WILD EINKORN WHEAT AND BARLEY FROM TELL MUREYBIT IN NORTHERN SYRIA

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SUMMARY

This paper deals with carbonized grains of the two-seeded variety of wild einkorn wheat *(Triticum boeoticum* var. *thaoudar)* and of wild barley *(Hordeum spontaneum)* from Tell Mureybit in northern Syria. Radiocarbon dates suggest an age between about 7500 and 8400 B.C. for the levels from which the seeds were recovered. The carbonized seeds are compared with modern wild eintorn and barley. It is likely that especially the wild einkorn was not collected in the vicinity of Tell Mureybit, but in the adjacent part of Turkey, at a distance of at least 100 km from the site.

1. INTRODUCTION

The early village site of Tell Mureybit is situated in northern Syria, on the bank of the Euphrates river, about 85 km east of Aleppo *(fig. 1)*. After a sounding untertaken in 1964, excavations on a somewhat larger scale were carried out in the autumn of 1965 by Dr. Maurits N. van Loon (Oriental Institute of the University of Chicago).

Seventeen levels of prehistoric habitation could be distinguished, constituting together an accumulation of 6 to 7 meters of occupation remains in the centre

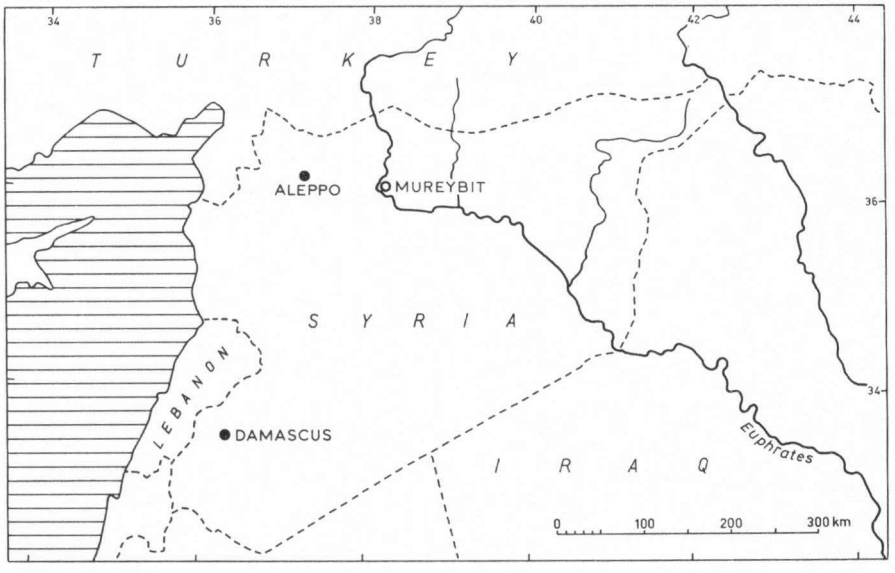

Fig. 1. Map of Syria.

of the mound. Radiocarbon determinations gave an age of 8357 ± 99 B.C. (P-1215) for the lowermost level but one, and of 7827 ± 126 B.C. (P-1224) for level 16, if calculated with a C-14 half life value of 5730 years. With a half life value of 5570 years these ages are 8050 and 7542 B.C. respectively. In the lower levels curved house structures were met with, whereas square houses turned out to be typical of the upper levels. A very large number of flints has been recovered. Stone tools for grinding, such as querns and mortars, were found frequently. A preliminary study of the animal bones showed that no domesticated animals had been kept (VAN LOON 1966, and personal communication).

In 1965 carbonized plant remains were recovered by means of a flotation process from samples of cultural fill taken at various levels by the excavator. Most of these samples yielded a smaller or larger number of charred seeds. A few other samples consist of seeds which had been recognized with the naked eye in a section or on a surface. In the spring of 1967 a second series of samples for botanical study was collected and floated by Mr. S. Bottema and one of us (W. v. Z.). These samples have not yet been studied in the laboratory, but a first check in the field indicated that it is not likely that they will change considerably the conclusions based on the results of the seed analysis of the samples collected in 1965.

Among the 18 types of seeds which could be established, cultivated plants are not represented. One must assume that the economy of the inhabitants of prehistoric Mureybit was entirely based on food gathering, that is to say on hunting and the collecting of vegetable food. A report on the paleobotany of Mureybit will appear as an appendix to Dr. Van Loon's final excavation report (to be published in: *Journal of Near Eastern Studies)*. In this paper attention will be paid to wild einkorn and barley, seeds of which have been met with in most samples from Mureybit.

