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Middle Aalenian – Lower Bajocian (Middle Jurassic) ammonites from Büdöskút, an old locality in the Bakony Mts, Transdanubian Hungary

András GALÁCZ[1] & Zoltán KOVÁCS[2]

(with 2 figures, 1 table and 1 plate)

In one of the repositories of the Hungarian Geological and Geophysical Institute a collection of ammonites from the Bakony Mountains was discovered, which goes back to the field activities of J. NOSZKY in the 1930's. The material was collected at Büdöskút, in those times a farmhouse between Eplény and Lókút, near Zirc. The ammonites are Middle Aalenian and Lower Bajocian in age. These age intervals and faunas are known only in a few localities within the region. Although the well-preserved specimens were collected without special attention to fine stratigraphical information, thus their biostratigraphic value is very limited, the occurrences of certain species (e.g. *Erycites* (*Abbasitoides*) *modestus*, described in detail) give an addition to the knowledge of Middle Jurassic ammonite faunas of the Bakony Mts.

Introduction

J. NOSZKY jr., the geologist for the Hungarian Geological Institute made mapping in 1935 around Lókút, not far from the town of Zirc in the Bakony Mts. Here, at the foot of the Kávás-hegy Hill, near to a farm called Büdöskút (a name referring to a well) he discovered fossiliferous early Middle Jurassic rocks. He collected numerous fossils, mainly ammonites, but he never mentioned again this place or these fossils in his later works. The material went into the collections of the Geological Institute, NOSZKY prepared them and made some preliminary determinations, but the specimens remained unregistered. After his death in 1970 the specimens found their way to the repository of the Geological Institute and sank into oblivion.

In 2011 the material has been re-discovered in Rákóczi-telep, one of the repositories of the Institute. It became clear that it represents assemblages which may complement the knowledge about the Upper Aalenian and the Lower Bajocian ammonites of the Bakony Mts, thus it deserves studying. Unfortunately there are no information on the way of collecting, thus the stratigraphic background of the assemblages remains poor. However, the historic value of the collection and some faunistic data standing even without exact stratigraphic references make the investigations worth doing.

The locality and material

Büdöskút is a place where an old well and in the past a farmhouse situated by the now abandoned Eplény-Lókút road (Text-fig.1). The area is well-known as a locality of Lower Jurassic rocks and ammonites. Kávás-hegy, the hill north to the road, was the study area of L. KOVÁCS (e.g. 1942) and later of GÉCZY (e.g. 1971; 1976). These studies resulted in detailed presentation of Sinemurian and Pliensbachian ammonite faunas.

The track of the NW-SE road follows a prominent fault bringing higher Jurassic rocks onto the surface on the other, southwestern side of the valley (see map 1 in KONDA 1970), and probably here were those outcrops where Noszky collected his ammonites.

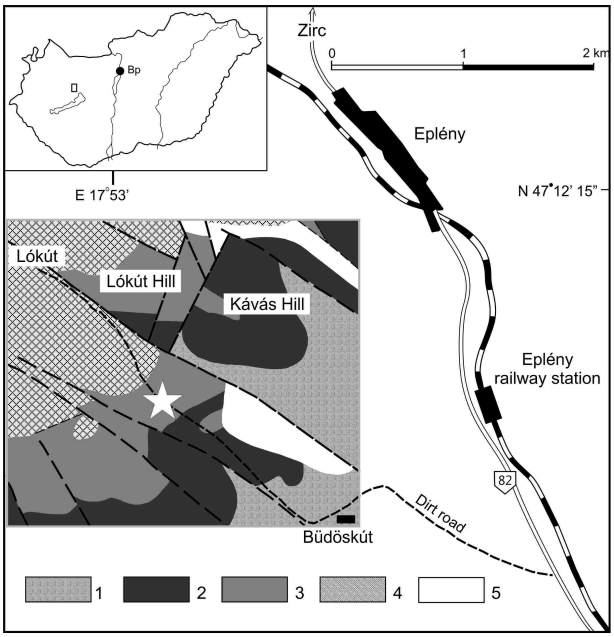
On the surviving original labels NOSZKY recorded four localities, each noted as 'mfh', i.e. 'megfigyelőhely = observation point'. This obviously refers to entry in his field notebook. Unfortunately neither field notebooks nor reconnaissance maps of NOSZKY are kept in the archives of the Geological Institute. On the other hand, maps edited by NOSZKY show smaller areas of exposed Middle Jurassic

[1] Eötvös University, Department of Palaeontology, H-1117 Budapest, Pázmány Péter sétány 1/C, Hungary. E-mail: galacz@ludens.elte.hu

[2] Department of Musicology and Music Theory, Liszt Academy of Music, H-1077 Budapest, Wesselényi u. 52, Hungary. E-mail: kzkovacszoltan@gmail.com

ammonite-bearing white *Bositra*-limestone. Most probably these exposures were at least partly artifical ones, because NOSZKY noted one as 'on the road leading to Lókút', possibly indicating a temporal situation due to road-maintenance or widening. Today, as Büdöskút being abandoned and ruined, and the road out of use, these outcops are unidentifiable.

The preservation of the specimens is uniform, i.e. there are no preservational differences between examples of Middle Aalenian and Lower Bajocian ones. All are internal casts with better, occasionally beautifully preserved lower sides. The matrix is white limestone with some clay content. The texture is dominated by thin *Bositra* shells as tiny filaments. This facies corresponds to the Bajocian clayey limestone known on the nearby Lókút Hill, which is ranged into the Eplény Limestone Formation (KNAUER in FŐZY 2012).



Text-fig. 1. The geographic situation of the Büdöskút locality with the geological build-up of the immediate surroundings (after KONDA 1970, fig.I). 1: Lowermost Jurassic limestone (Kardosrét Fm); 2: various Lower Jurassic carbonates; 3: Middle Jurassic limestones and radiolarite; 4: Upper Jurassic and lowermost Cretaceous carbonates; 5: Oligocene clastics. Asterisk indicates the most probable place of collecting.

The studied collection

The material consists of several hundred specimens, mainly ammonites. Other elements are extremely rare: only some belemnites and a few bivalves are in the collection. The majority of the ammonite specimens belongs to Phylloceratina and Lytoceratina, suborders usually represented with high proportions in Mediterranean, i.e. Bakony Mountains assemblages.

In our discussion we keep the notions of NOSZKY as he left as inscriptions on the specimens. All examples were labelled as „III", indicating the locality, and after a slash numbers 1 to 4, indicating the beds or the assemblages collected on different spots within the small locality area. Besides, each specimen bears a short combination of letters and numbers, referring probably to systematic affinity. For simplicity, we refer to the discussed specimens as belonging to „assemblages" III/1 to 4, however, these groups of individuals indicate very wide stratigraphic intervals (e.g. assemblage III/1 at least three Bajocian ammonite zones) or may indicate stratigraphic units in overlap (i.e. assemblages III/2 and 4, both indicating Middle Aalenian age). One point, corresponding to „assemblage" III/3, yielded extremely poor material: a few phylloceratids only.

