillips, *Method and Theory in American Archaeology* (Univ. of Chicago Press, Chicago, Ill., 1958).
13. R. J. Braidwood, in *The Identification of Non-artifactual Archaeological Materials*, W. W. Taylor, Ed. (Natl. Acad. Sci.–Natl. Research Council Publ. 565, Washington, D.C., 1957), pp. 14–16.
14. The major enabling grant—over and above the Oriental Institute's basic archeological field budget for its Iraq-Jarmo project—was made to the Department of Anthropology of the University of Chicago by the National Science Foundation. Supplemental grants came from the American Philosophical Society, the Baghdad School of the American Schools for Oriental Research, the Guggenheim Foundation, and the Wenner-Gren Foundation for Anthropological Research and from friends of the Oriental Institute.
15. J. C. Russel, soil scientist, chairman of the department of soils and agricultural chemistry of the University of Arizona, and recipient of a University of Arizona–Iraq College of Agriculture grant, has thoughtfully considered the matter in "Historical aspects of soil salinity in Iraq," a paper presented at the ICA–FAO conference of 30 Jan. 1956 in Baghdad.
16. H. Fleisch, *Quaternaria* 3, 101 (1956).
17. R. J. Braidwood, *Prehistoric Men* (Chicago Natural History Museum, Chicago, Ill., ed. 3, 1957).
18. H. L. Movius, Jr., in *Anthropology Today*, A. L. Kroeber, Ed. (Univ. of Chicago Press, Chicago, Ill., 1953).
19. G. Caton-Thompson, *The Kharga Oasis in Prehistory* (Univ. of London Press, London, 1952).
20. F. C. Howell, *Proc. Am. Phil. Soc.*, in press.
21. C. B. M. McBurney *et al.*, *J. Roy. Anthropol.* 83, 71 (1953); C. B. M. McBurney and R. W. Hey, *Prehistory and Pleistocene Geology in Cyrenaican Libya* (Cambridge Univ. Press, Cambridge, England, 1955).
22. H. E. Wright, Jr., and B. Howe, *Sumer* 7, 107 (1951).
23. R. J. Braidwood and B. Howe *et al.*, in preparation.
24. C. S. Coon, *The Seven Caves* (Knopf, New York, 1957). I have used this work as a direct source for radioactive carbon dates (see Table 1), since Coon has selected the single average dates (from a much larger number of date clusters) which seem most comprehensible to him.
25. R. J. Braidwood *et al.*, *Sumer* 10, 120 (1954).
26. R. S. Solecki, *ibid.* 13, 59, 165 (1957).
27. D. Garrod, *Bull. soc. préhist. franç.* 54, 439 (1957).
28. M. Stekelis and G. Haas, *Israel Exploration J.* 2, 35 (1952).
29. D. Garrod, *J. World History* (*Cahiers hist. mondiale*) 1, 14 (1953).
30. R. S. Solecki, *Smithsonian Inst. Publs. Rept. No. 4190 (1954)* (1955), p. 389.
31. For the meaning of the notation used with the counter numbers, see Table 1.
31a. R. S. Solecki and M. Rubin, *Science*, this issue.
32. H. Bobek, *Geograph. Jahresbericht Österr.* 25, 1 (1953–54); K. W. Butzer, *Erdkunde* 11, 21 (1957); M. Pfannenstiel, *Das Quartär der Levante* (Akad. Wiss. Lit. Mainz, Abhandl. math-naturw. Kl. No. 7, Wiesbaden, 1952), vol. 1.
33. It is worth pointing out that the flourishing of activity in the field of prehistory in Iraq is a direct reflection of the intelligent spirit in which the Iraqi Directorate General of Antiquities administers its antiquities law.
34. R. F. Flint, *Glacial and Pleistocene Geology* (Wiley, New York, 1957).
35. G. W. Barendsen, E. S. Deevey, L. J. Gralenski, *Science* 126, 908 (1957); H. E. Wright, Jr., *Am. J. Sci.* 255, 447 (1957).
36. Some authorities [for example, E. Antevs, *J. Geol.* 65, 129 (1957)] interpret the evidence as calling for an earlier late glacial–early postglacial time boundary, and Flint (*34*, p. 283) considers the difficulties involved if the time boundary is taken to be a unitary chronological "event" of world-wide validity.
37. R. J. Braidwood and L. Braidwood, *J. World History* (*Cahiers hist. mondiale*) 1, 278 (1953).
38. M. Rubin, personal communication.
39. Such typological assessments are based on the principle of assessing relative age by means of the relative technological complexity of items in the catalogs of several different archeological sites or phases [see G. Clark, *Archaeology and Society* (Harvard Univ. Press, Cambridge, Mass., 1957), p. 151]. The more restricted the region, the better the principle usually works, and it works best of all if "trade objects" link one phase to another. The principle need not imply physical (geological) stratigraphy at all, although sometimes this is also available for parts of the sequence.
