Relics of Prehistoric Flint Mining in Hungary

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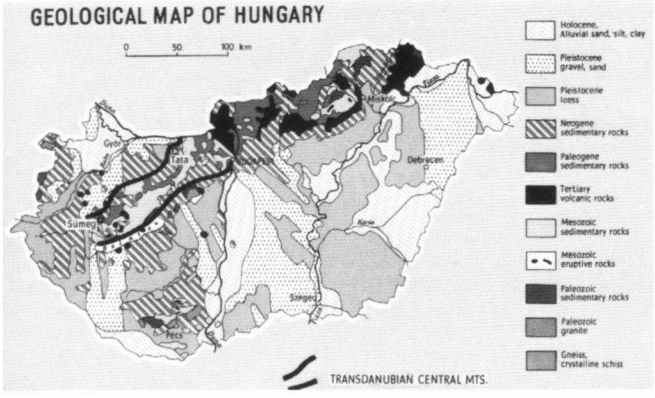
In the course of geological research work two prehistoric flint mine pits have been discovered in Hungary during the last fifteen years. Both localities occur in the transdanubian Central Mountains made up of Mesozoic formations. At Sümeg dark grey radiolarian flint lenses and layers interbedded with the well-stratified white limestone beds of the lowermost Cretaceous /Berriasian Stage/ 'Biancone' Formation were mined; at Tata Upper Dogger liver-brown radiolarian flint layers belonging to the Jurassic 'Ammonitico Rosso' Formation Group were worked.



The results of the fundamental archeological studies have been published in the following papers:
L. Vértes: Eine prähistorische Silexgrube am Mogyorósdomb bei Sümeg /Acta Arch. Ac. Sci. Hungaricae 16.1974/
J. Fülöp: Funde des prähistorischen Silexgrubenbaues am Kálvária. Hügel von Tata. /Acta Arch. Ac. Sci. Hungaricae 25.1973/.

Sümeg - Mogyorósdomb

The town Sümeg is situated on a Pliocene abrasion platform of the Mesozoic mountain margin, in the southwest part of the Transdanubian Central Mountains. This same abrasion terrain has accomodated a barren pasture field, called Mogyorósdomb, to the south of the town. Geologically, this is characterized by the occurrence of Middle to Upper Jurassic and Lower Cretaceous sequences in a vertical position of tectonic control, between two fault lines. The Upper Tithonian, Berriasian and Valanginian Stages are represented by a formation of 'Biancone' type. This consists mainly of white Tintinnina limestones alternating with dark grey radiolarian flint layers. The Upper Tithonian cherts are of spongy structure, less suitable for toolmaking than the Berriasian flint forming compact lenses and layers. Therefore the one-time flint mining was based mostly on these latter. Thus far a gallery, about 50 m in total length, has been unearthed, but this seems to represent only a small fraction of the whole mining area.
Because of the cropping out of the flint-bearing beds at the surface, early man could mine them, after removing the thin debris sheet atop, in steep-walled galleries driven along the strike of the strata /Fig. 1./. The galleries vary between 60 cm and 1.5 m in breadth, though with the collapse of the thin partitions between the closely-spaced galleries, the breadth has locally attained even 4 to 5 m. The depth of the galleries is 3 to 3.5 m in the majority of the cases. Some gallery stretches have been driven over several metres length beneath a roof of 0.1 to 1.5 m thickness. The resulting adits locally attain 1.8 to 2 m in height.
The packing rock filling the mine workings is rather diversified, consisting of several layers. The topmost layer is of black humic debris. It is underlain by an alternation of limestone rubble, uncemented or filled with liver-brown or redbrown fossil soil. Finally, a layer of rock detritus coated by white 'lime-milk' rests on the surface of the bedrock. Mining implements can be found in every stratum, least of all being so in the fossil soil layers.
That the mine workings are filled with such a material seems to indicate that the miners did not lift the waste rubble to the surface, but accumulated it in out-of-service parts of the mine galleries. In longer pauses of mining or in cases of working in other galleries humification-bound, fine-grained sediment was accumulated by meteoric waters or wind action on the abandoned surfaces. The lime-coated, basal debris derives from the precipitation of $CaCO_3$ dissolved in ground-water.

