

# Environment and Archeology

by K. W. Butzer

After agreement with author and publisher, 50 Associates were invited to participate in the Review\*. The first 20 who agreed to the terms were sent the author's précis and copies of the book, *Environment and Archeology*, by K. W. Butzer (Chicago: Aldine, 1964; 524 pp., 19 tables, 84 figures).

Seventeen reviewers responded in time for their reviews to be sent to the author for his reply. Printed below are the précis, the reviews by Lionel Balout, Pierre Biberson, W. W. Bishop, G. Bond, Robert J. Braidwood, Karl Brunnacker, T. van der Hammen, Richard L. Hay, Henry T. Irwin, Marvin W. Mikesell, Karl J. Narr, H. D. Sankalia, Günter Smolla, B. W. Sparks, J. E. Spencer, H. T. Waterbolk, and R. G. West, and the author's reply.—Editor.

## Author's Précis

The purpose of this book is the study and analysis of Pleistocene environments and their possible significance for prehistory. Pleistocene geology is primarily concerned with stratigraphy and chronology. What is needed is a more comprehensive study of past environments, a "Pleistocene geography" concerned with the natural environment and focused on the same themes of "man and nature" that are the concern of historical and contemporary geographies.

The first part (pp. 1-40) gives a very brief historical and methodological sketch of the role of interdisciplinary work on the Pleistocene and then attacks the basic problem of stratigraphy and chronology. The continental stratigraphy of Europe and the coastal stratigraphy of the Mediterranean Sea are outlined. Methods of dating are appraised and current information applied to Pleistocene chronology.

The second part (pp. 41-148) deals with the significance of vegetation, soils, and geomorphology as environmental indices and gives a non-technical review of relevant geomorphic processes, such as "periglacial" phenomena. A further chapter discusses modern mammalian distributions, including their relationship to the environment and their significance as a food resource for prehistoric man.

Part 3 (pp. 149-234) attempts a systematic description of Pleistocene sediments—stream, lake, wind, cave, slope, coastal—and the field or laboratory methods for their study. The terminal chapter focuses this information on the geomorphological investigation of archaeological sites. Part 4 (pp. 235-62) considers the biological sciences relevant to environmental reconstruction: palynology and past vegetation, palaeontology and prehistoric faunas. Although few or none of the methods presented in Parts 3 and 4 are likely to be applied directly by anthropologists, they may provide the student of prehistory with an outline of the more important techniques, as well as an understanding of their potential interpretation.

The regional reconstructions of specific Pleistocene environments in Part 5 (pp. 263-334) demonstrate current possibilities and limitations of this type of study. The emphasis on Europe, the Mediterranean lands, and northern Africa reflects the range of field experience of the writer. Much information is available concerning Late Pleistocene environments in North America, but it requires the attention of a specialist.

The final section on man-land relationships (pp. 335-471), also confined to the Old World, brings examples of the geographical setting to different stages of prehistory. The site examples (such as Torralba-Ambrona, Lebenstedt, Star Carr, Mugharet el-

Wad, Jarmo) all provide stepping stones within an obscure and controversial era. A number of cultural problems, such as australopithecine evolution, late Pleistocene extinctions, man's impact on the vegetation, post-glacial readaptations, agricultural origins and dispersals, and urbanization, are discussed from the geographer's perspective. The bibliography (pp. 472-510) concentrates on contemporary reference materials, with emphasis on the European literature.

## Comments

by LIONEL BALOUT

Paris, France. 4 II 66

*Environment and Archaeology* is a very good book, destined to be of great service both to students and to researchers. The reader is overwhelmed by the abundance and variety of the documentation and by the clarity, in spite of the complexity, of the exposition, which brings into play a great number of very diverse disciplines to treat the entire earth during the hundreds of thousands of years of the Pleistocene. Under such conditions, of course, it is difficult to be absolutely complete, and each specialist will have his own remarks to make.

For my part, I wonder whether the author's information on works in French is as precise as one might hope, especially regarding the Maghreb and the Sahara. No Saharan reference accompanies the name of H. Alimen, and his student J. Chavaillon is cited only for an article published in 1960, despite the fact that they have together proposed a classification of the Quaternary of the western Sahara based on climato-sedimentary cycles (see Chavaillon 1964 which includes a complete bibliography of the relevant research of both). R. Mauny does not appear except for a 1956 article, nor does T. Monod except for his synthesis in English in 1963; and the work of

such a specialist in the geography of the Sahara as R. Capot-Rey does not appear in the bibliography at all. J. Dubief is cited for an article in 1952, but apparently neither his communication to INQUA (1966) nor his monumental *Le Climat du Sahara* (1959-63) were utilized.

Similar remarks might be made about the Maghreb. Only the early works of R. Vaufray are cited and none of his very considerable African work (see Vaufray 1955 and its bibliography). All in all, the French geographers are very unevenly utilized. It is a surprise not to find any of the works of J. Dresch or of Quaternary geologists like Castany in Tunisia. One could find other examples without any trouble; but that is not the most important thing.

Butzer's fine book is very exactly characterized by its subtitle: "An Introduction to Pleistocene Geography." It is necessary to underline the fact that this is a matter of an *introduction* to a treatise on Pleistocene palaeogeography, a treatise which it would be premature to attempt to write. The author quite correctly places the accent on the indispensable interdisciplinary work, and it is primarily to that work that he exposes us. I fully approve of the application of the terms "geography" and "ecology" to the Pleistocene, although one might have preferred "palaeogeography" and "palaeoecology."

The main part of the book is devoted to an analysis of research methods in the different disciplines. These chapters perform services comparable to those of *La Découverte du Passé* (Laming *et al.* 1952). The necessity to condense in the extreme has led to choices which I can not always agree with: the Pre-Würmian position of the Ouljian (p. 26), for example, and the judgment made on the palaeolithic strata of the Somme Valley, based on the work of Breuil and Koslowski, which is largely outdated (pp. 223-24). In regard to the pluvial terraces of the desert zone, those of the Saoura are not even mentioned (p. 224), in spite of the work of Alimen and his collaborators. As a type of lacustrine stratum, the Aïn Hanech (Algeria) is on a par with Ternifine (p. 226). In regard to surface occurrences (p. 232), the importance of buried stages recently revealed by erosion should not be neglected, especially in the Sahara.

The fifth and sixth parts of the book interest the prehistorian more directly. The former portrays certain Pleistocene landscapes of the Old World—in Central and Mediterranean Europe, the Sahara, and East Africa. In so broad a frame, the author is forced to bring together a variety of information of unequal value. On the problem of *limons rouges*, for example

(p. 297), above all with reference to the western and central Sahara, what the author has come up with is in part based on a compilation of French works made in 1962 by S. Schanfeld. The problem of the climatic vicissitudes of the Pleistocene Sahara is mentioned only in passing (p. 310).

The prehistorian will be perplexed at the preference for an economic classification of prehistoric civilizations over one based on industries and typology-stratigraphy (pp. 341-42). Typological diagnosis is treated summarily in Figure 59, where the Levalloisian character of the flakes is not specified. The problem posed is much vaster than these remarks indicate. The palaeogeography of prehistoric times cannot be reconstructed on a continental scale before it has been done on the scale of local conditions during a given period.

These observations only call attention to some limited questions. They leave intact the essentials of the work, which represents an important step toward a revival of the geography of the Quaternary.

by PIERRE BIBERSON

Paris, France. 21 III 66

The work of our distinguished friend and colleague Karl W. Butzer is of the greatest interest to researchers studying his Quaternary. It represents an extremely precise application of modern techniques of investigation which will be of the greatest service to geologists, geographers, anthropologists, palaeontologists, palynologists, and prehistorians in introducing all of them to the problems and methods of each.

As a prehistorian and quaternarian oriented particularly toward the study of the lower palaeolithic of Africa and its environment, I will confine myself to some brief remarks on several points within my field of research which recent datings of absolute age by analysis of  $\text{Th}^{230}\text{-U}^{234}$  may in part illuminate.

Butzer (p. 26, Table 3, column "Morocco") places the Harounian, which he calls Kebibatian (Choubert's "Rabatien": Gigout's "Episode de Kebibat"), at the end of the Holstein, before the Tensiftian (that is, the Moroccan Riss). This position appears to me to be difficult to support, even if, following Gigout (1962), one places the Ouljian in the inter-Tensiftian-Soltanian, and thus the Riss-Würm (Eem); for according to Butzer himself, the beginning of the Holstein would date at least from 275,000 years B.P. (p. 40, Table 6). The Ouljian has just been dated by  $\text{Th}^{230}\text{-U}^{234}$  at 70,000 to 90,000 years B.P. (Stearns and Thurber 1965), which corresponds well to the period im-

mediately preceding the Würm *sensu stricto* (65,000 B.P.) and following the Tyrrhenian II—"Eutyrrhénien" (Bonifay and Mars 1959), our Moroccan Harounian—(115,000 to 140,000 B.P.), especially at Monastir; thus it is immediately before the "Warthe Stadial" but long after the Saale (200,000 B.P.) and thus much later than the Holstein (250,000 B.P.).

