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Notes on the Lower Jurassic Mercaticeratinae (Ammonitina) fauna from the Gerecse Mts (Hungary)

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Abstract

Taxonomic problems of the subfamily Mercaticeratinae, represented by four genera (*Mercaticeras, Pseudomercaticeras, Merlaites, Crassiceras*), are briefly discussed. The fauna described here from the Middle Toarcian (Lower Jurassic) ammonite assemblages of the Gerecse Mts (NE Transdanubian Range, Hungary) consists of mainly Mediterranean taxa. The assemblage is allied to the Submediterranean border zones of the Mediterranean Province (Mediterran–Caucasian Realm).

Keywords: Mercaticeratinae, Hildoceratidae, Ammonitina, Middle Toarcian, Jurassic, Gerecse Mts, Hungary

Introduction

This paper offers a brief summary of genera *Mercaticeras*, *Pseudomercaticeras*, *Merlaites*, and *Crassiceras* from the ammonite assemblages of the Gerecse Mts, as a contribution to the comprehensive treatment of the Toarcian ammonite material deposited in the Eötvös Museum of Natural History (Budapest). Research on the Mercaticeratinae is relevant from stratigraphic point of view: the genera comprise index taxa for the Middle–Upper Toarcian subdivisions in the Mediterranean Province. On the other hand, range of some taxa is important for palaeobiogeographic comparisons. Previous records of assigned species are cited from the literature and completed with new data and records. The Ammonitida material was collected in the last forty years from different localities of the Gerecse Mts (Figure 1). General taxonomic, quantitative, biostratigraphic and palaeobiogeographic analyses of the

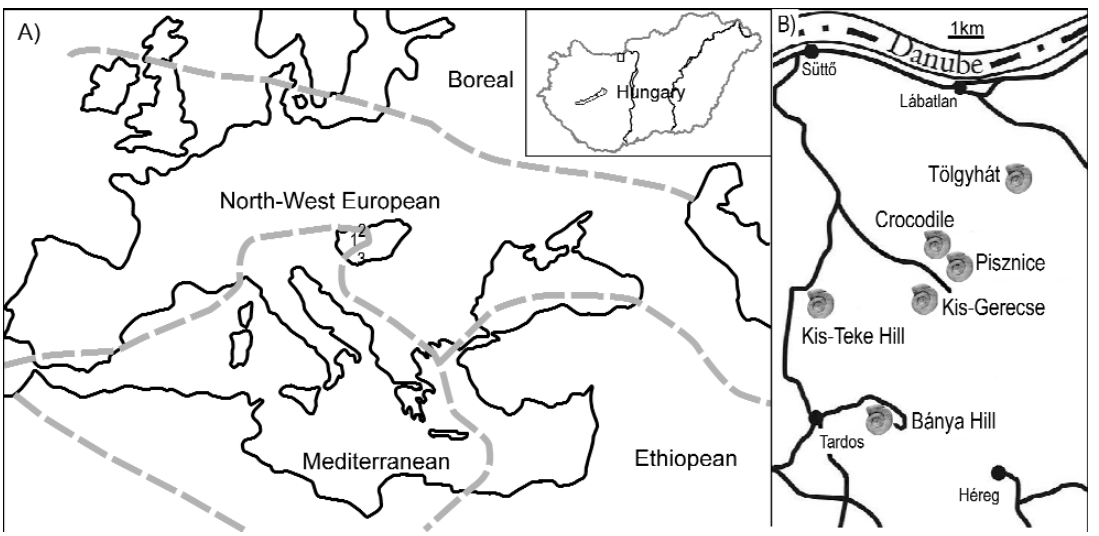

Figure 1. A) Middle Toarcian ammonite faunal provinces in Europe, N Africa and W Asia: (Page 2008), 1 – Bakony Mts, 2 – Gerecse Mts, 3 – Mecsek Mts; B) Location of Toarcian sections examined in the Gerecse Mts