The whole material belongs to the collections of the Hungarian Geological and Geophysical Institute (formerly Hungarian Geological Institute, MÁFI). The final cataloguing with inventory numbers will be given there, until then we refer to the specimens by their letters and numbers given by Noszky.

In the following sections we present the most interesting, important or significant ammonite species by subfamilies. We show here only those forms which contribute something new or additional to the Aalenian and Bajocian assemblages known previously from stratigraphically controlled sections. In the systematics, we follow the scheme recently published by HOWARTH (2013).

Systematic notes on the ammonites

Superfamily Hildoceratoidea HYATT, 1867
Family Hildoceratidae HYATT, 1936
Subfamily Tmetoceratinae SPATH, 1936

Tmetoceratinae show world-wide range and in the Mediterranean Province are characteristic in the Upper Toarcian—Aalenian. In Hungary, *Tmetoceras* was common in the Csernye and the Úrkút Sections, and a few specimens are known from the Gerecse Mts (KOVÁCS 2010). In the assemblages of Büdöskút, small to large specimens of *T. scissum* (BENECKE, 1865) (Tm 2 and Tm 6, Pl. 1, figs 1 and 2) agree well with those figured by GÉCZY (1967) from Csernye. A small complete adult specimen with subserpenticone coiling represents a rare species, *T. henriquesae* SANDOVAL, 2002 (Tm 7, Pl. 1, fig.3). It slightly differs from the type (Sandoval 2002, fig. 103) by being somewhat more evolute and by bearing more constrictions. It seems to agree with the *Tmetoceras* specimen figured by Callomon & Chandler (1994, pl. 6, fig. 3) that can be interpreted as *T. henriquesae* on the basis of morphological features. The species differs from *T. scissum* (Benecke), *T. regleyi* (Dumortier), and *T. difalense* (Gemmellaro) by very evolute coiling, smaller whorl expansion and blunter ribs. Two fragmentary specimens with subrectangular section and with dense, slightly sigmoid ribs are referred here to *T.* cf. *difalense* (Gemmellaro, 1886) (Tm 5, Pl. 1, fig.4). The species is known from Italy (Comptum—Haugi Subzones), and from Spain (Murchisonae Zone), and it clearly differs from *T. scissum* and *T. regleyi* by the section and by the specific shape of ribbing. A single specimen with more involute coiling, subcircular whorl-section, and dense, radiate ribs is identified as *T.* cf. *regleyi* (DUMORTIER, 1874) (Tm 3, Pl. 1, fig.5).

Family Graphoceratidae BUCKMAN, 1905
Subfamily Leioceratinae SPATH, 1936

Most taxa included in the family are zonal or horizon indices of the Aalenian, so the family has been widely discussed in the literature. Lately, genera *Leioceras*, *Canavarella*, *Cylicoceras*, *Costileioceras*, *Staufenia* were placed into Leioceratinae by HOWARTH (2013).

Genus *Leioceras* being absent, the Opalinum Zone cannot be documented. Genera *Costileioceras* and *Staufenia* with *Ludwigia haugi* DOUVILLÉ define the Haugi Subzone of the Murchisonae Zone. *Costileioceras opalinoides* (MAYER, 1864), as other species of the Graphoceratidae, shows moderate variability. From the well-preserved material of the Csernye Section, 6 morphotypes were described by GÉCZY (1967). The specimen figured here (Har. 316, Pl. 1, fig.7) with involute, platycone coiling, and with prorsiradiate, sigmoid, paired ribs is close to those forms which bear somewhat stronger ribs than the lectotype (refigured by SCHLEGELMILCH 1985, pl. 10, fig. 5). Similarly, *Staufenia sinon* (BAYLE, 1878) is also characterized by intraspecific variability. Three morphotypes occurred at Csernye. It is close to *Costileioceras* but differs in somewhat more evolute coiling (Har. 311, Har. 335, Pl. 1, figs 6, 8). The species is known from the Gerecse Mts as well (KOVÁCS & GÉCZY 2008).

Subfamily Graphoceratinae BUCKMAN, 1905

Graphoceratinae is represented at Büdöskút by Middle Aalenian genera *Ludwigia* and *Brasilia*. Due to lack of genus *Graphoceras*, the Concavum Zone cannot be recognized. All species mentioned below were recorded from the Csernye Section as well. Two species of *Ludwigia* are typical of the Haugi Subzone. *L. haugi* DOUVILLÉ, 1885 is a moderately evolute form with suboval section and strong, falcoid, simple or bifurcating ribs (Har. 305, Pl. 1, fig. 9). *L. crassa* HORN, 1909 is characterized by evolute coiling, subtrapezoid section, and by well-developed, slightly sigmoid, widely spaced ribs (Har. 343, Pl. 1, fig.10). *L. murchisonae* (SOWERBY, 1829) is the index of the Murchisonae Subzone. The species is a moderately evolute form with broad suboval section, and with simple or bifurcating, falcoid ribs (Har. 333, Har. 301, Pl. 2, figs 1 and 4). In Hungary, it is also known from the Mecsek Mts (VADÁSZ 1935), and from the Gerecse Mts (KOVÁCS & GÉCZY 2008). The morphology of a fragmentary specimen is close to *L. cosmia* (BUCKMAN, 1899), however, it differs by narrower section (Har. 350, Pl. 1, fig.12). Genus *Brasilia* is represented with three species. *B. bradfordensis* (BUCKMAN, 1881) is the zonal index of the Bradfordensis Zone/Subzone. It is a moderately evolute form with narrow suboval section, and fine, mostly bifurcating, prorsiradiate, falcoid ribs (Har 304, Har. 303, Pl. 2, figs 3, 4). *B. bradfordensis* was the most frequent taxon of the *Ludwigia—Brasilia* material of the Csernye Section, and occurred in the Mecsek Mts as well. *B. baylii* (BUCKMAN, 1887) with involute coiling, narrow suboval section, and dense, prorsiradiate, falcoid bifurcating ribs is considered as a transient form between *L. murchisonae* and *B. bradfordensis* (Har. 345, Pl. 1, fig.11). Three poorly preserved specimens with weakly developed, sigmoid, and bifurcating ribs are regarded as *B.* cf. *similis* (BUCKMAN, 1889) (Har. 332, Pl. 2 fig.2).

Family Hammatoceratidae BUCKMAN, 1887
Subfamily Hammatoceratinae BUCKMAN, 1887

A detailed taxonomic treatment of Hammatoceratidae was recently offered by RULLEAU (2009). The description of the Toarcian—Aalenian taxa of the Gerecse assemblages, as well as the revision of the hammatoceratid material of the Csernye Section was presented by KOVÁCS (2009).