Between the Harounian and the Ouljian, I have defined a "Presoltanian" (Biberson 1963); according to the latest datings, it falls between 115,000 and 90,000 years B.P. and corresponds perfectly to the faunal zone "W" of the North Atlantic. Ericson *et al.* (1961) considers it a primordial stage of the Würm (i.e., a kind of Pre-Würm), a stage often envisaged by numerous authors, but which some (e.g., Rosholt *et al.* 1961 and others) interpret as a final episode of the Riss. It corresponds to the Warthe Stadial (Butzer, p. 39).

Nevertheless, Stearns and Thurber's recent datings show clearly that the Ouljian is not, as Gigout (1962) has held, the equivalent of the "Eutyrrhénien" of Bonifay and Mars, since the former is dated from 140,000 to 115,000 B.P.

On the other hand, if one takes the position that the Harounian is not the equivalent of the Mediterranean "Eutyrrhénien," what is to represent the latter in Morocco? Conversely, what would correspond to the Harounian in the Mediterranean?

For my part, I remain persuaded that the Tensiftian is preceded by the Anfatian and followed by the Harounian. Whether the "Presoltanian" is a "Post-Rissian" or a "Pre-Würmian" matters little in this context. In any case, it seems to me that Butzer's Table 3 ought to be corrected lest it create misconceptions.

by W. W. BISHOP

London, England. 28 II 66

In view of the interdisciplinary scope of this volume, detailed critique from the single viewpoint either of an archaeologist or of individual workers in the field of palaeoenvironments would be unfair. As a geologist I might be tempted to point to the inadequacy of a mere 16 pages to cover humid, arid, and tropical geomorphology, but it would be churlish to proceed in this vein.

The value of the book lies in its spanning a large sector of an interdisciplinary no-man's-land. Here, sniping from flanking specialists is easy to sustain but serves no purpose, as the author's broad aim is clearly stated as "the study and analysis of Pleistocene environments and their possible significance for prehistory."

Critical comment seems warranted,

however, with regard to the neglect of the most important aspects of certain former environments, particularly in a crucial area for the study of prehistory and the evolution of man as a tool-maker.

Discussion of former climates in Africa is correctly restricted to the late Pleistocene, as for earlier periods the evidence is still to seek. However, in East Africa any discussion of climatic influences, even in the late Pleistocene, must be accompanied by mention of the important and contemporaneous changes in the physical environment. In reconstructing a meaningful palaeoecology in a realistic local environment, key factors are the tectonic movements and volcanic activity which modified man's East African habitats throughout the Pleistocene and into the Holocene.

Lakes were drained, ash falls blanketed the landscape as volcanoes erupted, and escarpments were elevated while succeeding hominine generations sought a water supply and a livelihood near the margins of intermittent rivers or on transient lake strands. It seems unfortunate that volcanic landforms and characteristic deposits could not be treated in Part 3. It is grossly insufficient merely to comment of lavas or volcanic ashes that "they have stratigraphic value at best" (p. 230). The lack of such a chapter is particularly odd in view of the importance of volcanic products in the primary burial of former landsurfaces and soils, in the stratification and mineralisation of fossils (briefly referred to on p. 248), in providing bulk detritus for reworking and deposition in lakes and rivers, in revolutionising the local relief (and microclimate), in contributing to the fertility of a region and, most recently, in providing a chronology for man's former environments, by palaeomagnetic or isotopic means (brief reference on p. 34).

I would agree with Butzer (p. 7) that in the past too many stratigraphical studies have neglected "a full interpretation of the immediate environment." But geological techniques are changing and developing. If geomorphology is to progress, it cannot afford to ignore any aspects of the ge which is not merely the prefix to its title but the very basis of the subject. From such a foundation it depends for its continued health on cross-fertilisation from many other disciplines, as is admirably illustrated by *Environment and Archeology*.

Again, it is probably true that stratigraphy and chronology have been unduly emphasised in the past. However, it detracts from the value of an interdisciplinary volume, which rightly stresses that "environmental reconstruction is the higher goal of attainment" (p. 7), to omit any

aspects of the total environment.

It remains to note that palaeoecological reconstructions, with the aid of specialist biologists and earth scientists, have always been the concern of the stratigraphical geologist. Similarly, the placing of reconstructed environments into a chronological setting, again with cooperation from biologists and geophysicists where necessary, is historical geology and stands at the core of earth science.

In addition, Butzer would suggest that historical geography can be conceived as linking with prehistory and ranging into a new realm of Pleistocene geography. Such a concept seems strange to a geologist, but it is certain that many workers, archaeologists, geologists, biologists, geophysicists, and geographers too, will derive a greater interest in Pleistocene studies as a result of this most timely and stimulating survey.

by G. BOND

Salisbury, Rhodesia. 7 II 66

The content of Karl Butzer's book seems to fall somewhere between the main title and the subtitle. A single volume could not cover all the ground of environment in relation to archaeology, and yet this book is a good deal more than an introduction to Pleistocene geography. The author's foreword indicates that it grew out of lectures and seminars conducted by him, and those students who have taken his course at first hand can count themselves extremely fortunate. The sequence of sections is logical, and the main aim is not lost to sight.

Emphasis is laid on the necessity for interdisciplinary attack on the problems of the Pleistocene, and where descriptions are given of the results of team studies of particular problems, it is abundantly clear how desirable this approach really is. In one who works in Africa south of the Equator this induces envy of the opportunities for research which have been available elsewhere. It emphasises how far behind we are in our Pleistocene studies, how thin we are on the ground, and how speculative and insecure much of the work in this region has been in the past.

Butzer shows a remarkable grasp of the wide range of specialisations which can be brought to bear on problems of Pleistocene geography. It is as well that the book has been written by a single author. If he had taken the easy path of inviting a number of specialists to write sections, the book would have run to a number of volumes instead of one. The result, however, is that the treatment is some-

what uneven and suffers inevitably from overcondensation. Part 3, for instance, contains in 80-odd pages descriptions not only of just about every type of Pleistocene deposit and process, but also of laboratory methods for their investigation. This cannot be more than an outline, and any student wishing to learn a technique of laboratory treatment will have to turn up the list of references and find amplification elsewhere. For those with access to good libraries this will be no hardship, but reading the book in the context of Southern Africa one wishes that this could have been avoided. The lists of references are, nevertheless, a boon to those of us who work in the not-so-splendid isolation of this region. Butzer is a good linguist and has drawn on references which those of us less gifted with tongues and with less access to the literature will find an absolute godsend. This is one of the great virtues of this book, and it has many others.

Its only real disappointment to me was the extremely scanty treatment of Central and Southern African problems. This was naturally the material for which I looked first. Perhaps this brevity is merely a reflection of the very small volume of solidly based research which has so far emerged. It is counterbalanced by the broad review of skilful interdisciplinary researches in better-known areas, which shows the kind of progress which we may one day achieve here.

There are a few details which call for comment. The comparison of the past with the present (p. 163) is a point which could be stressed more often. Surface textures of sand grains are discussed (pp. 170-71) so briefly that almost nothing is left. I would have preferred some other choice of wording than glacial *intervals* (p. 176). "Interpretation of alluvial deposits in dry lands must be studied in relation to contemporary environments in each particular case" is good advice, but the bald statement later in the paragraph that "The polemic as to whether alluviation or downcutting indicates greater aridity or greater humidity... is unnecessary" is unconvincing in Central and Southern Africa. The paragraph on the relation between tectonics and terraces (p. 181) is excellent.

There are two geographic inaccuracies which should be put right in the next edition. On page 364 Kalambo Falls is said to be in Tanganyika. The Kalambo River is the boundary between Zambia (Northern Rhodesia) and Tanzania (Tanganyika) but all the excavations have been on the Zambian side. More serious perhaps is that

Broken Hill is in Zambia, not Southern Rhodesia (p. 375).

On page 259, a sentence ending "...consisting partly of one organic oozes" suggests a slip in proofreading, and on page 388 skins are referred to as "tanned" when "brayed" would probably be more appropriate.

These, however, are minor, almost carping, criticisms. This book is a valuable and a welcome one.

by ROBERT J. BRAIDWOOD

Chicago, Ill., U.S.A. 2 II 66

Since my competence lies particularly in the area of Butzer's Chapter 29—"Agricultural Origins in the Near East as a Geographical Problem"—these remarks pertain largely to that chapter. Given Butzer's far more general palaeogeographical interests and the fact that while he is quite familiar with Egypt he has not yet worked in southwestern Asia itself, the chapter is indeed remarkably good. There is both discrimination and balance in Butzer's handling of the material available to him.