Middle Toarcian fauna were provided by GÉCZY (1985) and GÉCZY & SZENTE (2006), while detailed taxonomic treatments of Middle Toarcian taxa were presented by GÉCZY et al. (2008), KOVÁCS (2010, 2013, 2014a, b), and GALÁCZ et al. (2011). The constant dominance of suborder Phylloceratina places the Toarcian assemblage into the Mediterranean Province, appearances of standard Ammonitina zonal indices, however, enabled the application of the detailed NW European zonal stratigraphy, at least at zonal level. For the Middle Toarcian, based on the abundance and high diversity of genus *Hildoceras*, the two standard subzones with six horizons are identified within the Hildoceras bifrons Zone in the studied sections (Figure 2). The Merlaites gradatus Zone is the Mediterranean counterpart of the Haugia variabilis Standard Zone. Its local infrazonal stratigraphy with three subzones was established by GÉCZY & SZENTE (2006), modifying the scheme proposed by PARISI et al. (1998). The base of the Merlaites clausus Subzone is indicated by the appearance of genera *Crassiceras* or *Merlaites*. The Pseudogrammoceras subregale Subzone is identified by the appearance of genera *Pseudogrammoceras* and *Podagrosites*, while the base of the Merlaites alticarinatus Subzone coincides with the first occurrence of *M. alticarinatus*. The Middle Toarcian successions in the area are characterized by an "Ammonitico Rosso marl" subfacies, the Kisgerecse Marl Formation, that is a thin-bedded, red nodular marl of variable carbonate and clay content. Although it is rich in ammonoid assemblages, the fauna consists mainly of poorly to moderately preserved internal molds.

Systematic palaeontology

Suborder Ammonitina FISCHER, 1882
Superfamily Hildoceratoidea HYATT, 1867
Family Hildoceratidae HYATT, 1867

Subfamily Mercaticeratinae GUEX, 1973

The Mercaticeratinae represent a small, characteristic Tethyan group of the Hildoceratidae. The subfamily was erected by GUEX (1973) for genera *Mercaticeras* BUCKMAN, *Merlaites* GABILLY, *Pseudomercaticeras* MERLA, and *Arctomercaticeras* REPIN. Previously GÉCZY (1966) and VENTURI (1972a, b) emphasized the evolutionary tendency of this group from evolute to involute coiling with simple slightly sigmoid to fasciculate sigmoid ribbing. The species placed into the subfamily differ from the closely related hildoceratids in morphology by broad ventral part with deep ventral sulci, by lack of lateral groove, by simple or fasciculate ribs, and by development of the suture-line (e.g. height of the U2 lobe), and represent an independent phylogenetic line within the family. The new taxon became widely accepted in the literature that dealt with the Mediterranean faunal province. Taxonomic treatments of Mercaticeratinae and assigned genera were presented by e.g. ELMI et al. (1986), VENTURI & FERRI (2001), FAURÉ (2002), BÉCAUD et al. (2005), GÉCZY & SZENTE (2006), RULLEAU (2007). Lately VENTURI et al. (2010) and LACROIX (2011) presented detailed analyses of the subfamily. Nevertheless, the validity has remained controversial; it was recently rejected by HOWARTH (2013). From the earlier literature it is worth mentioning papers by MERLA (1932), LIPPI-BONCAMBI (1947), NICOTRA (1952), PINNA (1963, 1973), KOTTEK (1966), GÉCZY (1967a, b), GALLITELLI WENDT (1969), VENTURI (1975, 1981), and JAKOBS (1997) as significant contributions to the knowledge of the morphology, and of the stratigraphic and palaeogeographical ranges of Mercaticeratinae species.

Genus *Arctomercaticeras* from the Lower Toarcian of NE Russia was assigned to the subfamily Arieticeratinae by HOWARTH (2013), this arrangement is accepted here.

The earliest representative of the Mercaticeratinae is *Praemercaticeras* VENTURI, 1981. It was described from the Serpentinum Zone in Italian localities, and was probably one of the descendants of genus *Hildaites*. (*Praemercaticeras* has not been recorded from Hungary yet.) Two phylogeneric lineages are distinguished within the subfamily:

a, *Praemercaticeras* → *Mercaticeras*

b, *Praemercaticeras* → *Pseudomercaticeras* → *Crassiceras*, *Merlaites*.

Despite of sporadic records, the *Mercaticeras*-branch is typical of the Mediterranean Province. The *Pseudomercaticeras*-branch shows a wider distribution, although its diversity is higher in Mediterranean localities. The subfamily is unknown from the Caucasus, Iran, and SE Asia. Although Toarcian ammonite assemblages in South America show Tethyan affinities, only a single *Mercaticeras* sp. was recorded from Chile (HILLEBRANDT & SCHMIDT-EFFING 1981).

In the Gerecse sections genera *Mercaticeras* and *Pseudomercaticeras* appear in the Sublevisoni Subzone, and form a small part (2%) of the Ammonitina fauna. In the Bifrons Subzone both genera became more abundant (9%). The subfamily flourished in the Clausus Subzone with four genera (27%), then slowly disappeared from the fauna (Subregale–Alticarinatus–Bingmanni Subzones: 1%). Stratigraphic range of the species recorded here is shown on Figure 2.