Comparing the Büdöskút material with that from Csernye, its low number and diversity is noteworthy, because the subfamily is represented only by 7 specimens. Assemblage III/4 yielded a wholly septate and a fragmentary specimen of the rare *Hammatoceras spinosum* HANTKEN in PRINZ, 1904. Both agree with the holotype (PRINZ, pl. 18, figs 1-2, refigured by GÉCZY 1966, pl. 8, fig. 1) that is characterized by an evolute, compressed coiling, rounded flank, and high, carinate venter. The ornamentation consists of midflank tubercles on the inner whorls, which become elongated nodes on the last whorl of the phragmocone. The secondary ribs are dense and prorsiradiate (Ham. 305, Pl. 2, fig.6). At the Csernye Section, 13 specimens came from the Murchisonae Subzone. The species was also recorded without any description by BENSHILI (1989) from Morocco (Concavum Zone). *H. spinosum* was placed into genus *Accardia* by KOVÁCS (2009), however, the latter taxon is regarded as a synonym of *Hammatoceras* by HOWARTH (2013).

Genus *Planammatoceras* is represented by a poorly preserved *P. tenuinsigne* (VACEK, 1886) specimen. *Pseudaptetoceras klimakomphalum* (VACEK, 1886) (Har. 352, Pl. 3, fig.5) is known from the Bradfordensis Subzone—Concavum Zone at Csernye, and from the Murchisonae Subzone—?Concavum Zone in the Gerecse Mts. A single, poorly preserved specimen with evolute and very compressed coiling, high venter, fine ribs, and with a half whorl long preserved body chamber is referred to *Paviaites* sp. (Har 329, Pl. 3, fig.1). Its morphology is close to the lectotype of *P. iris* (CRESTA 2002, fig. 124/a), however, it differs by being slightly more involute. *P. iris* is known from Sicily (Aalenian) and Tunisia (Comptum Subzone).

Genus *Bredyia* is represented only by a poorly preserved specimen (Ham. 308, Pl. 3, fig.3). It is a wholly septate mold with moderately involute coiling, high, carinate venter, and wide-oval section. Strong, thin, radiate primaries bifurcate without any tubercles at the lower third of the flank, and intercalatory ribs appear regularly on the last whorl. The form differs from *B. subinsignis* (OPPEL, 1856) by bearing much finer and sharper ribs without any nodes, and from *B. alleoni* (DUMORTIER, 1874) in thinner and straight ribs.

Subfamily Erycitinae SPATH, 1928

Systematics and phylogeny of the subfamily, as well as the erycitid specimens of the Gerecse assemblages were recently treated by KOVÁCS & GÉCZY (2008). In his comprehensive book RULLEAU (2009) also offered a detailed taxonomic treatment of the subfamily.

The assemblages of Büdöskút yielded a rich erycitid material. *Erycites intermedius* HANTKEN in PRINZ, 1904 (Ham. 302, 303, Pl. 3, figs 4 and 7) is a moderately evolute form with slightly convex flanks, and with coarse, trifurcating ribs. The venter, which is divided by a smooth band, is low and broad on the phragmocone, while higher and narrower on the body chamber. The section is wide-oval in the inner whorls, but highly arched on the last whorl, and the body chamber is about one whorl in length. The species is known from the Murchisonae—Bradfordensis Subzones of Csernye, and from the Opalinum—Murchisonae Zones in the Gerecse Mts. *E. barodiscus* GEMMELLARO, 1886 is a moderately evolute form with subcircular whorl-section, and with coarse bi- or trifurcating ribs (Do. 102, Pl. 3, fig.2). It was not recorded from Csernye by GÉCZY (1966); however, the reinvestigation of the Csernye material (deposited in the collection of the Hungarian Geological and Geophysical Institute) proves its presence, as an *E.* cf. *subquadratus* GÉCZY (J5341), and 5 *Erycites* spp. (J4478, 4486, 4487, 4489, 4491) are emended here as *E. barodiscus*. In the Gerecse assemblages, *E. barodiscus* was the most abundant erycitid form in the Meneghinii—Opalinum Zones. Assemblage III/2 yielded some poorly preserved specimens of *E.* cf. *fallifax* ARKELL, 1958, *E.* cf. *baconicus* HANTKEN in PRINZ, 1904 and *E.* sp. aff. *partschi* Prinz, 1904 (Ham. 300, Pl. 3, fig.6).

Erycites (*Abbasitoides*) *modestus* (VACEK) is the most abundant species of the Erycitinae in the Büdöskút assemblages. As there is no such material of a respectable quantity discussed in the literature, we examine the taxon in detail.

Erycites (Abbasitoides) modestus (VACEK, 1886)
(Text-fig. 2 a-g)

1886 *Coeloceras modestum* n. sp. — VACEK, p. 100, pl. 17, figs 4-6

1923 *Coeloceras modestum* VACEK — RENZ, pl. 12, fig. 10

1966 *Erycites (Abbasitoides) modestus* (Vacek) — GÉCZY, p. 116-117, fig. 102, pl. 33, fig. 1, pl. 44, fig. 5 *(cum syn.)*

1970 *Erycites (Abbasitoides) modestus* (VACEK) — FISCHER, p. 602, pl. 4, figs 7-8

1988 *Abbasitoides modestum* (VACEK) — LINARES et al., pl. 2, fig. 4

1990 *Stephanoceras (Abbasitoides) modestum* (VACEK) — CALLOMON & CHANDLER, pl. 1, fig. 2

1990 *Stephanoceras (Abbasitoides)* aff. *modestum* (VACEK) — CALLOMON & CHANDLER, pl. 1, figs 3-4

2007 *Abbasitoides modestus* (VACEK) — RULLEAU, p. 110, pl. 86, fig. 3, pl. 103, fig. 8