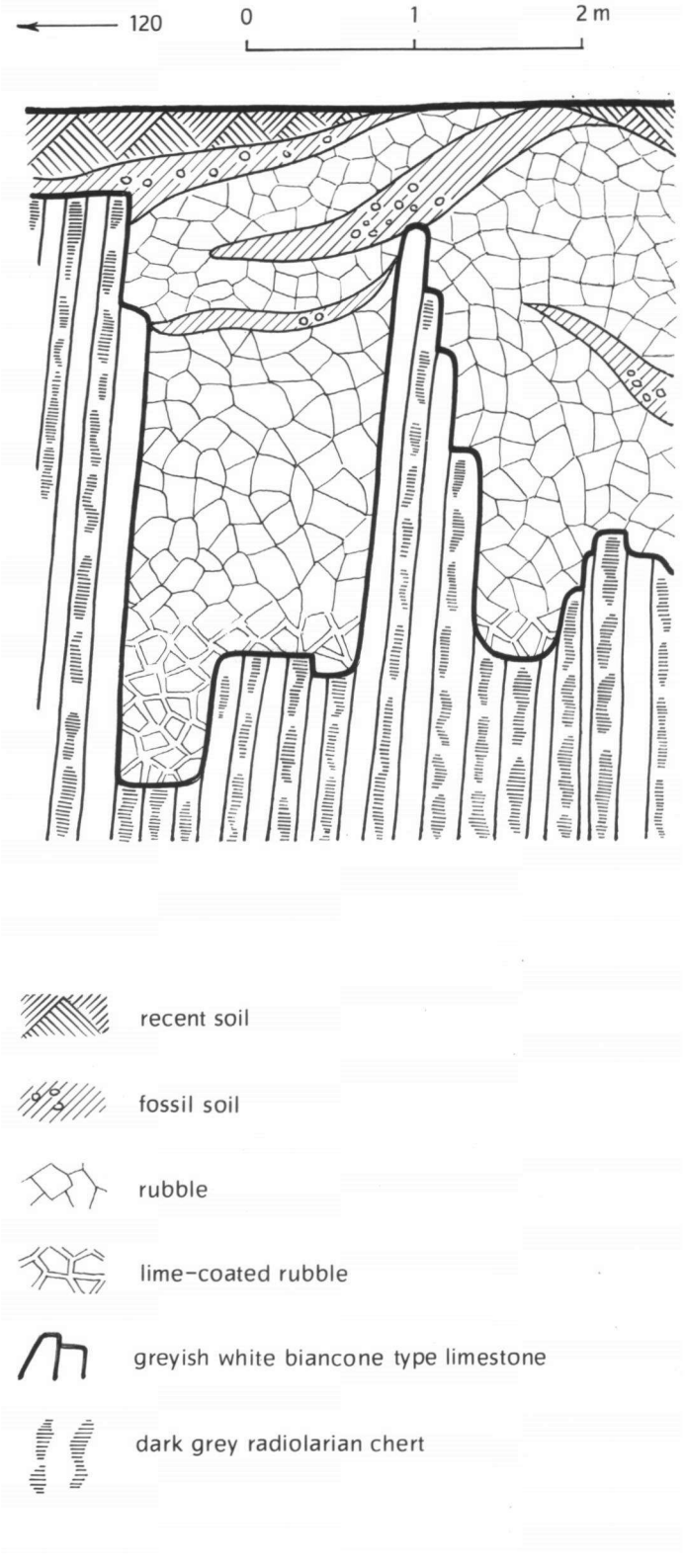
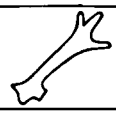
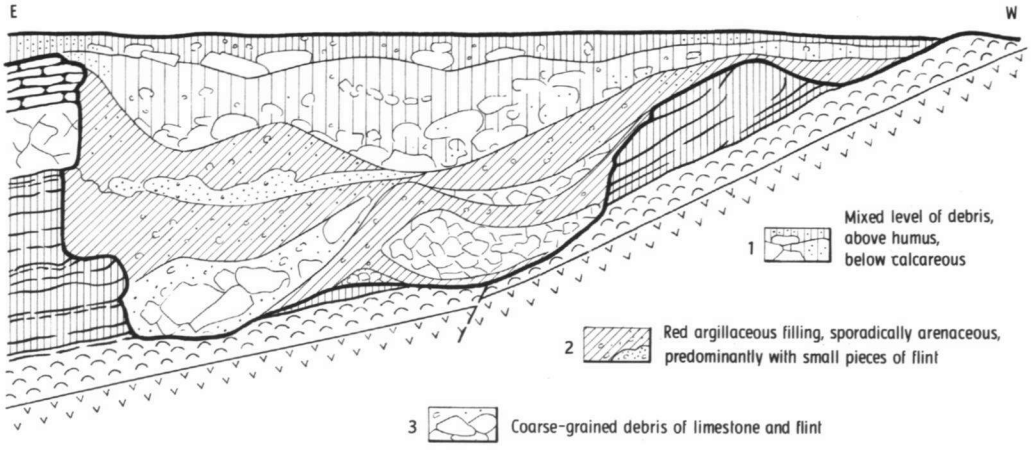


