

## Tmetoceratidae (Ammonitina) fauna from the Gerecse Mts (Hungary)

Zoltán Kovács  
Department of Pedagogy  
Liszt Ferenc University, Budapest

Taxonomic and stratigraphic problems of the family Tmetoceratidae and the genera *Dumortieria*, *Catulloceras*, *Cotteswoldia*, *Pleydellia* and *Tmetoceras* included in it are briefly discussed. Fifteen species of Tmetoceratidae are described and illustrated from the Upper Toarcian–Aalenian ammonite assemblages of the Gerecse Mts (NE Transdanubian Range, Hungary). The fauna described here is closely allied to the Mediterranean Province of the Mediterranean-Caucasian Realm.

Key words: Toarcian, Aalenian, Jurassic, Tmetoceratidae, Ammonitina, Gerecse Mts, Hungary

### *Introduction*

This paper offers a detailed taxonomic treatment of the genera *Dumortieria*, *Catulloceras*, *Cotteswoldia*, *Pleydellia* and *Tmetoceras* from the ammonite assemblages of the Gerecse Mts, as a contribution of the comprehensive treatment of the Toarcian–Aalenian ammonite material deposited in the Natural History Museum of the Faculty of Science of Eötvös Loránd University, Budapest. The material was collected from different localities of the Gerecse Mts (Fig. 1) by the staff of the Geological Institute of Hungary between 1976 and 1982. The first taxonomic, quantitative and paleobiogeographic analyses were provided by Géczy (1984, 1985). The Middle Toarcian Ammonitina fauna and biostratigraphy were presented in detail by Géczy and Sente (2007), whereas the taxonomy and biostratigraphy of Upper Toarcian–Aalenian assemblages were dealt with by Kovács and Géczy (2008) and Kovács (2009, 2010).

Address: Z. Kovács: H-1076 Budapest, Liszt Ferenc tér 8, Hungary  
e-mail: kzkovacsoltan@gmail.com

Received: February 18, 2011; accepted: March 29, 2011

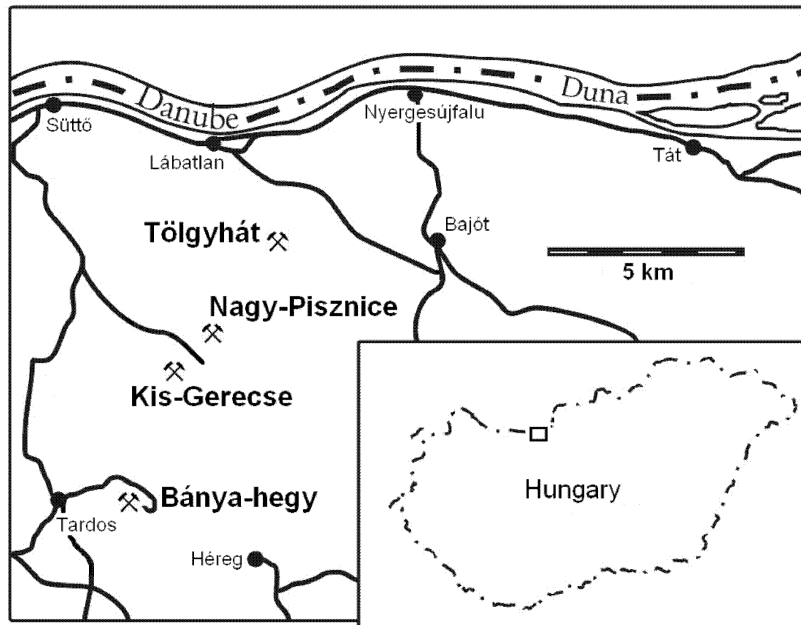


Fig. 1  
Location of the Toarcian–Aalenian sections, examined in the Gerecse Mts

Research on Tmetoceratidae is significant at least in two respects. From a stratigraphic viewpoint the genera comprise index taxa for the Upper Toarcian subdivisions, and allow correlation with other regions. The diversity of the genera and the range of some species vary in different areas, so data on their distribution are important for paleobiogeographic comparisons.