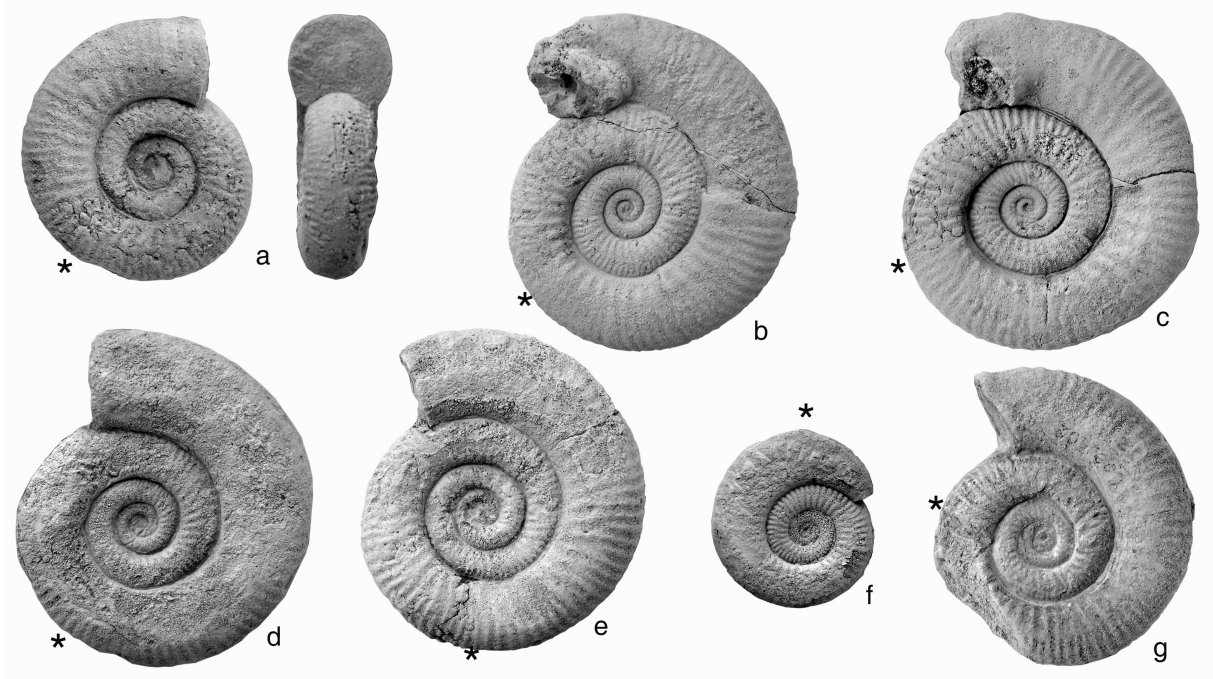
2008 *Abbasitoides modestus* (VACEK) — KOVÁCS & Géczy, p. 83, pl. 9, figs 2-3, pl. 13, fig. 2

2009 *Abbasitoides modestus* (VACEK) — RULLEAU, p. 82, fig. 19/6, pl. 85, figs 3, 13

2011 *Abbasitoides modestus* (VACEK) — SANDOVAL et al., fig. 11/6

Material: 15 specimens with subserpenticone, gradually growing coiling; wide, shallow umbilicus; convex flanks; broad, rounded venter, and subcircular section. The body chamber is 3/4 whorl in length; the peristome is simple and slightly projected. Fine, sigmoid ribs persist throughout the whorls. Radiate primaries bifurcate under the mid-flank, the secondaries bend slightly backward first, then curve forward on the venter, and fade out in the middle. They alternate with a narrow smooth band between them. Simple erycitid suture-line with short E, longer, ramified L, and divided, oblique U.

Measurements:



Text-fig. 2. *Abbasitoides modestus* (VACEK, 1886). All from Büdöskút, assemblages III/2 or III/4. a: Coe 111, III/4; b: Coe 105, III/2; c: Coe 108, III/4; d: Coe 104, III/2; e: Coe 103, III/2; f: Coe 100, III/2; g: Coe 102, III/2. All figures natural size, asterisk indicates end of phragmocone.

specimen	Diameter	Height	H/D%	Width	W/D%	Umbilical width	U/D%	Ribs on the last whorl
Coe 105	44.5	14	31.5	13.5	30.5	22	49.5	38
Coe 104	44	13,5	30.5	13	29.5	21	47.5	?
Coe 108	44	13	29.5	13	29.5	21	47.5	36
Do 103	43.5	14	32	16	36.5	20	46	?
Coe 103	43	13	30	13.5	31.5	21	49	37
Coe 107	42	12.5	29.5	13.5	32	20.5	49	37
Coe 102	40	12	30	13	32.5	20	50	?
Coe 111	35.5	12	34	13	36.5	17	48	33
Coe 109	32	10	31	10	31	15.5	48.5	?
Coe 112	29..5	10	34	10	34	14.5	49	?
Coe 100	23	8	34.5	7	30.5	10	43.5	?

Remarks: Subgenus *Abbasitoides* was created by GÉCZY (1966) with type species *Coeloceras modestum* (VACEK). The lectotype (VACEK, 1886, p. 100, pl. 17, fig. 4-6) was designated and refigured by WESTERMANN (1964, pl. 6, fig. 8). The taxon is regarded as a synonym of genus *Erycites* by HOWARTH (2013), however, considering the small size of the species included into the subgenus, the separation of the group by the conservation of the subgenus name seems to be established.

The interpretation of *A. modestus* is controversial. It was regarded as the earliest representative of the Otoitidae, included in genus *Stephanoceras* by PAGE (1993); and as the microconch of „*Stephanoceras" longalvum* (VACEK) by CALLOMON & CHANDLER (1990). On the other hand, — based on the erycitid suture-line, the ventral interruption and the simple aperture — WESTERMANN (1964, 1995) considered it as a small erycitid macroconch. The latter interpretation was confirmed by DIETZE et al. (2001), and RULLEAU (2009). *Coeloceras placidum* VACEK (= *Ammonites blampis*, GREGORIO 1886, pl. 11, fig. 5) which is a similar form in morphology, was regarded as a synonym of *A. modestus* by GREGORIO (l.c.) and RULLEAU (2009), however, it differs in suture construction with more developed external lobe (see VACEK l.c., pl. 17, fig. 8; GREGORIO l.c., pl. 11, fig. 5/c-d) that is not typical of the Erycitinae (GÉCZY 1966).

In the literature, the shape of ribbing and the proportion of involution of *A. modestus* show moderate variability. The type is characterized by prorsiradiate ribs, and its U/D is app. 43%. The example of RENZ (1923) resembles in the involution (U/D: app. 42%), while differs in fine, but almost radiate ribs. The specimens of FISCHER (1970, fig. 7), and of SANDOVAL et al. (2011) also bear less prorsiradiate ribs, and their style of coiling is more evolute (U/D: 50%). Three specimens were figured by CALLOMON & CHANDLER (1990, pl. 1, figs 2-4). Both the involution and the ornamentation of the example on their fig. 2 are closer to those of *Abbasites gardincola* (GREGORIO), — this specimen can be regarded as a transient form. The ribs of both *S.* (*A.*) aff. *modestum* (l.c., figs 3-4), — like the specimen of Rulleau (2007, pl. 103, fig. 8) — differ from the type by crossing the venter. A phylogenetic change might be manifested by these examples: the ventral interruption that was typical of the Erycitinae disappeared gradually in the last period of the subfamily (Bradfordensis—Concavum Zones: *Abbasites—Ambersites* group). This change can be connected with the Aalenian—Bajocian migration of ammonites between the Mediterranean and NW European regions of Europe when some Mediterranean taxa (e.g. *Erycites*, *Abbasitoides*, *Riccardiceras*, *Tmetoceras*) migrated northward to England where they became relatively common (SANDOVAL & CHANDLER 2000).

