

## Jeitun and the transition to agriculture in Central Asia

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*Most research on the origins and early spread of agriculture in the Old World has focused on Southwest Asia and Europe. Since 1989, Institute and other British archaeologists have been working east of the Caspian Sea in southern Turkmenistan, and it is now possible to draw conclusions about how agriculture and village life began in Central Asia.*

The questions of why and how, some 10,000 years ago, hunter-gatherers living in Southwest Asia began to cultivate crops and raise domestic herd animals has fascinated and puzzled archaeologists since V. Gordon Childe first proposed his concept of the Neolithic Revolution.<sup>1</sup> Even before the technique of radiocarbon dating had been invented, he had argued, in a series of widely read books, that the transition from hunting and gathering to settled village life based on agriculture took place in the Near East soon after the end of the last glacial period. He envisaged that from there the new way of life spread westwards to Greece and the Balkans, from where "Danubian" farmers colonized central and eventually northwest Europe.

Although this diffusionist model for the spread of farming during the neolithic period has been modified by later archaeological research, it has been broadly confirmed by many radiocarbon dates and it continues to fit the available evidence better than alternative models of independent agricultural origins in Europe.<sup>2</sup> Childe's main concern was with the Near East as "the oriental prelude to European prehistory",<sup>3</sup> and he paid little attention to the question of how agriculture began in the lands to the east of the Fertile Crescent – that arc of mountains, valleys and steppes that enfolds the central desert of Southwest Asia from the southern Levant to the southern Mesopotamian lowland.

### The discovery of early agricultural settlements in southern Turkmenistan

It was not until the late 1950s that the question of how the transition to agriculture occurred in Central Asia came to the fore, following excavations by Russian and Turkmenian archaeologists of neolithic sites east of the southern Caspian Sea (Fig. 1). There, in the piedmont zone between the northern range of the Iranian Plateau (the Kopet Dag) and the southernmost sand dunes of the Kara Kum desert, there are many prehistoric settlement sites that take the form of mounds or tells, known locally as kurgans. Two of these, at Anau near present-day Ashgabat, were partially excavated in 1904 by the American geologist-turned-archaeologist Raphael Pumpelly<sup>4</sup> (Figs 2 and 3), who found evidence there of domestic wheat, barley, goats, sheep and cattle. He inferred, on geological grounds, that the northern mound at Anau might have been occupied as early as the ninth millennium BC, but another 50 years were to pass before a more securely based chronology for the neolithic occupation of the piedmont was established.

It was at the small (0.7ha) tell site of Jeitun (Djeitun) on the edge of the desert, 25km north of Ashgabat, that the most comprehensive evidence for early agricultural settlement was found. There, Vadim Masson of the Institute of the History of



**Figure 1** Southwestern Turkmenistan and northeastern Iran showing the location of mesolithic and neolithic (Jeitun Culture) sites; only those sites mentioned in the text are named.



**Figure 2** The south kurgan at Anau seen from the north kurgan, with the Kopet Dag range beyond.

Material Culture in Leningrad directed excavations that revealed the existence of a settlement consisting of small (20–30m<sup>2</sup>) rectangular houses built of mudbrick (Figs 4 and 5).<sup>5</sup> The finds of pottery, bone and stone tools (particularly many sickle blades), together with impressions of barley and wheat grains in the mudbricks, indicated that the inhabitants cultivated cereals and herded sheep and goats. The presence of the bones of a variety of wild animals showed that the people also depended to some extent on hunting. No radiocarbon dates were obtained for Jeitun, but at two other sites on the piedmont – Togolok and Chaglyly (Fig. 1) – levels judged on pottery styles to be somewhat later than Jeitun were dated, respectively, to 5370±100 bc and 5050±110 bc.<sup>6</sup>

By the late 1960s, the existence in the mid-sixth millennium bc of a series of neolithic agropastoral settlements on the piedmont had been convincingly demonstrated (Fig. 1). They came to be referred to collec-

tively as the Jeitun Culture<sup>7</sup> and their existence raised challenging questions about how the beginnings of agriculture and settled life in Central Asia related to the equivalent processes in Southwest Asia. The cardinal question was: did agriculture originate independently in Central Asia or was the transition there the result of the spread of crops, domestic animals, agropastoral techniques and people from Southwest Asia?

Masson and his colleagues drew attention to similarities in certain types of artefact, such as clay figurines (Fig. 6), pottery and small stone axes, between the Jeitun Culture sites and finds at such Southwest Asian neolithic sites as Jarmo, Tepe Guran and Tepe Sarab in the Zagros mountain region, and they also raised the question of whether the origins of the Jeitun Culture should be sought in the southern Caspian area, where several mesolithic cave sites had been discovered (Fig. 1). But the question of how agriculture originated in the piedmont zone remained unresolved.