Based on the abundance of *Dumortieria* and *Catulloceras*, and the scarcity of *Pleydellia*, the upper part of the Toarcian was first assigned to the *Dumortieria levesquei* Zone by Géczy (1984). The revision of the assemblage allowed a slightly more precise zonation by the introduction of the Meneghinii and Aalensis Zones (Kovács and Géczy 2008), but the material did not permit further subdivision at subzonal level. Although the fauna belongs to the Mediterranean Province of the Mediterranean–Caucasian Realm, the Toarcian–Aalenian ammonite biostratigraphy proposed for the Submediterranean/NW European Province (Elmi et al. 1997) is applicable, with slight modifications. The biohorizon-level subdivision is based on the results of Géczy and Sente (2007), Kovács and Géczy (2008), and Kovács (2009), as well as on the recent re-investigation of the Lower Toarcian ammonite material of the Gerecse Mts (Fig. 2).

The lithology of the Jurassic sediments of the Gerecse Mts was studied by Császár et al. (1998). The Toarcian and Aalenian stages are characterized by the "Ammonitico Rosso marl" facies, which developed in two subfacies. Thin-bedded,

TOARCIAN		
ZONE	SUBZONE	BIOHORIZON
<i>Pleydellia aalensis</i>		<i>Cotteswoldia tenuiplicata</i>
<i>Dumortieria meneghinii</i>		<i>Dumortieria meneghinii</i>
<i>Geczyceras speciosum</i>		<i>Crestaites szentei</i> <i>Geczyceras speciosum</i>
<i>Grammoceras thouarsense</i>	<i>Pseudogrammoceras fallaciosum</i>	
	<i>Grammoceras striatulum</i>	
	<i>Pseudogrammoceras bingmanni</i>	
<i>Merlaites gradatus</i>	<i>Merlaites alticarinatus</i>	
	<i>Pseudogrammoceras subregale</i>	
	<i>Merlaites clausus</i>	
<i>Hildoceras bifrons</i>	<i>Hildoceras bifrons</i>	<i>Hildoceras semipolatum</i>
		<i>Hildoceras bifrons</i>
		<i>Hildoceras apertum</i>
	<i>Hildoceras sublevisoni</i>	<i>Hildoceras lusitanicum</i>
		<i>Hildoceras tethysi</i>
		<i>Hildoceras sublevisoni</i>
<i>Harpoceras serpentinum</i>	<i>Harpoceras falciferum</i>	<i>Orthildaites douvillei</i> <i>Harpoceras pseudoserpentinum</i>
	<i>Harpoceras serpentinum</i>	<i>Hildaites striatus</i>
<i>Dactylioceras tenuicostatum</i>		

Fig. 2  
Ammonite zonation of the Toarcian of the Gerecse Mts, Hungary. (Zonal scheme adapted from Elmi et al. 1997 and Metodiev 2008)

red nodular marl of variable carbonate and clay content (Kisgerecse Marl Formation) is typical of the *Dactylioceras tenuicostatum* – *Geczyceras speciosum* Zones. It is overlain by the well-bedded, red, hard nodular limestone (Tölgyhát Limestone Formation) in the Upper Toarcian – Aalenian. Both subfacies are rich in ammonoid assemblages; however, the fauna consists mainly of poorly to moderately preserved internal molds.

Note: The following abbreviations are used in this paper: D – diameter, H – whorl-height, h – H/D, W – whorl-width, w – W/H, U – umbilical-width, u – U/D, RLW – ribs of the last whorl.

*Systematic paleontology*Superfamily Hammatoceratoidea Schindewolf, 1964  
Family Tmetoceratidae Spath, 1936