Fig. 1. Sectional drawing of a pit in Sümeg-Mogyorósdomb

Antler implements:

Type of implement	Species of animals	Morphological characteristics		Length in cms	Remarks
Maul	Cervus elaphus L.		Antler-stalk cut down at the rose and above the middle tine	41.5	heavily used
Maul	Cervus elaphus L.		Antler-stalk cut down at the rose and above the middle tine	37.0	used
Maul	Cervus elaphus L.		Upper half of the middle tine slivered slantwise	32.5	used
Maul-fragments ? Maul-fragments	Cervus elaphus L. Cervus elaphus L. Cervus elaphus L. Cervus elaphus L.	2 fragments above the rose 1 fragment of the rose 1 fragment near the stub of the middle tine 3 fragments of strong antler-stalk			heavily used heavily used
Hammer-head	Cervus elaphus L.		Part above the rose with a trapezoid shaft-hole	12.5	broken
Wedge	Cervus elaphus L.		Wedge-shaped part of antler-stalk cut down at the stub of the middle tine	14.0	used
? Wedge	Cervus elaphus L.		Split slivered from the antler-stalk	7.0	
Expanding wedge	Cervus elaphus L.		Slantwise slivered part of antler-stalk above te the middle tine	33.0	used
Expanding wedge	Cervus elaphus L.		Lenghtwise slivered antler-stalk	39.0	used
Expanding wedge	Cervus elaphus L.		Brow antler with rose and cranial fragment	35.2	broken, used
Expanding wedge	Cervus elaphus L.		Brow antler with rose and cranial fragment	38.1	broken, used
Expanding wedge	Cervus elaphus L.		Antler-stalk with crown-tines	44.0	heavily used points of tines
? Expanding wedge	Cervus elaphus L.		Antler-stalk	22.5	broken
Expanding wedge-fragments	Cervus elaphus L.	3 fragments of Cervus elaphus L. - antler /with heavily worn points of tines/			
Expanding wedge	Capreolus capreolus /L/		Weak six-tined antler with rose and cranial fragment	20.8	heavily used
Expanding wedge-fragments	Capreolus capreolus /L/	Fragments of 7 antlers	/4 fragments near the rose/ /3 heavily worn points of tines/		
? Expanding wedge	Capra hircus L. Capra hircus L.		Horn-core Horn-core	10.2 13.2	horn perished
? Expanding wedge or maul	Cervus elaphus L.	Indeterminable fragments of 6 antler-stalks			