Three taxa were described from the Csernye assemblage: *Erycites* (*Abbasitoides*) *modestus* (VACEK) (10 specimens), *E.* (*A.*) *modestus crassornatus* GÉCZY (12 specimens), *E.* (*A.*) *modestus compressus* (PRINZ) (7 specimens). Both subspecies are larger forms with radiate and strong ribs. At Csernye, most specimens came from a horizon of 10 cm in the Opalinoides Subzone, but the genus ranged up to the Bradfordensis Zone. From the Gerecse Mts two *A. modestus* specimens were recorded from the Opalinum—Murchisonae Zones.

More than 30 specimens are known from different Italian localities (see VACEK 1886, BOTTO-MICCA 1893, BONARELLI 1893, RENZ 1923, WENDT 1971, KÄLIN & URETA 1987, CALLOMON et al. 1995, CRESTA 1996, PALLINI et al. 2005), but only a few were figured with different morphology (VACEK 1886, pl. 17, figs 4-5; WESTERMANN 1964; RENZ 1923, pl. 12, fig. 10). The *A. modestus* material of complete adults of the Csernye—Gerecse assemblages also shows moderate variability in size, involution and whorl-width. Some of them are close to that figured by RENZ (1923); on the other hand, each specimen from Büdöskút belongs to the same evolute morphotype. Most specimens of the mentioned Hungarian sections differ from the type by somewhat more evolute coiling, and by less prorsiradiate ribs. The species is abundant in the Betic Cordillera (SANDOVAL et al. 2011), where also the evolute form seems to be characteristic. Based on available data, the slightly more evolute style of coiling (U/D: 48-50%) can be regarded as specific form of the taxon.

A. modestus is known from Italy (Opalinum—Murchisonae Zones), Spain (Comptum Subzone—Concavum Zone), France (Bradfordensis Zone), Portugal (Bradfordensis Subzone), Austria (Murchisonae Zone), Morocco (Murchisonae—Concavum Zones), Greece and (?)Albania (Aalenian), England (Murchisonae Subzone—[?]Lower Discites Zone).

Family Sonniniidae BUCKMAN, 1892
Subfamily Witchelliinae CALLOMON & CHANDLER, 2006

Sonniniidae are represented in the nearby Lókút Section and in the Gerecse Mountains, the northeastern part of the Transdanubian Range (GALÁCZ 1991; CRESTA & GALÁCZ 1990), however their detailed documentation is still lacking. In Csernye the respective levels are very poor in ammonites, thus only some specimens were documented by GÉCZY (1967). The family was discussed recently in detail by DIETZE et al. (2005), and additional information was also published in

SANDOVAL & CHANDLER (2000), DIETZE et al. (2003) and OHMERT (2004). The limited material gives less than few new data on the representation of this family in the Bakony Mts. There are a few specimens from Assemblage 1 which belong to Sonniniidae, most of them are very poorly preserved. One *Witchellia* (Am 103, Pl. 4, fig.1) could be ranged into *W. pavimentaria* (BUCKMAN, 1927) with its size, dimensions and ribbing. Buckman's type (1903-33, pl. 751) came from the upper part (Romanoides faunal horizon) of the Laeviuscula Zone (see DIETZE et al. 2007, p. 13). Microconchiate forms also occur. One slightly worn internal cast is referred here to *Pelekodites spatians* (BUCKMAN, 1928). This specimen (Har 330, Pl. 4, fig. 3) is slightly bigger than the type (BUCKMAN 1903-33, pl. 399), but its ribbing matches well the holotype and the later figured topotypes (CHANDLER et al. 2006, fig. 4(5); DIETZE et al. 2007, figs 4a-b, d-g).

Superfamily Stephanocerataceae NEUMAYR, 1875
Family Stephanoceratidae NEUMAYR, 1875
Subfamily Stephanoceratinae NEUMAYR, 1875

Assemblage III/1 yielded some stephanoceratids indicating the Humphriesianum Zone. A medium-sized *Stephanoceras* (Am 102, Pl. 4, fig. 7) with its compressed and more overlapping whorls and lower and rounded tubercles can be ranged into *S. plicatum* (QUENSTEDT, 1858). Accidentally, a microconch, identified as *Itinsaites latansatus* (BUCKMAN, 1920) also appears in the same assemblage (Cad 111, Pl. 4, fig.8). These two forms were suggested by PAVIA (1983, p. 132) as a dimorphic pair. Similarly, a fragment of a densely ribbed *Lokuticeras* (Cad 104, Pl. 4, fig. 5), reminding the species *L. rossbrunnense*, described originally from the Lókút locality nearby, occurs together with the better preserved thus closer determinable *Masckeites densus* BUCKMAN, 1920 (Cad 109, Pl. 4, fig. 6), suggested also as a corresponding dimorphic pair (GALÁCZ 1994, p. 168). The *Lokuticeras/Masckeites* dimorph pair, as well as *Itinsaites latansatus* indicate the upper part of the Humphriesianum Zone. The same is suggested by an indeterminable *Teloceras* fragment, while a poorly-preserved, incomplete *Skirroceras* is similar to the Sauzei Zone forms of this genus.

