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Tamás Budai, professor at University of Pécs, was working as mapping geologist for the Geological Institute of Hungary near 40 years. He was mapping the area of the Transdanubian Range in the Keszthely Mountains and on the Balaton Highland (1982–1999), later in the Gerecse and in the Vértes Mountains (1992–2018). He edited and published several geological maps and their explanatory books. His main scientific professions are: the Triassic period (stratigraphy, sedimentary environments, palaeogeography, palaeoclimate); the regional geology and structure of the Transdanubian Range; the geology of the pre-Cenozoic basement of Hungary. Degrees: MSc geologist (Eötvös Loránd University, Budapest, 1982); Dr. Univ. (Eötvös Loránd University, Budapest, 1989), Ph. D. (Eötvös Loránd University, Budapest, 1995); D. Sc. (Hungarian Academy of Sciences, 2007). He received the Academic Prize (Hungarian Academy of Sciences) in 2022. Honorary member of the Hungarian Geological Society.

The present volume is dedicated to the systematic description of the Ladinian ammonoid fauna of the Balaton Highland. The creation of such monographic work was significantly inspired by the large-scale collections carried out recently by two amateur collectors, Miklós Bercsényi (Nyúl) and Zsolt Pintér (Győrszentiván), who are co-authors of one of the chapters. The introductory part of the monograph presents an outlook of the Triassic geology and the Ladinian stage of the Balaton Highland. The next chapter contains the stratigraphic descriptions of the studied sections and localities with the ranges of the collected ammonoids. This is followed by a brief summary of the Ladinian basin evolution and biostratigraphy. The main part, devoted to the systematic palaeontology of the fauna, comprises descriptions of 65 species belonging to 24 genera. Five of the genera and 7 of the species are described here as new taxa and a new subfamily was also introduced. The descriptions are illustrated with 70 text figures (photos of specimens and drawings of suture lines). At the end, 40 photographic plates demonstrate the external features of the described ammonoid species.



Co-authors of this volume on the Király Hill at Veszprémfajsz, 2025. From left to right: Tamás Budai, Zsolt Pintér, Attila Vörös, Miklós Bercsényi

GEOLOGICA HUNGARICA ser. PAL. fasc. 62

SARA
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FASCICULI INSTITUTI GEOLOGICI HUNGARIAE
AD ILLUSTRANDAM NOTIONEM GEOLOGICAM ET PALAEONTOLOGICAM

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SERIES PALAEONTOLOGICA FASCICULUS 62

ATTILA VÖRÖS, TAMÁS BUDAI

Ladinian ammonoids of the Balaton Highland (Hungary)



BUDAPEST, 2026

Ladinian ammonoids of the Balaton Highland (Hungary)

by

Attila Vörös, Tamás Budai

BUDAPEST, 2026

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Reviewer:
András Galácz
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Technical editor, DTP:
Klára Palotás

On the front cover:
Arpadites arpadis in lateral and ventral views (Veszprémfajsz, Király Hill, Longobardian)

Published by the Supervisory Authority for Regulatory Affairs
Kiadja a Szabályozott Tevékenységek Felügyeleti Hatósága

Responsible editor:
President of SARA

Date of online publication: 23 September, 2026

ISSN 0374-1893
ISBN 978-963-671-356-0

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Introduction

Attila Vörös

In his milestone book entitled “The Trias and its ammonoids” Tozer (1984, p. 28) put on the map the Balaton area in the assembly of important localities for the Alpine Triassic. Indeed, the results published in pioneering papers and monographs by Edmund von Mojsisovics (1870, 1882) and János Böckh (1872, 1873, 1874), deserved this outstanding merit. Mojsisovics’ magnificent monograph “Die Cephalopoden der Mediterranen Triasprovinz” portrayed not less than 38 ammonoid species from the Balaton area, thus highlighting the importance of these fossils and their value in stratigraphy.

Three decades later, the weighty palaeontological volumes, organized and edited by Lajos Lóczy in 1911–12 under the title “Resultate der wissenschaftliche Erforschungen des Balatonsees”, contributed by the best experts of that time (Carl Diener, Gustav Arthaber, Fritz Frech), crowned the contemporaneous knowledge on the Triassic ammonoids of the area. Remarkably, the most abundant and diverse ammonoid assemblages were described from the middle of the three divisions of the Triassic.[1]

After a long time of silence, new efforts in research of Middle Triassic ammonoids of the Balaton area started in the 1980’s. In the scope of the detailed geological mapping project by the Geological Institute of Hungary excavations and detailed collecting work in important stratigraphical sections, led chiefly by Tamás Budai and Attila Vörös, yielded immense amount of ammonoids from the Anisian and Ladinian stages. The monographic description of the ammonoids and stratigraphy commenced also. The multi-authored volume on the middle Anisian faunas and the redefinition of the Pelsonian Substage was edited by Vörös (2003); the extremely rich upper Anisian ammonoid fauna was described by Vörös (2018). The Ladinian ammonoids, although they appeared in high diversity in the papers by the classic authors cited above, remained somewhat neglected; only short reports were given in Vörös (1998), in Hungarian.

Besides this long-felt harassing deficiency, an unexpected factor gave an impetus on us to continue and accomplish the detailed treating of the Ladinian ammonoids. Two diligent and well-trained private collectors Miklós Bercsényi and Zsolt Pintér buckled down to one of our abandoned localities at Nemesvámos, Katrabóca, and continued working at newly discovered localities at Veszprémfajsz, Király Hill. We reported the preliminary results in two short papers (Vörös et al. 2024; 2025). The hundreds of recently collected ammonoid specimens, complemented by our previous material and the type specimens kept in the collections of the former Geological Institute of Hungary, constitute the basis of the present monograph. The systematic description of the ammonoids is accompanied with an introduction to the Ladinian stratigraphy and short discussions of diverse aspects of the fauna.

[1] The relevant contributions on the ammonoids appeared earlier as preprints: Diener (1899; Frech (1903). More details of previous research are given in the geological chapter in the present monograph.

The authors want to express sincere thanks to many colleagues who gave assistance in the field work and in the course of collecting ammonoids, namely Imre Szabó (†), Lajos Dosztály (†), Zoltán Batka, Gábor Csillag, András Galácz, János Haas, Viktor Hermann, Péter Ozsvárt, József Pálfy, István Szente and, with special emphasis, to Miklós Bercsényi and Zsolt Pintér.

We are grateful to László Makádi and Ottilia Szives (Geological Survey, Supervisory Authority for Regulatory Affairs, Budapest), Harald Lobitzer, Franz Stojaspal and Irene Zorn (Geologische Bundesanstalt, Wien) and Hans Rieber (†) (Paläontologisches Institut und Museum, Universität Zürich), for access to the collections in their charge. Thanks are due to the fossil collectors Gabriella Földvári (Kővágóörs) and István Szemes (Budapest) for visits in their private collections and occasional loaning of specimens.

We greatly appreciate the thought-provoking discussions we had with Paolo Mietto and Stefano Manfrin (Padova), Fran Vidaković (Zagreb), Marco Balini (Milan) and Leopold Krystyn (Vienna) on taxonomic issues.

The geological chapters of the manuscript were critically reviewed by János Haas; the systematic descriptions were kindly read by András Galácz; their useful comments and advices significantly improved the present work.

Essential financial and technical support was given by the Supervisory Authority for Regulatory Affairs, Budapest, whose kind permission for publishing this monograph as a volume of the Geologica Hungarica series Palaeontologica is much appreciated. Special thanks are due to Klára Palotás for the careful editing and DTP work.

"What is Ladinian"?

Attila Vörös & Tamás Budai

The question in the title of the chapter quotes Bittner's publicaton (1892) in which he introduced the term "ladinisch" and the answer is: Ladinian is a chronostratigraphic unit within the Triassic system/period, the upper/younger stage/age of the Middle Triassic series/epoch (https://stratigraphy.org/ICSchart/ChronostratChart2024-12.pdf).

Originally, the term "ladinisch" was suggested by Bittner (1892) instead of "Norische stufe" (sensu Mojsisovics 1882) for the "Buchensteiner" and "Wengener Schichten" which were the mapping units of Richthofen (1860). The Ladinian stage was later subdivided by Mojsisovics et al. (1895) for two parts: for the lower "Fassanische Unterstufe" (Buchensteiner Schichten), defined with the Protrachyceras Curionii Zone and for the upper "Longobardische Unterstufe" (Wengener Schichten), defined with the Protrachyceras Archelaus Zone. The use of the name of the formations in chronostratigraphic sense (e.g. "buchenstein age" or "wengen age") caused confusion for decades, which was pointed out by different publications (Budai & Dosztály 1990; Budai 1992; Brack & Rieber 1994; De Zanche & Gianolla 1995 etc.).

In parallel with the last mapping project of the Balaton Highland (Budai et al. 1999a,b), detailed and comprehensive biostratigraphic research was carried out in the area during the 1980s and the subsequent decades (Dosztály 1993; Kovács 1993a,b; Kovács et al. 1990, 1994; Góczán & Oravecz-Scheffer 1993; Márton et al. 1997; Vörös 1993, 1998; Vörös & Pálfy 1989), and in the Southern Alps (Brack & Rieber 1986, 1993; Brack et al. 1995; Fantini Sestini 1994, 1996; Manfrin & Mietto 1995; Mietto & Manfrin 1995a,b). Scientific debate was active around the definition of the Anisian/Ladinian boundary at international congresses (Gaetani ed. 1993; Piros ed. 2002) and also in several publications (Vörös et al. 1991; Brack & Rieber 1994; Kozur 1995; Vörös 1995 etc.). After various proposals regarding the GSSP of the base of the Ladinain stage (Brack et al. 1995, 2003; Mietto et al. 2003; Vörös et al. 1996, 2003) it was finally defined at the base of the Curionii Zone in the Bagolino section (Brack et al. 2005). Later the boundary between the Ladinian and the Carnian stages was also defined and the GSSP was fixed within the Prati di Stuores section (San Cassiano Formation, central-western Dolomites) based on the first appearance of the "real" trachyceratid ammonites, represented by *Daxatina canadensis* (Broglio-Loriga et al. 1999; Mietto et al. 2007, 2008, 2012).

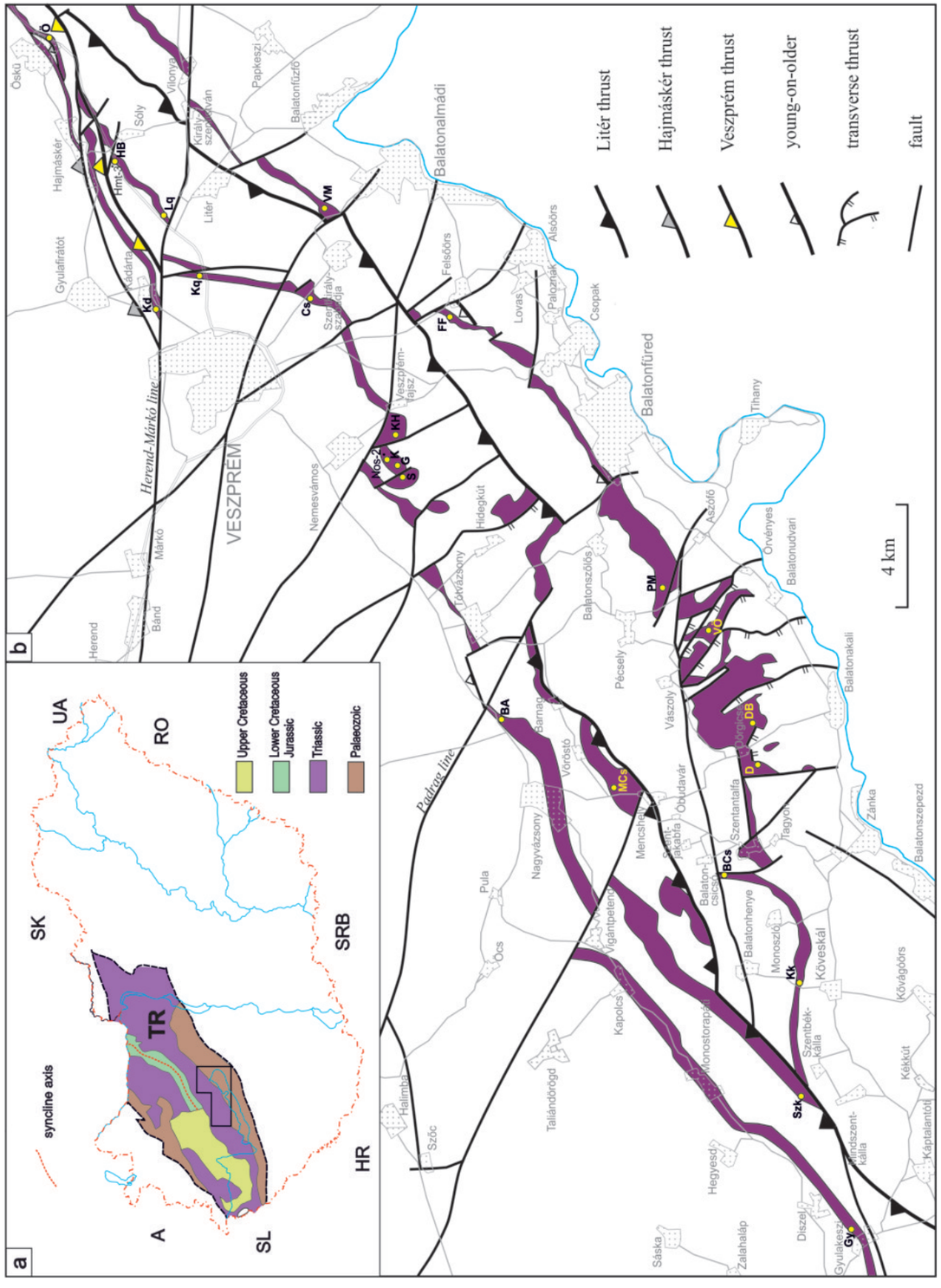
In the last decades various proposals emerged for the Tethyan Ladinian biostratigraphy based on ammonite and conodont zonation (e.g. Krystyn 1983; Mietto & Manfrin 1995b; Vörös 1998; Mietto et al. 2018; Vidaković et al. 2023). However, despite of the internationally accepted "official" lower and upper boundary of the Ladinian (Ogg et al. 2014), the biostratigraphic subdivision of the stage has not been settled yet (see chapter Biostratigraphy).

Geological setting and Triassic history of the Balaton Highland

Tamás Budai

The Balaton Highland belongs to the southeastern flank of the SW–NE oriented syncline structure of the Transdanubian Range Unit (*Fig. 1a*). The Eoalpine compression that created this structure during the mid-Creataceous manifested also in longitudinal thrusts along the Balaton Highland (*Fig. 1b*). The Upper Triassic formations of the footwall sheet are overthrusted along the Litér thrust by Palaeozoic to Middle Triassic formations of the hangingwall sheet and, with lower stratigraphic amplitude, along the Veszprém and Hajmáskér thrusts on the northeastern part of the Balaton Highland, that also called as Veszprém Plateau (Böckh 1872, 1873; Laczkó 1911; Lóczy 1913; Budai et al. 1999a,b; Héja et al. 2024).

The Upper Permian–Triassic succession of the Balaton Highland was formed during the rifting and the early opening stages of the Neotethys Ocean (Budai & Vörös 1993; Haas et al. 1995). The slightly metamorphosed and folded Lower Palaeozoic basement is overlain along erosional unconformity by cyclic siliciclastic succession of the fluvial Upper Permian Balatonfelvidék Sandstone Formation. As a consequence of sea-level rise at the Permian/Triassic boundary the area of the Late Permian alluvial plain became flooded. Sedimentation of the shallow-marine shelf was characterized by fine-grained siliciclastics and carbonates during this period (Arács Marl, Köveskál Dolomite, Hidegkút Dolomite, Zánka Sandstone and Csopak Marl), which lasted till the end of the Early Triassic (Haas & Budai 1995; Budai & Haas 1997). Due to cessation of the terrigenous input carbonate deposition became prevailing during the early Anisian (Aszófő Dolomite, Iszkahegy Limestone, Megyehegy Dolomite). At the beginning of the middle Anisian extensional tectonic activity disintegrated the former carbonate ramp (Budai & Vörös 1992, 1993, 2006). As a result, isolated platforms were formed (Tagyon Fm), coevally with the opening of halfgraben type basins (Felsőörs Fm) above the subsiding blocks (*Fig. 2*). Due to sea-level rise, accompanied by volcanic activity (Vászoly Fm), submarine highs were formed during the late Illyrian in the area of the drowned Pelsonian plaforms (Budai & Vörös 1993, 2006; Karádi et al. 2022; Budai et al. 2017, 2024). In the deepening basins pelagic carbonates and volcanic tuffs were deposited during the Ladinian (Buchenstein Fm), coevally, larger platforms started to grow (Budaörs Dolomite) to the north and northeast of the Balaton Highland. Due to the platform progradation (Kádárta Dolomite) around the Ladinan/Carnian boundary (Budai & Haas 1997; Budai & Vörös 2006) the basins started to be filled up with carbonate mud (Füred Limestone), and later with fine grained siliciclastics (Veszprém Marl), as a consequence of the Carnian Pluvial Episode in the



early Carnian (Julian) (HAAS et al. 2012; TÓTH et al. 2024; BARANYI et al. 2025, 2026). The Triassic basins became totally upfilled by the late Carnian (mid Tuvalian, Sándorhegy Fm) and a levelled topography of a huge platform (Fődolomit) developed (HAAS & BUDAI 1995, 1999; BUDAI et al. 1999b).

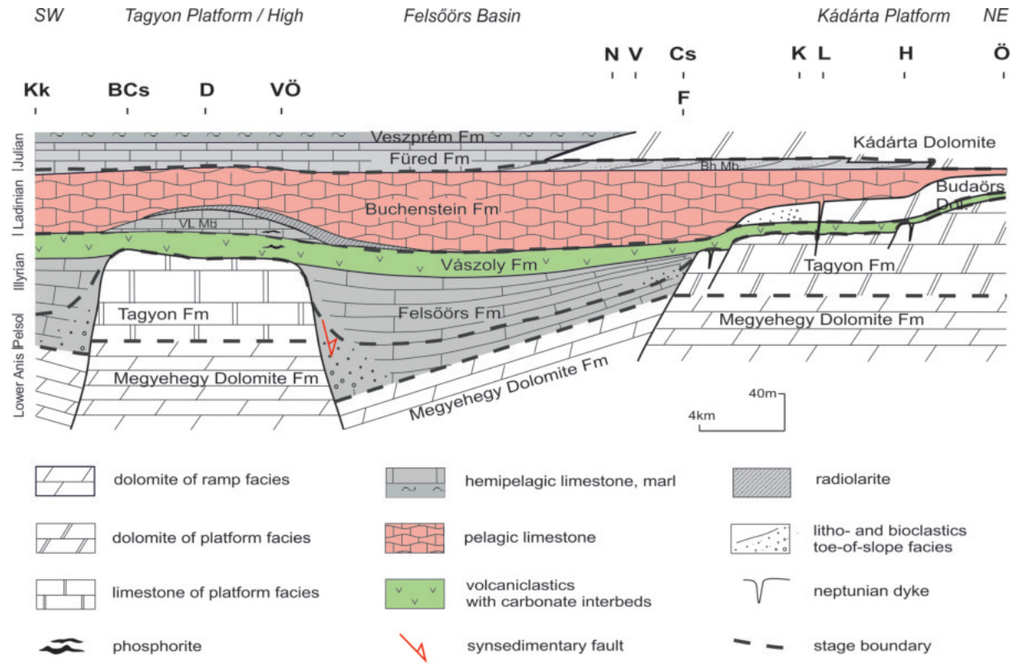


Figure 2. Geological profile of the Middle Triassic formations along the Balaton Highland and the Veszprém Plateau (after BUDAI & VÖRÖS 2006; BUDAI et al. 2017). Coloured parts represent the middle Anisian–lower Carnian formations of basin facies. Bh Mb – Berekhegy Member; VL Mb – Vászoly Limestone Member. Studied Ladinan sections, southern range (footwall sheet): Kk – Köveskál; BCs – Balatoncsicsó; D – Dörgicse; VÖ – Vászoly, Öreg Hill; F – Felsőörs. Northern range (hangingwall sheet): N – Nemesvámos, V – Veszprémfajsz; Cs – Cserhalompuszta – Szentkirályszabadja; K – Kádárta; L – Litér; H – Hajmáskér; Ö – Öskü.

← ***Figure 1.*** a) Sketch-map of the syncline structure of the Transdanubian Range Unit (TR). The rectangle shows the position of the map in Fig. 1b.; b) Tectonic map of the Balaton Highland (after HÉJA et al. 2024) showing the distribution of the middle Anisian–lowermost Carnian basinal sequence (Felsőörs, Vászoly, Buchenstein and Füred Formations). Yellow dots show the place of the Ladinian outcrops mentioned in the text: BA – Barnag, Akol Hill; BCs – Balatoncsicsó, Csukrét Gully; Cs – Cserhalompuszta – Szentkirályszabadja; D – Alsódörgicse, vineyard; DB – Dörgicse, Becserpuszta; FF – Felsőörs, Forrás Hill; G – Gyűr Hill, Nemesvámos; Gy – Gyulakeszi; HB – Hajmáskér, Berek Hill; K – Katrabóca, Nemesvámos; Kd – Kádárta, village; KH – Király Hill, Veszprémfajsz; Kk – Köveskál; Kq – Kádárta, quarry; Lq – Litér, quarry; MCs – Mencshely, Cser Hill; Ö – Öskü; PM – Pécsely, Meggy Hill; S – Som Hill, Nemesvámos; Szk – Szentbékkálla; VM – Vörösberény, Megye Hill; VÖ – Vászoly, Öreg Hill. Drilled core columns in the text: Hajmáskér Hmt–3; Nemesvámos Nos–2.

The Ladinian stage of the Balaton Highland

Tamás Budai

As a consequence of the definition of the base of the Ladinian stage at Bagolino GSSP (Brack et al. 2005) the "classic" interpretation of the Ladinian had to be changed in the Transdanubian Range. Accordingly, the so called "pietra verde" or "reitzi beds" of the Balaton Highland, in the current lithostratigraphic terminology the Vászoly Formation (Vörös et al. 1997; Budai et al. 1999b) shifted down into the upper Anisian (Illyrian) substage (Vörös et al. 2009; Vörös 2018; Budai et al. eds 2024).

The main part of the Ladinian stage at the Balaton Highland (*Fig. 2*) is made up by well bedded, nodular, often cherty siliceous limestones (Nemesvámos Member) of the Buchenstein Formation (Budai 1993; Budai et al. 1999b). Weathered volcanic tuff and marl intercalations occur almost in every part of the formation (Budai & Dosztály 1990), alternating with the limestone beds on the Veszprém Plateau (e.g. Kádárta quarry, see the studied sections). The colour varies laterally and also vertically, reflecting the redox conditions of the depositional environments: red or pale red limestone (with dark red chert), and/or grey and greenish grey limestone (with dark grey chert). In the the vicinity of the coeval Ladinian platforms the lower (Fassanian) part of the Buchenstein Formation laterally interfingers with toe-of-slope facies to the southwest at Gyulakeszi (Nagy et al. 2014) and also on the Veszprém Plateau to the northeast (Budai et al. 2001a; Karádi et al. 2022). This facies is coevel with the light grey bedded limestone unit in the upper part of the Vászoly Formation (Vászoly Limestone Member, Curionii Zone) on the submarine high in the central part of the Balaton Highland (*Fig. 2*) (Budai & Haas 1997; Budai & Vörös 2006).

Thin-bedded limestones with thin-shelled bivalve coquina (*Posidonia* and *Daonella* div. sp.) are characteristic in the upper part of the Buchenstein Formation (former "wengen posidonia shales" of Lóczy 1913; Keresztfatető Member of Budai et al. 1999b) in the area of the central part of the Balaton Highland, i.e. on the Öreg Hill at Vászoly (see the studied sections; Budai & Csillag 1998; Budai & Vörös 2006; Budai et al. 2017). Radiolarites are also typical for this area (Budai et al. 2017). Isolated lenses of bivalve coquina are known in the lower part of the formation in the surroundings of Hajmáskér (Tó Hill, Bittner 1901; Laczkó 1911). In the upper part of the formation the chert-free red ammonite-bearing limestone contains coquina lenses with gastropods and ammonites together with bivalves and crinoids in the range between Nemesvámos and Veszprémfajsz (see the studied sections; Vörös 1998; Vörös et al. 2024, 2025).

Upsection, the Buchenstein Formation is overlain by the light grey Füred Limestone Formation (sensu Böckh 1872). In many cases there is a gradual transition between the two formations and, accordingly,

determination of their boundary is not easy. Based on radiolarians and conodonts the entire Füred Limestone was assigned to the lower Carnian in most sections of the Balaton Highland (DOSZTÁLY et al. 1989; BUDAI & DOSZTÁLY 1990; KOVÁCS et al. 1991; BUDAI et al. 1999b, 2002). However, at some sections e.g. at Köveskál, at Nemesvámos and at Felsőörs, and also on the Veszprém Plateau at Hajmáskér (see the studied sections) in its basal beds upper Ladinian ammonites were found. This unit was classified as Berekhegy Limestone (sensu LACZKÓ 1911), member of the Füred Limestone Formation, represented with carbonate turbidite facies (*Fig. 2*) around the neighbouring Kádárta Platform (BUDAI & HAAS 1997; BUDAI et al. 2001a; BUDAI & VÖRÖS 2006; HAAS et al. 2000, 2014).

Lithostratigraphic correlation of the Ladinian formations of the Balaton Highland and their Alpine counterparts have been changed during the history of research. The first pioneer mapping geologist, János BÖCKH (1872, p. 85) correlated the nodular–cherty "tridentinus limestone" with the "buchenstein limestone" of South Tyrol. The red ammonitic limestone of Katrabóca at "Vámos" (see the studied sections) was corresponded with the Ladinian part of the "hallstatt limestone" by BITTNER (1901). Later, the underlying "reitzi beds" were correlated with the "buchenstein beds" while the "tridentinus limestone" was compared with the "wengen beds" by LACZKÓ (1911) and LÓCZY (1913), considering their age and ignoring the obvious lithological differences (BUDAI 1988; BUDAI & DOSZTÁLY 1990, BUDAI & CSILLAG 1998). According to stratigraphic studies (BUDAI 1992, 1993; BUDAI et al. 1999b) the Buchenstein Formation practically fills the Ladinian stage at the Balaton Highland (BUDAI et al. eds 2024). In comparison with South Alpine lithostratigraphic units the Buchenstein Formation of the Balaton Highland can be correlated with the Livinallongo Formation of the Dolomites (BUDAI 1992), the Buchenstein Formation of Lombardy and, partly, with the Clapsavon Limestone of the western Carnic Alps (BUDAI et al. 1999b; VÖRÖS et al. 2024, 2025). Similar lithofacies also occur in the Triassic succession of the Northern Calcareous Alps (Hallstatt Limestone) and of the Dinarides (Bulog Limestone), however, with wider stratigraphic extent (MOJSISOVICS 1875; KRYSTYN 1980; SUDAR et al. 2023; GAWLICK et al. 2023; MRDAK et al. 2024 and references therein). Wengen-type volcaniclastic sedimentary units are absent in the Balaton Highland area, similar lithofacies was reported only from the eastern Bakony (BUDAI 1993; BUDAI & VÖRÖS 1993; BUDAI et al. 2001b) and from the surroundings of the Buda Hills (FARICS & JÓZSA 2017; DUNKL et al. 2019).

Studied Ladinian sections of the Balaton Highland

ATTILA VÖRÖS & TAMÁS BUDAI

In this chapter we present the descriptions of those sections of the Balaton Highland from where Ladinian ammonites were collected (*Figs 1 and 2*). The list of previously published and newly collected ammonites is presented in *Table I*.

The southern range of the Balaton Highland

Along the the footwall sheet south of the Litér thrust, determining by local tectonic structures the surface extension of the Ladinian formations shows significant changes (*Fig. 1b*).

Köveskál

The Köveskál section is the southwestern–most exposure of the Ladinian–lower Carnian basin formations along the southern range of the Balaton Highland (Kk, Fig. 1b). It is found in the eastern outskirts of the village on a hillside near the Burnót Stream (coordinates: N46°53'14.66"; E17°36'46.30"). The last maintenance of the key section was performed for the conference of the Subcommission on Triassic Stratigraphy in 2002 when it was introduced on the field trip (BUDAI et al. 2002).

The succession represents the Buchenstein Formation and, after a transitional unit, the lower part of the Füred Limestone Formation (*Fig. 3a*). The under- and overlying units are unknown due to tectonic contacts (BUDAI et al. 1999a).

The following description of the succession is given after SZABÓ (1990) and KOVÁCS et al. (in BUDAI et al. 2002). The lowermost exposed unit is a greenish–yellowish volcanic tuff or tuffite bed-set, in the upper part with bedded green chert (Vászoly Formation). It is overlain by the lowermost part of the Buchenstein Formation made up by light grey, brownish mottled, thick bedded cherty limestone with thinner nodular beds. Upsection it is followed by red, nodular limestones with volcanic tuff, then purplish red limestones with red chert and green tuffite (*Fig. 3b*). It is overlain by 30 cm thick green tuff layer and above it reddish or purplish limestones with red chert. The overlying yellow, thick bedded limestone with brownish yellow chert yielded some ammonites (*Joannites, Proarcestes*). Above it red nodular limestone with green tuffite and yellowish grey, purplish mottled limestone occurs with thin volcanic tuff intercalations. The overlying unit shows transition to the Füred Limestone; it is made up by yellowish grey, thick bedded nodular limestone,

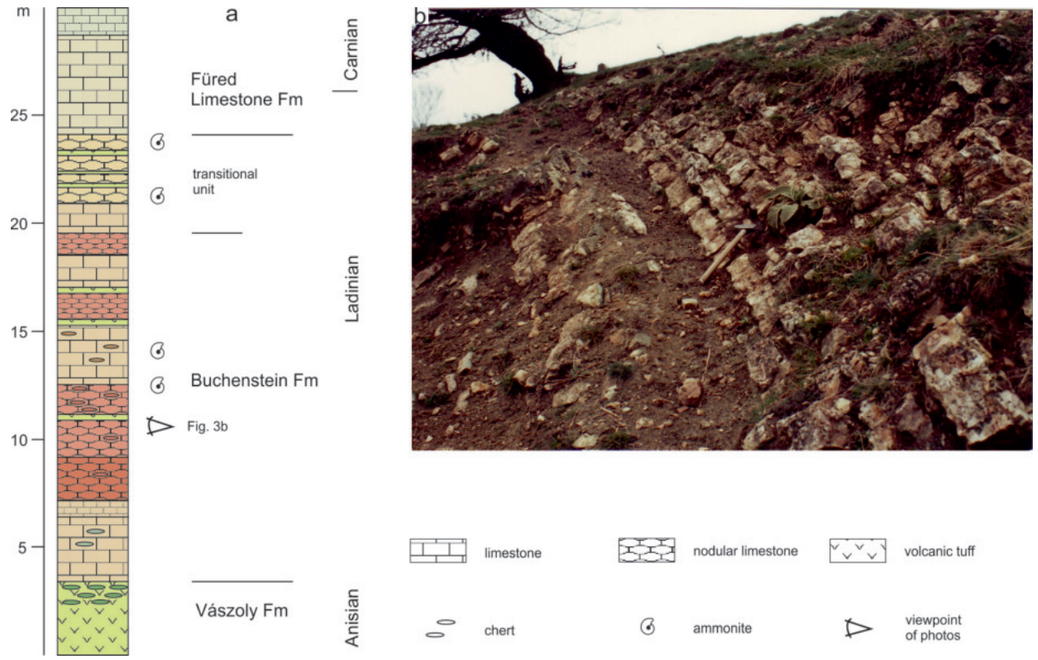


Figure 3. a) Stratigraphic column of the Köveskál key section (compiled after SZABÓ 1990);
b) Archive photo showing the lower part of the exposure

in the upper part with clay and greenish tuffite intercalations. The upper part of the section is made up of yellowish grey Füred Limestone; in the lower part thick bedded and upsection platy limestone with *Halobia* and/or *Daonella* shells. KITTL (1912a, plates IV, VII.) displayed the following bivalves from here: *Daonella latecostata, Halobia vixaurita.*

Bed by bed sampling for micropaleontological studies of the section was performed by H. KOZUR (KOZUR & MOSTLER 1971) who mentioned *Protrachyceras* cf. *curionii* and *P. rubrum* from the tuffitic nodular limestone (determined by L. Krystyn). In the early eighties S. KOVÁCS and L. KRYSTYN took samples for conodont research meanwhile some specimens of *Frankites* sp. were also found in the upper, transitional unit of the Buchenstein Formation (BUDAI et al. 2002). From the lower part of the formation *Protrachyceras* cf. *curionii* and *Arpadites* sp. were mentioned also by SZABÓ (1990). Unfortunately, the above mentioned ammonites have not been depicted anywhere and only *Frankites regoledanus* and *F. apertus* specimens are stored in collection. The studied ammonites are listed in *Table I*.

Balatoncsicsó, Csukrét Gully

The Csukrét Gully at Balatoncsicsó (it was referred as Szentantalfa in the earlier literature) is one of the classic Ladinian ammonite localites of the Balaton Highland (BCs, *Fig. 1b, Fig.4*). Even the first geological mapper, János BÖCKH has already described the geology of the area and mentioned ammonites that he found in the scree of the "tridentinus limestone" (BÖCKH 1872, p. 92). Besides arcestids he found several *Arpadites* species and a new Trachyceratid species that he described as *Trachyceras pseudoarchelaus* (BÖCKH 1872, pp. 153–154.).



Figure 4. a) Poorly stratified Buchenstein Limestone along the right (southwestern) side of the Csukrét Gully at the northeastern foot of the Kő Hill (above); b) Arcestid ammonites on the bedding plane (below)

Table I List of the Ladinian ammonoid taxa from the studied localities of the Balaton Highland and their number of specimens per localities

	Köveskál	Balatoncsicsó	Alsódörgicse	Dörgicse, Becserpuszta	Vászoly	Pécsely	Felsőörs	Vörösberény	Katrabóca	Király Hill	Gyűr Hill	Som Hill	Cserhalompuszta	Kádárta	Kádárta, quarry	Litér, quarry	Hajmáskér	Öskü	specimens
Bosnites ? sp.											1								1
Megaphyllites obolus									4	1									5
Epigymnites cf. *ecki*		1							2		1								4
Epigymnites cf. *credneri*									1	1									2
Epigymnites cf. *moelleri*									3	1									4
Proarcestes subtridentinus									2	2	1								5
Proarcestes boeckhi		1							2										3
Proarcestes pannonicus								1		1									2
Joannites cf. *tridentinus*										2									2
Joannites cf. *trilabiatus*				1			1												2
Joannites cf. *joannisaustriae*						1													1
Aplococeras ? *probasileus*									1										1
Arpadites arpadis		2						1	3	8	1								15
Arpadites szaboi		2			1				5	4		1							13
Arpadites toldyi		1								1	1								3
Arpadites telleri									1	4									5
Arpadites cf. *bracki*									2	1									3
Arpadites bercsenyii										6									6
Stenarpadites manzonii									1	5	1								7
Stenarpadites dimanzonii										2									2
Stenarpadites pinteri										3			1						4
Lenarpadites cinensis										3	1								4
Lenarpadites dichotomus		1								5									6
Argolites arpaditoides										5									5
Argolites ventisettembris										6									6
Argolites geometricus									2	1									3
Argolites trinodosus										1									1
Argolites nodosus										5									5
Meginoceras ? sp.										1									1
Pinterites laricus										3									3
Bercsenyiites montisregis		1								4	1								6
Bercsenyiites egregius										2									2
Bercsenyiites sp., aff. *montisregis*										2									2
Alkaites ? sp.										1									1
Anolcites cf. *doleriticus*							1												1

Table I List of the Ladinian ammonoid taxa from the studied localities of the Balaton Highland and their number of specimens per localities

	Köveskál	Balatonesicsó	Alsódörgicse	Dörgicse, Becserpuszta	Vászoly	Pécsely	Felsőörs	Vörösberény	Katrabóca	Király Hill	Gyűr Hill	Som Hill	Cserhalompuszta	Kádárta	Kádárta, quarry	Litér, quarry	Hajmáskér	Öskü	specimens
Anolcites ? sp.									1										1
Falsanolcites cf. *furcosus*															1				1
Falsanolcites stuerzenbaumi							1												1
Falsanolcites cf. *gortanii*									1									1	2
Falsanolcites rieberi					1													3	4
Paranolcites budaii										1									1
Paranolcites ozsvarti															1				1
Paranolcites kadartaensis															1				1
Asklepioceras loczyi												1							1
Frankites regoledanus	1																		1
Frankites apertus	1						1									2			4
Eoprotrachyceras curionii					1													1	2
Eoprotrachyceras cf. *pseudoarchelaus*		1							1	1				1					4
Eoprotrachyceras cf. *gervasuttii*																		1	1
Eoprotrachyceras ? *gredleri*			1		1				4	2									8
Protrachyceras archelaus		1					1		4	7						1			14
Protrachyceras archelaus acutus									2	4									6
Protrachyceras ladinum						1			5	5					2	1	2		16
Protrachyceras longobardicum		1							2	2	1								6
Protrachyceras cf. *margaritosum*									1	2									3
Protrachyceras steinmanni									2	2									4
Protrachyceras cf. *laevior*									1	1									2
Protrachyceras irregulare										1									1
Protrachyceras ? *neumayri*																	1		1
Katrabocaites laczkoi									4	1								1	6
Katrabocaites laczkoi nodosus									6	2									8
Katrabocaites miettoi									2	1									3
Katrabocaites manfrini										1									1
Celtites epolensis						1											1		2
Monophyllites wengensis		1							5	1	1								8
specimens	2	13	1	1	4	3	5	2	70	115	10	2	1	1	5	4	4	7	250
taxa-per-locality	2	11	1	1	4	3	5	2	26	44	10	2	1	1	4	3	3	5	

LÓCZY (1913, p. 117) also mentioned this site and presented the following list of fossils collected by Böckh: *Arpadites arpadis, Arpadites szaboi, Arpadites toldyi, Trachyceras archelaus, Trachyceras pseudoarchelaus, Proarcestes subtridentinus, Proarcestes pannonicus, Proarcestes böckhi, Proarcestes esinensis, Monophyllites wengensis.*

West of Szentantalfa and Balatoncsicsó the N–S oriented range of the Kő Hill is made up by thick-bedded Füred Limestone (BUDAI & CSILLAG 1998, BUDAI et al. 1999b). The outcrops of the underlying Buchenstein Formation can be found at the northeastern foot of the Kő Hill, close to the ruins of Árokfő church at the opposite side of the gully. The lower part of the succession on the hillside (coordinates: N46°55'14.12"; E17°39'41.26") consists of poorly stratified, bedded or thick-bedded, massive, hard limestone (*Fig. 4a*). Its colour is light grey or light reddish. On the bedding planes arcestid ammonites occur locally (*Fig. 4b*).

Recently the following ammonites were collected here: *Protrachyceras pseudoarchela*us*, Arpadites* div. sp. The studied ammonites are listed in *Table I.*

Further to WNW some beds of the upper part of the Buchenstein Limestone was exposed in the bed of the brook (coordinates: 46.921067°; 17.660640°). However, the connection of this outcrop with the above mentioned one was not possible to figure out because of the Quaternary cover.

Conodont investigation of the Csukrét Gully succession was recently performed by TELEK (2025) and BARANYI et al. (2026) who studied the Buchenstein Formation and also the lower Carnian Füred and Nosztor Limestones.

Dörgicse (Alsódörgicse), vineyard

The Buchenstein Formation can be traced on the surface in a large area in the surroundings of Alsódörgicse, due to local thrusts and folds (*Fig. 1b;* BUDAI et al. 1999a). The formation is represented by bedded nodular siliceous limestones (red, grey or greenish grey coloured) with large amount of chert and laminated siliceous tuffite (the latter contains a rich radiolaria assemblage, BUDAI 1988; BUDAI & CSILLAG 1998; BUDAI et al. 2017). Debris of these two rock types can be found also in the vineyard along the cart road leading from the southwestern part of the village to the Balázs Hill (D, *Fig. 1b;* coordinates: N46°54'26.63"; E17°43'06.04") where a large fragment of *Eoprotrachyceras* ? *gredleri* was found (BUDAI 1988; VÖRÖS 1998).

Dörgicse, Becserpuszta

Above the Vászoly Limestone Member of the Vászoly Formation the red and grey cherty limestone succession of the Buchenstein Formation has a significant surface distribution east of Alsódörgicse (*Fig. 1b;* BUDAI 1988; BUDAI et al. 1999a). In the Gernye Hill area („Old Forest") the following ammonites were collected along the forest road at Becserpuszta (DB, Fig. 1b, coordinates: N46°54'58.09"; E17°44'53.52"): *Monophyllites wengensis, Proarcestes* cf. *boeckhi, Joannites* cf. *trilabiatus, Joannites* cf. *tridentinus* (BUDAI 1988; VÖRÖS 1998).

Vászoly, Öreg Hill

The Öreg Hill at Vászoly (in the early publications mentioned as Pécsely) is one of the most relevant sites of the Middle Triassic stratigraphy (*Fig. 5)* of the Balaton Highland (VÖ, *Fig. 1b*). It was a target area of uranium-ore exploration in the 1950's (KISS & VIRÁG 1959) and several trenches and shafts were excavated and boreholes were drilled on the Öreg Hill for detailed study of the phosphoritic horizons in the Tagyon and Vászoly Formations.

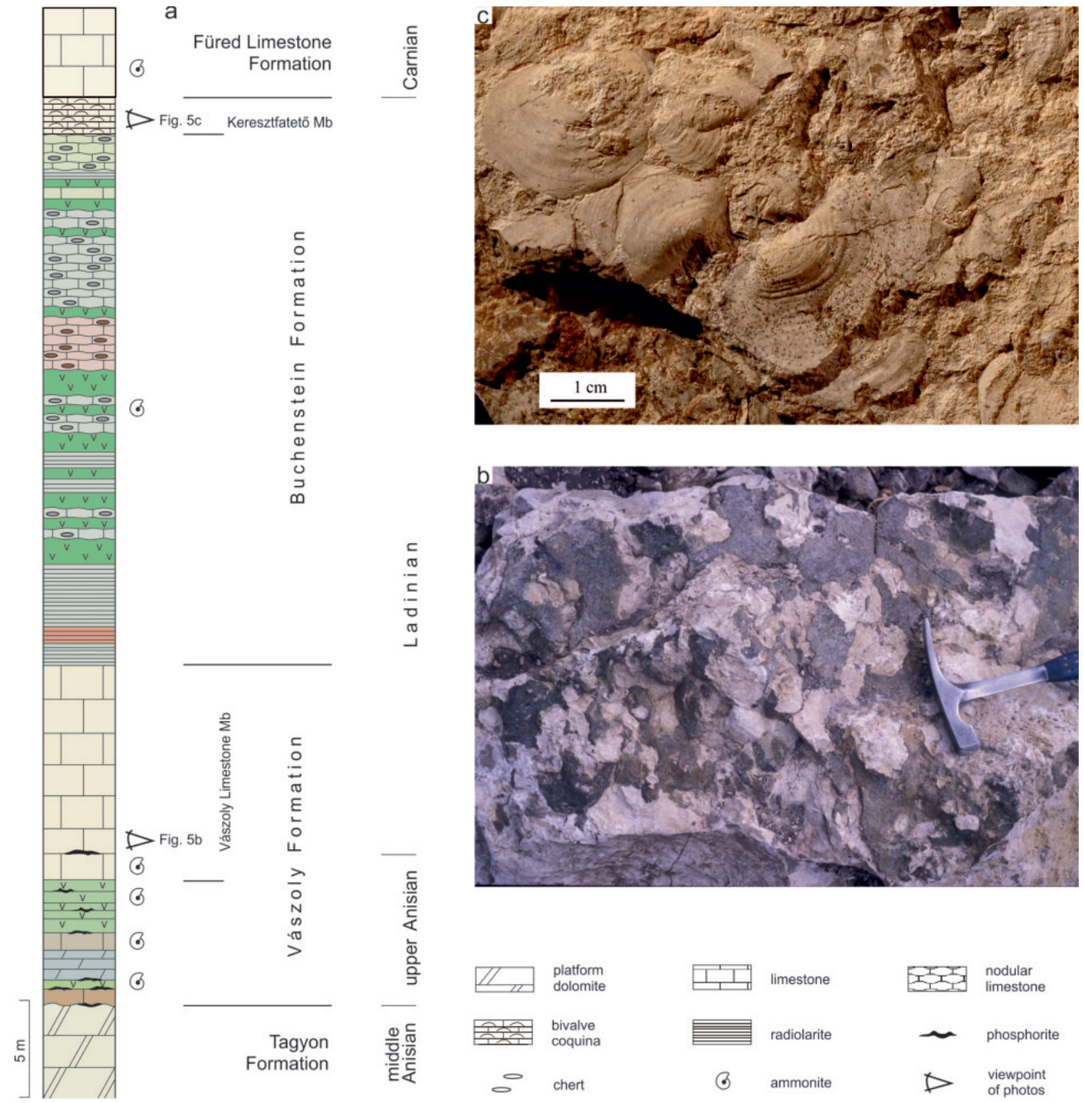


Figure 5. a) Composite stratigraphic column of the Middle Triassic successsion of the Öreg Hill and Nagy-vár Hill at Vászoly (after BUDAI & HAAS 1997; BUDAI & VÖRÖS 2006; BUDAI et al. 2017); b) phosphoritic hard ground on the bedding plane of Vászoly Limestone Mb; c) Posidonia coquina of the Keresztfatető Mb

The Middle Triassic of the area was described by SZABÓ (1972). Stratigraphic evaluation of the formations were presented later, within the frame of the geological mapping project of the Balaton Highland (BUDAI 1988; BUDAI & DOSZTÁLY 1990; BUDAI & CSILLAG 1998; BUDAI et al. 1999a,b). Detailed paleontological data and biostratigraphic interpretations of the studied sections of the Öreg Hill were published in connection with the key section program of the Geological Institute of Hungary (VÖRÖS & PÁLFY 1989; KOVÁCS et al. 1990) and the Anisian–Ladinaian boundary project of the Subcommission on Triassic Stratigraphy (VÖRÖS 1993; GAETANI ed. 1993).

The middle Anisian bedded dolomitized platform carbonate unit of the Tagyon Formation is overlain by upper Illyrian basinal succession of the Vászoly Formation, made up of ammonite- and brachiopod-rich limestone and dolomite beds and volcanic tuff layers (*Fig. 5a*). The upper Illyrian ammonite assemblages and their biostratigraphic interpretation of the bed by bed collected P–11/a shaft (coordinates: N46°55'44.63"; E17°47'04.72") and P–2 shaft (coordinates: N46°55'45.08"; E17°47'02.22") were published in details by VÖRÖS (1998, 2018). The upper part of the formation is represented by a light grey nodular limestone bed-set (Vászoly Limestone Member) punctuated by hard grounds with greenish dark grey phosphoritic coating (*Fig. 5b*). Based on the occurrence of *Falsanolcites rieberi* close to the P–11/a shaft (this study) this unit already belongs to the lower part of the Ladinian stage.

Upsection the Ladinian succession consists of nodular cherty limestones and laminated radiolarite of the Buchenstein Formation at the Öreg Hill (BUDAI et al. 2017). Only some ammonites were found in the pale red limestone in an artificial exposure on the southern side of the Öreg Hill: *Eoprotrachycears curionii* and *Protrachyceras* ? *steinmanni* (VÖRÖS 1998). *Arpadites szaboi* and *Eoprotrachyceras* ? *gredleri* were encountered in the blocks of stone piles along the vineyards. The studied ammonites are listed in *Table I*.

The uppermost part of the Buchenstein Formation in the Öreg Hill area is represented by few metres thick platy limestones (Keresztfatető Mb, BUDAI 1988, 1993; BUDAI & CSILLAG 1998; BUDAI et al. 1999b,) characterized by thin-shelled bivalves (*Posodonia, Halobia* and *Daonella* spp.) on the bedding-plane (*Fig. 5c*). This typical facies was already mentioned by BÖCKH (1872, p. 91), later by LÓCZY (1913, pp. 112–113 and p. 117) as "wengen posidonia shale" from Vászoly and from other sites of the Balaton Highland (Balatonudvari, Örvényes). KITTL (1912a plate I, III) reported the following bivalves from Vászoly, Balatonudvari and Örvényes: *Posidonia pannonica, Daonella böckhi, Daonella paucicostata, Daonella udvariensis*. LÓCZY (1913, p. 117) mentioned the following bivalves from the Örvényes valley: *Daonella lommeli, D. reticulata, D. pichleri, D.* n. sp. cf. *obliqua*. From Vászoly he mentioned *Arpadites toldyi* together with *Daonella sturi, D. böckhi, D. paucicosta* and *Enteropleura gümbeli* (LÓCZY 1913, p. 119).

The overlying bedded, nodular grey limestone of the Füred Formation contains gastropods, brachiopods and also ammonoids sporadically in the quarry of Nagy-vár Hill (*Dittmarites,* VÖRÖS 1998); it belongs already to the Carnian Stage.

Pécsely, Meggy Hill

The Meggy Hill is located in the Pécsely Basin in the central part of the Balaton Highland, about 1 km to the southeast of Pécsely (PM, Fig. 1b). The ridge of the E–W elongated hill is formed by well-bedded tabular limestone of the Füred Formation (BUDAI & CSILLAG 1998; BUDAI et al. 1999a). This was excavated in a quarry where the succession exhibits cyclic alternation of nodular limestone beds and marl interlayers. Based on ammonites (*Dittmarites* sp. aff. *rueppeli*) that were collected in the quarry (VÖRÖS 1998) and the bed by bed collected radioalrians and conondonts (DOSZTÁLY et al. 1989) the Füred Limestone was assigned to the lower Carnian.

The underlying Ladinian rocks can be traced only as debris in the vineyard on the southern hillside (coordinates: N46°56'36.95"; E17°48'13.28"). Below the thick lowermost beds of the Füred Limestone that forms the ridge of the Meggy Hill light grey calcareous marl with cm-sized nodular concretions was found in the scree (BUDAI & CSILLAG 1998). This may correspond with the so called "sóly marl" of LACZKÓ (1911) which he considered as a transitional unit between the Buchenstein Formation and the overlying Füred Limestone. Some

of the ammonoids that were mentioned from here by VÖRÖS (1998) belong to the upper Ladinian Regoledanus Zone (*Celtites* cf. *epolensis*) and some of them to the lower Carnian Aonoides Zone (*Trachyceras* cf. *brotheus*).

The Buchenstein Formation is represented by cherty limestones and siliceous tuffites in the scree and some ammonoids were also found (VÖRÖS 1998): *Protrachyceras* cf. *ladinum, Joannites* cf. *joannisaustriae*. LÓCZY (1913, pp. 116–117) also mentioned ammonites from this site: *Joannites* cf. in. aff. *deschmanni, Trachyceras longobardicum, Arpadites telleri, A. arpadis, Ptychites arthaberi*. The studied ammonites are listed in *Table I*.

Felsőörs, Forrás Hill

The Forrás Hill section at Felsőörs (FF, *Fig. 1b*) is one of the most famous, internationally known and widely referred geological locality of Hungary. The Middle Triassic series of the area has been in the focus of interest already since the beginning of the geological investigations of the Balaton Highland and classic works were published about the stratigraphy and ammonoids (ROTH 1871; BÖCKH 1972; STÜRZENBAUM 1875; MOJSISOVICS 1882; LÓCZY 1913). In the course of the key-section project of the Geological Institute of Hungary the section was revisited (SZABÓ et al. 1980; HAAS 1985; KOVÁCS et al. 1990). Interest of the section significantly increased during the 1990s in connection with the efforts of the STS working group to define the base of the Ladinian Stage. Accordingly, several papers were published on the new results of the biostratigraphic (DOSZTÁLY 1993; GÓCZÁN & ORAVECZ-SCHEFFER 1993; KOVÁCS 1993a,b; VÖRÖS 1993, 1998) and magnetostratigraphic investigations (MÁRTON et al. 1997) and sequence stratigraphic interpretations of the succession (BUDAI & HAAS 1997).

The oldest Triassic formation of the Forrás Hill is the lower Anisian Megyehegy Dolomite. Above a transitional bituminous dolomite unit it is overlain by bedded nodular cherty limestone of the middle Anisian Felsőörs Formation (VÖRÖS et al. 2003). Upsection it is followed by crinoidal brachiopod-bearing limestone ("recoaro limestone" of BÖCKH 1872). The upper part of the formation (*Fig. 6a*) is represented by bituminous limestone ("reifling limestone" of BÖCKH 1872) which contains a rich upper Illyrian ammonite-assemblage of the Trinodosus Zone (VÖRÖS 1993, 2018). It is overlain by volcanic tuff succession of the Vászoly Formation which contains siliceous limestone lenses and layers. Based on the bed by bed collected rich ammonite-assemblages it was assigned to the uppermost Illyrian Reitzi and Secedensis Zones (VÖRÖS 2018).

Before the official decision of the GSSP for the base of the Ladinian Stage (BRACK et al. 2005) the zonal marker ammonite had not been found in the Felsőörs section. Later, excavation of the basal layers of the bedded, nodular cherty limestone succession of the Buchenstein Formation (*Figs. 6b–c*, coordinates: N47°01'04.21"; E17°56'33.03") yielded some specimens of *Eoprotrachyceras curionii* (VÖRÖS et al. 2009). In the lower part of the Buchenstein Formation the limestone is light grey with brownish grey chert. Upsection, at the top of the Forrás Hill and on its northern slope the red nodular limestone beds contain dark red chert lenses. LÓCZY (1913, p. 109) mentioned the following ammonoids from the red "tridentinus" limestone of the Forrás Hill: *Protrachyceras pseudoarchelaus, Proarcestes subtridentinus, P. böckhi*. KITTL (1912a, p. 170) listed the following bivalves from the red "tridentinus limestone": *Daonella lommeli, D. reticulata, D. pichleri, D. indica, D.* cf. *hungarica*.

The overlying unit of the Buchenstein Formation is exposed north of the left tributary of the Malom Valley (*Fig. 6a,* upper part). The light grey well bedded nodular limestone is intercalated by grey marl with calcareous concretions (BUDAI 1991), that is similar to the so-called "sóly marl" of LACZKÓ (1911). Brachiopods rarely occur, thin chert lenses appear in the upper part. This unit represents the Berekhegy Member of the Füred

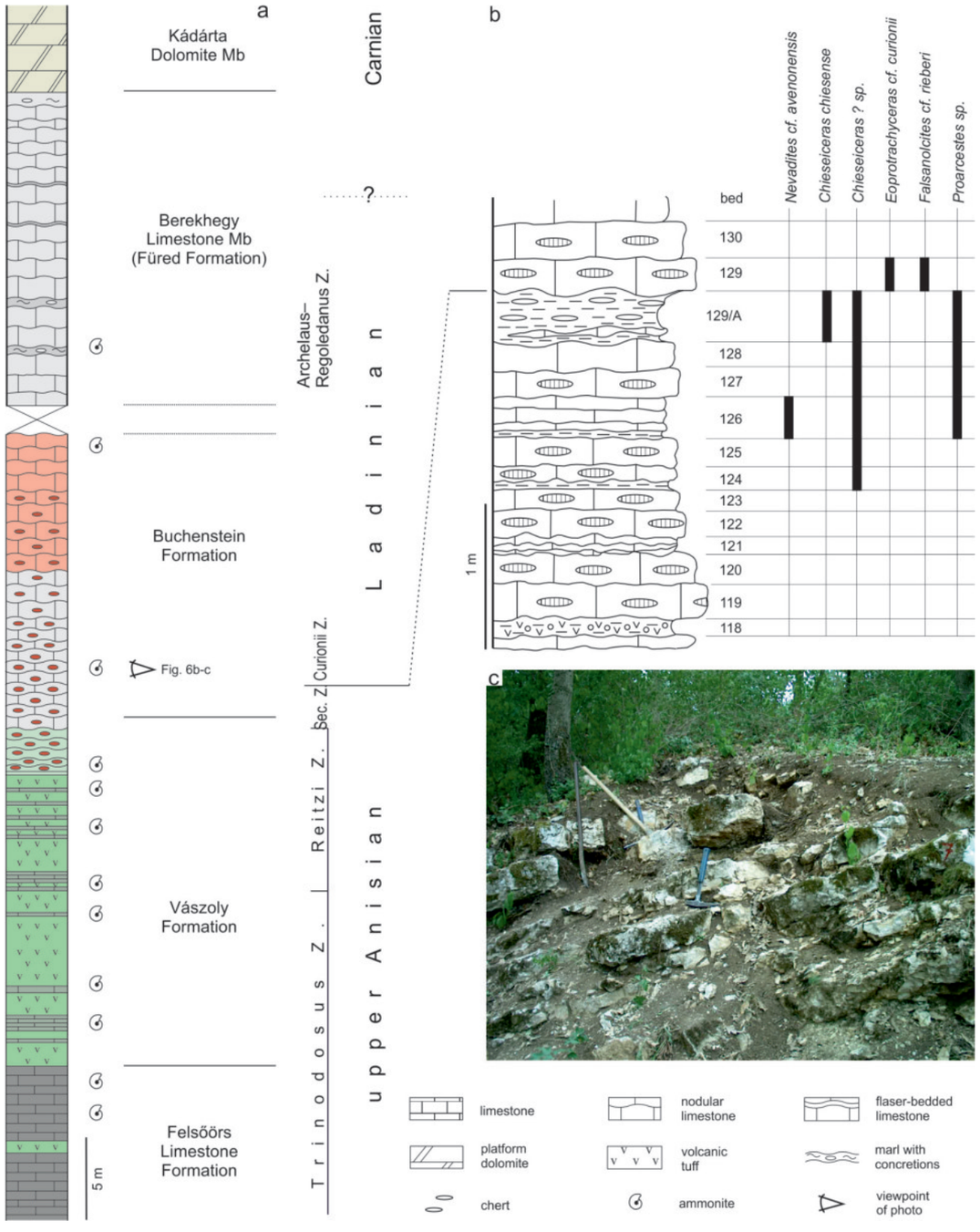


Figure 6. a) Stratigraphic column of the upper Anisian to lower Carnian succession along the Malom Valley at Felsőörs (after BUDAI et al. 2001a); b) detailed column of the transition between the Vászoly and Buchenstein Formations around the Anisian–Ladinian bondary at the Forrás Hill geological site (VÖRÖS 2018); c) exposure of the basal limestone beds of the Buchenstein Formation in 2004 with the first occurence of *Eoprotrachyceras curionii* (VÖRÖS et al. 2009).

Limestone Formation (BUDAI et al. 2001a). LÓCZY (1913, pp. 107–111, pp. 115–117) included this unit into the uppermost part of the "tridentinus limestone" from which he mentioned the following ammonoids: *Protrachyceras pseudoarchelaus, P. archelaus, P. ladinum, Anolcites richthofeni, A. doleriticum, A. stürzenbaumi, Celtites epolensis, Lecanites sibyllinus, Lobites bouéi, Proarcestes böckhi, P. subtridentinus, Joannites tridentinus, J.* cf. *trilabiatus*. Based on the joint presence of *Protrachyceras archelaus* and *Celtites epolensis* in the collected fauna, this unit belongs to the upper Ladinian, and partly to the lower Carnian due to the appearance of *Lobites* and *Lecanites* taxa. The studied ammonites are listed in Table I.

In the Malom Valley the Berekhegy Limestone (Füred Formation) is overlain by light grey, thin-bedded, in the lower part cellular and slightly siliceous dolomite (Kádárta Member, Gémhegy Dolomite Formation) that becomes thik-bedded upsection (BUDAI 1991).

Vörösberény, Megye Hill

The Megye Hill, north of Vörösberény (VM, *Fig. 1b*) is one of the classic sites of the Ladinian ammonoids of the Balaton Highland. The hilltop is formed by nodular cherty limestones of the Buchenstein Formation (BUDAI et al. 1999a). To characterize the Litér thrust BÖCKH (1872) compiled a geological profile across the range (p. 48). He collected the following ammonites in the red "tridentinus limestone" at the northeastern part of the hill (p. 88), referring to the publication of MOJSISOVICS (1870): *Arcestes subtridentinus, Arcestes pannonicus, Ammonites arpadis, Trachyceras baconicum, T.* cfr. *archelaus, Monophyllites wengensis*. The studied ammonites are listed in *Table I*.

The northern range of the Balaton Highland

In the hangingwall sheet of the northern range the Ladinian formations can be traced only in smaller isolated oucrops in the Kálla Basin (BUDAI et al. 1999a). The southwestern-most exposure is at Gyulakeszi (Gy, *Fig. 1b*) where the poorly exposed cherty limestone of the Buchenstein Formation contacts with Ladinian platform carbonates (NAGY et al. 2014). No ammonites were found, however, the conodonts constrain early Ladinain age.

The next site where outcrops of the Buchenstein Formation are known is at Szentbékkálla (Szk, *Fig. 1b;* BUDAI et al. 1999a). Northwest of the village, grey and red cherty limestone occurs in the scree of the vineyard between the Farkas Hill and the Kelemen-kő, where some *Proarcastes* specimens were found (VÖRÖS et al. 2015).

In the middle part of the northern range the Buchenstein Formation crops out in a syncline structure which can be traced along the Litér thrust from Balatonhenye to Szentjakabfa (BUDAI et al. 1999a); ammonites were not reported from here.

The northern slope of the Cser Hill at Mencshely (MCs, *Fig. 1b*) is the next site where Ladinian ammonites were found. This classic locality was well known primarily for its rich Anisian ammonite fauna and mentioned already by BÖCKH (1872) and LÓCZY (1913). Above the bed by bed collected upper Anisian succession (VÖRÖS 1998, 2018) *Proarcestes subtridentinus* occurred in the Buchenstein Limestone.

An isolated occurrence of the Buchenstein Formation also yielded some Ladinaian ammonites at the Akol Hill, north of Barnag (BA, *Fig. 1b*). Close to the bed by bed collected trench of the middle–upper Anisian "ammonitico rosso" in some small pits bedded siliceous cherty limestone was encountered, from where a poorly preserved *Protrachyceras* sp. was collected (VÖRÖS et al. 2022).

Nemesvámos–Veszprémfajsz

(Attila Vörös, Tamás Budai, Miklós Bercsényi & Zsolt Pintér)

In the northeastern part of the northern range the Buchenstein Formation is characterized by a highly diverse Ladinain ammonite assemblage. The red nodular limestone succession in the range of Som Hill–Gyűr Hill–Katrabóca–Király Hill at Nemesvámos and Veszprémfajsz (S, G, K and KH, *Fig. 1b*) yielded an unusually rich and excellently preserved ammonite fauna (VÖRÖS et al. 2024, 2025).

The oldest rock units exposed in this area belong to the lower Anisian carbonate ramp succession of the Balaton Highland (*Fig. 7a*). The dark grey, laminated bituminous limestone of the Iszkahegy Formation (iT2) at Veszprémfajsz is overlain by a relatively thin (some tens of metres), bituminous, bedded dolomite of the Megyehegy Formation (mT2) that caps the Kálvária Hill. The younger part of the Middle Triassic succession of the Veszprémfajsz–Nemesvámos area was penetrated by the Nemesvámos Nos–2 drilled core close to the Katrabóca fossil site (*Fig. 7b*). The middle to upper Anisian basin succession of the Felsőörs Formation (fT2) is made up of limestone and calcareous marl comprising bituminous laminated clayey limestone and dolomite in the lowermost part and silicified laminite in the uppermost part of the sequence. The overlying volcanic tuff

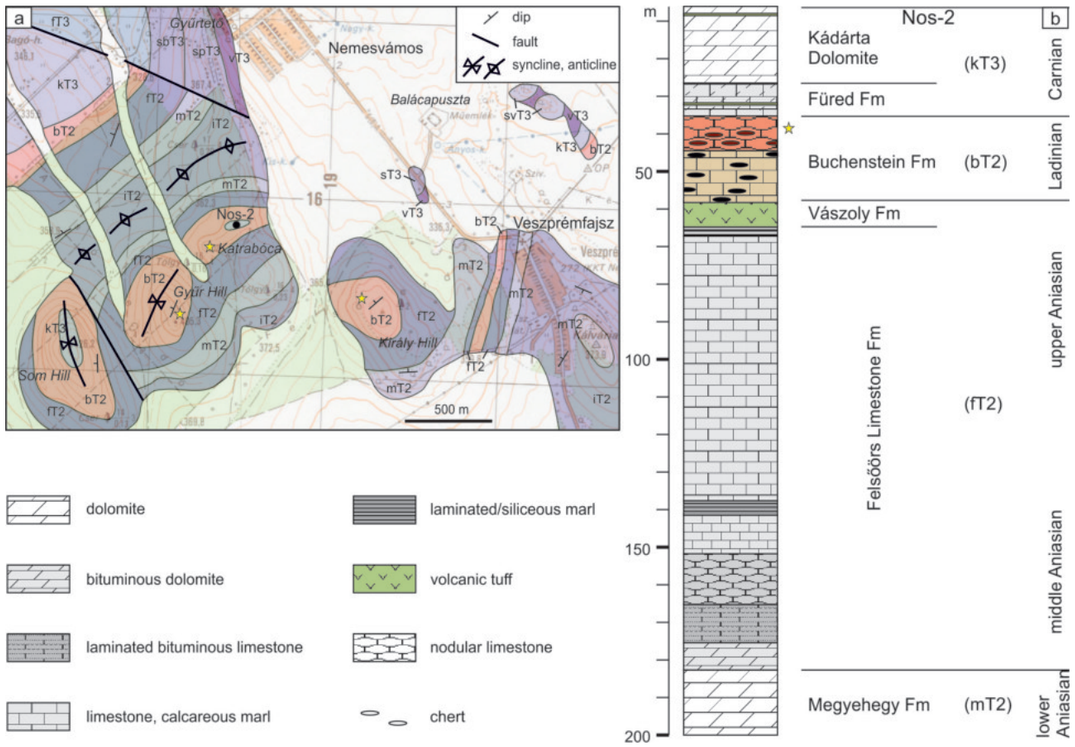


Figure 7. a) Geological map of the Nemesvámos–Veszrémfajsz area (after BUDAI et al. 1999a) showing the sites of the bed by bed collected outcrops (yellow asterisks); b) stratigraphic position of the ammonite-bearing Ladinian red limestone (yellow asterisk) in the column of the Nemesvámos Nos–2 drilled core (after VÖRÖS et al. 2024). Abbreviations of the Triassic formations: lower Anisian: iT2 – Iszkahegy Limestone Fm; mT2 – Megyhegy Dolomite Fm; middle–upper Anisian: fT2 – Felsőörs and Vászoly Fm; Ladinian: bT2 – Buchenstein Fm; Carnian: kT3 – Füred Fm and Kádárta Mb (Gémhegy Dolomite Fm); vT3 – Veszprém Fm; svT3 – Sédvölgy Mb (Gémhegy Dolomite Fm); sT3 – Sándorhegy Fm; spT3 – Pécsely Mb (Sándorhegy Fm); sbT3 – Barnag Mb (Sándorhegy Fm); fT3 – Fődolomit Fm

with siliceous limestone lenses of the uppermost Anisian Vászoly Formation is poorly exposed on the surface. The Ladinian Buchenstein Formation (bT2) comprises bedded, nodular, siliceous limestone with chert lenses. In the upper part of the formation the chert lenses disappear; the red limestone alternates with dark red thin marl layers. Thin intercalations of greenish volcanic tuff also occur, locally. At Katrabóca and on the top of the Som Hill (*Fig. 7a*) the overlying lower Carnian sequence is made up by light grey limestone (Füred Formation) and dolomite with cm-thick tuff layers (Gémhegy Formation, Kádárta Member, kT3).

The W–E oriented range that built up of Middle Triassic formations contacts with younger Carnian formations along a strike-slip fault at Nemesvámos, running from the NW to the SE (*Fig. 7a*). At Balácapuszta the Carnian basin succession (Veszprém Formation, vT3) is interbedded with various parts of the coeval platform dolomites (Kádárta and Sédvölgy Members of the Gémhegy Dolomite Formation). The Gyűrtető at the western part of Nemesvámos is formed by upper Carnian Sándorhegy Formation (sT3) and the overlying Fődolomit Formation (fT3).

Katrabóca (Nemesvámos)

The Gyűrtető at the western outskirts of Nemesvámos, more exactly its southern part called as “Katrabóca” (*Fig. 7a*), is one of the classic Ladinian fossil sites of the Balaton Highland. LACZKÓ (1911) gave a particularly detailed descripition on the geology and long lists of the regularly collected fossils derived from the Ladinian “tridentinus limestone”. Some of the ammonites collected by him were described by DIENER (1899, 1911) and by FRECH (1903, 1911), while the bivalves and the gastropods of the locality were also studied by BITTNER (1912) and KITTL (1912a,b).

Ammonites, DIENER (1911, pp. 12–15): *Arpadites cinensis, A.* cf. *arpadis, A.* cf. *toldyi, A.* cf. *szaboi, A.* cf. *telleri, Protrachyceras* cf. *ladinum, Protrachyceras* sp. ind., *Protrachyceras pseudoarchelaus, P.* cf. *archelaus, Anolcites laczkoi* n. sp., *Anolcites* cf. *richthofeni, Proarcestes subtridentinus, Proarcestes* cf. *boeckhi, Proarcestes* cf. *pannonicus, Gymnites ecki, Monophyllites wengensis, Celtites epolensis*. Ammonites, FRECH (1911, pp. 20–38): *Protrachyceras curionii* mut. var. *rubra; Trachyceras archelaus, Trachyceras archelaus* var. nov. *laevior, Protrachyceras pseudoarchelaus, Protrachyceras pseudoarchelaus* var. nov. *glabra, Protrachyceras ladinum, Protrachyceras neumayri, Protrachyceras longobardicum, Protrachyceras probasileus, Protrachyceras villanovae, Anolcites doleriticum, Anolcites richthofeni, Anolcites laczkoi, Balatonites* cf. *waageni, Arpadites arpadis* var. *carnica, Arpadites cinensis, Arpadites cinensis* var. *alta, A. toldyi, Celtites geometricus, Celtites* n. sp. aff. *laevidorsato, Gymnites moelleri, Gymnites breunneri* mut. nov. *baconica, Gymnites credneri, Gymnites ecki, Joannites tridentinus, Joannites* cf. *batolycus, Joannites* cf. *trilabiatus, Joannites deschmanni, Megaphyllites* cf. *oenipontanus, Monophyllites wengensis.*

Bivalves, BITTNER (1912, pp. 91–93): *Anodontophora subrecta, Myophoria* sp., *Pecten* ex. aff. *concentrice-striati, Pecten tridentini* n. sp., *Daonella lommeli, Posidonomya* sp. Bivalves, KITTL (1912a, p. 171): *Daonella lommeli, D.* juv., *Halobia* and *Daonella* n. sp. indet., *Posidonia* cf. *wengensis*.

Gastropods, KITTL (1912b, pp. 5–11): *Euryalox böckhi* n. sp., *Worthenia lóczyi* n. sp., *Worthenia vámosensis* n. sp., *Luciellina contracta* n. sp., *Luciellina striatissima, Turcicula katrabocensis* n. sp., *Naticella stratocostata, Hologyra* ? *progressa* n. sp., *Fedaiella* ? *somensis* n. sp., *Neritaria incisa* ?, *Neritaria bifasciata* ?, *Neritaria* ? *cassiana, Naticopsis* sp.

In 1995–96 bed by bed collection was performed in one of the abandoned quarries. The ammonoid fauna of the Katrabóca II section (coordinates: N47°02’22.0”, E17°52’17.5”) was published by VÖRÖS (1998). At the beginning of the 2020s a well-preserved rich cephalopod assemblage was collected from the upper part of the section (VÖRÖS et al. 2024). The composite column of the Katrabóca II summarizes the ammonite

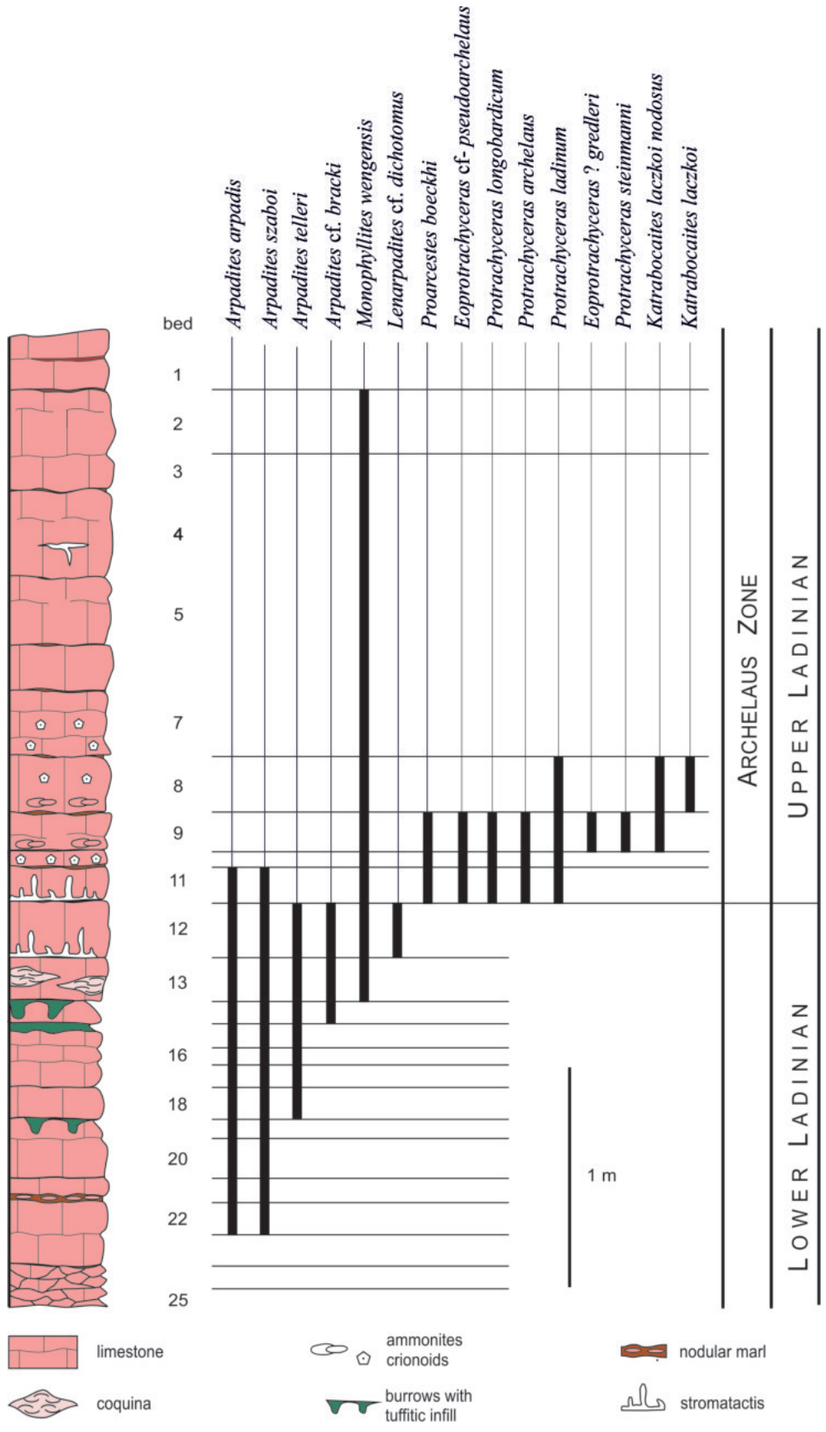


Figure 8. Stratigraphic column of the Katrabóca-II section with the range of the significant ammonite species (after VÖRÖS 1998, modified)

data of this two collecting campaigns (*Fig. 8*). The lowermost part of the lilac red limestone (Beds 24–25) contains only some *Proarcestes* specimens. Upsection more and more species of the *Arpadites* genus appear (Beds 19–22). In the sporadically crinoidal micritic limestone of Beds 14 and 15 the burrows are filled with greenish volcanic tuff. In Bed 13 lenses of gastropod–bivalve coquina with sparry calcite cement were encountered (*Fig. 9*). The next beds (10–12) are characterized by mass occurrence of *Arpadites* specimens in

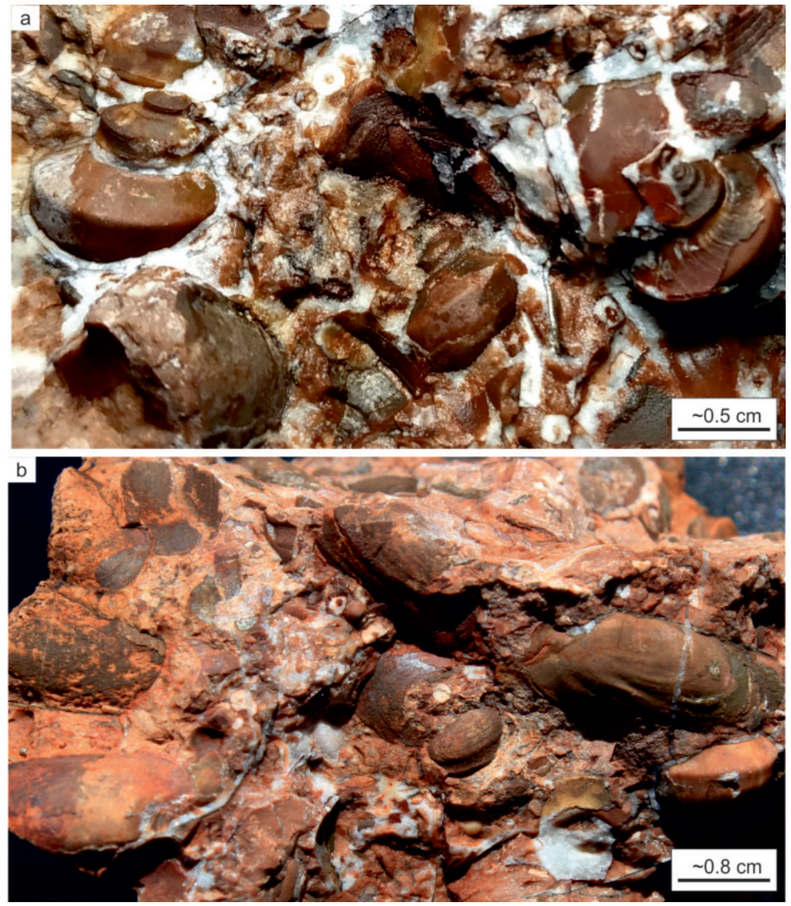


Figure 9. Coquina of Katrabóca II section (Bed 13) containing 5–10 mm sized gastropods (a) and 25 mm sized bivalves (b). Crinoid ossicles are also common (VÖRÖS et al. 2024).

a chaotic arrangement, with the presence of numerous species of the genus. Above a ferro-manganese crust occurs the most remarkable layer of the locality (Bed 9). The lower horizon of this layer yielded the richest ammonoid assemblage of the section. The brownish-red, pure micritic limestone enclosed a great number of well-preserved, ferro-manganese encrusted ammonoids, lying sub-parallel with the bedding. There is a change in the composition of the fauna: the predominant Arpaditinae are substituted by large Protrachyceratinae, and globose Arcestidae. Higher up the micritic limestone beds do not contain any noteworthy ammonoids, except *Monophyllites wengensis*.