2. WILD EINKORN *(Triticum boeoticum* Boiss. emend. Schiemann var. *thaoudar* (Reut.) Schiemann)

Two varieties of wild einkorn can be distinguished, *viz.* the small *Triticum boeoticum* Boiss. emend. Schiemann var. *aegilopoides* (Bal.) Schiemann, which is distributed in the Balkans and western Anatolia, and the much larger var. *thaoudar* (Reut.) Schiemann, which is found in southeastern Turkey, in Iran and Iraq (HARLAN & ZOHARY 1966). In *Tr. boeoticum* var. *aegilopoides* generally only one seed develops in a spikelet, whereas the spikelets of the var. *thaoudar* are as a rule two-seeded. Consequently, the name "einkorn" is not very appropriate to the two-seeded variety of *Tr. boeoticum.*

The carbonized wild einkorn from Mureybit belongs to the two-seeded variety *thaoudar.* Among more than 1800 specimens not one grain characteristic of a one-seeded spikelet was met with.

In contrast to the grains of the one-seeded wild einkorn, those of the two-seeded variety are not laterally compressed. The slender seeds *(Pl. 1,* and *fig. 2)* are spindle-shaped, showing the greatest width in the middle of the grain, while the ends are more or less pointed. The dorsal and ventral sides are longitudinally

Plate 1. Carbonized wild einkorn from Mureybit.

straight or slightly curved. The maximum thickness can occur just above the radicle shield as well as more towards the upper end, while in other seeds the ventral and dorsal sides are parallel over the greater part of the grain. In general the dorsal side shows a distinct ridge. The furrow on the ventral side can be narrow as well as open (see below). The radicle shield has a rather gentle slope. On the average the thickness is slightly greater than the width (see *tables 1* and *2)*.

From a sample with a large number of einkorn grains, 100 undamaged specimens have been measured. Since the radicle point had not been preserved on most of the grains this was not included in the measurement if present. The results of the measurements are represented in *table 1* and in *figs. 4*, *5* and *6* which show the frequency distribution histograms for the length, the L : B index $\left(\frac{100 \times \text{length}}{\text{width}}\right)$, and the T : B index $\left(\frac{100 \times \text{thickness}}{\text{width}}\right)$.

Table 1. Dimensions and indices for *Triticum boeoticum* var. *thaoudar* from Mureybit.

	minimum	average	maximum
Length (L) in mm	3.8	4.83	6.0
Width (B) in mm	0.9	1.30	1.6
Thickness (T) in mm	1.0	1.33	1.7
L : B index	286	376	518
T : B index	78	103	133

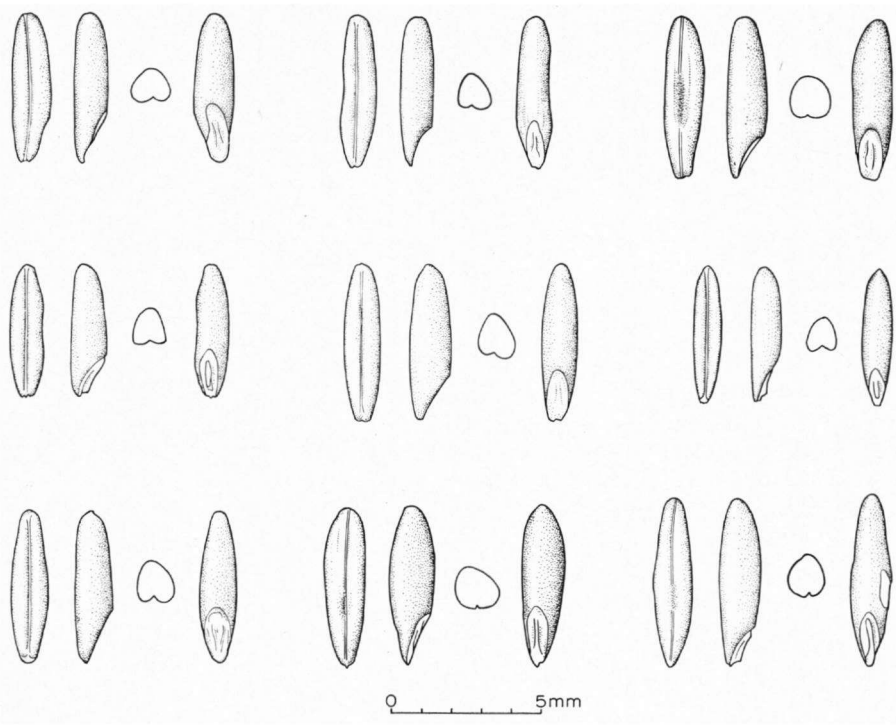

Fig. 2. *Triticum boeoticum* var. *thaoudar* from Mureybit.

