THE PREHISTORIC PROJECT

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The long push toward a final reporting on the Project's field research in the Zagros hill country in Iraq is almost over. Only two reports, by non-resident staff, remain incomplete. These unfinished publicaton responsibilities have kept us from the field, and a return to the site of Çayönü in northeastern Turkey seems unlikely before autumn, 1977. What follows here is an account of one aspect of our research and of how ideas about the past develop and change as new evidence is recovered.

In 1950, enroute to the second field season at our newly discovered site of Jarmo, we wrote an article in the British journal *Antiquity*, entitled "Jarmo: a Village of Early Farmers in Iraq." In it we gave our reasons for having searched for a site such as Jarmo in the uplands, counter to prevailing theory as to where agriculture began. We noted that almost all the then available early village sites (although none quite so early as Jarmo) lay along what we called "the hilly flanks of Breasted's 'Fertile Crescent,'" up in regions of at least 10 inches annual rainfall. It was also only upon these grassy or open oak-forested slopes that the remaining wild descendants of the original potential domesticates—the sheep, goats, wheat, barley, and pulses—could still be found.

To test such reasoning, however, would require competences which we, as archeologists, did not have. The 1950 article noted that

> We are only beginning to understand the ecological situation—the environment—in which the change-over from food gathering to food producing and settled village life came about. Here is one of the points where the prehistoric archeologist most needs the help of the natural scientist. One old theory held that the domestication of plants and animals resulted from their enforced propinquity to man as all three withdrew to oases and river valleys with the dessication which was believed to follow the end of the last glaciation. Hints from newer evidence make this seem quite unlikely; there seems in fact to have been some increase in moisture at the end of the Pleistocene.

Indeed, the more we thought about the then available evidence, the more we were inclined to see little if any climatic or environmental change in the Near East regions as the Pleistocene ice age ended. Fortunately, however, we were soon able to attract to the project both interested and competent natural scientists (and financial support for them through the National Science Foundation).

Our earliest such colleague was Professor Herbert E. Wright, Jr., Department of Geology, University of Minnesota. Herb was with us first for two Jarmo field seasons. He ranged far and wide in the surrounding Zagros mountains attempting to discover the detailed geological and climatological history of the region's late ice age and earliest post-glacial times, but found the evidence extremely fragmented and difficult to interpret. (The plowing of the soil, forest clearance, and over-grazing which have attended agriculture since its beginnings have had serious consequences in land surface erosion and change.) Given the unsatisfactory nature of his Iraqi evidence and—we'd now guess—perhaps some over-enthusiastic persuasion by us, Herb allowed himself to suggest that nature had been secondary in importance to culture among factors brings about the early village-farming economy. In 1960, he wrote

> . . . it is not safe to infer that this important and relatively rapid revolution was necessarily brought about by climatic change . . . the gradual evolution of culture, with increasing complexity and perfection of tool technology, may have been a more potent factor in bringing about this economic revolution than was the climatic change at the end of the glacial period.

Nevertheless, Herb, ever a cautious and thoughtful scientist, added,

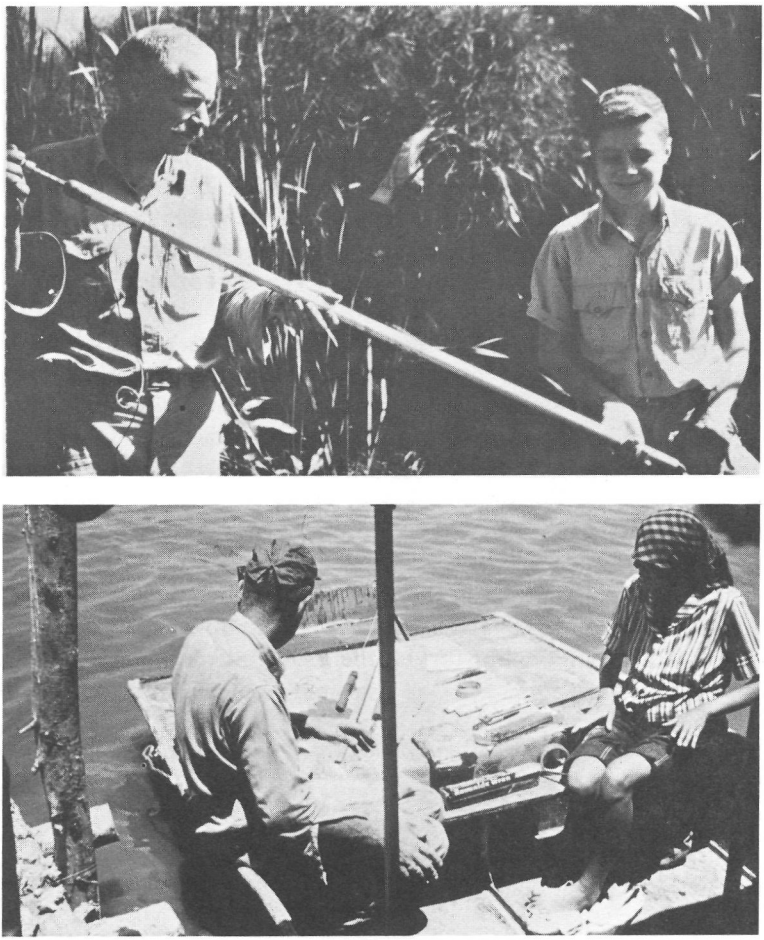
> Future work in climatic reconstructions must be directed toward a search for sensitive paleoclimatic indicators that can be dated with