Based also on the recent investigations the following cumulate list can be given for the colleted ammonite taxa (VÖRÖS 1998; VÖRÖS et al. 2024, supplemented): *Megaphyllites obolus, Epigymnites* cf. *ecki, Epigymnites* cf. *credneri, Epigymnites* cf. *moelleri, Epigymnites* sp., *Proarcestes subtridentinus, Proarcestes boeckhi, Proarcestes pannonicus, Joannites tridentinus, Eoprotrachyceras archelaus, Protrachyceras* sp., aff. *archelaus, Protrachyceras* sp., aff. *gredleri, Protrachyceras* cf. *margaritosum, Protrachyceras longobardicum, Protrachyceras steinmanni, Protrachyceras ladinum, Arpadites arpadis, Arpadites szaboi, Arpadites telleri, Arpadites cinensis, Arpadites* cf. *bracki, Arpadites* cf. *dichotomus, Anolcites* sp., aff. *recubariensis, Katrabocaites laczkoi, Katrabocaites* sp., aff. *laczkoi, Katrabocaites miettoi, Monophyllites wengensis, Aplococeras* ? *probasileus, Argolites geometricus, Falsanolcites* cf. *gortanii*. The studied ammonites are listed in *Table I*.

In the repository of the Geological Survey the following ammonites were identified: *Aplococeras* ? *probasileus* (FRECH, 1903), *Argolites geometricus* (FRECH, 1903), *Protrachyceras* cf. *laevior* (FRECH, 1903).

Király Hill (Veszprémfajsz)

The Király Hill is located between Veszprémfajsz and Katrabóca (*Fig. 7a*). As it was out of his study area, LACZKÓ (1911) did not pay attention to the "Hegyesgyűr" (as the hill was named on his geological map), however, LÓCZY's (1920) map represents its geology with high accuracy.

The top of the Király Hill is made up of bedded nodular cherty limestone of the Buchenstein Formation, which dips 30 degrees to the NW. The fossiliferous red limestone, representing the upper part of the formation is exposed by several small pits in the northern part of the hill (collecting sites 1–7), positioned some tens of metres form each other along strike (VÖRÖS et al. 2025).

For bed by bed collections a trench was excavated and sampled in 2024–25 near the top of the hill (collecting site 6, coordinates: 47.035619°, 17.883978°), the total thickness of the succession is about 1.8 m (*Fig. 10*). The red limestone in the lower part of the trench is well bedded (Beds 12–8), and is overlain by some thicker beds in the middle part (Beds 7–6). The upper part of the succession comprises by thin bedded micritic limestone (Beds 4–1) with thin marl intercalations. The most abundant ammonite assemblage of the succession was collected from a coquina layer (Bed 5) which contains crinoid fragments, bivalves, gastropods and orthocone cephalopods. Beds 4 and 10 also contain well preserved ammonoids in a relative great number.

Cumulate list of the ammonoid taxa of the colleting sites at the Király Hill (after VÖRÖS et al. 2025, supplemented): *Megaphyllites obolus, Epigymnites* cf. *credneri, Epigymnites* cf. *moelleri, Proarcestes subtridentinus, Proarcestes boeckhi, Arpadites arpadis, Arpadites szaboi, Arpadites toldyi, Arpadites teller, Arpadites* cf. *bracki, Arpadites bercsenyii, Arpadites* ? *manzonii, Lenarpadites cinensis, Lenarpadites* cf. *dichotomus, Stenarpadites manzonii, Stenarpadites dimanzonii, Stenarpadites pinteri, Argolites arpaditoides, Argolites geometricus, Argolites ventisettembris, Argolites trinodosus, Argolites nodosus, Pinterites laricus, Bercsenyiites montisregis, Bercsenyiites egregius, Alkaites* ? sp., *Paranolcites budaii, Eoprotrachyceras* cf. *pseudoarchelaus, Protrachyceras archelaus, Protrachyceras* sp., aff. *archelaus (-acutarchelaus), Protrachyceras ladinum, Protrachyceras longobardicum, Protrachyceras* cf. *margaritosum, Protrachyceras* cf. *gredleri, Protrachyceras* sp. aff. *gredleri, Protrachyceras steinmanni, Protrachyceras* cf. *laevior, Protrachyceras irregulare, Katrabocaites laczkoi, Katrabocaites laczkoi morphotype nodosus, Katrabocaites miettoi, Katrabocaites manfrini, Monophyllites wengensis, Meginoceras* ? sp. The studied ammonites are listed in *Table I*.

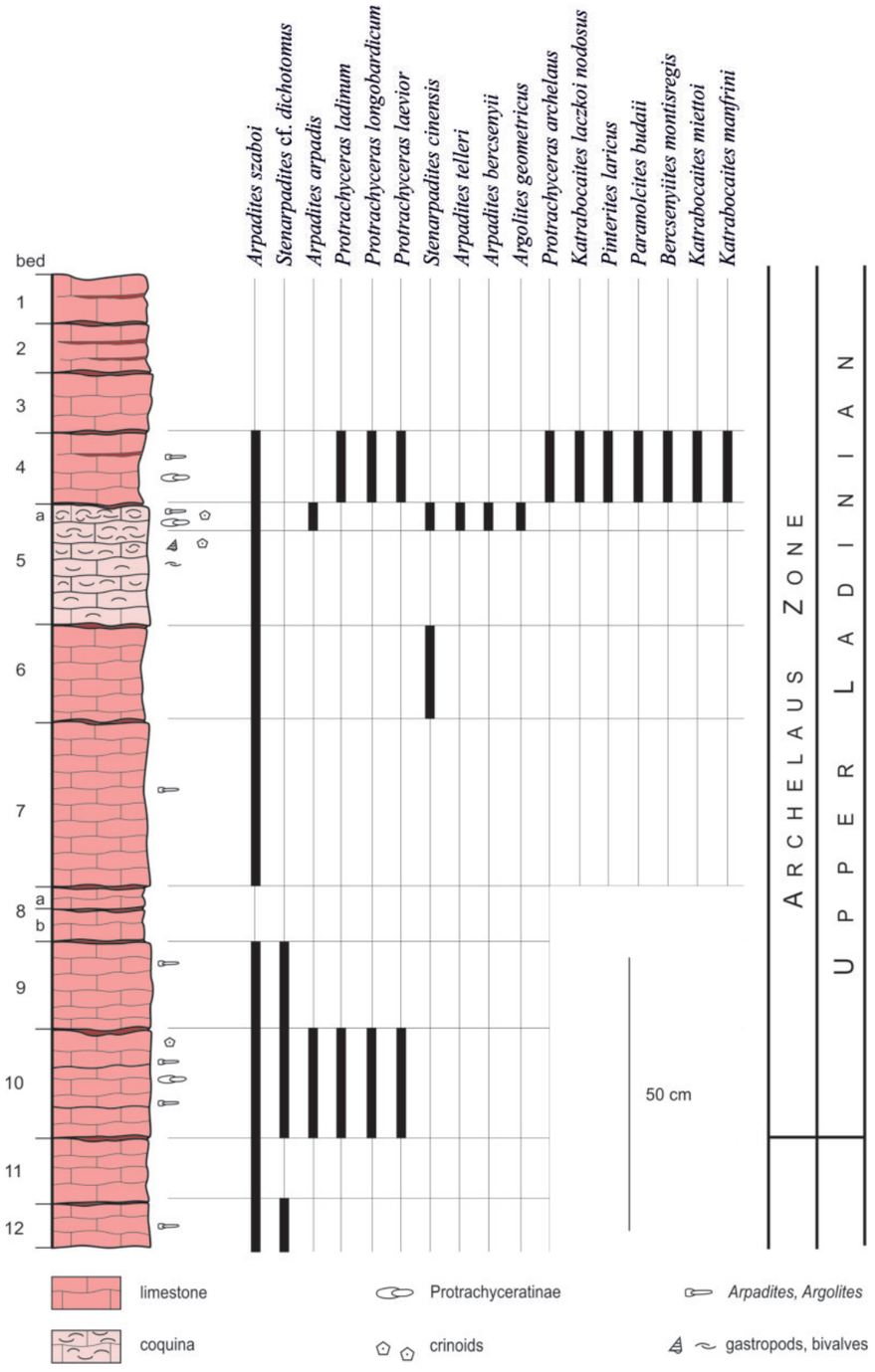


Figure 10. Stratigraphic column of the upper part of the Buchenstein Limestone in the trench on the Király Hill (collecting site 6) with the ranges of the ammonoid taxa (after VÖRÖS et al. 2025, modified)

Gyűr Hill (Nemesvámos)

The Gyűr Hill forms the central part of the Middle Triassic range southwest of Nemesvámos (*Fig. 7a*). The hill is made up of pale red nodular limestone with red chert nodules of the Buchenstein Formation; it is exposed by small abandoned quarry pits on the hillside. The bed thickness of the overlying red limestone at the eastern edge of the hilltop is between 20–70 centimetres (coordinates: N47°02'06.9"; E17°52'08.2"), which dips 20 degrees to the WNW (*Fig. 11a,* collecting site 1). From here the following ammonites were collected recently: *Arpadites arpadis, A. telleri, A. toldyi, Lenarpadites cinensis, Protrachyceras longobardicum, Bercsenyiites montisregis, Epigymnites* cf. *ecki, Proarcestes subtridentinus*. Some metres above (collecting site 2) a *Bosnites* ? sp. was found, while the overlying bed (collecting site 3) yielded *Arpadites, Protrachyceras* and *Proarcestes* fragments (coordinates: 47.035162, 17.868704). Mollusc coquina, similar to that of the Katrabóca site appears on the hilltop, containing gastropods, bivalves and small Arpaditids (*Fig. 11b*). Crinoid fragments of cm-size and lithoclasts also occur. Above it a large *Protrachyceras* was collected (collecting site 4). The studied ammonites are listed in *Table I*.

Som Hill (Nemesvámos)

The Som Hill repesents the westernmost part of the Triassic range at Nemesvámos (*Fig. 7a*). The hill is made up of a bedded nodular limestone succession of the Buchenstein Formation, cropping out on the relatively steep eastern slope. The westward dipping limestone beds are rich in dark red chert. Upsection it is followed by red limestone in the scree from which a small *Protrachyceras* and some *Arpadites szaboi* fragments were found recently (coordinates: 47°02'00.7"N 17°51'45.6"E). The top of the hill is capped by light grey, thin-bedded limestone (Berekhegy Member of the Füred Limestone Formation). Light brown chert subordinately occurs as small nodules or thin layers. Some layers comprise of sorted biocalcarenite. *Daonella* shells were found at the top of the hill. The uppermost part of the succession consists of light grey dolomite (Kádárta Member of the Gémhegy Dolomite Formation).

DIENER (1911, pp. 15–16.) listed the following ammonites from the Som Hill: *Celtites* cf. *epolensis, Arpadites* cf. *arpadis, A. (Dittmarites) loczyi* n. sp., *Protrachyceras* cf. *ladium, P. archelaus, Joannites* div. sp. FRECH (1911, pp. 26–37) furthermore mentioned the following species from here: *Protrachyceras pseudoarchelaus, Anolcites richthofeni, Celtites geometricus, Celtites* n. sp. aff. *laevidorsatus, Joannites batolycus, J. deschmanni*.

In the repository of the Geological Survey the following ammonites were identified: *Celtites* cf. *epolensis, Asklepioceras loczyi* (Diener, 1899) = *A. (Dittmarites) loczyi*. The studied ammonites are listed in *Table I*.

Cserhalompuszta (Szentkirályszabadja)

Northwest of Szentkirályszabadja, the area of the once-existing Cserhalompuszta (Cs, *Fig. 1b*) is the northeastern-most occurence of the basin facies of the middle–upper Anisian Felsőörs Limestone in the northern range of the Balaton Highland (BUDAI et al. 1999a). Besides the grey clayey limestones of the formation the "recoaro type" limestone is also represented here from which LACZKÓ (1911, pp. 68–69.) mentioned a long list of brachiopod species. At the time of Laczkó's mapping activity a small quarry was opened for mining the "tridentinus limestone" in 1907. According to LÓCZY (1913, p. 96, Fig. 64, pp. 111–112) the light grey or reddish cherty limestone beds alternate with greenish volcanic tuff intercalations. LACZKÓ (1911, p. 69) mentioned the following ammonites from this succession: *Trachyceras ladinum, Monophyllites wengensis, Arpadites arpadis, A. szaboi, A. telleri, Celtites epolensis, Arcestes subtridentinus, A.* cf. *pannonicus*. The studied ammonites are listed in *Table I*.

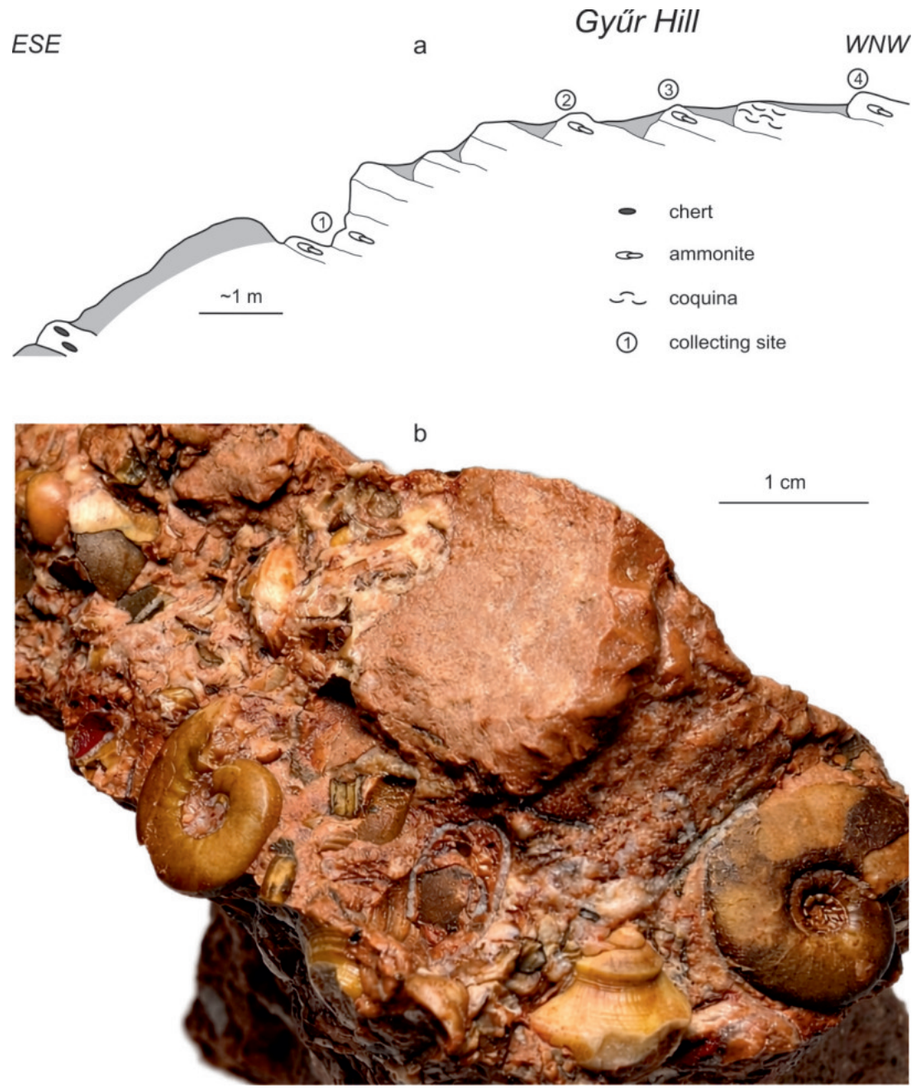


Figure 11. a) Sketchy profile of the Gyűr Hill showing the position of the collecting sites, mentioned in the text; b) slab of the coquina from the hilltop with ammonites, gastropods, together with bivalve and crinoid fragments. The diameter of the juvenile specimen of *Stenarpadites cinensis* on the right is 1.5 cm.

Kádárta

The Middle Triassic formations of Kádárta (Kd, *Fig. 1b*) has been known since the geological mapping of BÖCKH who mentioned the following ammonites here from the "tridentinus limestone" (1872, p. 124): *Arcestes tridentinus, Amm. arpadis, Phylloceras böckhi*. Later LACZKÓ (1911, pp. 65–67) gave a detailed description of the Ladinian beds of the area and mentioned the following fossils: *Daonella lommeli, D. obliqua, Pleuromya musculoides, Myoconcha gregaria, Worthenia* sp., *Neritaria* sp., *Arpadites arpadis, Proarcestes subtridentinus, Monophyllites wengensis*. In the frame of the geological mapping of the Bakony DETRE et al. (1979) published

the profile of an artificial trench in the village exposing the "pietra verde" and the overlying nodular limestones with chert leneses and greenish or reddish weathered volcanic tuff intercalations. Their ammonite collection comprises the following ammonites: *Protrachyceras archelaus, Proarcestes subtridentinus*.

At the end of the 1980's an *Eoprotrachyceras curionii* was collected by A. Vörös and M. Balini in an artificial pit at the western part of Kádárta (VÖRÖS 1998). In the present revision it is identified as *Eoprotrachyceras pseudoarchelaus* (BÖCKH 1872). The studied ammonites are listed in *Table I*.

Kádárta, quarry

A large active quarry occurs south of Kádárta (Kq, *Fig. 1b*), between the village and highway 8. Until the 2010s, the quarry area was small, exposing Upper Triassic dolomites (PEREGI & RAINCSÁK 1980, 1983). Later on the quarry expanded southward, providing an excellent exposure for the study of the Middle Triassic succession, as well (*Fig. 12a*). The middle Anisian to Ladinian formations of the NE-yard (coordinates: 47°6'32.07" N, 17°57'50.44" E) were sampled in 2017–19 for carbonate sedimentological, isotope geochemistrical and micropaleontological investigations (*Fig. 12b*). Comprehensive studies were published, concerning litho- and biostratigraphy, U–Pb geochronology and palaeoecology, supplemented by stratigraphic and palaeogeographic correlation with other areas of the Balaton Highland and with different sections of the Southern Alps and the Dinarides (KARÁDI et al. 2022; BUDAI et al. 2024). Dolomitization patterns of the platform carbonates were also studied (HAAS et al. 2021). Later this part of the quarry-yard was completely destroyed by the mining.

Along the wall of the NE-yard (lower part of *Fig. 12b*) the middle Anisian cyclic platform carbonate of the Tagyon Formation was unconformably overlain along a sharp contact by the upper Illyrian tuffitic basinal carbonate of the Vászoly Formation (KARÁDI et al. 2022). At this site we did not have any ammonites from the tuffitic succession but in the S-yard of the quarry a well preseved *Parahungarites arthaberi* was found by Emőke Tóth from the formation (*Fig. 13*). Upsection a wedge of thick-bedded matrix-supported dolomite breccia unit followed (*Fig. 12b*), in its lower part an ammonite mould could be classified as *Falsanolcites* cf. *gervasuttii*. Based on conodont data of the NE-yard the Buchenstein Formation represents the Longobardian substage (KARÁDI et al. 2022).

The Buchenstein Formation is exposed also in a continuous profile (named as E-yard on *Fig. 12a*, column is shown on the upper part of the column *Fig. 12b*), close to the published profile of the NE-yard (coordinates: N17.10816°, E17.96344°). Here the interwedging Budaörs Dolomite is overlain by the lower 1–1.5 metres thick part of the Buchenstein Formation that is made by nodular limestone beds with red marl interlayers (*Fig. 14*). It is followed upsection by a cyclic alternation of light grey nodular siliceous limestone beds and greenish grey (tuffitic) marl interlayers. From this part of the formation the following ammonites were found in the scree: *Protrachyceras archelaus, Paranolcites ozsvarti*. Upsection the bedding planes of the limestone beds are characterized by small nodules and bioturbation structures. *Daonella* shells often occur. It is transitionally overlain by the even bedded dolomitized limestone beds of the Berekhegy Member alternating with marl interlayers (*Fig. 12b*).

The SW-yard of the quarry also exposed the Buchenstein Formation (coordinates: N47°06'19.67"; E17°57'41.78"). From the nodular limestone with tuffitic marl intercalations the following ammonites were collected by Z. Batka, M. Bercsényi and Zs. Pintér: *Protrachyceras archelaus, Protrachyceras ladinum,*

Falsanolcites furcosus, Falsanolcites sp., *Paranolcites kadartaensis*. Upsection, in the scree of the Berekhegy Limestone a *Celtites epolensis* was found.

BÖCKH (1872, p. 123) collected the following ammonites from the "tridentinus limestone" at Gelemér csárda, SSE of Kádárta: *Arcestes Tridentinus, Ammonites Arpadis, A.* nov. sp. indet, *Trachyceras* sp. (fragment), *Phylloceras Böckhi*. According to the comparison of the recent topography with the geological maps of LACZKÓ (1911) and LÓCZY (1920) the location of the earlier Gelemérpuszta could have been along highway 8,

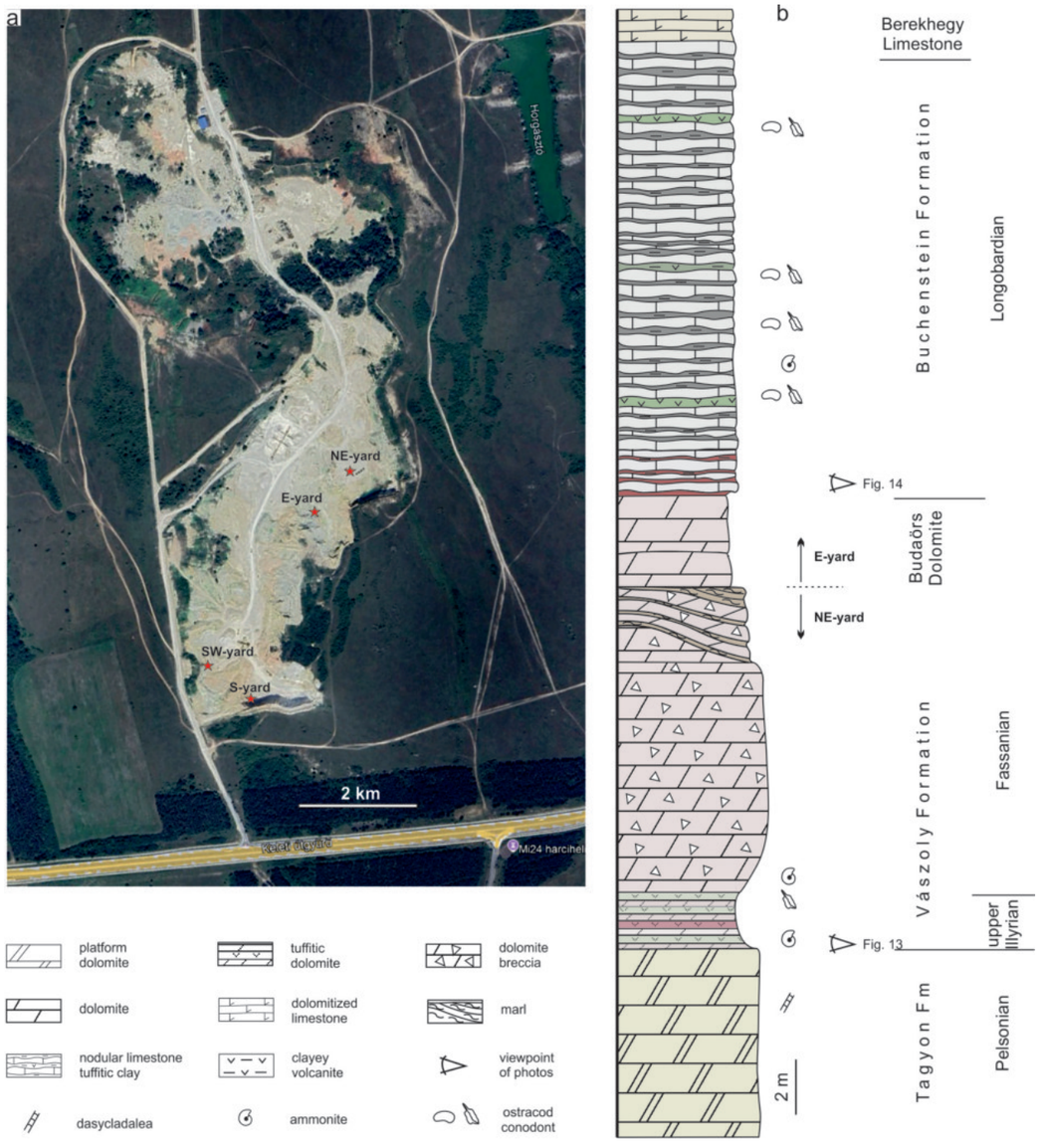


Figure 12. a) Google Earth airborne photo of the Kádárta quarry in 2025, showing the position of the studied profiles (asterisks); b) Composite stratigraphic column of the the Kádárta quarry. The lower part of the column shows the profile of the NE-yard (after KARÁDI et al. 2022) while the upper part of the column was constructed based on the profile of the E-yard.



Figure 13. Sharp unconformity contact (yellow dashed line) between the cyclic platform carbonate rocks of the middle Anisian Tagyon Formation (below) and the overlying lilac-reddish, yellowish, greenish tuffitic basin carbonate succession of the upper Illyrian Vászoly Formation (Kádárta quarry, S-yard). In the scree a *Parahungarites arthaberi* was found referring to the upper part of the Reitzi Zone.

close to the Kádárta quarry (somwhere around the current military helicopter monument, *Fig. 12a*). Lóczy's map depicts Ladinian formations at the area of the current quarry, while LACZKÓ (1911, p. 65) briefly described them along the road leading to Kádárta. Böckh's ammonites that can be found in the repository of the Hungarian Geological Institute may have come from these layers: *Proarcestes subtridentinus, Arpadites arpadis*. The studied ammonites are listed in *Table I*.

Litér quarry

The quarry can be found northwest of Litér, close to highway 8 (Lq, *Fig. 1b*). The Middle to Upper Triassic succession of the western part of the quarry was studied in the second part of the 1990s; the results of investigations were published in several papers (VÖRÖS 1998; BUDAI et al. 2001a; PÁLFY et al. 2003; BUDAI & VÖRÖS 2006; MONOSTORI & TÓTH 2013).

The succession exposed in the Litér quarry is similar to that of the Kádárta quarry. In the southern quarry yard (coordinates: N47°06'48.69"; E17°59'19.17") the dolomitized middle Anisian Tagyon Formation is overlain

by the volcanic tuff bearing carbonate sequence of the basinal Vászoly Formation which contains a 10 m thick bedded dolomite intercalation of the Budaörs Dolomite (*Fig. 15a*). The overlying Buchenstein Formation is made up by bedded nodular siliceous limestone alternating with greenish grey marl interlayers (*Fig 15b*). In these layers only some Arcestes speciemens were found, however, the radiolarian and ostracode microfauna was rich and the later was excellently preserved (BUDAI et al. 2001a, MONOSTORI & TÓTH 2013). The upper part of the Buchenstein Formation was characterized by nodular, bioturbated marly limestone with marl intercalations (*Fig. 15c*) where a *Protrachyceras gredleri* was found (VÖRÖS 1998). In the present revision this specimen is identified as *Protrachyceras archelaus*. Upsection, dolomitized limestone beds alternated with marl interlayers of the Berekhegy Member, in the scree of which a large specimen of *Protrachyceras ladinum* was collected by J. Haas (VÖRÖS 1998) and a *Frankites apertus* specimen was found by I. Szabó.

On the southern wall of the quarry there was a near vertical and upward widening dyke in the Tagyon Formation (*Fig. 15a*) filled by greenish weathered volcanic tuffs and dolomite clasts (BUDAI et al. 2001a;



Figure 14. View of the profile of the E-yard, Kádárta quarry. The lower part of the succession is made of poorly bedded dolomite (wedge of the Budaörs Fm), overlain by the lowermost bed-set of the nodular Buchenstein Limestone that cyclically alternates with reddish marl interlayers. In the upper part of the formation the colour of the marl change for greenish grey.

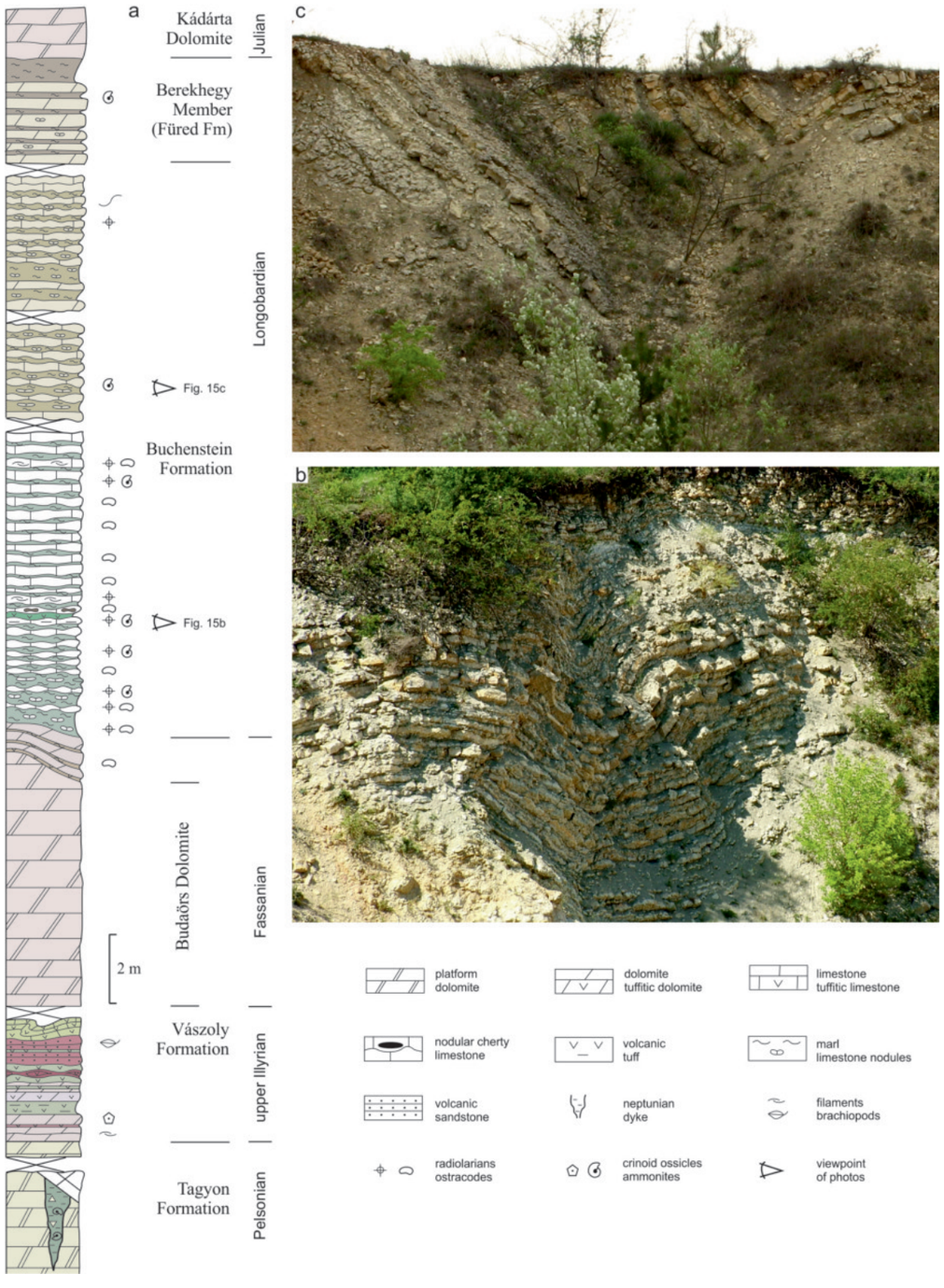


Figure 15. a) Stratigraphic column of the Litér quarry (after Budai et al. 2001a, Budai & Vörös 2006); b) nodular limestone beds alternate with tuffitic marl in the lower part of the Buchenstein Fm; c) slightly folded marly nodular limestone in the upper part of the Buchenstein Formation

Budai & Vörös 2006). From here the following quite large amount but poorly preserved ammonites were collected (Vörös 1998): *Eoprotrachyceras pseudoarchelaus, Protrachyceras archelaus, P. longobardicum, Arpadites arpadis, Proarcestes subtridentinus, Joannites* sp. The studied ammonites are listed in *Table I*.

Hajmáskér–Sóly

The Hajmáskér–Sóly area (HB, *Fig. 1b*) was already studied by Böckh (1872), and later Laczkó (1911) who gave a very much detailed description of the stratigraphy and the tectonic conditions. In the lower part of the "tridentinus limestone" he found a light grey bivalve coquina at the Tó Hill southeast of Hajmáskér (Laczkó 1911, p. 49). From the almost monospecific assemblage Bittner (1901, 1912, pp. 90–91) mentioned *Myoconcha gregaria* and *Avicula insolita* in rock-forming amount. From the upper part of the "tridentinus limestone" Laczkó mentioned *Proarcestes subtridentinus* and *Celtites epolensis* at this site. He classified the overlying light grey nodular marly limestone at the northern part of the Őr Hill as "berekhegy limestone" that contains brachiopods and bivalves (*Spirigerina wissmanni, Daonella cassiana, Gonodus* sp. ind. ex aff. *laticostata*). Between this two units he described (pp. 60–61) a light grey marl under the name "sóly marl", characterized with a typical texture of small calcareous nodules and fossil assemblage: *Rynchonella linguligera, Thecospira* cf. *arenosa, Halobia rugosa, Mysidioptera* cf. *vixcostata, Orthoceras* cf. *campanile, Trachyceras hoffmanni, Joannites* cf. *cymbiformis, Proarcestes* cf. *ausseanus, Arcestes bicarinatus, Lobites* cf. *ellipticus*.

In the frame of the geological mapping program of the Bakony Mountains the middle Anisian to lower Carnian succession of the Berek Hill was penetrated by the Hajmáskér Hmt–3 drilled core (*Fig. 16a*). The crinoidal limestone of the Vászoly Formation, that overlies the Pelsonian Tagyon Formation with a sharp contact contained a quite rich upper Illyrian ammonite assemblage of the Avisianum Subzone of the Reitzi Zone (Vörös 1998, 2018). The upsection following sequence was exposed also in the road-cuts along highway 8, where the well-beddded platform carbonate wedge of the Budaörs Dolomite was overlain by tuffs and nodular limestones of the Ladinian Buchenstein Formation (*Fig. 16b*). Ammonites were found generally as internal casts (Budai et al. 2001a): *Eoprotrachyceras* ? *steinmanni, Eoprotrachyceras* ? cf. *pseudoarchelaus, Protrachyceras* cf. *laczkoi, Detoniceras* sp. Unfortunately, after the widening constructions of the highway all of the road-cuts were covered. The studied ammonites are listed in *Table I*.

The uppermost part of the Ladinian is exposed in a small quarry (*Fig. 16c*) north of the highway, close to the junction of the road leads to Hajmáskér (Szabó 1990; Budai et al. 2001a, Budai & Vörös 2006). This site (coordinates: N47°08'07.56"; E18°01'07.20") is the key section of the Berekhegy Limestone Member (Füred Formation), between the Buchenstein Formation (below) and the lower Carnian Kádárta Dolomite (above). The lower 3 m part of the succession comprises light grey thin-bedded limestone whereas in the upper 3 m thick interval the beds become thicker and dolomitized. The limestone interval is made up by 10–15 cm thick layers which are separated by uneven erosional bedding surfaces. Normal grading is typical within the strata; the basal part of the beds contain cm-sized lithoclasts and the grain-size gradually decreases upward (Budai & Haas 1997; Haas et al. 2000, 2014). Bioturbation structures are common on the bedding-planes. Besides some large *Protrachyceras ladinum,* poorly preserved specimens of *Celtites epolensis* were found (Vörös 1998). The studied ammonites are listed in *Table I*.

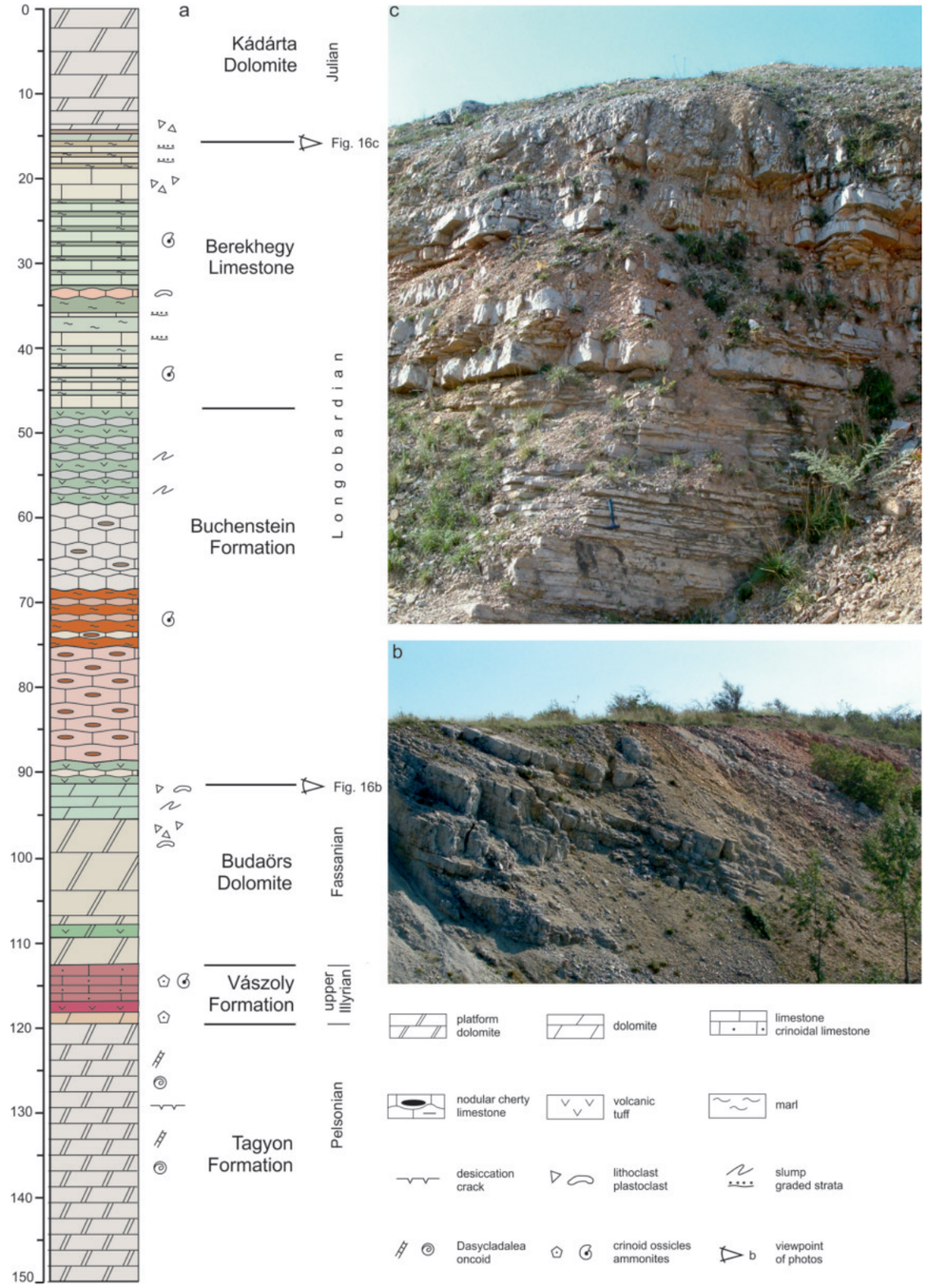


Figure 16. a) Stratigraphic column of the Hajmáskér Hmt-3 drilled core (BUDAI 2006); b) Budaörs Dolomite wedge overlain by volcanic tuff and nodular limestones of the Buchenstein Formation: panoramic view of the road-cut along the southern side of highway 8 at the Berek Hill; c) limestone–marl cyclic succession of the Berekhegy Limestone (below) and the overlying Kádárta Dolomite in the Berekhegy quarry (b–c photos from BUDAI 2006)

Öskü

The northeastern-most exposures of the Ladinian Buchenstein Formation of the Balaton Highland can be found in the surroundings of Öskü (Ö, *Fig. 1b*). In the road-cut along the southern side of the highway 8 (coordinates: N47°09'36.29"; E18°04'52.51") red and light grey or pale reddish, nodular bedded limestone was exposed, in the latter with greenish grey nodular marl intercalations (*Fig. 17*). These beds yielded the following lower Ladinian ammonites (VÖRÖS 1998; BUDAI et al. 2001a): *Eoprotrachyceras* cf. *curionii, E.* cf. *recubariense* (now *Falsanolcites gortanii*) and *E.* cf. *rieberi* (now *Falsanolcites rieberi*). From the light grey bedded slightly dolomitized limetsone (Vászoly Fm) on the northern side of the highway (coordinates: N47°09'15.51"; E18°04'37.74") an *Eoprotrachyceras* (now *Falsanolcites*) *gervasuttii* was collected (VÖRÖS 1998). The studied ammonites are listed in *Table I*.



Figure 17. Lower Ladinian bedded nodular limestone with marl interbeds along the southern raod-cut of hihgway 8 at Öskü (BUDAI 2006)

Evolution of palaeoenvironments

Tamás Budai & Attila Vörös

Based on basin analysis, the Anisian evolution of the sedimentary environments in the area of the Balaton Highland was discussed and evaluated in several publications (Budai & Vörös 1992, 1993; Budai et al. 1993; Haas & Budai 1995; Budai & Haas 1997; Vörös et al. 1997; Budai et al. 1999b; Budai & Vörös 2006; Budai et al. 2001a,b, 2017, 2024; Haas et al. 2012; Karádi et al. 2022). Efforts were also done to give palaeoenvironmental interpretation of various fossil groups, i.e. ammonites (Vörös 1996, 2002, 2010), bivalves (Vörös & Szente, in Vörös et al. 2003), brachiopods (Pálfy 1986, 1991, 1992, 1994) and ostracodes (Monostori 1991, 1995; Monostori & Tóth 2013). In this chapter, after a brief summury of the Anisian evolution of the studied region, we characterize the different Ladinian palaeoenvironments and their changes through time.

The uniform early Anisian carbonate ramp (Budai et al. 1993) became dissected in the Pelsonian by normal faults due to extensional tectonics (Budai & Vörös 1992, 1993), in connection with the westward opening of the Neotethys ocean (*Fig. 18*). As a result, halfgraben type hemipelagic basins were opened above the downfaulted blocks (Felsőörs Fm), meanwhile isolated platforms (Tagyon Fm) started to develop in the areas remained in uplifted position (Budai & Vörös 2006). This process could be reconstructed based on lateral changes of the coeval platform and basin lithofacies and also by the presence of diagnostic sediments and sedimentary structures e.g. platform slope breccias, neptunian dykes (Budai & Haas 1997; Vörös et al. 1997).

The characteristic sharp vertical contact (i.e. unconformity surface) between the Pelsonian platform carbonates (Tagyon Fm) and the overlying Illyrian tuffitic basin deposits (Vászoly Fm) indicates the drowning of the platforms, porobably due to a rapid sea-level rise accompanied by deposition of airborn ash of contenporaneous volcanic activity. As a result, submarine highs were formed, which may have been suitable habitat of a highly diverse ammonite assemblage (Vörös 2018) and, at some places by special biota, e.g. giant ostracodes (Monostori 1991) and marine vertebrates (Vörös et al. 2022). The drowning of the different parts of the three Pelsonian platforms recognised in the area of the Balaton Highland (*Fig. 19*) shows a shift in time. Some parts of the Barnag Platform was drowned already in the late Pelsonian, however, the Tagyon Platform and the southwestern part of the Kádárta Platform were drowned during the mid Illyrian (Budai et al. 2024).

During the Ladinian in a predominant part of the area of the Balaton Highland pelagic marine conditions prevailed (*Fig. 19*). In the relatively deep basin carbonate mud and radiolaria ooze and, episodically, volcanic ash deposited. The relatively high proportion of "palaeopsychrospheric" genera in the ostracode assemblages refer to deep marine environment, a water depth between 200 and 500 metres (Monostori & Tóth 2013; Karádi et al. 2022).

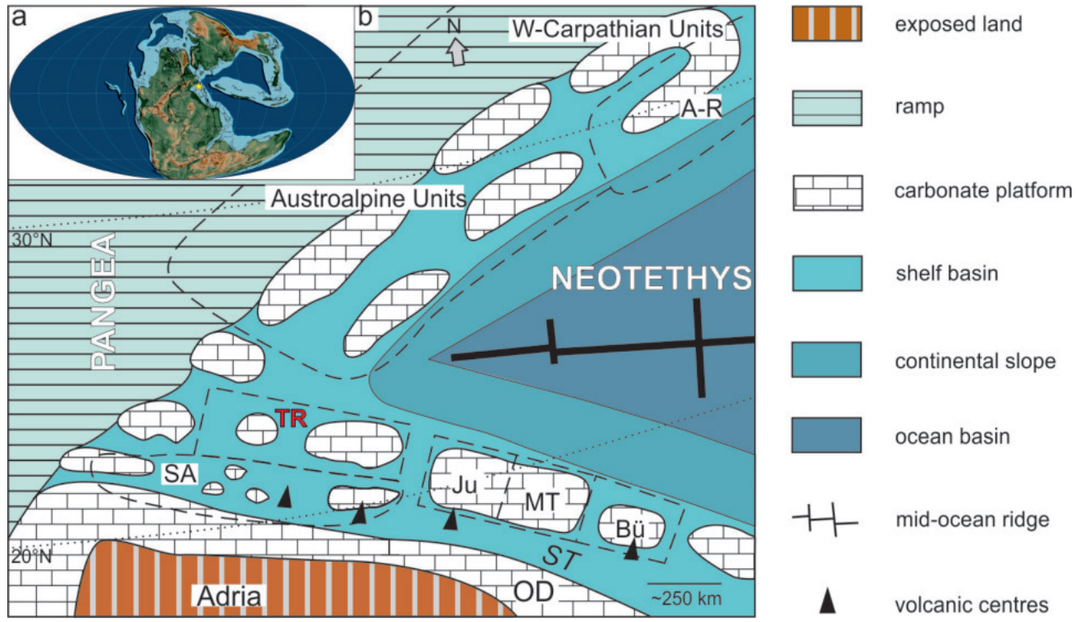


Figure 18. a) Ladinian palaeoglobe (SCOTESE et al. 2024) showing the position (asterisk) of the area on the map *Fig. 18b*; b) palaeogeographic reconstruction of the wesetrn part of the Neotethys for the Ladinian with the position of the Transdanubian Range Unit (TR), after BUDAI et al. (2017) and KARÁDI et al. (2022). Abbreviations: A-R – Aggtelek–Rudabánya Units; Bü – Bükk Unit; Ju – Julian Unit; MT – Mid-Transdanubian Unit; OD – Outer Dinarides; SA – South-Alpine Units; ST –Slovenian Trough

However, the sedimentation pattern was rather unique in the central part of the Balaton Highland, where phosphorites occur in the early Ladinian (Vászoly Limestone Mb), and radiolarians and thin shelled bivalves are present in high abundance (Keresztfatető Mb). This special environment was interpreted as an upwelling dominated submarine high (Tagyon High, BUDAI et al. 2017). The deepenig of the Ladinian basin was mostly controlled by extensional tectonics. This is indicated by the formation of neptunian dyke (Litér quarry, *Fig. 15a*) in the area of the Kádárta Platform which is filled by sediments derived from the Buchenstein Formation. Based on ammonite data (BUDAI et al. 2001a, BUDAI & VÖRÖS 2006) this tectonic activity can be dated to the late Ladinian (Archelaus Chron) and was probably in connection with the tectono-magmatic event that significantly influenced the basin evolution of the Dolomites (GIANOLLA et al. 2021).

Large Ladinian "Wetterstein-type" carbonate platforms, as the Esino Platform in Lombardy or the Sciliar (Schlern) Platforms in the Dolomites are not known in the area of the Balaton Highland. However, close vicinity of carbonate platforms can be assumed on the basis of diagnostic sediments, i.e. the appearance of platform slope breccias and platform prograding wedges within the basin successions. Platform progradation was reconstructed on the area of Veszprém Plateau in the Litér quarry (BUDAI et al. 2001a) and in the Kádárta quarry (KARÁDI et al. 2022) where dolomite breccia bed-set pinches out within the upper part of the volcaniclastic–carbonate succession of the Vászoly Formation. Based on ammonite (*Falsanolcites* cf. *gervasuttii*) and conodont data of the Kádárta section the toe-of-slope sediment deposited in the early Ladinian (KARÁDI et al. 2022). Similar lateral facies connection was observed at the southwestern part of the Balaton

Highland (Tapolca Basin), where a platform progradation event was dated to the early Ladinian by conodont data (NAGY et al. 2014). This event corresponds to the progradation phase of the Sciliar (Schlern) Platform in the Southern Alps (GIANOLLA et al. 1998).

Shallow marine bivalves and gastropods occur in coquina lenses in the upper part of the basin succession of the Buchenstein Formation in the area of Nemesvámos and Veszprémfajsz (VÖRÖS et al. 2024, 2025). KITTL (1912b, pp. 10–11) compared the gastropod-assemblage with that of the Hallstatt limestone and, partly, with that of the Esino limestone. This was confirmed by LACZKÓ (1911, p. 70) who mentioned an "Esino type" gastropod fauna from the dolomite of the Kis-Kilátó-hegy, south of Veszprém. In parallel with this, the dominance of *Arpadites* and *Argolites* species increases in the ammonite assemblage. These taxa are common in the Esino Platform in Lombardy (FANTINI SESTINI 1994). Based on all this, it can be assumed that a carbonate platform was present in the neigbourhood of the Balaton Highland area during the Archelaus Chron of the late Ladinian (*Fig. 19*) and this platform could be the habitat of the mollusc assemblage. The redeposition of the shells of shallow-marine molluscs into the deeper part of the basin can be attributed to the above mentioned late Ladinian tectonic activity.

The upper Ladinian basin succession of the Buchenstein Formation and the toe-of-slope deposit of the Berekhegy Limestone (Füred Formation) is covered by dolomites (Kádárta Member of the Gémhegy Formation) along the northern range of the Balaton Highland. This was interpreted as a dynamic platform progradation

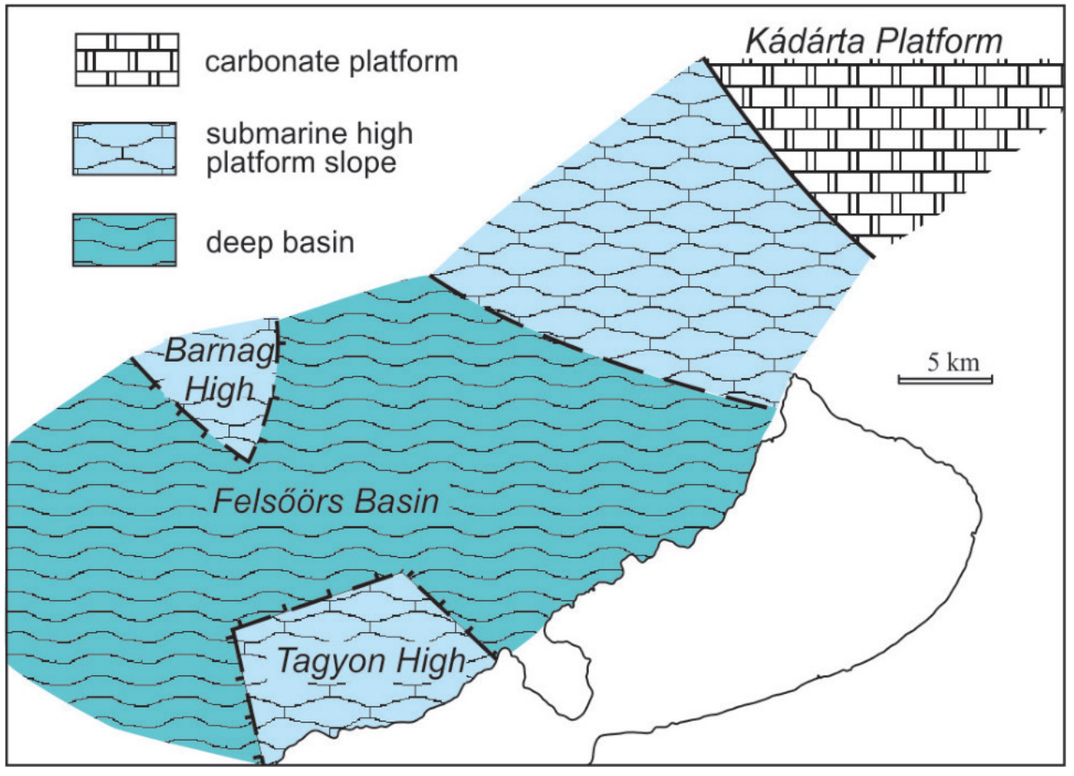


Figure 19. Palaeogeographic map of the Balaton Highland for the early Ladinian (after BUDAI & VÖRÖS 2006)

started in the latest Ladinian (Regoledanus Chron); it can be correlated with the first progradation episode of the Cassian Platforms in the Southern Alps and of the Karwendel Platform in the Northern Calcareous Alps (Budai & Haas 1997, Budai & Vörös 2006). The effect of this platform progradation could be identified only indirectly and may have taken place somewhat later in the more pelagic part of the basin in the southern range of the Balaton Highland where the Füred Limestone represents highstand shedding of the prograding platform at the beginning of the Carnian (Aon Zone). Total upfilling of the basins with fine-grained siliciclastics during the Carnian (Haas & Budai 1995, 1999; Rostási et al. 2011; Haas et al. 2012; Tóth et al. 2024; Baranyi et al. 2025, 2026) gave rise to the development of a huge carbonate platform in the late Carnian (Fődolomit Platform).

Biostratigraphy

Attila Vörös & Tamás Budai

The initial biostratigraphic subdivision of the Triassic system was based on Mojsisovics' classic works (Mojsisovics 1869, 1870, 1875, 1880, 1882; Mojsisovics et al. 1895). The evolution of ammonite biostratigraphy was later analyzed in the summary of Tozer (1984) and Balini et al. (2010), this chapter limits only to some problems concerning the Ladinian zonation.

Comparing the different Ladinian ammonite zonations of the western Neotethys (*Fig. 20*) it is well visible that there are some clear similarities between them. All of them include the Curionii Zone and most of them the Archelaus Zone. These are the zones that were originally introduced by Mojsisovics et al. (1895) for the Fassanian and for the Longobardian, and these represent the two main steps of the ammonite evolution

Ma	System	Series	Stage	Substage	Ammonite Zonation					
					Krystyn 1983	Mietto, Manfrin 1995	Brack et al. 2005	Mietto et al. 2018	Vidakovic et al. 2023	this paper
	Triassic	Late	Carnian	Julian	Aon Z	Aon Sbz Canadensis Sbz				Aon Z
237		Middle	Ladinian	Longobardian	Regoledanus Z	Protrachyceras Z: Regoledanus Sbz	Regoledanus Z	Regoledanus Sbz	Regoledanus Z	Regoledanus Z
						Neumayri Sbz		Neumayri Sbz	Archelaus Z: Neumayri Sbz	
					Archelaus Z	Longobardicum Sbz	Archelaus Z	Longobardicum Sbz	Longobardicum Sbz	Archelaus Z
					Gredleri Z	Gredleri Sbz				
						Margaritosum Sbz		Margaritosum Sbz	Margaritosum Z	
240				Fassanian	Curionii Z	Eoprotrachyceras Z: Recubariensis Sbz	Gredleri Z	Recubariensis Sbz	Curionii Z: Recubariensis Sbz	Recubariensis Z
						Curionii Sbz	Curionii Z	Curionii Sbz	Perticaense Sbz	Curionii Z
241.5			Anis	Illyrian	Nevadites Z	Chiesense Sbz	Secedensis Z	Chiesense Sbz	Curionii Sbz Secedensis Z	Secedensis Z

Figure 20. Some of the basic ammonite zonations of the Ladinian Stage in the western Neotethys

during the Middle Triassic: the appearance of the family Trachyceratidae at the beginning of the Ladinian; and the increasing diversity of subfamily Arpaditinae, Anolcitinae and Protrachyceratinae at the beginning of the Longobardian (Balini et al. 2010).

Further similarities of these zonations are that most of them separate the Recubariensis Zone as the upper part of the Fassanian Substage and each define the Regoledanus Zone as the upper part of the Longobardian.

The different ammonite zonations of the lower part of the Longobardian Substage, however, show several differences (*Fig. 20*). The Gredleri Zone was defined by Krystyn (1983) for the lowermost part of the Longobardian, separated from the Archelaus Zone. Mietto & Manfrin (1995a) introduced five subzones within their Longobardian Protrachyceras Zone. Brack et al. (2005) returned to Krystyn's classification with the slight modification of moving the Gredleri Zone into the Fassanian. Mietto et al. (2018) later cancelled the Gredleri Subzone from their biostratigraphic scheme what they justified by the much higher stratigraphic occurrence of the type specimen of the zonal index species in the upper Longobardian. This zonation was basically accepted later by Vidaković et al. (2023).

In the Ladinian biostratigraphic scale of the Balaton Highland, only the four Ladinian ammonite zones can be reliably distinguished which are identical in all zonations (*Fig. 20*). We accept the zonation of Brack et al. (2005) with the exception of the upper Fassanian Gredleri Zone, as the zonal marker species appears in the Archelaus Zone at the Balaton Highland (as it was pointed out also in the Recoaro area by Mietto et al. 2018). *Protrachyceras margaritosum* is a vaguely defined species to be subzonal marker in our opinion, moreover, it is very rare even in the rich and highly diverse assemblages of Katrabóca and Király Hill sections. *Protrachyceras longobardicum* is a much more characteristic and frequently occurring species, however, its stratigraphic distribution seems to be too long to be subzonal marker. *Protrachyceras neumayri* is the rarest Ladinian species in the study area (only one poorly preserved fragment was found), so it cannot be used as a subzonal marker in the Ladinian of the Balaton Highland. Therefore, we apply the zonal name Archelaus by the occurrence of the *Protrachyceras* and *Anolcites* species for the lower part of our Longobardian succession, without further subdivision.

What factors limit to establish a more detailed biostratigraphic scale for the Ladininian of the Balaton Highland? In our opinion the content of the different Ladinian ammonite zones/subzones is not exactly defined in the international literature. It means that if the zonal marker taxon is missing in a sequence, the zonal boundary cannot be identified in an exact way. Further disadvantage of the study area of the Balaton Highland is the lack of well-collected continuous section that would expose the entire Ladinian stage (despite its relatively reduced thickness). The only exception is the actively operating Kádárta quarry, however, the possibility of collecting is limited there. The other determining factor is the facies of the succession. The lower part of the Ladinian stage of the Balaton Highland is represented by limestones containing large amount of chert, in which ammonites are extremely rare, yet, the Curionii and the Recubariensis Zones were indicated at separate localities. On the other hand, the richest and most diverse ammonite fauna was found in a not more than 2 m thick "ammonitico rosso" type limestone (Archelaus Zone at Nemesvámos and Veszprémfajsz), but its facies indicates condensed sedimentation and perhaps also redeposition of fossils.

Systematic description of the Ladinian ammonoids

Attila Vörös

The classification in this paper follows mostly that of Tozer's (1981) with a few exceptions. The subfamily Arpaditinae is removed to the family Danubitidae and the family Trachyceratidae is removed to the superfamily Clydonitoidea, what is adopted from Mietto et al. (2018). Following the "Treatise" (Arkell et al., 1957) family Celtitoidea is placed to the superfamily Tropitoidea. The new subfamily Pinteritinae is inserted to the family Danubitidae and the new subfamily Katrabocaitinae is inserted to the family Trachyceratidae.

The signs of open nomenclature were used according to Bengtson (1988), except regarding the uncertainty of the generic attributions; here the opinions of Richter (1948) and Matthews (1973) were followed, i.e. question marks "?" after the name, instead of "aff." in front of the name, were used. The signs attached to the synonymy lists were applied from Richter (1943, p. 40–42) and Matthews (1973).

In the descriptions of the ammonoids the morphological terms were taken from the "Treatise" (Arkell et al. 1957) and from Klug et al. (2015).

The minor but significant part of the material is deposited in the palaeontological collection of the Supervisory Authority for Regulatory Affairs, Budapest (SARA) (formerly Geological Institute of Hungary) under the inventory numbers prefixed by T. This collection includes several holotypes of Ladinian ammonoid species described by classical authors; these and some other relevant ammonoid specimens are illustrated by photographs inserted as text-figures. The majority of the specimens, portrayed in the present monograph, are kept in the private collections of M. Bercsényi (Nyúl), Zs. Pintér (Győr), I. Szemes (Budapest) and Z. Batka (Budapest), with local, informal inventory codes, and in the Department of Palaeontology and Geology of the Hungarian Natural History Museum (HNHM) under the inventory numbers prefixed by M., INV, or PAL. These specimens are illustrated in 40 photographic plates at the end of the volume.

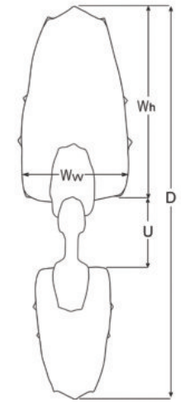


Figure 21. The axes of measurements (D = diameter, Wh = whorl-height, Ww = whorl-width, U = diameter of umbilicus) used in the present monograph.

The author made comparative studies on ammonoid specimens deposited in several museums abroad and in Budapest; the names of the collections and their acronyms (used in the present monograph) are the following: Geologische Bundesanstalt, Wien (GBAW), Paläontologisches Institut und Museum, Universität Zürich (PIMUZ), Natural History Museum, London (NHML), Supervisory Authority for Regulatory Affairs, Budapest (SARA).

The dimensions of the measured ammonoid specimens (D = diameter, WH = whorl-height, WW = whorl-width, U = diameter of umbilicus) are given in millimetres (*Fig. 21*).

Order Ceratitida HYATT, 1884

Superfamily Noritoidea KARPINSKY, 1889

Family Noritidae KARPINSKY, 1889

Genus *Bosnites* HAUER, 1896

Type species: *Bosnites clathratus* HAUER, 1896

***Bosnites* ? sp.**

Plate I: 1; Figure 22.

Material: One rather well-preserved specimen from Nemesvámos, Gyűr Hill, top (*Fig. 1b, Fig. 7* and *Fig. 11*).

Measurements:

Identity No.	D	Wh	Ww	U
BM-1.	61	33.7	12.7	5.9

Description: It is a medium-sized *Bosnites*. The coiling is very involute; the whorl-section is compressed, very high and narrow trapezoidal. The umbilicus is narrow and deep. The umbilical wall is subrounded, without marked shoulder. The flanks are very gently and evenly convex and meet the tabulate venter with a marked ventrolateral shoulder. The weak ornamentation develops only on the body chamber; it consists of faint sinuous, almost falcate, thread-like riblets with tiny, radially elongated bullae at mid-flank.

Suture lines are poorly preserved, subammonitic (*Fig. 22*). The lobes are deep and strongly denticulated; the first lateral saddle shows an entire top and weak incisions on the sides; the other lateral saddles seem to be dominantly crenulated.

Remarks: Both in general shape, and in lateral ornament, our specimen agrees well with the characters of the type species *Bosnites clathratus* HAUER, 1896. Hence the generic identification seems justified. On the other hand, the suture lines are partly different. *Bosnites* has club-shaped saddle heads, whereas in our specimen this feature appears only on the first lateral saddle, the others showing subammonitic aspect. This divergence may perhaps be explained by the age difference between the two taxa: *Bosnites* was described from the upper Anisian (~Reitzi Zone) of Han Bulog (HAUER 1896), while our specimen was collected from the Ladinian Archelaus Zone.

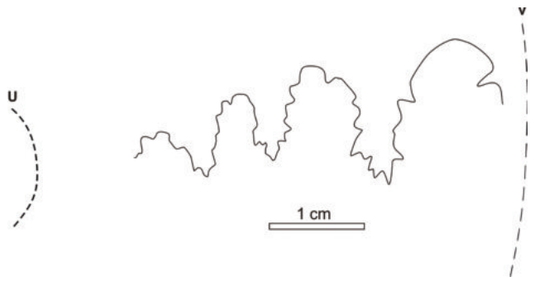


Figure 22. Suture line of *Bosnites* ? sp. (BM-1), at 40 mm whorl-height, Gyűr Hill, top, Longobardian, Archelaus Zone; u: umbilical margin, v: ventrolateral margin

Considering other genera of compressed conch and tabulate venter, our specimen is rather similar to *Esinoceras tozeri* FANTINI SESTINI, 1996, but is much compressed and shows a characteristic row of elongated bullae at mid-flank. After all, the use of question mark in the identification of our specimen is justified.

Distribution: Our specimen occurred in the upper Ladinian (Longobardian) Archelaus Zone.

Superfamily Megaphyllitoidea MOJSISOVICS, 1896

Family Megaphyllitidae MOJSISOVICS, 1896

Genus *Megaphyllites* MOJSISOVICS, 1879

Type species: *Ammonites jarbas* MÜNSTER, 1841

***Megaphyllites obolus* MOJSISOVICS, 1882**

Plate I: 2, 3.

*1882 *Megaphyllites obolus* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 192, pl. LIII, figs. 3–5.
1966 *Megaphyllites obulus* MOJS. – PISA, Alpi Carniche, p. 678, pl. LXXVII, figs. 12, 13; text-fig. 12.
v 1998 *Megaphyllites obolus* MOJSISOVICS, 1882 – VÖRÖS, Balaton-felvidék, p. 45.
v 2024 *Megaphyllites obolus* MOJSISOVICS, 1882 – VÖRÖS et al., Nemesvámos, p, 402, pl. I, figs. 2–4.
? 2025 *Megaphyllites obolus* MOJSISOVICS, 1882 – ĐAKOVIĆ et al., Durmitor, p. 10, fig. 4.
v 2025 *Megaphyllites obolus* MOJSISOVICS, 1882 – VÖRÖS et al., Király Hill, p. 314, pl. I, fig. 1.

Material: Five nearly complete specimens from Katrabóca (4) at Nemesvámos and from the Király Hill (1) at Veszprémfajsz (*Fig. 1b, Fig. 7, Fig. 8* and *Fig. 10*)

Measurements:

Identity No.	D	Wh	Ww	U
BM-2.	34.2	19.5	12.2	0
BM-3.	22.5	11.1	?	0

Description: Small to medium-sized with gently compressed conch. The umbilicus is completely occluded; the lateral parts are nearly planar and pass gradually to the regularly arched venter. The surface is smooth.

The suture line was not exposed.

Remarks: In spite of its almost characterless external appearance, several species have been introduced within the genus *Megaphyllites*. According to the statistical approach by PISA (1966, p. 677) *M. obulus* differs from *M. jarbas* (MÜNSTER, 1841) and *M. oenipontanus* MOJSISOVICS, 1882 by its narrower venter and less convex lateral margins. On the basis of these features the identification of our specimens is justified.

Distribution: M. obulus was described from the Ladinian of the Southern Alps, Northern Calcareous Alps and the Dinarides. At the Balaton Highland it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Superfamily Pinacoceratoidea MOJSISOVICS, 1879

Family Gymnitidae WAAGEN, 1895

Genus *Epigymnites* DIENER, 1916

Type species: *Gymnites ecki* MOJSISOVICS, 1882

***Epigymnites* cf. *ecki* (MOJSISOVICS, 1882)**

Plate I: 4, 5; Plate II: 1; Plate XXXVIII: 4.

*1882 *Gymnites Ecki* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 238, pl. LX, fig. 3.
v 1895 *Gymnites Ecki* MOJS. – SALOMON, Marmolatakalk, p. 191, pl. VII, figs. 10–14, pl. VIII, fig. 1.
1908 *Gymnites Ecki* MOJS. (C. Renz). – FRECH & RENZ, Neue Triasfunde, p. 459, pl. XV, fig. 4.

1910b *Gymnites Ecki* Mojsisovics. – RENZ, Argolis, p. 39, pl. IV, fig. 2.
? 1910 *Gymnites* cfr. *Ecki* MOJS. – SIMIONESCU, Deşli-Caïra, p. 472, fig. 4.
? 1960 *Epigymnites ecki* (MOJSISOVICS)1882. – ROSSI RONCHETTI, Grigne, p. 37, pl. VIII, fig. 4; text-fig.3.
1973 *Gymnites* cf. *ecki* MOJSISOVICS, 1882 – RIEBER, Grenzbitumenzone, p. 71, pl. 16, fig. 8.
1994 *Epigymnites ecki* (MOJSISOVICS). – FANTINI SESTINI, Esino, p. 247, pl. 12 fig. 1.
v 1998 *Epigymnites* cf. *ecki* (MOJSISOVICS, 1882) – VÖRÖS, Balaton-felvidék, p. 38, 45; pl. XVI, fig. 3.
v 2018 *Epigymnites ecki* (MOJSISOVICS, 1882) – VÖRÖS, Upper Anisian, p. 136, pl. XLI, figs. 4, 5
2023 *Epigymnites* cf. *ecki* (MOJSISOVICS, 1882) – VIDAKOVIĆ et al., Samobor, p. 530, pl. 7, fig. 4.
v 2024 *Epigymnites* cf. *ecki* (MOJSISOVICS, 1882) – VÖRÖS et al., Nemesvámos, p, 402, pl. I, fig. 7.
2025 *Epigymnites* cf. *ecki* (MOJSISOVICS, 1882) – ĐAKOVIĆ et al., Durmitor, p. 18, fig. 7.

Material: Four specimens of various state of preservation from Katrabóca (2), the Gyűr Hill (1) at Nemesvámos and Balatoncsicsó, Csukrét Gully (1) (*Fig. 1b, Fig. 7, Fig. 8* and *Fig. 11*).

Measurements:

Identity No.	D	Wh	Ww	U
M.98.133.	114.5	57.5	~15	29.2
PZs-1.	98.5	49.5	14.3	15.5
BM-4.	max69	34.8	?	13.2
PZs-55	58.5	20.6	?	23.4

Description: Medium-sized to large *Epigymnites* with moderately evolute, compressed conch. The whorl-section is very high oval to lanceolate. The umbilical wall is low, not well marked. The flank is almost flat and forms continuous curve from the umbilical margin to the highly arched, acute venter. The flanks are smooth, apart from the body chamber, where a distinctive, longitudinal row of blunt nodes or clavi appears at around the mid-flank. The nodes are usually elongated adorally.

The suture lines were not visible.

Remarks: E. ecki is a frequently recorded species, easy to recognize and identify by its single row of elongated nodes at the mid-flank.

The item by SIMIONESCU (1910, l.c.) is queried because the illustration is only a very poor drawing.

The specimen figured as *E. ecki* by ROSSI RONCHETTI (1960) is only a fragment with suture line and does not show the diagnostic row of lateral nodes, therefore it is included into the synonymy only with question mark.

The items by VÖRÖS (2018, l.c.) and VIDAKOVIĆ et al. (2023, l.c.) portray specimens of *E. ecki* with less acute venter, but these morphotypes may fit into the range of variation of the species.

Distribution: E. ecki was described from the Ladinian of the Southern Alps, the Dinarides, the Hellenides and probably Dobrogea. At the Balaton Highland it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Epigymnites cf. *credneri* (MOJSISOVICS, 1882)

Plate I: 6, 7.

*1882 *Gymnites Credneri* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 238, pl. LIX, fig. 3.
v 1903 *Gymnites Credneri* MOJS. – FRECH, Neue Cephalopoden, p. 35., pl. VII, fig. 1.
v 1998 *Epigymnites* sp. – VÖRÖS, Balaton-felvidék, p. 98; pl. XIII, fig. 8.

2018 *Epigymnites credneri* (MOJSISOVICS, 1882) – MIETTO et al., Recoaro and Tretto, p. 241, pl. 2, fig. 8.
v 2025 *Epigymnites* cf. *credneri* (MOJSISOVICS, 1882) – VÖRÖS et al., Király Hill, p. 307 (partim), pl. I, fig. 2 (only).

Material: Two incomplete and juvenile specimens from Katrabóca (1) at Nemesvámos and from the Király Hill (1) at Veszprémfajsz (*Fig. 1b, Fig. 7, Fig. 8* and *Fig. 10*).

Measurements:

Identity No.	D	Wh	Ww	U
BM-5.	48.5	23.7	?	11.5
M.98.113.	46.2	19.8	4.5	12.3

Description: Small *Epigymnites* with very involute and compressed, oxycone conch. The whorl-section is very high and slender. The umbilicus is very narrow; the umbilical margin is subrounded. The flanks are nearly flat. The venter is narrowly arched. The ornamentation is very weak or absent. One specimen shows very gentle, sinuous radial folds; their ventrolateral parts are arched backwards (adapically).

The suture line is not visible.

Remarks: Our specimens are rather small, juvenile, therefore they do not show the row of longitudinally elongated blunt nodes at the mid-flank, characterizing the species *E. credneri*. However, according to the illustrations by MOJSISOVICS (l.c. fig. 3), these nodes appear only on the adult body chamber. From *E. ecki* (MOJSISOVICS, 1882), *E. credneri* differs by its less acute venter and narrower umbilicus.

The specimen figured by VÖRÖS (1998, l.c.) as *Epigymnites* sp. from Katrabóca, now belongs to *E. credneri*. The specimen illustrated by VÖRÖS et al. (2025, pl. I., fig. 3) as *E. credneri,* on the basis of its very narrow umbilicus is now considered *E. moelleri* (MOJSISOVICS, 1882).

Distribution: E. credneri was described from the Ladinian of the Southern Alps. At the Balaton Highland it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Epigymnites cf. *moelleri* (MOJSISOVICS, 1882)

Plate I: 8; Plate XXXVIII: 1–3; Figure 23.

*1882 *Gymnites Moelleri* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 237, pl. LX, figs. 1, 2.
1914 *Gymnites Moelleri* MOJS. – DE TONI, Valdepena, p. 163, pl. XIII, fig. 5.
v 1998 *Epigymnites moelleri* (MOJSISOVICS, 1882) – VÖRÖS, Balaton-felvidék, p. 45.
v 2024 *Epigymnites* sp. – VÖRÖS et al., Nemesvámos, p, 402, pl. I, fig. 1.
v 2025 *Epigymnites* cf. *credneri* (MOJSISOVICS, 1882) – VÖRÖS et al., Király Hill, p. 307 (partim), pl. I, fig. 3 (only).

Material: Four incomplete specimens from Katrabóca (3) at Nemesvámos and from the Király Hill (1) at Veszprémfajsz (*Fig. 1b, Fig. 7, Fig. 8* and *Fig. 10*).

Measurements:

Identity No.	D	Wh	Ww	U
BM-6.	59.5	31.5	11.3	5.2
INV 2026.51.	93.2	51.1	?	10.1
INV 2026.52	53.2	28.2	9.1	5.5
BM-97	~210	95.5	31.1	~25

Description: Medium-sized to large *Epigymnites* with moderately evolute, compressed conch. The whorl-section is very high oval to lanceolate. The umbilical wall is low, not well marked. The flank is almost flat; the venter is highly arched, acute. The flanks are smooth, apart from the body chamber, where two distinctive, longitudinal rows of blunt nodes appear at around the mid-flank and in the outer half of the flank, respectively.

