

Prehistoric mining in Hungary

Őskori bányászat Magyarországon

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Abstract

Mining is one of the most ancient crafts in the life of mankind. With the general spread of tool-making and other artisan activities, the need for specific and good quality raw materials immediately appeared. Mining features are known from the Middle Palaeolithic period onwards, i.e., the cultural sphere of the Neanderthal Man; in absolute chronological dates, approximately 40000 years BC. The first exploitation sites aimed at the procurement of lithic raw materials, notably, siliceous rocks. In a rough generalisation, they are referred to as “flint mines”. The international scientific research centred on them uses this term, too (i.e. Union International des Sciences Préhistoriques et Protohistoriques Commission on flint mining in Pre- and Protohistoric times). With the advance of technology and the appearance of cultural needs, the range of mined goods extended to other lithic resources, pigments, salt, metals and decorative stones as well. This paper deals with prehistoric mines known and published so far from Hungary and their current state of research.

Tárgyszavak: bányászat, őskor, kovaközetek, Magyarország

Kivonat

A bányászat a legrégebb mesterségek egyike. A kőeszköz-készítés és használat általános elterjedésével hamarosan felmerült az igény speciális és jobb minőségű nyersanyagok beszerzésére. Ennek értelmében az első bányahelyek már az őskor középső szakaszától megjelentek és folyamatosan használatban voltak a kőeszköz-készítés valamennyi periódusában. Az első kitermelő helyeken ún. pattintott kőeszköz nyersanyagokat, elsősorban kovaközeteket bányásztak, ezért általánosságban ezeket a lelőhelyeket „kovabányáknak” vagy kevésbé pontos szóhasználatlaltal „tűzkőbányáknak” hívjuk. Kutatásukra a nemzetközi ősrégészeti kutatás külön szakbizottságot hozott létre (Union International des Sciences Préhistoriques et Protohistoriques Az őskori és őskori kovabányászati kutatások munkabizottsága néven). A technológia és a nyersanyag iránti igények függvényében a bányászott nyersanyagok köre még az őskorban jelentősen kiszélesedett az egyéb kőeszköz-nyersanyagok, festékek, só, fémek és ékkövek irányába. Ez a cikk az őskori bányák magyarországi kutatásának történetét és jelenlegi állását mutatja be.

Introduction

Mining is among most ancient human activities documented in the archaeological record (VERMEERSCH, PAULISSEN 1997). The motive for the systematical exploitation of various rocks and minerals is rooted in the effort of collecting the best possible raw material for tools as well as other, more sophisticated needs like ornaments and items of prestige (SÍKLÓSI 2004). Mine-fresh material is of better quality and sometimes large quantities were needed for the supply of the local community and other parties

connected directly or indirectly to the owners (supervisors?) of the territory where the raw material sources were located.

Various commodities were exploited already in prehistory, like siliceous rocks (“flint mines”), other rocks for polished stone tools and other stone artefacts, pigments, gemstones and salt (RAPP 2009). Mining of copper ore is documented since the Middle Neolithic period (JOVANOVIĆ 1982). The complexity of prehistoric mining features can be spectacular, involving tens of metres in depth, shafts, and systems of underground galleries.

Short history of research on prehistoric mining in Hungary

The first prehistoric exploitation sites were claimed by researchers of the 19th century and the beginning of the 20th century, respectively. J. Mihalik mentioned the possibility of prehistoric mining of limnic quartzite from Korlát and Boldogkőváralja (Tokaj Mts, MIHALIK 1896, 1897) and later on, the geologist Zoltán Schréter presented the limnic quartzite beds of Kács as possible source of “silex” extraction (SCHRÉTER 1916). These were not documented and though we know the geological conditions and the archaeological information seems to support these claims but we do not know the actual sites. The first case, when the existence of the mine was proved beyond doubt is the Miskolc-Avas “flint” mine (hydroquartzite) that was excavated by J. Hillebrand in the 1920-ies (HILLEBRAND 1928, 1929). Since that time, several researchers have performed excavations on this spot (SIMÁN 1979, 1995a; RINGER 2003; RINGER, RINGER, SZAKÁLL 2005, 2007, HARTAI, SZAKÁLL 2008). The opinions on the utilisation period of the exploitation site vary to great extent: from Middle Palaeolithic till Late Neolithic.

History of Hungarian “flint mining” research was summarised several times (VÉRTES 1969, BÁCSKAY 1980, 1982, 1984a, 1984b, 1990a; FÜLÖP 1976, 1984, SIMÁN 1986, BÁCSKAY 1995a–g; DOBOSI 1983, T. BIRÓ, DOBOSI 2002; BÁCSKAY, T. BIRÓ 2003, T. BIRÓ, REGENYE 2003). Studies on classical “flint mines” like Sümeg (VÉRTES 1964, BÁCSKAY 1978, 1979, 1986, 1987, 1990b, 1995a, BÁCSKAY, VÖRÖS 1980) Tata (FÜLÖP 1973) and Korlát (SIMÁN 1995b) are important elements of the study of prehistoric raw material economy and industrial activities in Hungary.