Tmetoceratinae was introduced by Spath (1936) as a subfamily of Hildoceratidae, without diagnosis. The monogeneric taxon with genus *Tmetoceras* was accepted by Arkell (1957) and became widely acknowledged in the literature. Nevertheless, it was emended as family Tmetoceratidae by Schindewolf (1964), and included in the new superfamily Hammatoceratoidea. Rulleau and Mouterde (1997), in consideration of both the close morphologic and the plausible phylogenetic connection between *Catulloceras* and *Tmetoceras*, placed *Tmetoceras* within the reinterpreted Dumortieriinae. This subfamily (as "Dumortierae") was designated by Maubeuge (1950) for the *Dumortieria* – *Catulloceras* group, but was rejected by Arkell (1957), who retained these genera and *Pleydellia* in the Grammocerotinae. Schindewolf (1964), based on suture constructions, accepted Dumortieriinae (Hammatoceratoidea), and also felt it reasonable to include *Pleydellia*, the ancestor of the genus *Leioceras*. Gabilly (1976) also emphasized the close relationship between *Dumortieria* and *Pleydellia*, and assigned the latter into Dumortieriinae. This classification was ignored by Donovan et al. (1981), but adopted, for instance, by Fauré and Cubaynes (1983) and Rulleau (1995). The two subfamilies were integrated by Rulleau and Mouterde (1997), and four genera: *Dumortieria*, *Catulloceras*, *Pleydellia* (with subgenera *Cotteswoldia*, *Walkericeras*, ?*Canavarina*) and *Tmetoceras* (successor of *Catulloceras*) were included in the Dumortieriinae (Graphoceratidae, Hammatoceratoidea); the subfamily was regarded as phylogenetic lineage between the latter family and the Hammatoceratidae. After the study of Rulleau et al. (2001) this scheme met with a wide acceptance in the literature, but was slightly modified by Fauré (2002) at generic level (see below). On the other hand, *Dumortieria*, *Catulloceras*, *Cotteswoldia* and *Pleydellia* were henceforward placed in the Grammocerotinae (Hildoceratoidea), for instance by Ohmert (1993) and Schulbert (2001). *Dumortieria*, *Catulloceras* and *Tmetoceras* were recently grouped into the revised Tmetoceratidae Spath (Hammatoceratoidea) by Venturi and Ferri (2001), Venturi and Bilotta (2008) and Venturi et al. (2010); *Pleydellia*, however, was classified among the Grammocerotinae. The close relationship between the above-mentioned genera seems unquestionable; moreover, the arrangements of Schindewolf (1964), Rulleau and Mouterde (1997), and Venturi and Ferri (2001) are properly reconcilable for phylogenetic and morphological reasons. However, the marked differences between the ventral parts of *Tmetoceras* and the other taxa must be emphasized by distinguishing two subfamilies within family Tmetoceratidae. The following genera are included:

I. Subfamily Dumortieriinae Maubeuge, 1950: *Dumortieria* Haug, 1885; *Catulloceras* Gemmellaro, 1886; *Cotteswoldia* Buckman, 1902; *Pleydellia* Buckman, 1899

II. Subfamily Tmetoceratinae Spath, 1936: *Tmetoceras* Buckman, 1892

The distribution of Late Toarcian subfamilies of Ammonitina within the Gerecse material is given in Kovács and Géczy (2008). Dumortieriinae culminated in the Meneghinii Zone with 52% of the fauna, and reached 34% in the Aalensis Zone, whereas *Tmetoceras* formed only 1.3% in the Aalenian. The ranges of the species recorded here from the Gerecse Mts are shown in Fig. 3.

Subfamily Dumortieriinae Maubeuge, 1950

Genus *Dumortieria* Haug, 1885

*Type species:* *Ammonites levesquei* D'Orbigny, 1844; designated by Haug (1885).

*Diagnosis:* Evolute, compressed form with wide and shallow umbilicus. Slightly convex flank, rounded venter, weakly developed keel, suboval section. Strong, simple, straight to sigmoid, non-tuberculate ribs. Moderately developed suture-line with long and wide L lobe, broad ES and broad, asymmetrical LS.

*Remarks:* Detailed analyses of the genus were recently provided by Rulleau (1995, 2007), Metodiev (1997), Rulleau and Mouterde (1997), Rulleau et al. (2001), Venturi and Ferri (2001), Schulbert (2001), Fauré (2002), Pallini et al. (2005) and Venturi et al. (2010). *Dumortieria* is closely allied to *Catullocceras*; however, it differs in at least three ways: the venter is narrower and rounded without ventral grooves; the whorl-section is suboval and both the type of the ornamentation and the shape of the section vary during ontogeny. *Dumortieria* is characterized by sexual dimorphism: *D. tabulata* Buckman, *D. explanata* Buckman, *Paradumortieria elmii* Seyed-Emami etc. are regarded as microconch forms.