The suture line (*Fig. 23*) is ammonitic, with deep and strongly denticulated lateral lobes; the first lateral saddle is constricted at its base and deeply incised laterally.

Remarks: E. moelleri is in close relationship with *E. credneri* (MOJSISOVICS, 1882) but, in contrast to the latter, its umbilicus remains very narrow even in the adult specimens. The other distinctive feature, the double rows of blunt and elongated clavi develops only on the body chamber.

The suture line of our specimen with the characteristic, basally constricted first lateral saddle is well comparable of that figured by MOJSISOVICS (l.c., fig. 2). Nevertheless, considering the rather poor state of preservation of our specimen, the use of "cf." in the identification seems justified.

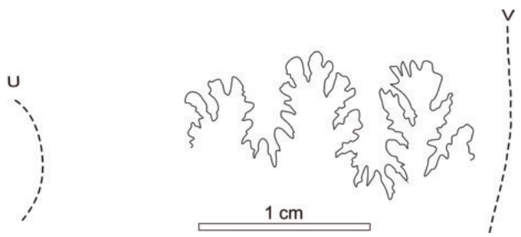


Figure 23. Suture line of *Epigymnites* cf. *moelleri* (MOJSISOVICS, 1882) (BM-6), at 22 mm whorl-height, Király Hill, loose, Longobardian, Archelaus Zone; u: umbilical margin, v: ventrolateral margin

Distribution: E. moelleri was described from the Ladinian of the Southern Alps. At the Balaton Highland it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Superfamily Arcestoidea MOJSISOVICS, 1875

Family Arcestidae MOJSISOVICS, 1875

Genus *Proarcestes* MOJSISOVICS, 1893

Type species: *Arcestes bramantei* MOJSIOVICS, 1869

***Proarcestes subtridentinus* (MOJSISOVICS, 1875)**

Plate II: 2–6.

1870 *Arcestes Tridentinus* MOJS. – MOJSISOVICS, Oenische Gruppe, p. 103, pl. IV, figs. 1, 2.
* 1875 *Arcestes subtridentinus* E. v. MOJSISOVICS. – Ceph. Hallst. Kalke, p. 91, pl. LVIII, fig. 20.
1882 *Arcestes subtridentinus* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 156, pl. XLIII, figs. 1–3; pl. XLIV, figs. 1–3.
? 1896 *Proarcestes subtridentinus* MOJS. – DE LORENZO, Lagonegro, p. 148, pl. XX, figs. 15–17.
v 1903 *Arcestes* (*Proarcestes*) *subtridentinus* MOJS. – FRECH, Neue Cephalopoden, p. 35., pl. VIII, fig. 2.
1904 *Proarcestes subtridentinus* MOJS. sp. 1875. – MARTELLI, Montenegro, p. 138, pl. VIII, fig. 2.
1931 *Proarcestes subtridentinus* MOJS. – ŽIVKOVIĆ, Zlatar, p. 96, pl. VII, fig. 2.
? 1960 *Arcestes* (*Proarcestes*) *subtridentinus* MOJSISOVICS 1882. – ROSSI RONCHETTI, Grigne, p. 34, pl. VII, figs. 1–7.
? 1965 *Arcestes* (*Proarcestes*) sp. cf. A. (*Pr.*) *subtridentinus* MOJS. – PARNES, Makhtesh Ramon, p. 12, pl. II, figs. 3, 4.
? 1977 *Joannites subtridentinus* (MOJSISOVICS) – URLICHS, Pachycardientuffe, p. 18, pl. 1, fig. 14.
? 1996 *Proarcestes subtridentinus* (MOJSISOVICS, 1882) – FANTINI SESTINI, Esino II, p. 223, pl. 1, fig. 16.
v 1998 *Proarcestes subtridentinus* (MOJSISOVICS, 1875) – VÖRÖS, Balaton-felvidék, p. 45.
v 2024 *Proarcestes subtridentinus* (MOJSISOVICS, 1875) – VÖRÖS et al., Nemesvámos, p, 402, pl. I, figs. 8, 9; pl. II, fig. 1.

2025 *Proarcestes subtridentinus* (MOJSISOVICS, 1882) – ĐAKOVIĆ et al., Durmitor, p. 30, figs. 14d–e.
v 2025 *Proarcestes subtridentinus* (MOJSISOVICS, 1875) – VÖRÖS et al., Király Hill, p. 314, pl. I, fig. 4.

Material: Numerous specimens of variable state of preservation; five of them were measured and illustrated from Katrabóca (2), The Király Hill at Veszprémfajsz (2) and the Gyűr Hill at Nemesvámos (1).

Measurements:

Identity No.	D	Wh	Ww	U
BM-7.	44.5	22.1	?	5.4
PZs-2.	46.8	24.1	23.5	5.5
PZs-3.	74.8	40.6	41.5	9
PZs-4.	80.8	42.1	41.5	9.2
PZs-6.	78.2	43.1	40.8	8.5

Description: Small to medium-sized *Proarcestes* with gently globose, sphaerocone conch. The whorl-section is weakly compressed, with maximum width near the umbilicus at the body chamber. The umbilicus is very narrow, but not occluded. The flanks are evenly convex and form a continuous arch with the arched venter. The shell surface is smooth, without ornamentation, except the venter of the body chamber, which is crossed by low but marked folds or flared ribs. These folds are the strongest at the top of the venter and fade towards the lateral flanks. Most specimens have three to five sinuous prorsiradiate constrictions, gently arched adorally and bent backwards (adapically) on the venter.

Suture lines were not recorded.

Remarks: The generic attribution of the large, globose, smooth ammonoids, mostly as internal moulds, to *Proarcestes* or *Joannites,* is often problematic and based chiefly on the suture lines and the character of the constrictions. In the present case, without knowledge on the suture lines, we relied on the character of the constrictions, which are strongly projected on the ventral margin at *Joannites* whereas prorsiradiate and gently bent backwards in *Proarcestes,* what was observed in the present case. On this ground our specimens belong to *Proarcestes*. The specific identification as *P. subtridentinus* is based on the number of constrictions, arched adapically on the venter and the marked flared ribs appearing on the venter of the body chamber. This was claimed as an important distinctive feature for this species (MOJSISOVICS 1882, p. 156).

The species name *subtridentinus* was introduced by MOJSISOVICS (1875, p. 91) in a footnote, with reference to specimens described and illustrated by him (MOJSISOVICS 1870, p. 103, pl. IV, figs. 1, 2) under the name *"Arcestes tridentinus"* from Vörösberény (Balaton area). The short indication was accompanied with a suture line drawing (MOJSISOVICS 1875, pl. LVIII, fig. 20) consequently the name *"Arcestes subtridentinus"* became valid.

Some of the later items in the synonymy list are queried. DE LORENZO (1898, l.c.) illustrated a crushed specimen without visible suture lines; the same holds true for the item by Parnes (1965, l.c.). The poor-quality figures by ROSSI RONCHETTI (1960, l.c.) are hardly be estimated. The very small specimen illustrated by URLICHS (1977, l.c.) shows only one or two constrictions.

Distribution: P. subtridentinus was described from the Ladinian of the Balaton Highland, the Northern Calcareous Alps, the Southern Alps, the Dinarides, the Hellenides and probably from the Apennines and Israel. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Proarcestes boeckhi (MOJSISOVICS, 1875)

Plate III: 1, 3; Figures 24, 25.

v * 1875 *Arcestes Böckhi* E. v. MOJSISOVICS. – CEPH. Hallst. Kalke, p. 91, pl. LVIII, fig. 21.
1882 *Arcestes Boeckhi* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 157, pl. XLIV, fig. 4.
1895 *Arcestes* cfr. *Böckhi* MOJS. – SALOMON, Marmolatakalk, p. 187, pl. VI, figs. 20, 21.
v 1903 *Arcestes Böckhi* MOJS. – FRECH, Neue Cephalopoden, p. 36., pl. VIII, fig. 5. + Foss.Cat
? 1914 *Proarcestes Boeckhi* MOJS. – DE TONI, p. 144, pl. XII, fig. 1.
1965 *Arcestes* (*Proarcestes*) sp. cf. *A.* (*Pr.*) *boeckhi* MOJS. – PARNES, Makhtesh Ramon, p. 11, pl. II, figs. 1, 2.
1976 *Arcestes boeckhi* MOJS. – LJUBOVIĆ, Durmitor, p. 204, pl. I, fig. 3.
v 1998 *Proarcestes* cf. *boeckhi* (MOJSISOVICS, 1875) – VÖRÖS, Balaton-felvidék, p. 54.
v 2024 *Proarcestes boeckhi* (MOJSISOVICS, 1875) – VÖRÖS et al., Nemesvámos, p, 402, pl. II, figs. 2–4.
2025 *Proarcestes boeckhi* (MOJSISOVICS, 1882) – ĐAKOVIĆ et al., Durmitor, p. 32, figs. 15a–d.
v 2025 *Proarcestes boeckhi* (MOJSISOVICS, 1875) – VÖRÖS et al., Király Hill, p. 314, pl. I, fig. 5.

Material: Two, partly incomplete specimens from Katrabóca at Nemesvámos (*Fig. 1b, Fig. 7* and *Fig. 8*). The holotype of this species from Balatoncsicsó (Csukrét Gully, *Fig. 1b, Fig. 4*), kept in the collections of the former Geological Institute of Hungary (SARA), was also inspected and a photographic illustration is added here.

Measurements:

Identity No.	D	Wh	Ww	U
T.161.	106	48	?	12
PZs-6.	84.5	44.1	42.1	9.3
BM-8.	82.1	44.1	51.5	10.5

Description: Medium-sized to large *Proarcestes* with globose, sphaerocone conch. The whorl-section is rather depressed, with maximum width near the umbilical rim at the body chamber. The umbilicus is narrow, not occluded. The flanks are convex and form a continuous arch with the widely arched venter. The shell surface is smooth, without noticeable ornamentation. The specimens are mostly shelly, i.e. retained their tests, therefore the characteristic prorsiradiate constrictions are observed only one case (*Pl. III: 3*).

The suture line (*Fig. 24*) is ammonitic, with at least five deep and profoundly incised lobes and five, extremely densely frilled saddles. The saddles are more or less triangular, only the first lateral saddle is slit obliquely.

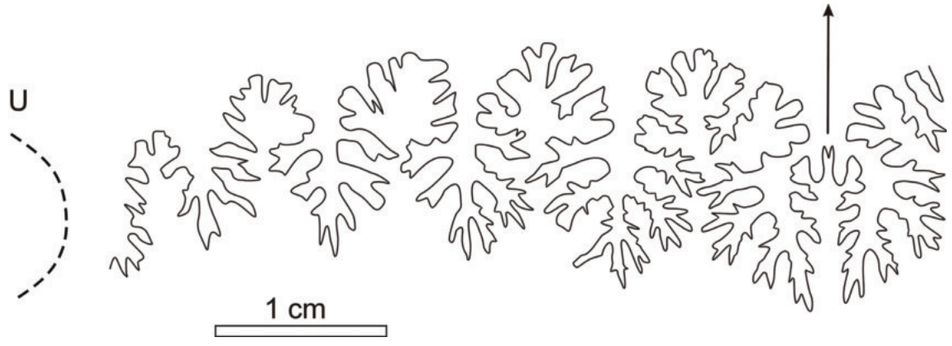


Figure 24. Suture line of *Proarcestes boeckhi* (MOJSISOVICS, 1875) (PZs-6), at 35 mm whorl-height, Katrabóca II, Bed 9, Longobardian, Archelaus Zone; u: umbilical margin, arrow: adoral direction

Remarks: MOJSISOVICS's (1870, l.c.) original type of *P. boeckhi* from "Csicsó" was indicated as a missing type in the comprehensive catalogue by BODA (1964, p. 147). The present author, helped by the staff of the collections of SARA, made successful efforts to find again this specimen. The large, globose appearance of our specimens corresponds to the description of the species *Proarcestes boeckhi* by MOJSISOVICS (1875, l.c.); moreover, one of our specimens (*Pl. III: 1*) is very much similar to the holotype, as illustrated here (*Fig. 25*). The observed prorsiradiate constrictions endorse the identification of our specimens.



Figure 25. *Proarcestes boeckhi* (MOJSISOVICS, 1875) holotype (T.161.); Balatoncsicsó, Longobardian, Archelaus Zone

The species name "*Böckhi*" was introduced by MOJSISOVICS (1875, p. 91) in a short remark, accompanied with a suture line drawing from "Csicsó" (Balatoncsicsó, Balaton area) (MOJSISOVICS 1875, pl. LVIII, fig. 20), consequently, the name "*Arcestes Boeckhi*" as used by MOJSISOVICS (1882, p. 157) became valid. According to MOJSISOVICS (1882, p. 157) the most important feature of this species deviating from *P. subtridentinus* (MOJSISOVICS, 1875) is the significantly more globose shape.

The specimen illustrated by DE TONI (1914, l.c.) shows strong ventral folds, therefore it seems more similar to *P. subtridentinus* (MOJSISOVICS, 1875).

Distribution: P. boeckhi was described from the Ladinian of the Balaton Highland, the Northern Calcareous Alps, the Southern Alps, the Dinarides and Israel. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Proarcestes pannonicus (MOJSISOVICS, 1870)

Plate III: 2; Figure 26.

v *1870 *Arcestes pannonicus* MOJS. nov. sp. – MOJSISOVICS, Oenische Gruppe, p. 104, pl. IV, figs. 3, 4.
1882 *Arcestes pannonicus* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 159, pl. XLV, figs. 6, 7.
? 1898 *Proarcestes pannonicus* MOJS. – TORNQUIST, Vicentin, p. 664, pl. XXI, fig. 6.
? 1914 *Proarcestes* cfr. *pannonicus* MOJS. – SALOPEK, Kunovac, p. 15, pl. V, fig. 2.
1960 *Arcestes* (*Proarcestes*) *pannonicus* MOJSISOVICS 1870. – ROSSI RONCHETTI, Grigne, p. 33, pl. VI, figs. 1–4.

v 1998 *Proarcestes pannonicus* (MOJSISOVICS, 1870) – VÖRÖS, Balaton-felvidék, p. 45.
2025 *Proarcestes pannonicus* (MOJSISOVICS, 1870) – ĐAKOVIĆ et al., Durmitor, p. 30, figs. 14/d–e.
v 2025 *Proarcestes boeckhi* (MOJSISOVICS, 1875) – VÖRÖS et al., Király Hill, p. 314, pl. I, fig. 5.

Material: One partly incomplete specimen from the Király Hill (1) at Veszprémfajsz (*Fig. 1b, Fig. 7, Fig. 8* and *Fig. 10*). The holotype of this species from the Megye Hill at Vörösberény (*Fig. 1b*), kept in the collections of the former Geological Institute of Hungary (SARA), was also inspected and a photographic illustration is added here (*Fig. 26*).

Measurements:

Identity No.	D	Wh	Ww	U
T.896. MÁFI	48.5	?	?	?
PZs-7.	55.6	28	50.8	9.2

Description: Small to medium-sized *Proarcestes* with markedly globose, sphaerocone conch. The whorl-section is strongly depressed, with maximum width close to the umbilical rim at the body chamber. The umbilicus is narrow, not occluded. The flanks are convex and form a continuous arch with the widely arched venter. The shell surface is smooth, without noticeable ornamentation. Constrictions were barely observed.

Remarks: MOJSISOVICS' (1870, l.c.) original type (the holotype of *P. pannonicus*) from Vörösberény was indicated as a missing type in the comprehensive catalogue by BODA (1964, p. 147). The present author, helped by the staff of the collections of SARA, made successful efforts to find again this specimen. It is an incomplete and crushed specimen (*Fig. 26*) and the illustration is complemented and unrealistic. Fortunately, MOJSISOVICS (1882, l.c.) figured a much better-preserved specimen of *P. pannonicus* from Mt. Clapsavon, and this illustration is considered reliable for identification of the species.

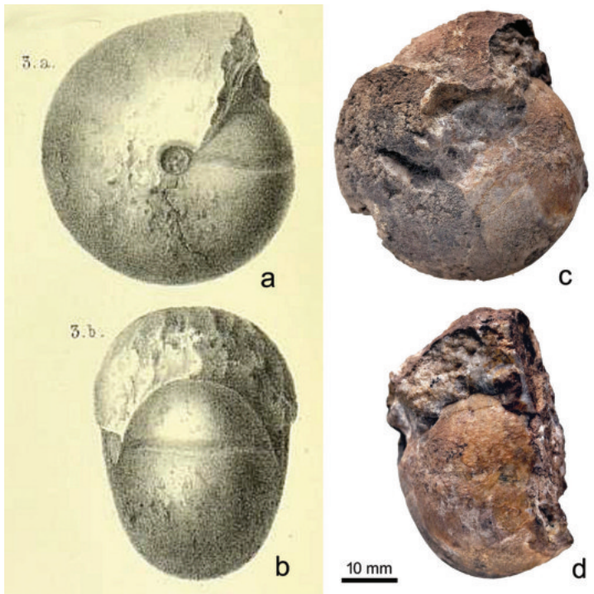


Figure 26. *Proarcestes pannonicus* (MOJSISOVICS, 1870) holotype (T.896.); Vörösberény, Longobardian, Archelaus Zone. Left: original figures in MOJSISOVICS (1870, pl. IV, figs. 3, 4), a: lateral view, b: apertural view. Right: photographs of the holotype specimen, c: lateral view, d: apertural view

One of our specimens (*Pl. III: 2*) was previously attributed to *Proarcestes boeckhi* (MOJSISOVICS, 1875) (VÖRÖS et al. 2025, p. 314). However, the specimen is considerably more globose than the typical *P. boeckhi* and its constrictions are weak or almost absent, therefore it more probably belongs to *P. pannonicus*.

The same specimen is extremely globose and has very depressed whorls; in these respects it is similar to *Proarcestes reyeri* (MOJSISOVICS, 1882). The ventral parts of the constrictions on the latter species are strongly arched adorally, which feature is not observed in our specimen. Moreover, *P. reyeri* was recorded from the Carnian (MOJSISOVICS 1882, p. 160). Therefore, we preferred the identification of our specimen as *P. pannonicus*.

The suture lines are poorly seen on the type specimen (T. 896. *Fig. 26*), therefore the drawing in MOJSISOVICS (1870, pl. IV, fig. 4) wrongly portrays a bipartite first lateral saddle. This was pointed out by MOJSISOVICS (1882, p. 159, footnote) who in the same work (pl. XLV, fig. 7) illustrated a proper suture line of a specimen from Mt. Clapsavon, showing a simple, narrow, triangular first lateral saddle.

The items by TORNQUIST (1898, l.c.) and SALOPEK (1914, l.c.) are queried because the state of preservation of the illustrated specimens does not allow a proper identification.

Distribution: P. pannonicus was described from the Ladinian of the Southern Alps and the Dinarides. At the Balaton Highland it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Family Joannitidae MOJSISOVICS, 1882

Genus *Joannites* MOJSISOVICS, 1879

Type species: *Nautilus cymbiformis* WULFEN, 1793

***Joannites* cf. *tridentinus* (MOJSISOVICS, 1869)**

Plate IV: 2, Figure 27.

*1869 *Ammonites* (*Arcestes*) *Tridentinus* MOJS. n. sp. – MOJSISOVICS, Die Gliederung, p. 137.
non 1870 *Arcestes Tridentinus* MOJS. – MOJSISOVICS, Oenische Gruppe, p. 103, pl. IV, figs. 1, 2.
1882 *Joannites* (?) *tridentinus* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 168, pl. XLVII.
v 1903 *Joannites tridentinus* MOJS. em. FRECH. – FRECH, Neue Cephalopoden, p. 36., pl. VIII, fig. 1, pl. IX, fig. 1.
1927 *Joannites tridentinus* MOJSISOVICS em. FRECH. – OGILVIE GORDON, Gröden, p. 53, pl. VI, fig. 15.
v 1998 *Joannites tridentinus* MOJSISOVICS, 1869 – VÖRÖS, Balaton-felvidék, p. 45, 54, 55, pl. XIII, fig. 7, pl. XVI, fig. 2.
2025 *Joannites* cf. *tridentinus* (MOJSISOVICS, 1869) – ĐAKOVIĆ et al., Durmitor, p. 32, figs. 15e–g.

Material: Two partly fragmentary specimens from Katrabóca at Nemesvámos (*Fig. 1b, Fig. 8*).

Measurements:

Identity No.	D	Wh	Ww	U
M.98.132.	108.5	56.2	?	9.1
M.98.98.	56	28	?	4.8

Description: Medium-sized *Joannites* with gently globose, thickly discoidal conch. The whorl-section is weakly compressed, with maximum width near the umbilicus at the body chamber. The umbilicus is narrow. The flanks are evenly convex and form a continuous arch with the arched venter. The shell surface is smooth, without ornamentation. The larger specimen shows four, gently sinuous prorsiradiate constrictions, which are arched adorally on the venter.

The suture line (*Fig. 27*) is ammonitic, with high and well denticulated ventral saddle; the first lateral saddle is wide and divided into two branches by a deep secondary lobe.

Remarks: The generic attribution of our specimens to *Joannites* was based partly on the character of the constrictions, which are strongly projected on the ventral margin. The partial suture line, with bipartite first lateral saddle endorses this judgement.

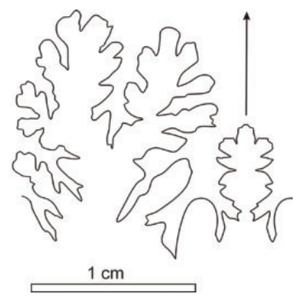


Figure 27. Suture line of *Joannites* cf. *tridentinus* (MOJSISOVICS, 1869) (M.89.132.), at 36 mm whorl-height, Katrabóca II, Bed 9, Longobardian, Archelaus Zone; arrow: adoral direction

The species name *tridentinus* was introduced by MOJSISOVICS (1869, l.c.) without figure. The first specimen illustrated by him under the name *"Arcestes tridentinus"* from Vörösberény (Balaton area) (MOJSISOVICS 1870, p. 103, pl. IV, figs. 1, 2), was later removed to the newly introduced species *"Arcestes subtridentinus"* (MOJSISOVICS 1875, p. 91, pl. LVIII, fig. 20). On the other hand, the species *tridentinus* was placed into the genus *Joannites*, characterized by adorally arched constrictions on the venter (MOJSISOVICS 1882, l.c.).

Distribution: J. tridentinus was described from the Ladinian of the Southern Alps and the Dinarides. At the Balaton Highland it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Joannites cf. *trilabiatus* MOJSISOVICS, 1882

Plate IV: 1; Figures 28, 29.

v *1882 *Joannites trilabiatus* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 167, pl. XLII, fig. 2.
? 1915 *Joannites trilabiatus* MOJS. var. *anatolica* ARTH. – ARTHABER, Bithynien, p. 165, pl. XV, figs. 3, 4.
v 1998 *Joannites* cf. *trilabiatus* MOJSISOVICS, 1882 – VÖRÖS, Balaton-felvidék, p. 54, pl. XVI, fig. 1.

Material: One partly fragmentary specimen from Becserpuszta at Dörgicse (*Fig. 1b*). The holotype of this species from the Forrás Hill at Felsőörs (*Fig. 1b*), kept in the collections of the former Geological Institute of Hungary (SARA), was also inspected and a photographic illustration is added here.

Measurements:

Identity No.	D	Wh	Ww	U
T.1714.	114	61	46	10
M.87.052.	85.1	39.8	37.2	11.1

Description: Medium-sized to large *Joannites* with gently globose, thickly discoidal conch. The whorl-section is weakly compressed, with maximum width near the umbilicus at the body chamber. The umbilicus is narrow but not occluded. The flanks are evenly convex and pass gradually to the arched venter. The shell surface is smooth, without ornamentation. The type specimen (*Fig. 28*) shows two sinuous, prorsiradiate



Figure 28. *Joannites* cf. *trilabiatus* MOJSISOVICS, 1882, holotype (T.1714.); Felsőörs, Longobardian, Archelaus Zone

constrictions which are strongly bent adorally on the venter; one constriction on the poorly preserved smaller specimen shows the same character.

The suture line (*Fig. 29*) is ammonitic, with at least five lateral lobes and saddles. The first lateral lobe is extremely deep; the first lateral saddle is wide and divided into two branches by a deep secondary lobe.

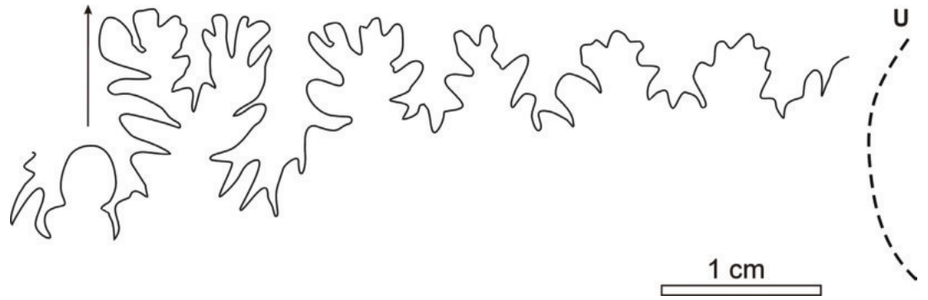


Figure 29. Suture line of *Joannites* cf. *trilabiatus* MOJSISOVICS, 1882 (M.87.052.), at 37 mm whorl-height, Dörgicse (Becserpuszta), loose, Longobardian, Archelaus Zone; u: umbilical margin; arrow: adoral direction

Remarks: J. trilabiatus was described by MOJSISOVICS (1882, l.c.) from Felsőörs and the type specimen was examined, and the second specimen from Dörgicse was compared to the type. This species is very similar to *J. tridentinus* but has fewer constrictions per whorl (two, in contrast to four in *tridentinus*). Moreover, the adoral arching of the constrictions are more expressed in *J. trilabiatus* than in *J. tridentinus*.

The variant *anatolica*, described by ARTHABER (1915, l.c.) seems to fit into the range of morphological variation of the species *J. trilabiatus*, and its suture line is also very similar to that of our specimen as illustrated here (*Fig. 29*).

Distribution: J. trilabiatus was described from the Ladinian of the Balaton Highland and probably from Anatolia. Recently it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Joannites cf. *joannisaustriae* (KLIPSTEIN, 1843)

Plate XXXIX: 1.

*1843 *Ammonites Johannis Austriae*. – KLIPSTEIN, Östl. Alpen, p. 105, pl. V, fig. 1.
1875 *Arcestes Johannis Austriae* KLIPSTEIN sp. – MOJSISOVICS, Ceph. Hallst. Kalke, p. 83, pl. LXI, fig. 4; pl. LXIV.
1882 *Joannites Joannis Austriae* (v. KLIPSTEIN) E. v. M. – MOJSISOVICS, Mediterr. Triasprovinz, p. 169.
1910a *Joannites Joannis Austriae* KLIPST. – RENZ, Stratigaphisch., p. 521, pl. XXII, fig. 4.
1910b *Joannites Joannis Austriae* KLIPSTEIN. – RENZ, Argolis, p. 84, pl. VII, fig. 1.
v 1998 *Joannites* cf. *joannisaustriae* (KLIPSTEIN, 1843) – VÖRÖS, Balaton-felvidék, p. 55, pl. XV, fig. 3.

Material: One moderately preserved specimen from the Meggy Hill at Pécsely (*Fig. 1b*).

Measurements:

Identity No.	D	Wh	Ww	U
M.89.15.	68	35.5	?	9.8

Description: Medium-sized *Joannites* with gently globose, thickly pachyconic conch. The whorl-section is moderately compressed, with maximum width near the umbilicus at the body chamber. The umbilicus is narrow

but not occluded. The flanks are strongly convex and pass gradually to the arched venter. The shell surface is smooth, without ornamentation. The specimen has two gently sinuous, prorsiradiate constrictions which are strongly bent adorally on the venter.

The suture line is poorly preserved, ammonitic. The ventral saddle is well denticulated; the first lateral saddle is wide and divided into two branches of nearly equal size.

Remarks: According to MOJSISOVICS (1882, p. 169), *J. joannisaustriae* differs from the similar *J. tridentinus* (MOJSISOVICS, 1869) in having only two constrictions in contrast to the four constrictions on the latter. Our specimen bears two consrictions what is considered the evidence of the specific identification. The character of the wide first lateral saddle, divided into two equal branches, supports the generic attribution to *Joannites*.

Distribution: J. joannisaustriae was described from the Ladinian and Carnian of the Northern Calcareous Alps and the Hellenides. At the Balaton Highland it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Superfamily Danubitoidea SPATH, 1951

Family Aplococeratidae SPATH, 1951

Genus *Aplococeras* HYATT, 1900

Type species *Dinarites avisianus* MOJSISOVICS, 1882

***Aplococeras* ? *probasileus* (FRECH, 1903)**

Figure 30.

v * 1903 *Trachyceras Probasileus* nov. sp. – FRECH, Neue Cephalopoden, p. 27, pl. V, figs. 3a, 3b.

Material: One moderately preserved specimen; the holotype of this species from Katrabóca at Nemesvámos (*Fig. 1b, Fig. 7* and *Fig. 8*), kept in the collections of the former Geological Institute of Hungary (SARA).

Measurements:

Identity No.	D	Wh	Ww	U
T.904.	19.5	6.5	5.9	9.5



Description: Small *Aplococeras* with very evolute, nearly serpenticone conch (*Fig. 30*). The whorl-section is oval. The umbilical wall is subrounded. The flanks are moderately convex, form continuous curve from the umbilicus to the arched venter. The flanks of the body chamber are almost smooth. There are weak bulges near the umbilicus and around 20 stronger ventral nodes per half whorl. These nodes show increasing density towards the aperture. There is a flat, smooth strip on the venter between the ventral rows of nodes. The phragmocone is almost smooth.

← ***Figure 30.*** *Aplococeras* ? *probasileus* (Frech, 1903), holotype (T.904.); Katrabóca, Longobardian, Archelaus Zone

A drawing of suture line was figured by FRECH (1903, l.c. fig. 3b), showing gently denticulated lobes and entire, smooth saddles.

Remarks: When introduced "*T. probasileus*", FRECH (1903, l.c.) compared his single specimen to "*Trachyceras*" *basileus* (MÜNSTER, 1841), and considered the new species a forerunner of the Carnian species. MOJSISOVICS (1882, p. 98, pl. XXIV, figs. 24, 25, 27-31) described and illustrated several small specimens of this species which show moderately involute and compressed, weakly ornamented conch, with dense rows of ventral nodes, with a distinct, narrow ventral groove between them. These are indeed "*Trachyceras*"-like morphological features. In contrast, *A. probasileus* is very evolute, has oval whorl section, a flat strip between the rows of ventral nodes, and has ceratitic suture; all disproving an attribution to "*Trachyceras*" or *Protrachyceras*. On the other hand, the general shape and the ornament of the type species are similar to certain ornamented *Aplococeras* species, e.g. *A. avisianum* (MOJSISOVICS, 1882), *A. laczkoi* (ARTHABER, 1903). The ceratitic suture also supports the attribution to *Aplococeras*.

Distribution: A. probasileus was described only from the Ladinian of the Balaton Highland.

Family Danubitidae SPATH, 1951

Subfamily Arpaditinae HYATT, 1900

Genus *Arpadites* MOJSISOVICS, 1879

Type species: *Ammonites arpadis* MOJSISOVICS, 1870

***Arpadites arpadis* (MOJSISOVICS, 1870)**

Plate IV: 3–4; Plate V: 1–10; Figures 31–33.

v * 1870 *Ammonites Arpadis* MOJS. nov. sp. – MOJSISOVICS, Oenische Gruppe, p. 109, pl. V, fig. 6.
v 1872 *Ammonites Arpadis* MOJS. – BÖCKH, Bakony déli, p. 156, pl. IX, figs. 12–14.
v 1873 *Ammonites Arpadis* MOJS. – BÖCKH, Südlich. Bakony, p. 167, pl. IX, figs. 12–14.
v 1882 *Arpadites Arpadis* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 54, pl. XXV, fig. 29.
? 1900 *Arpadites Arpadis* MOJS. var. *carnicus* mihi. – TOMMASI, Clapsavon, p. 21, pl. III, figs. 2, 2a.
v 1903 *Arpadites Arpadis* MOJS. – FRECH, Neue Cephalopoden, p. 30., pl. X, figs. 8a, 8b.
1914 *Arpadites Arpadis* MOJS. – DE TONI, Valdepena, p. 130, pl. X, fig. 6.
non 1927 *Arpadites Arpadis* MOJSISOVICS. – OGILVIE GORDON, Gröden, p. 63, pl. VII, fig. 17a, 17b.
? 1960 *Arpadites* (*Arpadites*) *arpadis* (MOJSISOVICS) 1870. – ROSSI RONCHETTI, Grigne, p. 29, pl. V, fig. 2.
non 1976 *Arpadites arpadis* (MOJS.) – WANG & HE, Jolmo Lungma, p. 328, pl. 15, figs. 4–6, text-fig. 30a.
v 1998 *Arpadites arpadis* (MOJSISOVICS, 1870) – VÖRÖS, Balaton-felvidék, p. 44, 54, pl. X, figs. 5–7.
v 2003 *Arpadites* cf. *arpadis* (MOJSISOVICS) – PÁLFY et al., U–Pb geochronology, p. 274, fig. 5/j.
? 2018 *Arpadites arpadis* (MOJSISOVICS, 1870) – MIETTO et al., Recoaro and Tretto, p. 228, pl. 1, figs. 2a, b.
v 2024 *Arpadites arpadis* (MOJSISOVICS, 1870) – VÖRÖS et al., Nemesvámos, p, 403, pl. VII, figs. 2–7.
v 2025 *Arpadites arpadis* (MOJSISOVICS, 1870) – VÖRÖS et al., Király Hill, p. 314, pl. I, figs. 6–10.

Material: 15 illustrated and measured specimens (including the type material kept in the collections of the former Geological Institute of Hungary, SARA), from the Megye Hill (1) at Vörösberény, the Csukrét Gully (2) at Balatoncsicsó, from Katrabóca (3) at Nemesvámos, from the Király Hill (8) at Veszprémfajsz and from the Gyűr Hill (1) at Nemesvámos (*Fig. 1b, Fig. 4, Fig. 7, Fig. 8, Fig. 10* and *Fig. 11*).

Measurements:

Identity No.	D	Wh	Ww	U
T.868. holo	38.8	10.2	?	20.2
T.192.	37.5	11.3	6.9	19.3
T.187.	34.2	9.0	7.4	?
BM-9.	61.5	15.8	10.6	30.8
BM-10.	46.9	15.6	9.1	19.7
BM-11.	50.5	13	8.5	27.5
BM-12.	56.2	15.2	10.1	30.1
BM-13.	53.2	13.1	8.6	27.5
BM-14.	58.2	15.2	11.5	29.5
PZs-8.	53.8	16.5	12.5	25.2
PZs-9.	53.1	13.7	11	28.1
BM-15.	56.8	14.1	?	32.2
BM-16.	60	16.5	?	32.4
BM-17.	37.2	11.4	7.9	18.1
BM-18.	28.2	7.3	6.1	14.7

Description: Medium-sized to large *Arpadites* with very evolute, moderately compressed serpenticone conch (U/D= 0.42 to 0.55; mean=0.51). The whorl-section is oval to subquadrate. The umbilical wall is steep; the umbilical margin is subrounded. The flanks are nearly flat and join with a marked margin to the arched venter. The flanks are ornamented with nearly rectiradiate and gently sinuous ribs, rather strong on the phragmocone (20 to 28 on a half whorl) and becoming finer and denser on the body chamber. The ribs start near the umbilicus with fine bulges; their strength increases towards the venter; secondary ribs of similar strength appear as intercalations around the half of the flanks. Rarely looped (fibulate) ribbing occurs (*Pl. IV: 3; Pl. V: 1*). The ventral endings of the ribs bear projected nodes along the ventrolateral shoulder. The venter is bicarinate. The keels are separated from the ventrolateral shoulder by a shallow depression. They portray various morphology. On the holotype these are hardly seen (*Fig. 31*).

On typical specimens the keels are simple, almost smooth, divided by a definite groove (*Pl. I: 4; Pl. V: 4, 5; Fig. 32*). In other cases, the keels are markedly crenulated with fine nodes; the intermediate groove is almost absent or very shallow and crossed by fine riblets connecting the fine nodes across the groove (*Pl. IV: 3; Fig. 33*).



← ***Figure 31.*** *Arpadites arpadis* (MOJSISOVICS, 1870) holotype (T.868.); Vörösberény, Longobardian, Archelaus Zone. A: original figures in MOJSISOVICS (1870, pl. V, fig. 6), a: lateral view, b: ventral view. B: photographs of the holotype specimen, a: lateral view, b: ventral view of the last part of the body chamber, indicated by arrow. Bottom: hand-written label by Böckh (from 1869)

Suture lines were not seen in the presently available material. MOJSISOVICS (1882, l.c.) gave a short description indicating a ceratitic suture ("Sattelköpfe ganzrandig, abgerundet.").

Remarks: The early history of the changing concept of the species "*Ammonites arpadis*" is an intriguing example of the case "type which is not typical".

MOJSISOVICS's (1870, l.c.) original, figured type specimen of *A. arpadis* from "Gelemér" (a once-existed settlement between Kádárta and Sóly, see Lóczy map, 1920) was indicated as a missing type in the comprehensive catalogue by BODA (1964, p. 146). The present author, helped by the staff of the collections of SARA, made successful efforts to find again this specimen. It is an incomplete, crushed and badly worn specimen (*Fig. 31B*) and the illustration is complemented and unrealistic (*Fig. 31A*). Nevertheless, it must be regarded as the holotype by monotypy of *A. arpadis*. It was endorsed by J. BÖCKH (who collected the specimen) on the label by his signature and hand-written note: "Eredeti példány [original specimen] Mojsisovics Cephal. d. önischen Gruppe Jahrbuch 20 Bd. Taf. V. fig 6.".



Figure 32. *Arpadites arpadis* (MOJSISOVICS, 1870). Photograph of a specimen considered typical by BÖCKH (1872, p. 156, pl. IX, fig. 12) (T.192.); Szentantalfa (now Balatoncsicsó), Longobardian, Archelaus Zone



Figure 33. *Arpadites arpadis* (MOJSISOVICS, 1870). Photograph of another specimen considered typical by BÖCKH (1872, p. 156, pl. IX, fig. 13) (T.187.); Szentantalfa (now Balatoncsicsó), Longobardian, Archelaus Zone

A minor problem (a contradiction) is that MOJSISOVICS (1870, l.c.) in the explanation to his pl. V. indicated "Gelemér" as the locality of the figured specimen of *A. arpadis*, whereas "Vörös-Berény" is written on Böckh's label (and the latter is evidently the correct); Mojsisovics probably mistook the name of the locality.

A major problem lies in the state of preservation of the holotype specimen. In fact, it does not portray any diagnostic morphological features, moreover some of the characters are obviously invented on the figure by MOJSISOVICS (1870, pl. V, fig. 3). This trouble was soon realized by BÖCKH (1872, l.c.; 1873, l.c.) who, based on a series of newly collected specimens, gave an emended and extended description of *A. arpadis*. He recognized and illustrated the morphological variants, particularly in the shape and ornamentation of the ventral regions, and illustrated two representative specimens from the locality Szentantalfa (now Balatoncsicsó) (BÖCKH l.c., pl. IX, figs. 12-14). These Böckh's original specimens were found in the collections of SARA, and their photographs are portrayed here (*Fig. 32; Fig. 33*). One of these, an almost complete specimen from Szentanatalfa

(now Balatoncsicsó), was also figured in high quality by MOJSISOVICS (1882, pl. XXV, fig. 29). Apparently, both Böckh and Mojsisovics intended to consider this specimen a typical representative of the species *A. arpadis*. Although it is not the holotype, it must be treated as the basic reference in identifying the species *A. arpadis*.

The specimens illustrated by OGILVIE GORDON (1927, l.c.) portray extremely strongly prorsiradiate ribbing, thus do not belong to *A. arpadis*.

Some of the items of the synonymy list (ROSSI RONCHETTI 1960, l.c.; MIETTO et al. 2018, l.c.) are queried because of the poor state of preservation or the poor quality of illustration.

The specimen illustrated by WANG & HE (1976, l.c.) does not belong to *A. arpadis*, instead it has a ribbing very similar in character and density to *A. szaboi* (BÖCKH, 1872).

Distribution: A. arpadis was described from the Ladinian of the Balaton Highland and the Southern Alps. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Arpadites szaboi (BÖCKH, 1872)

Plate V: 11; Plate VI: 1–8; Plate VII: 1, 2, 4; Figure 34.

v * 1872 *Ammonites Szabói* n. sp. – BÖCKH, Bakony déli, p. 158 (partim), pl. X, fig. 16, (non fig. 17.)
v 1873 *Ammonites Szabói* n. sp. – BÖCKH, Südlich. Bakony, p. 170 (partim), pl. X, fig. 16, (non fig. 17.)
v 1882 *Arpadites Szaboi* (BOECKH) E. v. M. – MOJSISOVICS, Mediterr. Triasprovinz, p. 55, pl. XXVI, fig. 2.
v 1903 *Arpadites Szabói* MOJS. – FRECH, Neue Cephalopoden, p. 31., pl. X, figs. 7a, 7b.
1960 *Arpadites* (*Arpadites*) *szaboi* (BOECKH) 1873. – ROSSI RONCHETTI, Grigne, p. 31 (partim), pl. V, figs. 6, 7 (only).
1976 *Arpadites arpadis* (MOJS.) – WANG & HE, Jolmo Lungma, p. 328, pl. 15, figs. 4–6, text-fig. 30a.
v 1998 *Arpadites szaboi* (BÖCKH, 1872) – VÖRÖS, Balaton-felvidék, p. 45, pl. XII, figs. 2–4.
v 2024 *Arpadites szaboi* (BÖCKH, 1872) – VÖRÖS et al., Nemesvámos, p, 403, pl. VIII, figs. 1–8.
v 2025 *Arpadites szaboi* (BÖCKH, 1872) – VÖRÖS et al., Király Hill, p. 314, pl. II, figs. 1–3, 4.

Material: 13 illustrated and measured specimens (including the type specimen kept in the collections of the former Geological Institute of Hungary, SARA), from the Csukrét Gully (2) at Balatoncsicsó, from Katrabóca (5) at Nemesvámos, from the Király Hill (4) at Veszprémfajsz, from the Som Hill (1) at Nemesvámos and from the Öreg Hill (1) at Vászoly (*Fig. 1b, Fig. 4, Fig. 7, Fig. 8, Fig. 10* and *Fig. 5*).

Measurements:

Identity No.	D	Wh	Ww	U
T.167. holo	45	15.5	10.8	14.5
BM-19.	34.4	11.8	7.2	13..5
BM-20.	68.1	17.3	11.1	33.1
BM-21.	49.5	13.5	10.2	25.7
PZs-10.	61.2	17.1	13.1	31.5
PZs-11.	48.2	14.5	8.5	32.1
PZs-12.	51.1	14.6	9.2	23.4
PZs-13.	39.4	11.6	7.5	18.1
BM-22.	49.6	13.6	9.9	24.1
BM-25.	61.5	17.3	12.4	29.1
INV 2026.33.	55.6	14.5	?	27.2
INV 2026.34.	26.7	8.1	7	12.9
INV 2026.35.	31.2	?	?	?

Description: Medium-sized to large *Arpadites* with evolute, moderately compressed serpenticone conch (U/D= 0.37 to 0.52; mean=0.48). The whorl-section is subquadrate to high oval. The umbilical wall is steep; the umbilical margin is subrounded. The flanks are nearly flat and join with a well-defined margin to the arched venter. The flanks are ornamented with slightly prorsiradiate and sinuous, gently falcoid ribs, somewhat stronger on the phragmocone (26 to 44 on a half whorl). The ribs start at the umbilical rim with fine bulges; their strength only slightly increases towards the venter. Fibulate ribbing rarely occurs (*Pl. VI: 2; Pl. VII: 1*). Secondary ribs of similar strength appear as intercalations in the inner third of the flanks; bifurcations are rare. In some cases, a few ribs bear indistinct nodes at mid-flank (*Pl. VII: 1; Fig. 34*). The ventral endings of the ribs bear strongly projected nodes along the ventrolateral shoulder; in some cases, these nodes split into fine riblets on the body chamber (*Pl. VI: 6*). The venter is bicarinate. The keels are separated from the ventrolateral shoulder by a shallow depression. Frequently the keels are simple, smooth, or gently crenulated and divided by a definite intermediate groove (*Pl. VI: 2, 6; Fig. 34*). In other cases, the keels are markedly crenulated, sometimes with coarse nodes (*Pl. VII: 1*) or the intermediate groove is very shallow or absent (*Pl. VI: 1*).

Suture lines were not seen in the presently available material.



Figure 34. *Arpadites szaboi* (BÖCKH, 1872), holotype (T.167.); Szentantalfa (now Balatoncsicsó), Longobardian, Archelaus Zone

Remarks: In the description of the new species *A. szaboi*, BÖCKH (1872, p. 158; 1873, p. 170) illustrated two, apparently different specimens (l.c., pl. X, figs. 16, 17). MOJSISOVICS (1882, l.c.) recognized the difference and indicated the specimen on BÖCKH's pl. X, fig. 16, as the type of *A. szaboi* (*Fig. 34*), whereas he described the other specimen (BÖCKH's pl. X, fig. 16) as a new species *A. toldyi*. This latter differs from *A. szaboi* by denser ribbing, narrower whorls, much narrower venter with closely spaced keels.

A. szaboi is similar to *A. arpadis* (MOJSISOVICS, 1870) but differs by its more numerous and slightly falcoid ribs, higher whorls and narrower umbilicus.

Two specimens illustrated by ROSSI RONCHETTI (1960, pl. V, figs. 6, 7) may correspond to *A. szaboi*. Others (l.c., pl. V, figs. 3–5) and (l.c., pl. V, fig. 8), rather belong to *A. telleri* MOJSISOVICS, 1882, and *A. bercsenyii* VÖRÖS, 2025, respectively.

The specimens figured as *A. arpadis* (MOJS.) by WANG & HE (1976, l.c.), are regarded here as representatives of *A. szaboi*, on the basis of their dense and falcoid ribbing.

Distribution: A. szaboi was described from the Ladinian of the Balaton Highland, the Southern Alps and the Himalayas. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

***Arpadites toldyi* MOJSISOVICS, 1882**

Plate VII: 3; Plate VIII: 8; Figure 35.

v 1872 *Ammonites Szabói* n. sp. – BÖCKH, Bakony déli, p. 158 (partim), pl. X, fig. 17, (non fig. 16.)
v 1873 *Ammonites Szabói* n. sp. – BÖCKH, Südlich. Bakony, p. 170 (partim), pl. X, fig. 17, (non fig. 16.)
v * 1882 *Arpadites Toldyi* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 56, pl. XXVI, fig. 1.
v 1903 *Arpadites Toldyi* MOJS. – FRECH, Neue Cephalopoden, p. 32., text-fig. 11.
v non 1998 *Arpadites toldyi* MOJSISOVICS, 1882 – VÖRÖS, Balaton-felvidék, p. 45; pl. XI, figs. 4, 5.
v 2025 *Arpadites toldyi* MOJSISOVICS, 1882 – VÖRÖS et al., Király Hill, p. 308, pl. II, fig. 5.

Material: Three specimens (including the type specimen kept in the collections of the former Geological Institute of Hungary, SARA), from the Csukrét Gully (1) at Balatoncsicsó, from the Király Hill (1) at Veszprémfajsz and from the Gyűr Hill (1) at Nemesvámos (*Fig. 1b, Fig. 4, Fig. 7, Fig. 10* and *Fig. 11*).

Measurements:

Identity No.	D	Wh	Ww	U
T.188. holo	45.1	14.7	7.9	18.1
BM-26.	46.1	14.2	8.6	20.8
PZs-21.	59.3	20.5	12.4	22

Description: Large *Arpadites* with evolute, compressed serpenticone conch (U/D= 0.40 to 0.45; mean=0.44). The whorl-section is high oval. The umbilical wall is steep; the umbilical margin is well-defined. The flanks are nearly flat and join gradually to the highly arched venter. The flanks are ornamented with slightly prorsiradiate and sinuous, gently falcoid ribs (44 to 52 on a half whorl); the ribs become very dense and thread-like on the body chamber. The ribs start at the umbilical rim with fine nodes; their strength only slightly increases towards the venter. Weaker secondary ribs appear as intercalations near the umbilical rim; bifurcations rarely occur in the outer third of the flanks. Fasciculate ribbing occurs at the body chamber (*Plate VII: 3; Fig. 35*). The ventral endings of the ribs are strongly projected along the ventrolateral shoulder and without any nodes, almost reach the ventral keels. The venter is bicarinate. The keels are simple, smooth, or very gently crenulated and divided by a definite intermediate groove (*Pl. VII: 3*).



Figure 35. *Arpadites toldyi* MOJSISOVICS, 1882, holotype (T.188.); Szentantalfa (now Balatoncsicsó), Longobardian, Archelaus Zone

The suture line is poorly preserved, ceratitic (*Fig. 35*). The first lateral lobe is deep and crenulated; the second lateral lobe is shallower and narrower; the second lateral saddle is wide and entire.

Remarks: The holotype of *A. toldyi* was included in the description of *A. szaboi*, BÖCKH (1872, p. 158; 1873, p. 170) and was illustrated as well (l.c., pl. X, fig. 17). MOJSISOVICS (1882, l.c.) recognized that this specimen represented a new species and gave an exhaustive description of *A. toldyi*. This species differs from *A. szabói* by denser ribbing, narrower whorls, much narrower venter with closely spaced keels and faint but marked umbilical nodes.

The poorly preserved fragments figured by VÖRÖS (1998, l.c.) as *A. toldyi* are now regarded as belonging to *A. szaboi*.

Distribution: A. toldyi was described from the Ladinian of the Balaton Highland. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

***Arpadites telleri* MOJSISOVICS, 1882**

Plate VII: 5–7, 10; Plate XXXIX: 2, 4.

v * 1882 *Arpadites Telleri* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 59 (partim), pl. XXVII, figs. 10–13, 15.
1898 *Arpadites Telleri* MOJS. – TORNQUIST, Vicentin, p. 649 (partim), pl. XX, fig. 6. (? fig. 5)
v 1903 *Arpadites Telleri* MOJS. – FRECH, Neue Cephalopoden, p. 30., pl. X, fig. 6.
? 1960 *Arpadites* (*Arpadites*) *telleri* MOJSISOVICS 1882. – ROSSI RONCHETTI, Grigne, p. 32, pl. V, fig. 1.
1960 *Arpadites* (*Arpadites*) *szaboi* (BOECKH) 1873. – ROSSI RONCHETTI, Grigne, p. 31 (partim), pl. V, figs. 3–5 (only).
v non 1998 *Arpadites telleri* MOJSISOVICS, 1882 – VÖRÖS, Balaton-felvidék, p. 45, p. 98, pl. XIII, fig. 5.
? 2018 *Arpadites* cf. *telleri* MOJSISOVICS, 1882 – MIETTO et al., Recoaro and Tretto, p. 230, pl. 1, figs. 4a, b.
v 2024 *Arpadites telleri* MOJSISOVICS, 1882 – VÖRÖS et al., Nemesvámos, p, 404 (partim), pl. IX, fig. 5.
v 2025 *Arpadites telleri* MOJSISOVICS, 1882 – VÖRÖS et al., Király Hill, p. 307 (partim), pl. II, figs. 7, 11.

Material: Six specimens from Katrabóca at Nemesvámos (1), Király Hill at Veszprémfajsz (4) and Csukrét Gully at Balatoncsicsó (1).

Measurements:

Identity No.	D	Wh	Ww	U
PZs-15.	35.5	9.7	7.4	16.4
PZs-16.	55.1	16.8	10.6	24.8
PZs-17.	41.3	11.8	8.8	19.1
BM-27.	24.5	6.8	5.6	12.4
BM-98.	39.1	11.5	8.1	19.6
FG-1.	54.9	17.3	10.3	25.8

Description: Medium-sized to large *Arpadites* with evolute, moderately compressed serpenticone conch (U/D= 0.41 to 0.46; mean=0.45). The whorl-section is oval to subquadrate. The umbilical wall is steep; the umbilical margin is subrounded. The flanks are nearly flat and join with a marked rim to the moderately arched venter. The flanks are ornamented with nearly rectiradiate or gently projected ribs (14 to 20 on a half whorl) of similar strength on the phragmocone and on the body chamber. The ribs start near the umbilicus with definite nodes of various strength; they become stronger towards the venter. Secondary ribs rarely intercalate around the inner third of the flanks. Strong nodes appear on each rib at the mid-flank. The slightly projected ventral endings of the ribs bear strong nodes or clavi along the ventrolateral shoulder in regular arrangement. The venter is bicarinate. The keels are gently separated from the ventrolateral shoulders by very shallow depressions. The keels are simple, almost smooth, divided by a definite intermediate groove.

Suture lines were not seen in the presently available material. MOJSISOVICS (1882, l.c.) gave a short description indicating a ceratitic suture (“Spitzgerundete Sättel.”).

Remarks: Arpadites telleri has some similarity to *A. arpadis* (MOJSISOVICS, 1870) in the character of the rectiradiate ribbing, but differs in the narrower and simply bicarinate venter and the definite lateral row of nodes. The narrowly bicarinate venter is shared with *A. toldyi* MOJSISOVICS, 1882, but the coarse ribbing and nodes make clear difference. The specimens figured by MOJSISOVICS (l.c.) were checked by the author in the collection of the Geologische Bundesanstalt (Vienna).

The row of marked lateral nodes at mid-flank, characterizing *A. telleri* is a feature appearing in some other species of *Arpadites*, e.g. "*A. manzonii*" (BENECKE, 1876), and even of *Argolites* (*A. nodosus* VÖRÖS, 2025). The overlooking of the extra row(s) of lateral nodes in other related species, e.g. *A. bercsenyii* VÖRÖS, 2025 and "*A*. aff. *manzonii*" presents further source of error in identification of *A. telleri*. This pitfall was not escaped by some authors, including the present one.

MOJSISOVICS (1882, l.c.) illustrated an *Arpadites* specimen with two rows of lateral nodes under the name *A. telleri*, which was recently ranked into *A. bercsenyii* by VÖRÖS (2025).

ROSSI RONCHETTI (1960, pl. V, figs. 3-8) illustrated a series of specimens under the name *A. szaboi* (BÖCKH, 1872). Two of these (l.c., figs. 3-5) are regarded here as *A. telleri*; the specimen on pl. V, fig. 8. is probably an *A. bercsenyii*.

The specimen figured by VÖRÖS (1998, l.c.) does not belong to *A. telleri* because it shows double rows of lateral nodes. Instead, it represents a new species decribed later in the present work.

MIETTO et al. (2018, l.c.) figured a partially preserved specimen where the diagnostic lateral part is concealed by matrix. Therefore, it is included into the synonymy only with question mark.

One of the specimens of *A. telleri* figured by VÖRÖS et al. (2024, l.c., pl. IX, fig. 1) is now regarded as belonging to "*A*." *manzonii* on the basis of narrower umbilicus.

VÖRÖS et al. (2025, l.c.) wrongly used a too wide interpretation of *A. telleri*. Two specimens (l.c., pl. II, figs. 7, 11) correspond to *A. telleri*. On the other hand, in the light of the continuing work on newly collected larger material, the specimens on pl. II, fig. 6 and fig. 10 are now considered „*A*." *manzonii* (BENECKE, 1876) and a new species related to „*A*." *manzonii*, respectively, whereas the specimen on pl. II, fig. 8 is regarded as *Argolites nodosus* VÖRÖS, 2025.

Distribution: A. telleri was described from the Ladinian of the Southern Alps and the Balaton Highland. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Arpadites cf. *bracki* FANTINI SESTINI, 1994

Plate VI: 9–11.

* 1994 *Arpadites bracki* sp. n. – FANTINI SESTINI, Esino, p. 262, pl. 11, figs. 13, 14.
v 2024 *Arpadites* cf. *bracki* FANTINI SESTINI, 1994) – VÖRÖS et al., Nemesvámos, p, 404, pl. IX, figs. 2–4.
v 2025 *Arpadites* cf. *bracki* FANTINI SESTINI, 1994 – VÖRÖS et al., Király Hill, p. 307, pl. II, fig. 9.

Material: Three partly incomplete specimens from Katrabóca (2) at Nemesvámos and from the Király Hill (1) at Veszprémfajsz (*Fig. 1b, Fig. 7, Fig. 8* and *Fig. 10*).

Measurements:

Identity No.	D	Wh	Ww	U
BM-23.	36.2	11.5	8.1	16.6
BM-24.	39.7	12.5	?	18.2
PZs-14.	40.4	9.8	7.8	19.6

Description: Medium-sized *Arpadites* with evolute, moderately compressed serpenticone conch (U/D= 0.46 to 0.49; mean=0.47). The whorl-section is subquadrate. The umbilical wall is steep; the umbilical margin is well-defined. The flanks are gently convex and join with a marked rim to the nearly flat venter. The flanks are ornamented with rectiradiate ribs, very strong on the phragmocone (16 to 18 on a half whorl) and becoming finer and somewhat diffuse on the body chamber. The ribs start near the umbilicus with very strong nodes or rather swellings; their strength decreases towards the venter; weak secondary ribs appear as intercalations near the umbilical margin. The ventral endings of the ribs are smooth or bear weak nodes along the ventrolateral shoulder. The venter is bicarinate. The keels are are simple, almost smooth, divided by a definite intermediate groove.

Suture lines were not seen in the presently available material.

Remarks: On the basis of the characteristic lateral ornament (strong rectiradiate ribs or swellings fading out ventrally), our specimens were tentatively identified with *A. bracki*. Doubts are justified by the differences in the venter; it is highly arched and narrow in typical *A. bracki* (see FANTINI SESTINI 1994, l.c.), whereas our specimen on *Pl. VI: 11* portrays a rather wide, flat venter.

The inner whorls of one of our specimens (*Pl. VI: 9*) has strong bifurcating ribs, alike to the ornamentation of *Arpadites trettensis* MOJSISOVICS, 1882 (MOJSISOVICS 1882, pl. XXXI, fig. 4).

Distribution: A. bracki was described from the Ladinian of the Southern Alps and the Balaton Highland. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Arpadites bercsenyii VÖRÖS, 2025

Plate VII: 8, 9, 11–13; Plate XXXIX: 3.

v 1882 *Arpadites Telleri* E. v. MOJSISOVICS, – MOJSISOVICS, Mediterr. Triasprovinz, p. 59 (partim), pl. XXVII, fig. 14 (only).
1960 *Arpadites* (*Arpadites*) *szaboi* (BOECKH) 1873. – ROSSI RONCHETTI, Grigne, p. 31 (partim), pl. V, fig. 8.
v * 2025 *Arpadites bercsenyii* n. sp. – VÖRÖS et al., Király Hill, p. 308 (partim), pl. II, fig. 12; pl. III, figs. 1, 2, 13. (only).

Material: Six, partly fragmentary specimens from Veszprémfajsz, Király Hill (*Fig. 1b, Fig. 7* and *Fig. 10*).

Measurements:

Inventory No.	D	Wh	Ww	U
PAL 2025.6.1.	48.8	15.9	9.4	21.3
BM-28.	42.4	14.4	8.6	18.2
BM-29.	40.8	13.5	7.5	16.8
BM-30.	51	17.2	?	24.5
PZs-18.	60.6	18.2	10.6	27.2
BM-99.	52.7	15.7	9.9	24.3

Description: Medium to large *Arpadites*, with moderately evolute conch (D/U= 0.41 to 0.44, mean= 0.43. The whorl section is high quadratic. The umbilical edge is subrounded. The flanks are almost flat and attach with obtuse angle to the gently arched venter. The flanks are ornamented with moderately strong ribs and nodes. The number of the slightly prorsiradiate ribs is 20 to 28 on the half whorl of the body chamber. On the periumbonal part the ribs are very weak; their strength increases toward the venter. Secondary ribs irregularly appear by intercalation. Bifurcation was not observed. The umbilical nodes are very fine. Two, closely spaced

rows of lateral nodes develop in the outer half of the ribs. The strong and projected ventrolateral nodes appear at the ventrolateral ends of the primary and the secondary ribs. The venter is bicarinate with rather closely spaced, keel-like elevations and a moderately deep intermediate furrow.

Suture lines are not visible.

Remarks: A. bercsenyii differs from other species of the genus *Arpadites* by its characteristic ornamentation, i.e. by the two rows of lateral nodes on the outer half of the flanks. MOJSISOVICS (1882, l.c.) illustrated an *Arpadites* specimen with two rows of lateral nodes under the name *A. telleri*. In the text he stated that this specimen had an additional spiral row of nodes between the laterals and ventrolaterals. This specimen should rightly be considered belonging to *A. bercsenyii*.

One of the specimens described and illustrated as *Arpadites szaboi* (BÖCKH, 1872) by ROSSI RONCHETTI (1960, pl. V, fig. 8) clearly shows the double lateral rows of nodes, therefore it is here regarded as belonging to *A. bercsenyii*.

VÖRÖS et al. (2025, l.c.) when introducing *A. bercsenyii*, superficially and too widely interpreted this new species. Three specimens (l.c., pl. II, fig. 12; pl. III, figs. 1, 2) correspond to *A. bercsenyii*. On the other hand, in the light of the continuing work on newly collected larger material, the specimens on pl. III, fig. 3 and fig. 17 are now considered two different new species related to "*A.*" *manzonii* (BENECKE, 1876).

Distribution: Up to now *A. bercsenyii* is known from the Esino Limestone (Lombardy) and from the Balaton Highland, from the upper Ladinian (Longobardian) Archelaus Zone.

Genus *Stenarpadites* n. gen.

Type species: *Ammonites manzonii* BENECKE, 1876.

Diagnosis: Conch subevolute; whorl section high oval. Steep to oblique umbilical wall; marked umbilical edge. Flanks almost flat; venter narrowly arched. Numerous, weak, slightly falcoid prorsiradiate ribs on the flanks. Rare intercalations, inserted mostly near the umbilical margin. Definite umbilical nodes. One to four rows of weak nodes on the outer half of lateral flanks. Bicarinate venter with simple keels and definite intermediate groove. Suture ceratitic with wide and moderately incised lateral lobes; lateral saddles entire.

Derivatio nominis: Referring to the narrow umbilicus and usually narrow (compressed) whorl section (stenos <Greek> = narrow).

Nominal species belonging to *Stenarpadites*:

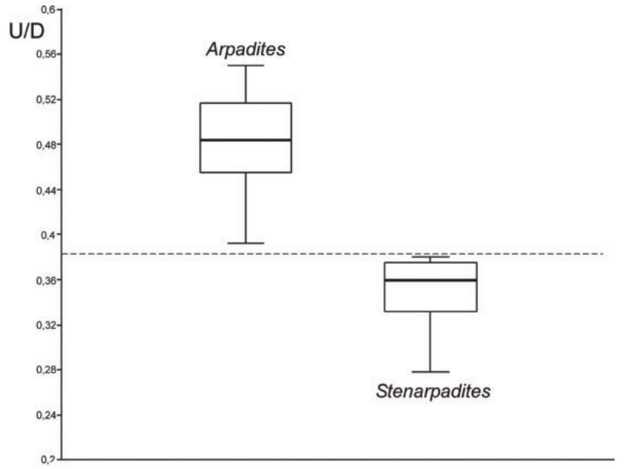
Stenarpadites manzonii (BENECKE, 1876, p. 314, pl. XXIV, figs. 5–9)

Stenarpadites dimanzonii n. sp.

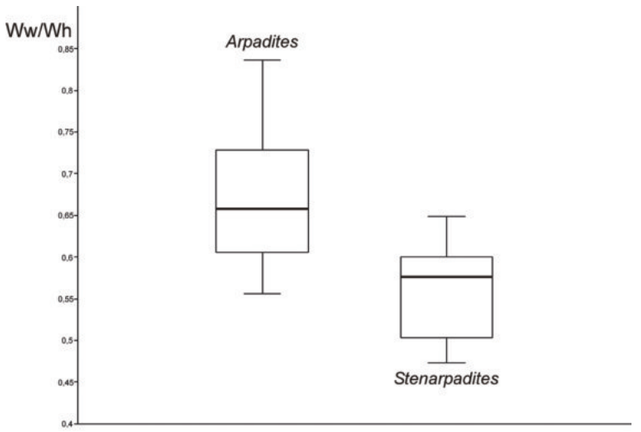
Stenarpadites pinteri n. sp.

Discussion: Stenarpadites is separated from *Arpadites* on the basis of its significantly narrower umbilicus (U/D ratios in *Fig. 36*) and more slender whorls (Ww/Wh ratios in *Fig. 37*). Moreover, the ornamentation of *Stenarpadites* is usually much weaker than most of the species of *Arpadites*. In the box diagram plotted on the basis of U/D ratios of all species of *Arpadites* and *Stenarpadites* (*Fig. 38*) and in the XY graph of U/D ratios against Ww/Wh ratios of 50 specimens (*Fig. 39*) the separation of the two genera is well demonstrated.

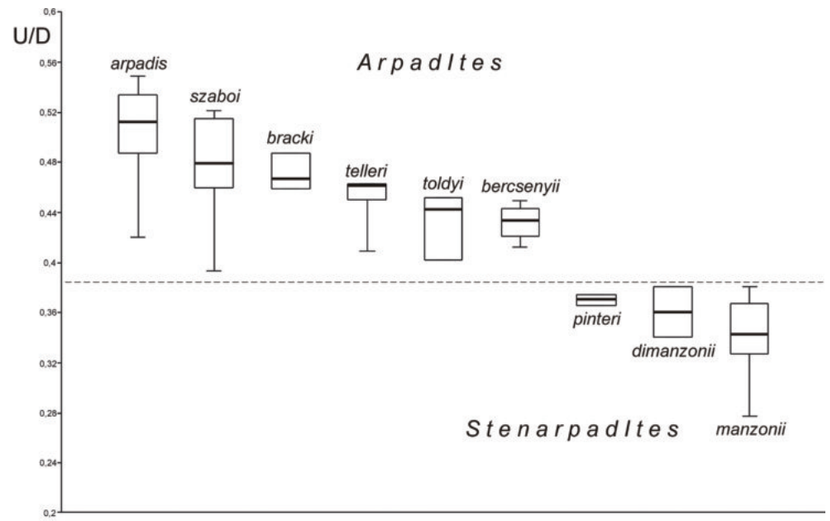
Distribution: Up to now *Stenarpadites* is known from the Esino Limestone (Lombardy) and Buchenstein Limestone (Balaton area), from the upper Ladinian (Longobardian) Archelaus Zone.



← ***Figure 36.*** Box plots of *Arpadites* and *Stenarpadites* generated from measurements of 50 specimens on the basis of their U/D ratios. Arbitrary limit drawn at 0.38 value



← ***Figure 37.*** Box plots of *Arpadites* and *Stenarpadites* generated from measurements of 50 specimens on the basis of their Ww/Wh ratios



← ***Figure 38.*** Box plots of nine species of *Arpadites* and *Stenarpadites* generated from measurements of 50 specimens on the basis of the U/D ratios. Arbitrary limit drawn at 0.38 value

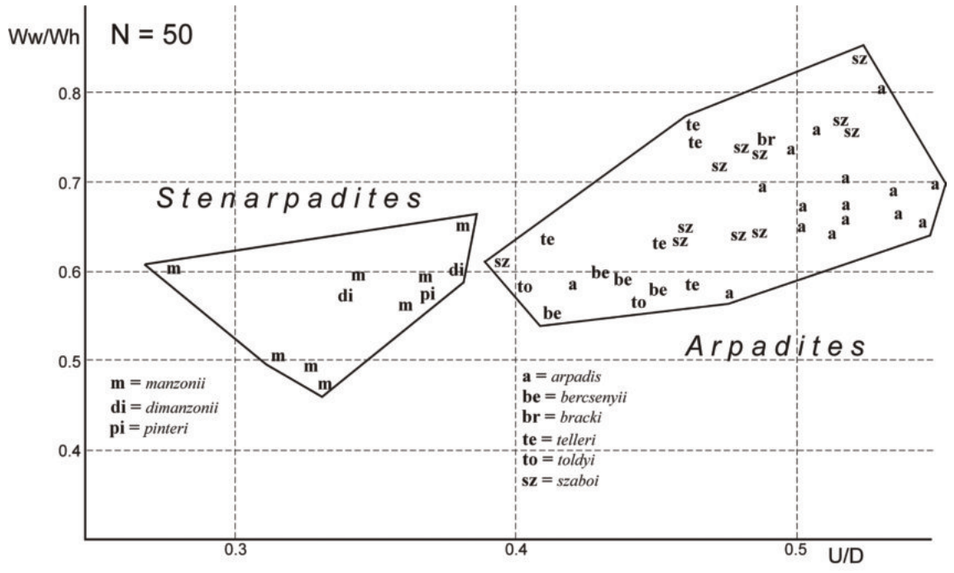


Figure 39. Plot of U/D ratios against Ww/Wh ratios of 50 specimens of *Arpadites* and *Stenarpadites* from various localities

Stenarpadites manzonii (BENECKE, 1876)

Plate VIII: 1–7; Figure 40.

* 1876 *Ammonites Manzonii* n. sp. – BENECKE, Esino, p. 314, pl. XXIV, figs. 5–9.

v 1882 *Arpadites Manzonii* (BENECKE) E. v. M. – MOJSISOVICS, Mediterr. Triasprovinz, p. 57, pl. XXVI, figs. 16–19; pl. XXVII, figs. 1–6.

v 2024 *Arpadites telleri* MOJSISOVICS, 1882 – VÖRÖS et al., Nemesvámos, p, 404 (partim), pl. IX, fig. 1 (only)

v 2025 *Arpadites telleri* MOJSISOVICS, 1882 – VÖRÖS et al., Király Hill, p. 307 (partim), pl. II, fig. 6. (only)

v 2025 *Arpadites* ? *manzonii* (BENECKE, 1876) – VÖRÖS et al., Király Hill, p. 308, pl. III, figs. 4–6.

Material: Seven, nearly complete specimens from Katrabóca (1) at Nemesvámos, from the Király Hill (5) at Veszprémfajsz and from the Gyűr Hill (1) at Nemesvámos (*Fig. 1b, Fig. 7, Fig. 8, Fig. 10* and *Fig. 11*).

Measurements:

Identity No.	D	Wh	Ww	U
BM-31.	55.2	16.8	10.9	21
BM-32.	47.1	14.6	?	20.4
BM-33.	35.6	12.9	6.1	11.8
PZs-19.	39.5	13.7	8.1	14.5
PZs-20.	46.4	15.8	9.4	15.9
BM-34.	31.8	14.9	7.5	10
BM-35.	27.7	10.6	6.3	9.5

Description: Small to large *Stenarpadites* with subevolute, strongly compressed serpenticone conch (U/D= 0.28 to 0.38; mean=0.34). The whorl-section is high oval. The umbilical wall is steep; the umbilical margin is well-defined. The flanks are nearly flat and join gradually to the highly arched venter. The flanks are ornamented with prorsiradiate and mostly sinuous ribs (14 to 34 or 40 on a half whorl); the ribs become very dense and thread-like

on the body chamber. The ribs start at the umbilical rim with fine nodes; their strength remains almost constant towards the venter, or the ribs start fading out ventrally. In some cases, the inner half of the flank bears amost no ribbing (*Pl. VIII: 5*) Weaker secondary ribs appear rarely as intercalations near the umbilical rim. The ribs bear definite, pointed nodes in the middle of the flanks. The ventral endings of the ribs are strongly projected along the ventrolateral shoulder and in typical cases without any nodes, almost reach the ventral keels (*Pl. VIII: 1, 3, 6, 7*). In other cases, projected nodes develop on the ventrolateral shoulder of the body chamber (*Pl. VIII: 2, 4, 5*). The venter is very narrow; bicarinate. The keels are simple, smooth, and divided by a definite intermediate groove.

The suture line is ceratitic (*Fig. 40*). The first lateral lobe is deep and strongly crenulated; the second lateral lobe is shallower and narrower; less crenulated. The first and second lateral saddles are wide and entire.

Remarks: The original description of *A. manzonii* by BENECKE (1876, l.c.) portrays forms with strong nodes at the umbilical rim and somewhat weaker ones at mid-flank and ribbing fading out ventrally. Some of our specimens (*Pl. VIII: 3, 7*) correspond to this morphotype. MOJSISOVICS (1882, l.c.) described and illustrated more numerous specimens from the Esino Limestone (Lombardy), revealing a wider morphological range of *A. manzonii*. The originals figured by MOJSISOVICS (l.c.) were checked by the author in the collection of the Geologische Bundesanstalt (Vienna). These specimens include coarsely ribbed forms and others with ventrolateral nodosity, but the marked lateral row of nodes appears as a typical feature. Our variable specimens seem to fit well into this wide range of morphology.

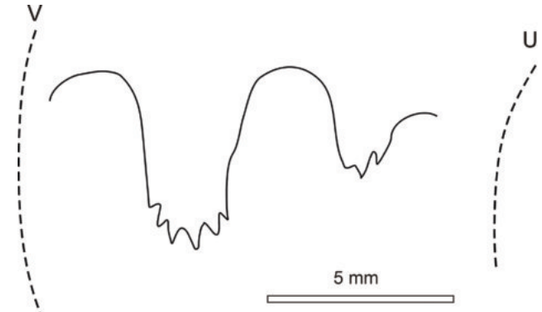


Figure 40. Suture line of *Stenarpadites manzonii* (BENECKE, 1876) (BM-31.), at 16 mm whorl-height, Király Hill, collecting site 7, (bed ?), Longobardian, Archelaus Zone; u: umbilical margin, v: ventrolateral margin

VÖRÖS et al. (2024, l.c.; 2025, l.c.) influenced by the distinct lateral rows of nodes, wrongly identified some specimens of *S. manzonii* as *A. telleri*. Now, in the light of the continuing work on newly collected larger material, and the differences in their coiling (U/D ratios), the items VÖRÖS et al. (2024, pl. IX, fig. 1) and VÖRÖS et al. (2025, pl. pl. II, fig. 6) are considered belonging to *S. manzonii*.

Distribution: S. manzonii was described from the Ladinian of the Southern Alps and the Balaton Highland. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Stenarpadites dimanzonii n. sp.

Plate IX: 7, 8; Figure 41.

v 2025 *Arpadites* ? sp., aff. *manzonii* (BENECKE, 1876) – VÖRÖS et al., Király Hill, p. 309, pl. III, figs. 14–16. (non figs. 13, 17)

Holotype: Hungarian Natural History Museum (Budapest), inventory number: PAL 2026.26.1. (*Pl. IX: 8*)

Locus typicus: Király Hill, collecting site 7, loose.

Stratum typicum: Red ammonitic limestone, Buchenstein Formation, Ladinian, Longobardian.

Derivatio nominis: Referring to the two lateral rows of nodes (di <greek> = two).

Diagnosis: Conch subevolute; whorl section high oval. Umbilical wall oblique with marked edge. Nearly flat flanks; slightly arched venter. Faint, prorsiradiate, sinuous riblets on flanks. Fine umbilical nodes; two rows of lateral nodes in the outer half of the flanks. Venter seems bicarinate. Suture ceratitic.

Material: Two incomplete specimens from Király Hill at Veszprémfajsz (*Fig. 1b, Fig. 7* and *Fig. 10*).

Measurements:

Identity No.	D	Wh	Ww	U
PAL 2026.26.1.	62.9	20.6	12.4	23.8
BM-43.	49.5	17	9.4	17

Description: Medium to large *Stenarpadites* with subevolute, strongly compressed serpenticone conch (U/D= 0.34 to 0.38; mean=0.36). The whorl-section is narrow, high oval. The umbilical wall is oblique; the umbilical margin is well-defined. The flanks are nearly flat and join gradually to the highly arched venter. The flanks are ornamented with very faint, prorsiradiate and gently sinuous ribs (around 24 on a half whorl). The ribs start at the umbilical rim with fine nodes; their strength slightly increases in the middle of the flanks, where the first row of lateral nodes appear on them. In the outer half of the flanks a second row of nodes develops. The ventral part of the ribs is weakly falcoid; their endings are projected along the ventrolateral shoulder which is marked by weak projected nodes. The venter is poorly preserved; narrow and seems to be bicarinate.

The suture line is ceratitic (*Fig. 41*) with three wide and entire lateral saddles. The first lateral lobe is deep and moderately crenulated; the second lateral lobe is shallower and less crenulated.

Remarks: S. dimanzoni is very similar to *S. manzonii* (BENECKE, 1876) but differs in having double rows of nodes in the outer half of the flank. This feature is shared with *A. bercsenyii* VÖRÖS, 2025, which however has more evolute coiling (U/D=0.43) in contrast to the subevolute conch (U/D=0.36) of *S. dimanzoni*. This surficial similarity misled VÖRÖS et al. (2025, l.c.) to unite two specimens of *S. dimanzoni* (l.c., pl. III, figs. 14–16) and another two specimens of *A. bercsenyii* (l.c., pl. III, figs. 13, 17) under the name *A.* ? sp., aff. *manzonii* (BENECKE, 1876).