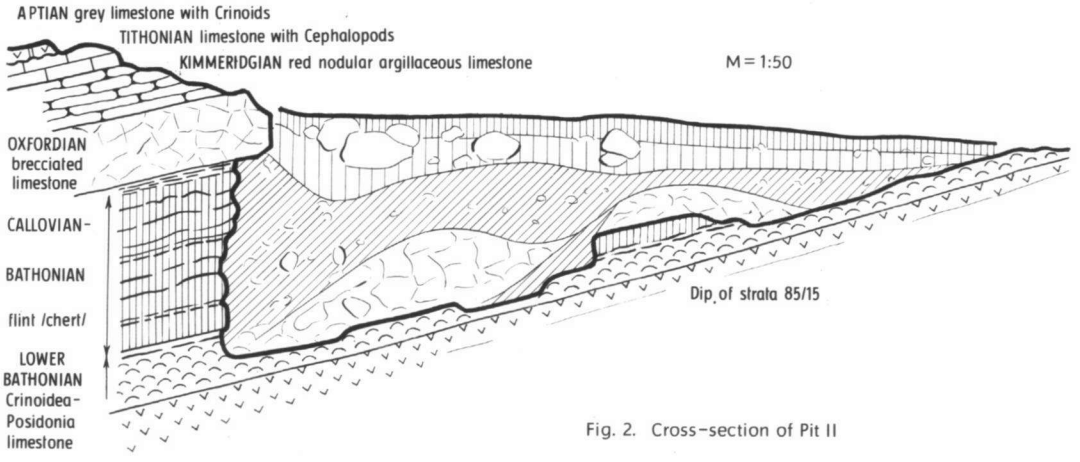


Fig. 2. Cross-section of Pit II

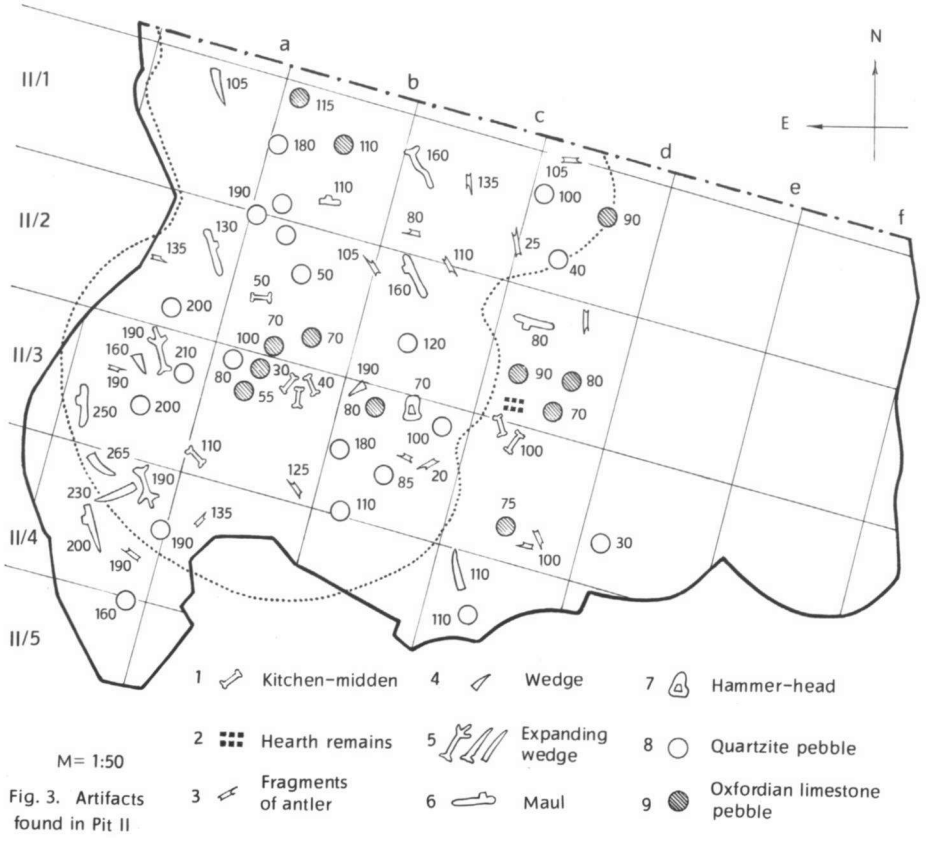
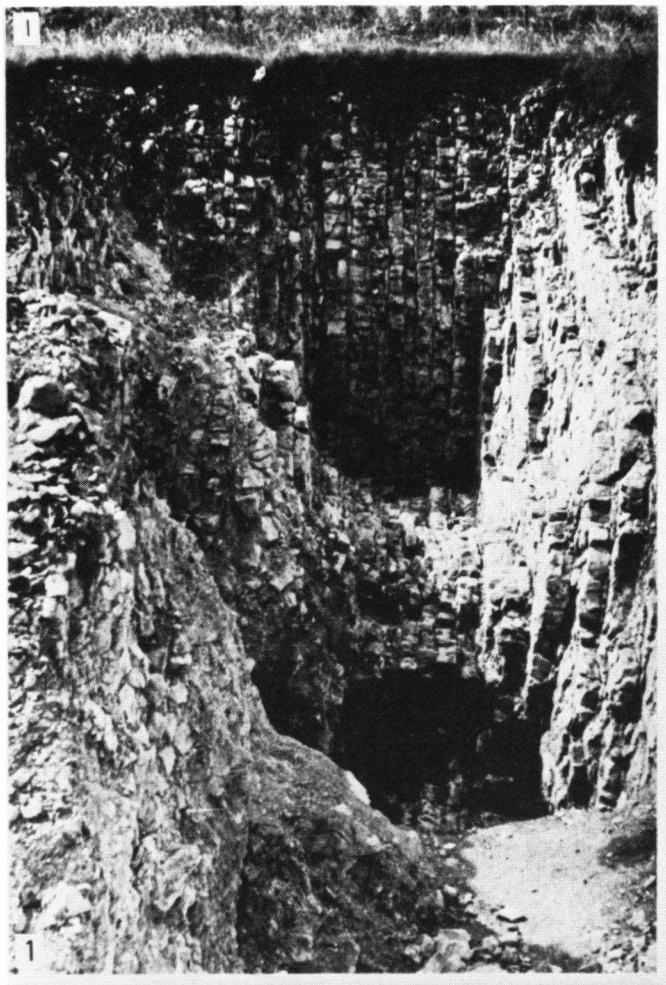
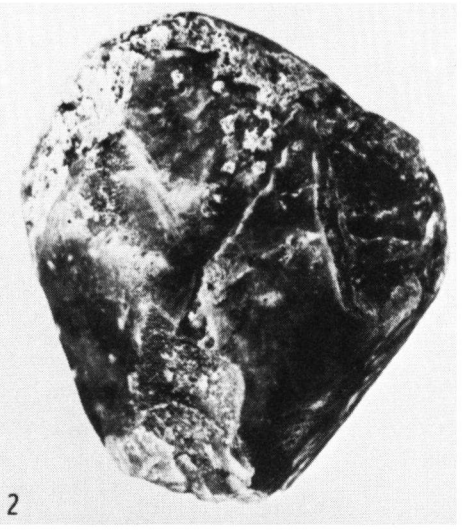