In Europe the paleogeographic range of the genus differs in the NW European and Mediterranean Provinces. The dominance of *D. meneghinii* (Zittel in Haug), *D. evolutissima* Prinz and *D. latumbilicata* Géczy is characteristic in the Tethyan localities. Some species are common in both provinces: e.g. *D. levesquei* (D'Orbigny), *D. pseudoradiosa* (Branco), *D. striatulocostata* (Quenstedt), *D. rhodanica* Haug, *D. taramellii* (Fucini), *D. insignisimilis* (Brauns), while the more involute, compressed, fine-ribbed forms are typical of the Pseudoradiosa Subzone of the NW European areas: for instance, *D. radians* (Reinecke), *D. moorei* (Lycett), *D. brancoi* Buckman, *D. multicostrata* Buckman are rare or absent from the Italian, Southern Spanish, Greek, Algerian and Hungarian assemblages. The *Dumortieria* material of Morocco seems to be mixed; it is closely allied to both provinces (Benshili 1989; El Hammichi et al. 2009). In the Mediterranean–Caucasian Realm the Bulgarian (Metodiev 1997, 2008), Iranian (Seyed-Emami et al. 2005, 2008), and Caucasian (Rostovtsev 1965; Nutschidze 1966; Topchishvili et al. 2006) *Dumortieria* assemblages are similar to those of the NW European Province.

The origin of *Dumortieria* seems uncertain: since its suture construction can be interpreted as a simplified variation of the hammatoceratid style of lobe, *Dumortieria* is thought to derive from the Hammatoceratinae in the late Speciosum/Dispansum Zone. The subserpenticone coiling and the sculpture

Stage		Toarcian			Aalenian				
Species	Zone	Sp.	Meneghinii	Aalensis	Opalinum		Murchisonae		
	Subzone				Op.	Com.	Ha.	Mu.	Br.
<i>Dumortieria meneghinii</i>			—————	—————					
<i>D. levesquei</i>			—————	—————					
<i>D. evolutissima</i>			—————	—————					
<i>D. striatulocostata</i>				—					
<i>D. latumbilicata</i>				—————					
<i>D. cf. tabulata</i>				—					
<i>Catullocheras dumortieri</i>				—————					
<i>C. pannonicum</i>				—					
<i>C. raricostatum</i>				—					
<i>Cotteswoldia tenuiplicata</i>				—————					
<i>C. cf. bifax</i>				—					
<i>C. cf. particostata</i>				—					
<i>C. paucicostata</i>				—					
<i>Pleydellia subcompta</i>				—————					
<i>Tmetoceras scissum</i>					—————	—————			

Fig. 3  
Stratigraphic distribution of the Tmetoceratidae of the Gerecse Mts. (Sp. – Speciosum, Op. – Opalinum, Com. – Comptum, Ha. – Haugi, Mu. – Murchisonae, Br. – Bradfordensis)

characterized by simple ribs might have originated from *Crestaites*. The acme of *Dumortieria* was typical of the Meneghinii/Pseudoradosa Zone. The genus is regarded as the ancestor of the genera *Catullocheras*, *Cotteswoldia* and *Pleydellia*.

The "classic" Gerecse ammonite assemblage contains 143 *Dumortieria* specimens of which 43 are determined at species level. Six species are represented: *D. levesquei*, *D. meneghinii*, *D. evolutissima*, *D. latumbilicata*, *D. striatulocostata* and *D. cf. tabulata*. The diversity of the Bakonycsérnye material was similar according to the recent classification; seven species were recorded (*D. meneghinii*, *D. latumbilicata*, *D. taramellii*, *D. evolutissima*, *D. insignisimilis*, *D. striatulocostata* and *D. cf. rhodanica*) by Géczy (1967), while two species are known from the Úrkút (*D. meneghinii* and *D. cf. rhodanica*) and the Szentgál sections (*D. meneghinii*, *D. evolutissima*) (Bakony Mts) (Géczy 1968, 1975). The Mediterranean forms dominate the *Dumortieria* faunas of the Transdanubian Range.

*Distribution:* Occurs worldwide in the Upper Toarcian.

*Dumortieria levesquei* (d'Orbigny, 1844)  
(Plate 2, Fig. 1; Plate 5, Fig. 5)

- 1844 *Ammonites levesquei* – d'Orbigny, p. 260, Pl. 60, Figs 1–4  
1966 *Dumortieria levesquei* d'Orbigny – Nutschidze, p. 107, Pl. 24, Fig. 1 (cum syn.)  
1978 *Dumortieria* cf. *levesquei* (d'Orbigny) – Dezi and Ridolfi, p. 17, Figs 2–3  
1985 *Dumortieria levesquei* (d'Orbigny) – Seyed-Emami and Nabavi, p. 248, Fig. 13  
1997 *Dumortieria levesquei* (d'Orbigny) – Metodiev, p. 20, Pl. 4, Fig. 2 (cum syn.)