Recently, in the framework of the EU project “Historical Quarries” most of the prehistoric mines were visited again, documented and locations were noted by GPS. The data obtained have several outputs: from simple revision of our comparative database locality data (Litotéka), integration into various data systems, like the Historic quarries database or the Cadastre of Industrial Archaeological monuments in Hungary.

Catalogue of mines

The catalogue of Hungarian flint mines was published first in WEISGERBER ed. (1980), enumerating 6 mines: Miskolc-Avas, Sümeg: Mogyorós-domb, Tata: Kálvária-domb, Korlát: Ravaszlyuk-tető, Erdőbénye: Sás patak and Boldogkőváralja (BÁCSKAY 1980). This list was complemented with the quarries Erdőbénye (BÁCSKAY 1995b), Bakonycsernye (BÁCSKAY 1995c), Szentgál (T. BIRÓ 1986, 1995, T. BIRÓ, REGENYE 1991), Hárskút (BÁCSKAY 1995d), Dunaszentmiklós (BÁCSKAY 1995e) and 2 quarries from Lábatlan (BÁCSKAY 1995f, g) in 1995. Weisgerber’s catalogue was published in a second edition in 1999 on the occasion of the VIIIth International Flint Conference in Bochum (KÖRLIN, WEISGERBER ed. 2006)

The new list presented here was compiled for two new internet-based projects, Historic Quarries (http://www2.sbg.ac.at/chc/chc_site_en/projekte_historicquarries.html) and the Cadastre of monuments for Industrial Archaeological importance in Hungary (<http://sites.google.com/site/iparregeszetikateszter/>). The relevant list is presented on Table 1. while locations of the mines is given on Figure 1.

New in prehistoric mining

Compared to the last updated catalogue (BÁCSKAY et al. in LECH 1995) the volume Archaeology at the turn of the Millennium (VISY et al. ed. 2003, BÁCSKAY, T. BIRÓ 2003a–b) enumerated 3 “new” mines (Budapest: Farkasrét, Lovas: Mackó-bánya and Kisújbánya: Szamár-hegy), of which only Budapest: Farkasrét is a “flint mine” in the traditional sense; the base publications were already made by the time of the 1995 summary (GÁBORI-CSÁNK 1989, 2006). The mine had probably two basic periods of use, in the Middle Palaeolithic and the younger phase of prehistory (Late Copper Age / Bronze Age). The reason for this is the inferior quality of the hornstone, tectonically fractured. Probably by the metal ages heat treatment could be applied on the raw material to enhance its qualities (T. BIRÓ 2002) Lovas is also not new; it was excavated and published in the 1950-ies and as it is widely known, the raw material exploited here was not silex but red pigment (MÉSZÁROS, VÉRTES 1955). There is, however, essential new evidence concerning dating and material analysis of the pigment (DOBOSI 2006) and as the 2003 survey comprised, apart from „flint mines” other known prehistoric exploitation sites as well, it was added as no. 14. On the list of Hungarian prehistoric mines we added also Kisújbánya: Szamár-hegy, exploitation site of phonolite for polished stone tools. This site was published by T. BIRÓ et al. 2001 in the framework of the IGCP-442 project (Raw materials of the Neolithic/Aeneolithic polished stone artefacts). Locating prehistoric polished stone tool quarries is more difficult than “flint mines” because these outcrops are typically exploited in historical times as well. For Kisújbánya, the fortunate moment was that it is located deep inside Mecsek Mts on a strictly protected area for its natural (biological) endowments, where documents of stone exploitation and chipping can be allegedly dated to prehistory only. For the same reason (natural protection area), only surface survey was done here. The raw material was found at several Late Neolithic settlements and evidences of local workshop activity were documented at the neighbouring Lengyel culture settlement, Zengővárkony (T. BIRÓ et al. 2003).