Fig. 3. Artifacts found in Pit II





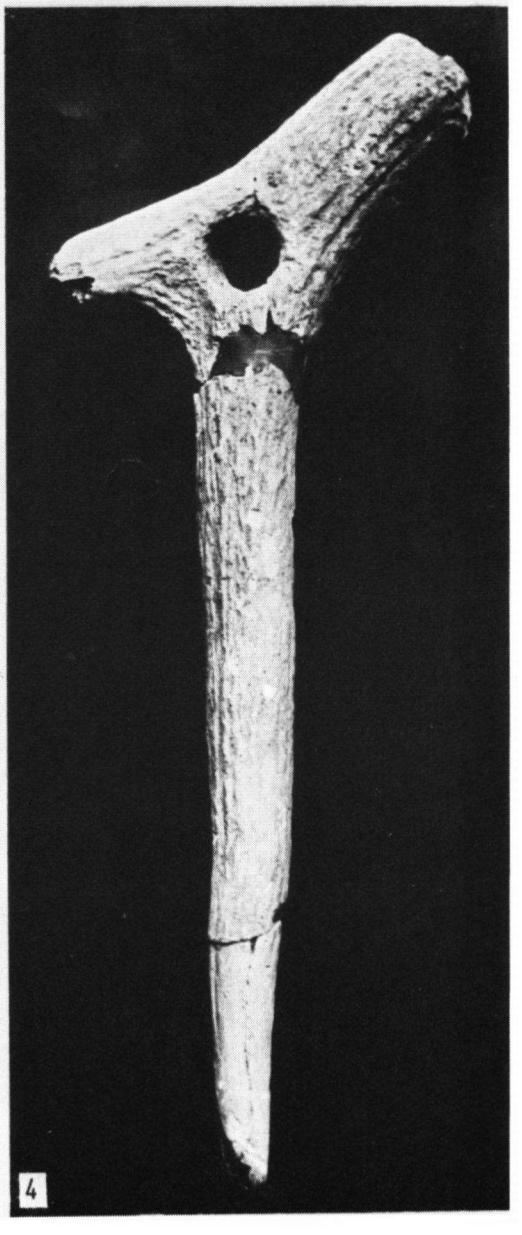


Table I
Sümeg-Mogyoródomb
1. *Gallery with adit end in flint mine*
2. *Hammer stone made of quartzite pebble /1:2/*
3. *Mining implements made of pebble and antler found in their original position during excavations*
4. *Pierced mining implement made of red deer antler /1:2/*