- 2001 *Dumortieria levesquei* (d'Orbigny) – Schulbert, p. 61, Text-fig. 4.3/g; Pl. 5, Figs 1–3, 10 (cum syn.)  
 2002 *Dumortieria levesquei* (d'Orbigny) – Fauré, p. 728, Pl. 22, Fig. 2  
 2004 *Dumortieria cf. levesquei* (d'Orbigny) – Myczynski, p. 56, Fig. 23/2, 6  
 2007 *Dumortieria levesquei* (d'Orbigny) – Rulleau, p. 90, Pl. 49, Fig. 3  
 2010 *Dumortieria levesquei* (d'Orbigny) – Arp, p. 38, Pl. 1, Figs 2–3 (cum syn.)

*Material:* Five poorly preserved internal molds (03.2011–07.2011).

<i>Measurements:</i>	D	H	h	W	w	U	u	RLW
03.2011	77	20	26%	13	65%	40	52%	50(?)
04.2011	74	20	27%	14	70%	38	51.3%	50

*Description:* Evolute form, shallow umbilicus, convex flank, narrow, rounded, carinate venter. Suboval whorl-section with maximum width at mid-height. The body chamber is three-quarters whorl in length. Oblique, projected peristome, preceded by a wide, deep constriction. Strong, straight, rectiradiate, simple ribs, rise from the umbilicus, bend forward on the ventrolateral part, fade away near the keel. Suture-line: narrow E, slightly longer, wide L, short, oblique U lobes; wide ES, wide, asymmetrically divided LS.

*Remarks:* The lectotype of *D. levesquei* was designated and figured by Gabilly and Mouterde (1994: 58, Pl. 36, Fig. 3; re-illustrated by Elmi et al. 1997, Pl. 11, Figs 9–10). Both Gerecse specimens agree well with the type. The species differs from both *D. meneghinii* and *D. latumbilicata* in slightly more involute coiling (U/D: 46–52%) and coarser, widely spaced ribs.

*Distribution:* Pseudoradosa/Meneghinii Zone: Europe, Morocco, Caucasus, Iran. Yakounensis Zone: North America. Gerecse Mts: Meneghinii Zone: Kis-Gerecse and Tölgyhát (A) sections, Meneghinii – Aalensis Zones: Nagy-Pisznice section.

*Dumortieria meneghinii* (Zittel in Haug, 1887)  
 (Plate 1, Figs 1–2; Plate 2, Fig. 4)

- 1867–1881 *Ammonites Levesquei* D'Orb. – Meneghini, p. 48, Pl. 10, Figs 4–5  
 1887 *Dumortieria Meneghinii* Zitt. in coll. – Haug, p. 128  
 v 1967 *Dumortieria meneghinii* (Zittel M. S.) in Haug – Géczy, p. 143, Text-fig. 142; Pl. 32, Fig. 2 (cum syn.)  
 v 1967 *Dumortieria meneghinii longilobata* n. subsp. – Géczy, p. 144, Text-fig. 143; Pl. 33, Fig. 3; Pl. 64, Fig. 5  
 1968 *Dumortieria meneghinii* (Zittel M. S.) in Haug – Géczy, Pl. 8, Fig. 1  
 1968 *Dumortieria meneghinii* (Zittel in Haug) – Levi Setti, p. 321, Text-Figs 2/3–5, 10, 14, 3/6; Pl. 30, Figs 1, 4; Pl. 31, Fig. 5 (cum syn.)  
 1997 *Dumortieria meneghinii* (Zittel in Haug) – Metodiev, p. 20, Pl. 4, Fig. 3  
 2001 *Dumortieria meneghinii* Haug – Venturi and Ferri, p. 225, p. 228, Figs a–d  
 2005 *Dumortieria meneghinii* (Zittel in Haug) – Pallini et al., p. 8, Pl. 5, Figs 6, 9; Pl. 14, Fig. 8; Pl. 15, Fig. 1  
 2007 *Dumortieria meneghinii* (Zittel) – Rulleau, p. 89, Pl. 49, Fig. 2

*Material:* 23 internal molds in different states of preservation (08.2011–30.2011).