Distribution: S. dimanzonii was described from the Balaton Highland, where it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

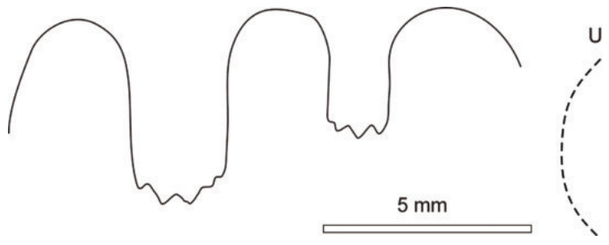


Figure 41. Suture line of *Stenarpadites dimanzonii* n. sp. (holotype, PAL 2026.26.1.), at 16.5 mm whorl-height, Király Hill, collecting site 7, (bed ?) Longobardian, Archelaus Zone; u: umbilical margin

***Stenarpadites pinteri* n. sp.**

Plate XXXIX: 5–8.

v 1998 *Arpadites telleri* MOJSISOVICS, 1882 – VÖRÖS, Balaton-felvidék, p. 98, pl. XIII, fig. 5.)

v 2025 *Arpadites bercsenyii* n. sp. – VÖRÖS et al., Király Hill, p. 308 (partim), pl. III, fig. 3. (only) (non figs. 1, 2. = *A. bercsenyii*)

Holotype: Hungarian Natural History Museum (Budapest), inventory number: PAL 2026.27.1. (*Pl. XXXIX: 5*)

Locus typicus: Király Hill, collecting site 2, bed 5a.

Stratum typicum: Red ammonitic limestone, Buchenstein Formation, Ladinian, Longobardian.

Derivatio nominis: After the name of Zsolt Pintér, who found the type specimen.

Diagnosis: Conch subevolute; whorl section high oval. Umbilical wall steep to oblique with marked edge. Nearly flat flanks; arched, narrow, bicarinate venter. Numerous, weak, prorsiradiate, sinuous primary and intercalatory riblets on flanks. Fine umbilical nodes; three rows of lateral nodes in the outer half of the flanks. Suture unknown.

Material: Four (one complete and three fragmentary) specimens from the Király Hill (3) at Veszprémfajsz and from Cserhalompuszta (1) at Szentkirályszabadja (*Fig. 1b, Fig. 7* and *Fig. 10*).

Measurements:

Identity No.	D	Wh	Ww	U
PAL 2026.27.1.	54.4	18.2	?	19.9
PZs-56.	>45.8	15.1	?	?
BM-100.	39.8	13.5	7.2	14.9
M.98.76.	>46	16.5	9.1	?

Description: Medium-sized to large *Stenarpadites* with subevolute, strongly compressed serpenticone conch (U/D= 0.365 to 0.375). The whorl-section is high oval. The umbilical wall is steep to gently oblique; the umbilical margin is well-defined. The flanks are nearly flat and join gradually to the highly arched venter. The flanks are ornamented with slightly prorsiradiate sinuous ribs of various strength (24 to 36 on a half whorl). The ribs start at the umbilical rim with fine nodes; their strength remains almost constant towards the venter. In some cases, the umbilical margin and the inner half of the flank are almost smooth (*Pl. XXXIX: 7, 8*). Secondary ribs appear rarely as intercalations near the umbilical rim and as bifurcations in the outer half of the flank. The ribs bear definite, pointed nodes in the middle of the flanks and two additional rows of nodes in the outer half of the flanks on the body chamber. There are slightly projected nodes at the ventral endings of the ribs. The venter is very narrow; bicarinate. The keels are simple, smooth, and divided by a definite intermediate groove.

The suture line is not seen.

Remarks: S. pinteri is very similar to *S. manzonii* (BENECKE, 1876) and *S. dimanzoni* n. sp., but differs in having triple rows of nodes in the outer half of the flank. This feature was previously overlooked by VÖRÖS (1998, l.c.) and partly by VÖRÖS et al. (2025, l.c.) who united a specimen of *S. pinteri* (l.c., pl. III, fig. 3) and another two specimens of *A. bercsenyii* (l.c., pl. III, figs. 1, 2) under the name *A. bercsenyii*.

Distribution: S. pinteri was described from the Balaton Highland, where it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Genus *Lenarpadites* n. gen.

Type species: *Arpadites cinensis* MOJSISOVICS, 1882.

Diagnosis: Conch subevolute to subinvolute; whorl section high oval. Steep umbilical wall; marked umbilical edge. Flanks almost flat; venter narrowly arched. Numerous, weak, slightly falcoid prorsiradiate ribs on the flanks. Intercalations occur. Definite umbilical nodes. Ribs numerous, prorsiradiate, sinuous to falcoid in fasciculate pattern. Nodes absent both on the flanks and on the venter. Bicarinate venter with simple keels and intermediate groove. Suture ceratitic.

Derivatio nominis: Referring to the weak ornamentation without lateral and ventral nodes (lenis <Latin> = smooth, soft).

Nominal species belonging to *Lenarpadites:*

Lenarpadites cinensis (MOJSISOVICS, 1882, p. 56, pl. XXVI, figs. 5-15)

Lenarpadites cinensis var. *alta* (MOJSISOVICS, 1882, p. 57, pl. XXVI, figs. 3, 4)

Lenarpadites vaceki (MOJSISOVICS, 1882, p. 59, pl. XXVII, figs. 8, 9)

Lenarpadites dichotomus (FANTINI SESTINI, 1994, p. 262, pl. 11, fig. 11)

Discussion: The subinvolute conch (U/D= 0.24 to 0.32) the weak ornamentation and the total absence of lateral and ventral nodes clearly differentiate *Lenarpadites* from any other genera of the subfamily Arpaditinae Hyatt, 1900.

Distribution: Up to now *Lenarpadites* is known from the Esino Limestone (Lombardy) and Buchenstein Limestone (Balaton area), from the Longobardian Archelaus Zone.

Lenarpadites cinensis (MOJSISOVICS, 1882)

Plate VIII: 9–12.

v * 1882 *Arpadites cinensis* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 56, pl. XXVI, figs. 5–15.
v 1882 *Arpadites cinensis* var. alta E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 57, pl. XXVI, figs. 3, 4.
v 1882 *Arpadites Vaceki* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 59, pl. XXVII, figs. 8, 9.
? 1896 *Arpadites cinensis* MOJS. – DE LORENZO, Lagonegro, p. 146, pl. XX, figs. 4–6.
1898 *Arpadites cinensis* MOJS. – TORNQUIST, Vicentin, p. 649, pl. XX, fig. 4.
1994 *Arpadites cinensis* (MOJSISOVICS) – FANTINI SESTINI, Esino, p. 262, pl. 11, fig. 11.
v non 2024 *Arpadites cinensis* MOJSISOVICS, 1882 – VÖRÖS et al., Nemesvámos, p, 404, pl. IX, fig. 2.
v 2025 *Arpadites* ? *cinensis* MOJSISOVICS, 1882 – VÖRÖS et al., Király Hill, p. 307, pl. III, figs. 7–9.

Material: Four, partly incomplete specimens from the Király Hill (3) and from the Gyűr Hill (1) at Nemesvámos (*Fig. 1b, Fig. 7, Fig. 10* and *Fig. 11*).

Measurements:

Identity No.	D	Wh	Ww	U
BM-36.	22.1	8.7	4.7	6.4
BM-37.	21.6	10.2	?	6.2
BM-38.	59.3	20.5	12.4	22
PZs-22.	35.2	13	7.2	12.6

Description: Small to large *Lenarpadites* with subevolute to subinvolute, strongly compressed serpenticone conch (U/D= 0.24 to 0.37; mean=0.32). The whorl-section is high oval. The umbilical wall is steep; the umbilical margin is well-defined. The flanks are nearly flat and join gradually to the highly arched venter. The flanks are ornamented with very weak, dense, prorsiradiate and sinuous ribs (around 30 on a half whorl). The ribs start at the umbilical rim with fine nodes and seem to have a kind of fasciculate pattern: they seem to be gradually flared and fade out ventrally. Nodes are absent both on the flanks and on the venter. The ventrolateral shoulder is sharp and separated from the bicarinate venter by a shallow depression. The ventral keels are simple, smooth, and divided by a definite intermediate groove.

Suture lines were not seen in the presently available material. MOJSISOVICS (1882, l.c.) gave a short description indicating a ceratitic suture ("Sättel ganzrandig ... Seitenloben im Grunde swach gezähnt.").

Remarks: The large number of specimens figured by MOJSISOVICS (1882, l.c.) from the Esino Limestone were checked by the author in the collection of the Geologische Bundesanstalt (Vienna) and the identification of our specimens as *L. cinensis* is endorsed.

The type specimens of "*Arpadites cinensis* var. *alta*" and "*Arpadites Vaceki*" described by MOJSISOVICS (l.c.) were also inspected in the same collection and the present author has concluded that both taxa should be included into *L. cinensis* (MOJSISOVICS, 1882).

A specimen was wrongly attributed to "*Arpadites cinensis*" by VÖRÖS et al. (2024, pl. IX, fig. 2); now it is better regarded as *A. bracki* FANTINI SESTINI, 1994.

Distribution: L. dimanzonii was described from the Southern Alps, the Balaton Highland and probably from the Apennines. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Lenarpadites dichotomus (FANTINI SESTINI, 1994)

Plate IX: 1–6.

* 1994 *Arpadites dichotomus* sp. n. – FANTINI SESTINI, Esino, p. 263, pl. 11, figs. 9, 10.
v 2024 *Arpadites* cf. *dichotomus* FANTINI SESTINI, 1994 – VÖRÖS et al., Nemesvámos, p. 404, pl. IX, fig. 6.
v 2025 *Arpadites* ? *dichotomus* FANTINI SESTINI, 1994 – VÖRÖS et al., Király Hill, p. 307, pl. III, figs. 10–12.

Material: Six specimens from Király Hill at Veszprémfajsz (5) and Csukrét Gully at Balatoncsicsó (1).

Measurements:

Identity No.	D	Wh	Ww	U
BM-39.	55.3	20.1	?	21.6
BM-40.	37.8	?	?	15
BM-41.	22.6	16.8	?	9.1
BM-42.	34.8	13.1	?	13.4
PZs-23.	36.1	13.4	?	11.2
INV 2026.50.	14.2	5.9	?	4.1

Description: Small to large *Lenarpadites* with subevolute to subinvolute, compressed serpenticone conch (U/D= 0.31 to 0.40; mean=0.38). The whorl-section seems to be high oval. The umbilical wall is steep to gently oblique; the umbilical margin is well-defined. The flanks are nearly slightly convex and join gradually to the arched venter. The flanks are ornamented with very fine, dense, prorsiradiate and sinuous to falcoid ribs (20 to 50 on a half whorl). The ribs start at the umbilical rim with fine nodes and start to bifurcate and further ramify from this point. Intercalations of secondary ribs are also frequent. These fasciculate ribs reach the venter with increasing strength; interspaces are narrow and deep. The ventral endings of the ribs are strongly projected. Nodes are absent both on the flanks and on the venter. The venter is poorly preserved but seems to be bicarinate.

Suture lines were not seen.

Remarks: L. dichotomus is a very characteristic and easily recognizable species by its fine, ramifying, sinuous to falcoid ribs with narrow interspaces, arranged into fasciculate pattern. Our specimens reach much greater size than the originals illustrated by FANTINI SESTINI (1994, l.c.), but their morphological identity is unambiguous.

Distribution: L. dichotomus was described from the Southern Alps, the Balaton Highland, where it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Genus *Argolites* RENZ, 1939

Type species: *Arpadites mojsisovicsi* DE LORENZO, 1896

The name *Argolites* was introduced by RENZ (1939, p. 243) in a faunal list as a subgenus of *Arpadites*. Then (p. 244) he outlined the taxon in some details, including "*Protrachyceras arpaditoides* MOJS.", "*Arpadites celtitoides* AIRAGHI" and a not described, new species. *Argolites* was raised to the rank of genus in TOZER (1981) without diagnosis. FANTINI SESTINI (1994, p. 264) gave a proper definition of the genus, with designation of the type species *A. mojsisovicsi* (DE LORENZO, 1896). According to her, the most diagnostic features separating *Argolites* from *Arpadites* were the more evolute shell, the stronger ribs becoming stronger ventrally, the prominent, mostly acute ventrolateral nodes and the rounded venter. The study of our present material mostly approved these differences. It may be added that while the ventrolateral nodes in *Arpadites* are of uniform strength and are evenly arranged, in *Argolites*, in many cases, every second or third ventrolateral node may bear thorn-like extension.

The current measurements on the specimens from the Balaton area show that the degree of evolute coiling seems nearly enough to distinguish the two genera. The mean U/D ratio is 0.46 in *Arpadites* s.l. (including *Stenarpadites* and *Lenarpadites*) (measured on 44 specimens) whereas this mean value is 0.57 in *Argolites* (measured on 18 specimens) (*Fig. 42*). The dimensions of the whorl section may give further help in the differentiation of the two genera: the mean Ww/Wh ratio is 0.66 *Arpadites* (measured on 35 specimens) whereas this mean value is 0.82 in *Argolites* (measured on 12 specimens) (*Fig. 43*). Moreover, our better preserved *Argolites* specimens

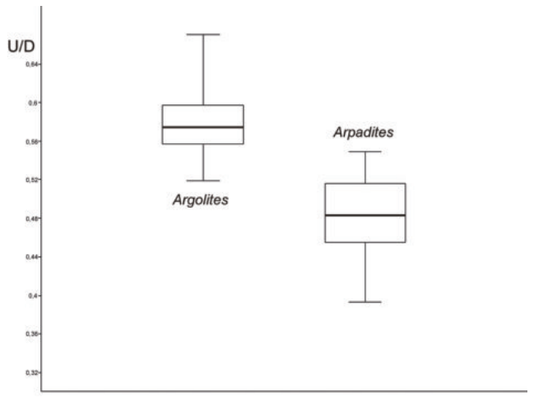


Figure 42. Box plots of *Argolites* and *Arpadites* s.l. (including *Stenarpadites* and *Lenarpadites*) generated from measurements of 18 specimens of *Argolites* and 44 specimens of *Arpadites* s.l., on the basis of their U/D ratios

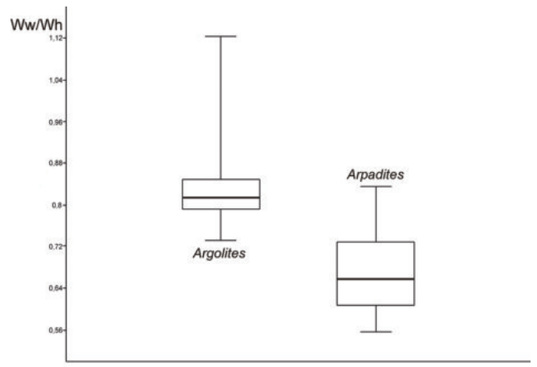


Figure 43. Box plots of *Argolites* and *Arpadites* s.l. (including *Stenarpadites* and *Lenarpadites*) generated from measurements of 12 specimens of *Argolites* and 35 specimens of *Arpadites* s.l., on the basis of their Ww/Wh ratios

revealed that the venter is bicarinate, with very faint double keels on the phragmocones, while the venter is not bicarinate but crossed by growth rugae on the body chambers. This is an important feature separating *Argolites* from *Arpadites*, since the latter portrays various, prominent keels throughout the whole conch.

The species of *Argolites*, well-illustrated in the literature, can be separated into two groups, on the basis of their degree of evolute coiling, i.e. the U/D ratio. The first group has U/D ratios below 0.5, and comprises *A. mojsisovicsi* (DE LORENZO, 1896 – 0.36), *A. paronai* (MARIANI, 1902 – 0.44), *A. pulcher* (FANTINI SESTINI, 1994 – 0.41), *A. fortis* (FANTINI SESTINI, 1994 – 0.47) and *A. trinodosus* (BALINI, 2006 – 0.46). The second group, with U/D ratio higher than 0.5 includes *A. arpaditoides* (MOJSISOVICS, 1882 – 0.61), *A. ventisettembris* (TORNQUIST, 1898 – 0.57), *A. celtitoides* (AIRAGHI, 1902 – 0.56), *A. geometricus* (FRECH, 1903 – 0.56), *A. arietiformis* (DE TONI, 1914 – 0.61) and *A. nodosus* (VÖRÖS et al., 2025 – 0.57). Remarkably, the menbers of the first group, with narrower umbilicus, occurred mainly in platform carbonate facies (Esino Limestone, Lombardy), whereas the more evolute forms of the second group (including all species of the Balaton area) were described mostly from pelagic sedimentary rocks (Nodosus Formation, Recoaro area and red, nodular limestones, Balaton Highland).

***Argolites arpaditoides* (MOJSISOVICS, 1882)**

Plate IX: 9, 10; Plate XXXIX: 9; Plate XL: 1, 2.

* 1882 *Trachyceras arpatitoides* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 101, pl. XXVII, fig. 16.
v 2025 *Argolites arpaditoides* (MOJSISOVICS, 1882) – VÖRÖS et al., Király Hill, p. 309, pl. IV, figs. 1–3.

Material: Five (three complete and two partly incomplete) specimens from the Király Hill at Veszprémfajsz (*Fig. 1b, Fig. 7* and *Fig. 10*).

Measurements:

Identity No.	D	Wh	Ww	U
BM-44.	>48	13.2	?	?
PZs-24.	33.2	7.3	8.2	20.1
BM-101	43.9	>10	8.8	27.1
BM-102.	57.8	12.4	10.1	33.8
BM-103	49.6	10.8	9.2	31.1

Description: Medium-sized to large *Argolites* with very evolute, moderately compressed serpenticone conch (U/D= 0.58 to 0.63; mean=0.61). The whorl-section is subquadrate. The umbilical wall is oblique; the umbilical margin is subrounded. The flanks are nearly flat and join with a marked rim to the slightly arched venter. The flanks are ornamented with nearly prorsiradiate and markedly projected ribs, very strong on the phragmocone (12 to 20 on a half whorl) and becoming finer and denser on the body chamber. The ribs start near the umbilicus in the form of massive bulges; their strength remains almost constant towards the venter. Rare and weak secondary ribs appear as intercalations from the umbilical margin. The primary ribs may bear strong nodes in the outer third of the flank (*Pl. XL: 1*). The projected ventral endings of the ribs are transformed into strong and pointed nodes along the ventrolateral shoulder. The venter is very faintly bicarinate on the phragmocone (*Pl. IX: 10*). On the body chamber the venter is smooth or crossed by adorally arched growth rugae.

Suture lines were not seen in the presently available material.

Remarks: In the original description of this species MOJSISOVICS (1882, l.c.) the name was written consequently as *arpatitoides* in the text, but as *arpaditoides* in the plate explanation. RENZ (1939) in the definition of the genus *Argolites* used the second form, as did later FANTINI SESTINI (1994, p. 264), and the name is applied here also as *arpaditoides*.

The most important diagnostic features of *A. arpaditoides* are the extremely strong prorsiradiate ribs, the thorn-like ventrolateral nodes set on the primary ribs, and the very faintly bicarinate, almost smooth venter. Although the type specimen of *A. arpaditoides* (originally deposited in Strasbourg) seems to be lost (FANTINI SESTINI 1994, p. 264), the

figures by MOJSISOVICS (pl. XXVII, fig. 16a, b) clearly show the above important features. The drawing of the lateral view (l.c., fig. 16a) of the small and incomplete specimen (a one-third conch) suggests a false impression as if the ribbing would be rursiradiate. On the other hand, the ventral view (l.c., fig. 16b) shows that the pointed ventrolateral endings of the ribs are projected forwards. The faint keels are also well depicted.

The original figures of *A. mojsisovicsi* by DE LORENZO (1897, pl. XX, figs. 7–14), designated as the type species of *Argolites* by FANTINI SESTINI (1994, l.c.) portray badly crushed and fragmentary specimens. On the other hand, the specimens illustrated by FANTINI SESTINI (1994, pl.11, fig. 16, 17) as *A. mojsisovicsi* (DE LORENZO, 1897), are partly similar to, but different from *A. arpaditoides*. The specimen on pl. 11, fig. 16 is much more involute and its ventrolateral nodes/spines are much higher than in *A. arpaditoides*. The ribs of the other specimen (l.c., pl. 11, fig. 17) are simply rectiradiate; this specimen seems to be closer to *A. celtitoides* (AIRAGHI, 1902).

"*Arpadites celtitoides*" (AIRAGHI, 1902, pl. IV, fig. 10) has similarly strong ribs as *A. arpaditoides* but the ribbing is rectiradiate.

"*Arpadites arietiformis*" (DE TONI, 1914, p. 131. pl. X, fig. 7) is even more similar to *A. arpaditoides* in strong, prorsiradiate ribbing and having simple, weak lateral nodes but the ribs of *A. arietiformis* are regularly bifurcate and its venter is wide, with four keels.

Distribution: A. arpaditoides was described from the Southern Alps, the Balaton Highland, where it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Argolites ventisettembris (TORNQUIST, 1898)

Plate IX: 11, 12; Plate X: 1–4; Figure 44.

* 1898 *Arpadites venti-settembris* TORNQ. – TORNQUIST, Vicentin, p. 651, pl. XX, fig. 7.

non 2018 *Arpadites* cf. *ventisettembris* TORNQUIST, 1898b – MIETTO et al., Recoaro and Tretto, p. 231, pl. 1, fig. 5.

v 2025 *Argolites geometricus* (FRECH, 1903) – VÖRÖS et al., Király Hill, p. 309 (partim), pl. IV, figs. 5–8, 12. (non figs. 4, 9. = *A. geometricus*)

Material: Six, mostly complete specimens from the Király Hill at Veszprémfajsz (*Fig. 1b, Fig. 7* and *Fig. 10*).

Measurements:

Identity No.	D	Wh	Ww	U
BM-45.	59.3	14.3	12.1	32.6
BM-46.	58.8	14.5	10.6	35.1
BM-47.	53	12.9	10.6	29.5
BM-48.	41	11.8	7.2	20.1
BM-49.	56.4	14.3	?	30.9
PZs-25.	53.8	12.8	10.4	30.5

Description: Large *Argolites* with evolute serpenticone conch (U/D= 0.52 to 0.67; mean=0.57). The whorl-section is subquadrate. The umbilical wall is steep; the umbilical margin is subrounded. The flanks are nearly flat and join with a marked margin to the gently arched venter. The flanks are ornamented with nearly rectiradiate and gently sinuous ribs, rather strong on the phragmocone (24 to 32 on a half whorl); in some cases the ribs become finer and denser on the body chamber. The strong ribs start near the umbilicus; their strength remains almost constant towards the venter. Weak secondary ribs appear as intercalations near the umbilical margin. The ventral

endings of the rectiradiate ribs become abruptly projected near the ventrolateral shoulder and bear projected nodes. The venter is weakly bicarinate on the phragmocone; on the body chamber the faint keels diminish and the venter is crossed by adorally arched growth rugae.

Suture line ceratitic with weakly crenulated, narrow lateral lobes, and wide and entire lateral saddles (*Fig. 44*).

Remarks: This is the largest *Argolites* species in our material. The identification with *A. ventisettembris* is based on the coarse and rather regular ribs, reminding of *Arpadites arpadis* (MOJSISOVICS, 1870), but differing in their greater strength and in abruptly projected ventrolateral endings.

The specimen figured by MIETTO et al. (2018, l.c.) has rather narrow umbilicus (U/D=0.47) and too much coarse ornamentation, what makes it different from *A. ventisettembris*.

VÖRÖS et al. (2025) interpreted too widely the species *A. geometricus* (FRECH, 1903); some of the specimens they figured as *A. geometricus* (l.c., pl. pl. IV, figs. 5–8, 12) now considered *A. ventisettembris*.

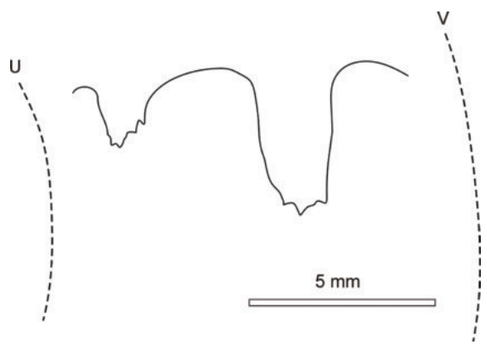


Figure 44. Suture line of *Argolites ventisettembris* (TORNQUIST, 1898) (BM-45.), at 11 mm whorl-height, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; u: umbilical margin, v: ventrolateral margin

Distribution: A. ventisettembris was described from the Southern Alps and the Balaton Highland where it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Argolites geometricus (FRECH, 1903)

Plate X: 5, 6; Figure 45.

v * 1903 *Celtites geometricus* n. sp. – FRECH, Neue Cephalopoden, p. 32., pl. X, fig. 9.

? 1914 *Celtites* cf. *geometricus* (FRECH) – HORN, Knollenkalke, p. 23, unnumbered figure on p. 24.

v 1998 *Arpadites* sp., aff. *arpadis* (MOJSISOVICS, 1870) – VÖRÖS, Balaton-felvidék, p. 45; pl. X, fig. 8.

v 2025 *Argolites geometricus* (FRECH, 1903) – VÖRÖS et al., Király Hill, p. 309 (partim), pl. IV, figs. 4, 9.

Material: Three specimens (including the type specimen kept in the collections of the former Geological Institute of Hungary, SARA), from Katrabóca (2) at Nemesvámos and from the Király Hill (1) at Veszprémfajsz (*Fig. 1b, Fig. 7, Fig. 8* and *Fig. 10*).

Measurements:

Identity No.	D	Wh	Ww	U
T.886.	34.8	7.1	5.2	19
M.98.91.	55.2	14.8	10.4	32
PZs-26.	38.3	9.5	?	21.4

Description: Medium-sized to large *Argolites* with evolute serpenticone conch (U/D= 0.55 to 0.58; mean=0.57). The whorl-section is subquadrate. The umbilical wall is oblique; the umbilical margin is subrounded. The flanks are gently convex and join rather abruptly to the gently arched venter. The flanks are ornamented with rectiradiate and straight ribs, very strong on the phragmocone (18 to 22 on a half whorl) and becoming finer and denser on the body chamber. The strong ribs start near the umbilicus without distinct

umbilical nodes; their strength remains almost constant towards the venter. Weak secondary ribs appear very rarely as intercalations near the umbilical margin. The ventral endings of the rectiradiate ribs bear strong nodes or tubercles. The venter is weakly bicarinate on the phragmocone.

Suture lines were not observed.

Remarks: The original specimen of *A. geometricus* (kept in the collections of the SARA (former Geological Institute of Hungary, under the inventory number T.886.), described by FRECH (1903, l.c.) from Katrabóca (*Fig. 45*) was inspected by the authors, thus the identification of our specimens is endorsed.



Figure 45. *Argolites geometricus* (FRECH, 1903), holotype (T.886.); Katrabóca, Longobardian, Archelaus Zone

The specimens of *A. celtitoides* (AIRAGHI, 1902) as figured by JADOUL et al. (1992, pl. 23, fig. 1) and by FANTINI SESTINI (1996, pl.1, fig. 7) are rather similar to *A. geometricus* but differ in having coarser and less numerous ribs (the number of ribs is 12–14 in *A. celtitoides* and 18 to 22 in *A. geometricus*).

The item by HORN (1914, l.c.) is queried because the illustration is a simple drawing of the cross section.

The very evolute specimen (U/D ratio 0.59) illustrated by VÖRÖS (1998, l.c.) as *Arpadites* sp., aff. *arpadis*, is now attributed to *A. geometricus*.

VÖRÖS et al. (2025) interpreted too widely the species *A. geometricus* (FRECH, 1903); some of the specimens they figured as *A. geometricus* (l.c., pl. IV, figs. 5–8, 12) now considered *A. ventisettembris*.

Distribution: A. geometricus was described from the Balaton Highland. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Argolites trinodosus BALINI, 2006

Plate X: 7.

* 2006 *Argolites trinodosus* n. sp – BALINI et al., Svilaja, p. 392, pl. I, fig. 7.

Material: One well-preserved specimen from Veszprémfajsz, Király Hill.

Measurements:

Inventory No.	D	Wh	Ww	U
BM-50.	41.2	11.9	9.8	19.8

Description: Medium-sized *Argolites*, with evolute conch (U/D ratio = 0.48). The whorl section is high quadratic. The umbilical edge is subrounded. The flanks are nearly flat and join the gently arched venter with obtuse angle. The venter is very slightly bicarinate. The flanks are ornamented with rather strong ribs and nodes. The number of the rectiradiate and slightly sinuous ribs is about 18 on the half whorl. The strength of the ribs increases toward the venter. Secondary ribs appear by intercalation near the umbilical margin irregularly on the body chamber. The umbilical nodes or swellings are not elevated. The row of rather strong lateral nodes develops

in the middle portion of the ribs. The strong and slightly projected ventrolateral nodes appear at the ventrolateral ends of the primary ribs; their strength becomes irregular on the body chamber.

Suture lines are not visible.

Remarks: A. trinodosus differs from many other species of the genus *Argolites* by its ornamentation, i.e. by the row of lateral nodes on the middle of the flanks. JACOBSHAGEN (1967, p. 25, pl. 1, fig. 2.) illustrated an *Argolites* specimen with a row of lateral nodes, under the name *Arpadites* (*Argolites*) *celtitoides*. This was an erroneous attribution, as FANTINI SESTINI (1994, p. 264) pointed out, because the species *A. celtitoides* (AIRAGHI, 1902) has no lateral nodes. Otherwise, Jacobshagen's illustrated specimen with lateral nodes bears very coarse ornamentation; therefore, it may represent another new(?) species of *Argolites*.

Argolites nodosus VÖRÖS, 2025 is similar to *A. trinodosus* in having three rows of nodes but differs in larger size, significantly wider umbilicus (U/D = 0.58) and finer and denser ornamentation.

Distribution: A. trinodosus was described from the Dinarides. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Argolites nodosus VÖRÖS, 2025

Plate X: 8–11; Plate XL: 3.

v * 2025 *Argolites nodosus* n. sp. – VÖRÖS et al., Király Hill, p. 309, pl. IV, figs. 10–15.

Material: Five, mostly well-preserved specimens from Veszprémfajsz, Király Hill.

Measurements:

Inventory No.	D	Wh	Ww	U
PAL 2025.7.1.	51.2	11.6	10	29
BM-51.	32.8	9	?	22
BM-52.	49.2	11.2	?	28.3
BM-53.	52.4	13.1	?	29
BM-104	43.8	10.7	8.6	24.1

Description: Medium-sized to large *Argolites*, with very evolute conch (mean U/D ratio = 0.58). The whorl section is high quadratic to oval. The umbilical edge is subrounded. The flanks are nearly flat and join the gently arched venter with obtuse angle. The flanks are ornamented with moderately strong ribs and nodes. The number of the slightly prorsiradiate and sinuous ribs is 18 to 26 on a half whorl. The strength of the ribs increases toward the venter. Secondary ribs irregularly appear by intercalation near the umbilical margin, both on the phragmocone and on the body chamber. The umbilical nodes or rather swellings are fine. The moderately strong row of lateral nodes develops in the middle portion of the ribs. The strong and projected nodes appear at the ventrolateral ends of the primary ribs; the secondary ribs bear weaker ventrolateral nodes. The venter is very slightly bicarinate on the phragmocone, and becomes smooth on the body chamber, with anteriorly arched growth rugae.

Suture lines are not visible.

Remarks: A. nodosus differs from most of the species of the genus *Argolites* by its ornamentation, i.e. by the row of lateral nodes on the middle of the flanks.

Argolites trinodosus BALINI, 2006 is similar to *A. nodosus* in having three rows of nodes but differs in smaller diameter, significantly narrower umbilicus (U/D = 0.47) and coarser and somewhat sparser ornamentation.

A third form of *Argolites* with three rows of nodes was illustrated by JACOBSHAGEN (1967, p. 25, pl. 1, fig. 2.) under the name *Arpadites* (*Argolites*) *celtitoides*. This was an erroneous attribution, as FANTINI SESTINI (1994, p. 264) pointed out, because the species *A. celtitoides* (AIRAGHI, 1902) has no lateral nodes. Therefore, Jacobshagen's illustrated specimen probably represent a different (perhaps new) species of *Argolites*.

Distribution: A. nodosus was described from the Balaton Highland. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Genus *Meginoceras* MCLEARN, 1930

Type species: *Steinmannites* (*Meginoceras*) *meginae* MCLEARN, 1930

***Meginoceras* ? sp.**

Plate XI: 1.

Material: One fragmentary specimen from the Király Hill at Veszprémfajsz (*Fig. 1b, Fig. 7* and *Fig. 10*).

Measurements:

Identity No.	D	Wh	Ww	U
BM-54.	>69	25.6	14.1	27.4

Description: Large *Meginoceras* with moderately evolute conch. The whorl-section is high oval. The umbilical wall is subrounded. The flanks are almost flat and pass into the arched venter. The ventrolateral margin is accentuated by a row of projected clavi. The flanks are ornamented with slightly prorsiradiate, gently sinuous, weakly projected primary ribs (arond 30 on a half whorl) without nodes. Few secondary ribs intercalate irregularly near the umbilicus or at around the inner third of the flank; bifurcation appears in the outer third of the flank. There are two rows of nodes. The umbilical nodes are very weak. The ventrolateral nodes form separate rows of projected clavi on the ventrolateral margins. The venter is rather wide and seems to be crossed by adorally arched weak riblets (*Pl. XI: 1b*). In another direction of lighting these riblets seem to be interrupted by a narrow groove (*Pl. XI: 1c*).

Suture lines were not seen.

Remarks: At a first glance, our single specimen gives an *Arpadites*-like impression, but in fact it is significantly different from any arpaditines occurring in high diversity in our Ladinian material. Its almost smooth venter with very weak sulcus, falcoid ribbing and wide umbilicus can be compared to some representatives of the genus *Meginoceras*, particularly to the specimen *M. aylardi* (MCLEARN) as figured by TOZER (1994, p. 149, pl. 73, fig. 18). Therefore, our specimen is tentatively attributed to the genus *Meginoceras*.

Distribution: Our specimen was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Subfamily Pinteritinae n. subfam.

This new subfamily includes genera with subinvolute and compressed shape and with excavated venter with v-shaped furrow bordered by alternating rows of weak nodes. The lateral ornamentation consists of various kinds of ribs and two to six rows of nodes of various strength. The suture is ceratitic.

Presently, two genera: *Pinterites* VÖRÖS, 2025 and *Bercsenyiites* n. gen. belong definitely to the subfamily Pinteritinae. The genus *Alkaites* BALINI, 2006 has ornamentation and ventral features rather similar to Pinteritinae, and although it was attributed to the subfamily Nevaditinae by BALINI et al. (2006, p. 391), here it is tentatively classified into Pinteritinae.

Genus *Pinterites* VÖRÖS, 2025

Type species: *Trachyceras laricum* MOJSISOVICS, 1882

Emended diagnosis: Subinvolute and compressed conch. The lateral flank bears rare broad flares starting from umbilical nodes. Around mid-flank sinuous and projected riblets intercalate. The ribs terminated by numerous, closely spaced, fine, projected ventrolateral nodes. Narrow, shallow to deep and V-shaped ventral furrow between two rows of alternating ventral nodes. Suture ceratitic.

Pinterites was included into the subfamily Anolcitinae by VÖRÖS et al. (2025, p. 310), although its very narrow umbilicus and compressed conch seemed to contradict this attribution. Now, in the light of the continuing work on newly collected larger material, and the evidence of the ceratitic sutures, *Pinterites* (together with its subfamily) is definitely placed into the family Danubitidae SPATH, 1951. This is in accordance with the opinion of MIETTO et al. (2008, pp. 396-403), who, in the detailed discussion of Anolcitinae, reported their observations on the Mojsisovics' original specimen of "*Trachyceras laricum*", and stated that this species was rather alien within the Anolcitinae.

***Pinterites laricus* (MOJSISOVICS, 1882)**

Plate XI: 3–5; Figures 46, 47.

v * 1882 *Trachyceras laricum* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 96, pl. XXIII, fig. 13; pl. XXIV, figs. 4(?), 5, non fig. 3

? 1960 *Trachyceras* (*Protrachyceras*) *ladinum* MOJSISOVICS 1882. – ROSSI RONCHETTI, Grigne, p. 25, pl. IV, figs. 1, 2.

non 1977 *Tracbyceras laricum* (MOJSISOVICS) – URLICHS, Pachycardientuffe, p. 24, pl. 1, fig. 2.

non 1995b "*Anolcites*" ex gr. *laricum* (MOJSISOVICS, 1882) – MIETTO & MANFRIN, Limite ladinico-carnico, p. 32 (partim), pl. 2, figs. 4–6.

v non 1998 *Anolcites* ? *laricus* (MOJSISOVICS, 1882) – VÖRÖS, Balaton-felvidék, p. 44.

2008 *Trachyceras laricum* E.v. MOJSISOVICS – MIETTO et al., Ladinian/Carnian boundary, p. 398, pl. 1, fig. 11.

v 2025 *Pinterites laricus* (MOJSISOVICS, 1882) – VÖRÖS et al., Király Hill, p. 310, pl. V, figs. 1, 2.

Material: Four, partly incomplete specimens from the Király Hill at Veszprémfajsz (3) and the Csukrét Gully at Balatoncsicsó (1 unmeasured) (*Fig. 1b, Fig. 7* and *Fig. 10*).

Measurements:

Identity No.	D	Wh	Ww	U
PZs-28.	46.1	23.3	12.1	8.5
BM-55.	65	29.8	15.9	13.2
BM-56.	61.2	27.5	14.8	?

Description: Small to medium-sized *Pinterites* with subinvolute, compressed conch (U/D=0.19). The whorl-section is high oval. The umbilical wall is subrounded to vertical. The flanks are gently convex, almost flat and meet with the venter at a sharp ventrolateral shoulder. The lateral ornamentation consists of nearly rectiradiate,

partly sinuous folds (flaring ribs) and secondary riblets. The folds start from well defined umbilical nodes or bulges (around 6 on a half whorl) at the umbilical margin; here they have the form of wide swellings with wide interspaces. Towards the mid-flank, the swellings become weaker. Further ventrally they gradually fade out, and gradually replaced by numerous, projected secondary riblets by insertion. The riblets bear 22 to 30 projected ventrolateral nodes. The two closely spaced rows of slightly elongated (clavate) ventral nodes are slightly separated from the ventrolateral nodes. They stand in alternating position and are separated by a moderately deep, U-shaped ventral groove.

The suture line (*Figs. 46* and *47*) is ceratitic, with entire lateral saddles, and moderately deep and indistinctly denticulated lobes.

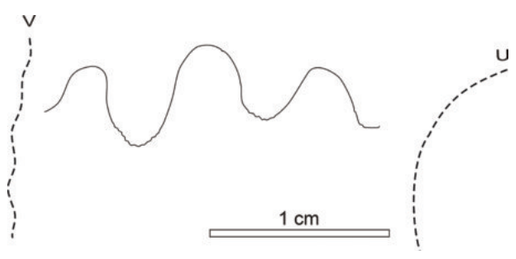


Figure 46. Suture line of *Pinterites laricus* (MOJSISOVICS, 1882) (BM-56.), at 22 mm whorl-height, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; u: umbilical margin, v: ventrolateral margin

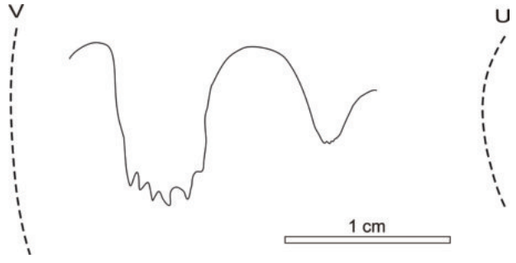


Figure 47. Suture line of *Pinterites laricus* (MOJSISOVICS, 1882) (BM-55.), at 30 mm whorl-height, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; u: umbilical margin, v: ventrolateral margin

Remarks: By monotypy, *P. laricus* is the type species of the new genus *Pinterites*. The present author inspected the original specimens figured by MOJSISOVICS (1882) in the collections of the Geologische Bundesanstalt (Vienna), and found that the illustrations of the four specimens were rather elusive. For example, in the figure of the seemingly best-looking specimen (pl. XXIV, fig. 4), the ventral part was greatly invented. Luckily, the illustration of the specimen pl. XXIV, fig. 5, was proper. MIETTO et al. (2008, p. 398) had the same opinion, and designated this specimen (MOJSISOVICS 1882, pl. XXIV, fig.5) as the lectotype of "*Trachyceras laricum*" and published a photographic illustration of it (MIETTO et al. 2008, pl. 1, fig. 11).

According to MIETTO et al. (2008) the species was too widely interpreted by MOJSISOVICS (1882, l.c.); one of his illustrated specimens (l.c., pl. XXIV, fig. 3) belongs to *Zestoceras lorigae* MIETTO & MANFRIN, 2008. In their opinion the same regads to the items by URLICHS (1977, l.c.) and partly to MIETTO & MANFRIN (1995b, l.c.).

ROSSI RONCHETTI (1960, l.c.) figured a rather well-preserved specimen under the name "*Trachyceras* (*Protrachyceras*) *ladinum* MOJSISOVICS 1882" with no discernible lateral nodes, instead the lateral ornament is rather similar to *P. laricus* and the narrow ventral part with dense nodes also. Therefore, even without inspecting the original specimen, it seems justified to include Rossi Ronchetti's item to *P. laricus*.

VÖRÖS (1998, l.c.) wrongly attributed a small specimen from Katrabóca to "*Anolcites* ? *laricus*"; now it is considered a juvenile individual of *Katrabocaites laczkoi* (DIENER, 1899).

Distribution: P. laricus was described from the Southern Alps and the Balaton Highland where it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Genus *Bercsenyiites* n. gen.

Type species: *Katrabocaites montisregis* VÖRÖS, 2025, p. 314, pl. XI, figs. 1–3.

Diagnosis: Conch subinvolute; whorl section high oval. Steep umbilical wall; marked umbilical edge. Flanks almost flat; venter narrowly arched. 24 to 44, weak, slightly falcoid prorsiradiate ribs on the flanks. Numerous intercalations, inserted mostly in the outer half of the flanks. Definite umbilical nodes. One to five rows of weak nodes on the lateral flanks. Sulcate venter; V-shaped groove with alternating rows of sharp ventral nodes. Suture ceratitic with wide and deeply incised lateral lobes; entire saddles.

Derivatio nominis: After the name of Mr. Miklós Bercsényi, who collected the type specimen of the type species.

Nominal species belonging to *Bercsenyiites*:

Bercsenyiites montisregis (VÖRÖS, 2025)

Bercsenyiites egregius n. sp.

Bercsenyiites sp. aff. *egregius* n. sp.

Discussion: Bercsenyiites has similarities to *Pinterites* in its narrow umbilicus, compressed shape and the character of the venter which is narrow, with deep, v-shaped furrow between alternating rows of pointed ventral nodes but differs in lateral ornamentation dominated by fine prorsiradiate ribs prevailing over the weak nodosity, in contrast to the wide, rectiradiate flaring ribs of *Pinterites*. The genus *Alkaites* BALINI, 2006 portrays significantly stronger lateral ornamentation.

Distribution: Up to now *Bercsenyiites* is known from localities of the Balaton Highland from the Longobardian Archelaus Zone.

***Bercsenyiites montisregis* (VÖRÖS, 2025)**

Plate XI: 6; Plate XII: 1, 2, 5; Plate XL: 5; Figure 48.

v * 2025 *Katrabocaites montisregis* n. sp. – VÖRÖS et al., Király Hill, p. 314, pl. IX, fig. 5; pl. XI, figs. 1–3.

Material: Six, partly incomplete specimens from Veszprémfajsz, Király Hill (4), from the Gyűr Hill (1) at Nemesvámos and from the Csukrét Gully (1) at Balatoncsicsó (*Fig. 1b, Fig. 4, Fig. 7, Fig. 10* and *Fig. 11*).

Measurements:

Inventory No.	D	Wh	Ww	U
PAL 2025.9.1.	73.1	36.5	15.1	13.1
BM-57.	55.4	26.4	13.6	10
BM-59.	70	32.2	18.1	?
PZs-30.	61.4	?	?	?
BM-106.	47.8	22.9	?	10.5
SzI-1.	48	?	?	?

Description: Medium-sized to large *Bercsenyiites* with subinvolute, compressed conch (U/D ratio = 0.17 to 0.20; mean= 0.18); the whorl section is high oval. The umbilical wall is steep, subrounded. The flanks are almost flat and join gradually to the sharp ventrolateral margin. The flanks are ornamented with numerous, weak, slightly falcoid prorsiradiate ribs. Their number increases by rare bifurcations and more frequently by intercalations up to 44 on the half whorl of the body chamber. The intercalations are inserted variously at

any part of the flanks. There are distinct umbilical nodes, three or (in typical cases) four rows of weak lateral nodes and stronger and strongly projected ventrolateral nodes at the end of the ribs. The ventrolateral nodes are of similar strength both on the primary and on the secondary ribs. The first row of lateral nodes is in the inner half of the flank; the second row in the mid-flank, and the other two, very weak rows of nodes are near the ventrolateral margin. The venter is narrow and excavated; the relatively wide, V-shaped furrow is bordered by rows of alternating nodes.

The suture is ceratitic (*Fig. 48*); the first and the (shallower) second lateral lobes are deeply crenulated; the tops of the lateral saddles are entire.

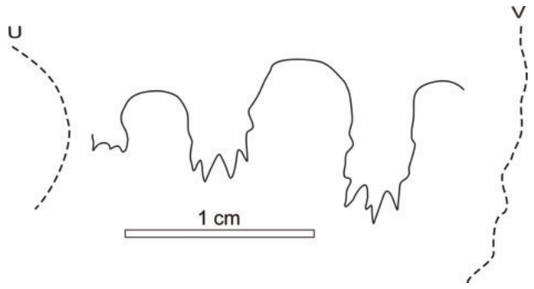


Figure 48. Suture line of *Bercsenyiites montisregis* (VÖRÖS, 2025) (PAL 2025.9.1.), at 22 mm whorl-height, Király Hill, collecting site 2, bed 4, Longobardian, Archelaus Zone; u: umbilical margin, v: ventrolateral margin

Remarks: This species was wrongly attributed to the genus *Katrabocaites* by VÖRÖS et al. (2025, l.c.) which was too widely interpreted at that time; now *montisregis* is designated as the type species of *Bercsenyiites*. In fact, the differences are conspicuous, particularly as the ventral parts are concerned: the venter of *Katrabocaites* is widely arched, the shallow furrow is not accompanied by distinct nodes, but only by the projected endings of the ribs. On the other hand, *B. montisregis* has an acute, narrow venter with deep, V-shaped furrow bordered by marked nodes. Moroever, as the current studies proved, the suture line of *B. montisregis* is ceratitic, in contrast to the subammonitic sutures of *Katrabocaites*.

The specimen illustrated as "*Eoprotrachyceras gibsoni* n. sp." by TOZER (1994, pl. 68, fig. 10 only) looks quite different from other *Eoprotrachyceras* species (e.g. *E. matutinum* Tozer) and, considering its lateral ornamentation and narrow excavated venter, may well be compared to *B. montisregis*.

Distribution: B. montisregis was described from the Balaton Highland where it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

***Bercsenyiites egregius* n. sp.**

Plate XII: 6; Plate XL: 4; Figure 49.

Holotype: Hungarian Natural History Museum (Budapest), inventory number: PAL 2026.28.1. (*Pl. XII: 6*).

Locus typicus: Veszprémfajsz, Király Hill, Locality 2., Bed 4.

Stratum typicum: Red ammonitic limestone, Buchenstein Formation, Ladinian, Longobardian.

Derivatio nominis: egregius <Latin> = eminent, excellent, referring to the exceptionally nice ornamentation of the type specimen.

Diagnosis: Conch subinvolute; whorl section compressed, high oval. Umbilical wall steep with marked edge. Flanks almost flat; venter sulcate. Numerous, weak, prorsiradiate, sinuous primary and intercalatory ribs on flanks. Umbilical nodes distinct. Four rows of lateral nodes; strong ventrolateral nodes. Strongly projected ventral nodes along marked ventral furrow. Suture ceratitic.

Material: Two well-preserved specimen from Király Hill.

Measurements:

Identity No.	D	Wh	Ww	U
PAL 2026.28.1.	52.2	24.8	13.5	9.5
BM-105.	55.7	27.5	?	10.6

Description: Medium-sized *Bercsenyiites* with subinvolute, compressed conch (U/D ratio 0.18); the whorl section is high oval. The umbilical wall is steep, subrounded. The flanks are gently convex, almost flat and join gradually to the sharp ventrolateral margin. The flanks are ornamented with numerous, weak to strong, slightly sinuous prorsiradiate ribs and nodes of various strength. There are distinct, bulbous umbilical nodes, seven on a half whorl; here start the very low and wide ribs of corresponding number. They bear rather strong and clavate nodes in the inner third of the flank. From here, the ribs start to be bifurcated and increase in strength. The second row of rather strong nodes appears around mid-flank; here the ribs start to be further bifurcated or intercalated by secondary ribs, and increase in strength. The third and fourth rows of somewhat weaker nodes develop near the ventrolateral margin, which has strong, projected clavi. Here the number of ribs is up to 34 on the half whorl. The venter is narrow and excavated; the relatively deep, V-shaped furrow is bordered by rows of rather sharp, alternating nodes.

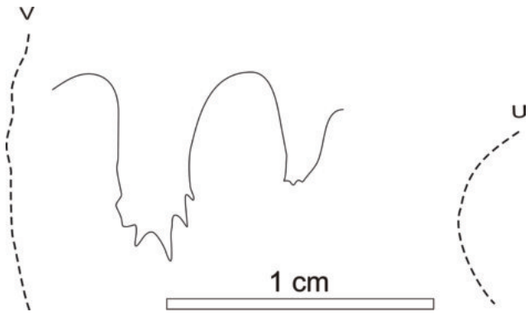


Figure 49. Suture line of *Bercsenyiites egregius* n. sp. (PAL 2026.9.1.), at 16 mm whorl-height, Király Hill, collecting site 2, bed 4, Longobardian, Archelaus Zone; u: umbilical margin, v: ventrolateral margin

The suture is ceratitic (*Fig. 49*). The first lateral lobe is very deep and strongly crenulated; the second one is much narrower and shallower, less serrated. The lateral saddles are high and entire.

Remarks: B. egregius is similar to *B. montisregis* but differs by its weaker ribbing and stronger nodes. The clavate character of the first row of lateral nodes is particularly distinctive.

Distribution: B. egregius was described from the Balaton Highland where it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

***Bercsenyiites* sp., aff. *montisregis* (VÖRÖS, 2025)**

Plate XII: 3, 4: Figure 50.

Material: Two, partly incomplete specimens from the Király Hill at Veszprémfajsz (*Fig. 1b, Fig. 7* and *Fig. 10*).

Measurements:

Identity No.	D	Wh	Ww	U
BM-58.	75.8	33.4	?	18.1
PZs-29.	70.2	30.6	15.8	15.7

Description: Large *Bercsenyiites* with subinvolute, compressed conch (mean U/D ratio = 0.23); the whorl section is high oval. The umbilical wall is steep, nearly overhanging; the umbilical margin is marked.

The flanks are gently convex and join gradually to the sharp ventrolateral margin. The flanks are ornamented with numerous, weak, slightly sinuous prorsiradiate ribs. Their number increases by bifurcations and by intercalations inserted variously at any part of the flanks and reaches 26 to 30 on the half whorl of the body chamber. There are distinct umbilical nodes, two or three rows of distinct lateral nodes and stronger and strongly projected ventrolateral nodes at the end of the ribs. The first row of lateral nodes is in the inner half of the flank; the second row in the mid-flank, and the third one (if present) in the outer half of the flank. The venter is narrow and excavated; the V-shaped furrow is bordered by rows of slightly projected alternating nodes.

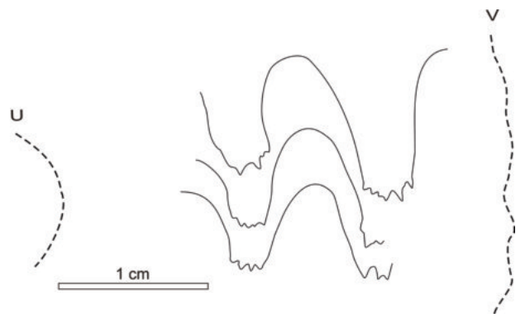


Figure 50. Suture lines of *Bercsenyiites* sp., aff. *montisregis* (VÖRÖS, 2025) (BM-58.), at 28 mm whorl-height, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; u: umbilical margin, v: ventrolateral margin

The suture lines are ceratitic (*Fig. 50*); both the first and the somewhat shallower second lateral lobes are well crenulated; the tops of the narrow lateral saddles are entire.

Remarks: The here described, not very well-preserved specimens show many similarities to *B. montisregis*, but at the same time their character of nodosity seems close to *B. egregius*. Moreover, the lateral ornamentation of our larger specimen (*Pl. XII: 4*) may be compared to that of *Alkaites dinaricus* illustrated by BALINI et al. (2006, pl. 1, fig. 4). Therefore, here we used the open nomenclature for our specimens.

Distribution: This taxon was described from the Balaton Highland where it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Genus *Alkaites* BALINI, 2006

Type species: *Alkaites dinaricus* BALINI, 2006

***Alkaites* ? sp.**

Plate XI: 2.

Material: One rather well-preserved specimen from the Király Hill at Veszprémfajsz (*Fig. 1b, Fig. 7* and *Fig. 10*).

Measurements:

Identity No.	D	Wh	Ww	U
PZs-27.	28.8	13.2	8.1	6.7

Description: It is a small *Alkaites*. The coiling is subinvolute (U/D=0.23); the whorl-section is compressed, high oval. The umbilical wall is steep; the umbilical margin is subrounded. The flanks are very gently and evenly convex and meet the tabulate venter with a marked ventrolateral shoulder. The ornamentation consists of very strong nodes and weaker ribs. The umbilical nodes tend to be highly pointed, and give rise to ribs of various strength. The very strong lateral nodes or rather spines appear around mid-flank (eight on a half whorl). In the outer half of the flank secondary ribs appear mainly by insertion. The ventrolateral nodes are moderately strong; their number is 18 on a half whorl. The venter is narrow and slightly excavated; the shallow furrow is bordered by rows of alternating clavate nodes.

Suture lines are not seen.

Remarks: Both in general shape and in the main features of the lateral ornament, our specimen agrees well with the characters of the smaller specimens of *Alkaites dinaricus* BALINI, 2006, as illustrated by BALINI et al. (2006, pl. 1, figs. 3, 5). Only the row of nodes in the inner half of the flank is missing, but this may be due to the small (juvenile?) state of our specimen. After all, the generic identification of our single specimen as *Alkaites* seems probable.

Distribution: Our specimen was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Superfamily Clydonitoidea HYATT, 1877

Family Trachyceratidae HYATT, 1877

Subfamily Anolcitinae MIETTO & MANFRIN, 2008

Genus *Anolcites* MOJSISOVICS, 1893

Type species: *Trachyceras doleriticum* MOJSISOVICS, 1869

***Anolcites* cf. *doleriticus* (MOJSISOVICS, 1869)**

Figure 51.

* 1869 *Ammonites* (*Trachyceras*) *doleriticus* MOJS. n. sp. – MOJSISOVICS, Gliederung, p. 131, pl. III, figs. 1–3.
v 1882 *Trachyceras doleriticum* E. v. MOJSISOVICS – MOJSISOVICS, Mediterr. Triasprovinz, p. 103, pl. XIII, fig. 5, pl. XXXVII, fig. 1.
? 1903 *Trachyceras* (*Anolcites*) *doleriticum* MOJS. – FRECH, Neue Cephalopoden, p. 29, pl. IX, fig. 2.
? 1966 *Trachyceras* (*Anolcites*) *doleriticum* MOJS. – PISA, Alpi Carniche, p. 658, pl. LXXIII, fig. 3.
1976 *Anolcites doleriticus* (MOJS.) – WANG & HE, Jolmo Lungma, p. 324 (partim), pl. 14, figs. 5–7, 10, 11; text-fig. 29a. (non pl. 14, figs. 8, 9.)
? 1977 *Anolcites doleriticus* (MOJSISOVICS) – URLICHS, Pachycardientuffe, p. 18, pl. 1, fig. 4.
2004 *Anolcites doleriticus* (MOJS., 1869) – RIEBER & BRACK, Falsanolcites, p. 166, figs. 23, 24.
? 2015 *Anolcites* cf. *doleriticus* (MOJSISOVICS) – ESCUDERO-MOZO et al., Eastern Iberia, p. 247, fig.11.4.

Material: One incomplete body chamber from the Forrás Hill at Felsőörs (*Fig. 1b* and *Fig. 6*), kept in the collections of the former Geological Institute of Hungary (SARA).

Measurements:

Identity No.	Lmax	Wh	Ww	U
T.3163.	26.1	14.8	13.5	?

Description: Small *Anolcites*, with moderately evolute conch. The whorl is depressed, stout; the cross-section is oval to subhexagonal. The umbilical edge is subrounded. The flanks are strongly convex and pass gradually into the gently arched venter. The flanks are ornamented with very strong ribs and weaker nodes. The widely spaced ribs are rectiradiate to slightly prorsiradiate. Very rarely, secondary ribs are irregularly inserted by intercalation. There are four rows of nodes. The umbilical nodes appear only as swellings weakly connected to the ribs. The lateral nodes develop on the outer third of the primary ribs. The ventrolateral nodes form projected endings on the ribs. The slightly elongated (clavate) ventral nodes are separated from the ventrolateral nodes and form two rows. They stand in opposite position and are separated by a ventral groove.



Figure 51. *Anolcites* cf. *doleriticus* (MOJSISOVICS, 1869), specimen collected by J. Stürzenbaum, in 1874 (T.3163.); Felsőörs, Longobardian, Archelaus Zone

Suture lines are not seen.

Remarks: The holotype specimen of *A. doleriticus* and a paratype figured by MOJSISOVICS (1882, l.c., pl. XXXVII, fig. 1) were inspected by the author in the collections of the Geologische Bundesanstalt (Vienna). Our incomplete specimen, illustrated here (*Fig. 51*), is smaller and has coarser ornament, but in other substantial features it may well be compared to Mojsisovics' types, considering the size difference. This specimen was collected by J. Stürzenbaum in 1874 at Felsőörs, and it may correspond to that mentioned by MOJSISOVICS (1882, p. 103) from the same locality: "aus dem weissen kreideartigen Kalk (Füreder Kalk) vom Forrás-hegy bei Felső-Örs im Bakonyer Walde". Accepting this identification means that this specimen came from the uppermost Ladinian strata.

The specimen figured by FRECH (1903, l.c.) from Felsőörs, also allegedly from the Füred Limestone, was not seen because it was housed in Breslau (Wroclaw).

The item in the synonymy by PISA (1966, l.c.) is queried because the ribbing of the specimen is too strongly projected. URLICHS (1977, l.c.) did not present ventral view.

Part of the specimens illustrated by WANG & HE (1976, pl. 14, figs. 8, 9) do not seem to belong to *A. doleriticus*, because their ribs simply cross the venter.

The specimen figured by ESCUDERO-MOZO et al. (2015, l.c.) is extremely poorly preserved; it may hardly belong to *A. doleriticus*.

RIEBER & BRACK (2004) in their detailed analysis of the new genus *Falsanolcites*, doubted the homogeneity of the species *doleriticus* as defined by MOJSISOVICS (1882, l.c.). They retained the holotype as *Anolcites doleriticus*, but they moved the paratype (MOJSISOVICS 1882, l.c., pl. XXXVII, fig. 1) to the genus *Falsanolcites*. This opinion is not accepted here.

Distribution: A. doleriticus was recorded from the Southern Alps, the Balaton Highland and the Himalayas and probably from Eastern Iberia.

***Anolcites* ? sp.**

Figure 52.

Material: One fragmentary specimen from Katrabóca at Nemesvámos (*Fig. 1b, Fig. 7* and *Fig. 8*), kept in the collections of the former Geological Institute of Hungary (SARA).

Measurements:

Identity No.	D	Wh	Ww	U
T.3635.	~62	22.5	?	?

Description: Medium-sized *Anolcites*, with moderately evolute conch. The whorls are compressed; the cross-section seems to be high oval. The umbilical edge is subrounded. The flanks are weakly convex and pass abruptly into the highly arched venter. The flanks are ornamented with rather thin, dense ribs; nodes

are indistinct. The closely spaced ribs are prorsiradiate and projected. Rarely, secondary ribs appear by bifurcation. There are two rows of nodes. The umbilical nodes are very weak. The slightly clavate ventral nodes are at the projected endings of the ribs, and form two rows. They stand in opposite position and seem to be connected by weak riblets across a shallow ventral groove.

Suture lines are not seen.

Remarks: The specimen was collected by Károly Papp from "Tridentinus limestone" (Vámos, Katrabocza)", and was identified as "*Anolcites* cf. *richthofeni* MOJS.". Looking at the morphology of the ventral part (*Fig. 52*), the generic attribution may be correct. On the other hand, the specific identification can be refuted because the ribbing of "*Trachyceras richthofeni* MOJSISOVICS, 1882" is definitely falcoid, as observed by the present author in the collections of the Geologische Bundesanstalt (Vienna). Moreover, according to Paolo Mietto and Stefano Manfrin (pers. comm.) the species *richthofeni* should be placed into the genus *Maclearnoceras*.

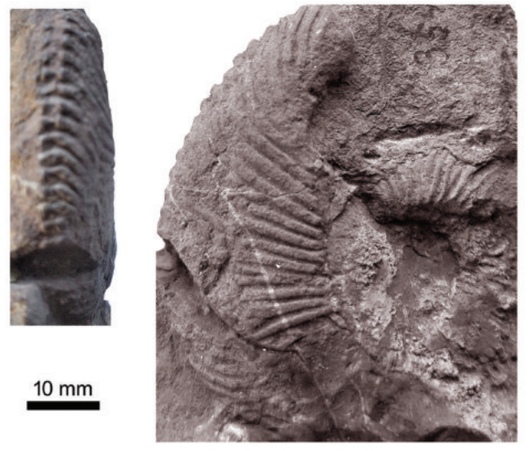


Figure 52. *Anolcites* ? sp., specimen collected by K. Papp (T.3635.); Katrabóca, Longobardian, Archelaus Zone

Distribution: This taxon was described from the Ladinian of the Balaton Highland.

Genus *Falsanolcites* RIEBER & BRACK, 2004

Type species: *Anolcites* (*Trachyceras*) *furcosus* MOJSISOVICS, 1893

RIEBER & BRACK (2004) devoted a special paper to the description of their new genus. Yet, the definiton of Falsanolcites remained somewhat vague and apparently too broad, considering the various morphology of the formerly described taxa by different authors, which were included to *Falsanolcites* by RIEBER & BRACK (2004). On the other hand, the comparison to the genus *Anolcites*, given by these authors, offers valuable distinctive features. *Anolcites* has elongate (clavate) ventral nodes, in contrast to the rounded ones in *Falsanolcites*; the intercalatory ribs of *Anolcites* appear in the outer third of the flanks, whereas in *Falsanolcites* they appear in the inner third; the whorls of the type specimen of *Anolcites* are more compressed than those of the representatives of *Falsanolcites*.

The species *recubariensis, rieberi* and *gortanii* seem to form a separate group within the genus *Falsanolcites* because they have prorsiradiate endings of the ribs in alternate arrangement, separated by a furrow. This is in contrast with the simple and opposing ventral nodes of the species *furcosus*, which are usually connected by weak ribs across the venter. Here the genus *Falsanolcites* is tentatively divided into two morhological groups in accordance with the above criteria. The "*recubariensis* group" is morphologically so much different from the type of *Falsanolcites* that it would deserve a separate genus. To express this uncertainty, in the names of the species ranked into this group, a question mark is used after the generic name.

Furcosus group

This informal category is not identical with the term "group *furcosus*" introduced by RIEBER & BRACK (2004), but used here in a narrower sense, for the species having simple and opposing ventral nodes, which are usually connected by weak ribs across the venter.

Falsanolcites cf. *furcosus* (MOJSISOVICS, 1893)

Plate XIII: 3.

* 1893 *Anolcites furcosus* E. v. MOJSISOVICS. – MOJSISOVICS, Hallstatt, p. 692, pl. CC, fig. 1.
non 1900 *Anolcites furcosus* v. MOJS. – DIENER, Schiechlinghöhe, p. 12, pl. I, fig. 3.
1912 *Anolcites furcosus* MOJS. sp. – SALOPEK, Samobor, p. 16, pl. I, fig. 3.
? 1913 *Anolcites furcosus* MOJS. – SIMIONESCU, Hagighiol, p. 299, pl. II, fig. 7.
1936 *Anolcites furcosus* MOJS. var. – SALOPEK, Gregurić brijeg, p. 214, pl. I, fig. 2.
2004 *Falsanolcites furcosus* (MOJS., 1893) – RIEBER & BRACK, Falsanolcites, p. 162, figs. 2, 13, 21, 22, 27–29.
2023 *Falsanolcites furcosus* (MOJSISOVICS, 1893) – VIDAKOVIĆ et al., Samobor, p. 500, pl. 2, figs. 6, 7; pl. 3, figs. 1, 2, 3.

Material: One incomplete specimen from the Kádárta quarry (S-yard) (*Fig. 1b* and *Fig. 12*).
Measurements:

Identity No.	D	Wh	Ww	U
PZs-31.	42.8	16.5	14.1	?

Description: Small *Falsanolcites*, with moderately evolute conch. The whorls are compressed, stout; the cross-section is oval to subhexagonal. The umbilical edge is subrounded. The flanks are strongly convex and pass gradually into the gently arched venter. The flanks are ornamented with very strong ribs and weaker nodes. The widely spaced ribs are rectiradiate to slightly prorsiradiate and projected. Secondary ribs are irregularly inserted by intercalation in the inner third of the flank. There are five rows of nodes. The umbilical nodes appear only as swellings. The first, very weak row of lateral nodes develops on the inner thirds of the flanks at the insertion points of the secondary ribs. The ventrolateral nodes form bulbous, projected endings on the ribs. The rounded ventral nodes are slightly separated from the ventrolateral nodes and form two rows. They stand in opposite position and are connected by weak ribs across the venter.

Suture lines are not seen in detail. The imprint of the last septum was partly preserved at the beginning of the body chamber; it shows entire saddles.

Remarks: This is the type species of the genus *Falsanolcites*, as defined by RIEBER & BRACK (2004, l.c.). The original figure of *furcosus* by MOJSISOVICS (1893, l.c.; assigned to *Anolcites* at that time) is very detailed and informative. RIEBER & BRACK (2004, l.c.) considerably extended the range of variation of this species and introduced a "group *furcosus*" for the related forms. They illustrated this group with photographs of not less than seven morphotypes. Our small and incomplete specimen falls into this wide range of morphotypes both in the lateral ornamentation and in the opposing character of the ventral nodes connected by ribs across the venter.

In the synonymy list, the item by DIENER (1900, l.c.) illustrates a very involute specimen with extremely coarse ribs and at least eight rows of strong nodes, therefore it may not belong to *F. furcosus*. The item by SIMONESCU (1913, l.c.) is queried because the diagnostic ventral part is not illustrated.

Distribution: A. furcosus was described from the Ladinian of the Southern Alps, Northern Calcareous Alps the Dinarides and probably from Dobrogea. At the Balaton Highland it was collected from the lower Ladinian (Fassanian) Recubariensis Zone.

Falsanolcites stuerzenbaumi (MOJSISOVICS, 1882)

Figure 53.

v * 1882 *Trachyceras Stürzenbaumi* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 106, pl. XXX, fig. 15.

Material: One nearly complete but poorly preserved specimen from the Forrás Hill at Felsőörs (*Fig. 1b* and *Fig. 6*), kept in the collections of the former Geological Institute of Hungary (SARA).
Measurements:

Identity No.	D	Wh	Ww	U
T.1710.	25.8	9.2	?	10.9

Description: Small *Falsanolcites*, with rather evolute conch. The whorls somewhat conpressed; the cross-section is oval. The umbilical edge is subrounded. The flanks are rather flat and pass gradually into the highly arched venter. The flanks are ornamented with very strong ribs and weak nodes. The regularly spaced ribs are prorsiradiate and projected. A few secondary ribs are inserted by intercalation in the inner third of the flank. On the body chamber the character of the ribbing changes to densely spaced, thin and projected riblets. On the phragmocone there are five rows of nodes. The umbilical nodes are weak swellings. The first, very weak row of lateral nodes develops on the inner quarter of the flanks. The ventrolateral nodes develop at the projected parts of the ribs. The rounded ventral nodes form two rows. They stand in opposite position and are connected by marked ribs across the venter.

Suture lines are poorly visible; simple, with entire saddles; the crenulation of the lobes is poorly preserved.



Figure 53. *Falsanolcites stuerzenbaumi* (MOJSISOVICS, 1882), holotype (T.1710.); Felsőörs, Longobardian(?), Archelaus(?) Zone

Remarks: This single specimen from Felsőörs was described in detail by MOJSISOVICS (1882, l.c.) when he introduced the species *stuerzenbaumi*. According to him, this species stands close to *A. doleriticus* (MOJSISOVICS, 1869) and, considering the general morphological features, this can partly be endorsed by our personal study of the holotype kept in the collections of the former Geological Institute of Hungary (SARA) (*Fig. 53*). However, a substantial difference lies between the two species that there is a definite groove between the ventral rows of nodes of *A. doleriticus*, whereas in *stuerzenbaumi* the opposing ventral nodes are connected by marked ribs. This condition unequivocally renders *stuerzenbaumi* to the genus *Falsanolcites*. This attribution is further supported by the fact that the intercalatory ribs appear in the inner third of the flanks.

Distribution: This taxon was described only from the Ladinian of the Balaton Highland.

Recubariensis group

This informal category includes forms with *Falsanolcites*-like lateral ribbing and which have prorsiradiate endings of the ribs in alternate arrangement, separated by a furrow.

Falsanolcites cf. *gortanii* (PISA, 1966)

Plate XIII: 4, 5.

? 1914 *Anolcites laczkói* DIEN. – DE TONI, p. 144, pl. XI, fig.4.
* 1966 *Trachyceras* (*Protrachyceras*) *gortanii* n. sp. – PISA, Alpi Carniche, p. 633, pl. LXXI, figs. 1–6; text-fig. 4.
v 1973 *Protrachyceras* cf. *gortanii* PISA, 1966 – RIEBER, Grenzbitumenzone, p. 69, pl. 15, fig. 14.
v 1993 *Protrachyceras* cf. *gortanii* PISA, 1966 – BRACK & RIEBER, Anisian/Ladinian, p. 486, pl. XIII, figs. 8, 9.
v 1998 *Eoprotrachyceras* cf. *recubariense* (MOJSISOVICS, 1882) – VÖRÖS, Balaton-felvidék, p. 53, pl. IX, fig. 3.
2007 *Falsanolcites* sp. – BRACK et al. 2007, fig. 5/5.
2018 *Falsanolcites gortanii* (PISA, 1966) – MIETTO et al., Recoaro and Tretto, p. 236, pl. I, fig. 8.
2023 *Falsanolcites* cf. *gortanii* (PISA, 1966) – VIDAKOVIĆ et al., Samobor, p. 507, pl. 2, figs. 1, 2, 8.
v 2024 *Anolcites* sp. aff. *recubariensis* (MOJSISOVICS, 1882) – VÖRÖS et al., Nemesvámos, p. 404, pl. IX, fig. 7.

Material: Two incomplete specimens from Katrabóca at Nemesvámos and from Öskü (*Fig. 1b, Fig. 7, Fig. 8* and *Fig. 17*).

Measurements:

Identity No.	D	Wh	Ww	U
M.98.120	Lmax 41	?	?	?
BM-60.	57.1	25.1	21.6	14.5

Description: Medium-sized *Falsanolcites* with moderately involute conch (U/D=0.26). The whorl-section is high oval. The umbilical wall is subrounded but well marked. The flanks are almost flat and pass gradually into the arched venter. The flanks are ornamented with slightly prorsiradiate, partly sinuous, projected primary ribs (around 16 on a half whorl) with indistinct nodes. The secondary ribs appear irregularly by intercalation and partly by bifurcation near the umbilicus or at around the inner third of the flank. The umbilical nodes are very weak. There are no true ventral nodes, instead, projected clavi appear on the projected ventrolateral endings of the ribs. The venter is rather wide and there is a narrow but deep furrow between the alternating ventral clavi.

Suture lines were not seen.

Remarks: Our specimens, illustrated here, were previously identified by VÖRÖS (1998, l.c.) and VÖRÖS et al. (2024, l.c.) as *Eoprotrachyceras* cf. *recubariense* (MOJSISOVICS, 1882) and *Anolcites* sp. aff. *recubariensis* (MOJSISOVICS, 1882), respectively, on the basis of their morphology similar to the species *recubariensis*. Now, the generic attribution of this species was settled to *Falsanolcites* by RIEBER & BRACK (2004), and this is tentatively accepted here.

As for the specific identification, the thorough analysis by PISA (1966, l.c.) convinced the present author to include the specimens in question to the species "*Trachyceras* (*Protrachyceras*) *gortanii*", introduced by PISA (1966, l.c.). This author compared his new species to "*Trachyceras* (*P.*) *recubariense*" and found that they are closely similar, but *gortanii* is significantly less evolute (U/D=0.35) than *recubariensis* (U/D=0.41) (see measurements in PISA 1966, pp. 634 and 646). One of our specimens is even less evolute (U/D=0.26), thus

standing closer to *gortanii* than to *recubariensis*. Its lateral and particularly the ventral ornamentation are also very similar to *gortanii*, therefore here it is tentatively attributed to that species.

RIEBER & BRACK (2004) included both *recubariensis* and *gortanii* into the genus *Falsanolcites*. Despite that both species have important morphological features (alternating ventral clavi, deep ventral furrow) which significantly differ from the type species of *Falsanolcites*, this generic attribution is provisionally applied here, with the restriction that these two species belong to the informal "*recubariensis* group".

An early record of "*Anolcites laczkói*" by DE TONI (1914, l.c.) on the basis of the very close apparent similarity is here tentatively included to the synonymy of *Falsanolcites gortanii*. It is true that *Katrabocaites laczkoi* (DIENER, 1899) portrays lateral ribbing and alternating ventral riblets with ventral furrow, somewhat similar to *F. gortanii*. However, it is more involute and has subammonitic sutures in contrast to the ceratitic sutures of all *Falsanolcites* species.

Distribution: F. gortanii was described from the Ladinian of the Southern Alps and the Dinarides. At the Balaton Highland it was collected from the lower Ladinian (Fassanian) Recubariensis Zone and from the upper Ladinian (Longobardian) Archelaus Zone.

Falsanolcites rieberi (FANTINI SESTINI, 1994)

Plate XIII: 6–8; Plate XIV: 1, 2.

v 1993 *Eoprotrachyceras* cf. *curionii* – VÖRÖS, Redefinition, p. 31, pl. VI, fig. 5.
* 1994 *Eoprotrachyceras rieberi* sp. n. – FANTINI SESTINI, Esino, p. 258, pl. 3, figs. 1–4; text-fig. 4h.
v 1998 *Eoprotrachyceras* cf. *rieberi* FANTINI SESTINI, 1994 – VÖRÖS, Balaton-felvidék, p. 53, pl. VIII, figs. 6–8.
v 1998 *Eoprotrachyceras* sp.– VÖRÖS, Balaton-felvidék, p. 53, pl. VIII, fig. 5.
v 2009 *Falsanolcites* cf. *rieberi* FANTINI SESTINI, 1994 – VÖRÖS et al., Curionii Zone, p. 333, pl. II, fig. 1.

Material: Five incomplete specimens from from the Öreg Hill at Vászoly (1) Forrás Hill at Felsőörs and from Öskü (3) (*Fig. 1b, Fig. 5* and *Fig. 17*).

Measurements:

Identity No.	D	Wh	Ww	U
M.98.102	50.5	22.9	?	13.6
M.98.101	33.1	13.9	12.8	11.1
M.98.121	max83	34	25	?
INV 2026.36.	>99	?	?	?

Description: Small to large *Falsanolcites* with moderately involute conch (U/D=0.27 to 0.33). The whorl-section is high oval. The umbilical wall is subrounded. The flanks are gently convex and pass gradually into the highly arched venter. The flanks are ornamented with prorsiradiate, partly sinuous, projected primary ribs (around 18 to 20 on a half whorl) mostly without nodes. The secondary ribs intercalate irregularly near the umbilicus or at around the inner third of the flank. The umbilical nodes are indistinct or very weak. The ventrolateral nodes develop at the endings of the ribs. The ventral nodes are slightly separated from the ventrolateral nodes and form two rows. They stand in alternate position and are separated by a ventral groove.

Suture lines were not seen.

Remarks: FANTINI SESTINI (1994, l.c.) established her new species "*Eoprotrachyceras rieberi*" on a specimen mentioned by BRACK & RIEBER (1986, fig. 10; 1993, p. 438) as "*Eoprotrachyceras* cf. *laczkoi*" from Pèrtica (Lombardy).

The secondary material from the Esino Limestone, illustrated by FANTINI SESTINI (1994, l.c.) portrays more convincing morphological features, yet this author further emphasized the close similarity between the species *rieberi* and *laczkoi*. In fact, this is not correct, because *rieberi* is more evolute and has ceratitic suture in contrast to the rather involute *laczkoi* with subammonitic suture. Moreover, lately the species rieberi was ranked into the genus *Falsanolcites* (RIEBER & BRACK 2004) and the species *laczkoi* into the genus *Katrabocaites* (VÖRÖS et al. 2025).