Family Otoitidae MASCKE, 1907

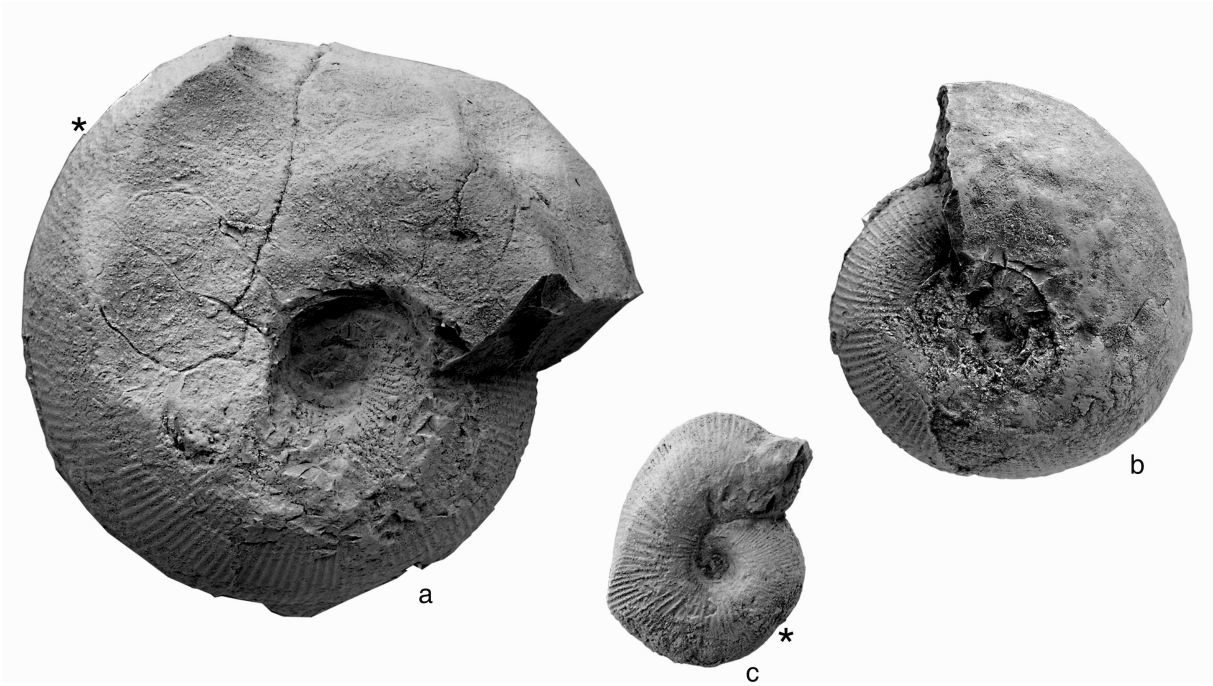
This family is represented in assemblage III/1 with a few *Emileia* and *Otoites* specimens (macroconchs and microconchs respectively). The single *Emileia* is very poorly preserved, while one of the two *Otoites* is only a partially preserved specimen (Cad 107, Pl. 4, fig.4), but the other one is determinable as *O. compressus* WESTERMANN, 1954. This form (Cad 122, Pl. 4, fig.2) with its slender body chamber represents a comparatively rare species which is known only by the type and paratype specimens from Gerzen (NW Germany, WESTERMANN 1954, p.109) and one more specimen recorded recently from the Schwäbische Alb, SW Germany (DIETZE et al. 2008, p.144). At both localities the species came from the Otoites sauzei Zone.

Family Sphaeroceratidae BUCKMAN, 1920
Subfamily Sphaeroceratinae BUCKMAN, 1920

The early members of this subfamily is represented in assemblage III/1 by *Labyrinthoceras* and its microconch pair *Manselites*. The big size of the macroconchiate specimen indicates *L. meniscum* (WAAGEN, 1868) (Em 100 and Em 104, Text-fig.3 a and b) and the microconch could be identified as *L.* (*Manselites*) *manselii* (J. BUCKMAN, 1881) (Am 110, Text-fig. 3c). The appearance of these Sauzei Zone forms in the material is not surprising, because the locality is very near to the Lókút Section, where these genera occur commonly (see GALÁCZ 1990). Humphriesianum Zone sphaeroceratids are represented also in assemblage III/1 by some poorly preserved *Chondroceras*.

Conclusions

The above discussed ammonite fauna represents Aalenian and Bajocian levels, however significant hiati appear, (see Table I). The Aalenian is indicated by ammonites characteristic to the Middle Aalenian Ludwigia murchisonae and Brasilia bradfordensis Zones (including the two zonal indices) in assemblages III/ 2 and 4, while the Upper Aalenian Graphoceras concavum Zone seems missing. Similarly, the Lower Bajocian Hyperlioceras discites and Fissilobiceras ovale Zones are not represented, then at least three higher Bajocian zones, the Witchellia laeviuscula, Otoites sauzei and Stephanoceras humphriesianum Zones are indicated in the single assemblage III/1. However, these representations do not mean total covering of the zones in question. Probably the beds which yielded the specimens might belong to different horizons, but to reconstructing the original situation would need more information on the circumstances in the time of the collecting, or good exposures in recent times for a revision.



Text-fig. 3. *Labyrinthoceras.* Macro- and microconch specimens from Büdöskút, assemblage III/1. a and b: *Labyrinthoceras* (*Labyrinthoceras*) *meniscum* (WAAGEN, 1868), Em 100 and Em 101; c:, corresponding microconch, *Labyrinthoceras* (*Manselites*) *manselii* (J. BUCKMAN), Am 110. All figures natural size, asterisk indicates end of phragmocone.

Table I. Biostratigraphic representation of Middle Aalenian to Lower Bajocian ammonite zones in the Büdöskút material (shaded cells) with the identified diagnostic ammonites.

Stages	Substages	Zones	Zones indicated by diagnostic ammonites in the here described Büdöskút material
BAJOCIAN	Lower	Humphriesianum	*Stephanoceras* (*S.*) *plicatum* (QUENSTEDT); *Stephanoceras* (*Itinsaites*) *latansatus* (BUCKMAN); *Lokuticeras rossbrunnense* GALÁCZ; *Masckeites densus* Buckman
		Sauzei	*Labyrinthoceras* (*L.*) *meniscum* (WAAGEN); *Labyrinthoceras* (*Manselites*) *manselii* (J.BUCKMAN); *Otoites compressus* WESTERMANN
		Laeviuscula	*Witchellia pavimentaria* (BUCKMAN); *Pelekodites spatians* (BUCKMAN)
		Ovale	
		Discites	
AALENIAN	Upper	Concavum	
	Middle	Bradfordensis	*Brasilia bradfordensis* (BUCKMAN); *Brasilia baylii* (BUCKMAN); *Brasilia* cf. *similis* (BUCKMAN)
		Murchisonae	*Ludwigia haugi* DOUVILLÉ; *Ludwigia* cf. *haugi* DOUVILLÉ; *Ludwigia crassa* HORN; *Staufenia sinon* (BAYLE); *Costileioceras opalinoides* (MAYER); *Ancolioceras* sp.; *Staufenia* sp.

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Plate I. Figs 1 and 2: *Tmetoceras scissum* (BENECKE, 1865), Tm 2, from assemblage III/2, Tm 6, III/2; Fig. 3: *Tmetoceras henriquesae* SANDOVAL, 2002, Tm 7, III/2; Fig. 4: *Tmetoceras* cf. *difalense* (GEMMELLARO, 1886), Tm 5, III/2; Fig. 5: *Tmetoceras* cf. *regleyi* (DUMORTIER, 1874), Tm 3, III/2; Figs 6 and 8: *Staufenia sinon* (BAYLE, 1878), Har 311, III/2 and Har 335, III/4; Fig. 7: *Costileioceras opalinoides* (MAYER, 1864), Har 316, III/2; Fig. 9: *Ludwigia haugi* DOUVILLÉ, 1885, Har 305, III/2; Fig. 10: *Ludwigia crassa* HORN 1910, Har 343, III4; Fig. 11: *Brasilia baylii* (BUCKMAN, 1887), Har 345, III/4; Fig. 12: *Ludwigia* cf. *crassa* (BUCKMAN, 1899), Har 350, III/4. All figures natural size, asterisk indicates end of phragmocone.