In particular, the last two sentences of the chapter deserve quoting:

It seems unlikely that the cultural innovation of the Near Eastern hearth of domestication was associated with any dramatic ecological changes at the close of the Pleistocene. Instead, a bountiful natural environment with a fortuitous assembly of suitable domesticates presumably favored the geographic location of the Near Eastern hearth.

We must assume that this book was written in 1963 at the latest. Much new evidence has come to hand since then, the later prehistory of the eastern Mediterranean being a focus of very active archaeological interest. A brief addendum to Butzer's chapter will be useful.

There is probably no need to amend Butzer's generalization that the late Pleistocene hunter-collectors of the southwestern Asiatic region were neither remarkably progressive nor specialized as compared to their western or central European contemporaries. Hole, Howe, and P. L. Smith have recently recovered significant new material for this range in the Zagros-Tauros region, as have Kökten and Bostanci on the southern coast of Anatolia, and Perrot and his associates on the Syro-Palestinian littoral. To what degree the peoples of his range were "particularly fond of cave habitation," as Butzer puts it, is not clear. Caves are a traditional locus of attention for prehistorians, but surveys have increasingly indicated open-air sites as well (very few of which, however, have yet been excavated).

Questions as to how, when, and where the general range of hunting-collecting terminated are still very

much with us. Certainly the termination was not uniform in time or aspect for the whole region. My "level of incipient cultivation and domestication" (a convenient heuristic device offered in 1949, following a suggestion of Julian Steward's, but always admittedly very difficult of identification) may have begun much earlier than we first supposed. It may also have lasted much longer in certain sub-regions than we first supposed. In fact, Jean Perrot now questions whether effective food-production was actually practiced along the eastern Mediterranean littoral until sometime after 5000 B.C. This suggestion, admittedly *bien fragile* as yet, underlines the lack of primary evidence of domestication, certainly in the Natufian and in the P.P.N.A. (Tell es-Sultan-Jericho) horizons. In this connection, Butzer is certainly right in treating the alleged artifactual evidence for domestication (e.g., "sickles," "milling stones," "hoes," etc.) as highly secondary at best. Plant identifications by Helbaek at Beidha and by Van Zeist at Ramad suggest that the P.P.N.B. horizon may have been food-producing in some degree. On the other hand, just as Sultan P.P.N.A. itself and Perrot's Mallaha open-air Natufian have quite substantial architecture (implying year-round, multi-generational occupation), so do Bouqras and Muraibet on the Middle Euphrates, and these again are without clear evidence of either plant or animal domestication. Naturally, materials from some of the most recent of these discoveries remain to be processed, but the excavators and their natural-science advisors have been very conscious of the problem, and the preliminary word is so far negative. We may soon find ourselves faced squarely with the questions, How complex and how permanently settled may intensified hunting-collecting societies have become in southwestern Asia? What criteria (if any) might we use to identify "incipient" domestication? What do such expressions as "cultivated wild grain" (Helbaek) or "herded wild goats" (Flannery) really imply?

My early suggestion that the incipience of food production, in southwestern Asia, was limited to the "hilly flanks zone" has since proved too restrictive. Flannery, following my more recent suggestion (Braidwood and Willey 1962:337), has recently restressed the importance of the environmental diversity afforded by the Zagros-Tauros flanks. Hole's work on the Ali Kosh sequence promises to throw most significant new light on this general problem focus along the Zagros flanks. It is indeed important that the site, with its pre-Jarmoan indications of the manipulation of plant and animal forms, appears at such a

low elevation on the flanks. At the other extreme, there is brief word-of-mouth news that P. L. Smith and Cuyler Young have just exposed an evidently very early village site in the high Kermanshah valley in the Zagros. No word is yet available of its plant and animal evidence.

Our own joint work with Istanbul University in 1964 on the flanks of Tauros in southeastern Turkey yielded a surprisingly well established village, Çayönü, with hot-hammered copper artifacts and four reasonably conformable radioactive carbon determinations averaging ca. 7000 B.P. Detailed study of the plant and animal remains is not yet complete, of course, but preliminary examination indicates that apparently barley and emmer, sheep and goat were domesticated. But Çayönü, while its inventory is certainly not directly comparable, has a somewhat Jarmo-like complexion. Unfortunately, we have not yet certainly identified sites of the preceding incipient horizon.

To the northwest, on the Anatolian plateau, we now have Bordaz' site of Suberde to add to Butzer's noting of basal Haçilar, and there is evidence that the two are close in age and of essentially comparable typological complexity. Study of the very considerable bulk of faunal material from Suberde is not yet complete; so far there is no certain evidence of domestication. For a later horizon, the determinations given in volume 7 of *Radiocarbon* tend to substantiate my hunch that Mellaart's Çatal Hüyük materials pertain mainly to the general level of the Halafian, of which assemblage they may yet prove to be a westerly cognate.

In sum, the implications of this addendum certainly do not detract from the value of Butzer's chapter. Had I been asked, before the event, to predict when the birth of such a book as Butzer's might be expected, I would certainly have said 10 years from now. But if the infant was indeed immature, it is nevertheless doing fine. I look forward to many useful revisions as it matures.

by KARL BRUNNACKER

Köln, Germany. 15 II 66

The aim of the author is to illustrate the methods by which the environment of Pleistocene man can be reconstructed. Up to now it is problems of the stratigraphy that has been most prominent in Pleistocene research; for instance, it was only a short while ago that the study of periglacial environments became a tool of research. Glaciology, geomorphology, and stratigraphy predominate in most well-known textbooks on the Quaternary. However, Quaternary research on an international scale during the last 20

years has gone far beyond this in its research methods. On many questions, completely new concepts have resulted, and textbooks representing the most advanced state of knowledge of a decade ago are already somewhat out of date. We have to recognize, however, that the extremely wide range of the subject of research exceeds the capacity of a single author.

The book covers a wide range of topics and includes consideration of those continental areas which were not actually glaciated and which are of much interest to the Quaternary researcher. The detailed discussion in English of several problems of the Old World (Parts 5 and 6) is especially welcome. The work frequently benefits from the results of the writer's special research, especially in the dry-warm climatic zones.

Nevertheless, the last two parts could have been shortened in favour of the other sections. Recent advances in molluscan studies could have received a more detailed discussion, and so could the problems of palaeopedology. Both these disciplines have, for the most part, broken free from the purely stratigraphical approach and taken up the environmental. However, this is less a criticism than a suggestion, for we must consider that were each of the 31 chapters of the book written as a separate monograph there would still be gaps.

Butzer's book is a sound introduction to the Quaternary insofar as its aim is to show the relationship between man and his natural environment. Beyond this one cannot go, but then, it is evident from the text itself, that the author does not intend this. Seen in this light, his description of Pleistocene geography and its methods is eminently successful. The book is well illustrated with figures and tables.

by T. VAN DER HAMMEN

*Leiden, Netherlands. 24 I 66*

It was a pleasure for me to read Butzer's book, and certainly not only because the subject is one of my special interests. The book's approach is in my opinion a good one, and there is no doubt that such a book has been badly needed by all those who work in the wide field of Quaternary geography. It is certainly not easy to obtain sufficient knowledge of all the sciences involved in addition to one's own specialisms. The chapters on soils, sedimentation, palynology, etc. are excellent short introductions to the different sciences that make a rapid orientation possible. Another of the merits of the book is that it brings the recent advances in Pleistocene geology and chronology to the archaeologist in an easily accessible form. It is im-

possible for the archaeologist to follow all the latest literature on these subjects, and therefore there is always a discrepancy between, for instance, the chronostratigraphical terminology of the archaeologist and that of the Quaternary geologist. Also important for the archaeologist is to learn how controversial the Milankovitch curve is today.

Since it is of course impossible for one person to judge the content of all the different chapters, I will only make some remarks on matters falling within my own field of knowledge. These remarks are certainly not criticisms, but only possible suggestions for a next edition.

On page 37 it is suggested that the Pleistocene-Holocene boundary lies closer to 11,00 B.P. (ca. 900 B.C.) than to 7912 B.C. However, ca. 11,00 is very close to the beginning of the colder Younger Dryas time. Potential limits are ca. 13,700 B.P. (possible beginning of the Late Glacial), ca. 12,400 B.P. (beginning of Bølling interstadial *sensu stricto*), ca. 11,800 B.P. (beginning of Allerød interstadial) or ca. 10,300 B.P. (beginning of Preboreal). The last-mentioned date is rather generally accepted in Europe as the Pleistocene-Holocene boundary. However, no binding statement was made on this matter on the last Inqua congress, as no agreement was reached.

I feel that a relatively extensive treatment of the coversands would add substantially to the value of the chapter on aeolian sediments (Chapter 12). A treatment of coversand stratigraphy (perhaps in another chapter) seems to be equally important.