Measurements	D	H	h	W	w	U	u	RLW
08.2011	114	26	22.8%	16	61.5%	66	57.8%	50(?)
09.2011	112	26	23.2%	19	73%	64	57%	63
10.2011	85	20	23.5%	14	70%	47	55.3%	53
11.2011	67	17	25.3%	12	70.5%	36	53.7%	61

*Description:* Evolute, compressed form, suboval whorl-section, wide, shallow umbilicus, low, rounded margin. Slightly convex flank, narrow, rounded, carinate venter, no ventral sulci. The body chamber is more than three-quarters whorl in length. Projected peristome, preceded by a wide constriction. Strong, simple, slightly curved, prorsiradiate ribs, bend forward and fade away on the venter without reaching the keel. Two narrow, deep constrictions on the last, and 2–3 on the inner whorls. Suture-line: wide E, slightly longer L, short, oblique U lobes; wide ES, wide, asymmetrically divided LS.

*Remarks:* The Gerecse specimens are close to the lectotype (Meneghini, 1867–1881, Pl. 10, Fig. 4, designated and re-illustrated by Pinna 1969, Pl. 2, Fig. 7). The specimens shown in the literature show slight variability in whorl-width, rib-density, length of lateral lobe, and breadth of lateral saddle (e.g. *D. meneghinii*, Pinna 1968, Text-fig. 6; *D. meneghinii longilobata*, Géczy 1967, Pl. 33, Fig. 3).

*Distribution:* Meneghinii/Pseudoradiosa Zone: Italy, Morocco, Tunisia, Algeria, Portugal, Greece, France. *Levesquei* Zone: Southern Spain, Austria, Bulgaria. Upper Toarcian: Bakony Mts (Hungary). Gerecse Mts: Meneghinii – lower Aalensis Zones.

*Dumortieria evolutissima* Prinz, 1904  
(Plate 3, Fig. 1; Plate 7, Fig. 1)

- v 1904 *Dumortieria evolutissima* nov. sp. – Prinz, p. 66, Pl. 30, Fig. 1; Pl. 38, Fig. 10  
v 1904 *Dumortieria evolutissima* nov. sp., nov. mut. *multicostata* – Prinz, p. 67, Pl. 30, Fig. 2; Pl. 38, Fig. 11  
1906 *Dumortieria evolutissima* Prinz, mut. *multicostata* – Prinz, p. 162  
1910 *Dumortieria evolutissima* Prinz mut. *multicostata* Prinz – Renz, Pl. 19, Fig. 1  
1967 *Dumortieria evolutissima* Prinz – Géczy, p. 146, Text-fig. 147; Pl. 33, Fig. 1; Pl. 64, Fig. 60 (cum syn.)  
1967 *Dumortieria evolutissima multicostata* Prinz – Géczy, p. 147, Text-fig. 148; Pl. 33, Fig. 2; Pl. 64, Fig. 61 (cum syn.)  
1968 *Dumortieria evolutissima* Prinz – Levi Setti, p. 335, Text-figs 2/6, 3/8; Pl. 31, Fig. 6; Pl. 32, Fig. 4  
1995 *Dumortieria* aff. *evolutissima multicostata* Prinz – Rulleau, Pl. 2, Fig. 1

*Material:* Five moderately preserved internal molds, and 6 fragmentary specimens (31.2011–41.2011).

Measurements	D	H	h	W	w	U	u	RLW
31.2011	134	30	22.3%	24	80%	79	59%	62
32.2011	94	20	21%	16	80%	58	62%	?
33.2011	80	18	21.2%	16	88.8%	48	60%	66

*Description:* Subserpenticone form, wide, shallow umbilicus, convex flank, broad, rounded, carinate venter. Subcircular whorl-section on the inner, wide-oval on



the external whorls with maximum width under the mid-height. The body chamber is about three-quarters whorl in length. Projected peristome, preceded by a wide and shallow constriction; and 3 deep, narrow constrictions on the last whorl. Well-developed, single, rectiradiate, straight to slightly curved ribs. Three to four constrictions on the inner whorls. Suture-line: short, narrow E, long, moderately wide L, short, oblique U lobes; broad ES, broad, asymmetrical LS.