Plate 1

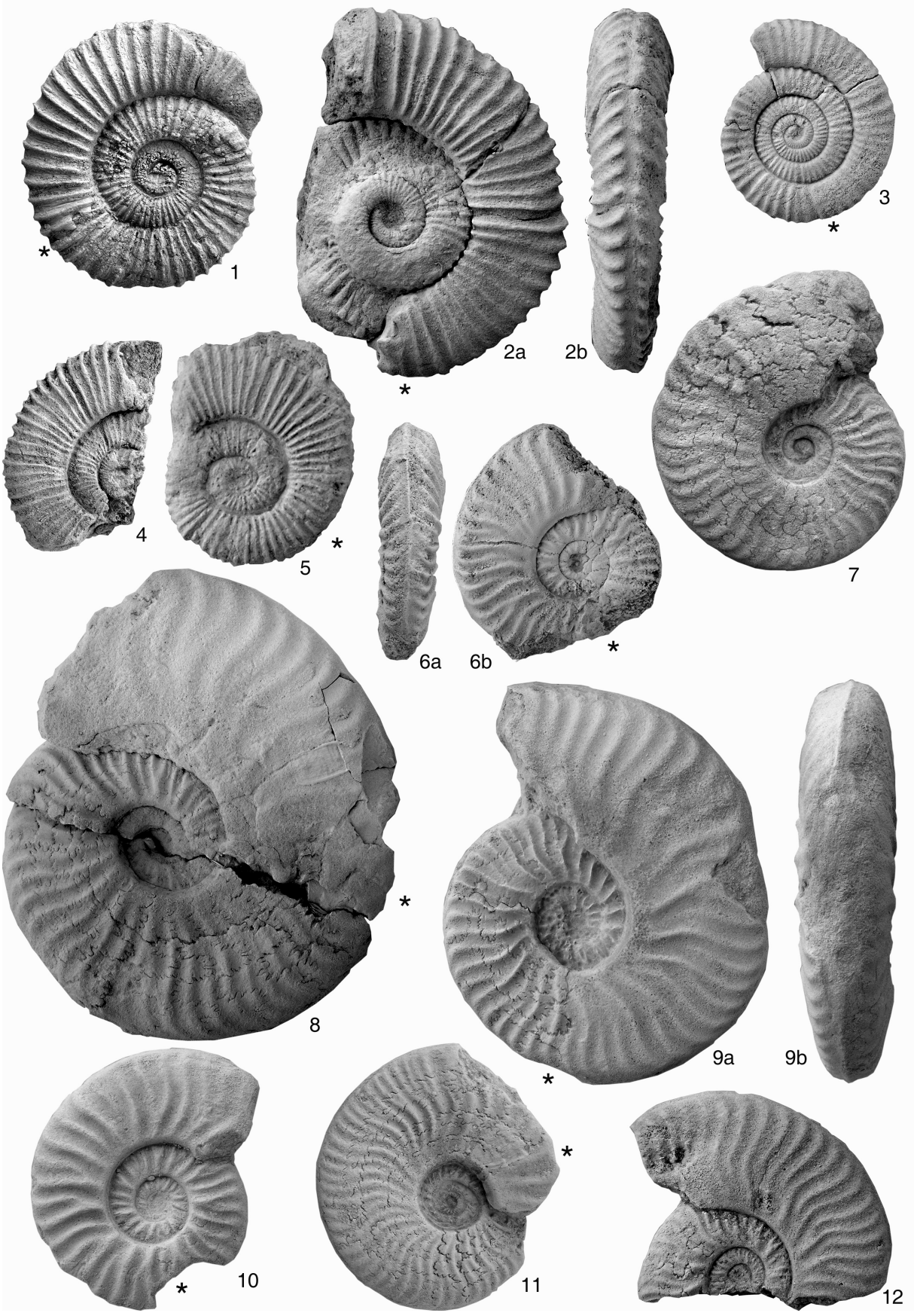

Plate 2

Figs 1 and 5: *Ludwigia murchisonae* (SOWERBY, 1829), Har 333, from assemblage III/4; Har 301, III/2;

Fig. 2: *Brasilia* cf. *similis* (BUCKMAN, 1889), Har 332, III/4;

Figs 3 and 4: *Brasilia bradfordensis* (BUCKMAN, 1881) Har 314, Har 303, both III/2;

Fig. 6: *Hammatoceras spinosum* HANTKEN in PRINZ, 1904, Ham 305, III/4.

All figures natural size, asterisk indicates end of phragmocone.