Chapter 16 gives a good general picture of palynology. However, I think that it may be important to discuss more extensively the influence of succession of plant communities and of local production in peat deposits (*Betula* in *Sphagnum* bogs, *Betula nana* in tundra-peat, Cyperaceae in sedge-peat, etc.) and the misinterpretations that are possible if this is overlooked.

On page 240, a good addition would be to mention the now widely used method of gravitative separation of organic material and clay in a mixture of bromoform and alcohol gravity (specific approx. 2), eventually with the aid of ultrason.

On page 241, it might be mentioned that a 1000 × magnification (100 × oil immersion objective) is often necessary for safe identifications of certain species. It seems to me that a slightly more extensive treatment of different types of pollen diagrams would facilitate the reading of them for the non-specialist. The Iversen

diagram (including both AP and NAP in the sum) is widely used for Late Glacial and Glacial pollen diagrams, while other types of diagrams have been used for tropical coastal sediments, etc.

On page 268 the chronology of the last glacial is treated. In the past two years new data have become available from Western Europe (partly unpublished) that change or complete this scheme. In the Netherlands two interstadials are now known, dated in many places at about 29,000-30,000 years B.P. and 38,000-39,000 B.P. These dates correspond to C-14 dates now available from the classical Paudorf soils of the loess region (Vogel and van der Hammen, in preparation; Zagwijn, Vogel, Maarleveld, and van der Hammen, in preparation). It seems probable now that the whole interval between ca. 40,000 and ca. 28,000 B.P. corresponds to the long "interstadial" in the curves of Emiliani. This information was, of course, unknown to the author; it only shows how fast the science is advancing.

Frenzel's map is mentioned on page 276, and in Chapter 19 the Mediterranean region during the Late Pleistocene is treated. The long diagrams from Spain (Padul) and from Greece (Philippi) both show that open steppe-vegetation was very common during the Würm Glacial in at least part of the North Mediterranean (Menendez and Florschütz 1964; van der Hammen, Wijnstra, and van der Molen 1965). In Macedonia herb percentages of up to 95% were found, including some 60% of *Artemisia*. These data seem to be in contradiction with the corresponding part of Frenzel's map.

Finally, I would appreciate very much the addition of a chapter "Some Pleistocene Environments of the New World." We need it very much, and it would give still more universal importance to the book.

The above remarks are no more than suggestions for an eventual new edition. The author has given us a very valuable book with a new approach, and I wish to congratulate him on it. I hope that regular revisions will be possible, so that it will remain an up-to-date guide for many years.

by RICHARD L. HAY

*Berkeley, Calif., U.S.A. 3 II 66*

*Environment and Archeology* is an impressive contribution to the environmental analysis of Old World Pleistocene sediments. It is not only a highly competent synthesis of palaeoenvironmental information, but also a concise summary of the methods and basic theory of the different disciplines contributing to an environmental

synthesis. I was impressed most by the analyses of Pleistocene environments of the Old World and of man-land relations in prehistory, which reflect Butzer's fieldwork and original thinking. The summaries of different disciplines should be useful to the readers who are non-specialists, although specialists may not be fully satisfied with treatment of their fields.

As a geologist, I found the discussion of weathering and soils and methods of studying sediments not fully satisfactory. The discussion of soils, although generally sound, leans heavily on Kubiena, who emphasizes the role of climate more strongly, relative to time and parent material, than do most American pedologists. To cite a specific example, my pedologist colleagues disagree with the statement "Chemical weathering [in mid-latitude grassland soils] is not sufficient to develop a (B) horizon" (p. 87). This statement is true only if parent material and duration of weathering are specified.

The discussion of geomorphology is a good summary of the "classical" climatic approach but would have been strengthened by reference to some of the recent quantitative work, such as that of Langbein and Schumm (1958) showing sediment yield as a function of rainfall. This modern approach, showing the quantitative effects of varying a single factor, is leading to a much more accurate interpretation of Pleistocene sediments and alluvial morphology than has previously been possible.

The chapter on field and laboratory analysis is not well balanced, although I realize that 21 pages are too few for adequate coverage. Morphometric gravel analysis (including pebble orientation) is described in relatively great detail, yet no mention is made of measuring streamchannel orientation and fluvial cross-bedding as a means of establishing the palaeogeography, although laboratory study of heavy minerals is listed in this regard. Parenthetically it may be noted that Butzer does not use a definition of cross-bedding acceptable to most New World geologists. From his unconventional definition it follows that "cross-bedding is confined to stream and aeolian deposits" and "cross-bedded sand dunes are mainly confined to situations with several major wind components and are rare where one wind direction is dominant" (p. 153). These statements are at variance with geological literature.

The aims of some of the laboratory methods are not elucidated, and the average reader may be curious as to why "pH values should be determined [by sensitive electrometer!] for all paleosols and for the various strata of complex stratigraphic profiles" (p.

171), and why "the accurate determination of all particle size components (in the fine sands, silt, and clay) is imperative for paleosol examination..." (p. 169). In my opinion this short chapter on methods of sediment analysis could have been more profitably devoted to one or more case histories showing how information is gained by using a wide range of techniques. One of Butzer's studies would make an excellent example!

In over-all balance the book is an excellent one, and its weaknesses are inevitable in an interdisciplinary book of such broad scope. Butzer is to be complimented for this contribution.

by HENRY T. IRWIN

Cambridge, Mass., U.S.A. 9 II 66

The most important aspect of this book is that it is written by a Pleistocene geologist or geographer and directed toward an audience of prehistorians. In this sense the book is unique and considerably more valuable to its audience than other available texts, such as Flint's *Glacial and Pleistocene Geology*, which are aimed at a considerably larger and more diffuse group.

Butzer's style is lucid and his presentation clear and concise. For this reason the book should be extremely valuable as a text in prehistory for graduate or undergraduate students. Among the most useful sections is that on soils and paleosols. Most prehistorians are now increasingly interested in sciences which aid in reconstructing the environment of the past. Observations on soils and weathering phenomena are too often treated as secondary to the study of stratigraphy. Furthermore, until *Environment and Archeology* appeared it was extremely difficult for the student of prehistory to learn much about these subjects without extensive research into technical monographs.

There are a few areas which could be improved if the book should be revised and reissued in the future. One of these is the chapter which deals with palynology. Summaries of palynological methods and techniques are very few and generally too technical to be of use to the student of prehistory. Butzer's section is correct but should be expanded. What would be of most help would be one or two examples closely followed from collection through preparation, count, and analysis.

Moreover, in his discussion on Africa, the author presents some palynological data that are too limited in terms of the number of grains present to be useful. Even the largest count in Table 16, 129 grains, is inadequate by modern standards. Con-

cerning Africa, it is unfortunate that Butzer did not have the recently available data from Nubia when he wrote his book, as this research will considerably change present thinking on the palaeogeography of the Nile River. However, from his own observations he notes the presence of an important soil zone in the late Pleistocene and suggests a threefold Nile sequence which is essentially in harmony with the new data from the Sudan. Fortunately, he wisely avoids a discussion of the terrace system in the Nubian area.

The examples that Butzer chooses in the section dealing with Pleistocene environments are specific and limited to the area of his specialized knowledge. Using this approach rather than trying to give a total coverage of the world is somewhat novel and may be criticized. However, it avoids two problems of a normal synthesis: errors arising from gaps in the author's knowledge and errors arising from the varying quality of data available from region to region.

Undoubtedly a critical audience will find a number of points of disagreement, especially in terms of individual facts. Considering the extensive amount of literature involved and the wide range of the sciences discussed, this is to be expected. There can be no question of the importance and usefulness of *Environment and Archeology*, and the author should be congratulated on a tremendous undertaking and an excellent achievement.

by MARVIN W. MIKESSELL

Chicago, Ill., U.S.A. 9 II 66

Butzer's book is a remarkable achievement, and, as a geographer, I cannot resist the temptation to suggest that it demonstrates very forcefully both the practical and the philosophical advantages of geographic training and the geographic point of view. Butzer is not the first geographer to devote himself to Pleistocene research or the man-land relationships of prehistory, but the general and specific interests expressed in his book have never been a major professional commitment and have been shared by only a handful of geographers in recent years. The methodological or pedagogic implications of Butzer's work should be evident to anthropologists and geographers. I wish to appraise the book from the standpoint of my own research interests in the historical geography of the Mediterranean region and the Near East.

Viewed in this light, Butzer's book has many admirable qualities. I appreciate, especially, his judicious summary of the literature on climatic change and his generally successful attempt to place subsistence activities



and settlement patterns in an ecological context. Moreover, Butzer's genetic approach to the study of physical geography impresses me as being more critical and hence more reliable than the generic descriptions that are offered in most textbooks.