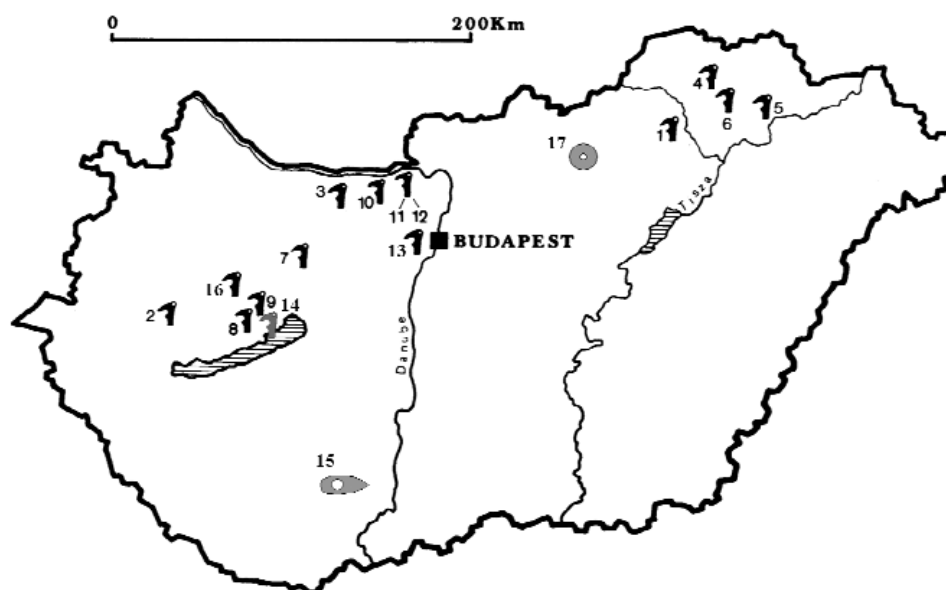
The only new “flint mine” recently excavated is Nagytevel-Kőbánya (Figure 1, no. 16) where Upper Cretaceous flint was exploited for stone tools, according to absolute dates and distribution data, by the population of the Middle Neolithic Linearband Pottery Culture and the Late Neolithic Lengyel Culture (T. BIRÓ 2003, T. BIRÓ et al. 2010). The raw material was spotted previously as important constituent of