Plate 2

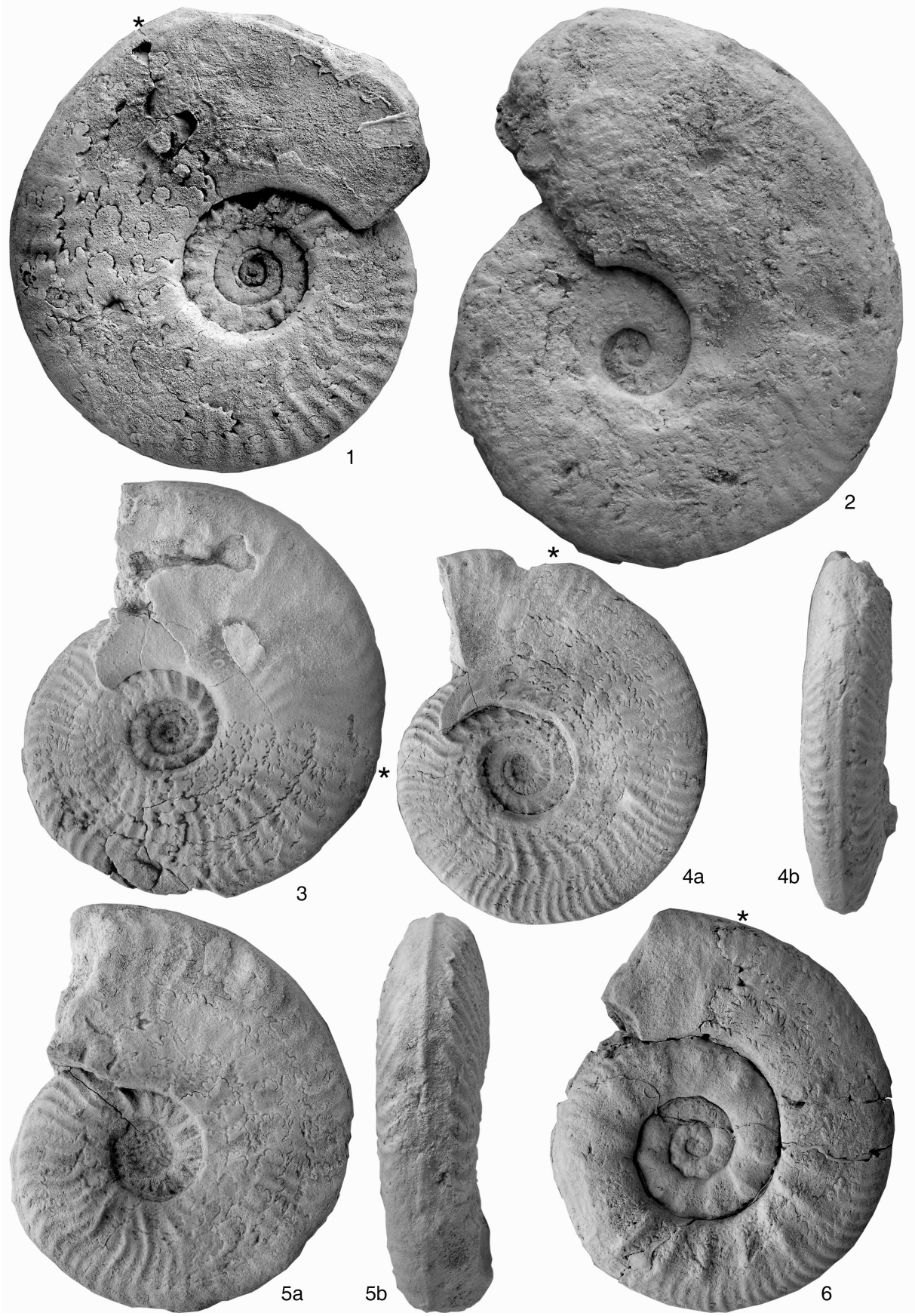

Plate 3

Fig. 1: *Paviaites* sp., Har 329, from assemblage III/2;

Fig. 2: *Erycites barodiscus* GEMMELLARO, 1886, Do 102, III/2; *Bredyia* sp., Ham 308, III/4;

Figs 4 and 7: *Erycites intermedius* HANTKEN in PRINZ, 1904, Ham 302 and Ham 302, both III/2;

Fig. 5: *Pseudaptetoceras klimakomphalum* (VACEK, 1886), Har 352, III/4; *Erycites* sp. aff. *partschi* PRINZ, 1904, Ham 300, III/2.

All figures natural size, asterisk indicates end of phragmocone.

Plate 3

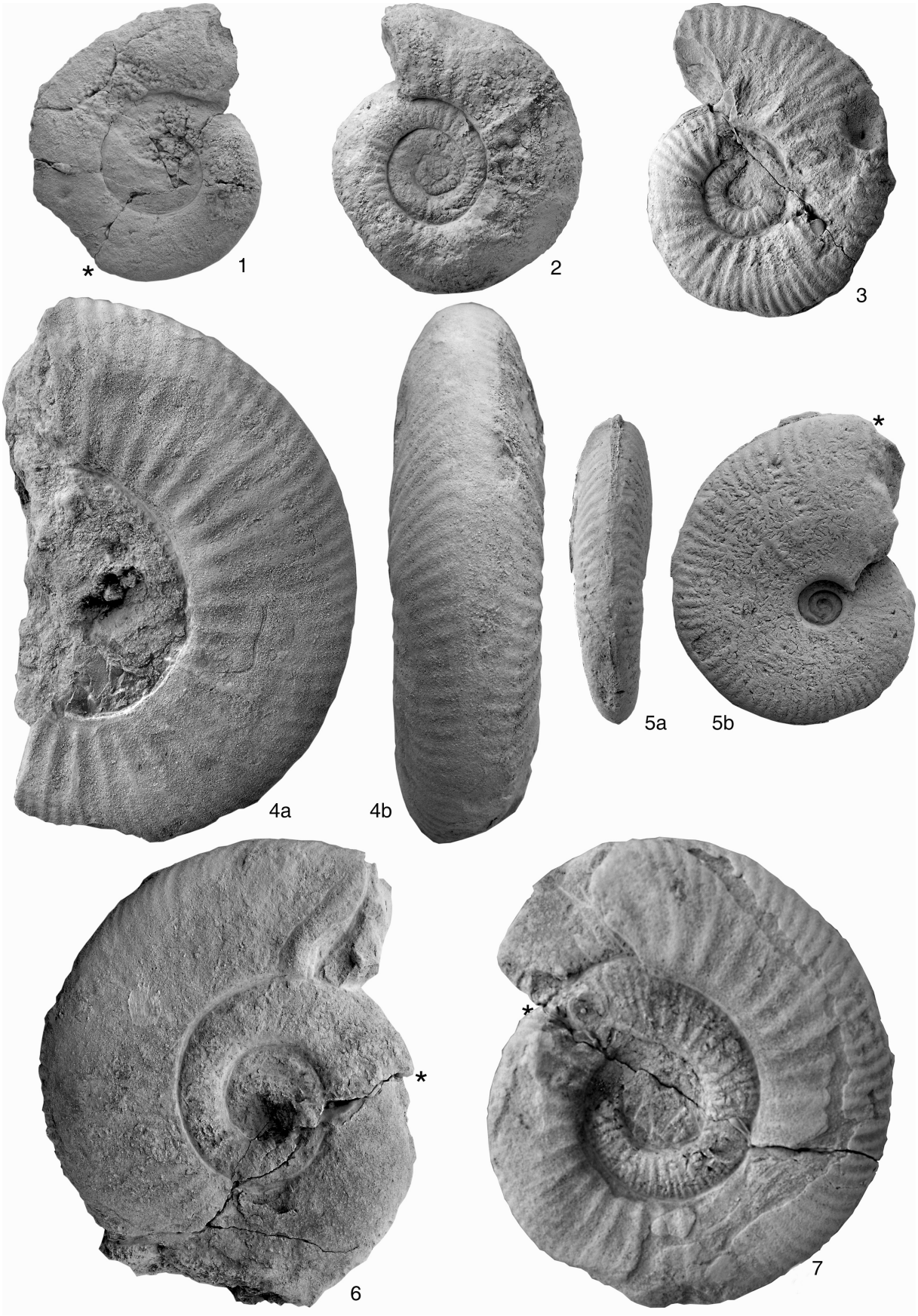

Plate 4

Fig. 1: *Witchellia pavimentaria* (BUCKMAN, 1927), Am 103, from assemblage III/1;

Fig. 2: *Otoites compressus* WESTERMANN, 1954, Cad 122, III/1; *Pelekodites spatians* (BUCKMAN, 1928), Har 330, III/1;

Fig. 4: *Otoites* sp., Cad 107, III/1;

Fig. 5: *Lokuticeras* cf. *rossbrunnense* GALÁCZ, 1994, Cad 104, III/1; *Masckeites densus* Buckman, 1920, Cad 109, III/1;

Fig. 7: *Stephanoceras plicatum* (QUENSTEDT, 1858), Am 102, III/1; *Itinsaites latansatus* (BUCKMAN, 1920), Cad 111, III/1.

All figures natural size, asterisk indicates end of phragmocone.

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Plate 4