The Mercaticeratinae material of the Gerecse Mts is closely related to that of the Bakony Mts. From Csernye and Úrkút the following species were recorded by GÉCZY (1966, 1967a, b, c): *Mercaticeras mercati*, *M. umbilicatum*, *M. thyrrenicum*, *M. rursicostatum*, *M. dilatum* (=*M. involutum* BUCKMAN), *Pseudomercaticeras rotaries*, *P. parvilobum*, *Crassiceras bayani* and *Merlaites alticarinatus*. New collecting works yielded *Mercaticeras umbilicatum*, *M. hellenicum*, *M. dilatum* and *Merlaites clausus* from Csernye, while *Pseudomercaticeras rotaries* and *Merlaites* cf. *gradatus* from Szentgál. The diversity of the subfamily in different localities of the Transdanubian Range corresponds with data known from Italy and Greece.

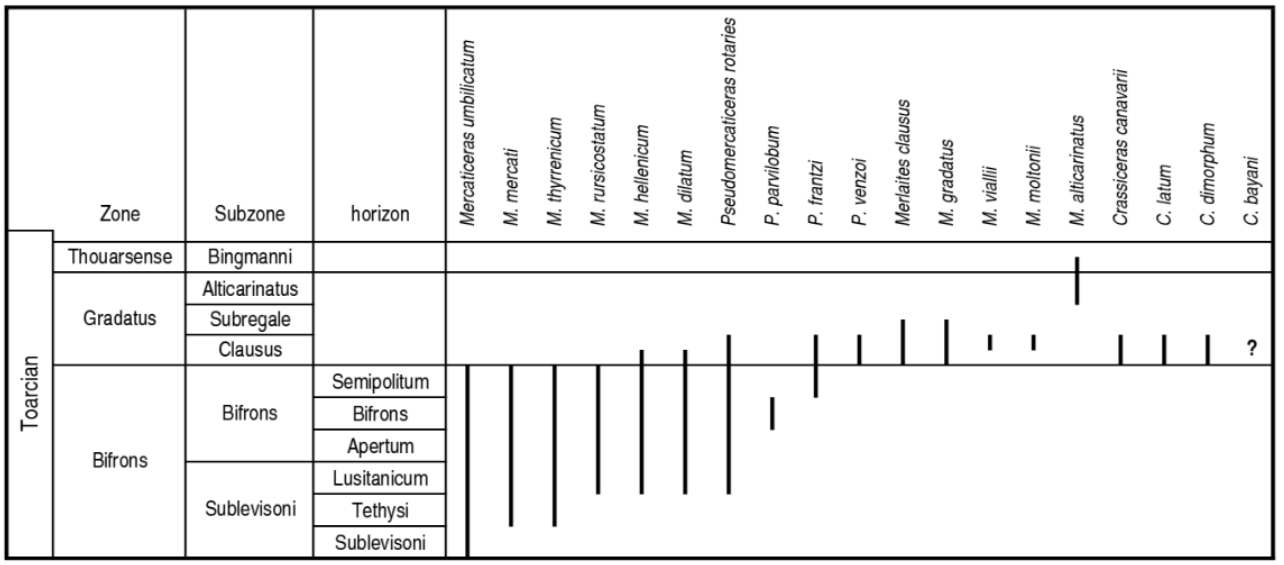

Figure 2. Chronostratigraphic distribution of Mercaticeratinae species in the Gerecse Mts

Summaries on genera

Note: The following abbreviations are used in this paper for measurements: D – diameter, H – whorl-height, W – whorl-width, U – umbilical-width. The description of suture-construction is based on VENTURI & FERRI (2001). Abbreviations: E – external lobe, L – lateral lobe, U – umbilical lobe, ES – external saddle, LS – lateral saddle.

Genus *Mercaticeras* BUCKMAN, 1913

Type-species: *Ammonites Mercati* HAUER, 1856 (BUCKMAN 1913)

Diagnosis: Evolute to involute coiling, compressed whorl, slightly convex flanks, tricarinate–bisulcate venter, subrectangular whorl-section, strong, simple, slightly sigmoid ribs. Suture-line: simple, short E, short, wider, simple L, short, straight U lobes, wide, symmetrically divided ES, narrower LS1.

Remarks: The genus was one of the descendants of *Praemercaticeras*; it appeared at the base of the Bifrons Zone. Apart from a single species (*M. dilatum*), *Mercaticeras* is typical of the Mediterranean Province, and in the closely related Middle Toarcian NW American localities.

M. umbilicatum differs from *M. mercati* in size and in much wider sulci. *M. thyrrenicum* differs from both in narrower whorls with subtrapezoid section, and in denser ribbing. Both *M. hellenicum* and *M. dilatum* have very broad whorls, but the latter bears much finer and denser ribs. *Mercaticeras stefaninii* MERLA was reclassified as *Cingolites stefaninii* by SASSAROLI & VENTURI (2010).