Table 1. Main features of prehistoric mines in Hungary

1. táblázat. A magyarországi őskori bányák főbb jellemzői

Quarry number	Town / Exact locality	Exploited	Formation period (geological age)	Mining period	Host mine (modern)	Open-air exhibition	Absolute Dates	Coordinate Lat. / Coordinate Long (WGS)	Description and mining features	References
II-1.	Miskolc/ Ávas	hydro-quartzite	Miocene	Palaeolithic-Late Neolithic		(plans)	no dating	N 48 10 / E 20 78	First "flint mine" located and excavated in Hungary. Excavations by Hillebrand (1928), Megy (1936) Simán (1976-78), Ringer (2002). Chipping floor, pits transecting siliceous tuff layer extending to 3-4 m depth. Various opinions on use period from Middle Palaeolithic till Late Neolithic.	PAPP 1907, HILLEBRAND 1928, 1929, SIMÁN 1979, 1995, RINGER 2003, RINGER, SZAKÁLL 2005, 2007, HARTAL, SZAKÁLL 2008
II-2.	Sírmeg/ Mogyorós-domb	(radiolarian) chert	Lower Cretaceous	Middle Neolithic-Late Bronze Age		Geological Protection Area (formerly MÁFI, now West Hungarian University)	C-14 Hv 11610 ± 95 BP; Hv 11611 ± 4840 ± 110 BP	N 46 51.802 / E 17 17.409*	Largest flint mine excavated in Hungary. Located in course of planning a geological section (L.Kocsis 1958). Excavations: Vértess 1960-1961, Fülöp 1963-1976, Bácskay 1978-1989). Features: trenches, pits, antler tools. C-14 dates, distribution data. Open-air exhibition.	BÁCSKAY 1978, 1979, 1980, 1986, 1987, 1990, 1995, BÁCISKAY, VÖRÖS 1980, FÜLÖP 1975, VÉRTES 1964, VÖRÖS 2007
H-3.	Tata/ Kálvária-domb	radiolarite	Middle Jurassic	Copper Age	limestone	Tata Natural Protection Area (ELTE)	LCA shards (Baden culture)	N 47 38.383 / E 18 19.026*	On the territory of the geological park with unique Mesozoic section, pits of prehistoric mining were located in Middle Jurassic radiolarite beds. Excavated by: Finds: Late Copper Age shards, antler tools. C-14 dates available. Open-air exhibition.	BÁCSKAY 1980, 1982, 1984a, 1984b, 1990, FÜLÖP 1973, 1976, TÓTH 2008
II-4.	Korlát/ Ravasz-hyuk-tető	limnic quartzite	Miocene	Palaeolithic-Bronze Age			no dating	N 48 38 / E 21 25	Excavation by K. Simán, 1983-85. Mining features: siliceous bedrock, chipping floor	SIMÁN 1986, 1995
II-5.	Lúdbánya/ Sás-patak	limnic opalite	Miocene	Upper Palaeolithic-Prehistoric			no dating	N 48 26 / E 21 36	Excavation by E. Bácskay, 1992. Mining features: pit, chipping floor.	BÁCISKAY 1995
II-6.	Boldogkővár-alja/ ?	limnic quartzite	Miocene	Neolithic?			no dating	N 48 33 / E 21 23	Observations by J. Mihalik. Mining features: pits, worked fragments and blocks	MIHALIK 1897
H-7.	Bakony-csernye/ Tüzköves-árok	radiolarite	Middle Jurassic	Neolithic?			no dating	N 47 31 / E 18 08	Located by L. Kocsis (1967); excavations by E. Bácskay in 1975. Features: small pits, worked debris, 8 antler tools, no dating.	BÁCISKAY 1980, 1982, 1984a, 1984b, 1990, 1995, FÜLÖP et al. 1969
II-8.	Szentgyál/ Tüzköves-hegy	radiolarite	Middle Jurassic	Neolithic			no dating	N 47 08.271 / E 17 41.858*	Largest area with worked radiolarite debris. Excavations by K. Bíró 1983-1985, 1993-1995. Mining features: pits (max. 3 m), hammerstones, worked debris. Distribution studies.	BÍRÓ 1986, 1995, BÍRÓ, REGENYE 1991, 2003
II-9.	Hárskút / Édesvíz-major	radiolarite	Middle Jurassic	Neolithic?			no dating	N 47 18 / E 17 81	Discovered by J. Konda in 1970 during geological fieldwork. Mining features: pits, worked flakes, antler tools.	BÁCISKAY 1982, 1984a, 1984b, 1990, 1995
II-10.	Dunaszentmiklós/ Hosszú-vonalú	radiolarite	Middle Jurassic	Neolithic?			no dating	N 47 10 / E 18 38	Discovered by J. Konda and D. Zilahy in the 1980ies. Mining features: pits, worked flakes, hammerstones.	BÁCISKAY 1984, 1990, 1995
II-11.	Lúdbánya/ Margit-tető	radiolarite	Middle Jurassic	Prehistoric			no dating	N 47 75 / E 18 50	Cauldron-shaped pit located during geological sondage. Hammerstones, worked debris.	BÍRÓ 1984, BÁCISKAY 1984, 1990, 1995
II-12.	Lúdbánya/ Pisznice	radiolarite	Middle Jurassic	Neolithic?			no dating	N 47 75 / E 18 50	Mining features: pits, worked flakes, hammerstones.	BÁCISKAY 1984, 1995
H-13.	Budapest/ Farkasrét	hornstone	Upper Triassic	Palaeolithic-Copper Age			C-14 GrN-13567 ± 900 BP; Bern 3470 ± 80 BP	N 47 29.282 / E 18 59.809*	Located by Zs. Baló. Excavated by V. Gábori-Csánk in 1984-1987. Mining features: pits, worked debris, antler tools. C-14 dating.	GÁBORI-CSÁNK 1989, 2006, VÖRÖS 2000
H-14.	Lovas/ Mackó-bánya	red pigment	Triassic / Eocene	Late Palaeolithic	dolomite grit		C-14 ETH-15199 Lovas 11740 ± 100	N 47 01.051 / E 17 55.154*	Red pigment exploitation from dolomite grit. Excavations by L. Vértess and Gy. Mészáros in 1952. Mining features: pits with bone mining tools, chipped stone tools. C-14 dating.	MÉSZÁROS, VÉRTES 1955, VÉRTES 1969, DOMOSI 2006, DOMOSI-VÖRÖS 1979
II-15.	Kisújványa/ Szamár-hegy	phonolite	Lower Cretaceous	Late Neolithic			no dating	N 46.15 / E 18.35	Located by Zs. Schleder in course of geological survey. Blocks and worked fragments on the surface. Petrographic and distribution studies. Relation to Zengővárkony I.N. settlement.	BÍRÓ et al. 2001
H-16.	Nagytevel/ Kőbánya	K3 flint	Upper Cretaceous	Middle Neolithic-Late Copper Age	limestone	Natura 2000 area	OSI. (MÁFI) 7.5 ± 0.9 Ky; 7.6 ± 0.9 Ky; 7.8 ± 1.1 Ky; 10.4 ± 1.2 Ky	N 47 16.433 / E 17 34.905*	The only s.s. flint occurrence in Hungary. Located by D. Bihari. Excavated by K. T. Bíró and J. Regenye, 2005-2008. Mining features: pits, worked debris, hammerstones. A few Neolithic shards, OSI. dating. Distribution data.	BÍRÓ, REGENYE 2003, BÍRÓ-REGENYE in press
II-17.	Domoszló/ Pipis	andesite	Miocene	Prehistoric - submodern				N 47 50.494 / E 20 04.688*	Surface use of scattered andesite blocks. Fragments, spoil pieces. Located by Tóth L. and Tóth Z. No excavation, no dating.	T. BÍRÓ, PÉTERDI 2011

Coordinates marked with asterisk (*) were measured on spot personally with GPS.