However, in one respect I find Butzer's presentation rather disappointing: his discussion of vegetation lacks the critical tone and explicit documentation of his sections on climatology and geomorphology. For example, although much of what has been written on the climatology and geomorphology of the Mediterranean region and the Near East is reviewed critically, a number of primary works on the plant cover of these regions are not even mentioned. I miss particularly Rikli's comprehensive work on the Mediterranean lands (1943-48), the excellent series of review articles on plant ecology published by the Unesco Commission on Arid Zone Research (1955), and Zohary's valuable works on the vegetation of Palestine and Iran (1962, 1963). Each of these studies deals primarily with modern distributions, but each also contains information on relic communities, vertical zonation, and natural or human-induced succession, and so is helpful in an attempt to reconstruct habitats. Although geomorphological and climatological investigations are doubtless of most immediate importance in the study of environment and archaeology, the reconstruction of past patterns of vegetation is certainly an essential part of Pleistocene or prehistoric geography.

To emphasize this deficiency is not to depreciate Butzer's over-all accomplishment. It is doubtful if anyone will master the diverse research techniques that make up the complex subject of his book, but he has performed a valuable service in exposing both the strengths and weaknesses of previous work. Moreover, I feel that he has demonstrated how "cultural ecology," which anthropologists have used thus far mainly as a heuristic device, can be the basis for a fruitful program of substantive research. I hope that Butzer's publisher will allow him to prepare new editions, for he certainly deserves the chance to make his remarkable book even more comprehensive and reliable

by KARL J. NARR

*Münster, Germany. 27 I 66*

This very welcome "Introduction to Pleistocene Geography" is the work of an author well acquainted with several different traditions of learning and research. The bibliography shows a pleasant contrast to many another synthesis in this respect, though one might wish that it had included more

works by Soviet scholars. In the U.S.S.R., earlier than in most other countries, archaeological research focused its attention on economic and ecologic factors and contributed valuable materials (e.g., remains of late "Mousterian" tents and/or huts, which Butzer misses in the Middle Palaeolithic, at Jeskaya and Molodova I).

We may hope that growing knowledge of the Russian language in "Western" countries will further the integration of these contributions.

Any work which attempts to combine the results of different branches of science will have some unavoidable gaps and deficiencies. Therefore, it would not be fair to list the minor errors which the specialist can detect, and for that reason I shall confine my remarks mainly to some problems of the man-land relationships in prehistory, i.e., to a matter of synthesis.

There are two ways to study the relationship between archaeologically defined units and ecologic zones. The first, and sounder, of these is to study the ecologic setting of as many sites of such a unit as possible; unfortunately, however, only a very limited number of sites provide the necessary information. The second way is to study the spatial and chronological congruities of ecologic and archaeological units. This depends on the quality of the chronological framework and of the climatological and ecologic maps of prehistoric times. Butzer emphasizes the hypothetical nature of the maps of Budel, Frenzel, and Troll and criticizes their ready acceptance by some scholars, but one must not overlook the fact that these maps allowed the interpretation of some distributional patterns of archaeologically defined units and of some observations of physical anthropology. Of course, this is not a convincing argument *per se*, but I think that these data may serve as a useful working hypothesis as long as they show no contradictions to the known facts.

Butzer avoids the possible pitfalls of this procedure, and especially the controversial chronology of the early Würm, and confines himself to some outstanding paradigms. I doubt that the picture of human origins deserves the sometimes rather positive diction, and I think that, in spite of all claims to the contrary, a level of mere tool-using is as yet not sufficiently demonstrated. Be that as it may, his choice of Torralba as an example of an Early Palaeolithic living site and of *Lebenstedt* as a Middle Palaeolithic one is a good one. One might wish that Butzer had done the same for the Upper Palaeolithic, e.g., by describing the site, habitat, and economy of the winter camp of *Mezin* and the summer

camps of *Stellmoor* and *Ahrensburg*. He does give sufficient information on the latter ones in different parts of the chapter in question. So we may hope that, thanks to his reports in English, these data will be noticed by those geographers, archaeologists, and anthropologists who seem not to know yet that, with respect to the life, habitat, and economy of prehistoric reindeer-hunters, hardly any equally informative sites have been excavated and studied.

I fully agree with Butzer in blaming some archaeologists for "overemphasis of environmentalism" with respect to the Mesolithic, though the boundary drawn by postglacial climatic change offers some practical advantages, and this change itself surely affected the needs and the adaptation of prehistoric man. But the "Mesolithic crisis" must not be explained in terms of changing environment only, since each interglacial caused approximately the same environmental changes. The crisis seems equally to be due to an overspecialization of most of the late Palaeolithic hunters in Europe. Though I think that the conventional Palaeolithic-Mesolithic boundary is not meaningless, I agree again with Butzer that there is also a need to "classify all of the specialized food-collecting economies at a single level." (Why not use, for the archaeological aspects, the term "Miolithic," coined by U. Rellini and later adopted by O. Menghin and some others?) Furthermore, Butzer favors a general terminology of cultural and socioeconomic levels. In this respect ethnology may be very helpful, but for some purposes archaeology needs its own terminology. I think that an archaeological classification based on technology and forms of artifacts must not be combined with one based on levels of subsistence. We need both, and we must try to avoid confusing them. Butzer himself points out that the weakness of Braidwood's classification is the equation of culture and technology. If, for example, we had only the crude stone artifacts of *Huaca Prieta* and not the plants and other finds of this site, these artifacts could be conceived as the remains of an unspecialized food-collecting economy with free wandering (according to a combining classification such as that quoted by Butzer on p. 341).

It is to be expected that some critics will blame Butzer for his use of "modern settlement patterns," i.e., ethnological "parallels," and they probably will repeat the old commonplaces of the fundamental difference between prehistoric and modern primitives and the ever changing cultures and socioeconomic formations. Never-

theless, the study of modern people can at least show the social restrictions inherent in a group limited in size by its methods and means of subsistence in relation to the environment. The paradigms of modern unspecialized food-gatherers are more useful for the understanding of early man than is the study of apes and monkeys. But I shall not repeat here what I have written elsewhere. Only one word *pro domo*: With regard to Palaeolithic man, I did not speak of "clans" (see Butzer p. 385).

Discussing cultural origins in the Near East, Butzer seems convinced that domestication of cereals must be the beginning of plant domestication, at least in that area. The earliest finds of wheat and barley, however, are associated with legumes (Jarmo and Ali Kosh and some sites of the "ceramic" Early Neolithic). If we assume even earlier beginnings of plant cultivation, e.g., for Jericho P.P.N.A., I see no necessity that this included cereals. Today the conception of plant cultivation without cereals is no longer a highly speculative hypothesis based upon mere ethnological data, but a prehistoric reality emerging from the excavations in Tamaulipas and Tehuacán. While we cannot demonstrate an analogous development in the Near East, the possibility should be borne in mind.

by H. D. SANKALIA

Poona, India. 17 I 66

I have read *Environment and Archaeology* with great interest and profit. Though there have been other works on this subject, Butzer's, I think, is the only book which deals with the subject so comprehensively, from several points of view. For this reason alone it would be most welcome to all students who are interested in archaeology and allied disciplines.

While I am not competent to speak on Butzer's treatment of Europe, the Mediterranean, and northern Africa, I would point out that in Chapters 25-27, particularly Chapter 27, "Late Paleolithic Man-Land Relationships in Eurasia," there is no reference at all to India, Pakistan, Southeast Asia, and China. It may be that much of the material on these countries is not published in Europe and/or America, but there are standard works on some of these countries and their Stone Age cultures and environments. A few of the most important are Clutton-Brock (1965), De Terra and Paterson (1939), Erhardt and Kennedy (1965), Paterson and Drummond (1962), Sakalia (1962-63, 1964, 1965), Wainright (1964), and Zeuner (1950, 1963). I would like to know, for example, what Butzer thinks of the glacial and interglacial sequence in the Kashmir Valley and its relation

to Stone Age cultures in the Punjab. The Kashmir Valley has also lacustrine deposits, *Karewas*, of the First and Second Interglacial periods.

A problem that is baffling us in our study of the Narmada and other peninsular rivers is the formation of huge and extensive deposits of gravels and silts of at least two or three periods right up to the source of the river. These regions are far from the sea and even in Pleistocene times could not have been much nearer the sea. Until recently it was assumed that these deposits (aggradation and erosion) were caused by the rise and fall of sea levels respectively or, alternatively, by tectonic causes. A new point of view is that much of the coarse material—bouldery deposits—might be colluvial in origin, but this does not explain the occurrence of such bouldery or pebbly gravels everywhere along the present river flanks.

Then there is the problem of the later deposits—sand dunes in North Gujarat and the *teries* in South India—and their association with microlithic industries.