### Recent investigations at Jeitun

No further investigations took place at Jeitun until the late 1980s, when Professor Masson invited the author and his archaeobotanical colleague at the Institute of Archaeology, Gordon Hillman, to undertake palaeoenvironmental research at Jeitun in conjunction with renewed excavation of part of the site. We gladly accepted this invitation and first visited the site in April 1989 for a short season of small-scale excavation (Fig. 5) and off-site ecological survey. Our main aim that year was to see if we could confirm Masson's conclusion that cereals had been cultivated at neolithic Jeitun. We hoped to do so by recovering charred remains of the plants (grains and chaff) by means of flotation – the technique whereby lighter materials, principally charred seeds, other plant fragments and small bones, are separated in water from the heavier finds and sedimentary matrix of the excavated deposits. If we were successful, we hoped also to have some of the grains directly dated by the new accelerator mass spectrometric radiocarbon (AMS) method, which allows samples as small as a single seed to be dated. During this first season it became apparent that organic remains were well preserved in the Jeitun deposits, and then and in subsequent seasons many samples of charred cereal grains and chaff were recovered, 11 of which have now been directly dated.<sup>8</sup>

Our investigations, from 1989 to our final season at Jeitun in 1994, have shown conclusively that domestic (6-row) barley and domestic (einkorn) wheat were cultivated, and domestic goats and sheep raised, at Jeitun when the site was first occupied at c. 5000 bc (= c. 6000 cal BC). The radiocarbon dates suggest that the settlement was occupied for perhaps no more than 500–600 years, not necessarily continuously; but its size, layout and architectural features, which broadly resemble those of early agricultural neolithic sites in Southwest Asia, indicate that, in the later phase



**Figure 3** Contemporary photograph of Pumpelly's excavation beginning on the north kurgan at Anau in 1904 (see n. 4: p. 13).



**Figure 4** Plan of the early neolithic settlement of Jeitun (modified from V. M. Masson by J. Mellaart, n. 6: 213).

of occupation, it was a small village of some 30 houses and a probable population of between 150 and 200.

**Archaeological reconnaissance in southwestern Turkmenistan**

Having worked at Jeitun for six seasons (1989–94), and confirmed Masson’s earlier conclusion that it represents the earliest known agricultural settlement in Central Asia, we have now begun to search for possible antecedents of the Jeitun Culture in rockshelter and open sites west of the piedmont zone. This led members of the team first, in 1996, to survey and test-excavate eight small rockshelters and one open site in the Sumbar and Chandyr valleys, and then, in 1997, to start investigating four large rockshelters in the Bolshoi Balkhan

mountains near the southeastern coast of the Caspian Sea (Fig. 1). The results of these new investigations are not yet available, but it is possible meanwhile to offer a speculative answer to the question of whether agropastoralism developed independently in western Central Asia or as a result of diffusion from Southwest Asia.

**How did agriculture originate in western Central Asia?**

We can first approach this question by considering the likelihood of any of the domesticated cereals and herd animals found at Jeitun – barley, einkorn wheat, goat and sheep – having been domesticated locally. Their wild ancestors (progenitors) are known, and it can be inferred from their present, and probable former, distributions that

neither einkorn wheat nor sheep would have been domesticated locally. Barley, too, is very unlikely to have been domesticated in Central Asia, whereas local domestication of the goat cannot be excluded because its wild progenitor, the bezoar (*Capra aegagrus*), has a range that extends from Southwest into Central Asia.<sup>9</sup> These biogeographical considerations suggest that the agropastoral economy is much more likely to have been introduced from the west than to have developed autonomously in Central Asia, as does the evidence that, from the beginning of neolithic settlement on the piedmont at c. 5000 bc, the founder crops and domestic animals of neolithic Southwest Asian agriculture are found together at Jeitun. If we add to this inference the architectural and artefactual similarities between the Jeitun Culture sites and neolithic sites in Southwest Asia already referred to, that conclusion is further strengthened.