- | | |
|---------------------------------------|--------------------------------|
| H-1. Miskolc: Avas, | H-13. Budapest: Farkasrét, |
| H-2. Sümeg: Mogorós-domb | H-14. Lovas: Mackó-bánya, |
| H-3. Tata: Kálvária-domb, | H-15. Kisújbánya: Szamár-hegy, |
| H-4. Korlát: Ravaszlyuk-tető, | H-16. Nagytevel: Kőbánya, |
| H-5. Erdőbénye: Sás patak, | H-17. Domoszló: Pipis |
| H-6. Boldogkőváralja: ?, | |
| H-7. Bakonycsérnye: Tűzköves-árok, | |
| H-8. Szentgál: Tűzköves-hegy, | |
| H-9. Hárskút: Édesvízmajor, | |
| H-10. Dunaszentmiklós: Hosszúvontató, | |
| H-11. Lábatlan: Margit-tető, | |
| H-12. Lábatlan: Pisznice, | |

Figure 1. Map of registered prehistoric mines in Hungary

1. ábra. Magyarországi nyilvántartott őskori bányák térképe

the Neolithic stone tool inventory but the outcrop was not accessible due to military reasons. In the 1990-ies the territory became accessible and from 2005 to 2008, the Hungarian National Museum and the Veszprém County Museum Directorate performed excavations here. A large mining field was discovered, partly destroyed by recent quarrying (for limestone). The excavations were finished in 2008 and a preliminary report produced for *Archaeológiai Értesítő* (T. BIRÓ et al. 2010).

The last prehistoric quarry on the list is a very special case. It is a millstone/quernstone quarry of possibly very long period of utilisation, the first of this kind registered in Hungary (T. BIRÓ, PÉTERDI 2011). It was found in 2009, at Domoszló: Pipis, on a high slope of the Mátra Mts., large rounded blocks of andesite could be spotted knapped into millstones and, probably prehistoric, quernstones. The site was observed and located by Zoltán and Lajos Tóth. So far, only a preliminary survey was made at the locality, and preliminary characterisation studies (petrography, geochemistry) were made on the raw material. More research is needed both on the locality and concerning its actual distribution.

Conclusions

Prehistoric mining is documented in Hungary from the Middle Palaeolithic period onwards. The exploited raw material is used for various purposes and of various lithology. The most typical commodity for mining is siliceous rocks, radiolarite, limnic silicites, hornstone and flint used for chipped stone tools. Raw material for polished stone tools and grinding stones was equally exploited, though we can prove its prehistoric exploitation only in special and very fortunate instances. Among the prestige (cultic?) goods exploited, that were not directly connected to everyday need of tools, the use and extraction of pigments is documented.

Prehistoric quarries are important elements of the industrial, archaeological and cultural heritage. In spite of that, the remains are more often neglected and sometimes even destroyed. There are two open-air presentation sites in Hungary where visitors can see these unique remains (at Tata and Sümeg), but their maintenance is rather difficult.

Probably more “mines” could be located and docu-

mented, but their identification needs an archaeologically as well as geologically trained eye, which is not always feasible. Another problem is dating; mining features are very difficult to date, and can probably be dated for a longer

period only. There are also a lot of practical problems concerning excavation and elaboration of archaeological material recovered from the prehistoric “mines” — lot of problems for future research.