Distributions: Bifrons Zone – Clausus Subzone: Austria, Italy, Switzerland, Greece, Albania, Hercegovina, Bulgaria (*M. mercati*), Portugal, Southern Spain, Algeria, Morocco, Turkey, South and North America. (*M. dilatum*: Mediterranean Province, Northern Spain, Southern France, ?Southern Germany). (The occurrence of the genus in Montenegro requires confirmation.) Hungary: Bakony Mts (Csernye, Úrkút), Gerecse Mts: Bifrons Zone – lower Clausus Subzone.

The following species were recorded from the Gerecse sections [number of specimens in brackets]:

Mercaticeras mercati (HAUER, 1856) [15] (GALÁCZ et al. 2011, pl. 5, figs 4–5) (Plate 1, figs 1–2)

Mercaticeras umbilicatum BUCKMAN, 1913 [30] (GALÁCZ et al. 2011, pl. 6, figs 1, 5–6) (Plate 1, figs 3–4)

Mercaticeras hellenicum (RENZ, 1906) [11] (Plate 1, figs 5, 7)

Mercaticeras rursicostatum MERLA, 1932 [4] (Plate 1, fig. 6)

Mercaticeras dilatum (MENEGHINI, 1883) [9] (Plate 1, fig. 8)

Mercaticeras thyrrenicum (FUCINI, 1905) [5] (Plate 1, fig. 9)

Mercaticeras sp. [24]

Genus *Pseudomercaticeras* MERLA, 1932

Type-species: *Pseudomercaticeras parvilobum* MERLA, 1932 (ARKELL 1957).

Diagnosis: Moderately evolute, planulate shell, slightly convex flanks, tricarinate–bisulcate venter, subrectangular whorl-section, strong to weak, sigmoid, simple or fasciculate ribs, weakly developed umbilical tubercles. Suture-line: moderately long E, wider L, short, straight U lobes, broad, symmetrically divided ES, narrower LS1.

Remark: The genus is one of the descendants of *Praemercaticeras*, and is thought to be the ancestor of genera *Merlaites* and *Crassiceras*. It differs from *Mercaticeras* in ornamentation, mainly by bearing high keel, and fasciculate ribbing. The specimen figured by GÉCZY & SZENTE (2006, pl. 4, figs 4–5) as *M. umbilicatum* is regarded here as *Pseudomercaticeras rotaries* (refigured on Plate 2, fig. 2).

Distribution: Bifrons–Gradatus/Variabilis Zones: Mediterranean Province (Italy, Austria, Greece, Southern Spain, Portugal, North Africa), Southern France, Northern

Spain, Romania, Oman, North America. Hungary: Bakony Mts (Csernye, Úrkút, Szentgál), Gerecse Mts: Lusitanicum horizon – Clausus Subzone.

The following species were recorded from the Gerecse sections:

Pseudomercaticeras parvilobum MERLA, 1932 [2] (Plate 1, figs 12–13)

Pseudomercaticeras venzoi PINNA, 1963 [3] (Plate 1, figs 10–11)

Pseudomercaticeras rotaries MERLA, 1932 [10] (Plate 2, figs 1–2)

Pseudomercaticeras frantzi (REYNÈS, 1868) [3] (Plate 2, fig. 7)

Pseudomercaticeras sp. [9]

Genus *Merlaites* GABILLY, 1974

Type-species: *Brodiceras alticarinatum* MERLA, 1932.

Diagnosis: Moderately involute, compressed coiling, slightly convex flanks, narrow venter, high carina, shallow ventral grooves, suboval to subtrapezoid section, moderately strong, sigmoid, simple or paired, fasciculate ribs, weakly developed umbilical tubercles. Suture-line: long E and L, short, wide, straight U lobes, high, broad, symmetrically divided ES, narrower LS1.

Remarks: *Merlaites* is abundant mainly in Mediterranean localities, but *M. alticarinatus* is known from Submediterranean regions as well. The genus is important from biostratigraphical point of view. Due to the lack or scarcity of genus *Haugia*, the Mediterranean Gradatus Zone (= standard Variabilis Zone) is defined with the first appearance of *Merlaites*, and two species (*M. clausus* and *M. alticarinatus*) are subzonal indices. The specimen figured by GÉCZY & SZENTE (2006, pl. 8, figs 2–3) represents factually *Merlaites viallii*, not *Crassiceras canavarii* (refigured here on Plate 3, fig. 5).