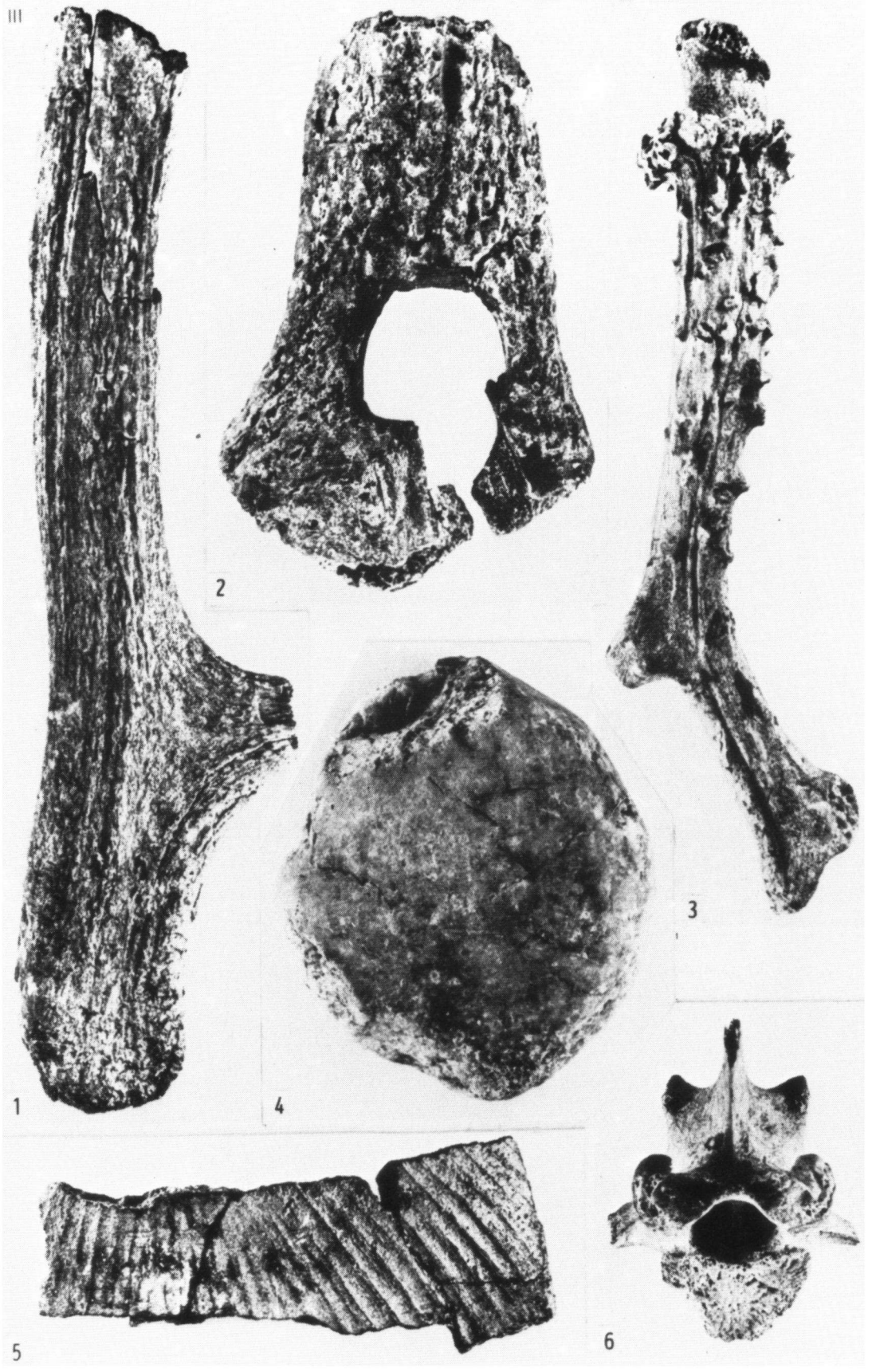


Table III
Mining implements and food garbage
1. *Maul made of red deer antler /1:2/*
2. *Hammer-head made of red deer antler with a trapezoidal shaft hole /2:3/*
3. *Expanding wedge made of deer antler /2:3/*
4. *Hammer stone made of quartzite pebble /1:2/*
5. *Sherd of Pécel /Late Aeneolithic/ /1:1/*
6. *Dorsal vertebra of red deer /food garbage/ /2:3/*