For comparison in *table 2* the dimensions and indices are given for 20 modern grains from two-seeded wild einkorn which originates from the Malatya area in southeastern Turkey, about 250 km north of Mureybit, and which had been grown in the experimental garden of the Institute of Plant Breeding at Wageningen. Drawings of a few seeds from this sample are shown in *fig. 3*. These modern seeds are from 10 spikelets. Two series of dimensions are given: one for the seeds after they had been kept in the spikelets under dry conditions for about 2 years, and the other for the same seeds after they had been allowed to take up water in a moisture chamber for about 24 hours. The radicle point and the hairs at the upper end are not included in the measurement. From this table

Table 2. Dimensions and indices for modern *Triticum boeoticum* var. *thaoudar*.

	minimum		average		maximum	
	dry	moist	dry	moist	dry	moist
Length in mm	4.7	5.3	5.77	6.13	6.65	7.1
Width in mm	1.05	1.1	1.47	1.68	2.0	2.1
Thickness in mm	1.3	1.4	1.62	1.78	2.0	2.1
L : B index	311	305	401	369	486	500
T : B index	85	88	112	107	152	155

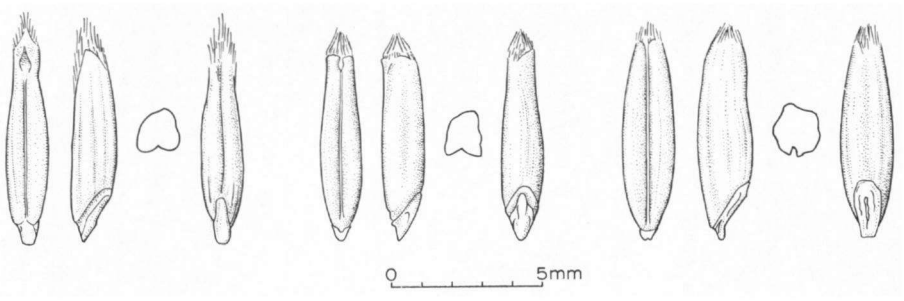

Fig. 3. Modern grains of *Triticum boeoticum* var. *thaoudar*.

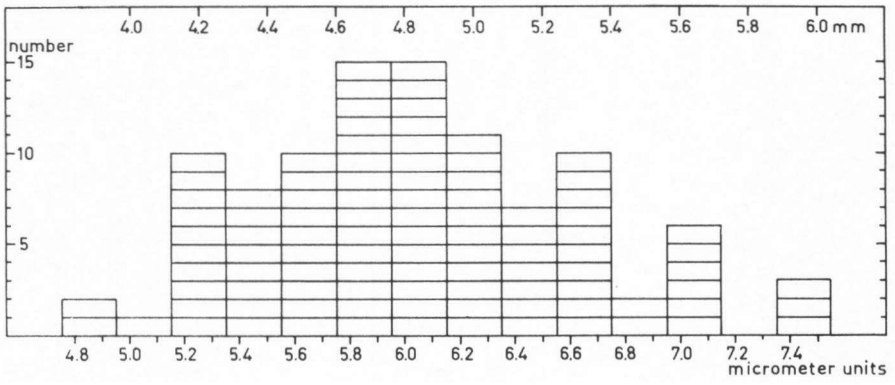

Fig. 4. Frequency distribution histogram for the length of Mureybit wild einkorn.

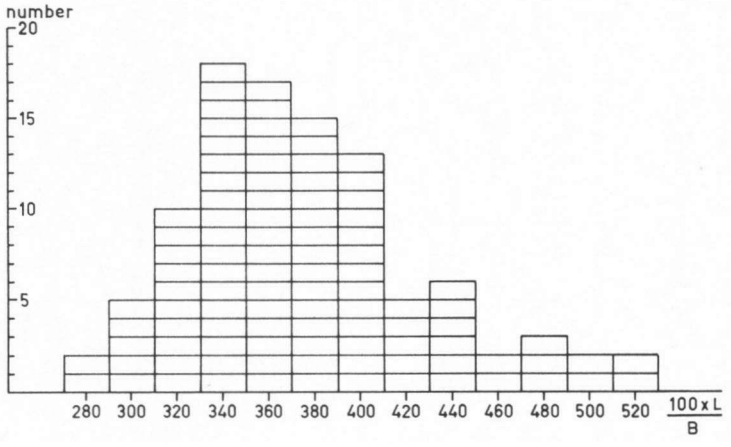

Fig. 5. Frequency distribution histogram for the L : B index of Mureybit wild einkorn.