References — Irodalom

- BÁCSKAY, E. 1978: A sümeg-mogyorósdombi őskori kovabányában 1976-ban végzett ásatás. — *A Magyar Állami Földtani Intézet Évi Jelentése 1978-ról*, 389–393.
- BÁCSKAY, E. 1979: A sümeg-mogyorósdombi őskori kovabányában 1977. évben végzett régészeti ásatás. — *A Magyar Állami Földtani Intézet Évi Jelentése 1978-ról*, 413–415.
- BÁCSKAY, E. 1980: Zum Stand der Erforschung prähistorischer Feuersteinbergbau. — In: WEISGERBER, G. (ed.): 5000 Jahre Feuersteinbergbau. Deutschen Bergbau-Museum Bochum, 179–182.
- BÁCSKAY, E. 1982: Újabb ásatások őskori tűzkőbányákban (Neuere Ausgrabungen in prähistorischen Feuersteingruben). — *Communications Archaeologicae Hungaricae* 1982, pp. 5–14.
- BÁCSKAY, E. 1984a: Óskori tűzkőbányák a dunántúli középhegységben (Prehistoric flint mines in the Transdanubian Central Mountains). — *Iparrégészeti* 2, 11–24.
- BÁCSKAY, E. 1984b: Prehistoric flint mines (exploitation sites) in Hungary and their role in the raw material supply. — In: KANCHEV, K. (ed.): *Proceedings of the 3rd International Seminar in Petroarchaeology*. pp. 127–145.
- BÁCSKAY, E. 1986: State of affairs at Sümeg. — T. BIRÓ, K. (ed.) 1986: *Óskori kovabányászat és kőeszköz-nyersanyag azonosítás a Kárpát medencében / International conference on prehistoric flint mining and lithic raw material identification in the Carpathian Basin, Sümeg 1986* (1) Budapest, pp. 11–26.
- BÁCSKAY, E. 1987: New field surveys near the Sümeg-Mogyorósdomb prehistoric flint mine. — In: T. BIRÓ, K. (ed.) 1987: *Óskori kovabányászat és kőeszköz-nyersanyag azonosítás a Kárpát medencében / International conference on prehistoric flint mining and lithic raw material identification in the Carpathian Basin, Sümeg 1987* (2) Budapest, 17–21.
- BÁCSKAY, E. 1990a: La minería prehistórica en Hungría. — *Cuadernos de Prehistoria de la Universidad de Granada* 1986 (11), pp. 273–325.
- BÁCSKAY, E. 1990b: New investigations into the processing and distribution of flint from the Sumeg-Mogyorósdomb flint mine in Hungary. — *Cahiers du Quaternaire* 17, 239–250.
- BÁCSKAY, E. 1995a: H 2 Sümeg-Mogyorósdomb, Veszprém county. — In: LECH, J. (ed.): *Catalogue of flint mines: Hungary. Archaeologia Polona* 33, pp. 383–395.
- BÁCSKAY, E. 1995b: H 5 Erdőbénye-Sás patak, Borsod county. — In: LECH, J. (ed.): *Catalogue of flint mines: Hungary. Archaeologia Polona* 33, pp. 395–400.
- BÁCSKAY, E. 1995c: H 7 Bakonycsernye-Tűzköves árok, Fejér county. — In: LECH, J. (ed.): *Catalogue of flint mines: Hungary. Archaeologia Polona* 33, pp. 401–402.
- BÁCSKAY, E. 1995d: H 9 Hárskút-Édesvízmajor, Veszprém county. — In: LECH, J. (ed.): *Catalogue of flint mines: Hungary. Archaeologia Polona* 33, pp. 408–409.
- BÁCSKAY, E. 1995e: H 10 Dunaszentmiklós-Hosszúvontató, Komárom county. — In: LECH, J. (ed.): *Catalogue of flint mines: Hungary. Archaeologia Polona* 33, pp. 409–410.
- BÁCSKAY, E. 1995f: H 11 Lábatlan-Margittető, Komárom county. — In: LECH, J. (ed.): *Catalogue of flint mines: Hungary. Archaeologia Polona* 33, pp. 410–411.
- BÁCSKAY, E. 1995g: H 12 Lábatlan-Piszniceető, Komárom county. — In: LECH, J. (ed.): *Catalogue of flint mines: Hungary. Archaeologia Polona* 33, pp. 411–412.
- BÁCSKAY, E., T. BIRÓ, K. 2003a: Nyersanyag, bányászat, kereskedelem. — In: VISY, Zs. (ed.): *Magyar Régészet az ezredfordulón (Újkőkor)* Budapest, pp. 118–123.
- BÁCSKAY, E., T. BIRÓ, K. 2003b: Raw materials, mining and trade. — In: VISY, Zs. (ed.): *Hungarian Archaeology at the turn of the Millennium*. Budapest, pp. 117–123.
- BÁCSKAY, E., VÖRÖS I. 1980: Újabb ásatások a Sümeg-mogyorósdombi őskori kovabányában (New excavations in the prehistoric flint mine at Sümeg-Mogyorósdomb). — *Veszprém Megyei Múzeumok Évkönyve* 15, pp. 7–47.
- BÁCSKAY E., SIMÁN, K., T. BIRÓ K. 1995: Hungary. [in separate entries by localities. — In: LECH, J. (ed.): *Catalogue of flint mines: Hungary. Archaeologia Polona* 33, pp. 383–412.
- DOBOSI, V. 1983: Óskori és római bányászat a Kárpát medencében. — *Bányászati és Kohászati Lapok* 116 (9), pp. 586–597.
- DOBOSI, V. 2006: Lovas (Hungary) ochre mine reconsidered. — In: KÖRLIN, G., WEISGERBER, G. (eds): *Proceedings of the VIIIth Flint Symposium. Der Anschnitt. Zeitschrift für Kunst und Kultur im Bergbau Bochum* 19, pp. 29–36.
- DOBOSI, V., VÖRÖS, I. 1979: Data to the evaluation of the finds assemblage of the Palaeolithic paint mine at Lovas. — *Folia Archaeologica* 30, pp. 8–25.
- FÜLÖP, J. 1973: Funde des prähistorischen Silexgrubenbaues am Kálvária-Hügel von Tata. — *Acta Archaeologica Academiae Scientiarum Hungaricae* 25, pp. 3–25.
- FÜLÖP, J. 1976: Relics of prehistoric flint mining in Hungary. — In: ENGELEN, F.G. H. (ed.): *Proceedings of the Second International Symposium on flint, Staringia* 3, pp. 72–77.
- FÜLÖP, J. 1984: *Az ásványi nyersanyagok története Magyarországon*. — Budapest Műszaki Könyvkiadó, 179 p.
- GÁBORI-CSÁNK, V. 1989: Európa legrégebb bányászati emléke Farkasréten. — *Magyar Tudomány* 1, pp. 13–21.
- GÁBORI-CSÁNK, V. 2006: Európa legrégebb bányászati emléke Farkasréten. — *Bányászattörténeti Közlemények* 1/2, pp. 3–14.
- HARTAI, É., SZAKÁLL, S. 2008: A Miskolc-avasí paleolitikumi kovakőbányászat földtani-ásványtani háttere [Geological-mineralogical background of the Palaeolithic flint mining...]. — In: SZAKÁLL S. (szerk.): *Az ásványok és az ember a mai Magyarország területén a XVIII. század végéig*. — *Bányászat* 74, pp. 241–242.
- HILLEBRAND, J. 1928: Über ein Atelier des „Proto-Campignien“ auf dem Avasberg in Miskolcz (Ungarn) *Eiszeitalter und Urgeschichte* 5, pp. 53–59.
- HILLEBRAND, J. 1929: Neuere Ausgrabungen auf dem Avasberg bei Miskolcz in Ungarn. — *Eiszeitalter und Urgeschichte* 6, pp. 136–141.