40. Because of the internal consistency of its catalog of materials, from top to bottom, Jarmo can only be assessed as a "one-period" site. It seems inconceivable to me that its duration can have been over 500 years at most, and I tend to believe, in fact, that it was probably less. Thus the scatter of Jarmo dates, from C-744 (5266 ± 450 years before the present) to W-657 (11,240 ± 300 years before the present), is archeologically quite unrealistic. This seems to have no relation either to the counters [compare Beersheba in Palestine, where the Chicago counter's date (C-919) ran early and the Washington counter's date (W-245) ran late for the same horizon] or to the way the samples were collected from Jarmo (for example, W-651 was of the same batch of samples, collected in the same way, as the C-742, -743 cluster). My own conclusion is that "geobiochemical" contamination *in situ* must have something to do with the 6000-year scatter of Jarmo dates, and M. Rubin writes that he wholeheartedly concurs.
41. The finding of a new site with Jarmo type material at its base, superimposed by Hassuna-Samarran phase material, has recently been reported from a valley adjacent to that of Jarmo [see H. Ingholt, *Sumer* 13, 214 (1957)]. I believe that Solecki's (*26*) typologically earlier open-air site, Zawi Chemi, is of the preceding era of incipient cultivation and is to be considered as contemporary with Karim Shahir and several other Iraq-Jarmo project sites (*23*).
42. F. E. Zeuner, *Antiquity* 30, 195 (1956).
43. K. Kenyon, *Palestine Exploration Quart.* 89, 101 (1957).
44. ———, personal communication from Miss Kenyon.
45. ———, *Antiquity* 30, 184 (1956).
46. V. G. Childe, *ibid.* 31, 36 (1957).
47. Miss Kenyon is due an apology from me, and this is freely given. Basing my opinion on the only cluster of radioactive carbon dates from Jarmo available at that time (C-113, -742, -743), I strongly favored a "short" chronology [*Antiquity* 31, 73 (1957)]. The newer dates (see above) for Jarmo and other sites make a general "short" chronology untenable.
48. K. Kenyon, *Antiquity* 31, 82 (1957.)
49. J. Garstang, *The Story of Jericho* (Hodder and Stoughton, London, 1940).
50. F. E. Zeuner, *Geol. Rundschau* 45, 2 (1955).
51. M. Wheeler, *Walls of Jericho* (Chatto and Windus, London, 1956), p. 117.
52. H. E. Wright, Jr., *Bull. Am. School Oriental Research* 128, 11 (1952).
53. Data in Fig. 5 are restricted to the available occurrences which now have radiocarbon dates; compare Figs. 5 and 6 with Table 1 in reference *37*.
54. J. Perrot, *Antiquity and Survival*, 2, 91 (1957).
55. H. Helbaek [see *23* and also *Ann. Rept. Inst. Archaeol. Univ. London* 9, 44 (1953)].
56. J. R. Harlan, personal communication; see also *Brookhaven Symposia in Biol. No. 9* (1956), p. 191.
57. Obviously, the character of the curves in Fig. 6 depends, among other things, on the way the geographical columns (compare Fig. 5) are arranged. Thus, the sharp rise, followed by inflection, of the right side of the village-farming community curve depends on placing the "south Mesopotamia" column next to the "Tigris" column of Fig. 5. Early villages have not appeared in the rainless alluvium of southern Mesopotamia.
58. G. R. Willey and P. Phillips, *Am. Anthropologist* 57, 723 (1955); in an earlier version of their useful book (see *12*) they used the idea of a "preformative stage" in categorizing certain New World materials. They have now eliminated the "preformative," in part—if I understand them correctly (*12*, p. 105)—because of "the difficulty of finding criteria that would hold for all major areas of New World archeology." I think they may have been overly timid and that some "stages," eras, or phases may not have been affairs of universal validity but may rather have been manifestations of a given environment alone.
59. W. F. Libby, *Radiocarbon Dating* (Univ. of Chicago Press, Chicago, Ill., ed. 2, 1955).
60. From F. E. Zeuner, in correspondence.
61. H. deVries, *Science*, in press.
62. K. O. Münnich, *ibid.* 126, 194 (1957).
63. W. S. Broecker, J. L. Kulp, C. S. Tucek, *ibid.* 124, 154 (1956).
64. C. S. Coon and E. K. Ralph, *ibid.* 122, 921 (1955).
65. H. E. Suess, *ibid.* 120, 467 (1954); M. Rubin and H. E. Suess, *ibid.* 121, 481 (1955); M. Rubin and H. E. Suess, *ibid.* 123, 442 (1956); M. Rubin, personal communication.