At the same time, FANTINI SESTINI (l.c.) rightly recognized the similarity between her new species and "*Protrachyceras gortanii*" PISA, 1966; here both species are included the informal "*recubariensis* group".

In previous papers by the present author, some *Falsanolcites rieberi* specimens were wrongly identified as *Eoprotrachyceras* cf. *curionii* (VÖRÖS 1993, l.c.) or simply as *Eoprotrachyceras* sp. (VÖRÖS 1998, l.c.).

Distribution: F. rieberi was described from the Ladinian of the Southern Alps. At the Balaton Highland it was collected from the lower Ladinian (Fassanian) Curionii and Recubariensis Zone.

Genus *Paranolcites* VÖRÖS, 2025

Type species: *Paranolcites budaii* VÖRÖS, 2025

Emended diagnosis: Conch involute; whorl section high oval. Umbilical wall steep with subrounded edge. Gently convex flanks; slightly arched, nearly tabulate venter. Numerous, strong, prorsiradiate, sinuous primary and intercalatory ribs on flanks. Umbilical and lateral nodes present; ventrolateral nodes absent or indistinct. Venter uninterruptedly crossed by strong, blunt ribs; ventral nodes connected by strong ribs across venter. Suture ceratitic.

In its lateral ornamentation, *Paranolcites* is similar to *Anolcites*, particularly the species *A. arminiae* (MOJSISOVICS, 1893, p. 694, pl. CC, figs. 3, 4.) and *A. impolitus* (TOZER, 1994, p. 158, pl. 78, figs. 10, 11) but differs by its much narrower umbilicus and the absence of distinct ventral nodes. The most diagnostic feature of *Paranolcites*, the ventral ornamentation with bulky ribs crossing the venter without distinct nodes, appear in some Canadian species of *Anolcites* (e.g. *A. anguinus* TOZER, 1994, p. 159, pl. 80, figs. 7, 8) and *Zestoceras* (e.g. *Z. enode*: TOZER, 1994, p. 180, pl. 82, figs. 2, 5, and *Z. nitidum*: l.c., pl. 80, fig. 9) but all these forms are significantly more evolute than *Paranolcites*. The mentioned Canadian species of "*Anolcites*" without ventral furrow should be formed a separate genus of Anolcitinae; the genus *Zestoceras* is in close relationship with *Paranolcites*.

Paranolcites budaii VÖRÖS, 2025

Plate XIV: 3.

v * 2025 *Paranolcites budaii* n. sp. – VÖRÖS et al., Király Hill, p. 311, pl. V, fig. 3.

Material: A single, mostly well-preserved specimen from Veszprémfajsz, Király Hill.

Measurements:

Inventory No.	D	Wh	Ww	U
PAL 2025.8.1.	55	26.9	20.3	13.3

Description (modified from VÖRÖS et al., 2025): Medium sized *Paranolcites* with rather involute conch (U/D=0.24). The whorl section is high oval. The umbilical wall is steep; the umbilical edge is subrounded.

The flanks are gently convex and join the gently arched, almost tabulate venter with obtuse angle. The venter is crossed by strong but blunt ribs. The flanks are ornamented with strong ribs. The number of the slightly sinuous prorsiradiate ribs increases by intercalations up to 22 on the half whorl of the body chamber. The strength of the ribs increases toward the venter. The umbilical nodes are moderately strong. The lateral flanks bear two rows of weak nodes. At the ventral margins the ribs simply pass straight across the venter with no indication of nodes.

Suture lines are not visible.

Remarks: P. budaii, in its host genus, seems to stand alone within the Ladinian ammonoids. In general ornamentation (the style of ribbing and the ribs crossing the venter) certain degree of similarity can be observed in *Anolcites arminiae* (MOJSISOVICS, 1893, p. 694, pl. CC, figs. 3, 4.), and in *A. impolitus* (TOZER, 1994, p. 158, pl. 78, figs. 10, 11), but these latter two species have definite ventrolateral rows of nodes and rather wide umbilicus, as usual in true *Anolcites*. In *Zestoceras enode* (TOZER, 1994, p. 180, pl. 82, figs. 2, 5.) and some other species of *Zestoceras* the ribs cross the venter without nodes, but these species are very evolute in contrast to the involute *P. budaii*.

Distribution: Up to now *P. budaii* is known only from the Balaton Highland, from the upper Ladinian (Longobardian) Archelaus Zone.

***Paranolcites ozsvarti* n. sp.**

Plate XIV: 5; Figure 54.

Holotype: Hungarian Natural History Museum (Budapest), inventory number: PAL 2026.29.1. (*Pl. XIV: 5*)

Locus typicus: Kádárta, quarry (E-yard), loose.

Stratum typicum: Greenish-grey ammonitic limestone, Buchenstein Formation, Ladinian, Longobardian.

Derivatio nominis: After the name of Péter Ozsvárt, who found the type specimen.

Diagnosis: Conch moderately involute; whorl section high oval to rectangular. Umbilical wall steep with marked edge. Gently convex flanks; slightly arched, nearly tabulate venter. Numerous, strong, prorsiradiate, sinuous primary and intercalatory ribs on flanks. Strong umbilical nodes; three rows of lateral nodes. Venter uninterruptedly crossed by strong, blunt ribs; no ventrolateral nodes. Suture ceratitic.

Material: A single, mostly well-preserved specimen from the Kádárta quarry (*Fig. 1b, Fig. 12* and *Fig. 14)*.

Measurements:

Identity No.	D	Wh	Ww	U
PAL 2026.29.1.	61.2	26.3	18.5	19.1

Description: Large *Paranolcites* with moderately involute conch (U/D=0.31). The whorl section is high oval to rectangular. The umbilical wall is steep; the umbilical edge is well-marked. The flanks are nearly flat and join the almost tabulate venter with obtuse angle. The venter is crossed by strong but blunt ribs. The flanks are ornamented with strong ribs, 10 on a half whorl. The number of the slightly sinuous prorsiradiate ribs increases by bifurcations and intercalations up to 24 on the half whorl of the body chamber. Most of the bifurcations and intercalations appears on the outer half of the flanks. The strength of the ribs slightly increases toward the venter. The umbilical nodes are very strong. The lateral flanks have three rows of distinct nodes. At the ventral margins the ribs simply pass straight across the venter with no indication of nodes.

The suture line (*Fig. 54*) is ceratitic with entire saddles; the first lateral lobe is very deep and weakly crenulated.

Remarks: Paranolcites ozsvarti is rather similar to *P. budaii* but differs in wider umbilicus, more rectangular whorl section, stronger umbilical nodes and three well-defined rows of lateral nodes, instead of two rows of nodes in *P. budaii*. A few of the Canadian "*Anolcites*" species (e.g. *anguinus, impolitus*; TOZER 1994, pp. 158, 159) have some similarity to *P. ozsvarti* but they are much more evolute and bear distinct ventral nodes. The representatives of the genus *Zestoceras* (in TOZER 1994, pp. 159–161) are also partly similar but they are more evolute (U/D=0.4 to 0.50) in contrast to the U/D=0.31 value of *P. ozsvarti*, and they have no lateral nodes.

Distribution: Up to now *P. ozsvarti* is known only from the Balaton Highland, from the upper Ladinian (Longobardian) Archelaus Zone.

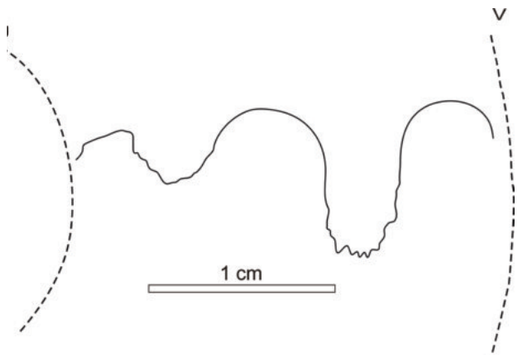


Figure 54. Suture line of *Paranolcites ozsvarti* n. sp. (PAL 2026.29.1.), at 20 mm whorl-height, Kádárta, quarry (E-yard), loose, Longobardian, Archelaus Zone; u: umbilical margin, v: ventrolateral margin

***Paranolcites kadartaensis* n. sp.**

Plate XIV: 4.

Holotype: Hungarian Natural History Museum (Budapest), inventory number: PAL 2026.30.1. (*Pl. XIV: 4*)

Locus typicus: Kádárta, quarry, loose.

Stratum typicum: Greenish-grey nodular ammonitic limestone, Buchenstein Formation, Ladinian, Longobardian.

Derivatio nominis: After the name of the locality Kádárta.

Diagnosis: Whorl section rectangular. Umbilical wall steep with marked edge. Nearly flat flanks; slightly arched, nearly tabulate venter. Numerous, strong, prorsiradiate, sinuous primary and intercalatory ribs on flanks. Strong umbilical nodes; five rows of lateral nodes. No ventrolateral nodes. Venter uninterruptedly crossed by strong, wide, adorally arched ribs. Suture with entire saddle.

Material: A single, incomplete specimen (fragment of a body chamber) from the Kádárta quarry, SW-yard (*Fig. 1b* and *Fig. 12*).

Measurements:

Identity No.	D	Wh	Ww	U
PAL 2026.30.1.	>30	27.5	11.5	?

Description: Small *Paranolcites* with high oval to rectangular whorl section. The umbilical wall is not seen; poorly preserved. The flanks are nearly flat and join the almost tabulate venter with obtuse angle. The venter is crossed by strong, blunt ribs. The flanks are ornamented with strong ribs. The number of the sinuous prorsiradiate ribs increases by bifurcations and intercalations appearing on the outer half of the flanks. The strength of the ribs increases toward the venter. The umbilical nodes are strong. The lateral flanks have five rows of distinct nodes. The first row of lateral nodes is separated from the umbilical nodes; the ribs start from these first lateral nodes. At the ventral margins the ribs are strongly projected, thickened and simply pass straight across the venter with no indication of nodes. The ribs crossing the venter are wide, with narrow interspaces and arched adorally. Their ventral parts are slightly depressed, suggesting an incipient ventral furrow.

The suture line is not seen but the imprint of the last septum was partly preserved at the beginning of the body chamber; it shows an entire saddle.

Remarks: P. kadartaensis differs from *P. budaii* and *P. ozsvarti* by it more numerous rows of lateral nodes and by the peculiar ventral ornamentation, with thickened and adorally arched ribs across the venter.

P. kadartaensis, just as the other species of *Paranolcites* has some similarity to a few Canadian "*Anolcites*" species (see in TOZER 1994, pp. 158–161). In particular, the character of the ribs crossing the venter in *Zestoceras enode* (TOZER 1994, pl. 82, fig. 5) and in *Z. nitidum* (TOZER 1994, pl. 80, fig. 9) is somewhat similar to that of *P. kadartaensis* but the Canadian forms have no lateral nodosity.

Distribution: Up to now *P. kadartaensis* is known only from the Balaton Highland, from the lower Ladinian (Fassanian) Recubariensis Zone.

Genus *Asklepioceras* RENZ, 1910

Type species: *Arpadites* (*Dittmarites*) *segmentatus* MOJSISOVICS, 1893

***Asklepioceras loczyi* (DIENER, 1899)**

Figure 55.

v * 1899 *Arpadites* (*Ditmarites*) *Lóczyi* nov. sp. – DIENER, Neue Cephalopoden, p. 15, pl. I, fig. 5.
1910b *Asklepioceras* cf. *Loczyi* DIENER. – RENZ, Argolis, p. 50, pl. IV, fig. 3.
non 1913 *Arpadites* (*Asklepioceras*) *Loczyi* DIEN. – SIMIONESCU, Hagighiol, p. 304, 350, pl. III, fig. 3.
non 1977 *Muensterites* cf. *loczyi* (DIENER) – URLICHS, Pachycardientuffe, p. 18, pl. 1, fig. 8.
? 2000 *Asklepioceras* cf. *loczyi* (DIENER, 1899) – BALINI et al., Schilpario, p. 39, pl. 1, fig. 2.

Material: One nearly complete specimen from the Som Hill at Nemesvámos (*Fig. 1b* and *Fig.7*), kept in the collections of the former Geological Institute of Hungary (SARA).

Measurements:

Identity No.	D	Wh	Ww	U
T.898.	30.0	10.8	?	10.7

Description: Medium-sized *Asklepioceras* with moderately involute conch (U/D=0.36). The whorl section is high oval. The umbilical wall is steep to overhanging; the umbilical edge is well marked. The flanks are gently convex and join gradually to the arched venter. The flanks are ornamented with strong and extremely wide ribs and very narrow interspaces. The number of the prorsiradiate and strongly projected ribs is around 14 on a half whorl. The umbilical parts of the ribs are bulbous, particularly on the phragmocone. Bifurcations occur near the umbilicus. The strength of the ribs decreases toward the aperture and they become almost equal in thickness with the interspaces at the contracted body chamber. At the ventral margins the endings of the ribs are strongly projected and form opposing rows along a weak ventral groove.

Suture lines are not visible.

Remarks: DIENER (1899, l.c.) when introduced *A. loczyi*, enumerated the major features which differentiated his new species from *A. segmentatus* (MOJSISOVICS, 1893, p. 457, pl. CLV, fig. 1). These are: the deeper umbilicus with vertical wall marked by strong bullae, the greater number of ribs with deeper interspaces, and the more strongly projected ventral endings of the ribs. These morphological differences are well recognized in the original specimen figured by Diener (reproduced in photographs here; *Fig. 55*) thus the validity of the species *A. loczyi* (DIENER, 1899) is endorsed.

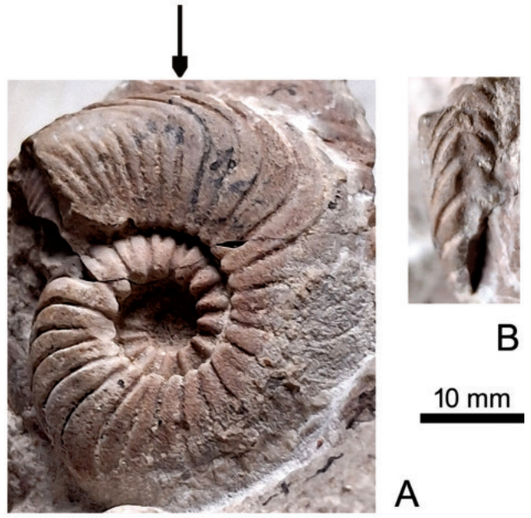


Figure 55. *Asklepioceras loczyi* (DIENER, 1899), holotype (T.898.); Som Hill, upper Longobardian, Regoledanus Zone (?). A: lateral view; B: ventral view of the last part of the body chamber, indicated by arrow

SIMIONESCU (1913, l.c.) figured a specimen which shows a ribbing quite different from *A. loczyi*.

The specimen illustrated by URLICHS (1977, l.c.) as "*Muensterites* cf. *loczyi* (DIENER)" is a small, very poorly preserved, characterless specimen. Moreover, the species *loczyi* was wrongly attributed to *Muensterites*, which has definite nodes and a deep ventral furrow in contrast to the smooth shell of *A. loczyi* without true ventral furrow.

The item by BALINI et al. (2000, l.c.) illustrates a poorly preserved, totally crushed specimen; the identification is queried.

Some forms of *Asklepioceras* with ornamentation rather similar to *A. loczyi* were described and illustrated from Canada (e.g. *A. laurenci*, TOZER 1994, pl. 82, figs. 12, 13), but these are much more involute than *A. loczyi*.

Distribution: A. loczyi was described from from the Ladinian of the Balaton Highland, the Southern Alps and the Hellenides.

Genus *Frankites* TOZER, 1971

Type species: *Paratrachyceras sutherlandi* MCLEARN, 1947

In the interpretation of the genus *Frankites* and the species attributed, as the results of the detailed revision by MIETTO et al. (2008, pp. 403–410) are followed here.

***Frankites* ? cf. *regoledanus* (MOJSISOVICS, 1869)**

Plate XIV: 6.

* 1869 *Ammonites* (*Trachyceras*?) *Regoledanus* MOJS. n. sp. – MOJSISOVICS, Gliederung, p. 134, pl. III, figs. 7, 8.
v 1882 *Trachyceras regoledanum* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 132, pl. XXIX, 7–8.
non 1913 *Trachyceras Regoledanum* MOJS. – SIMIONESCU, Hagighiol, p. 298, pl. III, fig. 8.
non 1915 *Paratrachyceras regoledanum* MOJS. sp. – ARTHABER, Bithynien, p. 137, pl. XVI, fig. 1. (=F. apertus)
non 1960a *Trachyceras* (*Paratrachyceras*) cf. T. (P.) *regoledanum* (MOJSISOVICS) – KUMMEL, Thailand, p. 687, pl. 83, figs. 1, 2; non pl. 94, fig. 10

non 1994 *Trachyceras regoledanum* MOJSISOVICS, 1869 – BALINI, Curioni collection, p. 58, pl. 4, fig. 3. (=*F. apertus*)
1995a *Frankites regoledanus* (MOJSISOVICS, 1869) – MIETTO & MANFRIN, High resolution, p. 555 (partim), pl. V, fig. 4. (non fig. 3. = *F. apertus*)
1995b *Frankites regoledanus* (MOJSISOVICS, 1869) – MIETTO & MANFRIN, Limite ladinico-carnico, p. 30 (partim), pl. 1, fig. 6. non fig. 9. (= *F. apertus*)
non 2000 *Frankites regoledanus* (MOJSISOVICS, 1869) – BALINI et al., Schilpario, p. 40, pl. 1, figs. 3, 4.
2008 *Frankites regoledanus* (MOJSISOVICS) – MIETTO et al., Ladinian/Carnian boundary, p. 398, pl. 1, fig. 10., p. 406, pl. 3, figs. 1–4, 6–11.
? 2010 *Frankites regoledanus* (MOJSISOVICS) – ROSLI OMAN & LEMAN, Malaysia, p. 56, fig. 2.1.

Material: A single, moderately preserved specimen from Köveskál.

Measurements:

Identity No.	D	Wh	Ww	U
INV 2026.37.	36	13.5	~ 9.5	?

Description: Small *Frankites* with very involute, compressed conch. The whorl-section is high oval. The umbilical wall is poorly seen. The flanks are gently convex, almost flat and meet with the acute venter at a sharp angle. The lateral ornamentation consists of numerous, thin, prorsiradiate, falcoid ribs. The ribs start from the poorly defined umbilical margin, where a few secondary riblets intercalate. The ribs and the interspaces are of nearly equal width; their numbers are around 44 in a half whorl. Ventrally the ribs become strongly projected. The venter is not seen (not preserved).

The suture line is not visible.

Remarks: F. regoledanus, the first described species of the genus *Frankites* (MOJSISOVICS, 1869, l.c.) was frequently cited and sometimes misidentified as *F. apertus* (MOJSISOVICS, 1893) by several authors. MIETTO et al. (2008) studied the original specimens of both species in the collections of the Geologische Bundesanstalt (Vienna) and designated the lectotype (specimen figured by MOJSISOVICS 1869, pl. II, fig. 7; re-figured by MOJSISOVICS 1882, pl. XXIX, fig. 7, and MIETTO et al. 2008, pl. 1, fig. 10). This original specimen was also inspected by the present author in the same collection. MIETTO et al (2008) stated that *F. regoledanus* is characterized by usually smaller size, clearly falcoid, ribs which bifurcate rarely at the umbilical rim, in contrast to the larger size, the slightly sigmoid ribs with frequent bifurcations in the inner third of the flank of *F. apertus*. Considering these characteristics, our single specimen is rightly identified as *F. regoledanus*.

On the same grounds, the items of the synonymy: SIMIONESCU (1913, l.c.), ARTHABER (1915, l.c.), KUMMEL (1960, l.c.), BALINI (1994, l.c.) are representing *F. apertus*, instead of *regoledanus*. Part of the specimens illustrated by MIETTO & MANFRIN (1995a, pl. V., fig. 3) and MIETTO & MANFRIN (1995b, pl. 1, fig. 9) are now also considered *F. apertus*.

BALINI et al. (2000, l.c.) figured two specimens as *F. regoledanus*. One of them (l.c., pl. 1, fig. 3) seems more similar to *F. apertus*, the other (l.c., pl. 1, fig. 4.) is a poorly preserved, totally crushed specimen; the identification is dubious.

The generic attribution of *F. regoledanus* became dubious recently. MIETTO et al. (2008, p. 409) indicated that on the basis of its gently sulcate venter it may better be ranked into the genus *Meginoceras* MCLEARN, 1930. This idea was apparently accepted also by VIDAKOVIĆ et al. (2023, p. 510). Until this problem is settled, here we use the form *Frankites* ? *regoledanus*.

Distribution: F. regoledanus was described from from the Ladinian of the Southern Alps. In the present project it was collected from the upper Ladinian (Longobardian) Regoledanus Zone.

Frankites apertus (MOJSISOVICS, 1893)

Plate XIV: 7–9; Figure 56.

* 1893 *Juvavites* (*Dimorphites*) *apertus* E. v. MOJSISOVICS. Hallstatt 6/2, p. 147, pl. CXXVI, Fig. 28.
v 1903 *Trachyceras* (*Anolcites*) *Richthofeni* MOJS. – FRECH, Neue Cephalopoden, p. 29, pl. VI, fig. 5.
1915 *Paratrachyceras regoledauum* MOJS. sp. – ARTHABER, Bithynien, p. 137, pl. XVI, fig. 1.
? 1927 *Anolcites Richthofeni* MOJSISOVICS. – OGILVIE GORDON, Gröden, p. 61, pl. VII, fig. 11. non pl. VII, fig. 9.
1976 *Paratrachyceras* sp. – WANG & HE, Jolmo Lungma, p. 323, pl. 14, figs.16, 17.
1977 *Frankites apertus* (MOJSISOVICS) – URLICHS, Pachycardientuffe, p. 18, pl. 1, fig. 3.
1994 *Trachyceras regoledanum* MOJSISOVICS, 1869 – BALINI, Curioni collection, p. 58, pl. 4, fig. 3.
1995a *Frankites regoledanus* (MOJSISOVICS, 1869) – MIETTO & MANFRIN, High resolution, p. 30 (partim), pl. 5, fig. 3. non fig. 4.
1995b *Frankites regoledanus* (MOJSISOVICS, 1869) – MIETTO & MANFRIN, Limite ladinico-carnico, p. 30 (partim), pl. 1, fig. 9. (non fig. 6)
1995b *Frankites apertus* (MOJSISOVICS, 1893) – MIETTO & MANFRIN, Limite ladinico-carnico, p. 32 (partim), pl. 2, fig. 18. (non fig. 10)
2008 *Frankites apertus* (MOJSISOVICS) – MIETTO et al., Ladinian/Carnian boundary, p. 398, pl. 1, fig. 8., p. 403, pl. 4, figs. 5, 6, pl. 5, figs. 7–17.
? 2010 *Frankites apertus* (MOJSISOVICS) – ROSLI OTHMAN & LEMAN, Malaysia, p. 56, fig. 2.2.

Material: Four fragmentary specimens from Köveskál (1) from the Litér quarry (2) (*Fig. 1b, Fig. 4* and *Fig. 15*), including the original specimen figured by FRECH (1903) from the Forrás Hill at Felsőörs (T.839.), kept in the collections of the former Geological Institute of Hungary (SARA), was also inspected and a photographic illustration is added here.

Measurements:

Identity No.	D	Wh	Ww	U
T.839.	>35.9	27.5	?	?
INV 2026.38.	> 81	?	?	?
INV 2026.39.	> 58	31	?	?
INV 2026.40.	> 25	18.5	13.1	?

Description: Large *Frankites* with rather involute, compressed conch. The whorl-section is high oval. The umbilical wall seems to be steep, partly overhanging. The flanks are gently convex, almost flat and meet gradually with the arched venter. The lateral ornamentation consists of numerous, thin, prorsiradiate, ribs. The ribs start from the umbilical margin; here and in the inner half of the flank several secondary riblets intercalate; bifurcation is also frequent. The ribs and the interspaces are of nearly equal width; their numbers are around 50 in a half whorl. Ventrally the ribs become strongly projected. The ribs cross the venter in a chevron-like pattern, though in other lighting direction they seem to be divided by a very weak groove.

The suture line is not visible.

Remarks: F. apertus was frequently cited and sometimes misidentified as *F. regoledanus* (MOJSISOVICS, 1869) by several authors. MIETTO et al. (2008) studied the original specimens of both species in the collections of the Geologische Bundesanstalt (Vienna) and designated the monotypic holotype of "*Juvavites*" *apertus* (specimen figured by MOJSISOVICS 1893, pl. 126, fig. 28; re-figured by MIETTO et al. 2008, pl. 1, fig. 8). They stated that *F. apertus* is characterized by usually larger size, slightly sigmoid, ribs which frequently bifurcate in the inner third of the flank, in contrast to the smaller size, the clearly falcoid ribs which rarely bifurcate near the umbilical rim of *F. regoledanus*. Considering these features, our specimens are well identified as *F. apertus*.

By using the same principles, the items of the synonymy: FRECH (1903, l.c.), ARTHABER (1915, l.c.), BALINI (1994, l.c.) are representing *F. apertus*. The original specimen illustrated by FRECH (1903, pl. VI, fig. 5) as "*Trachyceras* (*Anolcites*) *Richthofeni*", kept in the collections of the former Geological Institute of Hungary (SARA) is re-figured here (*Fig. 56*) and is considered here a *F. apertus*.

The fragmentary specimen illustrated as "*Anolcites richthofeni*" by OGILVIE GORDON (1927, l.c.) may also belong to *F. apertus*, on the basis of the character of the ribbing.

Part of the specimens illustrated as *F. regoledanus* by MIETTO & MANFRIN (1995a, pl. V., fig. 3) and MIETTO & MANFRIN (1995b, pl. 1, fig. 9) are now also considered *F. apertus*.

Distribution: F. apertus was described from from the Ladinian of the Southern Alps, the Northern Calcareous Alps, the Balaton Highland, Anatolia, the Himalayas and probably from Malaysia. In the present project it was collected from the upper Ladinian (Longobardian) Regoledanus Zone.

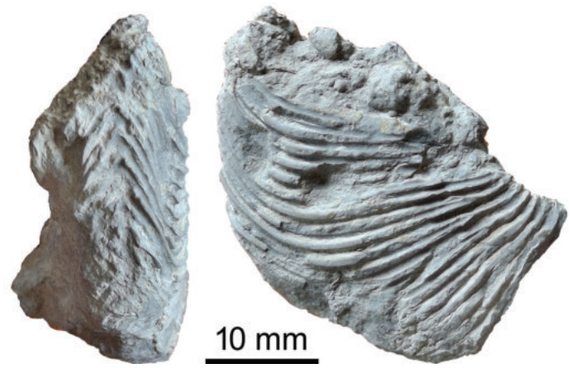


Figure 56. *Frankites apertus* (MOJSISOVICS, 1893), specimen figured by FRECH (1903, l.c.) as "*Trachyceras* (*Anolcites*) *Richthofeni*" (T.839.), Felsőörs, Longobardian, Regoledanus Zone (?)

Subfamily Protrachyceratinae TOZER, 1971

Genus *Eoprotrachyceras* TOZER, 1980

Type species: *Eoprotrachyceras matutinum* TOZER, 1980

Eoprotrachyceras cf. *curionii* (MOJSISOVICS, 1882)

Plate XV: 1, 2.

v * 1882 *Trachyceras Curionii* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 116, pl. XIV, fig. 4.
? 1913 *Protrachyceras Curionii* MOJS. – SIMIONESCU, Hagighiol, p. 288, text-fig. 16.
1914 *Protrachyceras Curionii* MOJS. – HORN, Knollenkalke, p. 19, pl. I, figs. 3, 4.
1927 *Protrachyceras Curionii* MOJSISOVICS. – OGILVIE GORDON, Gröden, p. 51, pl. VI, figs. 11a, b.
v non 1993 *Eoprotrachyceras* cf. *curionii* – VÖRÖS, Redefinition, p. 31, pl. VI, fig. 5.
1994 *Trachyceras curionii* MOJSISOVICS, 1882 – BALINI, Curioni collection, p. 58, pl. 2, figs. 1, 2, pl. 3, fig. 1.
1995a *Eoprotrachyceras curionii* (MOJSISOVICS, 1882) – MIETTO & MANFRIN, High resolution, p. 551, 553, pl. III, fig. 5; pl. IV, fig. 6.
v 1998 *Eoprotrachyceras curionii* (MOJSISOVICS, 1882) – VÖRÖS, Balaton-felvidék, p. 53 (partim), pl. IX, figs. 2, 4. non fig. 5. (=*E. pseudoarchelaus*)
v ? 1998 *Eoprotrachyceras curionii* (MOJSISOVICS, 1882) – VÖRÖS, Balaton-felvidék, p. 52, 53, pl. IX, fig. 1.
v 2009 *Eoprotrachyceras* cf. *curionii* (MOJSISOVICS, 1882) – VÖRÖS et al. Curionii Zone, p. 331, pl. I, fig. 5.
? 2016 *Eoprotrachyceras curionii* (MOJSISOVICS). – PÉREZ-VALERA et al., Triásico Medio, p. 473, fig. 3/A.
2018 *Eoprotrachyceras curionii* (MOJSISOVICS, 18826) – MIETTO et al., Recoaro and Tretto, p. 238, pl. 2, fig. 4.
? 2018 *Eoprotrachyceras* cf. *curionii* (MOJSISOVICS, 18826) – MIETTO et al., Recoaro and Tretto, p. 240, pl. 2, fig. 5.

Material: Two incomplete specimens from Vászoly, Öreg Hill (1) and Öskü, road-cut (1).

Measurements:

Identity No.	D	Wh	Ww	U
M.98.106.	>110	?	?	?
M.98.77.	>148	72	50	?

Description: Large *Eoprotrachyceras* with moderately involute conch. The whorl-section is high trapezoidal. The umbilical wall is steep to slightly overhanging. The flanks are very gently convex and pass into the wide, almost tabulate venter. The ventrolateral margin is accentuated by a row of projected clavi. The flanks are ornamented with very coarse, prorsiradiate, somewhat projected primary ribs (16 to 20 on a half whorl) and strong nodes. Secondary ribs intercalate irregularly at around the middle of the flank; bifurcation occurs also. On the flanks the ribbing strongly prevails over the nodes which develop only as rather irregular swellings on the ribs. There are four rows of nodes. The umbilical nodes are regularly developed. The first row of the weak lateral nodes runs near the inner third of the flank. The second row of the stronger lateral nodes or swellings runs in the outer third of the flank. The ventrolateral nodes form separate rows of projected clavi on the ventrolateral margins. The venter is vide and only slightly arched, and the two rows of the ventral clavi are in alternating position.

The suture line is not properly seen but the imprint of the last septum in the specimen on *Pl. XV: 2* was partly preserved at the beginning of the body chamber; it shows entire saddles.

Remarks: The type specimen figured by MOJSISOVICS (l.c.), kept in the museum of the Geological Service of Italy in Rome was checked and re-figured by BALINI (1994, l.c.), thus the morphology of *E. curionii* is well documented. Yet, a too wide interpretation of this species occurred; e.g. VÖRÖS (1993, l.c.) illustrated a specimen which is now considered *Falsanolcites rieberi* (FANTINI SESTINI, 1994); and one of the specimens figured as *E. curionii* in VÖRÖS (1998, pl. IX, fig. 5) is ranked now to *Eoprotrachyceras pseudoarchelaus* (BÖCKH, 1872).

Some other items of the synonymy are indicated with question mark, because the illustrations poor or the illustrated specimens are poorly preserved, hindering the identification.

The generic attribution of *curionii* to *Eoprotrachyceras* is based on its suture line, clearly described by MOJSISOVICS (1882, l.c.) with lateral saddle weakly frilled on the sides and having entire tops.

Distribution: E. curionii was described from from the Ladinian of the Southern Alps, the Balaton Highland, and probably from Dobrogea and Spain. In the present project it was collected from the lower Ladinian (Fassanian) Curionii Zone (VÖRÖS et al. 2009).

Eoprotrachyceras cf. *pseudoarchelaus* (BÖCKH, 1872)

Plate XVI: 1–4; Figures 57, 58.

v * 1872 *Trachyceras pseudoarchelaus* n. sp. – BÖCKH, Bakony déli, p. 153, pl. X, fig. 15.
v 1873 *Trachyceras pseudoarchelaus* n. sp. – BÖCKH, Südlich. Bakony, p. 165, pl. X, fig. 15.
v 1882 *Trachyceras pseudo-Archelaus* BOECKH. – MOJSISOVICS, Mediterr. Triasprovinz, p. 121, pl. XIX, fig. 4; pl. XX, fig. 2.
? 1896 *Protrachyceras pseudo-Archelaus* BOECKH sp. – DE LORENZO, Lagonegro, p. 148, pl. XX, fig. 19.
? 1900 *Protrachyceras pseudo-Archelaus* BOECKH. – TOMMASI, Clapsavon, p. 26, pl. IV, figs. 2, 2a–c.
v non 1903 *Trachyceras Pseudo-Archelaus* BÖCKH (Protrachyceras). – FRECH, Neue Cephalopoden, p. 25., text-figs. 7β, 10a.
? 1908 *Trachyceras Pseudo-Archelaus* BOECKH (Protrachyceras) – FRECH & RENZ, Neue Triasfunde, pl. XVII, fig. 1.
? 1910b *Trachyceras* (*Protrachyceras*) *pseudo-Archelaus* BOECKH. – RENZ, Argolis, p. 50, pl. IV, fig. 1.

? 1912 *Protrachyceras* cfr. *pseudo-Archelaus* BOECKH. – SALOPEK, Samobor, p. 18, pl. I, fig. 6.
? 1914 *Protrachyceras pseudo-archelaus* BOECKH. – DE TONI, Valdepena, p. 138, pl. X, fig. 5, pl. XI, fig. 3.
? 1927 *Protrachyceras* cf. *pseudo-Archelaus* BOECKH sp. – OGILVIE GORDON, Gröden, p. 59, pl. VII, figs. 6a, 6b.
? 1936 *Protrachyceras pseudo-archelaus* BOECKH sp. – SALOPEK, Gregurić brijeg, p. 219, pl. III, fig. 1.
non 1964a *Protrachyceras* cf. *pseudoarchelaus* (BOECKH) – BANDO, M. Tr. Japan, p. 132, pl.V, figs. 4–6.
non 1964b *Protrachyceras* cf. *pseudoarchelaus* (BOECKH) – BANDO, Triassic Japan, pl.11, figs. 2–4.
non 1966 *Trachyceras* (*Protrachyceras*) *pseudo-archelaus* BOECKH – PISA, Alpi Carniche, p. 642, pl. LXX, figs. 6, 7; text-fig. 6.
non 1983 *Protrachyceras pseudo-archelaus* (BOECKH) – WANG, Ladinian-E. Carnian, p. 157, pl. I, figs. 1, 2, 9, 10.
v 1998 *Eoprotrachyceras* ? *pseudoarchelaus* (BÖCKH, 1872) – VÖRÖS, Balaton-felvidék, p. 44, 54, 94; pl. XI, figs. 1, 2.
non 2023 *Protrachyceras* cf. *pseudoarchelaus* (BÖCKH, 1872) – VIDAKOVIĆ et al., Samobor, p.. 518, pl. 5, figs. 1–3, 5.
v ? 2024 *Protrachyceras* cf. *pseudoarchelaus* (BÖCKH, 1872) – VÖRÖS et al., Nemesvámos, p. 403, pl. IV, fig. 5.
v 2025 *Eoprotrachyceras* cf. *pseudoarchelaus* (BÖCKH, 1872) – VÖRÖS et al., Király Hill, p. 307, pl. V, fig. 4.

Material: Five, partly incomplete specimens (including the type specimen figured by BÖCKH (1872) from Szentantalfa (now Balatoncsicsó) (T.172.), kept in the collections of the former Geological Institute of Hungary (SARA), from Nemesvámos, Katrabóca (1), Kádárta (1), Veszprémfajsz, Király Hill (1) and Balatoncsicsó, Csukrét Gully (1).

Measurements:

Identity No.	D	Wh	Ww	U
T.172,	108.5	46.6	35.4	29.1
M.98.90.	>100	49.5	?	?
M.98.130.	>100.5	48.4	36.3	?
BM-61.	115	54.5	29.8	22.8
FG-2.	103.2	43.7	?	25.2

Description: Medium-sized to large *Eoprotrachyceras* with subinvolute conch (U/D ratio from 0.20 to 0.27). The whorl-section is high oval to quadratic. The umbilical wall is steep to slightly overhanging. The flanks are gently convex and pass into the wide, arched venter. The flanks are ornamented with slightly prorsiradiate, gently projected primary ribs (20 to 22 on a half whorl) and weak nodes. Numerous secondary ribs intercalate irregularly both in the inner and in the outer third of the flank; bifurcations are rare. The primary and the secondary ribs strengthen towards the ventrolateral margin. On the flanks the ribbing strongly prevails over the nodes which develop mostly as rather irregular swellings on the ribs. There are five to seven rows of nodes. The umbilical nodes are massive. The first and second rows of the weak lateral nodes run in the inner third of the flank. The third and fourth rows, if discernible, run in the outer third of the flank. The ventrolateral nodes form a row of projected clavi on the ventrolateral margin on the endings of the ribs; their number is around 24 to 28 on a half whorl. The venter has a deep, V-shaped furrow, bordered by two rows of closely set elongated clavi in alternating position. The ventrolateral and ventral rows of clavi are separated by a smooth belt.

The suture line is ceratitic, with a deep and strongly denticulated first lateral lobe and entire lateral saddles (*Fig. 57*).

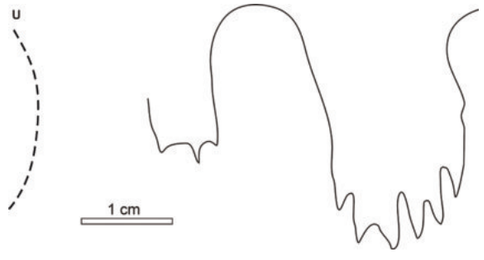


Figure 57. Partial suture line of *Eoprotrachyceras* cf. *pseudoarchelaus* (Böckh, 1872) (BM-61.), at 43 mm whorl-height, Király Hill, collecting site 2, bed 4, Longobardian, Archelaus Zone; u: umbilical margin

Remarks: The species *pseudoarchelaus* is a very frequently cited, yet poorly defined and in many cases misinterpreted species, as VIDAKOVIĆ et al. (2023, p. 519) rightly stated. The first and substantial problem emerges from the absence or presence, and the type of the suture lines and, in consequence, the generic attribution either to *Protrachyceras* or *Eoprotrachyceras*.

The well-preserved holotype (by monotypy) of "*Trachyceras pseudoarchelaus*" kept in the collections of the former Geological Institute of Hungary (SARA) (*Fig. 58*), portrays nicely the diagnostic features of the morphology, namely the prevalence of ribbing over the nodosity and the near absence of the lateral nodes. On the other hand, regrettably the sutures were impossible to develop. In the re-description of this species MOJSISOVICS (1882, pl. XIX, fig. 4) included a further specimen which clearly showed entire saddles. This specimen was checked by the author in the collection of the Geologische Bundesanstalt (Vienna) and the entire saddles were confirmed. The specimens from the type area (Balaton) in the present study also show entire saddles (*Fig. 57*), or only very gentle frilling on the sides of the saddles (*Pl. XVI: 1*). Consequently, the present author has the definite opinion that the species *pseudoarchelaus* should be attributed to the genus *Eoprotratchyceras*.

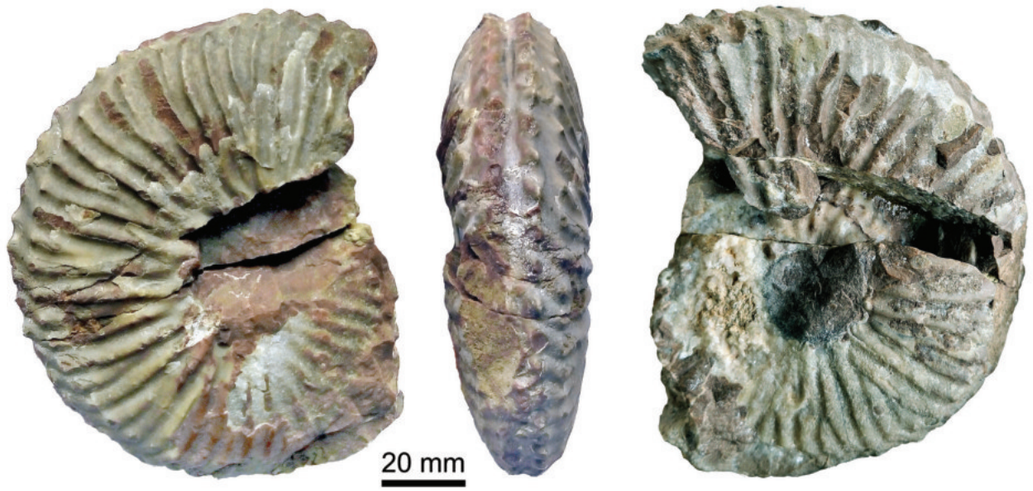


Figure 58. *Eoprotrachyceras pseudoarchelaus* (BÖCKH, 1872) holotype (T.172.); Szentantalfa (now Balatoncsicsó), Longobardian, Archelaus Zone

Accordingly, the previous items of the synonymy where an ammonitic or subammonitic suture was recorded (e.g. FRECH 1903; VIDAKOVIĆ et al. 2023), should represent another taxa. Besides, they show external differences, e.g. they have more numerous ribs. Probably the same holds true for many other items citing "*Protrachyceras pseudoarchelaus*", with dense ribbing and without recorded suture (e.g. FRECH & RENZ 1908; SALOPEK 1912, 1936; VÖRÖS et al. 2024); in these cases, a question mark is used in the synonymy.

In many other items of the synonymy the question mark indicates the uncertainty of identification due to poor preservation or poor quality of the illustration (e.g. DE LORENZO 1896; TOMMASI 1900; RENZ 1910; OGILVIE GORDON 1927).

Some items are excluded from the synonymy because the illustrated specimens are definitely different from *E. pseudoarchelaus* by their external morphology (e. g. BANDO 1964a, b; PISA 1966; WANG 1983).

Distribution: E. pseudoarchelaus was described from from the Ladinian of the Balaton Highland and it probably occurs in the Southern Alps, the Dinarides, the Hellenides and the Apennines. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Eoprotrachyceras cf. *gervasuttii* FANTINI SESTINI, 1994

Plate XIII: 2.

* 1994 *Eoprotrachyceras gervasutii* sp. n. – FANTINI SESTINI, Esino, p. 257, pl. 5, figs. 1, 2; text-fig. 4a.
v 1998 *Eoprotrachyceras* cf. *gervasuttii* FANTINI SESTINI, 1994 – VÖRÖS, Balaton-felvidék, p. 52, pl. VIII, fig. 9.
? 2018 *Eoprotrachyceras gervasuttii* FANTINI SESTINI – MIETTO et al., Recoaro and Tretto, p. 240, pl. 2, fig. 6.
v 2022 *Eoprotrachyceras* cf. *gervasuttii*– KARÁDI et al., Kádárta, fig. 10.

Material: One poorly preserved specimen from Öskü, road-cut.

Measurements:

Identity No.	D	Wh	Ww	U
M.98.107.	75.1	26.2	21.9	22.6

Description: Medium-sized *Eoprotrachyceras* with subevolute conch (U/D ratio 0.30). The whorl-section is high oval to quadratic. The umbilical wall is steep to subrounded. The flanks are nearly flat and pass into the wide, arched venter. The flanks are ornamented with slightly prorsiradiate, partly sinuous primary ribs (12 on a half whorl) and nodes. Secondary ribs intercalate irregularly both in the middle and in the outer third of the flank; bifurcations occur rarely. On the flanks the ribbing strongly prevails over the nodes which appear as rather irregular swellings on the ribs. The umbilical nodes are massive and bullate. The first and second rows of the weak lateral nodes run in the inner third of the flank. The lateral rows of nodes are hardly discernible. The ventrolateral nodes develop on the endings of the ribs; their number is around 24 on a half whorl. The venter has a wide and moderately deep, U-shaped furrow bordered by two rows of gently clavate nodes in alternating position.

The suture line is not seen.

Remarks: On the basis of the main features of the ribbing, the ventrolateral and ventral nodes, furthermore the character of the ventral furrow, our specimen seems to belong to *E. gervasuttii*, although the poor state of preservation justifies the use of "cf." in the identification.

The type specimen of *E. gervasutii* figured by FANTINI SESTINI (1994, pl. 5, fig. 1) is very similar to *E. pseudoarchelaus*, particularly to Böckh's holotype re-figured here (*Fig. 58*), except the delicate difference that the latter has only one row of ventrolateral nodes, whereas the type specimen of *E. gervasutii* bears two.

RIEBER & BRACK (2004) attributed this species to their new genus *Falsanolcites*. Considering the contradictions appeared around this genus, MIETTO et al. (2018) suggested to keep it in *Eoprotrachyceras*. This opinion is accepted here.

Distribution: E. gervasuttii was described from the Ladinian of the Southern Alps and the Balaton Highland. In the present project it was collected from the lower Ladinian (Fassanian) Recubariensis Zone.

Eoprotrachyceras ? *gredleri* (MOJSISOVICS, 1882)

Plate XXIV: 5, 6; Plate XXXI: 1, 3–5; Plate XXXII: 1, 2; Figure 59.

v * 1882 *Trachyceras Gredleri* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 117 (partim), pl. XVII, non pl. XXXIV, fig. 7.
? 1966 *Trachyceras* (*Protrachyceras*) *gredleri* MOJS. – PISA, Alpi Carniche, p. 639, pl. LXX, figs. 2–4.
? 1995a "*Eoprotrachyceras*" *gredleri* (MOJSISOVICS), 1882 – MIETTO & MANFRIN, High resolution, p. 557, pl. V, fig. 8.
v 1998 *Protrachyceras gredleri* (MOJSISOVICS, 1882) – VÖRÖS, Balaton-felvidék, p. 44, 54, 92; pl. X, figs. 1, 2, 4. (non fig. 3. = P. archelauus)
? 2000 *Protrachyceras archelaus* (Laube) – URLICHS & TICHY, Schlernplateau, p. 4 (partim), fig. 2 (only)
v 2003 *Protrachyceras* cf. *gredleri* (MOJSISOVICS) – PÁLFY et al., U–Pb geochronology, p. 274, fig. 5/h.
v 2024 *Protrachyceras* sp. aff. *gredleri* (MOJSISOVICS, 1882) – VÖRÖS et al., Nemesvámos, p. 403, pl. III, figs. 4–6.
v 2025 *Protrachyceras* sp. aff. *gredleri* (MOJSISOVICS, 1882) – VÖRÖS et al., Király Hill, p. 307, pl. VII, figs. 2, 3.

Material: Eight, partly incomplete specimens from Nemesvámos, Katrabóca (4), Veszprémfajsz, Király Hill (2), Vászoly, Öreg Hill (1) and Alsódörgicse, vineyard (1).

Measurements:

Identity No.	D	Wh	Ww	U
M:89.047.	>93	70.1	60.1	?
M.98.96.	56.4	24.5	25.2	17.8
BM-73.	>53.5	25.5	23.8	?
BM-74.	48.6	19.6	19.1	14.4
BM-81.	75	38	30.4	19.5
BM-82.	68.2	25.8	28.2	23.5
PZs-47.	52.1	21.8	18.5	17.5
INV 2026.45.	>28	10.8	10.5	?

Description: Small to large *Eoprotrachyceras*, with subevolute conch (U/D ratio from 0.26 to 0.34). The whorls are weakly to moderately compressed, stout (Ww/Wh ratio from 0.72 to 1.10; mean=0.86); the cross-section is oval to subquadratic. The umbilical edge is subrounded. In young individuals (*Pl. XXIV: 5, 6; Pl. XXXI: 3–5; Pl. XXXII: 1, 2*) the flanks are strongly convex and pass gradually into the widely arched venter; in adult (gerontic) specimen (*Pl. XXXI: 1*) the flanks and the venter are almost flat.

In young individuals the flanks are ornamented with very strong ribs and strong, pointed nodes or spines. The widely spaced ribs are prorsiradiate; their number is around 10 on a half whorl. Secondary ribs are irregularly inserted by intercalation in the middle and the outer third of the flanks; bifurcations rarely occur in the outer third of the flanks. There are five rows of nodes and/or spines. The umbilical nodes appear as bullate swellings of the ribs. The first, relatively weak row of lateral nodes develops on the inner thirds of the primary ribs. The second row of lateral nodes emerges at the outer third of the ribs; some of the secondary ribs start at these very prominent spines. The ventrolateral spines are also prominent; their number is 16 to 18. The venter has a moderately deep, narrow, U-shaped groove, bordered by the rows of strong, occasionally spinose nodes in alternating position.

In the large specimen (fragment of a body chamber), the lateral flanks bear weak and rather irregular, slightly projected ribbing and weak nodes. Well discernible, projected nodes appear on the ventrolateral shoulder; from these, weak riblets in chevron-like arrangements run towards the middle of the venter. The venter bears a shallow central groove.

The suture line is ceratitic, with two deep and strongly incised lobes; the flanks of the saddles are only slightly frilled and the heads are entire (*Fig. 59*).

Remarks: The specimens figured by MOJSISOVICS (1882, l.c.) were checked by the author in the collection of the Geologische Bundesanstalt (Vienna). The large specimen (pl. XVII) was designated as the lectotype of the species *gredleri* by KRYSTYN et al. (2004, p. 48). Our large fragment of a body chamber (*Pl. XXXI: 1*) corresponds rather well to the lectotype. The smaller specimen illustrated by MOJSISOVICS (1882, pl. XXXIV, fig. 7) with coarse ribs and spines reminds the ornamentation of our smaller specimens (e.g. *Pl. XXXI: 5; Pl. XXXII: 1*). However, Mojsisovics' smaller specimen has a rather deep, V-shaped ventral furrow and it will be separated as a new species of a new genus (Mietto and Mafrin, written communication).

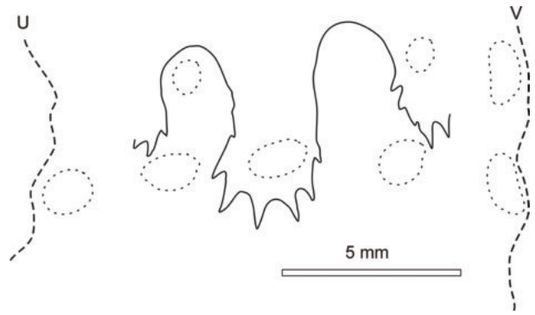


Figure 59. Suture line of *Eoprotrachyceras* ? *gredleri* (MOJSISOVICS, 1882) (BM-82.), at 17 mm whorl-height, Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; u: umbilical margin, v: ventrolateral margin; thin dotted lines mark the sites of pointed nodes

Our smaller specimens may better be compared to the inner whorls of the large specimen of MOJSISOVICS (l.c. pl. XVII) i.e. the lectotype of *E. gredleri*.

The generic attribution of the species *gredleri* to *Eoprotrachyceras* is now established by revealing the ceratitic suture line in one of our specimens (*Fig. 59*).

On the same grounds, the attribution of one specimen figured by VÖRÖS (1998, pl. X. fig. 3) to *E. gredleri* is cancelled; the saddles of its suture would rather fit to that of *Protrachyceras archelaus* (LAUBE, 1869).

One of the specimens illustrated as *Protrachyceras archelaus* by URLICHS & TICHY (2000, l.c.) may rather belong to *E. gredleri*.

Distribution: E. gredleri was described from from the Ladinian of the Southern Alps and the Balaton Highland. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Genus *Protrachyceras* MOJSISOVICS, 1893

Type species: *Trachyceras archelaus* LAUBE, 1869

Protrachyceras archelaus (LAUBE, 1869)

Plate XVII: 1–4; Plate XVIII: 1–3; Plate XIX: 1–5; Plate XX: 1, 2; Plate XXXI: 2; Plate XL: 6; Figures 60, 61.

*1869 *Trachyceras Archelaus* LAUBE. – LAUBE, St. Cassian, p. 74, pl. XL, fig. 1.
1869 *Ammonites* (*Trachyceras*) *Archelaus* LAUBE. – MOJSISOVICS, Gliederung, p. 130 (partim), pl. II, fig. 1 (only) (fig. 2 = P. ladinum).
v 1882 *Trachyceras Archelaus* LAUBE. – MOJSISOVICS, Mediterr. Triasprovinz, p. 118, pl. XIII, fig. 9; pl. XIV, figs. 1,2; pl. XVIII, figs. 1, 2; pl. XIX, fig. 1, 2; pl. XXIII, fig. 1; pl. XXXI, fig. 1.
? 1896 *Protrachyceras* cfr. *Archelaus* LAUBE sp. – DE LORENZO, Lagonegro, p. 147, pl. XX, fig. 18.
1900 *Protrachyceras Archelaus* LAUBE. – TOMMASI, Clapsavon, p. 25 (partim), pl. IV, fig. 1, non pl. III, figs. 5, 6.
non 1902 *Protrachyceras Archelaus* (LAUBE) MOJS. – AIRAGHI, Calcare di Esino, p. 33 + text-fig.
1908 *Protrachyceras archelaus* v. MOJSISOVICS. – DIENER, Spiti, p. 22, pl. I, figs. 1, 3.
1913 *Protrachyceras Archelaus* LAUBE. – SIMIONESCU, Hagighiol, p. 288, pl. IV, fig. 2; text-figs. 12, 13.

non 1914 *Protrachyceras Archelaus* LBE. – DE TONI, Valdepena, p. 134, pl. X, fig. 1.
1914 *Protrachyceras Archelaus* LAUBE (MOJS.). – HORN, Knollenkalke, p. 33, pl. I, fig. 7.
? 1927 *Protrachyceras Archelaus* LAUBE sp. – OGILVIE GORDON, Gröden, p. 59, pl. VII, figs. 5a, 5b.
1976 *Protrachyceras archelaus* (LAUBE) – WANG & HE, Jolmo Lungma, p. 320, pl. 13, figs. 20–22, pl. 14, figs. 20, 21; text-fig. 28e.
v 1993 *Protrachyceras archelaus* (LAUBE, 1868) BRACK & RIEBER, Anisian/Ladinian boundary, p. 486, pl. 13, figs. 2, 3.
v 1998 *Protrachyceras archelaus* (LAUBE, 1863) – VÖRÖS, Balaton-felvidék, p. 44 (partim), pl. XV, figs. 1, 2, non fig. 5.
v 1998 *Protrachyceras gredleri* (MOJSISOVICS, 1882) – VÖRÖS, Balaton-felvidék (partim), p. 53; pl. X, fig. 3. (only)
2000 *Protrachyceras archelaus* (LAUBE) – URLICHS & TICHY, Sclernplateau, p. 4 (partim), fig. 3 (non fig. 2)
v 2024 *Protrachyceras archelaus* (LAUBE, 1869) – VÖRÖS et al., Nemesvámos, p. 402, pl. III, figs. 1–3.
v 2025 *Protrachyceras archelaus* (LAUBE, 1869) – VÖRÖS et al., Király Hill, p. 307, pl. V, figs. 5, 6; pl. VI, fig. 1; pl. VII, fig. 1; pl. IX, figs1, 3.
2026 *Protrachyceras* cf. *archelaus* (LAUBE, 1869) – PIERONI & BALINI, Rasa, p.249, pl. 9, fig. 2.

Material: 13 specimens of various state of preservation, including the specimen illustrated by MOJSISOVICS (1882, pl. XXXI, fig. 1) from Felsőörs, kept in the collections of the former Geological Institute of Hungary (SARA), from Katrabóca (4) at Nemesvámos, Király Hill (7) at Veszprémfajsz, Litér, quarry (1) and Csukrét Gully (1) at Balatoncsicsó.

Measurements:

Identity No.	D	Wh	Ww	U
T.691.	88.2	28.5	37.2	38.5
M.98.109.	>80	49.8	40.6	?
M.98.142.	141	61.5	?	?
M.98.144.	106.5	48.8	35	32.1
BM-62.	>96.1	>40.1	?	28.5
BM-63.	48.2	23.1	16.1	12.1
BM-64.	175	68	50.6	51.6
BM-65.	39.5	19.8	13.6	9.1
BM-66.	63.2	30.4	?	15.8
PZs-32.	61.6	31.4	21.1	11.8
PZs-33.	68.5	33.8	24.6	16.7
PZs-34.	71.9	35.3	23.4	19.1
PZs-35.	69.8	33.8	?	18.1
SzI-2.	>95	45	?	?

Description: Small to very large *Protrachyceras* with subinvolute conch (U/D ratio from 0.19 to 0.30). The moderately compressed whorls (Ww/Wh ratio from 0.62 to 0.83; mean=0.71) are high oval to quadratic. The umbilical wall is steep to slightly overhanging in large specimens. The flanks are gently convex and pass gradually into the wide, arched venter. The flanks are ornamented with prorsiradiate, gently projected primary ribs (14 to 18 on a half whorl) and very strong nodes. The nodosity prevails over the ribbing. Secondary ribs intercalate irregularly both in the inner and in the outer third of the flank; rare bifurcations appear near the ventrolateral margin. The ribs and nodes strengthen towards the venter. There are six rows of nodes. The umbilical nodes are massive spines leaning over the umbilicus. The first and second rows of the weaker lateral nodes run in the inner half of the flank. The third and fourth (ventrolateral) rows are very strong, usually pointed; their number is around 18 to 22 on a half whorl. The ventrolateral and ventral nodes are connected by bulky, strongly projeceted ribs. The venter has a deep, V-shaped furrow bordered by two rows of obliquely elongated strong nodes in alternating position.

The suture line is ammonitic, with wide and deeply incised ventral lobe; the first lateral lobe is very profound and also deeply incised. The first lateral saddle is phylloid, high and strongly crenulated; the second lateral saddle is lower, constricted on the middle part and bears a small, entire top (*Fig. 60*).

Remarks: P. archelaus is the type and most easily recognizable species of the genus; nevertheless, many previous authors, including the present one, made partial mistakes in their identifications. *P. archelaus* is different from all other *Protrachyceras* species by its extremely strong nodes arranged in six rows and the highest Ww/Wh index (mean=0.71).

In his early work, MOJSISOVICS (1869, l.c.), besides a true "*Trachyceras Archelaus*" (l.c., pl, II, fig. 1), illustrated another specimen (l.c., pl. II, fig. 2) which he later introduced as "*Trachyceras ladinum*" (MOJSISOVICS 1882, p. 125).

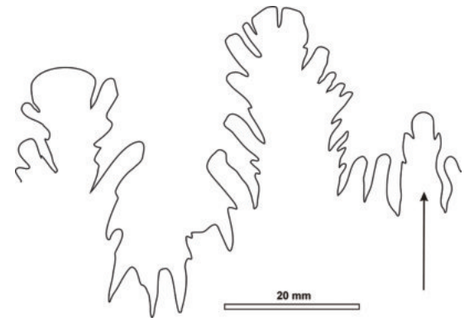


Figure 60. Partial suture line of *Protrachyceras archelaus* (LAUBE, 1869) (M.98.109.), at 50 mm whorl-height, Litér, quarry, loose, Longobardian, Archelaus Zone; arrow: adoral direction

The original, illustrated specimens by MOJSISOVICS (1882, l.c.) were checked by the author in the collection of the Geologische Bundesanstalt (Vienna), moreover a paratype, kept in the collections of the former Geological Institute of Hungary, SARA (Budapest) is re-figured here (*Fig. 61*), thus the identification of our specimens is endorsed.

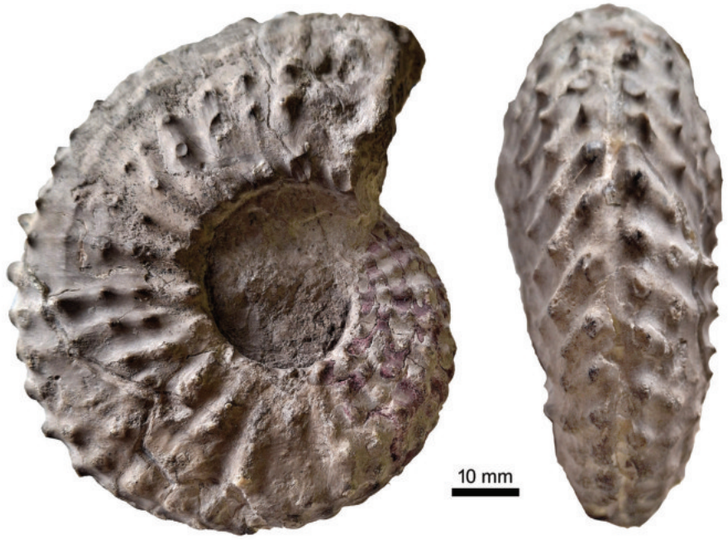


Figure 61. *Protrachyceras archelaus* (LAUBE, 1869), T.691., specimen figured by MOJSISOVICS (1882, pl. XXXI, fig, 1); Felsőörs, Forrás Hill, Longobardian, Archelaus Zone

One of the specimens figured by TOMMASI (1900, pl. IV, fig. 1) may belong to *P. archelaus*, whereas two others (l.c., pl. III, figs. 5, 6) are too much evolute and probably represent other taxa.

The item by AIRAGHI (1902, l.c.) portrays less than six rows of nodes, therefore it is here excluded form *P. archelaus*.

The specimen illustrated as *P. archelaus* by DE TONI (1914, l.c.) has a high triangular whorl outline, with narrow, compressed ventral part. It probably belongs to a new morphotype of the species, introduced as the next item in the present paper. The same morphotype *acutus* was previously included into *P. archelaus* by VÖRÖS (1998, pl. XV, fig. 5).

Further two misidentifications by VÖRÖS (1998) refer to the specimen figured as *P. archelaus* in pl. XIV, fig. 2. which is now regarded as a *P. ladinum*, and to the big fragment of a phragmocone with marked ammonitic suture figured as *P. gredleri* (l.c. pl. X, fig. 2), which is here considered the inner whorl of a large *P. archelaus*.

One of the specimens illustrated as *P. archelaus* by URLICHS & TICHY (2000, fig. 2) is most probably belong to *E. gredleri* (MOJSISOVICS, 1882).

Two items of the synonymy (DE LORENZO 1896, l.c., and OGILVIE GORDON 1927, l.c.) are questionable because either the specimens are poorly preserved, or the figures are of poor quality.

Distribution: P. archelaus was described from from the Ladinian of the Southern Alps, the Balaton Highland, Dobrogea and the Himalayas and perhaps from the Apennines. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

***Protrachyceras archelaus* (LAUBE, 1869)**

morphotype *acutus*

Plate XXI: 1-3; Plate XXII: 1-3.

1914 *Protrachyceras Archelaus* LBE. – DE TONI, Valdepena, p. 134, pl. X, fig. 1.

? 1966 *Trachyceras* (*Protrachyceras*) *pseudo-archelaus* BOECKH – PISA, Alpi Carniche, p. 642, pl. LXX, figs. 6, 7; text-fig. 6.

v 1998 *Trachyceras Archelaus* (LAUBE) – VÖRÖS, Balaton-felvidék (partim), p. 102, pl. XV, fig. 5 (only)

v 2024 *Protrachyceras* sp. aff. *archelaus* (LAUBE, 1869) – VÖRÖS et al., Nemesvámos, p. 402, pl. IV, figs. 1, 3, 4.

v 2025 *Protrachyceras* sp. aff. *archelaus* (LAUBE, 1869) – VÖRÖS et al., Király Hill, p. 307, pl. VIII, fig. 1.

Material: Six, mostly complete and well-preserved specimens from Katrabóca (2) at Nemesvámos and Király Hill (4) at Veszprémfajsz.

Measurements:

Identity No.	D	Wh	Ww	U
M.98.143.	89.5	37.8	30.8	28.5
PZs-36.	92.1	47.4	31.1	21.2
PZs-37.	>104.5	59.8	42.1	?
BM-67.	66.2	33.1	23.6	15.4
BM-68.	70	33.1	19.7	15.6
BM-69.	85.8	40.7	24.9	23

Description: Medium-sized *Protrachyceras* with subinvolute to subevolute conch (U/D ratio from 0.23 to 0.32). The moderately compressed whorls (Ww/Wh ratio from 0.60 to 0.81; mean=0.70); are high subtrapezoidal to subtriangular, ventrally tapering. The umbilical wall is steep to slightly overhanging in larger specimens. The flanks are very gently convex. The strength of the ribs and nodes increase towards the venter. There are six rows of nodes. The umbilical nodes are massive spines, leaning over the umbilicus. The first and second rows of lateral nodes are relatively weak and run in the inner half of the flank.

The third and fourth (ventrolateral) rows are very strong, sometimes pointed; their number is around 18 to 20 on a half whorl. The ventrolateral and ventral nodes are weakly connected by strongly projeceted ribs. The venter has a deep, V-shaped furrow bordered by two rows of obliquely elongated strong nodes and spines in alternating position.

The suture line is not seen.

Remarks: The morphotype *acutus* shares almost all basic features of the host species *P. archelaus*; the only considerable difference lies in the outline of the whorls: the cross section of the whorls of morphotype *acutus* is significantly narrowing ventrally. It was tempting to erect a separate new species on the basis of this striking difference but, considering the already overflowing number of *Protrachyceras* species, the author refrained from doing so.

Two previous records of "*P. archelaus*" (DE TONI, 1914, l.c.) and "*T.* (*P.*) *pseudo-archelaus*" (PISA, 1966, l.c.), respectively, are here tentatively included into the synonymy of *P. archelaus* morphotype *acutus*, on the basis of the shape of whorl sections of the illustrated specimens.

One of the specimens illustrated as *P. archelaus* by VÖRÖS (1998, pl. XV, fig. 5) is now considered belonging to *P. archelaus* morphotype *acutus*.

This morphotype was described and illustrated by VÖRÖS et al. (2024, l.c.) and VÖRÖS et al. (2025, l.c.) under the name *Protrachyceras* sp. aff. *archelaus*.

Distribution: This taxon was described from the Ladinian of the Southern Alps and the Balaton Highland. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

***Protrachyceras ladinum* (MOJSISOVICS, 1882)**

Plate XXII: 4-6; Plate XXIII: 1, 2; Plate XXIV: 1-4; Plate XXV: 1, 2; Plate XXVI: 1, 2; Plate XXVII: 1; Plate XXVIII: 1; Plate XXIX: 1, 2; Figure 62.

1869 *Ammonites* (*Trachyceras*) *Archelaus* LAUBE. – MOJSISOVICS, Ueber die Gliederung, p. 130 (partim), pl. II, fig. 2 (only).

v *1882 *Trachyceras ladinum* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 125 (partim), pl. XIV, fig. 2; pl. XV, pl. XVI, fig. 1; pl. XXII, fig. 1; pl. XXIII, fig. 2, 3; pl. XXXVI, fig 2. (non pl. XIX, fig. 5 = perhaps *P. steinmanni*.)

v 1903 *Trachyceras ladinum* MOJS. (*Protrachyceras*). – FRECH, Neue Cephalopoden, p. 26., pl. VI, fig. 1.

1908 *Protrachyceras ladinum* v. MOJSISOVICS. – DIENER, Spiti, p. 23, pl. I, figs. 2, 4, 5.

? 1913 *Protrachyceras ladinum* MOJS. – SIMIONESCU, Hagighiol, p. 289, pl. III, fig. 4.

1914 *Protrachyceras ladinum* MOJS. – HORN, Knollenkalke, p. 38, pl. I, fig. 9.

? 1927 *Protrachyceras ladinum* MOJSISOVICS. – OGILVIE GORDON, Gröden, p. 60, pl. VII, fig. 7.

non 1960 *Trachyceras* (*Protrachyceras*) *ladinum* MOJSISOVICS 1882. – ROSSI RONCHETTI, Grigne, p. 25, pl. IV, figs. 1, 2.

non 1976 *Protrachyceras ladinum* MOJS. – WANG & HE, Jolmo Lungma, p. 321, pl. 13, figs. 12–19); text-fig. 28b.

1977 *Protracbyceras* cf. *ladinum* (MOJSISOVICS) – URLICHS, Pachycardientuffe, p. 18, pl. 1, fig. 1.

v 1998 *Protrachyceras ladinum* (MOJSISOVICS, 1882) – VÖRÖS, Balaton-felvidék, p. 44, 54, 55, pl. XII, figs. 7–9; pl. XIII, figs. 3, 4, pl. XIV, figs. 1, 2.

v 1998 *Eoprotrachyceras* ? *steinmanni* (MOJSISOVICS, 1882) – VÖRÖS, Balaton-felvidék, (partim), p. 55, pl. XIII, fig. 2.

v 2003 *Protracbyceras* cf. *longobardicum* (MOJSISOVICS) – PÁLFY et al., U–Pb geochronology, p. 274, fig. 5/i.

2017 *Protrachyceras ladinum* (MOJSISOVICS, 1882) – URLICHS, St. Cassian, p. 179, figs. 4.1.–4.4.

2023 *Protrachyceras ladinum* (MOJSISOVICS, 1882) – VIDAKOVIĆ et al., Samobor, p. 524, pl. 6, fig. 1, pl. 11, fig. 3.

v 2024 *Protrachyceras ladinum* (MOJSISOVICS, 1869) – VÖRÖS et al., Nemesvámos, p. 403, pl. V, figs. 4–6; pl. VI, figs. 1–3; pl. VII, fig. 1.

v 2025 *Protrachyceras ladinum* (MOJSISOVICS, 1882) – VÖRÖS et al., Király Hill, p. 307, pl. VI, fig. 4; pl. VIII, figs. 2, 5; pl. X, fig. 2.

Material: 16, mostly well-preserved but partly incomplete specimens from Nemesvámos, Katrabóca (5), Veszprémfajsz, Király Hill (5), Kádárta, quarry (2), Pécsely, Meggy Hill (1), Litér quarry (1) Hajmáskér, quarry (1) and Hajmáskér, road-cut (1).

Measurements:

Identity No.	D	Wh	Ww	U
BM-70.	55.8	28.4	15.2	10.2
BM-71.	63.5	33.1	21.5	11.1
BM-72.	73.8	36.5	21.8	12.4
BM-75.	117	43.9	28.5	20.2
BM-77.	55.8	28.4	15.2	10.2
PZs-38.	58.2	30.5	18.5	11.2
PZs-39.	109.8	53.1	31.6	22.5
PZs-40.	91.2	44.5	27.8	19.2
PZs-41.	82.7	43.4	26.1	13.2
PZs-42.	86.5	43.7	?	17.2
PZs-43.	92.1	45.2	23.5	18
BZ-1.	125.2	66.2	~35	23.1
M.89.14.	105.5	52.8	29.1	?
M.98.12.	230	103	72.5	52.2
INV 2026.43.	> 220	?	?	?
INV 2026.44.	>184	?	?	?

Description: Small to very large *Protrachyceras* with subinvolute conch (U/D ratio = 0.17 to 0.23), with moderately compressed, high oval whorl section (Ww/Wh ratio from 0.50 to 0.65; mean=0.60). The umbilical wall is steep to slightly overhanging in the larger specimens. The flanks are almost flat and join the arched venter with a marked edge. The flanks are ornamented with moderately strong, slightly falcoid prorsiradiate ribs and strong nodes. The number of the ribs is 18 to 22 on a half whorl. Many intercalations appear irregularly in the inner and the outer third of the flank; bifurcations rarely occur near the ventrolateral margin. The ribs bear well developed nodes. There are seven rows of nodes (rarely six on small specimens). The umbilical nodes are bullate. There are four distinct rows of nodes on the flanks, more or less equidistantly separated. These rows of nodes persist also on the body chamber. The ventrolateral nodes are projected and pointed. The venter is narrow and deeply grooved by a V-shaped furrow. The furrow is bordered by two alternating rows of sharply pointed, clavate and laterally leaning ventral nodes.

In very large, gerontic specimens the ribbing fades and the pointed nodes strongly prevail (*Pl. XXVI: 2; Pl. XXVII: 1; Pl. XXIX: 1*).

The suture line is ammonitic, with a wide and profound, deeply incised first lateral lobe and also deep but narrower and less denticulated second lateral lobe. The lateral saddles are of nearly equal height and incised in various degree (*Fig. 62*).

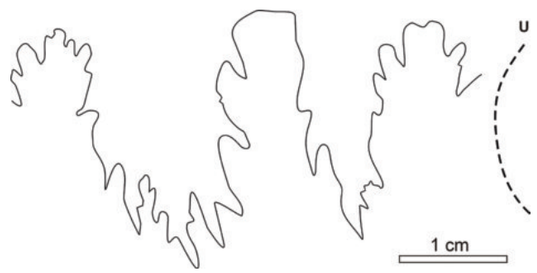


Figure 62. Partial suture line of *Protrachyceras ladinum* (MOJSISOVICS, 1882) (M.89.14.), at 30 mm whorl-height, Pécsely, Meggy Hill, loose, Longobardian, Archelaus Zone; u: umbilical margin

Remarks: The partially poorly preserved original specimens of *P. ladinum* figured by MOJSISOVICS (1882, l.c.), were checked by the author in the collection of the Geologische Bundesanstalt (Vienna). The largest specimen stored in Innsbruck (pl. XV; XVI, fig.1) was not seen but the illustrations by Mojsisovics showed excellently the diagnostic features. The specimen on pl. XXXVI, fig 2. was selected as lectotype and re-figured by URLICHS (2017, p. 179, fig. 4.4.) who made a thorough survey on the type material and possible relations of *P. ladinum*. On these grounds the identification of our material as belonging to this species is endorsed.

Only one of the large (gerontic) specimens (*Pl. XXVIII: 1*) is the odd one out, by its marked ribbing even on the body chamber. This specimen was excluded from the synonymy by URLICHS (2017, p. 179), but since its other features fit the species *P. ladinum*, the present author was not inclined to erect a new species on this sole specimen.

P. ladinum differs from *P. archelaus* by its weaker nodes arranged in more numerous (seven) rows, more slender whorls and by its lower Ww/Wh index (mean=0.60). *P. longobardicum* (MOJSISOVICS, 1882) is similar to *P. ladinum* but the latter has even more numerous (eight) rows of nodes, more flattened whorls and lower Ww/Wh index (mean=0.56).

URLICHS (2017, l.c.) examined and re-figured the original of *Protrachyceras* "*aequinodosum*" KLIPSTEIN (1843, pl. 7, fig. 1) and formed the opinion that it was identical with "*Trachyceras ladinum*" MOJSISOVICS, 1882, the latter considered as a junior synonym. Nevertheless, for the stability of the nomenclature he suggested to maintain *Protrachyceras ladinum* as valid species, and consider "*Ammonites aequinodosus*" as *nomen oblitum*.

The present author agrees that *Protrachyceras ladinum* must be kept as a valid species, and not only because this species name was much frequently cited than the *aequinodosus*, but rather because the above identification was based on the judgement by Urlichs, thus it provided a case of subjective synonymy. In this matter it is worth citing the early opinion by MOJSISOVICS (1882, p. 126) who also compared the two species and wrote: "*Trachyceras aequinodosum* ... zeigt nun überdies so bedeutende Abweichungen gegenüber *Trachyceras ladinum*, dass an der Verschiedenheit der beiden Formen nicht länger gezweifelt werden kann." [Moreover, *Trachyceras aequinodosum* shows so important deviations from *Trachyceras ladinum* that the separation of the two forms can not be doubted any more.]

Notwithstanding this nomenclatural issue, *P. ladinum* is a well recognizable and widely recorded species; it is the most abundant *Protrachyceras* species in the Ladinian of the Balaton area.

The lateral ornamentation of the specimen illustrated by MOJSISOVICS (1882, pl. XXV, fig. 5) is rather different from that of the other specimens of *P. ladinum*; it may rather belong to *P. longobardicum* (MOJSISOVICS, 1882).

The item in the synonymy by SIMIONESCU (1913, l.c.) is questionable, because the illustrated specimen has too strong ribbing.

OGILVIE GORDON (1927, l.c.) figured a poorly preserved imprint with no diagnostic features hindering the identification as *P. ladinum*.

The specimen figured as *T.* (*P.*) *ladinum* by ROSSI RONCHETTI (1960, pl. IV, figs. 1, 2) does not show any discernible lateral nodes, instead the lateral ornament with rare and low, flared ribs is rather similar to *Pinterites laricus* MOJSISOVICS, 1882; the narrow ventral part with dense nodes enhances the similarity.

WANG & HE (1976, l.c.) gave poor quality illustrations under the name *P. ladinum*; the lateral ornamentation of some of them *Protrachyceras*-like, but the suture line in text-fig 28b is clearly ceratitic what excludes this identification.

One specimen figured as "*Eoprotrachyceras* ? *steinmanni* (MOJSISOVICS, 1882)" by VÖRÖS (1998, pl. XIII, fig. 2) does not show the typical characters of this species; it is now considered as *P. ladinum*.