These are some of the problems to be solved by Indian archaeologists, geologists, and climatologists. I was eager to see if such problems had occurred in Africa, particularly south of the Sahara, and how they were being solved, and I am sure that Butzer and other scholars would be interested in these problems in Asia.

by GÜNTER SMOLLA

Frankfurt/M., Germany. 26 I 66

Pleistocene geology is not alone in being "primarily concerned with stratigraphy and chronology;" the same is true of prehistoric archaeology. It has been said that chronology and geography are the "eyes" of history. History and prehistory, however, Cyclops-like, have seen their subject primarily in the time dimension; the dimension of space has been neglected. Therefore it should not be said that this book fills a gap, but rather that it opens up for prehistoric archaeology a dimension of systematic scientific method which, although known, has been long ignored.

In such a work, completeness of facts—which is unattainable anyway—is not as important as completeness of perspective. It speaks not only for the author's mettle, but also for his method and his competence, that there is little to find fault with in this regard. Perhaps in a second edition the "anthropogeographical" viewpoint might receive as systematic treatment as the physical-geographical. Chapter 23 is an excellent example of what I mean; for example, it lacks an adequate section on demographic data: population number and density, the dimensions of

local and regional cultural units, etc. The many and valuable details are all too scattered through the text.

Closely related to this is the question of setting an upper temporal boundary to the subject matter at the historical time range. The author has generally limited himself to the Pleistocene: in Chapters 28-31, however, he also treats problems related to the Neolithic and the origin of urban cultures. Although I find these chapters particularly valuable, I would suggest that a later edition be limited to the Pleistocene. For the more recent period, one wants a somewhat differently oriented book, and the author is young and active enough so that one can hope for the fulfilment of such a wish.

Since the other commentators will probably comment mainly on that portion of the book dealing with the Pleistocene, I will confine my remarks to the questions raised by the final chapters. Evolution *vs.* diffusion seems no less problematical to me than the desiccation theory of agricultural origins, against which Butzer (pp. 435-37) correctly argues. The same applies to the theory of the "Neolithic Revolution:" it seems convincing at first sight, but becomes more questionable as one acquaints oneself with the facts. In this regard Butzer seems to be strongly influenced by Braidwood and his associates. Unfortunately, all we know so far of this imposing and laborious research are the investigator's plans and theories. Since the basic evidence has been incompletely published and since the theories have been modified over the years, one cannot be quite sure just what has been altered: the facts or the interpretation. For example, to the best of my knowledge, no profile of Jarmo has yet been published. Reputedly, the stratigraphy is more than seven meters thick: Where have the remains of domesticated plants and animals been found? From Jericho we know a little more, although excavation conditions were very poor there, and Miss Kenyon has at least begun to publish a final report. Perhaps something should also be said here about Anati's interesting hypothesis (1962) that the location of Jericho is related not only to a spring but also to the salt resources of the Dead Sea. Since the early Palaeolithic, mineral resources such as flint, obsidian, and salt have played an increasingly important role, and their distribution is a geographic problem.

From what I know of a number of Natufian sites, the ecology of the Natufian (pp. 431-33) is understandable only if one postulates a somewhat moister climate, as Butzer does on pages 425-26. But it also appears to me that the ecological contrasts between the different sites are so great that one could not speak of a culture



in which agriculture already played a significant role in the subsistence pattern.

With regard to page 444: Evidence for hunting activity is seldom found in Danubian sites, in contrast to those of most of the other early Neolithic cultures in this area. Similarly, there is no proof of hoes, even if we include mattocks or digging sticks. We still do not know exactly with what tools the Danubians worked their fields.

Finally, I do not believe that each "Rapid demographic expansion has ensued upon several major technological improvements of the food supply" (p. 456). Spiritual-religious ideas have at least equal significance. Butzer is correctly no ecological determinist; he should guard against external-deterministic deductions in demography as well.

These, however, are only trifles compared with the achievement documented in this book. It should enliven and assist research, one would hope in successive new editions, in the well-deserved status of a standard work.

by B. W. SPARKS

Cambridge, England. 4 I 66

Butzer has attempted a difficult task. His book is most welcome in view of the increasing interest in the geography of the Pleistocene in the last decade or so. The emerging geographical pictures illuminate the subject in the same way as palaeogeographical reconstructions shed light on stratigraphy. They also have the same disadvantages, largely deriving from the fact that while practically all Pleistocene evidence is subject to variations in interpretation, one particular interpretation has to be chosen for each piece of evidence included in the synthesis.

In the totality of reconstructed Pleistocene geography, each line of evidence reveals one aspect of geography. Several geographical pictures may, however, blend together. Thus an assemblage of Mollusca deposited by a flooding river will reflect the sum of ecological niches available in the stream; it will also include a number of land Mollusca, some of which may reveal the nature of the environment immediately adjacent to the river, but others of which may have been secondarily derived from soil creep, a fact which may well be almost impossible to detect from different states of preservation. Even when the pictures are approximately disentangled, we have only reached the stage of appreciating micro-habitats and micro-climates. The connection between these and regional climate and environment requires another step of faith. The same probably holds for the

interpretation of any group of plants or animals. These interpretations must be based on the assumptions that environmental requirements rarely change and that we know what these requirements are. The latter assumption is often not fully justified.

On the other side are the interpretations of geomorphological and geological features as the results of physical processes conditioned by the regional climate, which may be interpreted from them. This involves a very strong faith in the dominance of climatic control. Here a high degree of variation may be introduced by rock type. In a given area, for example, corries will be better preserved on hard splintery igneous or metamorphic rocks than on sediments of medium resistance, such as unmetamorphosed Palaeozoics. This could lead to an interpretation of regionally varying macro-climate which had not in fact existed. Again, is it possible in, say, Mesozoic sediments to differentiate between corries, spring-heads, and landslip scars? In ideal cases it may be possible to apply criteria, but in the vast majority of far from ideal natural landforms I doubt it.

On the whole, Butzer's treatment is critical, clearly written, and free from the jargon which could readily have been brought in from all the sciences considered. Such problems as the differences between the modern tundra and the Pleistocene periglacial regions consequent on different latitude and hence different insolation are discussed, as is the possibility of interpreting vegetation successions both climatically and edaphically. The contemporaneity of pluvial phases in different parts of the Sahara with glacial phases in high latitudes is perhaps taken too much for granted; a pluvial on the poleward side of deserts may be glacial, but on the equatorward side it may be interglacial.

Some few criticisms of the book, largely deriving from the breadth of the subject, must be made. Few Pleistocene specialists interpret more than one or two lines of evidence. Butzer has to cover the whole field. Hence, many reviews and secondary sources have to be used, for example, the Burg Wartenstein symposia and standard texts on geomorphology. Thus, an element of certainty creeps in, for example in the discussion of glacier flow (pp. 95-96), which is not quite in keeping with the openness of many such problems at present. This is unfortunate but inevitable and no reflection on the author's own state of mind.

Again, the author relies heavily on mammal evidence, whereas modern quantitative studies are mainly on plants and such animals as Coleoptera or

Mollusca, where isolated examples are of less significance than the general spectrum of the fauna. Is one mammoth any more significant than one *Columella columella* or a valve of *Draba incana*, except in the sense that a mammoth is less likely to have been dropped accidentally into a deposit? The distributions of the larger vertebrates are much more likely to have been influenced by human pressure, while the interpretation of past geography ideally requires the elimination as far as possible of all distributional controls other than those of physical geography.

However, as an over-all view in a vast field of specialisms, Butzer's book will surely be an asset to a great range of undergraduates and research workers and will stimulate even more interest in the fascinating detective problem of reconstructing Pleistocene geography.

by J. E. SPENCER

Los Angeles, Calif., U.S.A. 24 I 66

A reader may judge a book in terms of its content in relation to (1) the title and the publisher's claims; (2) the stated purpose of the author; or (3) the content he wishes the author had dealt with. I presume to react to Butzer's book in each of these three ways.

My first review centered around the thought that here, at last, was a book "reconstructing the physical environments and man-land relationships of prehistory," as the jacket claimed. I had anticipated the materials in the first and fourth parts and was not too unhappy over the content of the third part; the hundred pages of the second part, devoted to a discussion of basic geographic concepts fitted around overgeneralized maps of contemporary climates, vegetation, and soils, compared quite favorably with the corresponding section in Cornwall's *The World of Ancient Man*, but I wondered why it was here at all. I was dismayed to find that these four parts took up more than half the text. Mollification replaced dismay as I read through the fine discussions on "Some Pleistocene Environments" in the fifth part; however, the dismay returned as I reached the end of the text after reading about less than half the earth.

What the author intended this book to be is a textbook for advanced students from several disciplines, few of whom possess extended basic training outside their own disciplines. He aimed relatively high in interpreting the Pleistocene, but necessarily included material that is essentially elementary background for readers out of their own fields. But can one not

expect readers to study the basic materials in fields beyond their own? One hears much of the interlinkage of thinking in the broad realms of modern science, but although this may be true for many of the experienced scholars, it is not true for the students. The interdisciplinary inquiry cannot utilize the basic statements of the specialties per se, for each field is oriented inward and concerned to develop core concepts which distinguish it from neighboring fields. After years of interdisciplinary work in one teaching field, I still struggle with the problem of providing reading materials chosen from specific disciplines, for the detailed presentations of each do not engender a common understanding. Butzer, then, in trying to write an interdisciplinary handbook for those interested in any of the problems of reconstructing the man-land relationships of prehistory, had to interpret the basic concepts of each discipline. Blended into the last portion of the book on specific problems of the Old World are some chapters which distinctly outreach the elementary handbook.