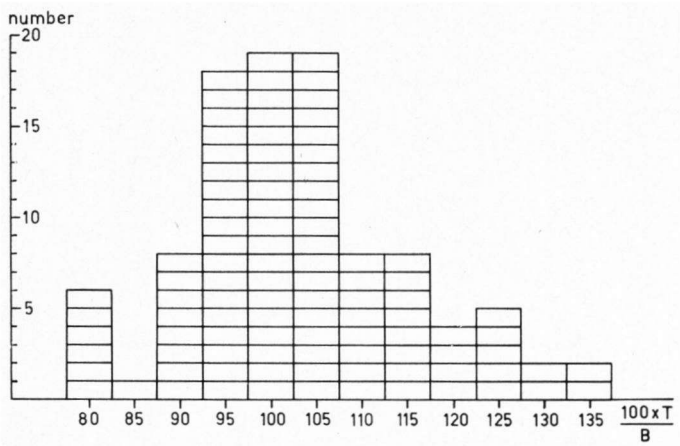

Fig. 6. Frequency distribution histogram for the T:B index of Mureybit wild einkorn.

it appears that the absorption of water caused a swelling in all directions, but that the length shows the smallest proportional increase.

Comparison between *tables 1* and *2* shows that the carbonized einkorn seeds are smaller than the modern specimens. The average indices for the charred seeds agree fairly well with those for the modern grains after they had absorbed water. This suggests that the carbonization has caused some swelling in the Mureybit einkorn grains. In this connection it must be mentioned that for cultivated two-seeded einkorn *(Triticum monococcum* L.) HOPF (1957) found a decrease of the length by 5%, an increase of the width by 29.5% and an increase of the thickness by 4% after carbonization.

In two-seeded wild einkorn the two grains in one spikelet are not completely identical. As is shown in the cross-sections of modern grains in *fig. 7* (upper row) one of the seeds has a protruding and the other an intruding ventral side. The same dimorphism can be observed in the Mureybit charred grains *(fig. 7*, middle and lower row). Through carbonization the grain dilates in width; the difference between protruding and intruding ventral side becomes less pronounced and it can even disappear entirely.

There is also a not inconsiderable difference in size between the two seeds

Table 3. Average dimensions and indices for intruded and protruded seeds of *Triticum boeoticum* var. *thaoudar*.

	intruded		protruded	
	dry	moist	dry	moist
Length in mm	5.35	5.70	6.20	6.56
Width in mm	1.33	1.55	1.61	1.81
Thickness in mm	1.49	1.63	1.75	1.92
L:B index	409	373	392	365
T:B index	114	107	110	107

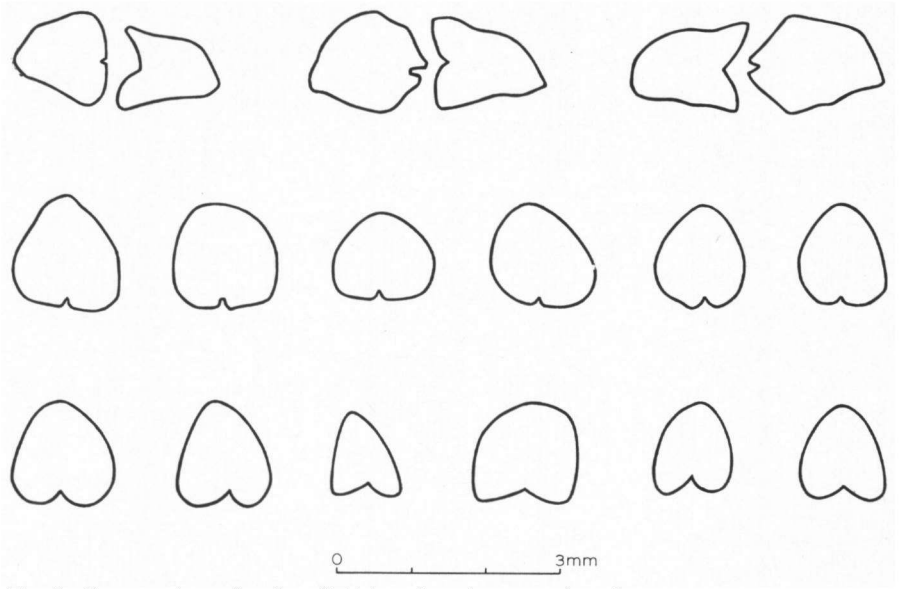

Fig. 7. Cross-sections of grains of *Triticum boeoticum* var. *thaoudar*.
Upper row: 3 pairs from spikelets of modern grains.
Middle row: carbonized grains with protruding ventral side.
Lower row: carbonized grains with intruding ventral side.