Distribution: P. ladinum was described from the Ladinian of the Southern Alps, the Balaton Highland, the Dinarides, the Himalayas and perhaps from Dobrogea. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Protrachyceras longobardicum (MOJSISOVICS, 1882)

Plate XXVI: 3; Plate XXVII: 2, 3; Plate XXX: 1, 3; Figures 63, 64.

v * 1882 *Trachyceras longobardicum* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 126 (partim), pl. XVIII, fig. 5; pl. XX, fig. 1; pl. XXI, fig. 5. (non pl. XVIII, fig. 4)
v 1903 *Trachyceras longobardicum* MOJS. (*Protrachyceras*). – FRECH, Neue Cephalopoden, p. 27., pl. VI, fig. 3.
1908 *Protrachyceras longobardicum* v. MOJSISOVICS. – DIENER, Spiti, p. 24, pl. I, fig. 6.
non 1913 *Protrachyceras longobardicum* MOJS. – SIMIONESCU, Hagighiol, p. 29, pl. IV; text-figs. 14, 15.
1914 *Protrachyceras longobardicum* MOJS. – DE TONI, Valdepena, p. 140, pl. X, figs. 2–4.
1914 *Protrachyceras longobardicum* MOJS. – HORN, Knollenkalke, p. 35, pl. I, fig. 6.
1914 *Protrachyceras* cf. *longobardicum* MOJS. – HORN, Knollenkalke, p. 37, pl. I, fig. 8.
1927 *Protrachyceras longobardicum* MOJSISOVICS. – OGILVIE GORDON, Gröden, p. 52, pl. VI, figs. 13a, b.
non 1960 *Trachyceras* (*Protrachyceras*) cf. *longobardicum* MOJSISOVICS 1882. – ROSSI RONCHETTI, Grigne, p. 26, pl. IV, figs. 4–6.
1976 *Protrachyceras longobardicum* (MOJS.) – WANG & HE, Jolmo Lungma, p. 322, pl. 13, fig. 9, (? figs. 7, 8), pl. 14, figs. 18, 19; text-fig. 28d.
1994 *Protrachyceras longobardicum* (MOJSISOVICS, 1882) – FANTINI SESTINI, Esino, p. 259, pl. 4, fig. 1–4.
1995a *Protrachyceras longobardicum* (MOJSISOVICS), 1882 – MIETTO & MANFRIN, High resolution, p. 557, pl. V, fig. 2.
v 1998 *Protrachyceras longobardicum* (MOJSISOVICS, 1882) – VÖRÖS, Balaton-felvidék, p. 44, 54, 94, 96; pl. XI, fig. 3; pl. XII, figs. 1, 6.
v 2003 *Protrachyceras* cf. *longobardicum* (MOJSISOVICS) – PÁLFY et al., U–Pb geochronology, p. 274, fig. 5/i.
2023 *Protrachyceras longobardicum* (MOJSISOVICS, 1882) – VIDAKOVIĆ et al., Samobor, p. 523, pl. 6, fig. 3.
v 2024 *Protrachyceras longobardicum* (MOJSISOVICS, 1882) – VÖRÖS et al., Nemesvámos, p. 403, pl. V, fig. 3.
v 2025 *Protrachyceras longobardicum* (MOJSISOVICS, 1882) – VÖRÖS et al., Király Hill, p. 307, pl. VI, figs. 2, 3; pl. IX, fig. 2.

Material: Six specimens of various state of preservation, including the specimen illustrated by MOJSISOVICS (1882, pl. XVIII, fig. 4.) from Balatoncsicsó, kept in the collections of the former Geological Institute of Hungary (SARA, inv. no. T.142.), from Katrabóca (2) and Gyűr Hill (1) at Nemesvámos and from Király Hill (2) at Veszprémfajsz.

Measurements:

Identity No.	D	Wh	Ww	U
T.142.	68.5	33.4	?	17.6
BM-76.	98.4	54.2	28.2	15.5
BM-78.	120.2	54.8	?	23.4
PZs-44.	90.8	41.7	25.8	16.5
PZs-45.	42.8	20.8	12.8	7.4
M.98.94.	59.5	30.8	17.5	9.7

Description: Small to medium-sized *Protrachyceras* with subinvolute conch (U/D ratio = 0.16 to 0.19), with moderately compressed, high oval whorl section (Ww/Wh ratio from 0.50 to 0.62; mean=0.56). The umbilical wall is steep to slightly overhanging. The flanks are nearly flat and join the narrowly arched venter with a marked edge. The flanks are ornamented with moderately strong, slightly falcoid prorsiradiate ribs and weaker nodes. The number of the ribs is 20 to 26 on a half whorl. Many intercalations appear

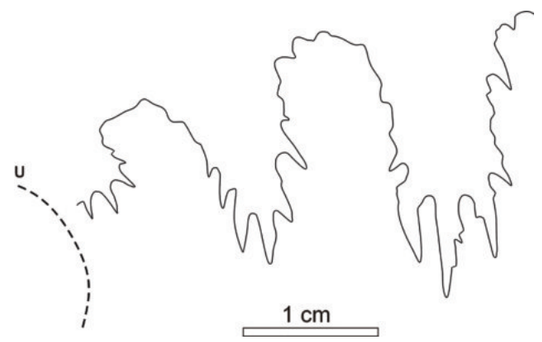


Figure 63. Partial suture line of *Protrachyceras longobardicum* (MOJSISOVICS, 1882) (BM-76.), at 35 mm whorl-height, Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; u: umbilical margin

irregularly in the inner and the outer third of the flank; bifurcations occur around the mid-flank. The ribbing prevails over the nodes in strength. There are eight rows of nodes. The umbilical nodes are slightly bullate. There are five distinct rows of nodes on the flanks, more or less equidistant distribution. The ventrolateral nodes are projected and slightly pointed. The venter is narrowly arched and deeply grooved by a V-shaped furrow. The furrow is bordered by two rows of pointed, slightly clavate alternating ventral nodes.

The suture line is ammonitic, with moderately profound and deeply incised lateral lobes; the umbilical lobe is shallow. The lateral saddles are of nearly equal height and moderately incised. (*Fig. 63*).

Remarks: P. longobardicum differs from *P. archelaus* and from *P. ladinum* by its weaker nodes arranged in more numerous (eight) rows, even more slender whorls and by its lower Ww/Wh index (mean=0.56).

The specimens figured by MOJSISOVICS (1882, l.c.) were checked by the author in the collection of the Geologische Bundesanstalt (Vienna), and in the collections of the former Geological Institute of Hungary (SARA), respectively. One of them (l.c., pl. XVIII, fig. 4), kept in the latter collection is re-figured here (*Fig. 64*). Its ornamentation, predominated by blunt nodes and hardly seen ribs is rather different from that seen on Mojsisovics' corresponding, cited figure, and not only in the number of the rows of nodes what MOJSISOVICS (l.c., p. 126) noticed. The important differences from *P. longobardicum* are the absence of true ribs and the bulbous nature of the nodes. This specimen obviously belongs to a different *Protrachyceras* species.

The items by SIMIONESCU (1913, l.c.) and ROSSI RONCHETTI (1966, l.c.) portray strong ribbing, whereas nodes are not seen, therefore these are excluded from the synonymy.

Distribution: P. longobardicum was described from the Ladinian of the Southern Alps, the Balaton Highland, the Dinarides and the Himalayas. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.



Figure 64. *Protrachyceras* sp., T.142., specimen figured by MOJSISOVICS 1882, pl. XVIII, fig, 4, as *Protrachyceras longobardicum*; Balatoncsicsó, Csukrét Gully, Longobardian, Archelaus Zone

Protrachyceras cf. *margaritosum* (MOJSISOVICS, 1882)

Plate XXX: 2, 4, 5.

v * 1882 *Trachyceras margaritosum* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 127, pl. LXXXII, fig. 1.
1936 *Protrachyceras* sp. ind. ex aff. *margaritosum* Mojs. – SALOPEK, Gregurić brijeg, p. 221, text-fig. 10.
v 1993 (*Eo-*)*Protrachyceras margaritosum* (Mojs., 1882) – BRACK & RIEBER, Anisian/Ladinian boundary, p. 484, pl. 13, figs. 6, 7; text-fig. h.
1994 *Protrachyceras* cf. *margaritosum* (MOJSISOVICS, 1882) – FANTINI SESTINI, Esino, p. 259, pl. 2, fig. 3.
1995a *Protrachyceras margaritosum* (MOJSISOVICS), 1882 – MIETTO & MANFRIN, High resolution, p. 557, pl. IV, figs. 2, 4.
2007 (*Eo-*)*Protrachyceras margaritosum* (MOJSISOVICS, 1882) – BRACK et al., Cernera, p. 334, fig. 5/1.
2018 *Protrachyceras margaritosum* (MOJSISOVICS, 1882) – MIETTO et al., Recoaro and Tretto, p. 240, pl. 2, fig. 7.
2023 *Protrachyceras margaritosum* (MOJSISOVICS, 1882) – VIDAKOVIĆ et al., Samobor, p. 517, pl. 5, fig. 5, text-fig. 9c.
v 2024 *Protrachyceras* cf. *margaritosum* (MOJSISOVICS, 1882) – VÖRÖS et al., Nemesvámos, p. 403, pl. IV, fig. 2.
v 2025 *Protrachyceras* cf. *margaritosum* (MOJSISOVICS, 1882) – VÖRÖS et al., Király Hill, p. 307, pl. VI, fig. 5.

Material: Three incomplete and partly poorly preserved specimens from Nemesvámos, Katrabóca (1) and Veszprémfajsz, Király Hill (2).

Measurements:

Identity No.	D	Wh	Ww	U
Pzs-46.	70.8	37.6	21.1	10.6
BM-79.	121	59.5	?	22.4
BM-80.	85.5	42.2	22.1	17.1

Description: Medium-sized *Protrachyceras* with subinvolute conch (U/D ratio = 0.15 to 0.20), with moderately compressed, high oval whorl section (Ww/Wh ratio from 0.53 to 0.56). The umbilical wall is steep to subrounded. The flanks are nearly flat and join the narrowly arched venter with a marked edge. The flanks are ornamented with weak, slightly falcoid prorsiradiate ribs and fine nodes. The number of the ribs is 22 to 30 on a half whorl. Many intercalations appear irregularly in any part of the flank; bifurcations rarely occur. The nodes prevail over the ribbing in strength. There are eight to ten rows of nodes. The umbilical nodes are slightly bullate. There are six to seven distinct rows of nodes on the flanks, more or less equidistant distribution. The ventrolateral nodes are projected and slightly pointed. The ventral nodes are slightly clavate and pointed. The venter is poorly preserved.

Sutures were not recorded.

Remarks: P. margaritosum is a frequently recorded, yet rather vaguely defined species. Only the very numerous rows of nodes (9-10) seem to be a good distinctive feature separating it form other *Protrachyceras* species. But considering the character of the nodes, two morphological groups can be outlined: one with strong, verruca-like nodes (the type specimen by MOJSISOVICS 1882, pl. LXXXII, fig. 1; MIETTO et al. 1995a, pl. IV, fig. 2; BRACK et al. 2007, fig. 5/1) and another, with very fine nodes develpoed on dominant ribs (MIETTO et al. 1995, pl. IV, fig 4; MIETTO et al. 2018, pl. 2, fig. 7; VIDAKOVIĆ et al. 2023, pl. 5, fig. 5). The two morphological variants are currently suggested to keep together (Mietto and Manfrin, pers. comm.).

Anyhow, our specimens, figured on *Pl. XXX*, stand closer to the second group. Regrettably, their state of preservation is poor, nevertheless, they are here tentatively compared to *P. margaritosum*.

Distribution: P. margaritosum was described from from the Ladinian of the Southern Alps, the Balaton Highland and the Dinarides. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Protrachyceras steinmanni (MOJSISOVICS, 1882)

Plate XXXII: 3-6.

v * 1882 *Trachyceras Steinmanni* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 109, pl. LXXXI, figs. 10, 11.
v ? 1882 *Trachyceras ladinum* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 125 (partim), pl. XIX, fig. 5. only
? 1960 *Trachyceras* (*Protrachyceras*) *steinmanni* MOJSISOVICS 1882 – ROSSI RONCHETTI, Grigne, p. 28, pl. IV, figs. 7, 8.
1992 *Protrachyceras steinmanni* (MOJSISOVICS) – JADOUL et al., Brembana Valley, p. 323, pl. 23, fig. 5.
v 1993 *Protrachyceras steinmanni* (MOJS., 1882) BRACK & RIEBER, Anisian/Ladinian boundary, p. 484, pl. 13, figs. 1, 4, 5; text-fig. g.
1994 *Protrachyceras steinmanni* (MOJSISOVICS, 1882). – FANTINI SESTINI, Esino, p. 259, pl. 4, fig. 1.
v 1998 *Eoprotrachyceras* ? *steinmanni* (MOJSISOVICS, 1882) – VÖRÖS, Balaton-felvidék (partim), p. 53, pl. XIII, fig. 1; (non p. 55, pl. XIII, fig. 2.
v 2024 *Protrachyceras steinmanni* (MOJSISOVICS, 1882) – VÖRÖS et al., Nemesvámos, p. 403, pl. IV, fig. 6.; pl. V, figs. 1, 2.
v 2025 *Protrachyceras steinmanni* (MOJSISOVICS, 1882) – VÖRÖS et al., Király Hill, p. 307, pl. VIII, fig. 3.

Material: Four specimens of various state of preservation from Nemesvámos, Katrabóca (2) and Veszprémfajsz, Király Hill (2).

Measurements:

Identity No.	D	Wh	Ww	U
BM-83.	>72.1	35.1	?	14.5
BM-84.	91	43.7	?	18.4
BM-85.	53.1	28.4	17.1	9.5
PZs-48.	64.5	29.2	?	12.4

Description: Medium-sized *Protrachyceras* with subinvolute conch (U/D ratio=0.18 to 0.20), with moderately compressed, high oval whorl section (Ww/Wh ratio=0.60). The umbilical wall is steep to slightly overhanging. The flanks are almost flat and join the narrowly arched venter with a marked edge. The flanks are ornamented with rather weak, slightly falcoid prorsiradiate ribs and moderately strong nodes. The number of the ribs is 22 to 24 on a half whorl. Many intercalations appear irregularly in the inner and the outer third of the flank; bifurcations rarely occur. The ornamentation becomes denser on the body chamber, which may be contracted. The ventrolateral nodes are strongly projected. The venter is narrow and moderately grooved by a shallow furrow. The furrow is bordered by two rows of projected and alternating ventral nodes.

Suture line was not seen.

Remarks: The specimens figured by MOJSISOVICS (1882, l.c.) as "*T. steinmanni*" were checked by the author in the collection of the Geologische Bundesanstalt (Vienna), thus the identification of our specimens is endorsed.

In most parameters *P. steinmanni* stands close to *P. ladinum*, but differs from it, and from the other species of *Protrachyceras*, by the lateral rows of nodes separated from the umbilical and ventrolateral nodes.

One of the specimens illustrated under the name "*T. ladinum*" by MOJSISOVICS (1882, pl. XIX, fig. 5) shows rather widely spaced lateral rows of nodes, less numerous than usually in this species; it may rather belong to *P. steinmanni*.

The item by ROSSI RONCHETTI (1960, l.c.) is queried because the low quality of the figure hampers the identification.

One of the specimens illustrated by VÖRÖS (1998, pl. XIII, fig. 2) as *P. steinmanni* is now excluded from the synonymy, because the specimen does not show the wide interspace between the umbilical and lateral rows of nodes.

Distribution: P. steinmanni was described from the Ladinian of the Southern Alps and the Balaton Highland. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Protrachyceras cf. *laevior* (FRECH, 1903)

Plate XXXII: 8; Figure 65.

v 1903 *Trachyceras Archelaus* LBE. var. nov. *laevior* (*Protrachyceras*). – FRECH, Neue Cephalopoden, p. 24., pl. V, fig.1; text-fig. 10b.
v 2025 *Protrachyceras* cf. *laevior* (FRECH, 1903) – VÖRÖS et al., Király Hill, p. 311, pl. VI, fig. 6.

Material: Two, partly incomplete specimens, including the type specimen illustrated by FRECH (1903, pl. V, fig. 1.) from Nemesvámos, Katrabóca, kept in the collections of the former Geological Institute of Hungary (SARA, inv. no. T.873.) and from Veszprémfajsz, Király Hill (1).

Measurements:

Identity No.	D	Wh	Ww	U
T.873.	~140	52.5	?	43.2
PZs-50.	48.5	23.7	13.5	15.2

Description: Medium-sized to large *Protrachyceras* with subevolute conch (U/D ratio = 0.31). The moderately compressed whorls (Ww/Wh ratio = 0.57) are high subtriangular. The umbilical wall is steep to slightly overhanging. The flanks are gently convex. The flanks are ornamented with rather strong prorsiradiate, partly falcoid ribs and moderately strong nodes. The number of the ribs is 16 to 20 on a half whorl. Many bifurcations and intercalations appear irregularly in the inner and the outer third of the flank. There are five to six rows of nodes. The umbilical nodes are massive, bulbous. The first and second rows of lateral nodes are well-developed, rather pointed and run in the inner and the outer third of the flank. The ventrolateral rows are somewhat weaker; their number is around 22 to 26 on a half whorl. The venter has a narrow furrow bordered by two rows of moderately strong nodes in alternating position.

The suture line is not known.

Remarks: This taxon was introduced as a variant of *P. archelaus* by FRECH (l.c.) and was compared to the specimens figured by MOJSISOVICS (1882, pl. XVIII, fig. 2 and pl. XXXI, fig. 1). These comparisons are not convincing. The new taxon has six rows of nodes, just as *P. archelaus*, but its nodes are significantly weaker. In "var. *laevior*", as the original specimen of Frech portrays (*Fig. 65*), the strength



← ***Figure 65.*** *Protrachyceras laevior* (FRECH, 1903) holotype (T.873.); Nemesvámos, Katrabóca, Longobardian, Archelaus Zone

of ribbing predominates over the strength of nodes, a similar feature characterizing the species *Eoprotrachyceras pseudoarchelaus* (BÖCKH, 1872). Moreover, the ribs of *P. laevior* are more projected, almost falcoid in the ventrolateral part. These characters seem to support that the taxon "var. *laevior*" deserves to be raised to the species level.

Our specimen (*Pl. XXXII: 8*) is considerably smaller than the specimen figured by FRECH (1903, l.c.), and designated here as the holotype by monotypy, but the substantial morphological features are shared with the type specimen.

Distribution: P. laevior was described from from the Ladinian of the Balaton Highland. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Protrachyceras irregulare FANTINI SESTINI, 1994

Plate XXXII: 7.

* 1994 *Protrachyceras irregulare* sp. n. – FANTINI SESTINI, Esino, p. 259, pl. 12, figs. 1–4.
2007 *Protrachyceras* cf. *irregulare* FANTINI SESTINI, 1994 – BRACK et al., Cernera, p. 334, fig. 5/2.
v 2025 *Protrachyceras irregulare* FANTINI SESTINI, 1994 – VÖRÖS et al., Király Hill, p. 311, pl. VIII, fig. 4.

Material: One well-preserved specimen from Veszprémfajsz, Király Hill.

Measurements:

Identity No.	D	Wh	Ww	U
PZs-49.	75.5	36.8	25.4	18.2

Description: Medium-sized *Protrachyceras* with subinvolute conch (U/D ratio = 0.24). The moderately compressed whorls (Ww/Wh ratio = 0.69) are high oval to subquadratic. The umbilical wall is steep to slightly overhanging. The flanks are gently convex and pass gradually into the arched venter. The flanks are ornamented with prorsiradiate, projected primary ribs (around 12 on a half whorl) and very strong nodes. Secondary ribs intercalate and bifurcate irregularly both in the inner and in the outer third of the flank. There are five rows of nodes. The umbilical nodes are massive and emerge well from the umbilical margin. The first and second rows of the very strong, verruca-like lateral nodes run widely spaced in the inner and outer third of the flank. The ventrolateral rows are also very strong; their number is around 22 on a half whorl. The ventrolateral and ventral nodes are connected by strongly projeceted ribs. The venter has a moderately deep furrow bordered by two rows of obliquely elongated strong nodes in alternating position.

Suture lines were not seen.

Remarks: FANTINI SESTINI (1994, p. 259) defined this species as having prorsiradiate strong ribs and six (in smaller specimens five), mostly irregularly spaced rows of strong, rounded nodes. BRACK et al. (l.c.) illustrated a specimen with similar ornamentation. On these grounds the identification of our specimen as *P. irregulare* seems to be justified.

From *P. archelaus* (LAUBE, 1869), which occurs frequently in our material, *P. irregulare* differs by its less pointed, bulky nodes arranged into five rows of nodes, instead of six rows in *P. archelaus*.

On the basis of its five rows of nodes, *P. irregulare* may be compared to *E. gredleri* (MOJSISOVICS, 1882), as it was suggested by Mietto and Manfrin (pers. comm.). However, the latter species is more evolute (U/D ratio 0.30) and has significantly stouter whorls (mean Ww/Wh ratio 0.86).

Distribution: P. irregulare was described from from the Ladinian of the Southern Alps. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Protrachyceras ? cf. *neumayri* (MOJSISOVICS, 1869)

Plate XXXII: 9.

* 1869 *Ammonites* (*Trachyceras*) *Neumayri* MOJS. n. sp. – MOJSISOVICS, Gliederung, p. 132, pl. II, figs. 3–6.
v 1882 *Trachyceras Neumayri* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 107, pl. XII, fig. 6; pl. XIV, fig. 1.
v non 1903 *Trachyceras Neumayri*.? (*Protrachyceras*). – FRECH, Neue Cephalopoden, p. 27, pl. IV, fig. 2.
1995a "*Protrachyceras*" *neumayri* (MOJSISOVICS, 1869) – MIETTO & MANFRIN, High resolution, p. 555, pl. V, fig. 1.
1995b "*Protrachyceras*" *neumayri* (MOJSISOVICS, 1869) – MIETTO & MANFRIN, Limite ladinico-carnico, p. 30, pl. 1, figs. 12, 19.

Material: A single crushed and smashed specimen from Hajmáskér, quarry.

Measurements:

Identity No.	D	Wh	Ww	U
INV 2026.46.	>32	?	?	~12

Description: Small *Protrachyceras* with seemingly subevolute conch. The state of preservation hinders the observation of some further details. The lateral flanks carry prorsiradiate and partly sinuous ribs and moderately strong nodes. The visible part of the ribs are rather thick and flat; intercalation of splitting of ribs are hardly observable. There are six rows of nodes. The umbilical nodes are somewhat bullate. The lateral nodes are mostly eroded. The ventrolateral and ventral nodes are well discernible; sharp and clavate. The venter is not visible.

Remarks: The type specimens figured by MOJSISOVICS (1882, l.c.) were checked by the author in the collection of the Geologische Bundesanstalt (Vienna). Very similar specimens were illustrated by MIETTO & MANFRIN (1995a, 1995b, l.c.). Due to the poor preservation, the distinctive characters of the ribbing are not well seen on our specimen, nevertheless, its tentative comparison to *P. neumayri* seems possible.

The specimen illustrated as *P. neumayri* by FRECH (1903, l.c.) and kept in the collections of the former Geological Institute of Hungary, SARA, inv. no. T.889.) seems to be very different from this species. Considering its ornamentation and subammonitic suture, it may belong to the genus *Katrabocaites*.

Distribution: P. neumayri was described from from the Ladinian of the Southern Alps. In the present project it was collected from the upper Ladinian (Longobardian) Regoledanus Zone.

Subfamily Katrabocaitinae VÖRÖS, 2025

This subfamily shares the subammonitic suture and the furrowed venter bordered with alternating nodes of the subfamily Protrachyceratinae TOZER, 1980 within the family Trachyceratidae HYATT, 1877, but differs in its arched venter and the lateral ornamentation where the strength of falcoid prorsiradiate ribbing significantly predominates over the nodosity. Presently the subfamily comprises only the genus *Katrabocaites* VÖRÖS, 2025. The species described by VÖRÖS et al. (2025) as "*Katrabocaites montisregis*" is now transferred to *Bercsenyiites* n. gen. and included to the new subfamily Pinteritinae within the family Danubitidae SPATH, 1951.

Genus *Katrabocaites* VÖRÖS, 2025.

Type species: *Anolcites laczkoi* DIENER, 1899, p. 13, pl. I, fig. 7.

Emended diagnosis: Conch strongly to moderately involute; whorl section high oval. Steep umbilical wall. Flanks gently convex; venter widely arched. 22 to 34, moderately strong, slightly falcoid prorsiradiate ribs on the flanks. Numerous intercalations, inserted or bifurcated along the flanks. Definite umbilical nodes. One to five rows of weak

nodes on the lateral flanks. Weak and narrow sulcus on venter accompanied with rows of endings of alternating ribs. Suture subammonitic with wide and deeply incised lateral lobe; second lateral saddle slightly crenulated.

Nominal species belonging to *Katrabocaites*:

Anolcites laczkoi DIENER, 1899, p. 13, pl. I, fig. 7.
Katrabocaites laczkoi (DIENER, 1899) morphotype *nodosus*
Katrabocaites miettoi n. sp.
Katrabocaites manfrini n. sp.

Discussion: Katrabocaites has similarities to *Protrachyceras* in its ventral furrow accompanied by alternating nodes and in subammonitic suture, but differs in lateral ornamentation with ribs dominating over weakly developed nodes. The attribution of the type species *laczkoi* to *Protrachyceras* by VÖRÖS (1998, p. 44) is now refuted for the above reasons. VIDAKOVIĆ et al. (2023, p. 525) in a thorough analysis of this taxonomic problem reached the same conclusion and implicitly suggested to introduce a new genus for the species *laczkoi*. The large and diverse material from the localities Katrabóca and Király Hill enabled us to introduce further few new species of *Katrabocaites* which broaden the morphological range of variation of the genus.

Distribution: Up to now *Katrabocaites* is known from localities in the Balaton area and possibly from the Samobor Mts. (Croatia), from the Longobardian Archelaus Zone.

Katrabocaites laczkoi (DIENER, 1899)

Plate XXXIII: 1–4; Plate XXXVI: 2; Figures 66, 67.

v * 1899 *Anolcites Laczkói* nov. sp. – DIENER, Neue Cephalopoden, p. 13., pl. I, fig. 7.
v 1903 *Trachyceras* (*Anolcites*) *Laczkói* DIEN. – FRECH, Neue Cephalopoden, p. 29., pl. VI, figs. 4a, 4b.
1908 *Anolcites* cf. *Laczkói* DIENER. – DIENER, p. 26, pl. I, fig. 8.
1912 *Anolcites Láckoi* DIENER var. – SALOPEK, Samobor, p. 16, pl. I, fig. 4.
? 1914 *Anolcites laczkói* DIEN. – DE TONI, p. 144, pl. XI, fig.4.
1936 *Anolcites laczkói* DIEN. var. *falcoidea* n. – SALOPEK, p. 216, text fig. 9.
v 1998 *Protrachyceras* ? *laczkoi* (DIENER, 1899) – VÖRÖS, Balaton-felvidék, p. 44, pl. XIII, fig. 6; pl. XV, fig. 4.
v 1998 *Anolcites* ? *laricus* (MOJSISOVICS, 1882) – VÖRÖS, Balaton-felvidék, p. 44.
2023 "*Anolcites*" cf. *laczkoi* (DIENER, 1899) – VIDAKOVIĆ et al., Samobor and Žumberak, p. 525, pl. 6, fig. 2.
v non 2024 *Anolcites* sp., aff. *laczkoi* DIENER, 1899 – VÖRÖS et al., Nemesvámos, p. 404, pl. IX, figs.10, 11; pl. X, figs. 1, 2; pl. XI, fig. 1.
v non 2024 *Anolcites laczkoi* DIENER, 1899 – VÖRÖS et al., Nemesvámos, p. 404, pl. IX, figs. 8, 9.
v 2025 *Katrabocaites laczkoi* (DIENER, 1899) – VÖRÖS et al., Király Hill, p. 312, figs. 3, 4.

Material: Six, partly incomplete but well-preserved specimens, including the type specimen kept in the collections of the former Geological Institute of Hungary (SARA), from Katrabóca at Nemesvámos (4), from the Király Hill (1) at Veszprémfajsz and from Öskü (1) (*Fig. 1b, Fig. 7, Fig. 8, Fig. 10* and *Fig. 17*).

Measurements:

Identity No.	D	Wh	Ww	U
T.883.	72	28.8	24.5	20.6
M.98.139.	79.5	35.4	26.1	22.6
INV 2026.47.	87.1	42.2	26	20.8
INV 2026.48.	26	10.5	?	5.9
INV 2026.49.	61.8	27.9	?	22
BM-92.	117.5	54.5	?	33

Description: Small to very large *Katrabocaites* with subinvolute to subevolute conch (U/D ratio = 0.23 to 0.36, mean = 0.28), with high oval whorl section. The umbilical wall is steep to slightly overhanging; the umbilical edge is subrounded. The flanks are gently convex and join the arched venter with a continuous curve. The flanks are ornamented with strong, slightly falcoid prorsiradiate ribs. The number of the ribs is 24 to 32 on a half whorl. Many bifurcations appear in the inner third of the flank; the intercalations are mainly inserted in the outer third of the flank. The ribs became strongly projected on the ventrolateral margin. The umbilical nodes are strong, bulbous. There are barely discernible nodes in the outer half of the lateral flanks; the body chamber does not bear nodes. The venter is rather wide and broadly arched and has a rather deep and narrow furrow between the rows of the ventral alternating nodes.

The suture is subammonitic (*Fig. 66*). The first lateral lobe is wide and deeply incised; the second lateral lobe is much narrower and less crenulated. The lateral saddles are rather high and narrow; laterally distinctly incised.

Remarks: The holotype of "*A.*" *laczkoi* was inspected in the collections of the collections of the former Geological Institute of Hungary (SARA) and is re-figured here (*Fig. 67*); the identification of our specimens is endorsed.

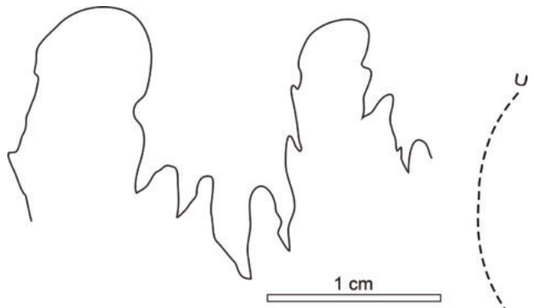


Figure 66. Suture line of *Katrabocaites laczkoi* (DIENER, 1899) (M.98.139.), at 28 mm whorl-height, Katrabóca II., Bed 9, Longobardian, Archelaus Zone; u: umbilical margin

This taxon was originally described as a species of *Anolcites* by DIENER (1899, l.c.), and this attribution was maintained by many later authors. VÖRÖS (1998, l.c.), despite the obvious difference in the external morphology, apparently concerned by the subammonitic suture, tentatively used the combination *Protrachyceras laczkoi*. Recently VIDAKOVIĆ et al. (2023, l.c.) gave a very thorough analysis of this taxonomic problem and implicitly advised to introduce a new genus for the species *laczkoi*. This was done by VÖRÖS et al. (2025, l.c.) where the genus *Katrabocaites* was defined and its morphological groups were preliminarily described.

In the list of synonymies, the item by DE TONI (1913, l.c.) is queried because RIEBER & BRACK (2004, p. 170) definitely ranked it to the genus *Falsanolcites*. This seems contradicted by De Toni's figures where the venter has a discernible furrow and the ventrolateral nodes are in alternating position. After all, in spite of the similarity in ornament to *K. laczkoi*, De Toni's specimen probably belongs to *Falsanolcites gortanii* (PISA, 1966) on the basis of its wider umbilicus.

The item "*Anolcites* ? *laricus*" by VÖRÖS (1998, l.c.) is now considered a juvenile specimen of *Katrabocaites laczkoi*.

Many diverse specimens illustrated by VÖRÖS et al. (2024, l.c.) under the names "*Anolcites laczkoi*" and "*Anolcites* sp. aff. *laczkoi*", respectively, in the light of the examination of the newly collected material, definitely belong to different morphotypes and new species of *Katrabocaites* which will be described in the next paragraphs of this paper.

Distribution: K. laczkoi was described from from the Ladinian of the Balaton Highland, the Dinarides and the Himalayas, and it probably occurs in the Southern Alps. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

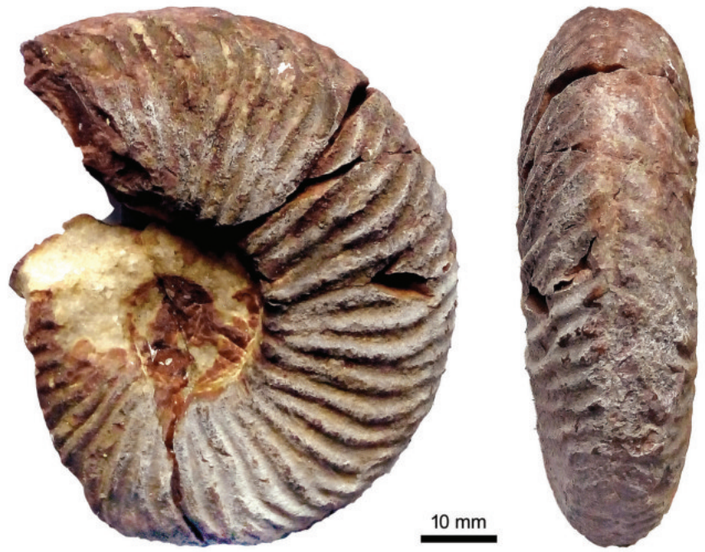


Figure 67. *Katrabocaites laczkoi* (DIENER, 1899), holotype (T.883.); Katrabóca, Longobardian, Archelaus Zone

Katrabocaites laczkoi (DIENER, 1899)

morphotype *nodosus*

Plate XXXIII: 5, 6; Plate XXXIV: 1–3; Plate XXXV: 1; Plate XXXVI: 3, 4; Figures 68, 69.

v 2024 *Anolcites* sp., aff. *laczkoi* DIENER, 1899 – VÖRÖS et al., Katrabóca, p. 404, pl. IX, figs. 10, 11; pl. X, figs. 1, 2; pl. XI, fig. 1.
v 2025 *Katrabocaites* sp., aff. *laczkoi* DIENER, 1899 A – VÖRÖS et al., Király Hill, p. 314, pl. IX, fig. 7.

Material: Eight, partly incomplete but well-preserved specimens from Katrabóca at Nemesvámos (6) and from the Király Hill (2) at Veszprémfajsz (*Fig. 1b, Fig. 7, Fig. 8* and *Fig. 10*).

Measurements:

Identity No.	D	Wh	Ww	U
BM-89.	102	48.8	34.5	27
BM-86.	72.2	33.1	29.1	21.1
BM-87.	72.3	36.5	27.3	16.5
BM-88.	105.1	48.4	36.1	24.3
PZs-52.	89.8	42.1	30.2	20.1
PZs-51.	42.8	20.2	17.5	11.3
BM-93	45.5	20.1	17.5	~11
M.98.140.	>50	22.6	19.5	?

Description: Small to very large *Katrabocaites* with subinvolute conch (U/D ratio = 0.22 to 0.29, mean = 0.25), with high oval whorl section. The umbilical wall is steep to slightly overhanging; the umbilical edge is subrounded. The flanks are moderately convex and join the arched venter with a continuous curve. The flanks are ornamented

with strong, slightly falcoid prorsiradiate ribs and nodes. The number of the ribs is 26 to 32 on a half whorl. Many bifurcations appear near the umbonal margin; most of the intercalations are inserted in the outer third of the flank. The ribs became strongly projected on the ventrolateral margin. The umbilical nodes are strong, bulbous. There are two distinct rows of nodes on the flanks. The first row is near the mid-flank; the second in the outer half of the flank; these rows of nodes persist also on the body chamber. The ventrolateral nodes are projected. The venter is wide, broadly arched and rather robust. There is a rather deep and narrow furrow on the venter between the rows of alternating ventral nodes.

The suture is subammonitic (*Figs. 68* and *69*). The first lateral lobe is wide and deeply incised; the second lateral lobe is narrower but also deeply crenulated. The lateral saddles are rather wide and distinctly incised on their flanks.

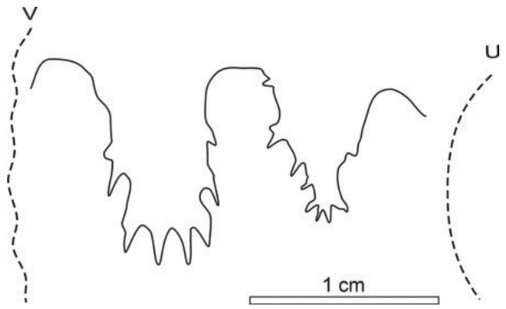


Figure 68. Suture line of *Katrabocaites laczkoi* (DIENER, 1899) morphotype *nodosus* (BM-88), at 28 mm whorl-height, Katrabóca II., Bed 9, Longobardian, Archelaus Zone; u: umbilical margin, v: ventrolateral margin

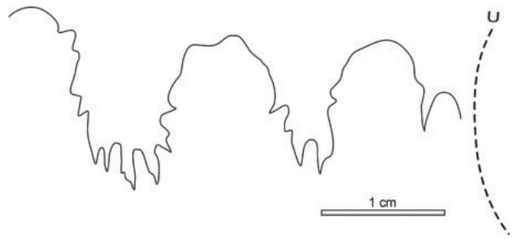


Figure 69. Suture line of *Katrabocaites laczkoi* (DIENER, 1899) morphotype *nodosus* (PZs-52), at 34 mm whorl-height, Katrabóca II., Bed 9, Longobardian, Archelaus Zone; u: umbilical margin

Remarks: This morphotype was well illustrated by VÖRÖS et al. (2024, l.c.) from Katrabóca, and was regarded as a possible new species allied to *K. laczkoi* (DIENER, 1899). In fact, the morphotype *nodosus* stands close to *K. laczkoi* but differs by its distinct lateral nodes and its more robust shape. However, transitions in both characters can be observed between the two taxa, therefore at the moment we do not intend to define morphotype *nodosus* as a new species.

Distribution: In the present project this taxon was collected from the upper Ladinian (Longobardian) Archelaus Zone.

***Katrabocaites miettoi* n. sp.**

Plate XXXV: 2–4.

v 2024 *Anolcites laczkoi* DIENER, 1899 – VÖRÖS et al., Nemesvámos, p. 404, pl. IX, figs. 8, 9.
v 2025 *Katrabocaites* sp., aff. *laczkoi* (DIENER, 1899) B – VÖRÖS et al., Király Hill, p. 314, pl. IX, fig. 4; pl. X, fig. 1.

Holotype: Hungarian Natural History Museum (Budapest), inventory number: PAL 2026.31.1. (*Pl. XXXV: 2*)
Locus typicus: Király Hill, collecting site 6, bed 4.
Stratum typicum: Red ammonitic limestone, Buchenstein Formation, Ladinian, Longobardian.
Derivatio nominis: After the name of Paolo Mietto, renowned expert on Triassic ammonoids.

Diagnosis: Conch subinvolute; whorl section oval. Umbilical wall steep to overhanging. Rather convex flanks; widely arched venter. Strong, prorsiradiate, sinuous to falcoid ribs on flanks. Umbilical bullae; few indistinct lateral nodes on adolescents; no ribs on adult. Venter grooved with alternating endings of ribs.

Material: Three, partly incomplete but well-preserved specimens from Katrabóca (2) at Nemesvámos and from the Király Hill (1) at Veszprémfajsz (*Fig. 1b, Fig. 7, Fig. 8* and *Fig. 10*).

Measurements:

Identity No.	D	Wh	Ww	U	U/D
PAL 2026.31.1.	102.4	50.1	34.9	23.2	0.23
BM-90.	40.5	21.2	?	?	
BM-91.	63.1	30.1	25.6	14.8	0.23

Description: Small to very large *Katrabocaites* with subinvolute conch (U/D ratio = 0.23), with oval whorl section. The umbilical wall is steep to slightly overhanging; the umbilical edge is subrounded. The flanks are moderately convex and join the arched venter with a continuous curve. The flanks are ornamented with strong, partly falcoid prorsiradiate ribs. The number of the ribs is 26 to 34 on a half whorl. Most of the bifurcations and intercalations appear in the inner third of the flank; but many of them are inserted also in the outer third of the flank. The ribs become strongly projected on the ventrolateral margin. The umbilical nodes may rather be termed as bullae. There are a few indistinct nodes in the mid-flanks of the smaller (adolescent) specimens (*Pl. XXXV: 3, 4*); nodes are absent on the largest adult specimen (*Pl. XXXV: 2*). The ventrolateral nodes are in fact the thickened endings of the ribs and are strongly projected. The venter is wide, broadly arched and rather robust. It has a moderately deep and narrow furrow between the rows of the weak ventral alternating nodes.

The suture is unknown.

Remarks: Two specimens of this taxon were illustrated from Katrabóca by VÖRÖS et al. (2024, l.c.) under the name "*Anolcites laczkoi*". Then, on the basis of the more complete material from Király Hill, now these specimens are considered belonging to *Katrabocaites miettoi*, new species. This is the most involute species of *Katrabocaites*; further differences are the absence of the lateral nodes and the extremely robust shape of the conch.

Distribution: In the present project *K. miettoi* was collected from the upper Ladinian (Longobardian) Archelaus Zone.

***Katrabocaites manfrini* n. sp.**

Plate XXXVI: 1.

v 2025 *Katrabocaites* sp., aff. *laczkoi* DIENER, 1899 C – VÖRÖS et al., Király Hill, p. 314, pl. IX, fig. 6.

Holotype: Hungarian Natural History Museum (Budapest), inventory number: PAL 2026.32.1. (*Pl. XXXVI: 1*)
Locus typicus: Király Hill, collecting site 6, bed 4.
Stratum typicum: Red ammonitic limestone, Buchenstein Formation, Ladinian, Longobardian.
Derivatio nominis: After the name of Stefano Manfrin, renowned expert on Triassic ammonoids.
Diagnosis: Conch subinvolute; whorl section high oval to quadrangular. Umbilical wall steep with marked edge. Nearly flat flanks; slightly arched venter. Strong, prorsiradiate, sinuous ribs on flanks; bifurcations in outer half of flanks. Strong umbilical nodes; two rows of very faint clavate lateral nodes in the inner half of the flanks. Venter grooved with alternating endings of ribs.

Material: A single specimen from Király Hill at Veszprémfajsz.

Measurements:

Identity No.	D	Wh	Ww	U	U/D
PAL 2026.32.1.	81.5	33.8	21.8	23.1	0.28

Description: Large *Katrabocaites* with subinvolute conch (U/D ratio = 0.28), with high oval to quadrangular whorl section. The umbilical wall is steep to slightly overhanging; the umbilical edge is marked. The flanks are nearly flat and join the arched venter with a marked ventrolateral rim. The flanks are ornamented with very strong, slightly sinuous prorsiradiate ribs. The number of the ribs is 22 on a half whorl. Bifurcations and intercalations are inserted in the outer half of the flank. The ribs became projected on the ventrolateral margin. The umbilical nodes are strong. Two rows of very faint, clavate nodules appear in the inner half of the lateral flanks (*Pl. XXXVI: 1a*); the ornamentation of the body chamber becomes weaker and simpler, with ribs and no intercalatories. The venter is rather narrow and has a moderately shallow but wide furrow between the rows of the alternating ventral nodes.

The suture is unknown.

Remarks: The holotype of *K. manfrini* was illustrated by VÖRÖS et al. (2025, l.c.) under the name *Katrabocaites* sp., aff. *laczkoi* DIENER, 1899 C. Now, on the basis of the more detailed studies on the morphological features, this specimen is considered belonging to *K. manfrini*, new species. This is different from other species of the genus by the strong ribbing with intercalations restricted to the outer half of the flanks, the few, faint, clavate nodules and the rather compressed conch.

Distribution: In the present project *K. miettoi* was collected from the upper Ladinian (Longobardian) Archelaus Zone.

Superfamily Tropitoidea MOJSISOVICS, 1875

Family Celtitidae MOJSISOVICS, 1893

Genus *Celtites* MOJSISOVICS, 1882

Type species: *Trachyceras epolensis* MOJSISOVICS, 1878

According to TOZER (1981, p. 94) *Celtites* was a nomen dubium, and was identical with *Orthoceltites* SPATH, 1951; both genera classified to the superfamily Danubitoidea SPATH, 1951. On the contrary, *Celtites* was properly defined by MOJSISOVICS (1882, p. 143) and by MOJSISOVICS (1893, p. 346) who restricted type species to *epolensis*. This was followed by SPATH (1951, p. 97) and the "Treatise" (ARKELL et al. 1957, p. L171) who classified *Celtites* and its family to the superfamily Tropitoidea MOJSISOVICS, 1875. This opinion is accepted here.

Celtites epolensis MOJSISOVICS, 1882

Plate XXXVI: 5, 6.

* 1882 *Celtites epolensis* E. v. MOJSISOVICS. – MOJSISOVICS, Mediterr. Triasprovinz, p. 149, pl. XXIX, figs. 1, 2; pl. XXXVIII, fig. 13.
1977 *Celtites epolensis* (MOJSISOVICS) – URLICHS, Pachycardientuffe, p. 18, pl. 1, figs. 10, 11.

1994 *Celtites epolensis* MOJSISOVICS, 1882 – BALINI, Curioni collection, p. 59, pl. 3, figs. 2, 3.
1995b *Celtites epolensis* MOJSISOVICS, 1882– MIETTO & MANFRIN, Limite ladinico-carnico, p. 30, pl. 1, fig. 18.
v 1998 *Celtites epolensis* MOJSISOVICS, 1882 – VÖRÖS, Balaton-felvidék, p. 55, 56, pl. XVI, figs. 4, 5.
2000 *Celtites epolensis* MOJSISOVICS, 1882 – BALINI et al., Schilpario, p. 38, pl. 1, fig. 1.
2010 *Celtites epolensis* MOJSISOVICS – ROSLI OTHMAN & LEMAN, Malaysia, p. 56, fig. 2.8.

Material: Two poorly preserved, partly crushed specimens from from the Meggy Hill (1) at Pécsely and from the Hajmáskér quarry (1) (*Fig. 1b* and *Fig. 16*).

Measurements:

Identity No.	D	Wh	Ww	U
M.89.16	~23	?	?	~13.8
M.98.119	~25	?	?	~14.8

Description: Small *Celtites* with very evolute, serpenticone conch (U/D ratio ~ 0.6); the whorl section and the character of the venter are not visible. The umbilical wall seems to be steep. The flanks bear prorsiradiate and strongly projected weak ribs, around 28 on a half whorl, with interspaces of similar width.

Remarks: C. epolensis, the type species of the genus, due to its simple but diagnostic characters is easy to recognize and was frequently cited. *C. laevidorsatus* (HAUER, 1860) figured and discussed also by MOJSISOVICS (1893, p. 349, pl. CXXI, fig. 45: pl. CXCV, fig. 5.) is very similar but, according to MOJSISOVICS (l.c.) it came from the uppermost Carnian.

Distribution: C. epolensis was described from from the Ladinian of the Southern Alps, the Balaton Highland, and from Malaysia. In the present project it was found in the upper Ladinian (Longobardian) Regoledanus Zone.

Order Phylloceratoidea ZITTEL, 1884

Family Ussuritidae HYATT, 1900

Genus *Monophyllites* MOJSISOVICS, 1879

Type species: *Ammonites sphaerophyllus* HAUER, 1850

Monophyllites wengensis (KLIPSTEIN, 1843)

Plate XXXVI: 7; Plate XXXVII: 1–6; Plate XL: 7; Figure 70.

* 1843 *Ammonites Wengensis*. – KLIPSTEIN, Östl. Alpen, p. 120, pl. VI, fig. 11.
1869 *Phylloceras sphaerophyllum* HAU. sp. – MOJSISOVICS, Cephalopoden-Fauna des alpinen Muschelkalkes, p. 586, pl. XVI, fig. 2.
1870 *Phylloceras Böckhi* MOJS. nov. sp. – MOJSISOVICS, Oenische Gruppe, p. 110, pl. V, fig. 7.
v 1872 *Phylloceras Böckhi* MOJS. – BÖCKH, Bakony déli, p. 158, pl. X, figs. 18, 19.
v 1873 *Phylloceras Böckhi* MOJS. – BÖCKH, Südlich. Bakony, p. 171, pl. X, figs. 18, 19.
1882 *Monophyllites wengensis* (v. KLIPSTEIN) E. v. M. – MOJSISOVICS, Mediterr. Triasprovinz, p. 207, pl. LXXVIII, figs. 11, 12.
1882 *Monophyllites Aonis* E. v. MOJSISOVICS – MOJSISOVICS, Mediterr. Triasprovinz, p. 208, pl. LXXVIII, figs. 3–5.
1895 *Monophyllites* cfr. *Wengensis* KLIPST. sp. – SALOMON, Marmolatakalk, p. 191, pl. VII, figs. 8, 9.
1900 *Monophyllites wengensis* KLIPST. sp. – TOMMASI, Clapsavon, p. 33, pl. IV, figs. 5, 5a.
1904 *Monophyllites sphaerophyllus* HAUER sp. 1850. – MARTELLI, Montenegro, p. 99, pl. VIII, fig, 3., pl. IX, fig.6.
1904 *Monophyllites wengensis* KLIPSTEIN sp. 1845. – MARTELLI, Montenegro, p. 101, pl. VIII, fig, 4.
1910a *Monophyllites Wengensis* KLIPST. – RENZ, Stratigaphisch., p. 529, pl. XVIII, fig. 1.

1910b *Monophyllites Wengensis* KLIPSTEIN. – RENZ, Argolis, p. 46, pl. III, figs. 1, 2.
1913 *Monophyllites wengensis* KLIPST. var. *sphaerophyllus* HAUER *emend*. RENZ – RENZ, Küsteninseln, p. 563, fig. 7.
1913 *Monophyllites Aonis* MOJS. – SIMIONESCU, Hagighiol, p. 332, pl. VI, figs. 1, 5, 7; pl. VII, fig. 5; text-figs. 60–64.
1927 Ex aff. *Monophyllites sphaerophyllus* HAUER sp. – OGILVIE GORDON, Gröden, p. 54, pl. VI, figs. 17a, 17b.
1927 *Monophyllites wengensis* KLIPSTEIN sp. – OGILVIE GORDON, Gröden, p. 53 (partim), pl. VI, fig. 16. non pl. VII, fig. 9.
1931 *Monophyllites wengensis* KLIPST. – ŽIVKOVIĆ, Zlatar, p. 95, pl. VII, fig. 1.
1938 *Monophyllites sphaerophyllus* HAUER – SIMIĆ, Berane, p. 217, pl. XVIII, fig. 3.
? 1960b *Monophyllites* cf. *sphaerophyllus* (HAUER) – KUMMEL, Thailand, p. 491, figs. 13, 14.
? 1960 *Monophyllites* cf. *wengensis* (KLIPSTEIN)1845. – ROSSI RONCHETTI, Grigne, p. 39, pl. VIII, fig. 3
1964b *Monophyllites wengensis* (KLIPSTEIN) – BANDO, Triassic Japan, p. 116, pl. 9, fig. 1.
1966 *Monophyllites wengensis* (KLIPSTEIN) – PISA, Alpi Carniche, p. 665, pl. LXXV, figs. 1–7; text-figs. 2, 10.
1994 *Monophyllites wengensis* (KLIPSTEIN, 1850) – FANTINI SESTINI, Esino, p. 267, pl. 2, fig. 4, pl. 9, fig. 4..
v 1998 *Monophyllites wengensis* (KLIPSTEIN, 1845) – VÖRÖS, Balaton-felvidék, p. 45, 54, pl. XII, fig. 5, pl. XIV, fig. 3.
2023 *Monophyllites wengensis* (KLIPSTEIN, 1843) – VIDAKOVIĆ et al., Samobor, p. 538, pl. 9, fig. 2.
v 2024 *Monophyllites wengensis* (KLIPSTEIN, 1843) – VÖRÖS et al., Nemesvámos, p, 405, pl. XI, figs. 2–6.
? 2025 *Monophyllites* cf. *wengensis* (KLIPSTEIN) – MRDAK et al., Montenegro, p. 194, fig. 8e.
2025 *Monophyllites wengensis* (KLIPSTEIN, 1843) – ĐAKOVIĆ et al., Durmitor, p. 34, figs. 16a–e.
v 2025 *Monophyllites wengensis* (KLIPSTEIN, 1843) – VÖRÖS et al., Király Hill, p. 307, pl. XI, figs. 4, 5.

Material: Eight, rather well-preserved specimens from Katrabóca (5) and Gyűr Hill (1), at Nemesvámos, from the Király Hill (1) at Veszprémfajsz and from the Csukrét Gully (1) at Balatoncsicsó (*Fig. 1b, Fig. 4, Fig. 7, Fig. 8* and *Fig. 10*).

Measurements:

Identity No.	D	Wh	Ww	U
BM-94.	91.1	34.8	25.1	33.3
BM-95.	59.1	22.1	16.5	21.1
PZs-53.	67.1	27.1	18.6	23.5
PZs-54.	93.5	36.1	23.1	32.4
SzI-3.	72.8	31.5	21.5	24.5
BM-96.	70.1	27.8	20.3	22.6
M.98.97.	46.5	17.5	12.6	17.3
INV 2026.53.	52.2	19.8	13.1	?

Description: Medium-sized to very large *Monophyllites* with subevolute conch (U/D ratio = 0.32 to 0.37; mean = 0.35). Whorl section is oval, tending to be slightly subtrapezoidal. The umbilical margin is rounded; the flanks are gently arched, almost flat; the venter is arched. The flanks are ornamented by uniform, prorsiradiate, sigmoidal riblets (or growth lines), they continuously cross the venter, where they are gently arched adorally. The inner whorls usually bear widely and irregularly spaced strong folds or rugae (*Pl. XXXVII: 1, 2*).

The suture line is ammonitic, monophyllic (*Fig. 70*). The lateral lobes are asymmetrically trifid, deeply incised. The first lateral saddle is low, symmetric; the second and third one are asymmetrically bent and incised on their umbilical side.

Remarks: The very simple, archetypical shape and ornamentation of *M. wengensis* tempted many early authors to find variances in their findings and introduce new species, based on slight morphological differences. Even MOJSISOVICS (1882, p. 208) in the description of his new species "*Aonis*", admitted that: "Die Abweichungen gegenüber *Monophyllites wengensis* sind sehr gering und würden für sich allein die Trennung der beiden Formen nicht rechtfertigen." [The deviations from *Monophyllites wengensis* are very small and in themselves do not prove the separation of the two forms.]



Figure 70. Suture line of *Monophyllites wengensis* (KLIPSTEIN, 1843) (PZs-53), at 25 mm whorl-height, Katrabóca II., Bed 9, Longobardian, Archelaus Zone; u: umbilical margin

Nevertheless, besides *aonis*, further new nominal species of *Monophyllites* have been introduced, e.g. *sphaerophyllus* by HAUER (1869, l.c.), *boeckhi* by MOJSISOVICS (1870, l.c.). PISA (1966, l.c.) with a detailed study on a large material, re-defined *M. wengensis* as a widely interpreted species embracing many earlier introduced similar forms. This concept is applied here, too.

Distribution: M. wengensis was described from the Ladinian and Carnian of the Southern Alps, the Balaton Highland, the Dinarides, the Hellenides, Dobrogea, Thailand and Japan. In the present project it was collected from the upper Ladinian (Longobardian) Archelaus Zone.

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Plates

PLATE I.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by M., and in the private collections of M. Bercsényi (Nyúl, prefixed by BM). + indicates the beginning of the body chamber.

1. *Bosnites* ? sp. – BM-1., Nemesvámos, Gyűr Hill, top, Longobardian, Archelaus Zone; a: lateral view, b: ventral view, c: apertural view.
2. *Megaphyllites obolus* MOJSISOVICS, 1882 – BM-2., Veszprémfajsz, Király Hill, collecting site 1, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
3. *Megaphyllites obolus* MOJSISOVICS, 1882 – BM-3., Nemesvámos, Katrabóca, section II, bed 12, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
4. *Epigymnites* cf. *ecki* (MOJSISOVICS, 1882) – M.98.133., Nemesvámos, Katrabóca, section II, bed 12, Longobardian, Archelaus Zone; a: lateral view, b: apertural view.
5. *Epigymnites* cf. *ecki* (MOJSISOVICS, 1882) – BM-4., Nemesvámos, Gyűr Hill, collecting site 1, Longobardian, Archelaus Zone; lateral view.
6. *Epigymnites* cf. *credneri* (MOJSISOVICS, 1882) – M.98.113., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; lateral view.
7. *Epigymnites* cf. *credneri* (MOJSISOVICS, 1882) – BM-5., Veszprémfajsz, Király Hill, collecting site 7, Longobardian, Archelaus Zone; lateral view.
8. *Epigymnites* cf. *moelleri* (MOJSISOVICS, 1882) – BM-6., Veszprémfajsz, Király Hill, loose, Longobardian, Archelaus Zone; lateral view.

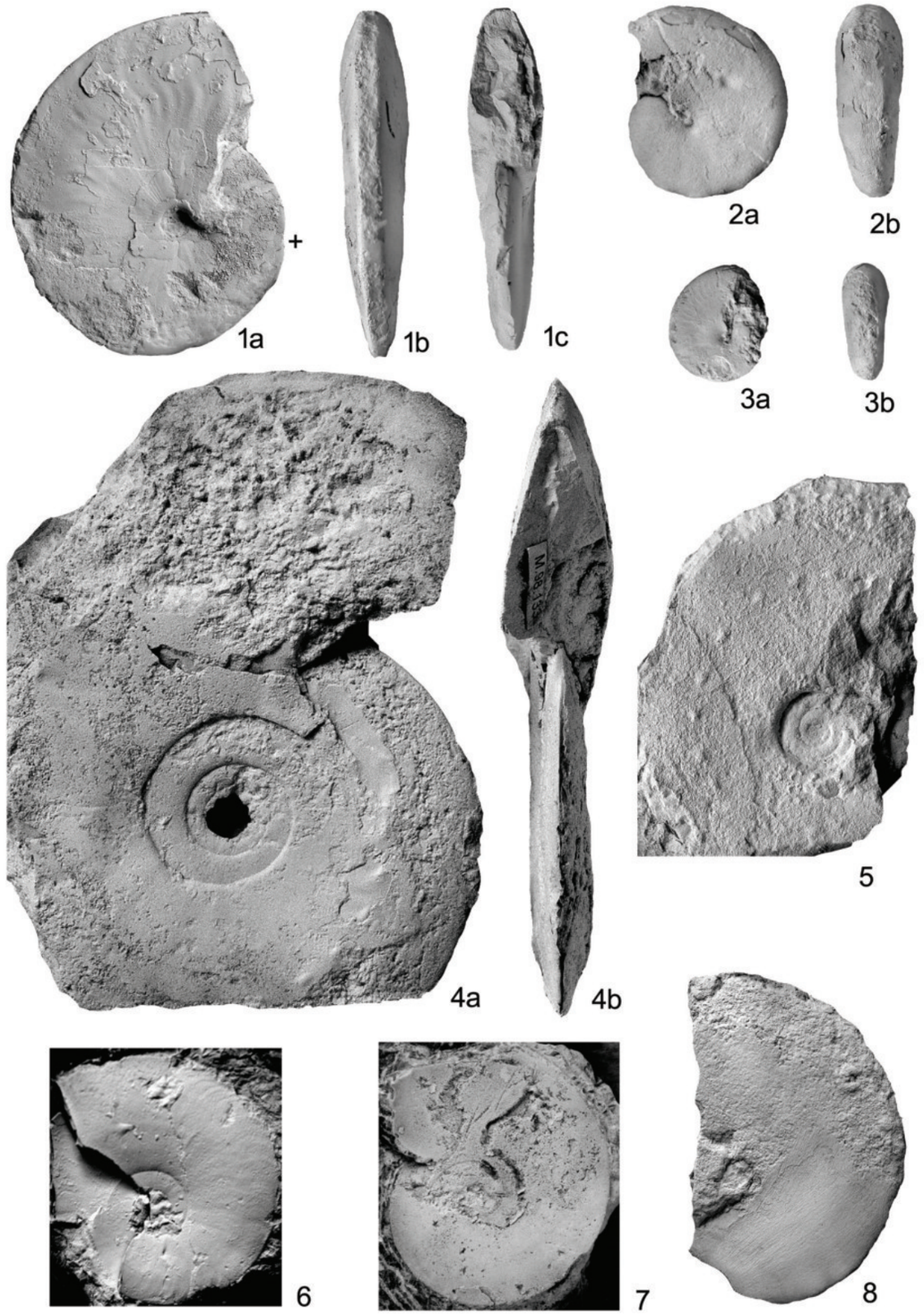


PLATE II.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the private collections of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM) and Zs. Pintér (Győr, under the inventory numbers prefixed by PZs).

1. *Epigymnites* cf. *ecki* (MOJSISOVICS, 1882) – PZs-1., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Proarcestes subtridentinus* (MOJSISOVICS, 1875) – BM-7., Veszprémfajsz, Király Hill, collecting site 1, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
3. *Proarcestes subtridentinus* (MOJSISOVICS, 1875) – PZs-2., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
4. *Proarcestes subtridentinus* (MOJSISOVICS, 1875) – PZs-3., Nemesvámos, Gyűr Hill, loose, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
5. *Proarcestes subtridentinus* (MOJSISOVICS, 1875) – PZs-4., Veszprémfajsz, Király Hill, loose, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
6. *Proarcestes subtridentinus* (MOJSISOVICS, 1875) – PZs-5., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; lateral view.

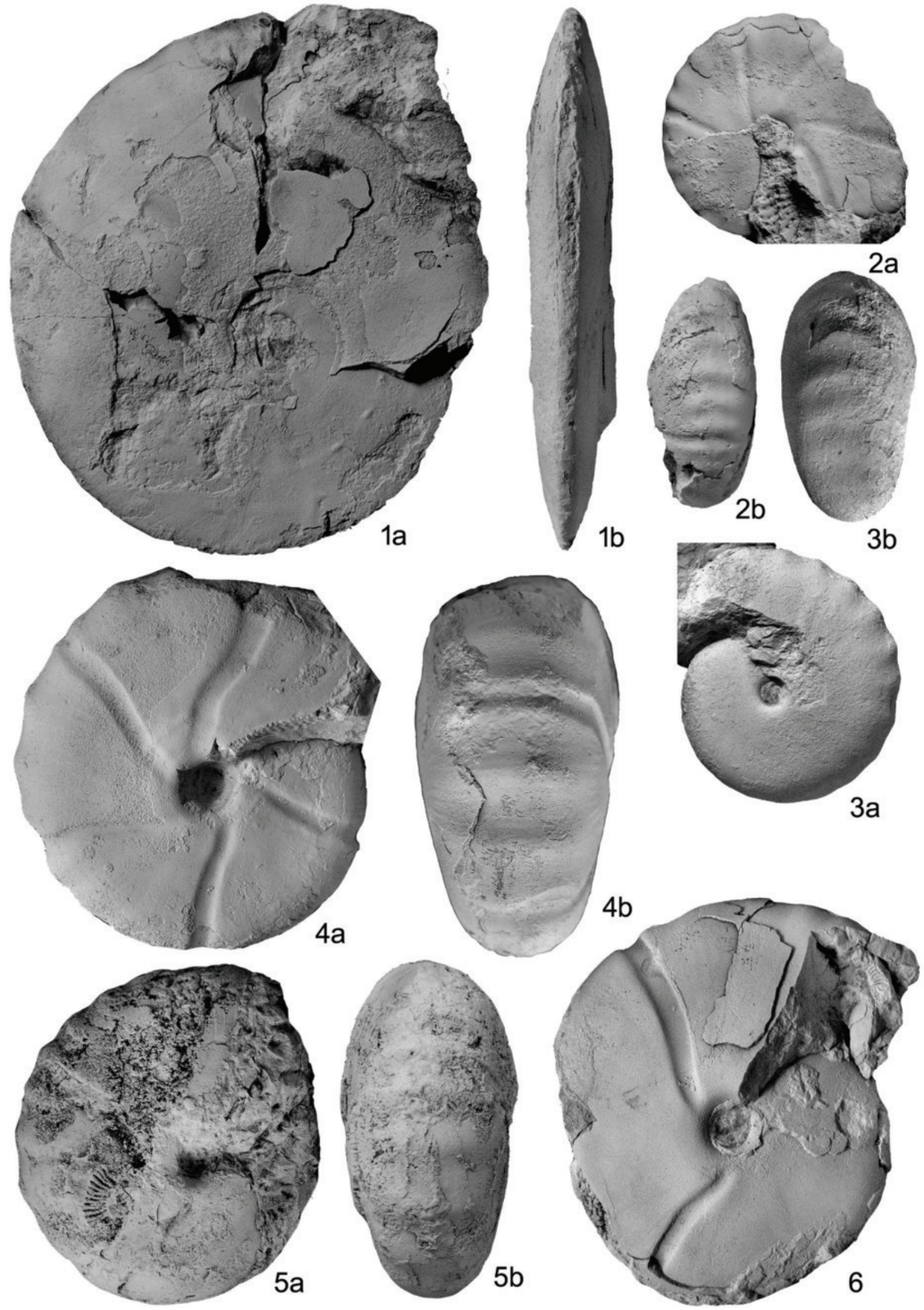


PLATE III.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the private collections of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM) and Zs. Pintér (Győr, under the inventory numbers prefixed by PZs). + indicates the beginning of the body chamber.

1. *Proarcestes boeckhi* (MOJSISOVICS, 1875) – PZs-6., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: apertural view.
2. *Proarcestes pannonicus* (MOJSISOVICS, 1870) – PZs-7., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: apertural view.
3. *Proarcestes boeckhi* (MOJSISOVICS, 1875) – BM-8., Nemesvámos, Katrabóca, section II, bed 11, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.

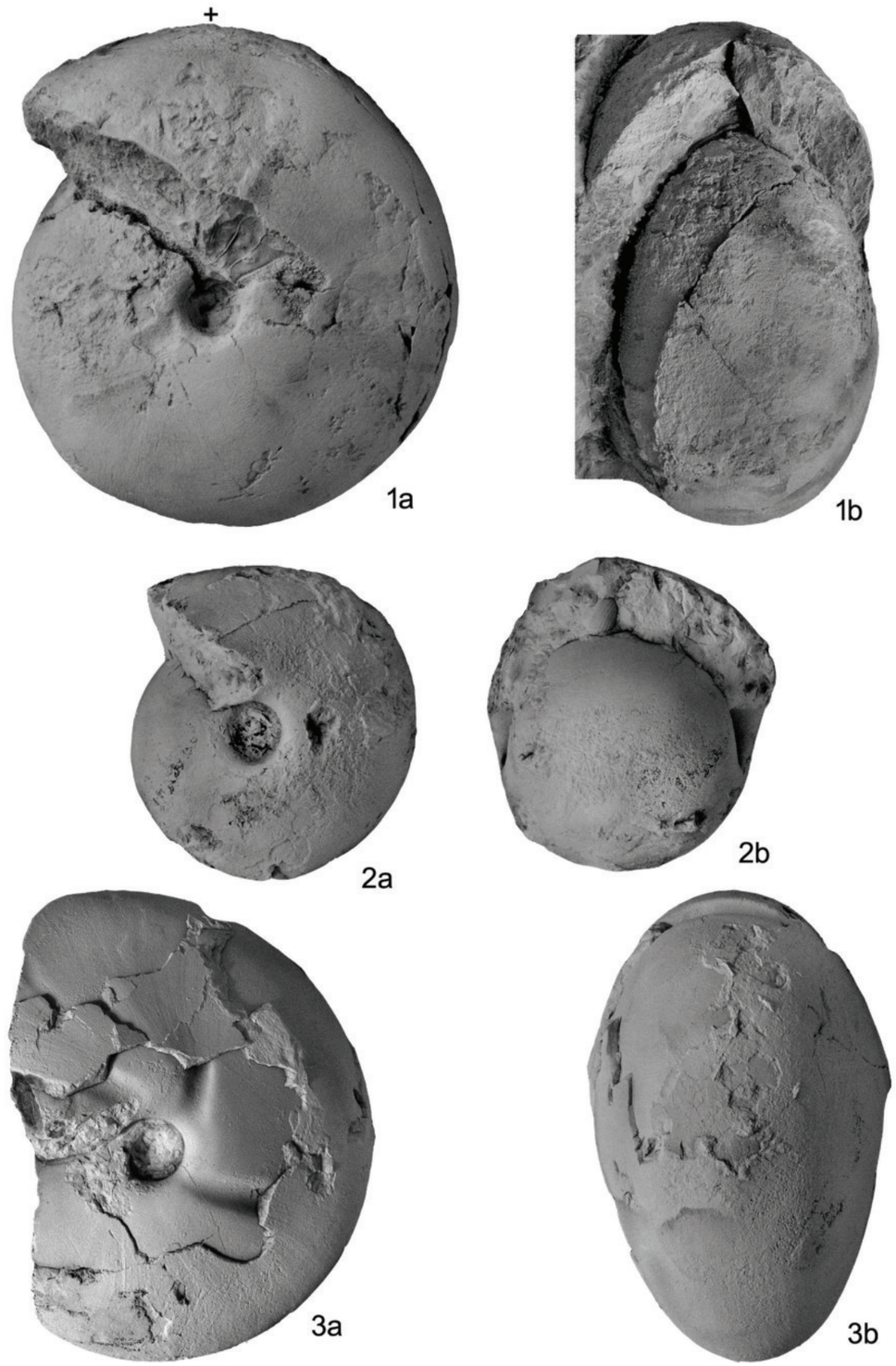


PLATE IV.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by M. and in the private collections of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM). + indicates the beginning of the body chamber.

1. *Joannites* cf. *trilabiatus* MOJSISOVICS, 1882 – M.87.052., Dörgicse, Becserpuszta, loose, Longobardian, Archelaus Zone; a: left lateral view, b: right lateral view.
2. *Joannites* cf. *tridentinus* (MOJSISOVICS, 1869) – M.98.132., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; lateral view.
3. *Arpadites arpadis* (MOJSISOVICS, 1870) – BM-9., Veszprémfajsz, Király Hill, collecting site 6, bed 10, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
4. *Arpadites arpadis* (MOJSISOVICS, 1870) – BM-10., Veszprémfajsz, Király Hill, loose, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.

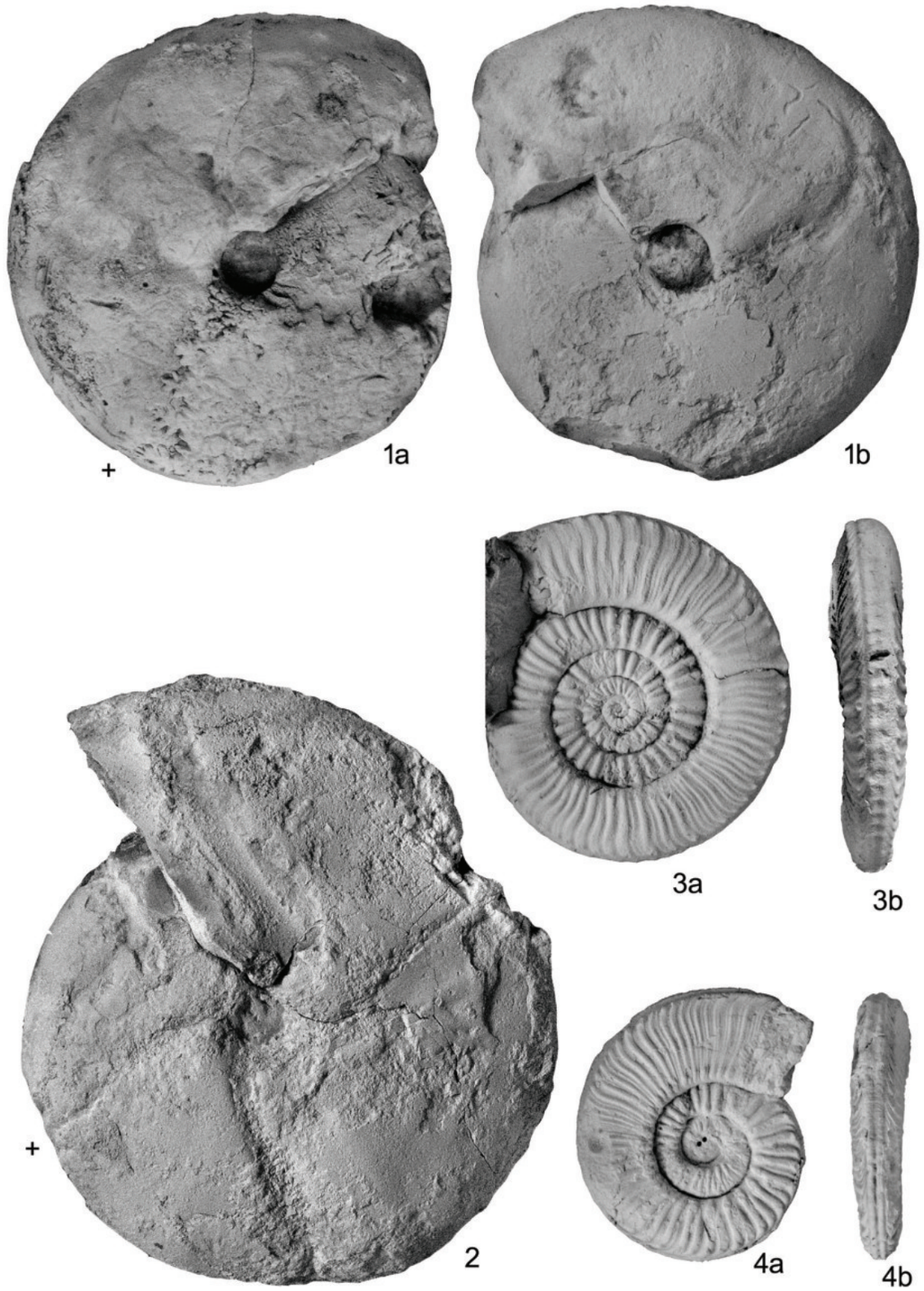


PLATE V.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the private collections of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM) and and Zs. Pintér (Győr, under the inventory numbers prefixed by PZs).

1. *Arpadites arpadis* (MOJSISOVICS, 1870) – BM-11., Nemesvámos, Katrabóca, section II, bed 11, Longobardian, Archelaus Zone; lateral view.
2. *Arpadites arpadis* (MOJSISOVICS, 1870) – BM-12., Nemesvámos, Katrabóca, section II, bed 12, Longobardian, Archelaus Zone; lateral view.
3. *Arpadites arpadis* (MOJSISOVICS, 1870) – BM-13., Veszprémfajsz, Király Hill, collecting site 6, bed 10, Longobardian, Archelaus Zone; lateral view.
4. *Arpadites arpadis* (MOJSISOVICS, 1870) – BM-14., Nemesvámos, Katrabóca, section II, bed 12, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
5. *Arpadites arpadis* (MOJSISOVICS, 1870) – PZs-8., Veszprémfajsz, Király Hill, loose, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
6. *Arpadites arpadis* (MOJSISOVICS, 1870) – PZs-9., Veszprémfajsz, Király Hill, collecting site 2, bed 4?, Longobardian, Archelaus Zone; lateral view.
7. *Arpadites arpadis* (MOJSISOVICS, 1870) – BM-15., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; lateral view.
8. *Arpadites arpadis* (MOJSISOVICS, 1870) – BM-16., Nemesvámos, Gyűr Hill, collecting site 1, Longobardian, Archelaus Zone; lateral view.
9. *Arpadites arpadis* (MOJSISOVICS, 1870) – BM-17., Veszprémfajsz, Király Hill, loose, Longobardian, Archelaus Zone; lateral view.
10. *Arpadites arpadis* (MOJSISOVICS, 1870) – BM-18., Veszprémfajsz, Király Hill, loose, Longobardian, Archelaus Zone; lateral view.
11. *Arpadites szaboi* (BÖCKH, 1872) – BM-19., Veszprémfajsz, Király Hill, collecting site loose, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.