Specialists can quibble both with certain of the inclusions and with some of the omissions. I am a little unhappy over the very rough generalizations of the latter portion of Chapter 23, dealing with subsistence and settlement patterns, and with the over enthusiastic acceptance of a single version of the origin of plant domestication and crop-growing in Chapters 29 and 30. An agricultural system based on vegetative planting does exist, and the grain seed-planting theory does not explain its derivation. The replacement of vegetative planting by seed-planting is amply documented in India and southeastern Asia. Many specific disagreements of this kind could be found, but they would not invalidate the generalization that this volume is extremely valuable to all of us in fields of study having to do with man and the earth. Butzer accomplished well what he set out to achieve, and I do not propose to heckle him further at this point.

When I begin to think about the book I wish the author had written, I hope, thereby, that I am speaking toward an early second edition. First, I would urge the author to insist upon a somewhat larger format, so that some of the maps could be printed on a larger scale to include more significant detail. For example, Figure 21, on the significance of frost and aridity, has application far beyond its geomorphic importance. Were the present map on a larger scale and executed in greater detail, some understanding of prehistoric man-land relationships could be drawn from sections necessarily left blank in

several parts of the world. Better yet would be several accompanying maps setting out those possible patterns (even speculative ones) during past glacial and interglacial periods. And certainly in the next edition there must be a series of maps on the varying limits of land and sea, with possible routes of human movement for the whole earth, for the several different levels of sea-stand which have characterized those geographic intervals of prehistory during which man has moved about the earth. Finally, one could hope that a second edition could provide some chapters acutely (or even speculatively) examining situations outside Europe, the Middle East, and North Africa. Butzer has said that the examination of the New World would require the attention of a specialist. But Butzer is a specialist; it just happens that he is a specialist in a particular sector of the Old World. Perhaps a few seminars could explore the New World and the eastern sector of the Old World before the next edition; or perhaps another specialist or two could be drafted into service to round out what the title declares to be a book devoted to general Pleistocene geography.

by H. T. WATERBOLK

*Groningen, Netherlands. 18 II 66*

There is certainly a wealth of information in Butzer's book, and one admires the wide knowledge of the author, to whom African deserts and arctic tundras seem to be as familiar as Mediterranean coasts over the whole period during which man has been present on the earth.

Why, then, does this book fail to satisfy the reader? That it has too many printing errors (in names of plants, places, and authors) is, of course, not decisive. That it contains poor fragments on themes with which the author is not familiar is only to be expected in a book of so wide a scope. That it is difficult to find the information one looks for because of excessive splitting up into 31 chapters cannot be the main reason either.

The subtitle says that the book is an introduction to *Pleistocene geography*, which the author defines as "an analysis of the environment and its possible significance for prehistory." Although he states that it is more a point of view than a scholarly discipline, one cannot help feeling that he wants us to believe in the usefulness of a geographical approach to the problems concerning the relations of man and his environment.

A geographer is, by definition, one who uses the evidence put forward by geology, botany, zoology, climatology, pedology, history, archeology, and

other disciplines. In general, he will be an outsider in most of these fields. The problem is whether the advantages, if any, of a geographical approach are not outbalanced by the disadvantage of the absence of specialist knowledge in too many fields. Butzer's book has strengthened me in my conviction that this is the case.

The field is really too wide. One cannot be a prehistorian and at the same time a palaeontologist, a soil-scientist, a geomorphologist, etc. For the solving of problems in environmental archaeology we need the co-operation of a team of such scientists, each with specialist knowledge *within* his discipline. What could a geographer add to the discussion of these specialists?

I think this is why as a European prehistorian I have felt unhappy at too many points in the book, for example, the discussion of the growth of interdisciplinary Pleistocene work (pp. 6-7), radiocarbon dating (pp. 29-34), lake sediments (pp. 186-87), sand sheets (p. 196), marine-littoral sediments, coastal dunes, and estuarine and deltaic features (pp. 214-15), the geomorphological study of archaeological sites (pp. 221-33), the contribution of the biological sciences (pp. 237-47), the environmental factors influencing the location of early agricultural settlements in Europe (pp. 444-49), and Upper Palaeolithic settlement patterns in Eurasia (pp. 389-93). In the present form this book is too ambitious. The author should have restricted himself to his own field, the Quaternary geology of the Mediterranean.

I realise that I have very probably overstated my case and that the book is much better than one might conclude from what I have just said. I hope, however, that my remarks will provoke discussion and that the author, for whom I have great admiration, will forgive me.

by R. G. WEST

*Cambridge, England. 7 II 66*

The aim of this book is an admirable one, and the author is well qualified to undertake its accomplishment. The layout of the book is useful, and the contents are encyclopaedic. It is complementary to the well-known standard textbooks on the Pleistocene and provides a valuable synthesis of the geography of many archaeologically important sites in various climatic regions of the world.

Where so many disciplines are concerned, there will undoubtedly be criticisms from specialists in the various fields, but the author's synthesis of the outlines of the various

disciplines involved in Pleistocene research is an achievement for which he deserves our thanks. Especially useful, for a non-archaeologist are the sections dealing with particular environments and their archaeology. But to the biologist, the important question is whether Butzer provides his non-biologist readers with useful background about the biological contribution to Pleistocene research. The factual material is certainly there, but one might have expected a more detailed discussion and examples of the interpretation of the data, for example: (1) a more extended treatment of Iversen's important results on the relation between the Neolithic and vegetational history and on the interpretation of the elm decline; (2)

more detail on the stratigraphy and palaeobotanical results from Star Carr, expressed in figures, so that the reader could better understand the contributions of these kinds of data to the investigation of this site; or (3) a discussion of the validity of interpreting past climates from present plant distributions. I would like to know what the author means by "radical ecological change" (p. 324). There is, in fact, nothing to support the idea that "the warm mixed oak forest never attained [in the Holstein interglacial] the prominent position it held in the Eem and the Holocene." Pollen diagrams of this age from northwest Europe, often show extended periods

of mixed oak forest dominance. Also, little respect is paid to the statistical possibilities of plant megafossil analysis, which have provided much useful information about environmental history.

These are, however, minor criticisms. They do not detract from the usefulness of the mass of factual data and the references which allow us to follow up the discussions. The book will satisfy the advanced undergraduate and the specialist who wants to know something of other fields of research. It would not seem so suitable for the less advanced student or beginner, who would require a more general account of the subject.

## Reply

by KARL W. BUTZER

In writing an interdisciplinary book along lines not previously followed there are several difficulties to be faced: (a) methodology, approach and selection of materials; (b) level and detail of presentation, predicated by a heterogeneous audience; (c) space limitations, dictated by the purpose at hand and complicated by the wealth of relevant materials from related fields; and (d) the competence, experience, and interests of the writer. It is gratifying, indeed, that the majority of the reviewers have recognized these inherent problems and have been kindly in their criticism of details or of the treatment of larger problems.

The selective nature of the regional treatments in parts 5 and 6 was bound to evoke a measure of criticism. Bond suggests discussion of Central and South African problems, Sankalia and Spencer a treatment of South and East Asia, van der Hammen and Spencer an outline of New World regions. I agree that a fuller regional discussion would be useful and desirable. However, for most of these areas it would have to remain a discussion of problems. At the present state of information, a regional presentation such as that attempted for Europe and the Mediterranean borderlands would only be feasible for North America, and that only in the wake of the spate of publications attendant on the 1965 Congress of the International Quarternary Association (INQUA) in Boulder. In fact the number of pertinent publications on the Pleistocene of the United States has almost doubled in the last two or three years. Any systematic discussion of prehistoric man-land relationships in the New World would be quite out-

side my field of competence, and at least some readers will be grateful that I have not attempted to go where American archaeologists have feared to tread. However, the painstaking, still unpublished work of Haynes, Mehringer, Lance, and Haury at the Lehner Mammoth Site should provide an excellent example of a terminal Pleistocene community in its physical setting. I had originally prepared a discussion of the Lindenmeier Site for Chapter 27, but abandoned it on account of the unsatisfactory nature of the published material. The apparent overemphasis of agricultural beginnings in the Near East and the seemingly enthusiastic acceptance of a single version of agricultural origins has been chided by Smolla, Spencer, and some reviewers in other journals. This has been unintentional. Indeed, Narr raises an important point when he insists that we keep an open mind on whether cultivated legumes preceded cereal planting in the Near East or vice versa. Concerning the New World hearth area, I would prefer to await a detailed and up-to-date review of the work of MacNeish and his associates in Mesoamerica. And we still need even the most rudimentary archaeological evidence from other potential areas of early plant domestication. The apology that Irwin has offered for the selective, thematic treatment of parts 5 and 6 expresses my own feelings well, and I might only add that *Environment and Archaeology* intends to be topical rather than regional in scope.