*Remarks:* *D. evolutissima multicosata* was regarded as synonym of *D. evolutissima* by Levi Setti (1968, 338 p.). This arrangement is confirmed here by the reinvestigation of the type specimens (deposited in the Geological Institute of Hungary). The type of *D. evolutissima* is a poorly preserved internal mold with dissolved surface; the ribs of the innermost whorls are invisible. The styles of coiling show only slight differences; the numbers of the ribs are the same on both external whorls. Most Gerecse specimens agree well with the type of *D. evolutissima multicosata* (Prinz 1904, Pl. 30, Fig. 2, re-illustrated by Géczy 1967, Pl. 33, Fig. 2), and the specimens shown by Renz (1910, Pl. 19, Fig. 1) and Rulleau (1995, Pl. 2, Fig. 1). The species differs from *D. meneghinii* in subserpenticone coiling and wider whorls. In the literature the U/D proportions of *D. meneghinii* are 53–58.5%, 67.5% for the type of *D. evolutissima*, 62.5% for *D. evolutissima multicosata*, and 56–63% for the specimens illustrated by Renz (l.c.), Levi Setti (l.c.), and Rulleau (l.c.). The *D. evolutissima* specimens of Levi Setti with low W/H data (61–80%) markedly differ from the types (W/H: 90%). Considering the variability of the whorl-thickness, the presence of wide, suboval-subquadrate sections with 80–90% W/H proportion is recognized here as a specific morphological feature.

*Distribution:* Meneghinii/Pseudoradiosa Zone: Italy, France, Morocco, Algeria. Levesquei Zone: Austria, Southern Spain. Upper Toarcian: Greece, Hungary (Bakony Mts). Gerecse Mts: Meneghinii – lower Aalensis Zones.

*Dumortieria latumbilicata* Géczy, 1967  
(Plate 2, Fig. 3)

- v 1904 *Dumortieria Levesquei* d'Orbigny – Prinz, p. 67, Pl. 24, Fig. 1
- 1967 *Dumortieria levesquei latumbilicata* n. subsp. – Géczy, p. 146, Text-fig. 146; Pl. 32, Figs 1, 6; Pl. 64, Figs 58–59
- 1968 *Dumortieria latumbilicata* Géczy – Levi Setti, p. 331, Text-figs 2/11–12, 3/7; Pl. 32, Figs 1–2
- 1974 *Dumortieria* cf. *latumbilicata* Géczy – Elmi et al., Text-fig. 17/32; Pl. 5, Fig. 5
- 1997 *Dumortieria latumbilicata* Géczy – Rulleau and Mouterde, Pl. 1, Fig. 2
- 2002 *Dumortieria latumbilicata* Géczy – Fauré, p. 728, Pl. 22, Fig. 7
- 2005 *Dumortieria latumbilicata* Géczy – Pallini et al., p. 8, Pl. 5, Figs 7, 10; Pl. 15, Figs 2–3
- 2007 *Dumortieria latumbilicata* Géczy – Rulleau, Pl. 48, Fig. 5

*Material:* One poorly preserved internal mold, and one fragmentary specimen.

<i>Measurements:</i>	D	H	h	W	w	U	u	RLW
42.2011	93	24	25.8%	20	83.3%	51	54.8%	53
43.2011	93	25	26.8%	22	88%	51	54.8%	?

*Description:* Evolute form, shallow umbilicus, rounded umbilical wall and margin, slightly convex flank. Broad, low, rounded, carinate venter, weakly developed keel. Wide-oval section with maximum width under the mid-height. The body chamber is somewhat more than a half whorl in length. Projected peristome, preceded by a wide and deep constriction; three narrow constrictions on the last whorl. Strong, straight, simple ribs, bend forward on the ventrolateral part and fade away on the venter. The suture-line cannot be traced in all details, but is typical of *Dumortieria*.

*Remarks:* The Gerecse specimens are close to the types (Géczy 1967, Pl. 32, Figs 1, 6), and the specimens illustrated by Levi Setti (1968, Pl. 32, Fig. 1) and Rulleau (2007, Pl. 48, Fig. 5). The species differs from *D. levesquei* in more evolute coiling, and from *D. meneghinii* in much wider section and stronger ribs. *D. insignisimilis* is a robust form with more involute coiling and subcircular section.

*Distribution:* Meneghinii/Pseudoradiosa/Reynesi Zone: Italy, Southern Spain, France, Portugal, Morocco, Tunisia, Algeria. Upper Toarcian: Bakonycsernye (Hungary). Gerecse Mts: upper Meneghinii – Aalensis Zones.