Distribution: Gradatus/Variabilis Zone: Mediterranean Province (Italy, Greece, Southern Spain, Portugal, North Africa), Southern France, Northern Spain, ?Romania, North America. Hungary: Bakony Mts (Csernye, Szentgál), Gerecse Mts: Clausus – lower Bingmanni Subzone.

The following species were recorded from the Gerecse sections:

Merlaites clausus (MERLA, 1932) [8] (Plate 2, figs 3, 6)

Merlaites moltonii (VENZO in PINNA, 1963) [1] (Plate 3, fig. 1)

Merlaites gradatus (MERLA, 1932) [14] (Plate 3, fig. 3)

Merlaites alticarinatus (MERLA, 1932) [7] (Plate 3, fig. 4)

Merlaites viallii (VENZO in PINNA, 1963) [1] (Plate 3, fig. 5)

Genus Crassiceras Merla, 1932

Type-species: *Crassiceras latum* MERLA, 1932 (ARKELL 1957).

Diagnosis: Moderately involute to involute coiling, convex flanks, broad, low, tricarinate–bisulcate venter, subrectangular to trapezoid whorl-section, well-developed, sigmoid, fasciculate ribs, umbilical tubercles. Suture-line: short E, longer and wider L, short, wide, straight U lobes, broad, symmetrically divided ES, narrower LS1.

Remark: The genus is known from both European faunal provinces, but its diversity is higher in the Mediterranean region. The ornamentation of *Crassiceras bayani* is similar to that of *Merlaites gradatus*, but the former bears much broader whorls. *C. canavarii* differs from other *Crassiceras* species in moderately evolute coiling; it is probably a transitional form between genera *Pseudomercaticeras* and *Crassiceras*. *C. latum* is close to *C. dimorphum* in morphology, but differs in widely spaced and broader ribs.

Distribution: Gradatus/Variabilis Zone: Italy, Greece, Spain, Portugal, Southern France, Romania, Morocco. Hungary: Bakony Mts (Úrkút), Gerecse Mts: Clausus Subzone.

The following species were recorded from the Gerecse sections:

Crassiceras bayani (DUMORTIER, 1874) [2] (GÉCZY et al. 2008, pl. 2, figs 1, 2)

Crassiceras latum MERLA, 1932 [2] (Plate 2, fig. 4)

Crassiceras dimorphum MERLA, 1932 [7] (GÉCZY & SZENTE 2006, pl. 8, fig. 5) (Plate 2, fig. 5, Plate 3, fig. 2)

Crassiceras canavarii (FRANCESCHI, 1921) [4] (GÉCZY et al. 2008, pl. 2, fig. 3)

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Plate 1

Figure 1a–b *Mercaticeras mercati* (HAUER, 1856), Bánya Hill, Bed 41, (D: 27, H: 9, W: 10, U: 10)
Figure 2a–b *Mercaticeras mercati* (HAUER, 1856), Tölgyhát A, Bed 111, (D: 21, H: 7, W: 9, U: 8)
Figure 3a–b *Mercaticeras umbilicatum* BUCKMAN, 1913, Bánya Hill, Bed 43, (D: 45, H: 12, W: 13, U: 22)
Figure 4. *Mercaticeras umbilicatum* BUCKMAN, 1913, Kis-Gerecse, Bed 89, (D: 36, H: 11, W: 12, U: 16)
Figure 5a–b *Mercaticeras hellenicum* (RENZ, 1906), Bánya Hill, Bed 37, (D: 46, H: 16, W: 16, U: 18)
Figure 6a–b *Mercaticeras rursicostatum* MERLA, 1932, Bánya Hill, Bed 44, (D: 38, H: 13, W: 11, U: 17)
Figure 7a–b *Mercaticeras hellenicum* (RENZ, 1906), Pisznice, Bed 121, (D: 27, H: 10, W: 11, U: 11)
Figure 8a–b *Mercaticeras dilatum* (MENEGHINI, 1883), Kis-Teke Hill, Bed 8, (D: 23, H: 10, W: 13, U: 7)
Figure 9a–b *Mercaticeras thyrrenicum* (FUCINI, 1905), Tölgyhát A, Bed 112, (D: 43, H: 14, W: 12, U: 18)
Figure 10a–b *Pseudomercaticeras venzoi* PINNA, 1963, Pisznice, Bed 116, (D: 33, H: 12, W: 11, U: 11)
Figure 11a–b *Pseudomercaticeras venzoi* PINNA, 1963, Kis-Teke Hill, Bed J11, (D: 40, H: 16, W: 16, U:13)
Figure 12a–b *Pseudomercaticeras parvilobum* MERLA, 1932, Pisznice, Bed 121, (D: 52, H: 15, W: 15, U: 23)
Figure 13a–b *Pseudomercaticeras parvilobum* MERLA, 1932, Pisznice, Bed 121, (D: 48, H: 13, W: 14, U: 23)

The specimens have been coated with ammonium chloride before photography, and are shown in their natural size.