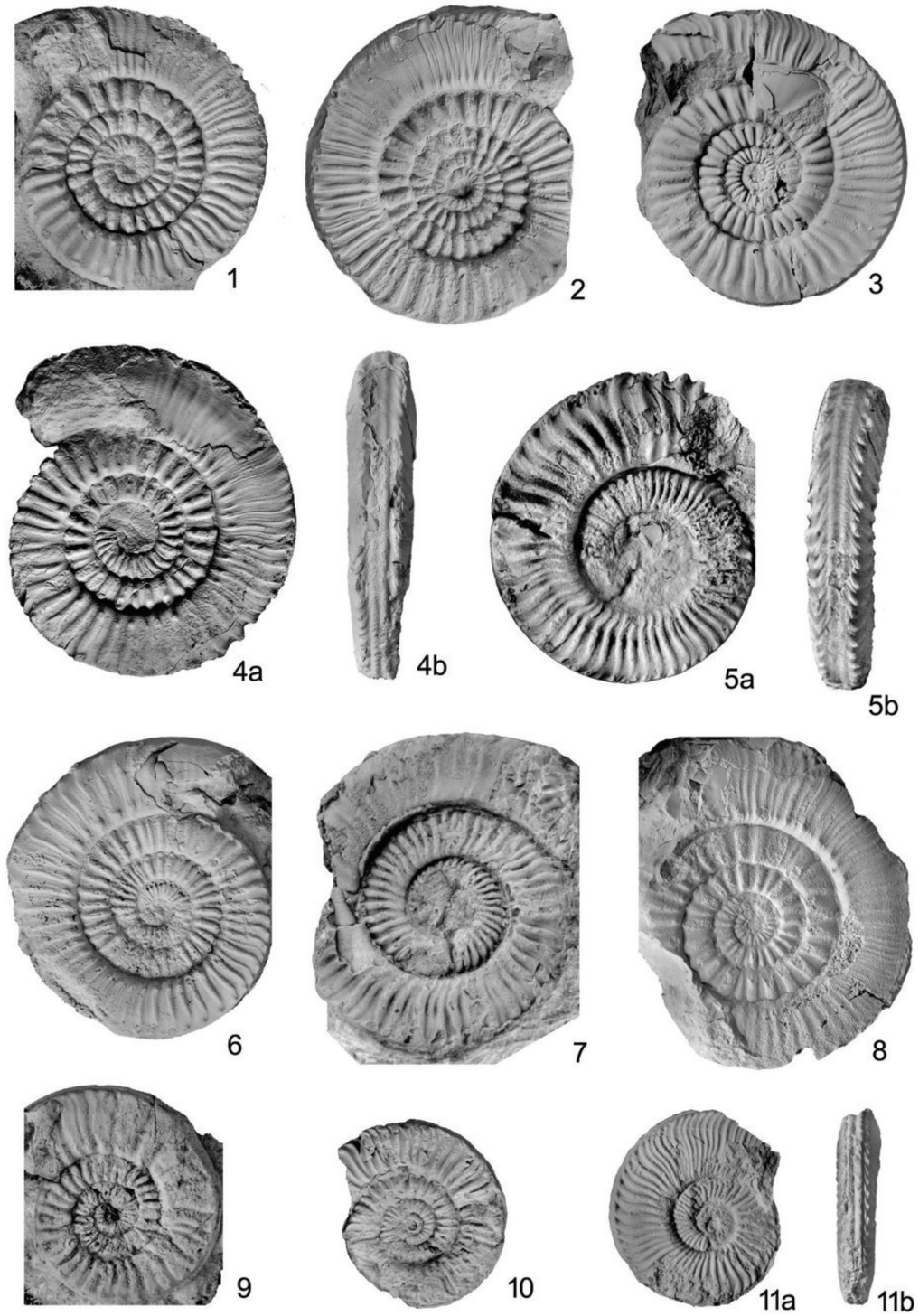


PLATE VI.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by INV, and in the private collections of M. Bercsényi (Nyúl, prefixed by BM) and Zs. Pintér (Győr, under the inventory numbers prefixed by PZs).

1. *Arpadites szaboi* (BÖCKH, 1872) – BM-20., Nemesvámos, Katrabóca, section II, bed 12, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Arpadites szaboi* (BÖCKH, 1872) – PZs-10., Nemesvámos, Katrabóca, section II, bed 11/12, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
3. *Arpadites szaboi* (BÖCKH, 1872) – BM-21., Nemesvámos, Katrabóca, section II, bed 12, Longobardian, Archelaus Zone; lateral view.
4. *Arpadites szaboi* (BÖCKH, 1872) – PZs-11., Nemesvámos, Katrabóca, section II, bed 12, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
5. *Arpadites szaboi* (BÖCKH, 1872) – INV 2026.33., Balatoncsicsó, Csukrét Gully, loose, Longobardian, Archelaus Zone; lateral view.
6. *Arpadites szaboi* (BÖCKH, 1872) – BM-22., Veszprémfajsz, Király Hill, collecting site 7, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
7. *Arpadites szaboi* (BÖCKH, 1872) – PZs-12., Nemesvámos, Katrabóca, section II, bed 11/12, Longobardian, Archelaus Zone; lateral view.
8. *Arpadites szaboi* (BÖCKH, 1872) – PZs-13., Veszprémfajsz, Király Hill, collecting site 1, bed 5a, Longobardian, Archelaus Zone; a: lateral view.
9. *Arpadites* cf. *bracki* FANTINI SESTINI, 1994 – BM-23., Nemesvámos, Katrabóca, section II, bed 12, Longobardian, Archelaus Zone; lateral view.
10. *Arpadites* cf. *bracki* FANTINI SESTINI, 1994 – BM-24., Nemesvámos, Katrabóca, section II, bed 12, Longobardian, Archelaus Zone; lateral view.
11. *Arpadites* cf. *bracki* FANTINI SESTINI, 1994 – PZs-14., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.

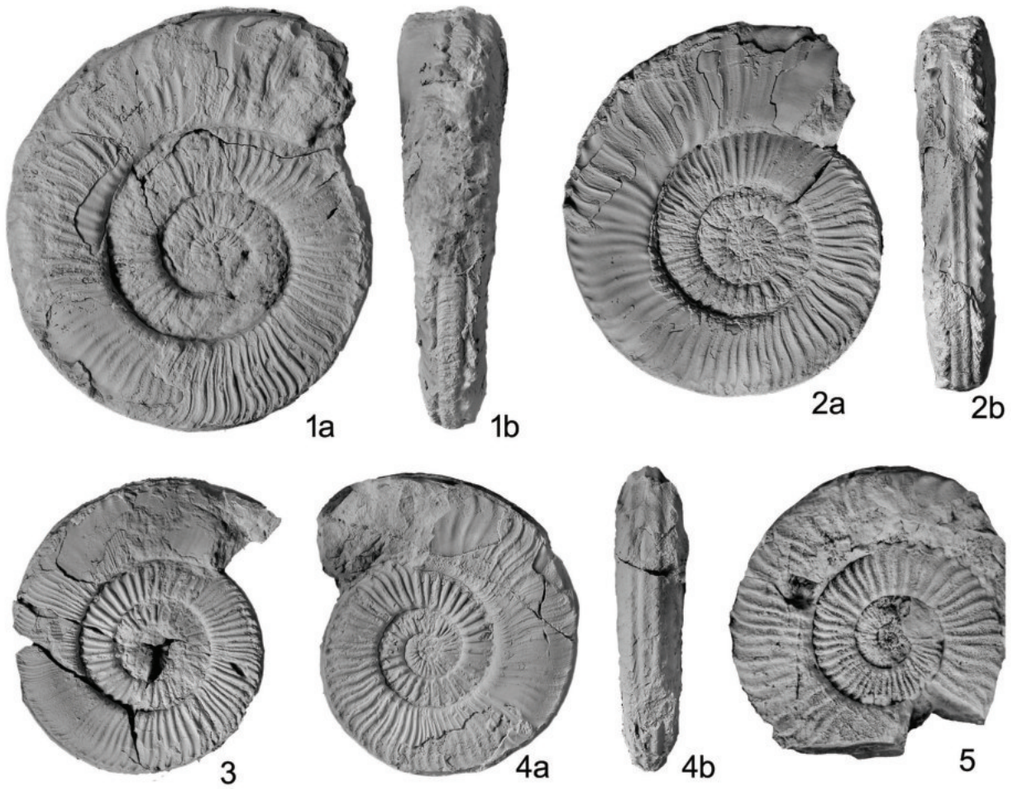


PLATE VII.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by PAL or INV, and in the private collections of M. Bercsényi (Nyúl, prefixed by BM) and Zs. Pintér (Győr, under the inventory numbers prefixed by PZs).

1. *Arpadites szaboi* (BÖCKH, 1872) – BM-25., Veszprémfajsz, Király Hill, collecting site 7, bed 10, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Arpadites szaboi* (BÖCKH, 1872) – INV 2026.34., Nemesvámos, Som Hill, loose, Longobardian, Archelaus Zone; lateral view.
3. *Arpadites toldyi* MOJSISOVICS, 1882 – BM-26., Veszprémfajsz, Király Hill, loose, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
4. *Arpadites szaboi* (BÖCKH, 1872) – INV 2026.35., Vászoly, Öreg Hill, loose, Longobardian, Archelaus Zone; lateral view.
5. *Arpadites telleri* MOJSISOVICS, 1882 – PZs-15., Veszprémfajsz, Király Hill, collecting site 1, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
6. *Arpadites telleri* MOJSISOVICS, 1882 – PZs-16., Nemesvámos, Katrabóca, loose, Longobardian, Archelaus Zone; lateral view.
7. *Arpadites telleri* MOJSISOVICS, 1882 – BM-27., Veszprémfajsz, Király Hill, collecting site 2, bed 5a, Longobardian, Archelaus Zone; lateral view.
8. *Arpadites bercsenyii* VÖRÖS, 2025 – holotype, PAL 2025.6.1., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
9. *Arpadites bercsenyii* VÖRÖS, 2025 – BM-28., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
10. *Arpadites telleri* MOJSISOVICS, 1882 – PZs-17., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; lateral view.
11. *Arpadites bercsenyii* VÖRÖS, 2025 – BM-29., Veszprémfajsz, Király Hill, collecting site 1, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
12. *Arpadites bercsenyii* VÖRÖS, 2025 – BM-30., Veszprémfajsz, Király Hill, collecting site 3, bed 5a, Longobardian, Archelaus Zone; lateral view.
13. *Arpadites bercsenyii* VÖRÖS, 2025 – PZs-18., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; a: lateral view.

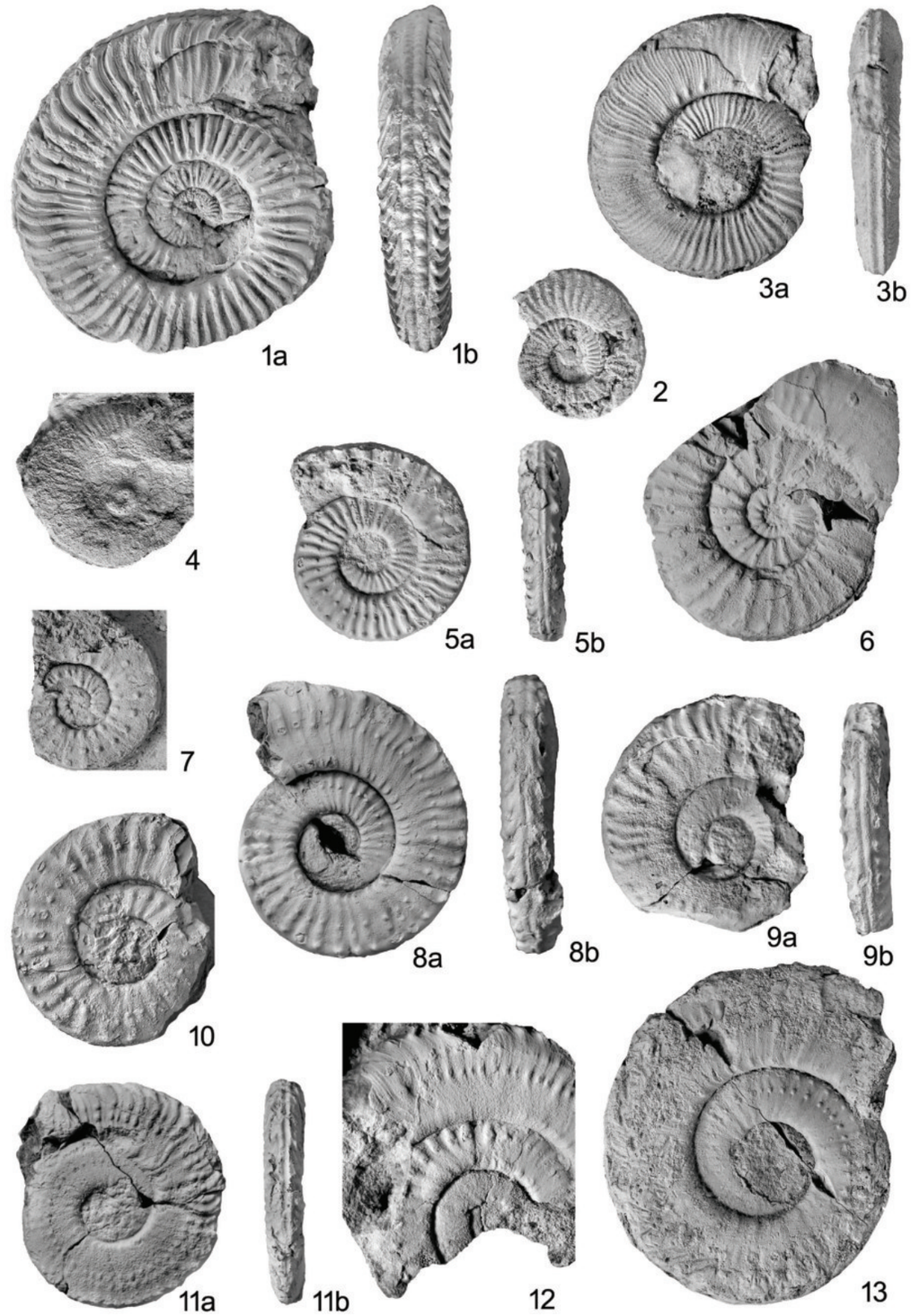


PLATE VIII.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the private collections of M. Bercsényi (Nyúl, prefixed by BM) and Zs. Pintér (Győr, under the inventory numbers prefixed by PZs).

1. *Stenarpadites manzonii* (BENECKE, 1876) – BM-31., Veszprémfajsz, Király Hill, collecting site 7, Longobardian, Archelaus Zone; a: lateral view, b: apertural view.
2. *Stenarpadites manzonii* (BENECKE, 1876) – BM-32., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; a: left lateral view, b: right lateral view.
3. *Stenarpadites manzonii* (BENECKE, 1876) – BM-33., Veszprémfajsz, Király Hill, collecting site 7, Longobardian, Archelaus Zone; lateral view.
4. *Stenarpadites manzonii* (BENECKE, 1876) – PZs-19., Nemesvámos, Gyűr Hill, loose, Longobardian, Archelaus Zone; lateral view.
5. *Stenarpadites manzonii* (BENECKE, 1876) – PZs-20., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; lateral view.
6. *Stenarpadites manzonii* (BENECKE, 1876) – BM-34., Veszprémfajsz, Király Hill, collecting site 6, bed 5, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
7. *Stenarpadites manzonii* (BENECKE, 1876) – BM-35., Nemesvámos, Katrabóca, section II, bed 12, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
8. *Arpadites toldyi* MOJSISOVICS, 1882 – PZs-21., Nemesvámos, Gyűr Hill, collecting site 1, Longobardian, Archelaus Zone; lateral view.
9. *Lenarpadites cinensis* (MOJSISOVICS, 1882) – PZs-22., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
10. *Lenarpadites cinensis* (MOJSISOVICS, 1882) – BM-36., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; lateral view.
11. *Lenarpadites cinensis* (MOJSISOVICS, 1882) – BM-37., Veszprémfajsz, Király Hill, collecting site 2, bed 5a, Longobardian, Archelaus Zone; lateral view.
12. *Lenarpadites cinensis* (MOJSISOVICS, 1882) – BM-38., Nemesvámos, Gyűr Hill, collecting site 1, Longobardian, Archelaus Zone; a: left lateral view, b: ventral view, c: right lateral view.

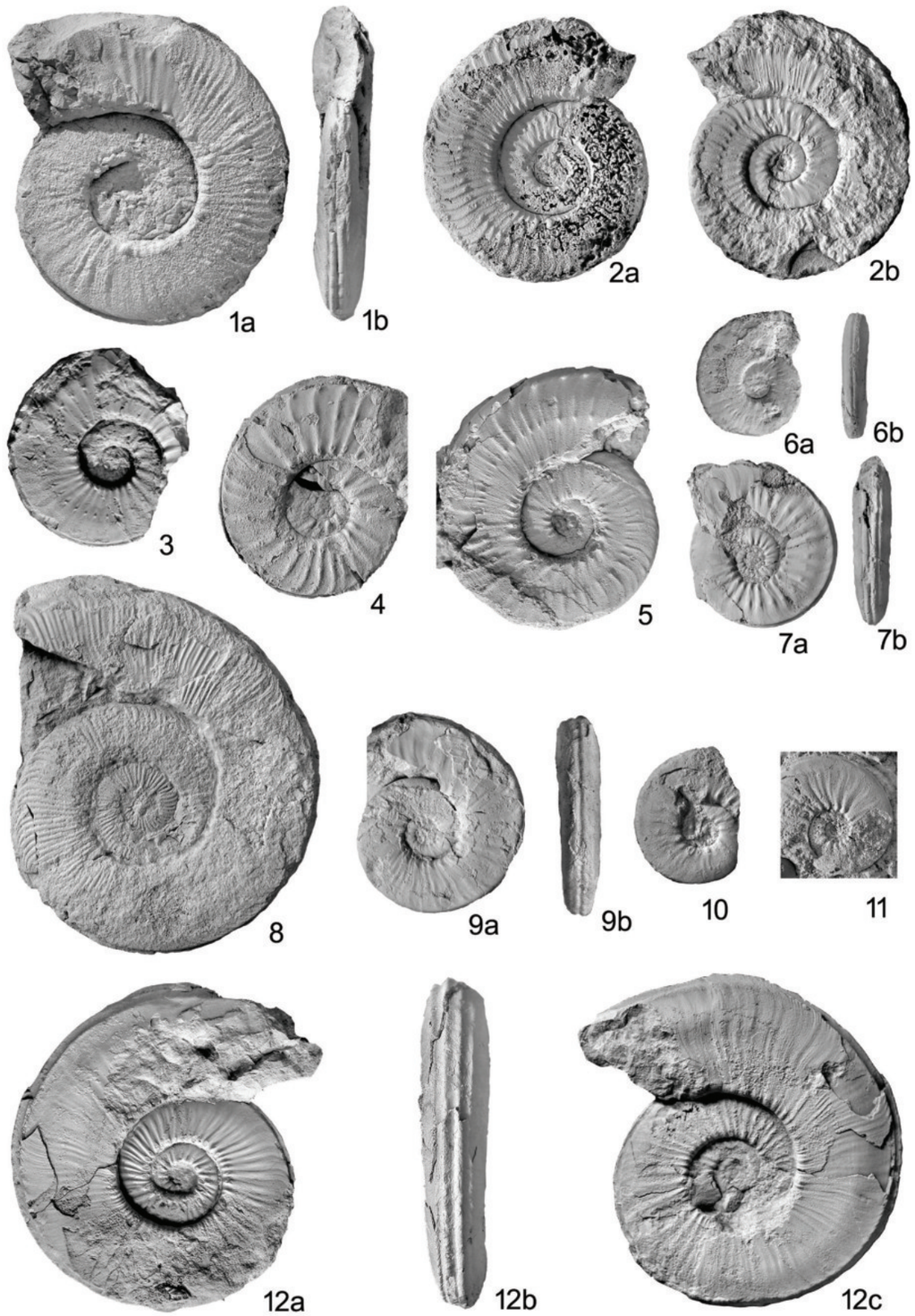


PLATE IX.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by PAL or INV, and in the private collections of M. Bercsényi (Nyúl, prefixed by BM) and Zs. Pintér (Győr, under the inventory numbers prefixed by PZs).

1. *Lenarpadites dichotomus* (FANTINI SESTINI, 1994) – BM-39., Veszprémfajsz, Király Hill, collecting site 7, Longobardian, Archelaus Zone; lateral view.
2. *Lenarpadites dichotomus* (FANTINI SESTINI, 1994) – PZs-23., Veszprémfajsz, Király Hill, collecting site 7, Longobardian, Archelaus Zone; lateral view.
3. *Lenarpadites dichotomus* (FANTINI SESTINI, 1994) – BM-40., Veszprémfajsz, Király Hill, loose, Longobardian, Archelaus Zone; lateral view.
4. *Lenarpadites dichotomus* (FANTINI SESTINI, 1994) – BM-41., Veszprémfajsz, Király Hill, collecting site 6, Longobardian, Archelaus Zone; lateral view.
5. *Lenarpadites dichotomus* (FANTINI SESTINI, 1994) – BM-42., Veszprémfajsz, Király Hill, collecting site 7, Longobardian, Archelaus Zone; lateral view.
6. *Lenarpadites dichotomus* (FANTINI SESTINI, 1994) – INV 2026.50., Balatoncsicsó, Csukrét Gully, loose, Longobardian, Archelaus Zone; lateral view.
7. *Stenarpadites dimanzonii* n. sp. – BM-43., Veszprémfajsz, Király Hill, collecting site 7, Longobardian, Archelaus Zone; lateral view.
8. *Stenarpadites dimanzonii* n. sp. – holotype, PAL 2026.26.1., Veszprémfajsz, Király Hill, collecting site 7, Longobardian, Archelaus Zone; a: lateral view, b: cross section.
9. *Argolites arpaditoides* (MOJSISOVICS, 1882) – BM-44., Veszprémfajsz, Király Hill, collecting site 1, bed 5a, Longobardian, Archelaus Zone; lateral view.
10. *Argolites arpaditoides* (MOJSISOVICS, 1882) – PZS-24., Veszprémfajsz, Király Hill, collecting site 1, bed 5a, Longobardian, Archelaus Zone; a: left lateral view, b: ventral view, c: right lateral view.
11. *Argolites ventisettembris* (TORNQUIST, 1898) – BM-45., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
12. *Argolites ventisettembris* (TORNQUIST, 1898) – BM-46., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; lateral view.

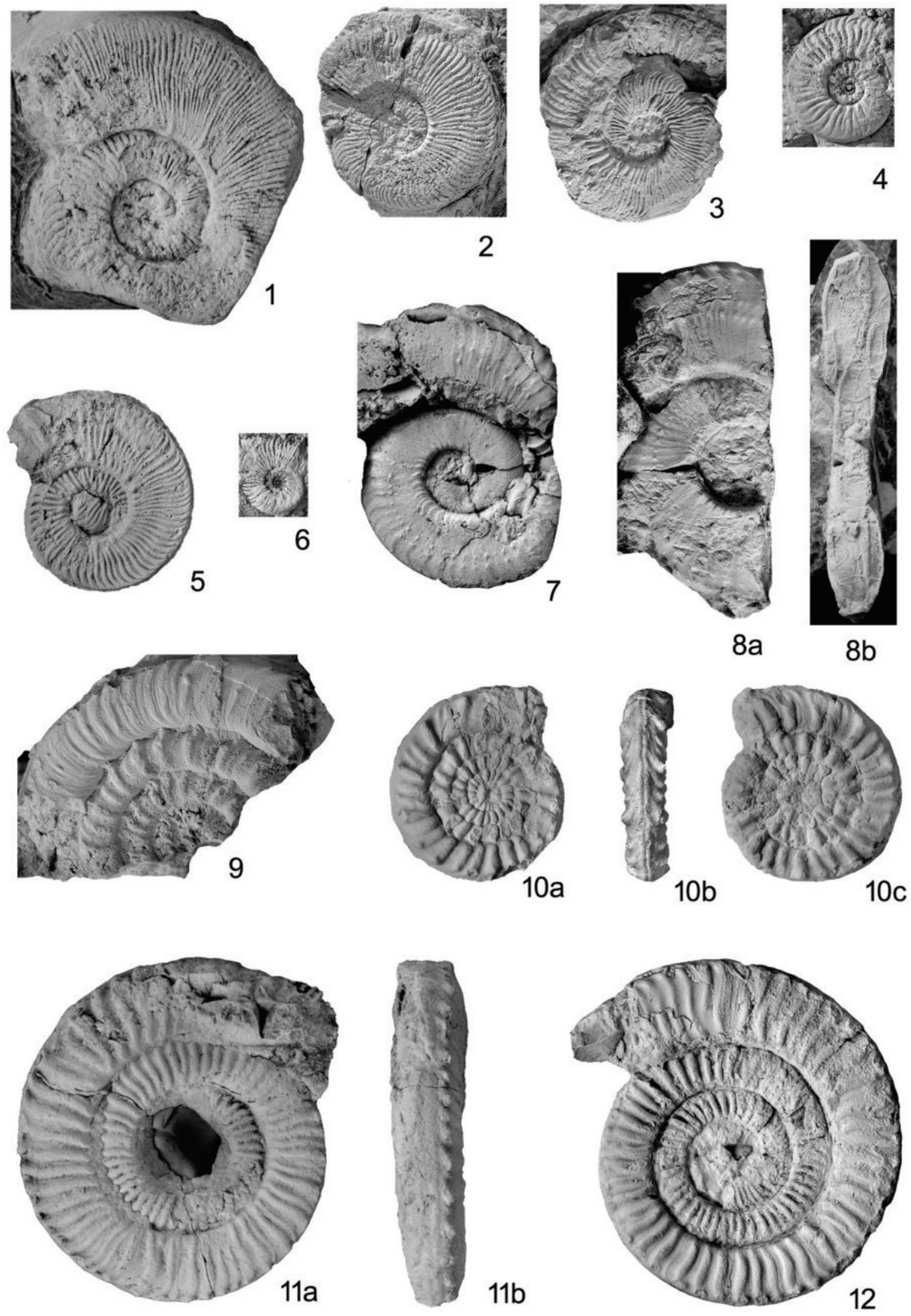


PLATE X.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by PAL or M., and in the private collections of M. Bercsényi (Nyúl, prefixed by BM) and Zs. Pintér (Győr, under the inventory numbers prefixed by PZs). + indicates the beginning of the body chamber.

1. *Argolites ventisettembris* (TORNQUIST, 1898) – BM-47., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Argolites ventisettembris* (TORNQUIST, 1898) – PZs-25., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
3. *Argolites ventisettembris* (TORNQUIST, 1898) – BM-48., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: lower part of the apertural view.
4. *Argolites ventisettembris* (TORNQUIST, 1898) – BM-49., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; lateral view.
5. *Argolites geometricus* (FRECH, 1903) – M.98.91., Nemesvámos, Katrabóca, section II, bed 11, Longobardian, Archelaus Zone; lateral view.
6. *Argolites geometricus* (FRECH, 1903) – PZs-26., Veszprémfajsz, Király Hill, collecting site 1, bed 5a, Longobardian, Archelaus Zone; lateral view.
7. *Argolites trinodosus* BALINI, 2006 – BM-50., Veszprémfajsz, Király Hill, loose, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
8. *Argolites nodosus* VÖRÖS, 2025 – holotype, PAL 2025.7.1., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
9. *Argolites nodosus* VÖRÖS, 2025 – BM-51., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
10. *Argolites nodosus* VÖRÖS, 2025 – BM-52., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
11. *Argolites nodosus* VÖRÖS, 2025 – BM-53., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.

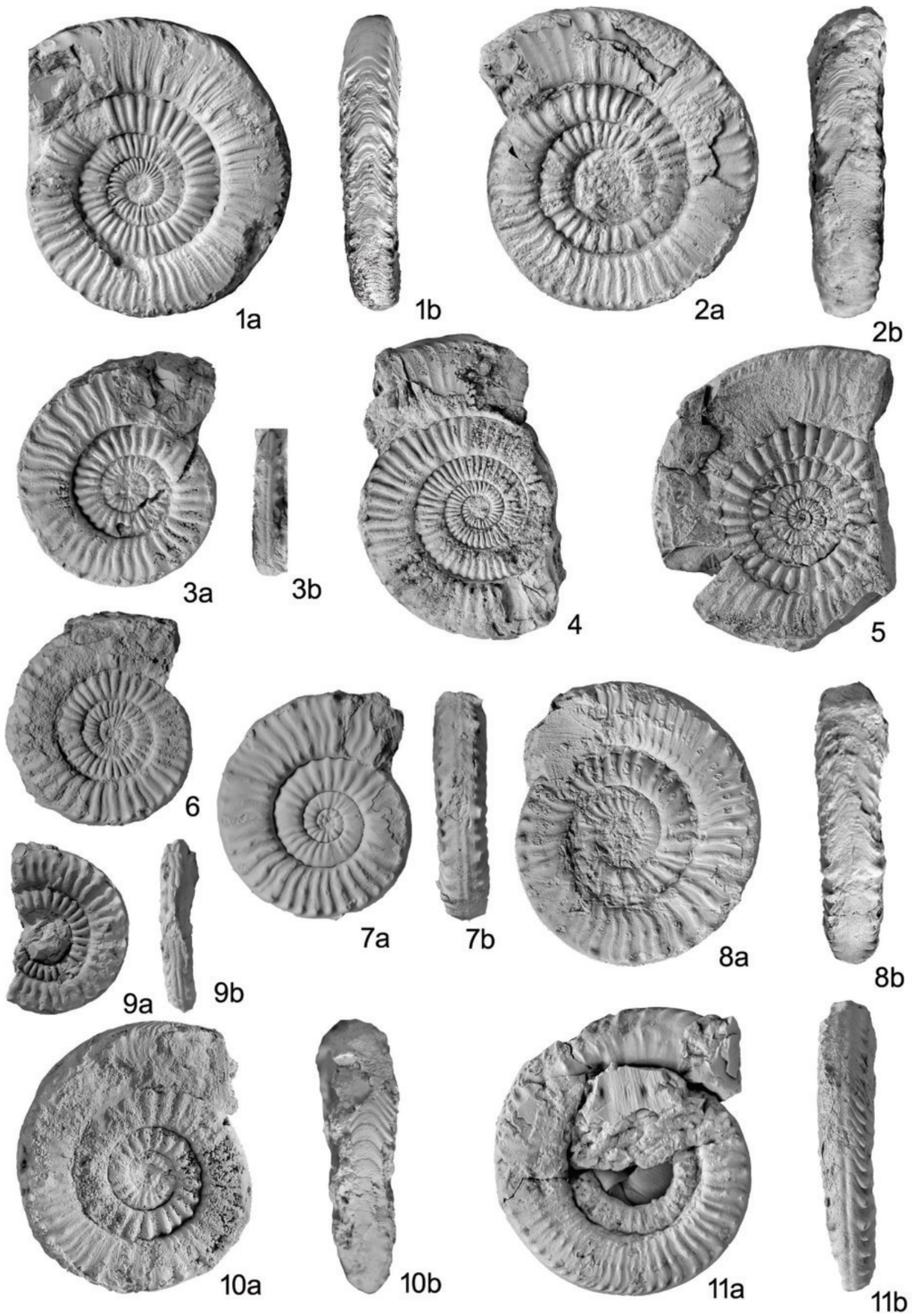


PLATE XI.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by PAL, and in the private collections of M. Bercsényi (Nyúl, prefixed by BM) and Zs. Pintér (Győr, under the inventory numbers prefixed by PZs). + indicates the beginning of the body chamber.

1. *Meginoceras* ? sp. – BM-54., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; a: lateral view, b: partial ventral view, c: partial ventral view.
2. *Alkaites* ? sp. – PZs-27., Veszprémfajsz, Király Hill, collecting site 2, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
3. *Pinterites laricus* (MOJSISOVICS, 1882) – BM-55., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
4. *Pinterites laricus* (MOJSISOVICS, 1882) – PZs-28., Veszprémfajsz, Király Hill, collecting site 5, bed 4, Longobardian, Archelaus Zone; a: left lateral view, b: ventral view, c: right lateral view.
5. *Pinterites laricus* (MOJSISOVICS, 1882) – BM-56., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
6. *Bercsenyiites montisregis* (VÖRÖS, 2025) – holotype, PAL 2025.9.1., Veszprémfajsz, Király Hill, collecting site 2, bed 4, Longobardian, Archelaus Zone; a: left lateral view, b: ventral view, c: right lateral view.

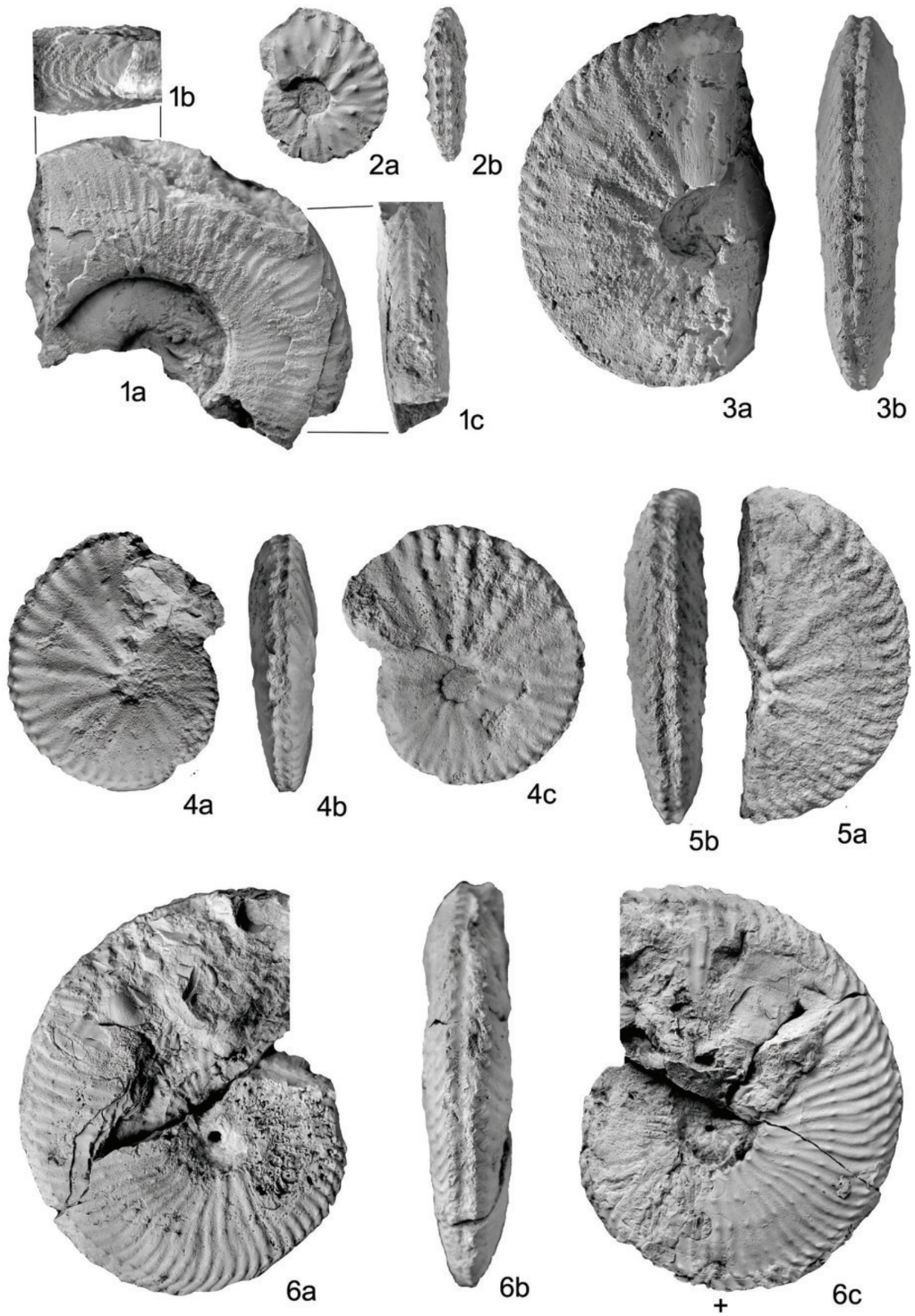
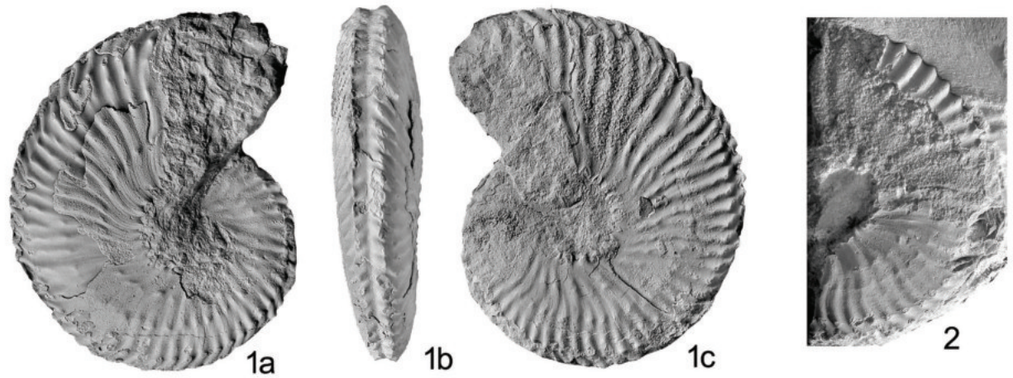
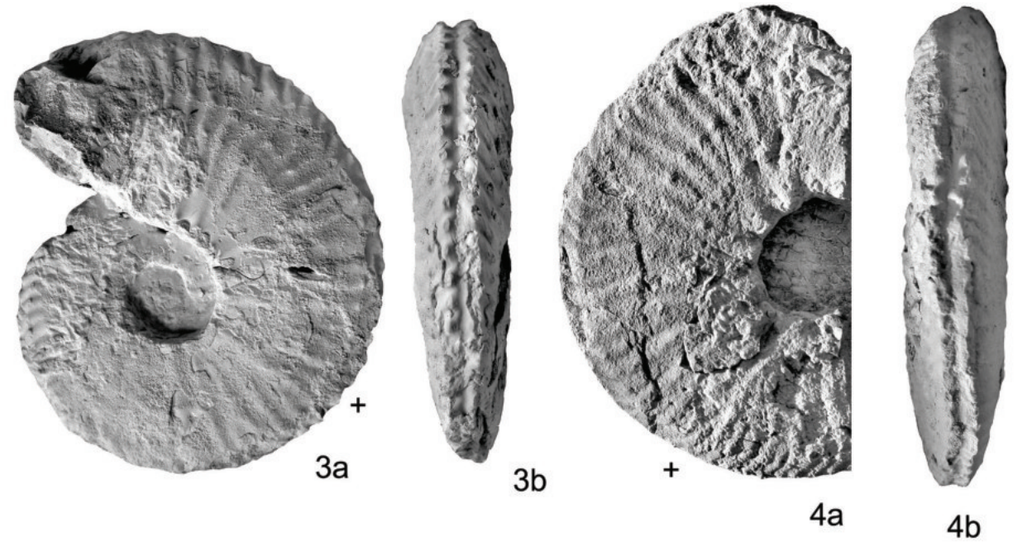
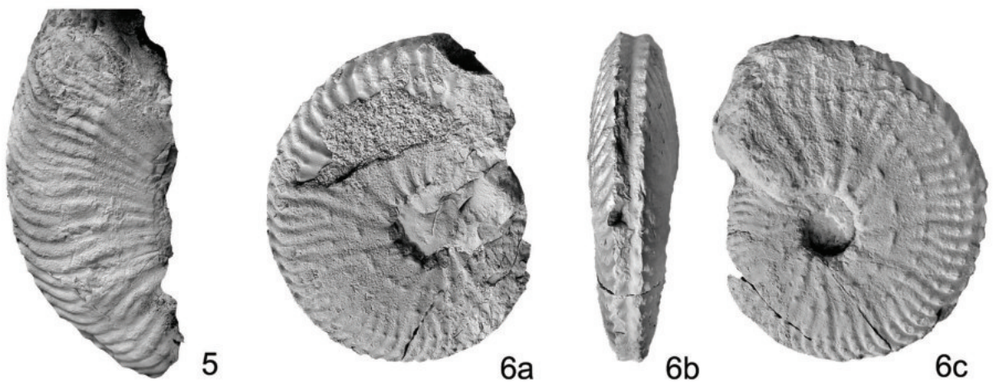


PLATE XII.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by PAL, and in the private collections of M. Bercsényi (Nyúl, under the identity numbers prefixed by BM), Zs. Pintér (Győr, under the identity numbers prefixed by PZs) and I. Szemes (Budapest, under the identity numbers prefixed by SzI). + indicates the beginning of the body chamber.







1. *Bercsenyiites montisregis* (VÖRÖS, 2025) – BM-57., Nemesvámos, Gyűr Hill, collecting site 1, Longobardian, Archelaus Zone; a: left lateral view, b: ventral view, c: right lateral view.
2. *Bercsenyiites montisregis* (VÖRÖS, 2025) – SzI-1., Balatoncsicsó, Csukrét Gully, loose, Longobardian, Archelaus Zone; lateral view.
3. *Bercsenyiites* sp., aff. *montisregis* (VÖRÖS, 2025) – PZs-29., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
4. *Bercsenyiites* sp., aff. *montisregis* (VÖRÖS, 2025) – BM-58., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
5. *Bercsenyiites montisregis* (VÖRÖS, 2025) – PZs-30., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; a: lateral view.
6. *Bercsenyiites egregius* n. sp. – holotype, PAL 2026.28.1., Veszprémfajsz, Király Hill, collecting site 2, bed 4, Longobardian, Archelaus Zone; a: left lateral view, b: ventral view, c: right lateral view.

PLATE XIII.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by M., and in the private collections of M. Bercsényi (Nyúl, prefixed by BM) and Zs. Pintér (Győr, under the inventory numbers prefixed by PZs).

1. *Bercsenyiites montisregis* (VÖRÖS, 2025) – BM-59., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Eoprotrachyceras* cf. *gervasuttii* FANTINI SESTINI, 1994 – M.98.107., Öskü, road cut, loose, Longobardian, Recubariensis Zone (?); a. lateral view, b: ventral view.
3. *Falsanolcites* cf. *furcosus* (MOJSISOVICS, 1893) – PZs-31., Kádárta, quarry, SW-yard, loose, Longobardian, Recubariensis Zone (?); a: ventral view, b: lateral view.
4. *Falsanolcites* cf. *gortanii* (PISA, 1966) – BM-60., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
5. *Falsanolcites* cf. *gortanii* (PISA, 1966) – M.98.120., Öskü, road cut, loose, Longobardian, Recubariensis Zone (?); lateral view.
6. *Falsanolcites rieberi* (FANTINI SESTINI, 1994) – M.98.104., Öskü, road cut, loose, Longobardian, Recubariensis Zone (?); lateral view.
7. *Falsanolcites rieberi* (FANTINI SESTINI, 1994) – M.98.101., Öskü, road cut, loose, Longobardian, Recubariensis Zone (?); a: lateral view, b:ventral view.
8. *Falsanolcites rieberi* (FANTINI SESTINI, 1994) – M.98.121., Öskü, road cut, loose, Longobardian, Recubariensis Zone (?); lateral view.

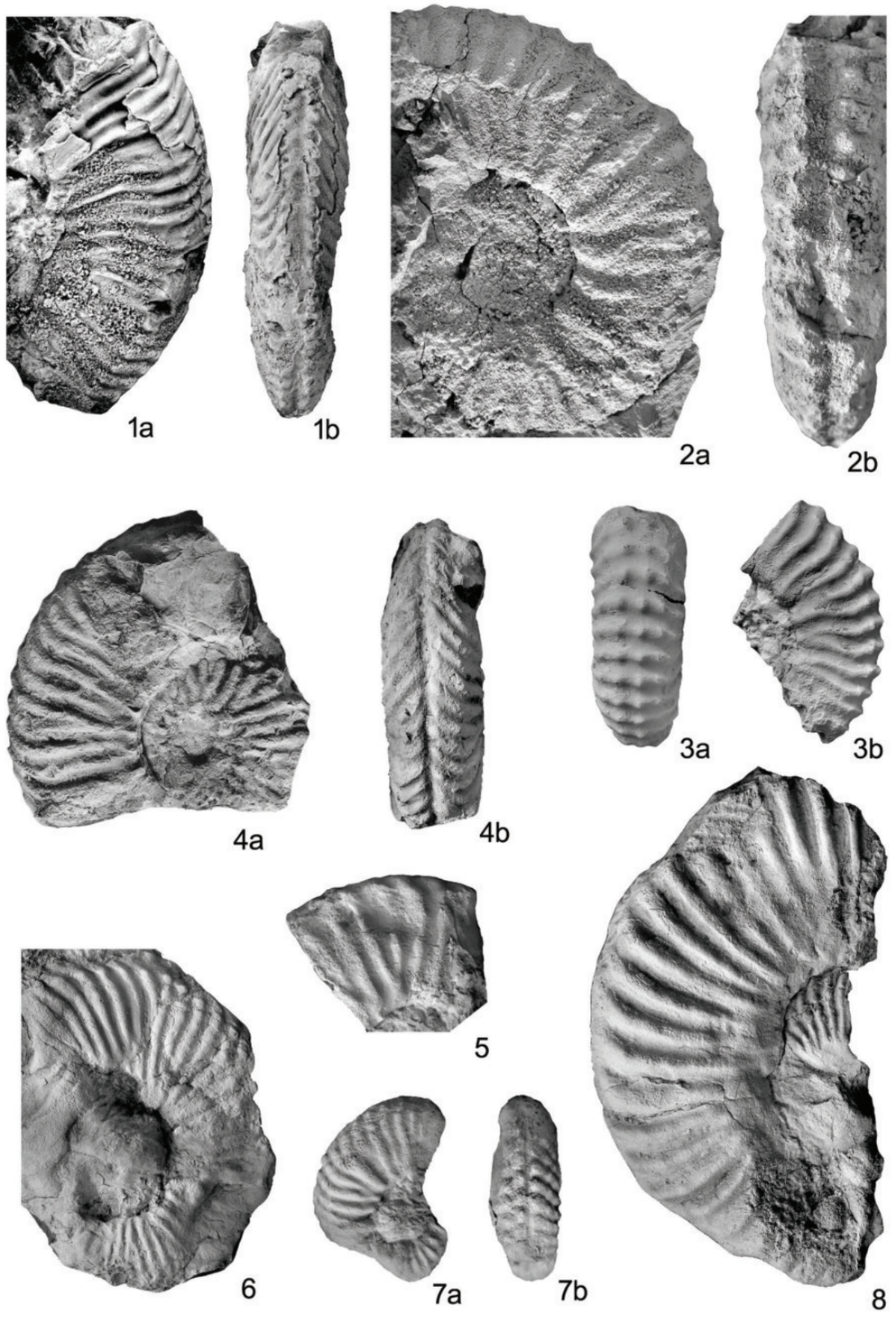


PLATE XIV.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by M., PAL or INV. + indicates the beginning of the body chamber.

1. *Falsanolcites rieberi* (FANTINI SESTINI, 1994) – M.98.102., Öskü, road cut, loose, Longobardian, Recubariensis Zone (?); lateral view.
2. *Falsanolcites rieberi* (FANTINI SESTINI, 1994) – INV 2026.36., Vászoly, Öreg Hill, loose, Longobardian, Recubariensis Zone (?); lateral view.
3. *Paranolcites budaii* VÖRÖS, 2025 – holotype, PAL 2025.8.1., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; a: lateral view, b: ventral view, c: apertural view.
4. *Paranolcites kadartaensis* n. sp. – holotype, PAL 2026.30.1., Kádárta, quarry, SW-yard, loose, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
5. *Paranolcites ozsvarti* n. sp. – holotype, PAL 2026.29.1., Kádárta, quarry, E-yard, loose, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
6. *Frankites* ? cf. *regoledanus* (MOJSISOVICS, 1869) – INV 2026.37., Köveskál, key section, loose, Longobardian, Regoledanus Zone; lateral view.
7. *Frankites apertus* (MOJSISOVICS, 1893) – INV 2026.38., Köveskál, key section, loose, Longobardian, Regoledanus Zone; lateral view.
8. *Frankites apertus* (MOJSISOVICS, 1893) – INV 2026.40., Litér, quarry, loose, Longobardian, Regoledanus Zone; a: lateral view, b, c: ventral views with different lighting directions.
9. *Frankites apertus* (MOJSISOVICS, 1893) – INV 2026.39., Litér, quarry, loose, Longobardian, Regoledanus Zone; a: lateral view, b, c: ventral views with different lighting directions.

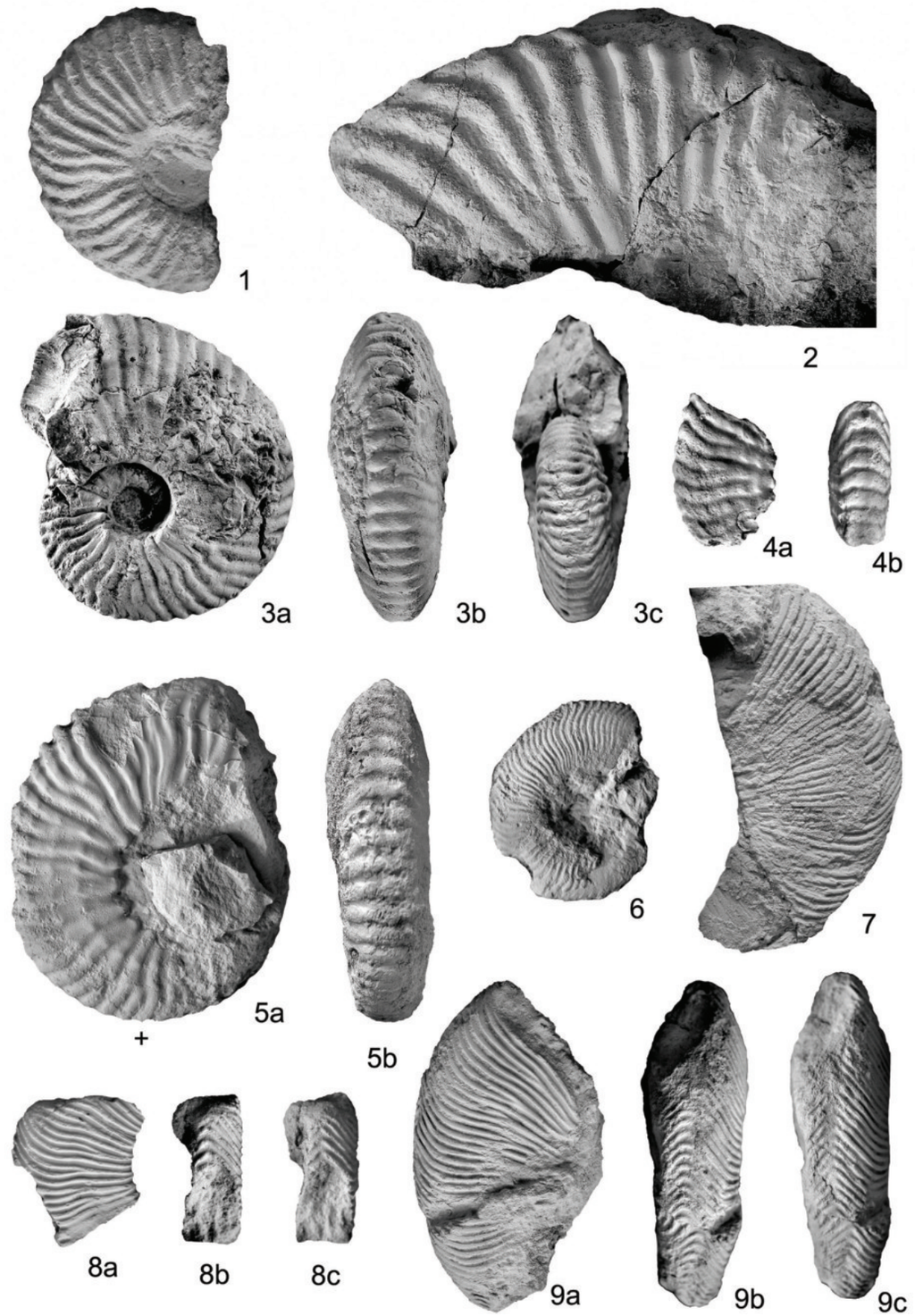
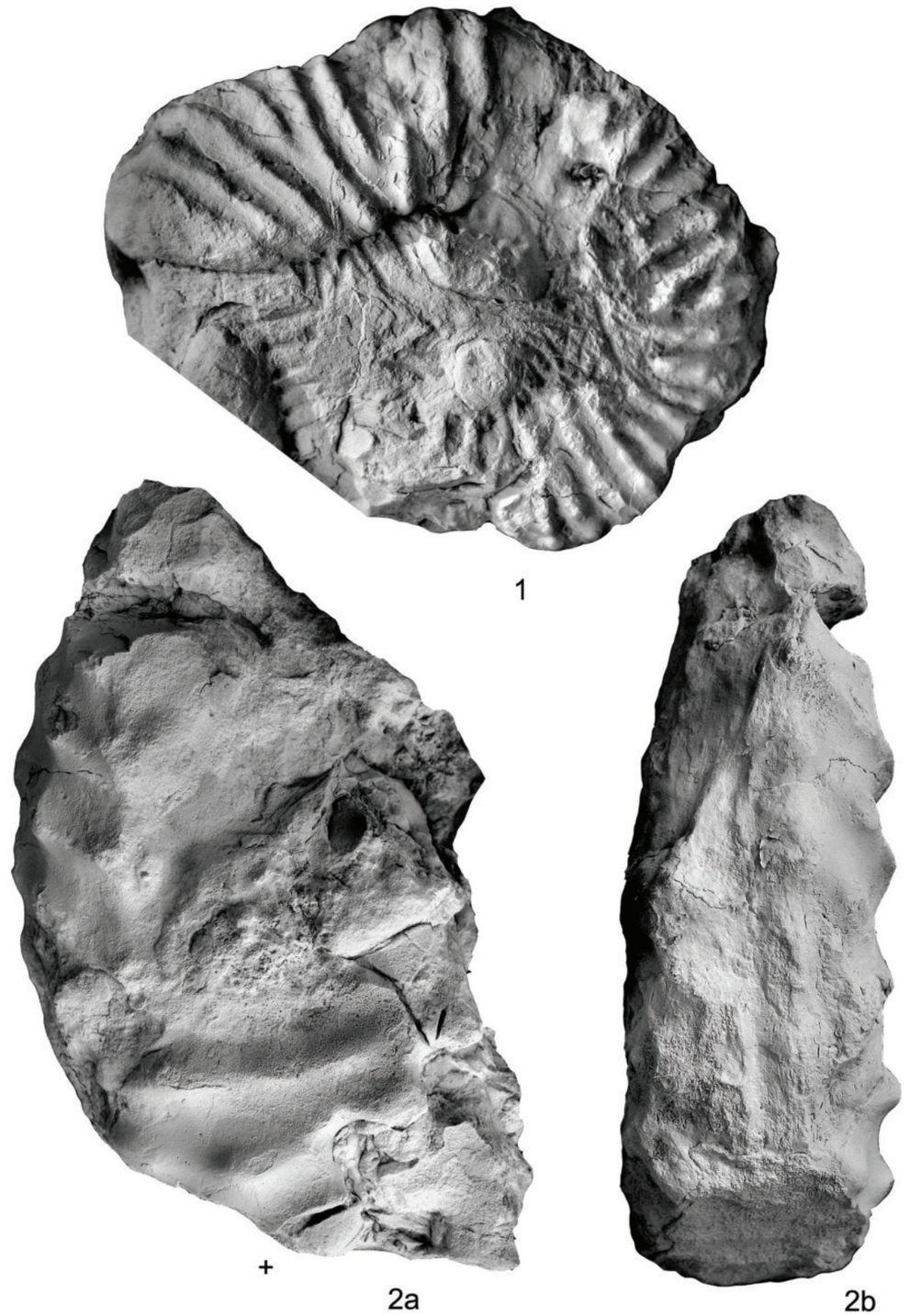


PLATE XV.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by M. + indicates the beginning of the body chamber.



1. *Eoprotrachyceras* cf. *curionii* (MOJSISOVICS, 1882) – M.98.106., Öskü, road cut, loose, Longobardian, Curionii Zone (?); lateral view.
2. *Eoprotrachyceras* cf. *curionii* (MOJSISOVICS, 1882) – M.98.77., Vászoly, Öreg Hill, loose, Longobardian, Curionii Zone (?); a: lateral view, b: ventral view.

PLATE XVI.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by M. and in the private collections of M. Bercsényi (Nyúl, prefixed by BM) and of G. Földvári (Kővágóörs, prefixed by FG). + indicates the beginning of the body chamber.

1. *Eoprotrachyceras* cf. *pseudoarchelaus* (Böckh, 1872) – M.98.90., Nemesvámos, Katrabóca, section II, bed 11, Longobardian, Archelaus Zone; lateral view.
2. *Eoprotrachyceras* cf. *pseudoarchelaus* (Böckh, 1872) – BM-61., Veszprémfajsz, Király Hill, collecting site 2, bed 4(?), Longobardian, Archelaus Zone; lateral view.
3. *Eoprotrachyceras* cf. *pseudoarchelaus* (Böckh, 1872) – M.98.130., Kádárta, loose, Longobardian, Archelaus Zone; lateral view.
4. *Eoprotrachyceras* cf. *pseudoarchelaus* (Böckh, 1872) – FG-2., Balatoncsicsó, Csukrét Gully, loose, Longobardian, Archelaus Zone; lateral view.

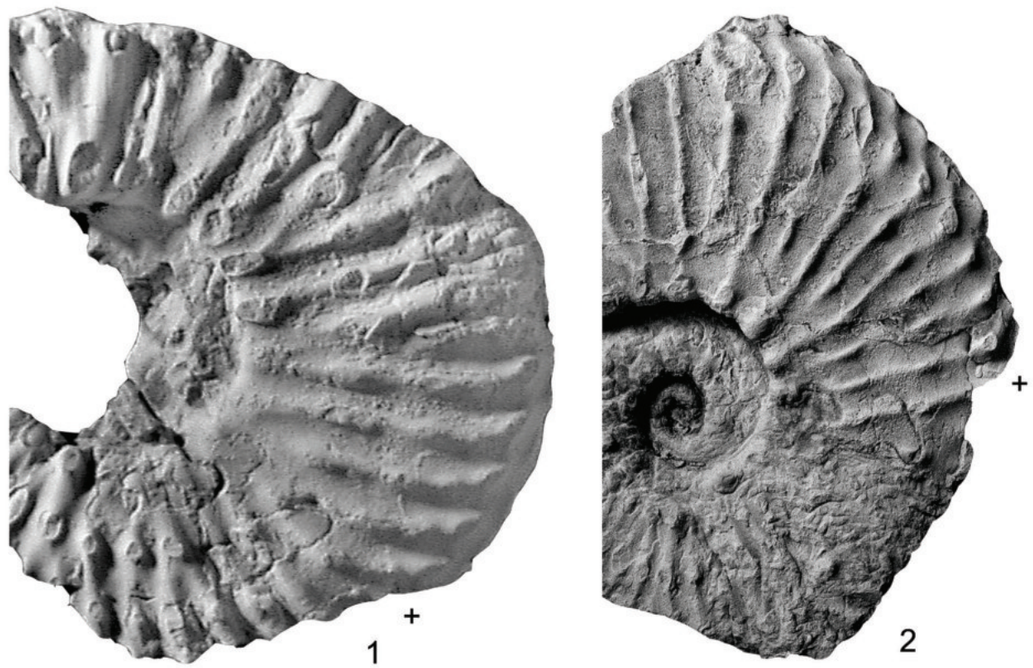
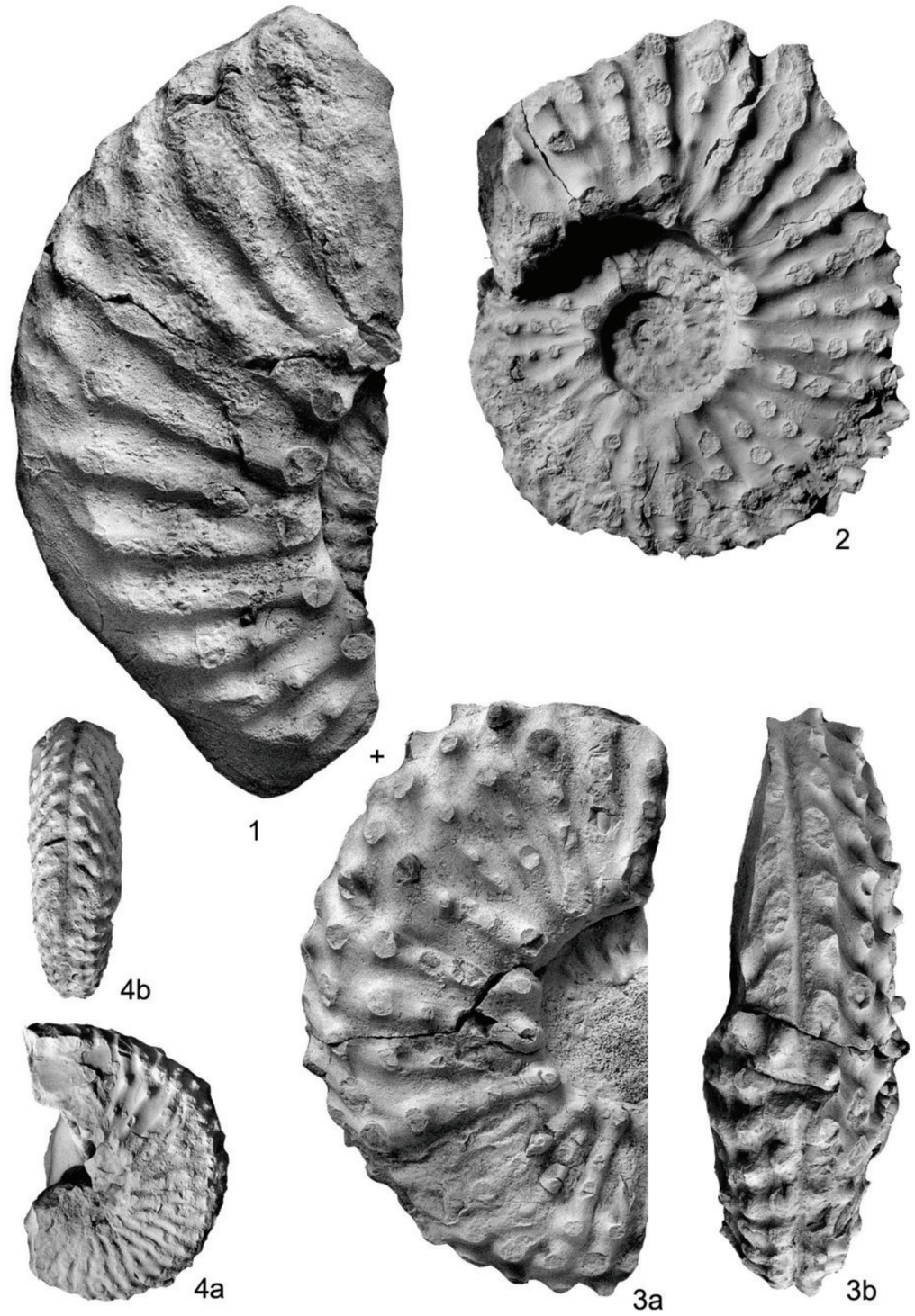


PLATE XVII.

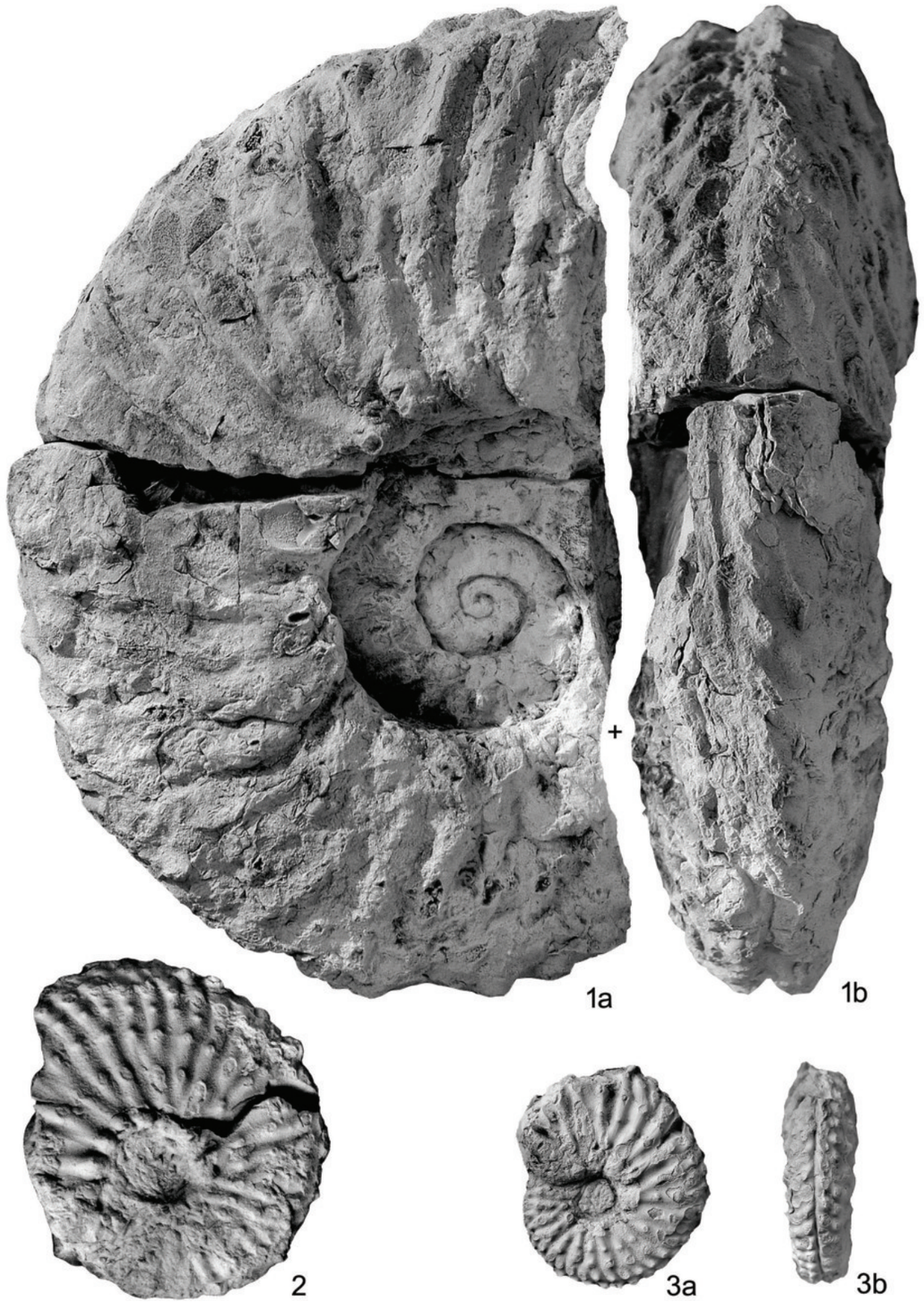
All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by M. and in the private collections of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM). + indicates the beginning of the body chamber.



1. *Protrachyceras archelaus* (LAUBE, 1869) – M.98.102., Nemesvámos, Katrabóca, section II, bed 9 Longobardian, Archelaus Zone; lateral view.
2. *Protrachyceras archelaus* (LAUBE, 1869) – BM-62., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; lateral view.
3. *Protrachyceras archelaus* (LAUBE, 1869) – M.98.144., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
4. *Protrachyceras archelaus* (LAUBE, 1869) – BM-63., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.

PLATE XVIII.

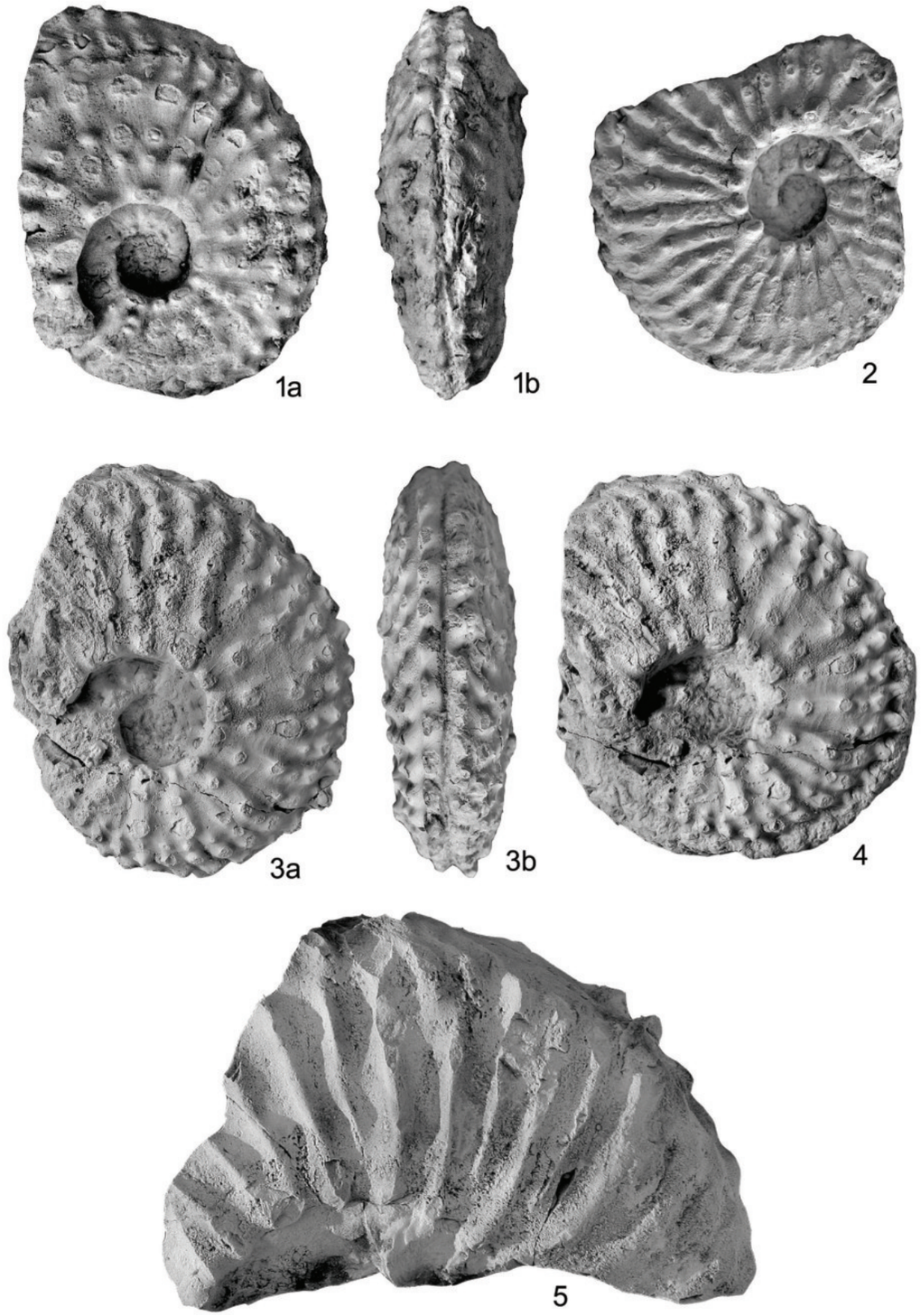
All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM) and Zs. Pintér (Győr, under the inventory numbers prefixed by PZs).



1. *Protrachyceras archelaus* (LAUBE, 1869) – BM-64., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Protrachyceras archelaus* (LAUBE, 1869) – PZs-32., Veszprémfajsz, Király Hill, collecting site 6, bed 4, lateral view.
3. *Protrachyceras archelaus* (LAUBE, 1869) – BM-65., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.

PLATE XIX.

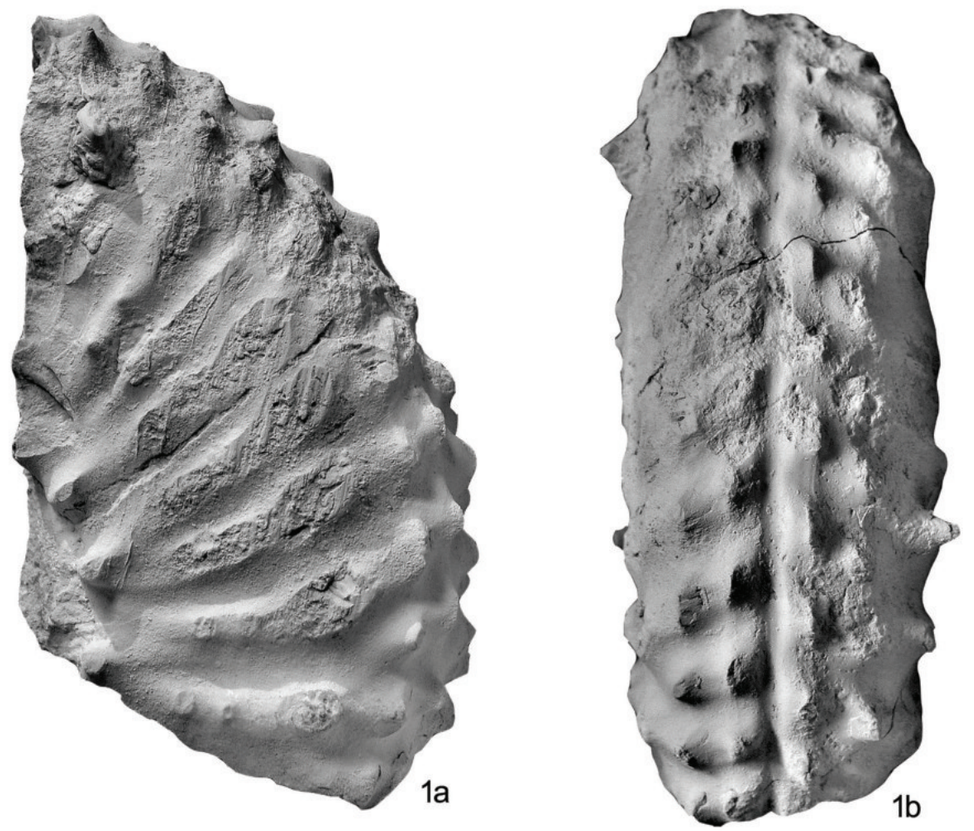
All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM), Zs. Pintér (Győr, under the inventory numbers prefixed by PZs) and I. Szemes (Budapest, under the inventory numbers prefixed by SzI).



1. *Protrachyceras archelaus* (LAUBE, 1869) – PZs-33., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Protrachyceras archelaus* (LAUBE, 1869) – BM-66., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; lateral view.
3. *Protrachyceras archelaus* (LAUBE, 1869) – PZs-34., Veszprémfajsz, Király Hill, collecting site 7, bed (?), Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
4. *Protrachyceras archelaus* (LAUBE, 1869) – PZs-35., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; lateral view.
5. *Protrachyceras archelaus* (LAUBE, 1869) – SzI-2., Balatoncsicsó, Csukrét Gully, loose, Longobardian, Archelaus Zone; lateral view.

PLATE XX.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by INV. + indicates the beginning of the body chamber.



1. *Protrachyceras archelaus* (LAUBE, 1869) – INV 2026.41., Kádárta, quarry, SW-yard, loose, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Protrachyceras archelaus* (LAUBE, 1869) – INV 2026.42., Kádárta, quarry, SW-yard, loose, Longobardian, Archelaus Zone; a: left lateral view, b: ventral view, c: right lateral view.

PLATE XXI.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by M., in the collection of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM) and Zs. Pintér (Győr, under the inventory numbers prefixed by PZs). + indicates the beginning of the body chamber.

1. *Protrachyceras archelaus* (LAUBE, 1869) morphotype *acutus* – M.98.143., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Protrachyceras archelaus* (LAUBE, 1869) morphotype *acutus* – BM-67., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
3. *Protrachyceras archelaus* (LAUBE, 1869) morphotype *acutus* – PZs-36., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.

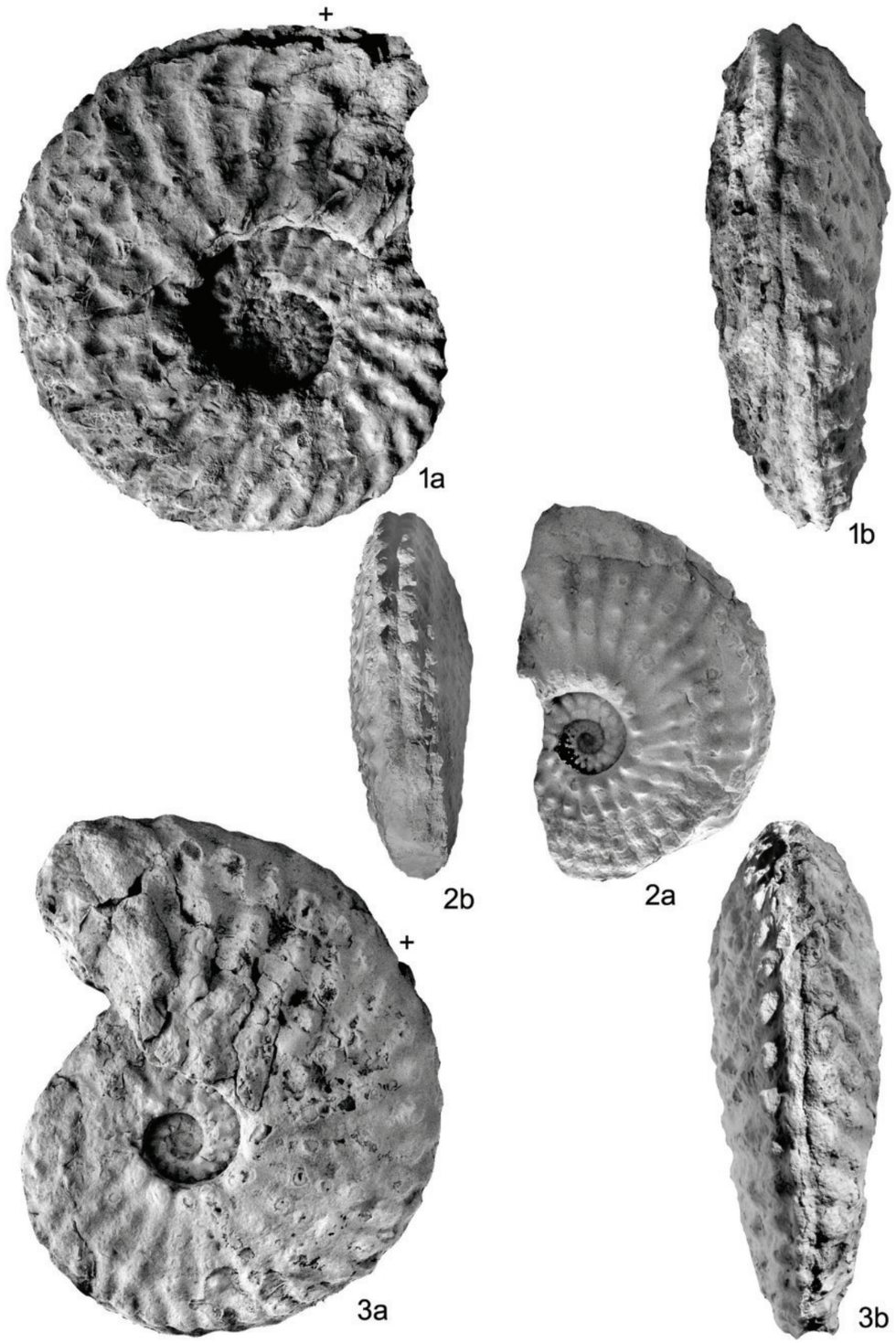


PLATE XXII.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM) and Zs. Pintér (Győr, under the inventory numbers prefixed by PZs).