in one spikelet, the seed with the protruding ventral side being the larger one. This finds expression in *table 3* which shows the average dimensions for 10 intruded and 10 protruded modern seeds repectively. These grains are the same as those on which the values in *table 2* are based. Professor Jack R. Harlan (Urbana, Illinois, U.S.A.) informed us that he found the protruded seeds to have about twice the weight of the intruded ones. It is not inconceivable that the rather flat shape of the length frequency distribution histogram *(fig. 4)* must, at least partly, be ascribed to the difference in size between both grains from one spikelet.

3. WILD BARLEY (*Hordeum spontaneum* C. Koch)

Characteristic of the seeds of *Hordeum spontaneum (fig. 8)* are the rather flat dorsal side, the comparatively small thickness, and the more or less angular cross-section. The dorsal side is longitudinally straight over the whole grain or at most slightly turned up at one or both ends. This side has a low median ridge in the lower part of the grain, whereas in the upper part a shallow depression can be observed. The ventral side is convex in longitudinal profile, and the greatest thickness is found in the middle of the grain. The furrow is relatively narrow at the lower (radicle) end and has its maximum breadth at the upper end. The maximum width of the grain is in the middle and tapers to a narrow lower end. Towards the upper end the width decreases only slightly. It will be

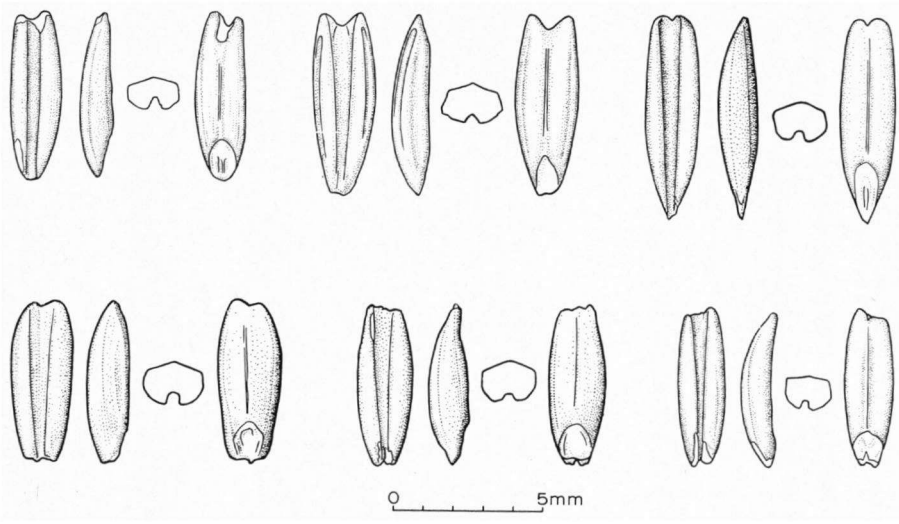

Fig. 8. *Hordeum spontaneum* from Mureybit.

Table 4. Dimensions and indices for *Hordeum spontaneum* from Mureybit.

	minimum	average	maximum
Length in mm	3.8	5.44	6.7
Width in mm	1.5	1.89	2.1
Thickness in mm	1.0	1.26	1.6
L : B index	252	290	372
T : B index	61	67	76

superfluous to mention that the glumes adhere strongly to the seed so that it is very difficult to remove them.

As wild barley seeds occurred only in small numbers in the Mureybit samples and, moreover, many specimens were more or less seriously damaged, only 8 charred seeds turned out to be suitable for measurement. The results are shown in *table 4*.