Table II
Tata-Kálváriadomb
1. Pits I, II and open rock fissure III
2. Pit I
3. Pit II, undermining

Mining implements made of antler are very frequent in the rubble of the mine galleries. Flint miners made use of almost all parts of the antler of deer /Cervus elaphus Linné/ and made of them tools of hammering, engraving, plugging, picking and raking functions assignable to at least 10 different types. Among the 200 specimens or so of antler artifacts thus far recovered 4 specimens have shown a subcircular hole drilled for the wooden shaft. In an additional one a quadrangular hole was made.
Beside the antler tools a number of quartzite pebble hammerstones have also been recovered. These derive from near-by Pliocene conglomerates. Having the size of a fist, they carry on their edges the traces of wear and tear. They seem to have been used for removing the unutilizable limestone coating of the flint slabs. 3 of the stone tools have been finished off in the shape of biconvexe discs, 6 to 7 cm in diameter.

L. Vértes considered the mine galleries of the Mogyorósdomb at Sümeg to form a transition between the Mardellengrube type and the true underground mines. In this respect the mine at Mauern, Austria, is the closest counterpart.
No half-product, crudely prefabricated tool-form, has been found. Polished stone tools and ceramic artifacts are also lacking. Radiocarbon dating showed the age of these finds to correspond to 2,560±160 /2.720±160/ Years B.C., i.e. latest Neolithic to Aeneolithic.

Tata. Kálvária Hill
On the northwestern border of the Transdanubian Central Mountains abounding in hot and tepid springs scores of prehistoric sites can be found. The Mesozoic basement horst block forming the bedrock of the substratum of the town Tata rises as a low hill above the Tertiary and Quaternary foreland of the mountains. The highest part is the Kálvária Hill. The Jurassic above the Upper Tithonian Dachstein Limestone is represented here by about 50 metres of 'Ammonitico Rosso'. This sequence includes an interbedded layer of liver-brown Upper Dogger radiolarian chert /flint/ of 1 to 1.5 m thickness, cropping out over 180 m length with a dip of 15 to 20°.
The flint miners could easily uncover the bedrock made up of flint layers. Using antler tools, they stripped off the gently dipping strata down to the limestone underneath. Thereafter the work became more difficult, because the flint plunges eastward beneath the overlying Upper Jurassic limestones. The collapse hazard due to undermining and the increasing technological difficulties of working beneath the limestone overburden set limitations to the deepward progress of flint mining /Fig. 2/. Therefore people found more advisable to recommence the work by staring it from the surface.
Basic implements of flint mining at this site too were tools made of antler: maul, expanding wedge, and pick /Fig. 3/. The types and essential data of antler tools are shown in the appended tabulation.
Beside antler tools, several hammer stones were also found. These derive partly from Pleistocene terrace pebble and quartzite and various kinds of metamorphic rocks, partly are made of Jurassic limestone of local origin. They seem to have been used for cleaning the recovered flint slabs and to break up the bones at meals.
Several hearth remains could be recognized at the locality. The food garbage recovered in considerable quantity contained remnants of deer, roe, cattle, aurochs, goat, pig, brown hare, rabbit, partridge and European wels. With a view to the results of 3810±65 years before 1950 obtained by C_{14} dating and to the discovery of a Pécel sherd, the age of flint mining corresponds to a late Copper Age.The artifacts recovered from a deeper level and thus far lacking any age data do not preclude the possibility that the flint mining here may be traced back well into the Neolithic. The area of the flint mine pits is crossed by a rock fissure widened by karstic hot water to a breadth of 1.5 to 2 m which is locally covered by a vault-like roof of rock, being open elsewhere. In this fissure, at 4.4 m depth, a large hearth remnant, a few stone and antler implements and a considerable amount of flint splinters were found on the surface of the Pleistocene fissure-fill, at the centre of the open part. At the southern cave-like end of the fissure a smaller hearth remain was discovered with a round hollow at its centre. In addition to the above, two discs shaped of limestone, 10 to 16 cm in diameter each, have also been recovered.

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