- JOVANOVIĆ, B. 1982: Rudna Glava. Nastarije rudarstvobakra na Centralnom Balkanu (Rudna Glava. Der älteste Kupferbergbau im Zentralbalkan). — Bor-Beograd, Arheološki Institut, Beograd, pp. 1–155.
- KANCHEV, K. ed. 1984: *Proceedings of the 3rd International Seminar in Petroarchaeology. Plovdiv 1984*. — University of Plovdiv "Paisii Hilendarski" pp. 1–380.
- KÖRLIN, G., WEISGERBER, G. eds. 2006: Stone Age - Mining Age. — *Proceedings of the IIIth International Flint Symposium, September 13–17 1999, Bochum*. (=Veröffentlichungen aus dem Deutschen Bergbaumuseum Bochum 148; *Der Anschnitt*, Beiheft 19).
- LECH, J. (ed.) 1995: Catalogue of flint mines. — *Archaeologia Polona* 33, 590 p..
- MÉSZÁROS, GY., VÉRTES, L. 1955: A paint mine from the Early Upper Palaeolithic age near Lovas (Hungary, county Veszprém). — *Acta Archaeologica Academiae Scientiarum Hungaricae* 5, pp. 5–34.
- MIHALIK, J. 1896: Abaúj-Torna vármegye őstörténete. — In: SZIKLAY, J., BOROVSKY, S.: *Magyarország vármegyéi és városai I. Abaúj-Torna vármegye és Kassa*. Budapest, pp. 463–473.
- MIHALIK, J. 1897: A boldogkővőraljai neolithkori telepek. — *Archaeológiai Közlemények* 50, pp. 5–39.
- RAPP, G. 2009: Archaeomineralogy. — In: *Natural Science in Archaeology*. Springer Verlag Berlin-Heidelberg, 348 p.
- RINGER, Á. 2003: Őskőkori kovabányászat és kovakő-feldolgozás a miskolci Avason. — *Herman Ottó Múzeum Évkönyve* 42, pp. 5–16.
- RINGER, Á., SZAKÁLL, S. 2005: Paleolithic stone raw material mining and processing on the Avas Hill of Miskolc. — *Praehistoria* 4/5, pp. 5–6.
- RINGER, Á., SZAKÁLL, S. 2007: Paleolithic Flint Mining on the Avas Hill = Őskőkori kovabánya a miskolci Avason. — In: *microCAD 2007 International Scientific Conference 22-23 March 2007. A szekció : Környezetbarát és minőségi nyersanyagtermelés Miskolc: Miskolci Egyetem Innovációs és Technológiai Transzfer Centrum*, pp. 89–93.
- SCHRÉTER, Z. 1916: Néhány adat a Bordsod-Hevesi Bükk hegység ősrégészetéhez. *Barlangkutatás* 4, pp. 86–88.
- SIKLÓSI, Zs. 2004: Prestige goods in the Neolithic of the Carpathian Basin. — *Acta Archaeologica Academiae Scientiarum Hungaricae* 55, pp. 1–62.
- SIMÁN, K. 1979: Kovabánya az Avason. — *A Herman Ottó Múzeum Évkönyve* 18, pp. 87–102.
- SIMÁN, K. 1986: Limnic quartzite mines in Northeast Hungary. — T. BIRÓ, K. (ed.): *Őskori kovabányászat és kőeszköz-nyersanyag azonosítás a Kárpát medencében / International conference on prehistoric flint mining and lithic raw material identification in the Carpathian Basin, Sümeg 1986* (1) Budapest, pp. 95–100.
- SIMÁN, K. 1995a: H 1 Miskolc, Avas-hill. — In: LECH, J. (ed.): *Catalogue of flint mines: Hungary. Archaeologia Polona* 33, pp. 371–382.
- SIMÁN, K. 1995b: The Korlát-Ravaszyuktető workshop site in North Eastern Hungary (H4). — In: LECH, J. ed.: *Catalogue of flint mines: Hungary. Archaeologia Polona* 33, 41–58.
- T. BIRÓ, K. 1986: The Szentgál workshop complex (Preliminary report). — T. BIRÓ, K. (ed.): *Őskori kovabányászat és kőeszköz-nyersanyag azonosítás a Kárpát medencében / International conference on prehistoric flint mining and lithic raw material identification in the Carpathian Basin, Sümeg 1986* (1) Budapest, 101–106.