Several reviewers plead for a fuller discussion of the biological contributions to Pleistocene research. Specifically, Brunnacker and Sparks mention mollusca; van der Hammen, Irwin, and West would like greater emphasis on techniques of data interpretation in palynology; Mikesell questions the neglect of relict plant communities and vertical zonation of vegetation as

potential tools. These points are well taken, and there may be opportunity to expand on them in a possible revised edition.

The presentation of the geomorphic and pedologic material is brief and not always adequate, as Bishop, Brunnacker, Bond, Hay, and Waterbolk have indicated. As a geomorphologist and Pleistocene stratigrapher, I found it most difficult to write these sections and still remain within the bounds of an approach tailored to the problems at hand. An overly difficult or detailed outline would have proved a serious obstacle for students with little or no background in the earth sciences. And above all, this was no place to argue extensively on current controversies in geomorphology. For example, I could not evaluate such problematic themes as the role of thermal expansion in mechanical weathering, the designation of B-horizons in American pedological literature, the extrusion flow theory in ice movement as advocated in the most recent texts on glaciology, stream behavior and the mechanisms of alluviation and floodplain development, etc. To take up the argument of Hay on B-horizons in grassland soils as an example: Many introductory texts and many soil scientists simply designate as a B-horizon any carbonate or salt horizon, or, any horizon intermediate between the A and C that shows structural or color change. Such imprecise usage is fortunately not current in continental Europe. Illuvial or cambic B-horizons in semidesert soils of the American Southwest, as presented on a 1965 INQUA excursion, were relict or polysequential soil developed on older surfaces, not the product of contemporary soil-forming factors. I was appalled to learn from local pedologists that such soils differed from weak soils developed on Recent surfaces only by a time factor: the modern AC-soils supposedly were "immature," the deep, polysequential

ABC-profiles "mature," despite a mean annual precipitation of 10-15 inches today and a succession of climatic changes during the Pleistocene.

I would be the first to agree with Bond and Hay that the discussion of field and laboratory techniques is uneven and inadequate: it was difficult to foresee how a chapter of this sort would be received in an interdisciplinary book, particularly since this topic is rather difficult to present in a class with students lacking in geological training. Bishop would like to see a discussion of vulcanism, a significant azonal environmental factor and geomorphic agency in critical areas such as East Africa. I apologize for this serious omission. Hay further suggests that contemporary quantitative studies on slope processes and denudation rates be integrated into the sections dealing with climatic geomorphology. Despite rapid advances in the last few years, such work is still far from representative for any single morphogenetic environment, and its inclusion would serve little purpose. Parenthetically I might add that, had this been an advanced text in geomorphology, I would have written it rather differently.

Without enumerating the major points, I would express my appreciation for the valuable suggestions and new material on archaeological aspects communicated by Braidwood and Narr, but I regret that Waterbolk did not offer any constructive criticism in his own field of specialization. A number of errors, misprints, and unclarities were cited by several reviewers, and I will try to remedy

these if and when opportunity arises. In reply to West, by "radical ecological change" I would mean a shift from pine-spruce to oak-hickory woodland, or from grassland to forest. I stand corrected on the matter of Holstein-age vegetation patterns: I should have specified pine pollen and restricted this comment to central Europe. The sentence that Bond objects to (p. 178) must be read in context: emphasis should be on comparative sedimentological work rather than on theoretical considerations wherever suitable stream deposits are preserved. Although Sparks suggests a possible correlation of interglacial and pluvial climates in tropical Africa, all of the radiocarbon-dated sequences so far suggest that the last pluvial complex in Ethiopia (as evidenced in the Nile flood regime; see Butzer and Hansen 1965; de Heinzelin 1966), in East Africa (van Zinderen Bakker 1966) and in the southern Sahara (Faure 1965) fell within the time range of the Würm. However, the Würm was not an uninterrupted pluvial; at times it was at least as dry as today in these respective areas. Balout suggests that my ideas on *limons rouges* are based on secondary sources, which is completely incorrect (see Butzer and Cuenda 1962; Butzer 1963). The fact that I have ignored many summary notes on the western Sahara may be excused, and both Cocque's excellent Tunisian study (1962) and Chavaillon's massive Saoura volume (1964) were unavailable to me at the time of writing. Biberson introduces Stearns and Thurber's (1965) thorium-uranium dates. There is no space here to em-

phasize sufficiently all their implications for Moroccan and Mediterranean sea-level stratigraphy. As Biberson points out, the Ouljian is indeed contemporary with the Neotyrrenian, dating ca. 75,000-95,000 B.P., i.e. in the Eem. Biberson's Kebabian and the classical Tyrrhenian (II) appear to lie between Saale and Warthe, ca. 125,000-160,000 B.P., emphasizing the true interglacial character of the warm deep-sea faunal zone "V." Accordingly, Table 3 will require revision.

It seems to me that Waterbolk's remarks question the intrinsic value of synthesis. Surely there is purpose and gain to seeing beyond one's pet problem or geographical pale. Most of the spectacular scientific advances of recent years have been a product of interdisciplinary work, something that is inconceivable for individuals unable to understand their partners' methods or unaccustomed to seeing the interrelations that link disciplines. It may be fashionable to disparage other disciplines, but Waterbolk may also not be aware that physical geographers have contributed significantly to interdisciplinary work: Albrecht Penck and Eduard Brückner, the authors of *Die Alpen im Eiszeitalter*, were geographers. Applying my own professional experience to a general physical geography focused on prehistoric man has been an intellectual adventure that has profited my more specialized studies in southern Europe and northern Africa. If this attempt will serve to stimulate more thought and more collaboration in Pleistocene studies, it will have more than fulfilled its purpose.

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## DISCUSSION AND CRITICISM

### More on the Intensification of International Cooperation in the Field of European Agrarian Ethnography

by NORBERT F. RIEDL

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In the past CA has published various letters, articles, and comments which, in one form or another, emphasized the importance of material-oriented research. Particularly from European scholars have come contributions from the area of folk culture or *Volkskunde* which one wishes had found more response especially among American anthropologists. W. Jacobeit's plea for "Intensification of International Cooperation in the Field of European Agrarian Ethnography" (CA 5:179-90) is the latest such contribution. His article, which received CA★ treatment, points out not only the need for cooperation but also the high level of development which has been achieved in Europe in regard to methodology pertaining to folk culture research in general and *Sachvolkskunde* in particular.

With American folk culture being essentially an extension of European folk culture I find it incomprehensible that none of the three American reviewers of the article raised the question of American participation or referred to the benefits that could be derived for American folk culture research from a successful completion

either of Jacobeit's specific suggestions or of the work of the International Secretariat for Research on the History of Agricultural Implements in general.

It is also interesting to note the reaction to Jacobeit's article since its publication almost one year ago: one short reply and from the way it was phrased one has to question its sincerity (CA 6:1).

The meager response of American anthropologists does not really come as a surprise. With only a few exceptions they have never paid much attention to the study of American folk culture in general or its material aspects in particular. To some extent this neglect must be attributed to the animosity that existed and still exists here between anthropologists and folklorists. To an even larger part, however, I would ascribe this neglect to the widespread unfamiliarity with the work of European ethnographers (?) and the general nonacceptance of, or disinterest in, local ethnography as a field of study within anthropology on the part of American anthropologists.

I feel that it is high time that we as anthropologists concern ourselves with the study of American folk culture. To this end it will only be

helpful to get on the European bandwagon and to cooperate in any way we can. We have enough to contribute not to feel like beggars at the rich table of European folk culture research. At the same time we could gain immensely from closer contact with our European colleagues who have developed a sound methodology, not only in regard to the study of the spiritual but also the material aspects of folk culture. Both American anthropology and museums would take a great step forward by making an organized effort in the cooperation with such "international"-European folk culture research organizations as exist, particularly with the newly created International Society for Ethnology and Folklore (SIEF).

W. Jacobeit's or the Secretariat's pleas for intensified cooperation should therefore receive our closest attention since it would be wrong to shrug them off as strictly "European" problems.

### Reply

by FRITZ L. KRAMER

Sacramento, Calif., U.S.A. 2 vi 65

I agree with Riedl's position that agrarian ethnography need not and should not be a European monopoly. This was what I had in mind when, in my comments on Jacobeit's paper, I said: "It should not be restricted . . . to plowing implements, nor to Europe, North Africa, and the Near East." Riedl's suggestion goes even further, embracing not only American agrarian ethnography but folk culture in general. Who could quarrel with this?