This line of reasoning has led us to search the published literature for evidence of neolithic settlement in northeastern Iran, where, it transpires, there are several such sites, e.g. Yarim, Tureng and Sang-i Chakmak (Fig. 1), whose architecture, pottery and other artefacts resemble to varying degrees those of the Jeitun Culture sites.<sup>10</sup> Farther west across the northern Iranian plateau there is a dearth of excavated neolithic settlements for over 400km, until the site of Sialk is reached, the lowest levels of which are said culturally to resemble the Jeitun Culture.<sup>11</sup>

The overall conclusion to be drawn from our investigations is therefore that the transition to agriculture in Central Asia was the result of the spread of already domesticated crops and animals from the Fertile Crescent. Whether this process was brought about wholly or mainly by colonizing neolithic farmers (primary diffusion), or whether it was the result more of hunter-gatherers adopting the crops, animals and techniques of agropastoralism (secondary diffusion), cannot at present be resolved. It is likely that both processes operated, but, given the inherent tendency of agrarian populations to increase more rapidly than hunter-gatherer groups, and the relatively sudden appearance of the Jeitun Culture exhibiting many of the features of the neolithic economy and settlement pattern found earlier in the Fertile Crescent, the probability is that agriculture began in Central Asia primarily as a result of colonization. Although Gordon Childe did not concern himself with the aftermath of the Neolithic Revolution east of the Fertile Crescent, this conclusion mirrors, in a remarkably symmetrical way, his model for the westward spread of agriculture into Europe.



**Figure 5** Rectangular mudbrick house at Jeitun excavated in 1989, showing interior oven, adjacent platform and doorway, and “yard” areas outside the house.



Figure 6 Animal figurine and "cone" (possibly used as a counter in a game) made of baked clay; excavated at Jeitun in 1993.

#### Notes

1. Gordon Childe first alluded to the concept in *The most ancient East*, pp. 42–3 (London: Kegan Paul, Trench, Trubner, 1928) and later elaborated it in *New light on the most ancient East*, pp. 23–30 (London: Routledge & Kegan Paul, 1934) and in *Man makes himself*, pp. 66–104 (London: Watts, 1936). He went on to become the first full-time Director of the Institute of Archaeology, a post he held from 1946 to 1956.
2. See discussions of this controversial topic by contributors to two recent books: *The origins and spread of agriculture and pastoralism in Eurasia*, D. R. Harris (ed.) (London: UCL Press, 1996) and *Last hunters – first farmers*, T. D. Price & A. B. Gebauer (eds) (Santa Fe, New Mexico: School of American Research Press, 1995).
3. This phrase forms the subtitle to Childe's *The most ancient East* (see n. 1 above).
4. See *Explorations in Turkestan (Expedition of 1904)*, vol. 1: *prehistoric civilizations of Anau*, R. Pumpelly (ed.) (Washington DC: Carnegie Institution of Washington, 1908).
5. See V. M. Masson, "The first farmers in Turkmenia", *Antiquity* 35, 203–13, 1961; and V. M. Masson & V. I. Sarianidi, *Central Asia: Turkmenia before the Achaemenids* (London: Thames & Hudson, 1972).
6. See p. 212 in J. Mellaart, *The Neolithic of the Near East* (London: Thames & Hudson, 1975) and pp. 33 and 42 in Masson & Sarianidi (ref. in n. 5 above).
7. See *Central Asia: palaeolithic beginnings to the Iron Age*, P. L. Kohl (ed.), pp. 45–55 (Paris: Editions Recherche sur les Civilisations, Synthèse 14, 1984).
8. See pp. 436–9 in D. R. Harris, C. Gosden, M. P. Charles, "Jeitun: recent excavations at an early neolithic site in southern Turkmenistan", *Proceedings of the Prehistoric Society* 62, 423–42, 1996; and pp. 330–3 in D. R. Harris, V. M. Masson, Y. E. Berezkin, M. P. Charles, C. Gosden, G. C. Hillman, A. K. Kasparov, G. F. Korobkova, K. Kurbansakhatov, A. J. Legge, S. Limbrey, "Investigating early agriculture in Central Asia: new research at Jeitun, Turkmenistan", *Antiquity* 67, 324–38, 1993. The above list of authors includes almost all colleagues from Britain, Russia and Turkmenistan who have participated in the Jeitun project as specialists for one or more seasons. I am grateful to them and to the many other people who have assisted us in the field. Most of all I am indebted to Chris Gosden of the Pitt Rivers Museum, Oxford University, who joined the project in 1991, took a leading role on site at Jeitun, and is now directing the new investigations at sites west of Jeitun near the Caspian Sea.
9. See D. R. Harris, "The distribution and ancestry of the domestic goat", *Proceedings of the Linnean Society of London* 173, 79–91, 1962.
10. For fuller discussion of these Iranian sites, see pp. 381–2 in D. R. Harris & C. Gosden, "The beginnings of agriculture in western Central Asia", in *The origins and spread of agriculture and pastoralism in Eurasia*, D. R. Harris (ed.), 370–89 (London: UCL Press, 1996).
11. See p. 45 in Masson & Sarianidi and p. 194 in Mellaart (see, respectively, n. 5 and n. 6 above).