- T. BIRÓ, K. (ed.) 1986: *Őskori kovabányászat és kőeszköz-nyersanyag azonosítás a Kárpát medencében / International conference on prehistoric flint mining and lithic raw material identification in the Carpathian Basin, Sümeg 1986* (1) Budapest, 342 p.
- T. BIRÓ, K. (ed.) 1987: *Őskori kovabányászat és kőeszköz-nyersanyag azonosítás a Kárpát medencében / International conference on prehistoric flint mining and lithic raw material identification in the Carpathian Basin, Sümeg 1986* (2). Budapest 1–284.
- T. BIRÓ, K. 1995: H 8 Szentgál-Tűzköveshegy, Veszprém county. — In: LECH, J. ed.: *Catalogue of flint mines: Hungary. Archaeologia Polona* 33, pp. 403–407.
- T. BIRÓ, K. 2002: New data on the utilisation of Buda hornstone in the Early Bronze Age. — *Budapest Régiségei* 36, pp. 131–143.
- T. BIRÓ, K. 2003: Tevel flint: a special constituent of the Central European LBC lithic inventories. — In: BURNEZ-LANOTTE, P. (ed.): *Production and Management of Lithic Materials in the European Linearbandkeramik. UISPP Liege, Colloque 9.3 BAR - IS* 1200, pp. 11–17.
- T. BIRÓ, K., DOBOSI V. 2002: Prehistoric and classical stone quarries ("mines") in the Carpathian Basin. — In: JEREM, E., BIRÓ, K. T. (eds): *Archaeometry 98. Proceedings of the 31st Symposium, Budapest, April 26 – May 3. BAR – IS. Vol. II* 1043/2, pp. 819–823.
- T. BIRÓ, K., PÉTERDI B. 2011: Domoszló-Pipis: őrlőkő és malomkő készítő műhely a Mátrában / Domoszló-Pipis: exploitation site and workshop for the production of quernstones and millstones in the Mátra Mts. — In: TÓTH E. szerk. *Kovács-Festschrift, Magyar Nemzeti Múzeum, Budapest*, pp. 523–534.
- T. BIRÓ, K., REGENYE, J. 1991: Prehistoric workshop and exploitation site at Szentgál-Tűzköveshegy. — *Acta Archaeologica Academiae Scientiarum Hungaricae* 43, pp. 337–375.
- T. BIRÓ, K., REGENYE, J. 2003: Exploitation Regions and Workshop Complexes in the Bakony Mountains, Hungary. — In: STÖLLNER, TH., KÖRLIN, G. STEFFENS, G., CIERNY, J. (eds): *Man and Mining – Mensch und Bergbau*. — *Anschnitt*, Bochum 16, pp. 55–64.
- T. BIRÓ, K., SZAKMÁNY, GY., SCHLÉDER, Zs. 2001: Neolithic Phonolite mine and workshop complex in Hungary. — *Slovak Geological Magazine* 7 (4), pp. 345–350.
- T. BIRÓ, K., SCHLÉDER Zs., ANTONI J., SZAKMÁNY Gy. 2003: Petroarchaeological studies on polished stone artifacts from Baranya county, Hungary II. Zengővárkony: notes on the production, use and circulation of polished stone tools. — *A Janus Pannonius Múzeum Évkönyve* 46/47, pp. 37–76.
- T. BIRÓ, K., REGENYE, J., PUSZTA S., THAMÓNÉ BOZSÓ E. 2010: Előzetes jelentés a nagytevel-tevel hegyi kovabánya ásatásának eredményeiről. — *Archaeológiai Értesítő* 135, pp. 5–25.
- VERMEERSCH, M. P., PAULISSEN, E. 1997: Extensive middle paleolithic extraction in the Quenna area (Egypt). — In: SCHILD, R., SULGOSTOWSKA, S. (eds): *Man and Flint*. pp. 133–143.
- VÉRTES, L. 1964: Eine prähistorische Silexgrube am Mogyorósdomb bei Sümeg. *Acta Archaeologica Academiae Scientiarum Hungaricae* 16, pp. 187–215.
- VÉRTES, L. 1969: *Őskori bányák Veszprém megyében*. — Veszprém Megyei Múzeumi Igazgatóság, Veszprém, 59 p.
- VISY Z., NAGY M., B. KISS Zs. (eds) 2003: *Magyar Régészet az ezredfordulón / Hungarian Archaeology at the turn of the Millennium*. — Budapest, 471 p.
- WEISGERBER, G. (ed.) 1980: *5000 Jahre Feuersteinbergbau*. — Deutschen Bergbau-Museum, Bochum 670 p.