> some precision, so that the subtle relations between environment and culture can be worked out for this area for the time range of this important economic revolution.

Even before the above was printed, however, two things happened. The political situation in Iraq had made a return to Jarmo impossible, so we shifted our scene of work to the Iranian Zagros region; and, second, Herb decided that palynology—which the dictionary calls the scientific study of spores and pollen—would given him those "sensitive paleoclimatic indicators" he needed. We were somewhat startled to learn that palynology would also involve us in the logistics of establishing a modest naval operation on a small lake high in the Persian Zagros. It also eventually brought a new member to our team, Professor Willem van Zeist of the Biologisch-Archaeologisch Instituut of the University of Groningen in the Netherlands.

The procedure Herb and Willem use is to drive hollow tubes deep down through the bottom of lakes or swamps. Pulled up again, the hollow tubes yield corings which contain the stratified sequence of the yearly "rain" of pollen which was borne by air from the plants of the region out over the surface of the waters, and which then settled to the bottoms of the lakes or ponds. In effect, the complete corings contain the detailed vegetational history of the region surrounding the lake or swamp, back as far in time as the depth of the core may reach.

A view of Lake Zeribar, where palynological samples were taken in 1960



The tool used in coring, and some palynological samples wrapped in aluminun foil to preserve them. Photographs from another of H. E. Wright's expeditions, at Houleh, Israel.

Furthermore, samples from the core, at various depths, may be "dated" by the radiocarbon method, so that the vegetational—and hence, climatological—history may be chronologically fixed. The key to the whole matter, of course, is that the fossil pollen or spores from the various depths on the cores can be recognized and identified as to the types of climatological and environmental situations within which their parent plants lived and flourished.

Herb's little naval operation to recover these "sensitive paleo-climatic indicators" was first activated on Lake Zeribar, a small lake

high in the Zagros mountains northwest of Kermanshah in the spring of 1960. Eventually, he and Willem secured cores covering over 65 feet of depth of deposition, which spanned at least 22,000 years of vegetational history, up to the present. The pollen sequence showed that until after 11,000 years ago, our supposed grassy or open oak-forested "hilly flanks" had really been a cold dry steppe country dominated by a kind of sage brush and with few trees. Thereafter, warming set in and moisture began to increase, but the present oak-grassland situation was not fully established until about 5500 years ago (3500 B.C.). Not unnaturally, Herb began to wonder again about the nature vs. culture factors in the beginnings of agriculture:

> . . . it may be possible to evaluate with more accuracy whether the agricultural revolution was stirred by the force of climatic change and its associated environmental factors . . . the chronological coincidence of climatic change and the agricultural revolution cannot be denied.

Of course, more than the Lake Zeribar evidence was needed. By the mid 1960's, Herb had begun palynological work in eastern Turkey while Willem and some of his Dutch colleagues had started coring operations in southwestern Turkey and in Greece. We now have newly in hand a long report of Willem's work, published in the 1975 issue of the Dutch journal *Palaeohistoria*. Increasingly, it appears that until about 10,000 years ago, cool dry steppe conditions obtained in the eastern Mediterranean region, with warming and more moist conditions setting in (somewhat irregularly) thereafter. Willem's account concludes,

> The Söğüt and Beyşehir pollen diagrams reflect large scale interference of man with the vegetation in the second and first millennia B.C. The forest must have been cleared over large areas. As for palynological indications of grain-growing, various Near Eastern wild grass species produce Cerealia-type pollen grains. Fruit trees cultivated by the Beyşehir and Söğüt farmers included: *Juglans* (walnut), *Castanea* (sweet chestnut), *Olea* (olive) and *Vitis* (grape). Besides, *Fraxinus ornus* (manna ash) was planted, most probably for its manna.

So much for the story so far, as it comes from the palynological evidence, but that is neither all of the evidence nor the full story. We ourselves are far from ready to say that environmental change alone brought about the appearance of the village-farming way of life, nor would Herb or Willem go that far. All we can hope to have done here is to show you how one tries to pull together the pieces of the story.