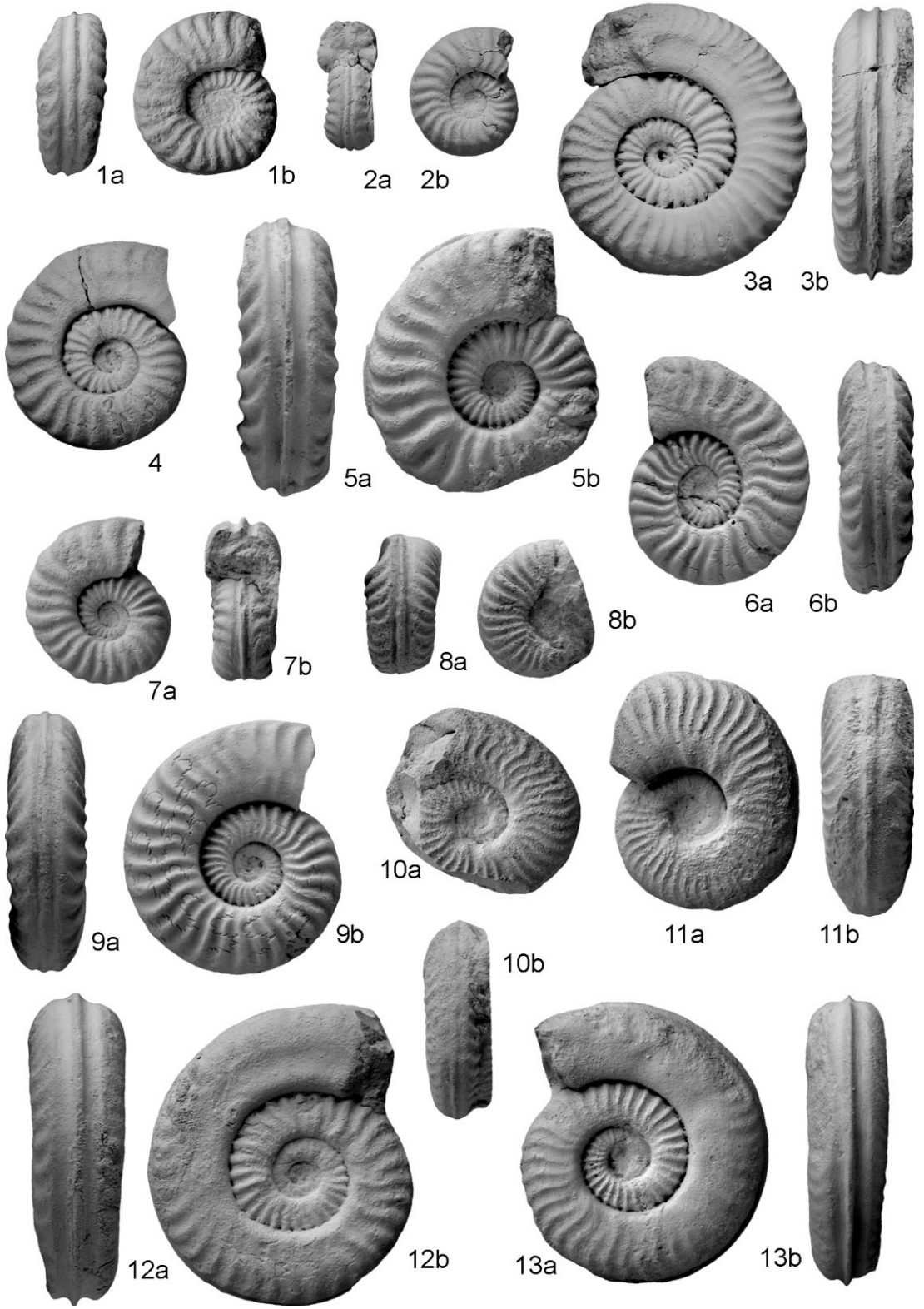
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Plate 2