For comparison dimensions have been taken from 10 modern seeds of wild barley from the mountains west of Damascus *(fig. 9)*. The dimensions and indices for the modern specimens are given both for dry grains and for the same

Table 5. Dimensions and indices for modern *Hordeum spontaneum*.

	minimum		average		maximum	
	dry	moist	dry	moist	dry	moist
Length in mm	8.3	8.9	9.20	9.44	10.05	11.05
Width in mm	2.5	2.8	2.84	3.14	3.2	3.45
Thickness in mm	1.2	1.5	1.55	1.82	1.8	2.1
L : B index	295	277	325	301	357	343
T : B index	48	54	55	58	64	68

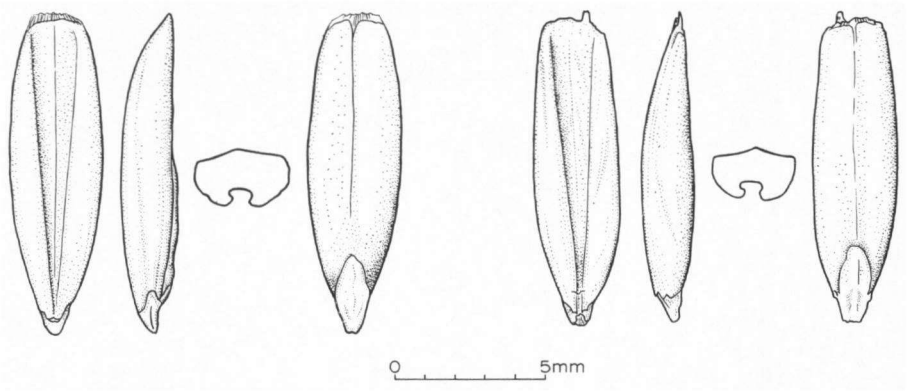

Fig. 9. Modern grains of *Hordeum spontaneum*.

seeds after they had absorbed water during 24 hours. The average dimensions for 10 dry seeds from the same sample measured formerly amount to 9.36, 2.91 and 1.67 mm. respectively, which agrees with the corresponding values in *table 5*. The modern wild barley, the grains of which are much larger than the Mureybit ones, very likely belongs to the race which according to HARLAN & ZOHARY (1966) is characterized, among other things, by extremely large seeds, and which is common in southwestern Syria and in northern Jordan and Israel. In the swollen grains the thickness shows the largest proportional increase, *viz.* 17%, whereas the expansion of the width amounts to 11% on an average.

From *tables 4* and *5* it is clear that the indices for the charred wild barley agree more with those for the swollen modern grains than with those for the dry specimens. The T : B indices suggest that in the carbonized grains the relative increase of the thickness is even more than in the swollen seeds from *table 5*.

After carbonization of the modern wild barley grains from *table 5* the average dimensions turned out to have changed to 7.67, 2.90 and 1.90 mm respectively. This demonstrates that carbonization of barley grains can cause a considerable decrease in length. Consequently, it is not unlikely that the original length of the Mureybit barley may have amounted to about 6.5 mm instead of 5.44 mm on an average.

4. ORIGIN OF WILD EINKORN AND BARLEY IN MUREYBIT

It has already been mentioned that wild einkorn has been met with in most samples, and a few cases even in larger numbers, suggesting that this wild crop played a not inconsiderable part in the diet of the prehistoric inhabitants of Mureybit. At present wild einkorn is not found in the plain of northern Syria, but it grows in massive stands in southeastern Turkey, at elevations between 600 and 2000 m (HARLAN & ZOHARY 1966). If about 10,000 years ago the climate of northern Syria was cooler and moister than to-day, wild einkorn could have been harvested in the vicinity of Mureybit. However, the scarce palynological

evidence available up to now for the Near East does not support such a hypothesis (cf. VAN ZEIST & WRIGHT 1963; VAN ZEIST 1967). Consequently, it is more likely that the wild einkorn was harvested in the adjacent part of Turkey, at about 100 to 150 km from the site.

That wild einkorn can have contributed essentially to the economy of food gatherers is demonstrated by HARLAN (1967). On the ground of his experiments in harvesting wild einkorn this author arrived at the conclusion that under favourable conditions a family group could have gathered enough grain to cover the yearly consumption in about 3 weeks.

HELBAEK (1959) reports wild einkorn for the Early-Neolithic site of Jarmo in northern Iraq (about 6750 B.C.), where it has been found together with wild and domesticated emmer and with a cultivated two-row barley.

Wild barley has only been met with in small numbers. Nevertheless it is likely that it was collected intentionally. The Mureybit wild barley could have been harvested in the vicinity of the site, although it would never have occurred there in large stands. In that case the so-called wadi race of HARLAN & ZOHARY (1966) would have been concerned. On the other hand, wild barley is common in the foothills and mountains of southeastern Turkey, so that it could have been harvested there, just as with the wild einkorn.

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