1. *Protrachyceras archelaus* (LAUBE, 1869) morphotype *acutus* – BM-68., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Protrachyceras archelaus* (LAUBE, 1869) morphotype *acutus* – PZs-37., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; lateral view.
3. *Protrachyceras archelaus* (LAUBE, 1869) morphotype *acutus* – BM-69., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
4. *Protrachyceras ladinum* (MOJSISOVICS, 1869) – BM-70., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; lateral view.
5. *Protrachyceras ladinum* (MOJSISOVICS, 1869) – BM-71., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: apertural view.
6. *Protrachyceras ladinum* (MOJSISOVICS, 1869) – PZs-38., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.

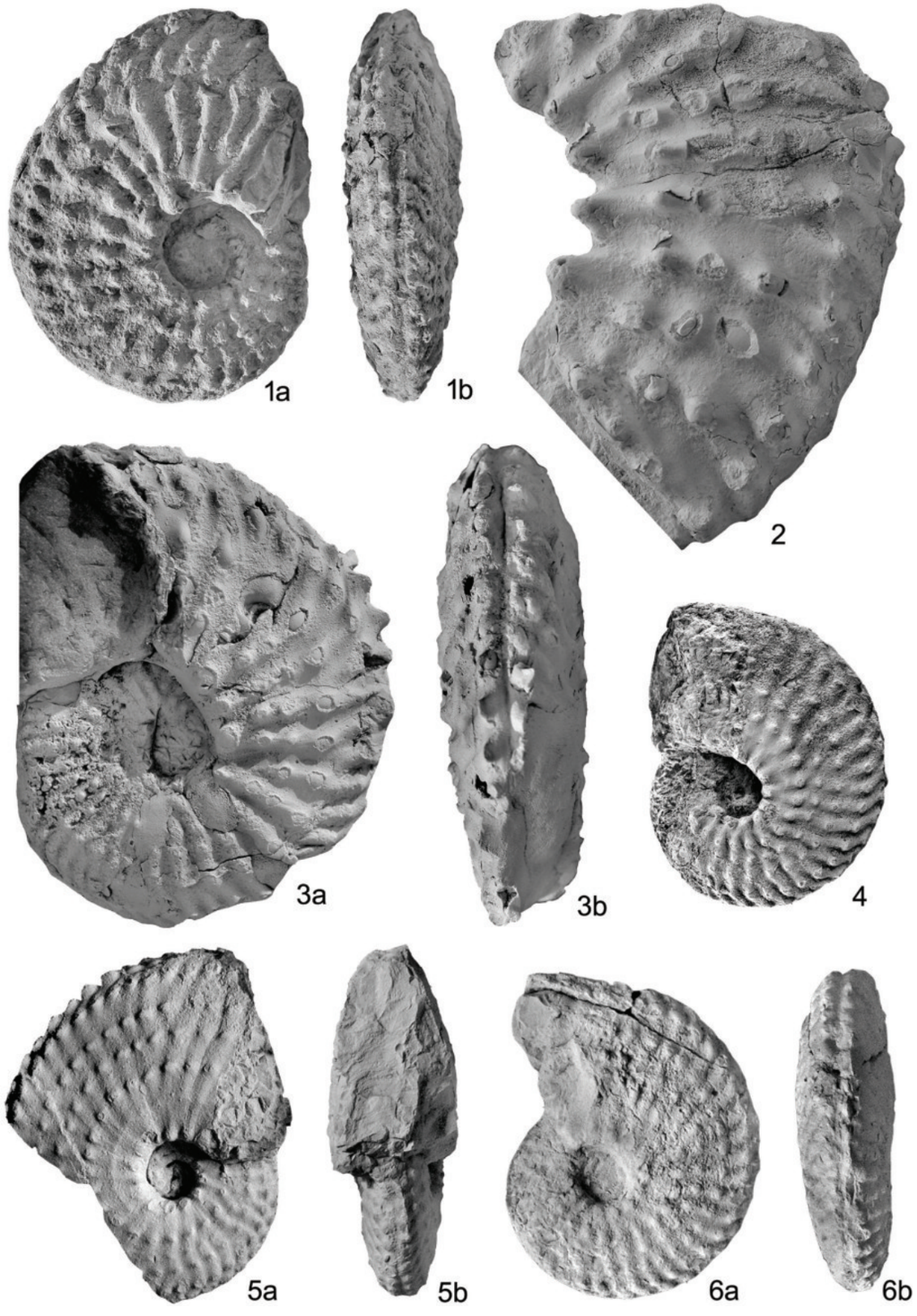
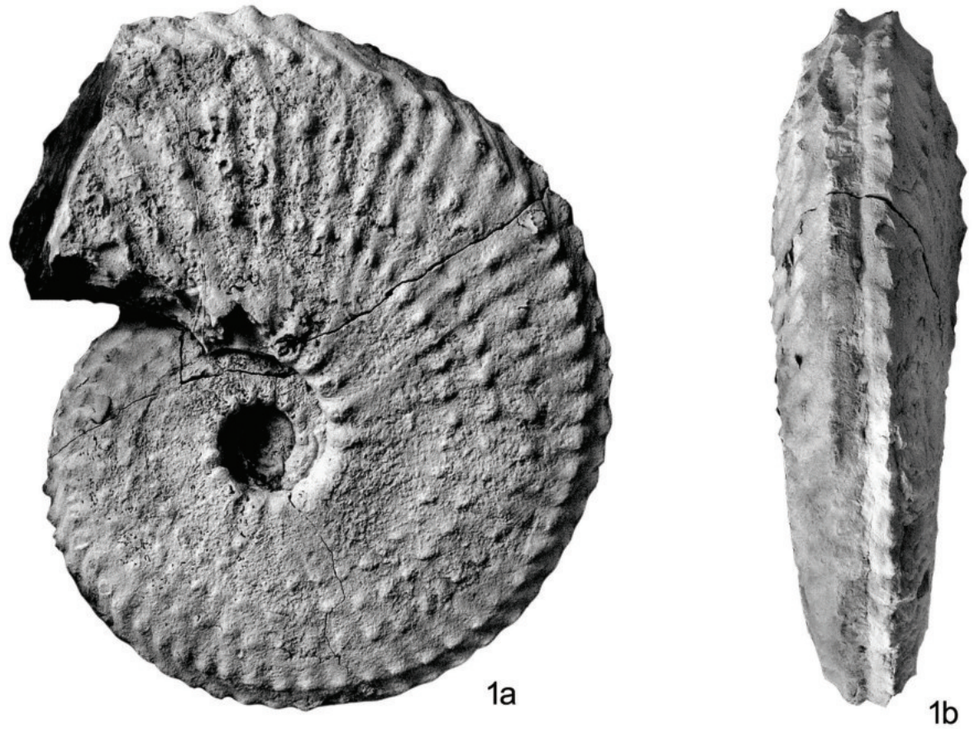


PLATE XXIII.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of Zs. Pintér (Győr, under the inventory numbers prefixed by PZs).



1. *Protrachyceras ladinum* (MOJSISOVICS, 1869) – PZs-39., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Protrachyceras ladinum* (MOJSISOVICS, 1869) – PZs-40., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.

PLATE XXIV.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM) and Zs. Pintér (Győr, under the inventory numbers prefixed by PZs).

1. *Protrachyceras ladinum* (MOJSISOVICS, 1869) – PZs-41., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Protrachyceras ladinum* (MOJSISOVICS, 1869) – BM-72., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; lateral view.
3. *Protrachyceras ladinum* (MOJSISOVICS, 1869) – PZs-42., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; lateral view.
4. *Protrachyceras ladinum* (MOJSISOVICS, 1869) – PZs-43., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; lateral view.
5. *Eoprotrachyceras* ? *gredleri* (MOJSISOVICS, 1882) – BM-73., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
6. *Eoprotrachyceras* ? *gredleri* (MOJSISOVICS, 1882) – BM-74., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.

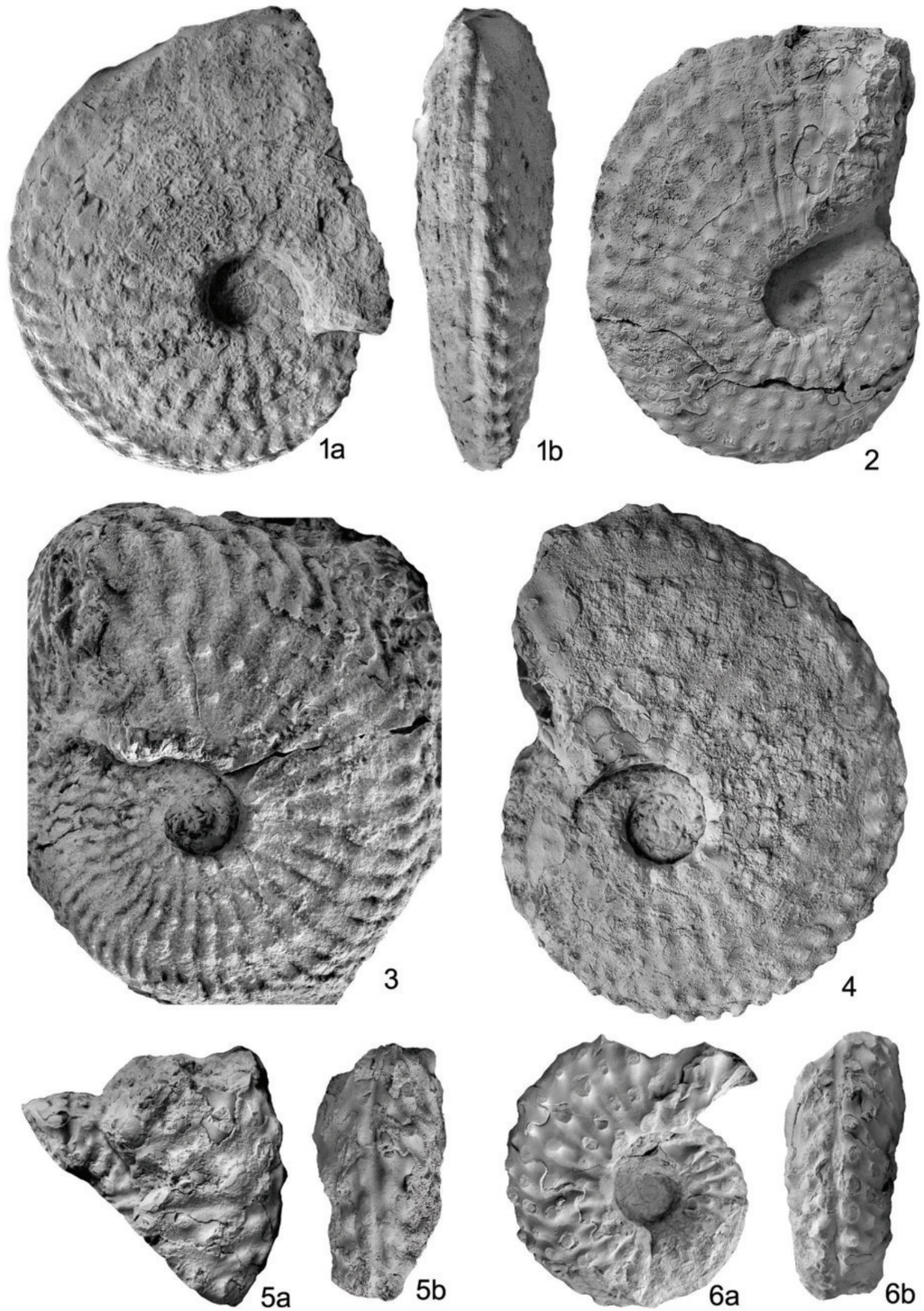


PLATE XXV.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM) and Z. Batka (Budapest, under the inventory numbers prefixed by BZ). + indicates the beginning of the body chamber.

1. *Protrachyceras ladinum* (MOJSISOVICS, 1869) – BM-75., Kádárta, quarry, SW-yard, loose, Longobardian, Archelaus Zone; a: lateral view, b: apertural view.
2. *Protrachyceras ladinum* (MOJSISOVICS, 1869) – BZ-1., Kádárta, quarry, SW-yard, loose, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.

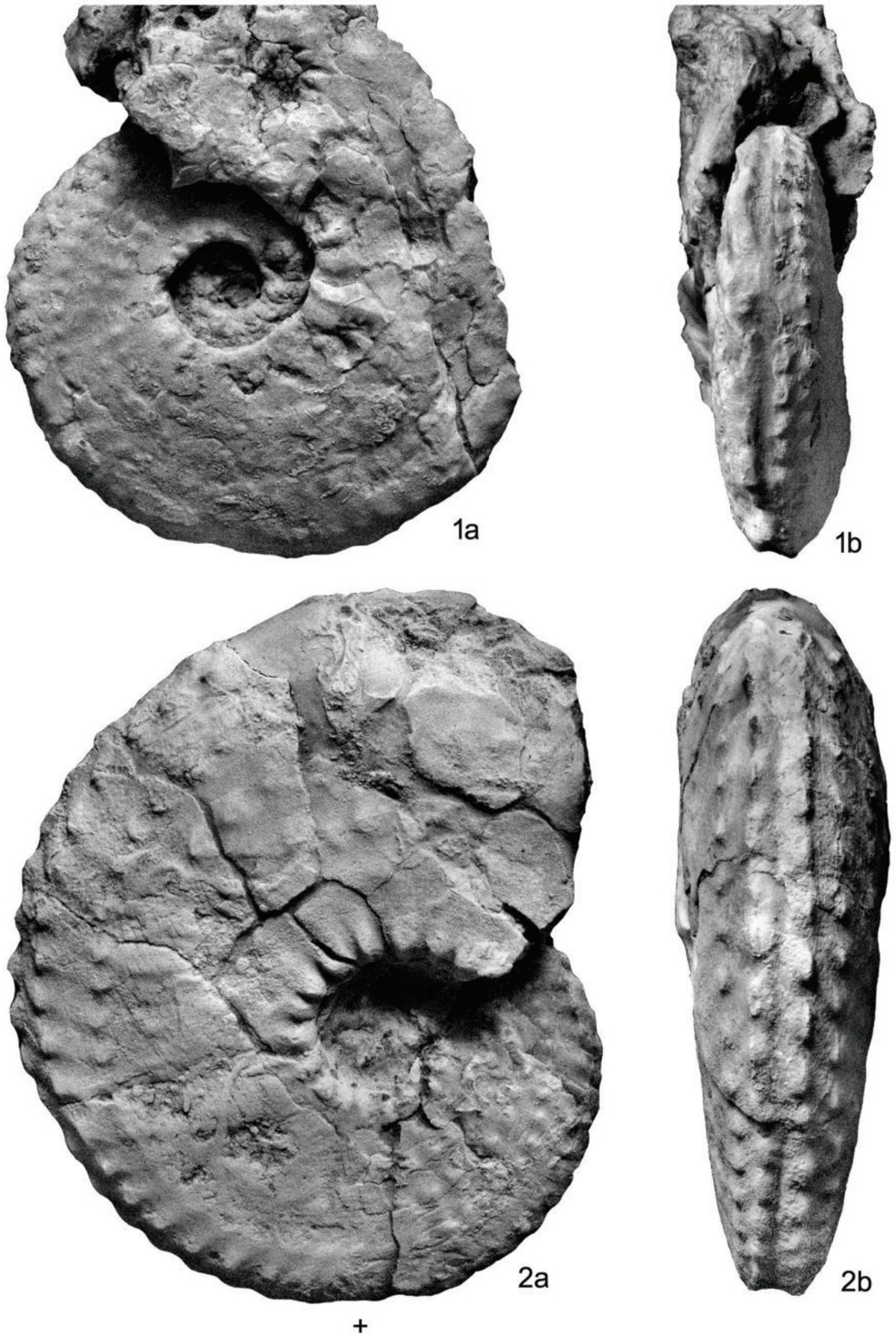


PLATE XXVI.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by M., or INV, and in the collection of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM).

1. *Protrachyceras ladinum* (MOJSISOVICS, 1869) – M.89.14., Pécsely, Meggy Hill, loose, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Protrachyceras ladinum* (MOJSISOVICS, 1869) – INV 2026.43., Hajmáskér, quarry, loose, Longobardian, Archelaus Zone; lateral view.
3. *Protrachyceras longobardicum* (MOJSISOVICS, 1882) – BM-76., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; lateral view.

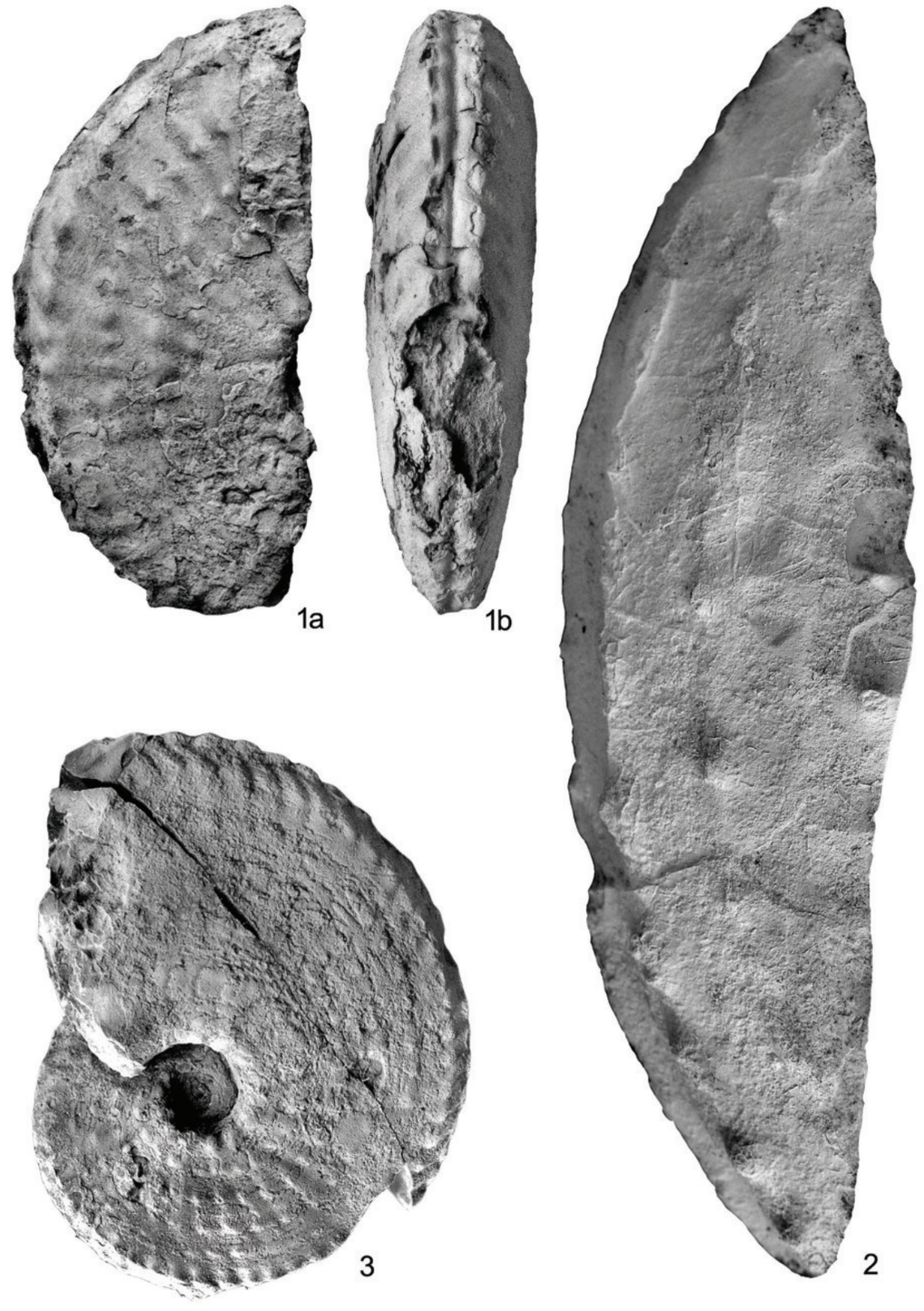
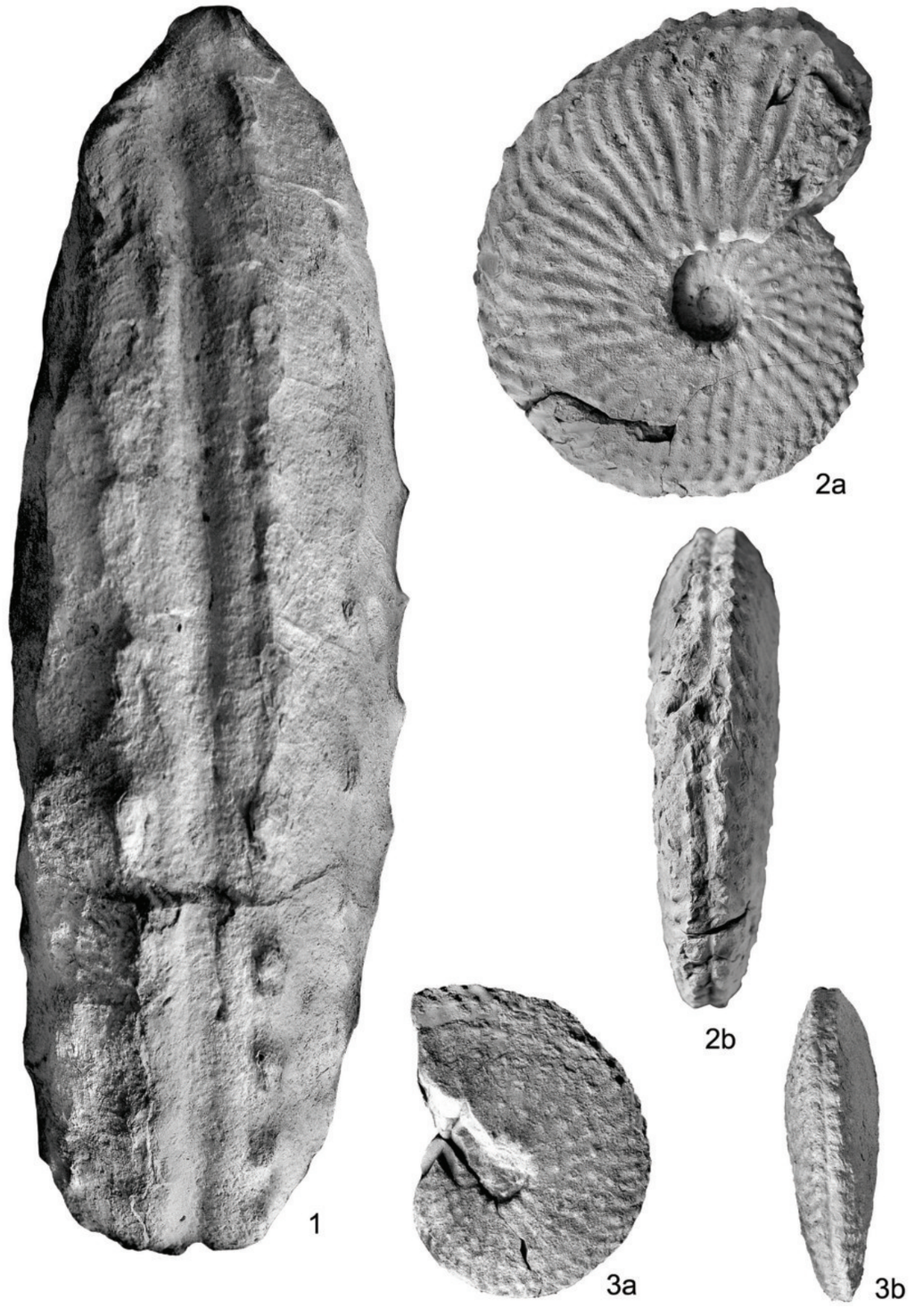


PLATE XXVII.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by M., or INV, and in the collection of Zs. Pintér (Győr, under the inventory numbers prefixed by PZs).



1. *Protrachyceras ladinum* (MOJSISOVICS, 1869) – INV 2026.43., Hajmáskér, quarry, loose, Longobardian, Archelaus Zone; ventral view of the specimen on *Pl. XXVI: 2*.
2. *Protrachyceras longobardicum* (MOJSISOVICS, 1882) – PZs-44., Nemesvámos, Gyűr Hill, loose, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
3. *Protrachyceras longobardicum* (MOJSISOVICS, 1882) – M.98.94., Nemesvámos, Katrabóca, section I, bed 2, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.

PLATE XXVIII.

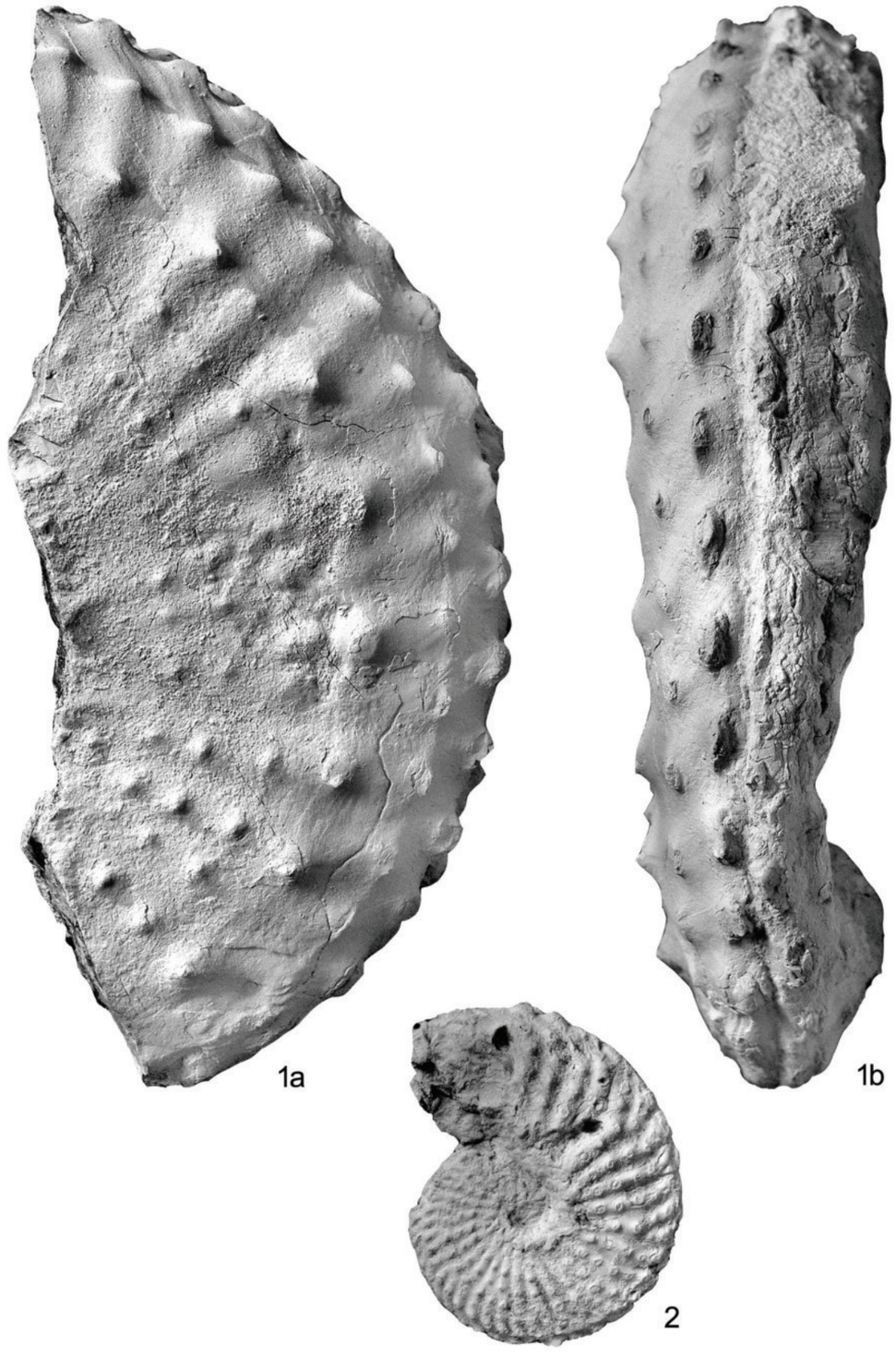
Natural size. Specimen has been coated with ammonium chloride before photography. Specimen is deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by M.



1. *Protrachyceras ladinum* (MOJSISOVICS, 1869) – M.98.12., Litér, quarry, loose, Longobardian, Archelaus Zone; lateral view.

PLATE XXIX.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by INV, and in the collection of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM).



1. *Protrachyceras ladinum* (MOJSISOVICS, 1869) – INV 2026.44., Hajmáskér, road-cut, loose, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Protrachyceras ladinum* (MOJSISOVICS, 1869) – BM-77., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; lateral view.

PLATE XXX.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM) and of Zs. Pintér (Győr, under the inventory numbers prefixed by PZs).

1. *Protrachyceras* cf. *longobardicum* (MOJSISOVICS, 1882) – PZs-45., Veszprémfajsz, Király Hill, collecting site 5, bed 4(?), Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Protrachyceras* cf. *margaritosum* (MOJSISOVICS, 1882) – PZs-46., Veszprémfajsz, Király Hill, loose, Longobardian, Archelaus Zone; lateral view.
3. *Protrachyceras* cf. *longobardicum* (MOJSISOVICS, 1882) – BM-78., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; lateral view.
4. *Protrachyceras margaritosum* (MOJSISOVICS, 1882) – BM-79., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; lateral view.
5. *Protrachyceras* cf. *margaritosum* (MOJSISOVICS, 1882) – BM-80., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; lateral view.

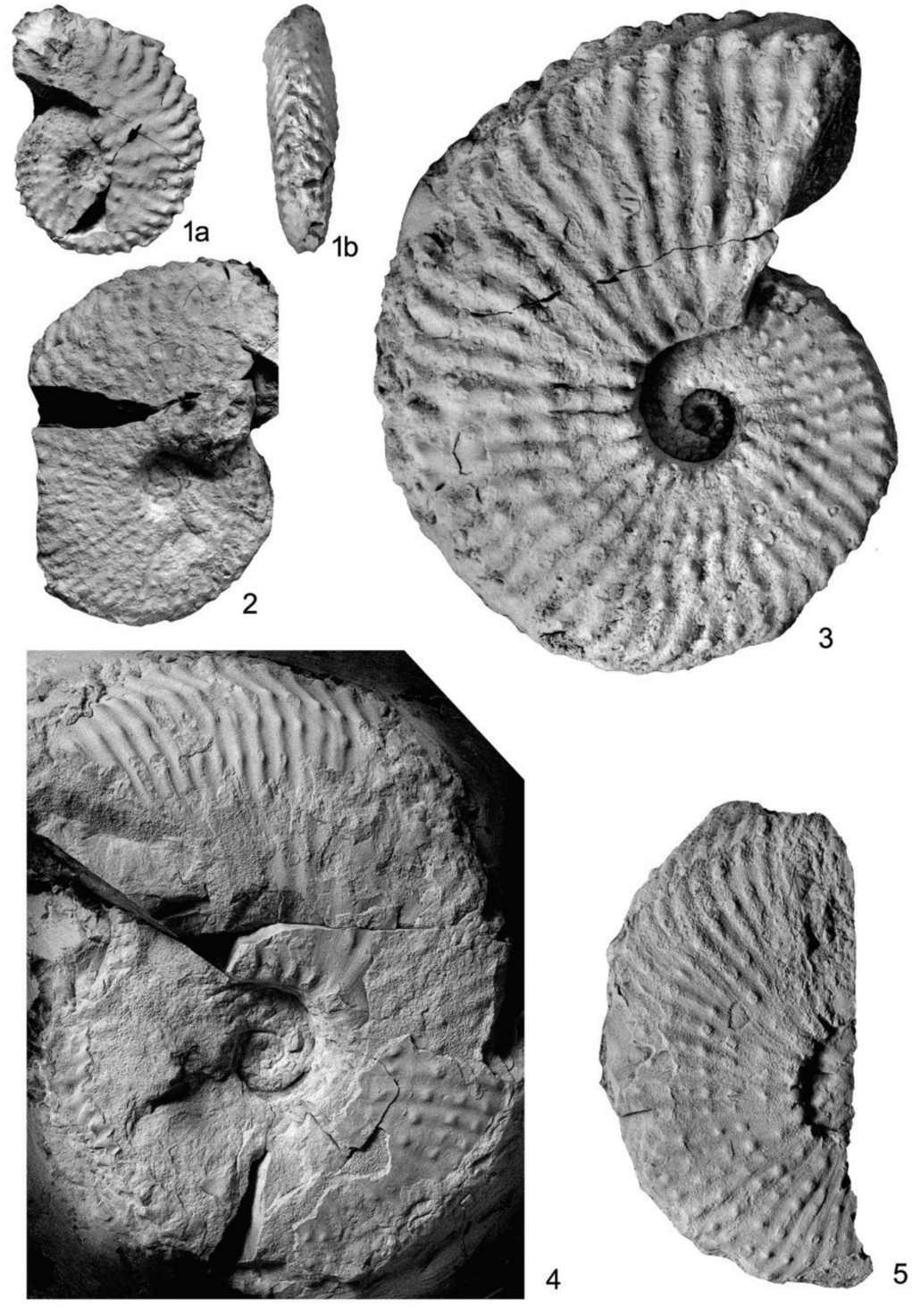


PLATE XXXI.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by M., in the collection of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM) and in the collection of Zs. Pintér (Győr, under the inventory numbers prefixed by PZs). + indicates the beginning of the body chamber.

1. *Eoprotrachyceras* ? cf. *gredleri* (MOJSISOVICS, 1882) – M.89.047., Alsódörgicse, vineyard, loose, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Protrachyceras* cf. *archelaus* (MOJSISOVICS, 1869) – M.98.109., Litér, quarry, loose, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
3. *Eoprotrachyceras* ? cf. *gredleri* (MOJSISOVICS, 1882) – PZs-47., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; lateral view.
4. *Eoprotrachyceras* ? *gredleri* (MOJSISOVICS, 1882) – BM-81., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; lateral view.
5. *Eoprotrachyceras* ? *gredleri* (MOJSISOVICS, 1882) – BM-82., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.

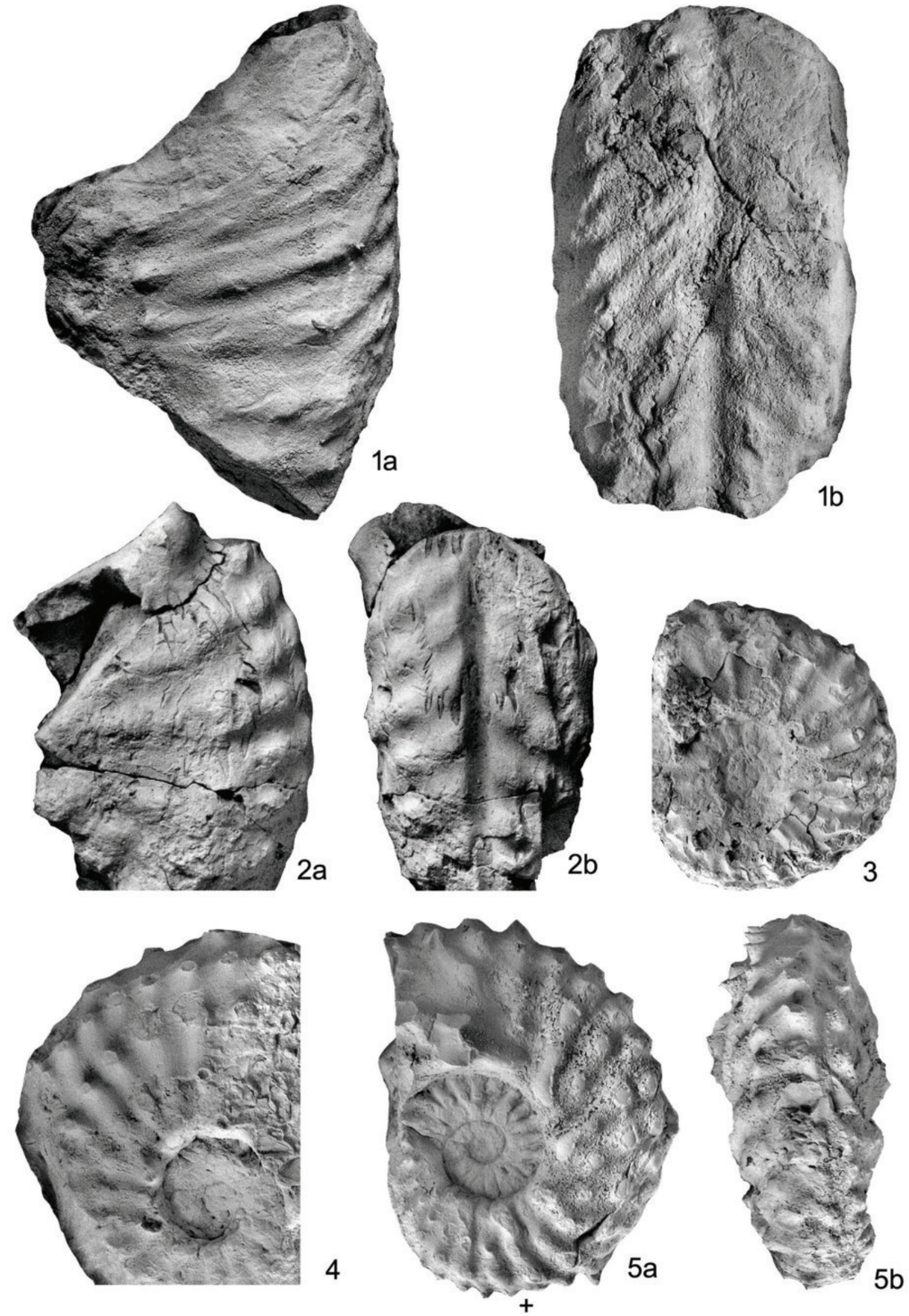


PLATE XXXII.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by M., or INV, in the collection of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM) and in the collection of Zs. Pintér (Győr, under the inventory numbers prefixed by PZs). + indicates the beginning of the body chamber.

1. *Eoprotrachyceras* ? *gredleri* (MOJSISOVICS, 1882) – M.98.96., Nemesvámos, Katrabóca, section I, bed 2, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Eoprotrachyceras* ? cf. *gredleri* (MOJSISOVICS, 1882) – INV 2026.45., Vászoly, Öreg Hill, loose, Longobardian, Archelaus Zone; lateral view.
3. *Protrachyceras steinmanni* (MOJSISOVICS, 1882) – BM-83., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; lateral view.
4. *Protrachyceras steinmanni* (MOJSISOVICS, 1882) – BM-85., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
5. *Protrachyceras steinmanni* (MOJSISOVICS, 1882) – BM-84., Veszprémfajsz, Király HillI, collecting site 6, bed 4, Longobardian, Archelaus Zone; lateral view.
6. *Protrachyceras steinmanni* (MOJSISOVICS, 1882) – PZs-48., Veszprémfajsz, Király HillI, collecting site 6, bed 4, Longobardian, Archelaus Zone; lateral view.
7. *Protrachyceras irregulare* FANTINI SESTINI, 1994 – PZs-49., Veszprémfajsz, Király HillI, collecting site 2, bed 4, Longobardian, Archelaus Zone; lateral view.
8. *Protrachyceras* cf. *laevior* (FRECH, 1903) – PZs-50., Veszprémfajsz, Király HillI, collecting site 6, bed 4, Longobardian, Archelaus Zone; lateral view.
9. *Protrachyceras* ? cf. *neumayri* (MOJSISOVICS, 1869) – INV 2026.46., Hajmáskér, quarry, loose, Longobardian, Archelaus Zone; lateral view.

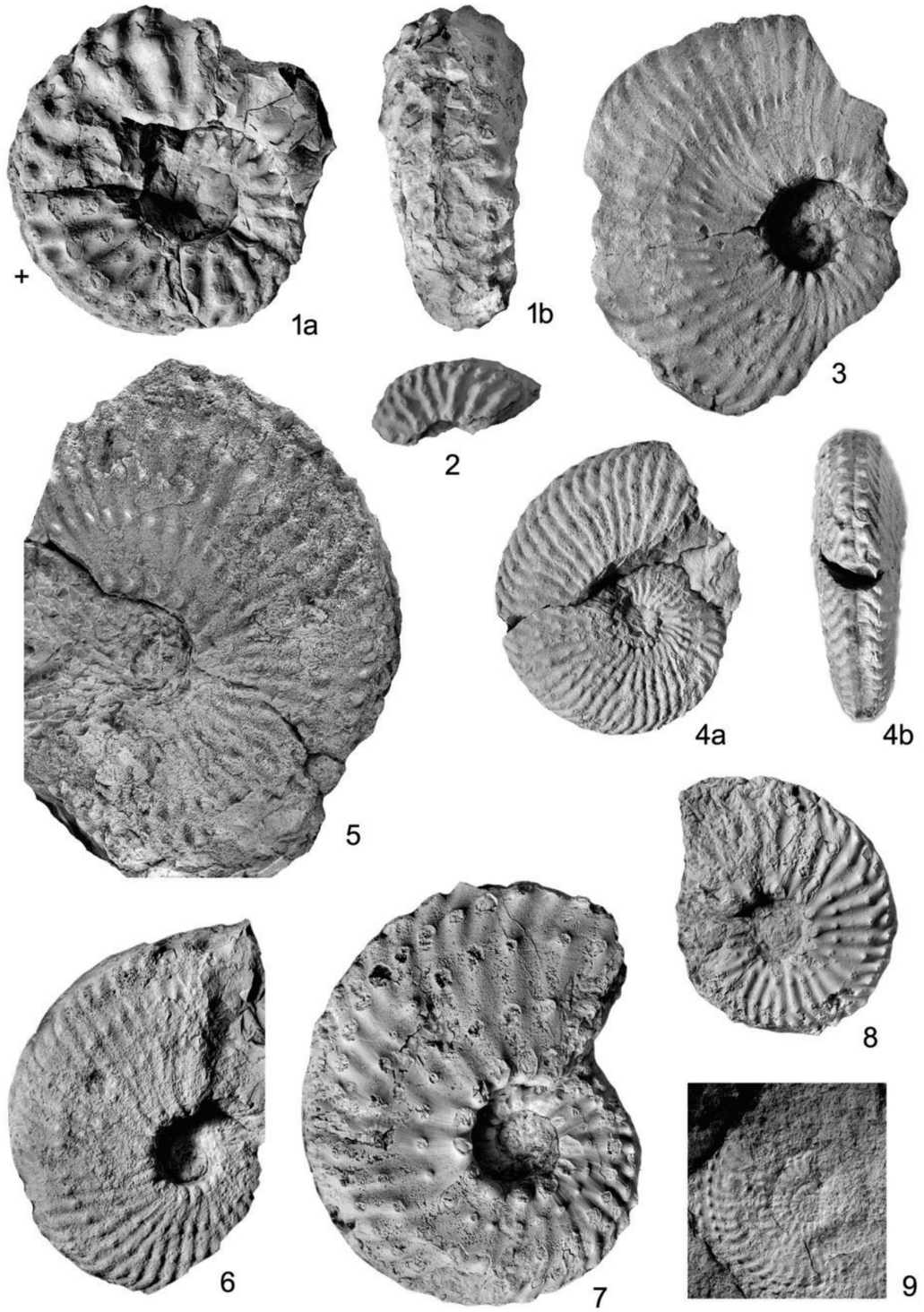


PLATE XXXIII.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by M. or INV and in the private collections of M. Bercsényi (Nyúl, prefixed by BM). + indicates the beginning of the body chamber.

1. *Katrabocaites laczkoi* (DIENER, 1899) – M.98.139., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view, c: apertural view.
2. *Katrabocaites laczkoi* (DIENER, 1899) – INV 2026.47., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: apertural view.
3. *Katrabocaites laczkoi* (DIENER, 1899) – INV 2026.48., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; lateral view.
4. *Katrabocaites laczkoi* (DIENER, 1899) – INV 2026.49., Öskü, road-cut, Longobardian, Recubariensis Zone(?); lateral view.
5. *Katrabocaites laczkoi* (DIENER, 1899) morphotype *nodosus* – BM-86., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; lateral view.
6. *Katrabocaites laczkoi* (DIENER, 1899) morphotype *nodosus* – BM-87., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.

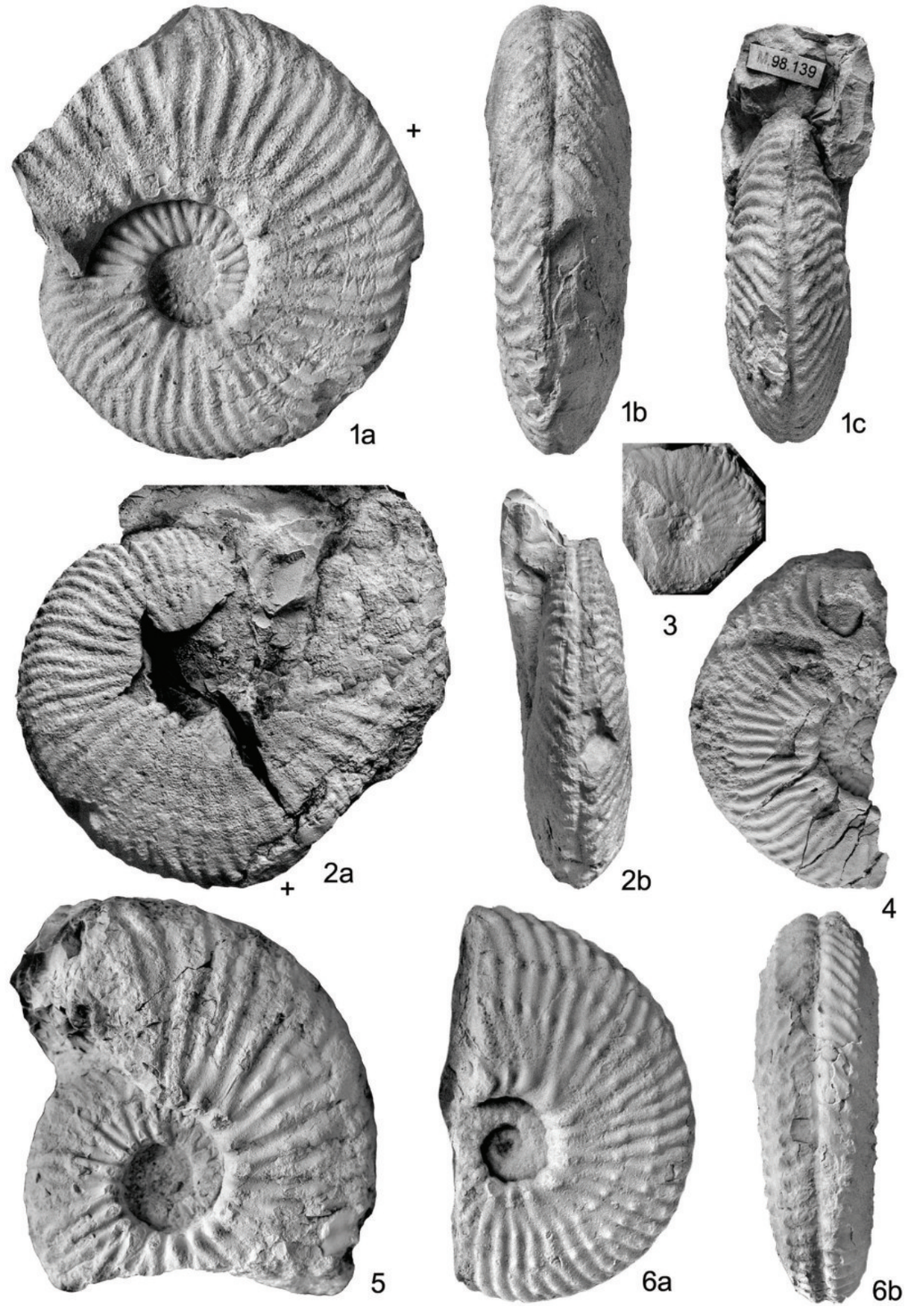


PLATE XXXIV.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the private collections of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM) and Zs. Pintér (Győr, under the inventory numbers prefixed by PZs). + indicates the beginning of the body chamber.

1. *Katrabocaites laczkoi* (DIENER, 1899) morphotype *nodosus* – BM-88., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Katrabocaites laczkoi* (DIENER, 1899) morphotype *nodosus* – PZs-51., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
3. *Katrabocaites laczkoi* (DIENER, 1899) morphotype *nodosus* – PZs-52., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.

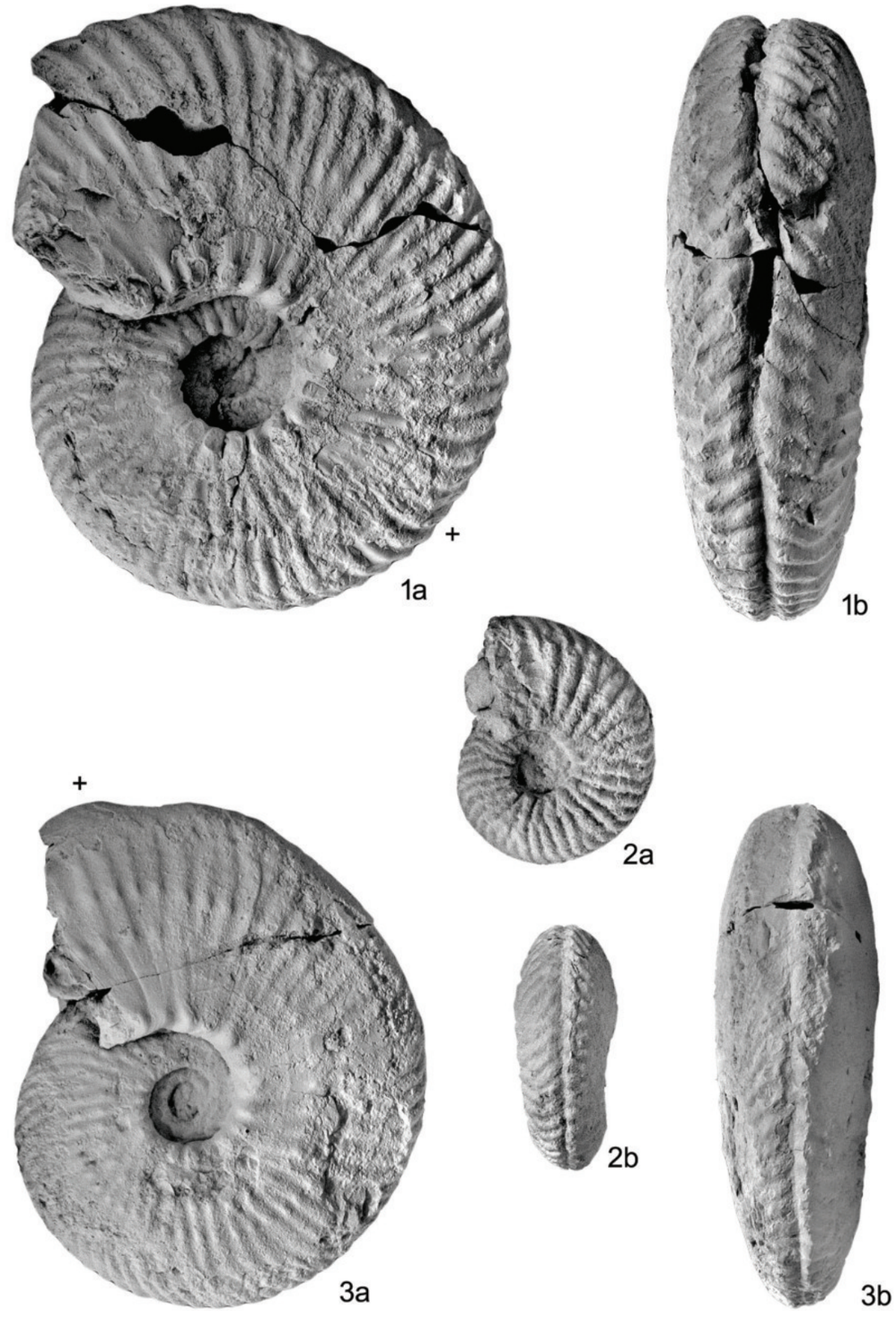


PLATE XXXV.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by PAL, and in the private collections of M. Bercsényi (Nyúl, prefixed by BM). + indicates the beginning of the body chamber.

1. *Katrabocaites laczkoi* (DIENER, 1899) morphotype *nodosus* – BM-89., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Katrabocaites miettoi* n. sp. – holotype, PAL 2026.31.1., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; a: lateral view, b: apertural view, c: ventral view.
3. *Katrabocaites miettoi* n. sp. – BM-91., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
4. *Katrabocaites miettoi* n. sp. – BM-90., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.

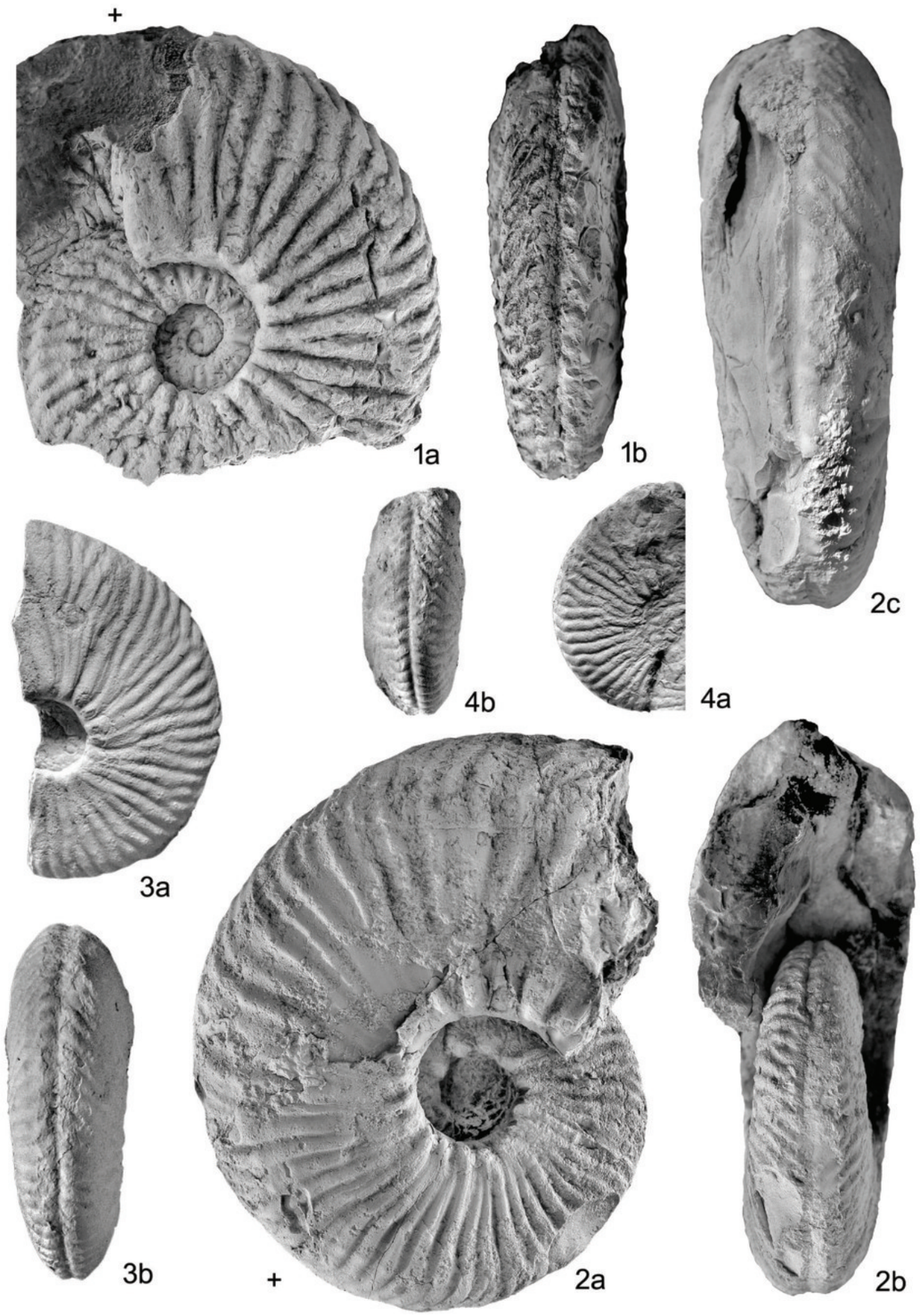


PLATE XXXVI.

All figures are in natural size, unless otherwise stated. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by PAL, or M. and in the private collections of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM). + indicates the beginning of the body chamber.

1. *Katrabocaites manfrini* n. sp. – holotype, PAL 2026.32.1., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; a: lateral view, b: ventral view, c: detail of lateral view, magnified 2x.
2. *Katrabocaites laczkoi* (DIENER, 1899)– BM-92., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; lateral view.
3. *Katrabocaites laczkoi* (DIENER, 1899) morphotype *nodosus* – M.98.140., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; lateral view.
4. *Katrabocaites laczkoi* (DIENER, 1899) morphotype *nodosus* – BM-93., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; lateral view.
5. *Celtites epolensis* MOJSISOVICS, 1882 – M.89.16., Pécsely, Meggy Hill, loose, Longobardian, Archelaus Zone; lateral view.
6. *Celtites epolensis* MOJSISOVICS, 1882 – M.98.119., Hajmáskér, quarry, loose, Longobardian, Archelaus Zone; lateral view.
7. *Monophyllites wengensis* (KLIPSTEIN, 1843) – M.98.97., Nemesvámos, Katrabóca, section I, bed 3, Longobardian, Archelaus Zone; lateral view.

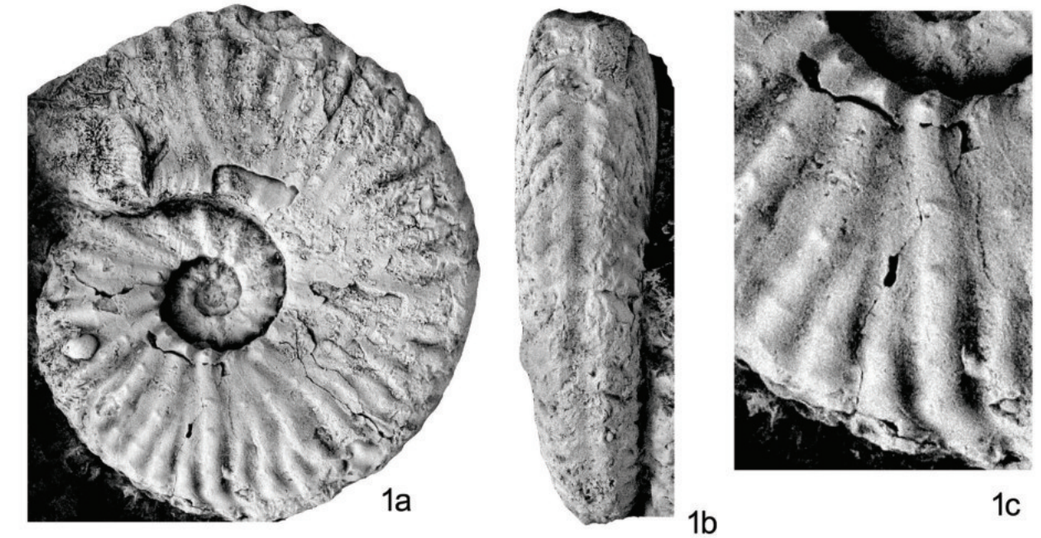


PLATE XXXVII.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the private collections of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM), Zs. Pintér (Győr, under the inventory numbers prefixed by PZs) and I. Szemes (Budapest, under the inventory numbers prefixed by SzI). + indicates the beginning of the body chamber.

1. *Monophyllites wengensis* (KLIPSTEIN, 1843) – BM-94., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; lateral view.
2. *Monophyllites wengensis* (KLIPSTEIN, 1843) – BM-95., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
3. *Monophyllites wengensis* (KLIPSTEIN, 1843) – PZs-53., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; lateral view.
4. *Monophyllites wengensis* (KLIPSTEIN, 1843) – BM-96., Veszprémfajsz, Király Hill, collecting site 6, bed 4, Longobardian, Archelaus Zone; a: lateral view, b: apertural view.
5. *Monophyllites wengensis* (KLIPSTEIN, 1843) – SzI-3., Balatoncsicsó, Csukrét Gully, loose, Longobardian, Archelaus Zone; lateral view.
6. *Monophyllites wengensis* (KLIPSTEIN, 1843) – PZs-54., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; lateral view.

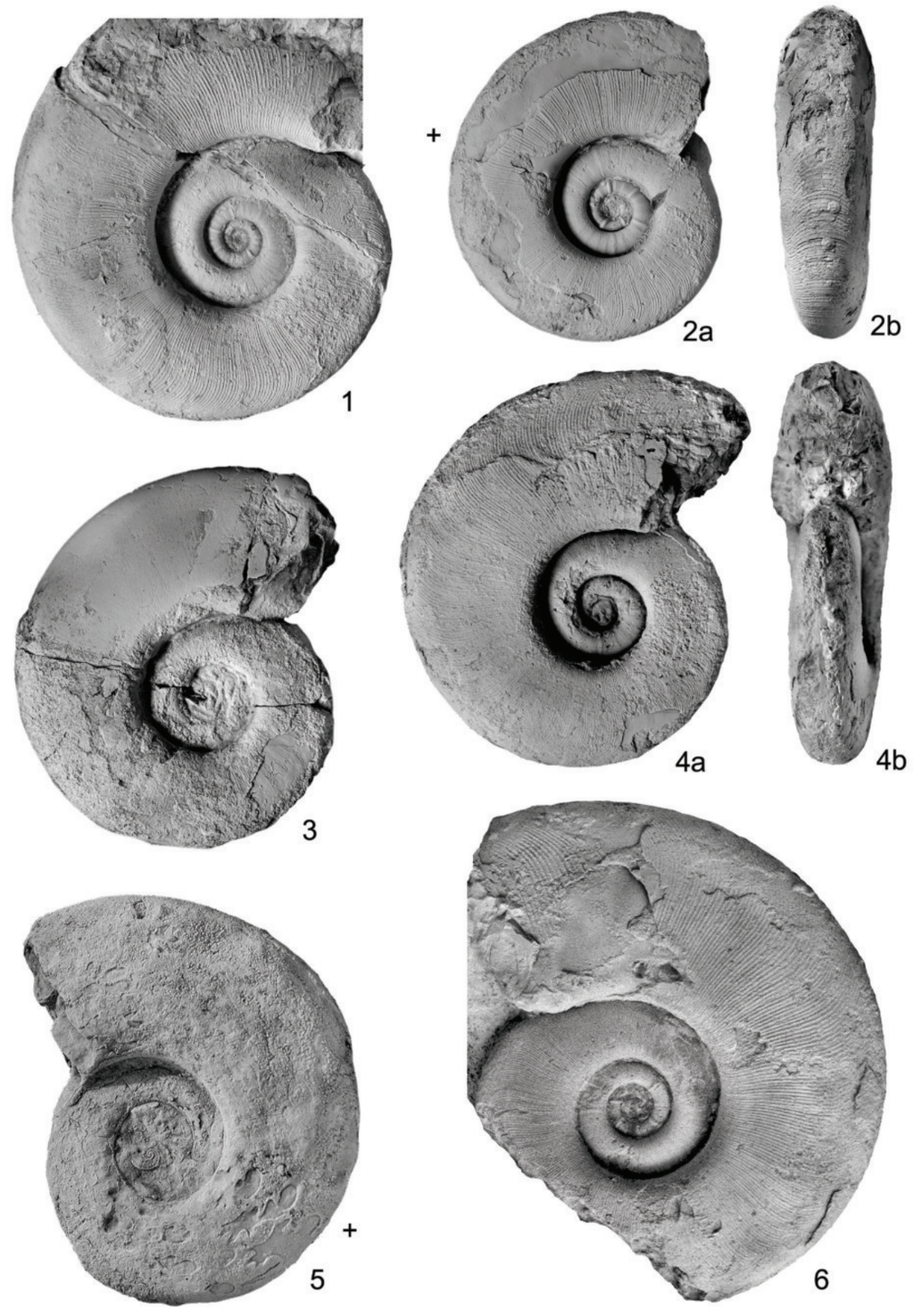


PLATE XXXVIII.

All figures are in natural size unless otherwise stated. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by INV and in the private collections of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM) and Zs. Pintér (Győr, under the inventory numbers prefixed by PZs).



1. *Epigymnites* cf. *moelleri* (MOJSISOVICS, 1882) – INV 2026.52., Nemesvámos, Katrabóca, section II, bed 8, Longobardian, Archelaus Zone; lateral view.
2. *Epigymnites* cf. *moelleri* (MOJSISOVICS, 1882) – BM-97., Nemesvámos, Katrabóca, section II, bed 9, Longobardian, Archelaus Zone; lateral view, reduced 0.8x.
3. *Epigymnites* cf. *moelleri* (MOJSISOVICS, 1882) – INV 2026.51., Nemesvámos, Katrabóca, section II, bed 8, Longobardian, Archelaus Zone; lateral view.
4. *Epigymnites* cf. *ecki* (MOJSISOVICS, 1882) – PZs-55., Balatoncsicsó, Csukrét Gully, loose, Longobardian, Archelaus Zone; lateral view.

PLATE XXXIX.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by PAL or M. and in the private collections of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM), Zs. Pintér (Győr, under the inventory numbers prefixed by PZs) and G. Földvári (Kővágóörs, prefixed by FG). + indicates the beginning of the body chamber.

1. *Joannites* cf. *joannisaustriae* (KLIPSTEIN, 1843) – M.89.15., Pécsely, Meggy Hill, loose, Longobardian, Archelaus Zone; a: left lateral view, b: apertural view, c: right lateral view.
2. *Arpadites telleri* MOJSISOVICS, 1882 – BM-98., Veszprémfajsz, Király Hill, collecting site 2, bed 4, Longobardian, Archelaus Zone; lateral view.
3. *Arpadites bercsenyii* VÖRÖS, 2025 – BM-99., Veszprémfajsz, Király Hill, collecting site 2, bed 4, Longobardian, Archelaus Zone; a: left lateral view, b: ventral view, c: right lateral view.
4. *Arpadites telleri* MOJSISOVICS, 1882 – FG-1., Balatoncsicsó, Csukrét Gully, loose, Longobardian, Archelaus Zone; lateral view.
5. *Stenarpadites pinteri* n. sp. – holotype, PAL 2026.27.1., Veszprémfajsz, Király Hill, collecting site 2, bed 5a, Longobardian, Archelaus Zone; lateral view.
6. *Stenarpadites pinteri* n. sp. – M.98.76., Szentkirályszabadja, Cserhalompuszta, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
7. *Stenarpadites pinteri* n. sp. – PZs-56., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; lateral view.
8. *Stenarpadites pinteri* n. sp. – BM-100., Veszprémfajsz, Király Hill, collecting site 2, bed 4, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
9. *Argolites arpaditoides* (MOJSISOVICS, 1882) – BM-101., Veszprémfajsz, Király Hill, collecting site 2, bed 4, Longobardian, Archelaus Zone; lateral view.

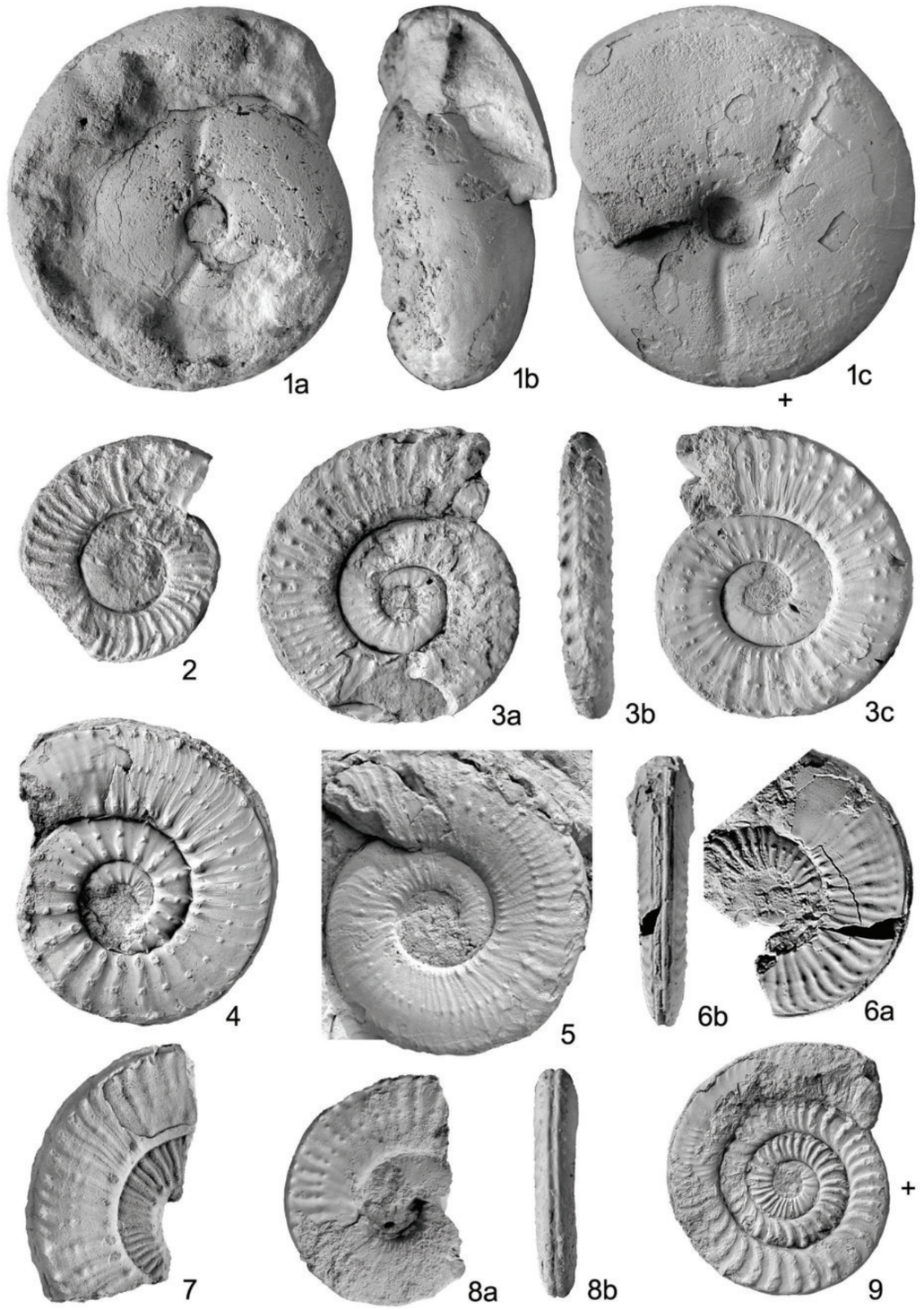
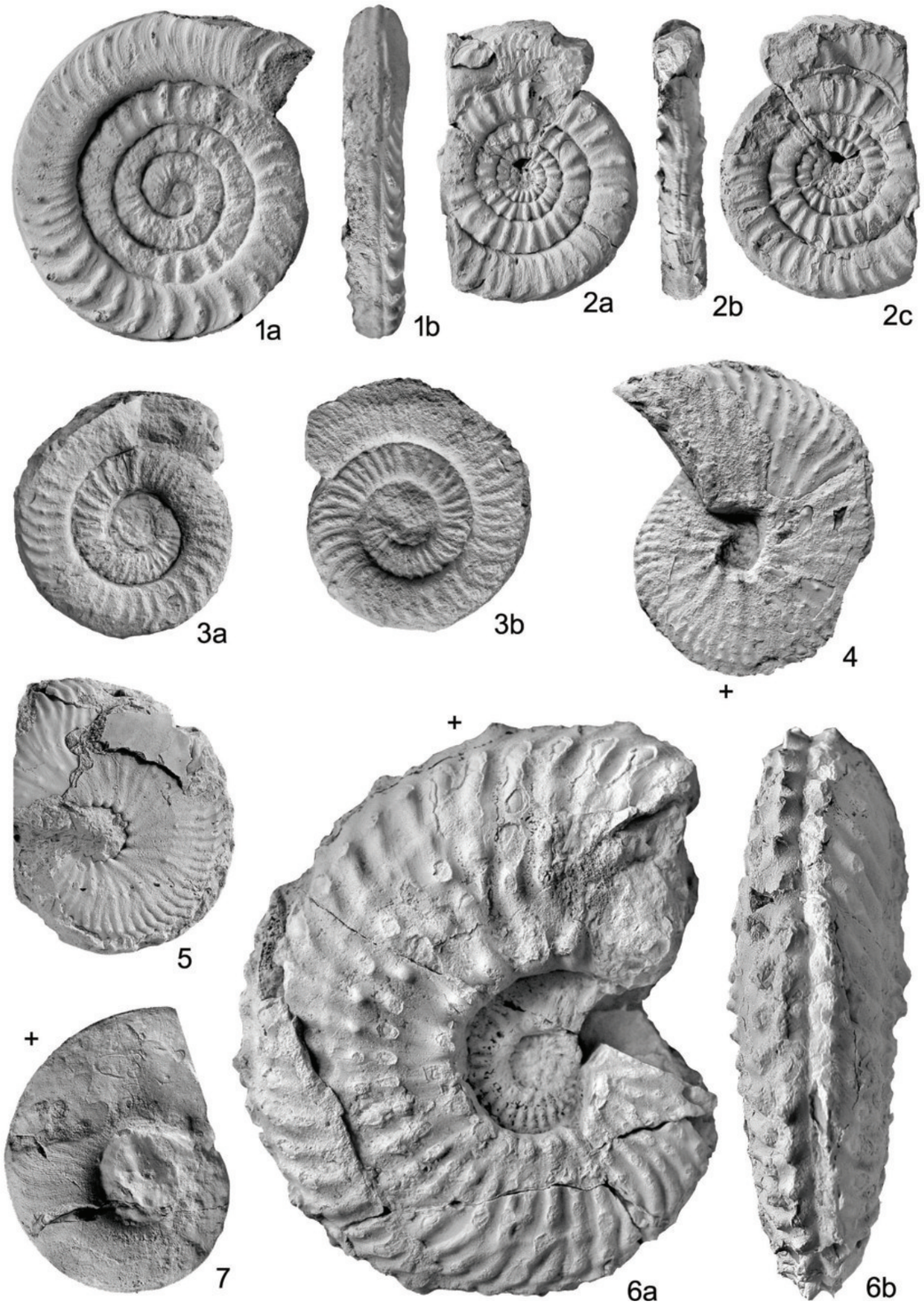


PLATE XL.

All figures are in natural size. Specimens have been coated with ammonium chloride before photography. Specimens are deposited in the collection of the Department of Paleontology and Geology, Hungarian Natural History Museum (Budapest), under the inventory numbers prefixed by INV and in the private collections of M. Bercsényi (Nyúl, under the inventory numbers prefixed by BM) and Zs. Pintér (Győr, under the inventory numbers prefixed by PZs). + indicates the beginning of the body chamber.

1. *Argolites arpaditoides* (MOJSISOVICS, 1882) – BM-102., Veszprémfajsz, Király Hill, collecting site 2, bed 4, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
2. *Argolites arpaditoides* (MOJSISOVICS, 1882) – BM-103., Veszprémfajsz, Király Hill, collecting site 2, bed 5a, Longobardian, Archelaus Zone; a: left lateral view, b: apertural view, c: right lateral view.
3. *Argolites nodosus* VÖRÖS, 2025 – BM-104., Veszprémfajsz, Király Hill, collecting site 2, bed 5a, Longobardian, Archelaus Zone; a: left lateral view, b: right lateral view.
4. *Bercsenyiites egregius* n. sp. – BM-105., Veszprémfajsz, Király Hill, collecting site 2, bed 4, Longobardian, Archelaus Zone; lateral view.
5. *Bercsenyiites montisregis* (VÖRÖS, 2025) – BM-106., Veszprémfajsz, Király Hill, collecting site 6, bed 5a, Longobardian, Archelaus Zone; lateral view.
6. *Protrachyceras archelaus* (LAUBE, 1869) – PZs-57., Veszprémfajsz, Király Hill, collecting site 2, bed 4, Longobardian, Archelaus Zone; a: lateral view, b: ventral view.
7. *Monophyllites wengensis* (KLIPSTEIN, 1843) – INV 2026.53., Nemesvámos, Gyűr Hill, collecting site 1, Longobardian, Archelaus Zone; lateral view.



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