Figure 1a–b *Pseudomercaticeras rotaries* MERLA, 1932, Pisznice, Bed 126, (D: 47, H: 14, W: 12, U: 21)
Figure 2a–b *Pseudomercaticeras rotaries* MERLA, 1932, Pisznice, Bed 124, (D: 56, H: 16, W: 14, U: 25)
Figure 3a–b *Merlaites clausus* (MERLA, 1932), Bánya Hill, Bed 34, (D: 66, H: 25, W: 16, U: 21)
Figure 4a–b *Crassiceras latum* MERLA, 1932, Pisznice, Bed 116, (L: 65, H: 27, W: 22)
Figure 5 *Crassiceras dimorphum* MERLA, 1932, Tölgyhát A, Bed 87, (D: 50, H: 19, W: 16, U: 15)
Figure 6a–b *Merlaites clausus* (MERLA, 1932), Kis-Teke Hill, Bed J11, (D: 35, H: 15, W: 10, U: 10)
Figure 7a–b *Pseudomercaticeras frantzi* (REYNÈS, 1868), Pisznice, Bed 117, (D: 100, H: 30, W: 20, U: 42)

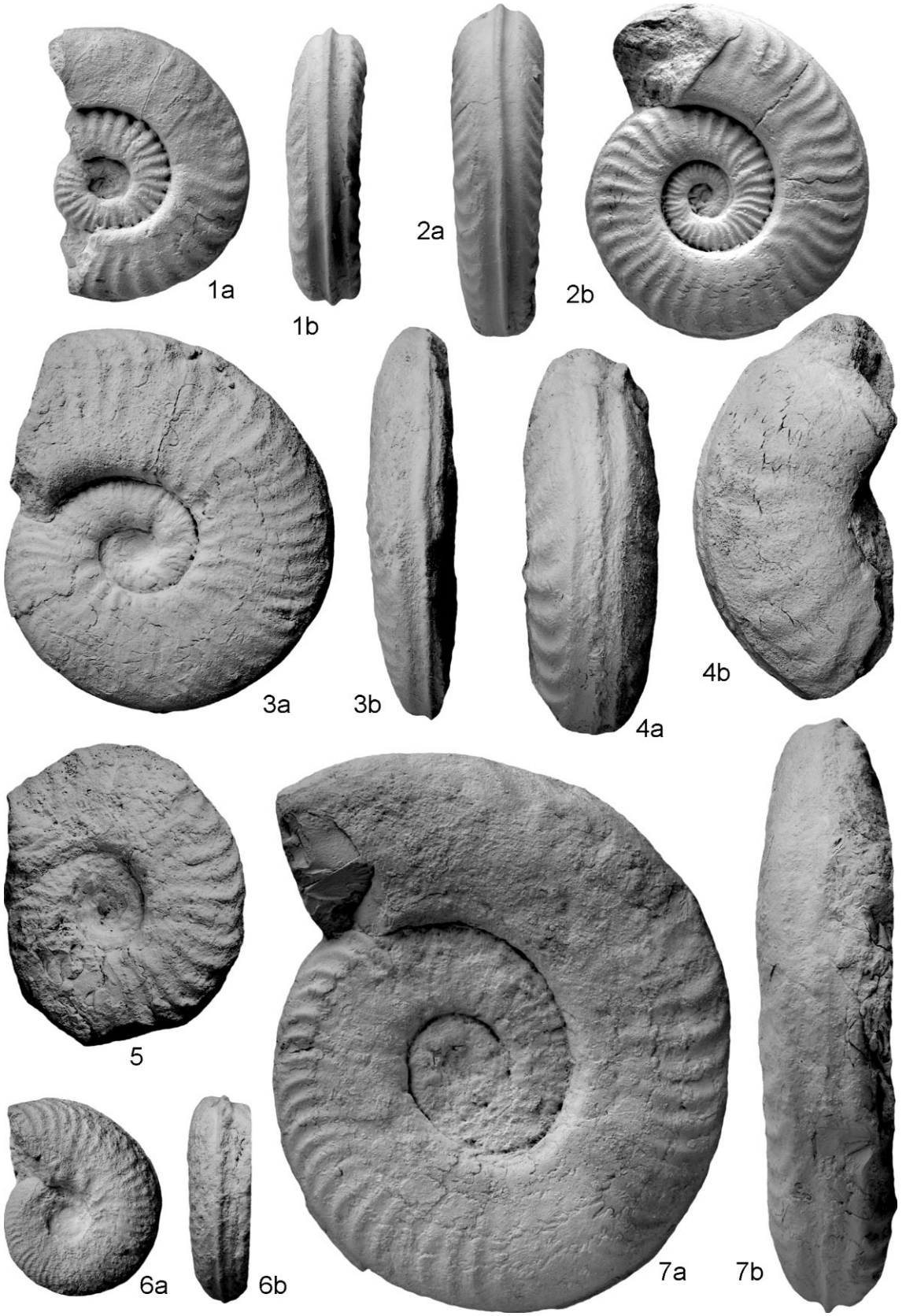
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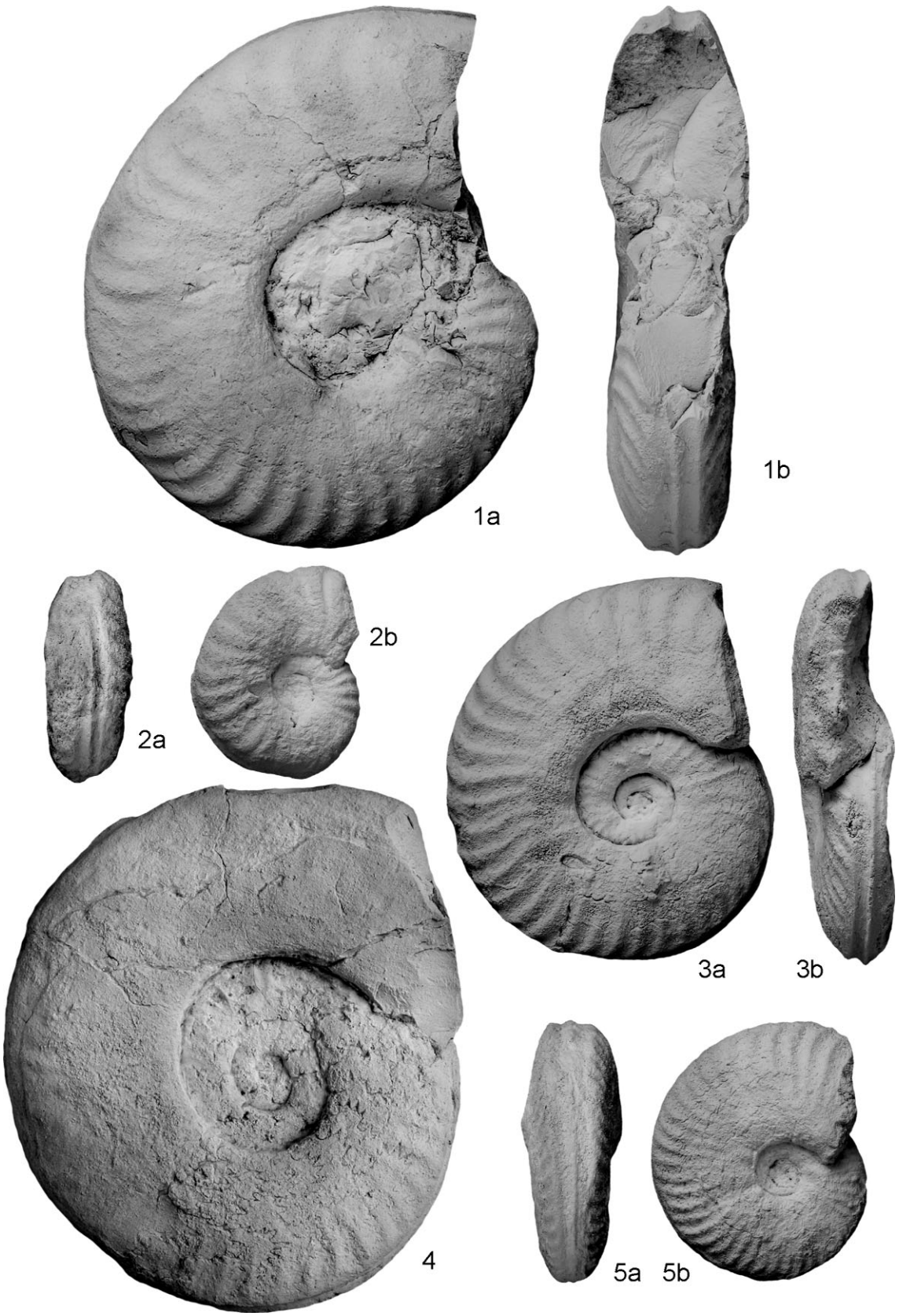
Plate 3

Figure 1a–b *Merlaites moltonii* (VENZO in PINNA, 1963), Kis-Gerecse, Bed 79, (D: 93, H: 33, W: 21, U: 33)
Figure 2a–b *Crassiceras dimorphum* MERLA, 1932, Tölgyhát A, Bed 86, (D: 36, H: 15, W: 12, U: 9)
Figure 3a–b *Merlaites gradatus* (MERLA, 1932), Bánya Hill, Bed 33, (D: 67, H: 27, W: 18, U: 20)
Figure 4 *Merlaites alticarinatus* (MERLA, 1932), Kis-Gerecse, Bed 63, (D: 92, H: 31, W:15, U: 33)
Figure 5a–b *Merlaites viallii* (VENZO in PINNA, 1963), Pisznice, Bed 116, (D: 44, H: 20, W: 15, U: 9)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