*Dumortieria striatulocostata* (Quenstedt, 1885)  
(Plate 4, Fig. 1)

1885 *Ammonites striatulo-costatus* – Quenstedt, p. 413, Pl. 52, Fig. 7 (non Figs 8–10)

1966 *Dumortieria striatulo-costata* Quenstedt – Nutsbidze, p. 112, Pl. 24, Fig. 6(!); Pl. 25, Fig. (cum syn.)

v 1967 *Dumortieria striatulocostata* (Quenstedt) – Géczy, p. 141, Text-fig. 139; Pl. 31, Fig. 4; Pl. 64, Fig. 53

2001 *Dumortieria striatulocostata* (Quenstedt) – Schulbert, p. 74, Text-fig. 4.3/g; Pl. 8, Fig. 1 (cum syn.)

2002 *Dumortieria striatulocostata* (Quenstedt) – Fauré, p. 729, Pl. 22, Fig. 6

2005 *Dumortieria striatulocostata* (Quenstedt) – Seyed-Emami et al., p. 359, Fig. 5/G

2007 *Dumortieria striatulocostata* (Quenstedt) – Rulleau, Pl. 50, Fig. 4

2010 *Dumortieria striatulocostata* (Quenstedt) – Arp, p. 39, Pl. 1, Fig. 1

*Material:* One moderately preserved internal mold.

<i>Measurements:</i>	D	H	h	W	w	U	u
44.2011	94	30	32%	16	53.3%	41	43.6%

*Description:* Evolute, compressed form, shallow umbilicus, slightly convex flank, low, narrow, carinate venter. Narrow suboval whorl-section with maximum width above the margin. No whole body chamber preserved. Almost straight, prorsiradiate, simple ribs on the inner whorls, slightly denser and sigmoid ribs on the external whorl. 47 primaries with 5 ventrolateral intercalatories on the last whorl. Suture-line: narrow E, long, narrow L, short, oblique U lobes; wide ES, broad, asymmetrically divided LS.

*Remarks:* The Gerecse specimen is close to the type (Quenstedt, 1885, Pl. 52, Fig. 7, re-illustrated by Schlegelmilch 1976, Pl. 50, Fig. 4) in morphology, but differs by bearing slightly denser and non-rectiradiate ribs on the penultimate whorl. This

style of ribbing can be interpreted as a transitional stage between two nearly related forms: *D. striatulocostata* and *D. pseudoradiosa*.

*Distribution:* Levesquei Zone: Germany, Austria. Pseudoradiosa Zone: France, Northern Spain, Bulgaria, Caucasus. Upper Toarcian: England, Italy, Switzerland, Bulgaria, Bosnia-Herzegovina, Hungary (Bakonycsernye), North Africa. Gerecse Mts: upper Meneghinii Zone: Kis-Gerecse section.

*Dumortieria* cf. *tabulata* Buckman, 1904  
(Plate 2, Fig. 2)

- 1904 *Dumortieria tabulata* – Buckman, p. S.185, Pl. 22, Figs 25–27  
1965 *Dumortieria tabulata* Buckman – Rostovtsev, p. 82, Pl. 13, Fig. 3 (cum syn.)  
1995 *Dumortieria tabulata* (Buckman) – Rulleau, Pl. 6, Figs 6–7  
2001 *Dumortieria tabulata* Buckman – Schulbert, p. 73, Pl. 9, Fig. 5  
2004 *Dumortieria* cf. *tabulata* Buckman – Myczynski, p. 60, Fig. 25/1–2  
2006 *Dumortieria tabulata* Buckman – Topchishvili et al., Pl. 20, Fig. 5  
2007 *Dumortieria* aff. *tabulata* Buckman – Rulleau, p. 90, Pl. 51, Fig. 4

*Material:* One fragmentary internal mold (45.2011: D: appr. 28).

*Description:* Small, moderately evolute form, shallow umbilicus, slightly convex flank. The ventral part is damaged. Simple, strong, straight, rectiradiate ribs, bend forward around the shoulder. Slightly wider intercosta than the rib-width. The suture-line cannot be observed in all details, but is typical of *Dumortieria*.

*Remarks:* The Gerecse specimen resembles the type (Buckman 1904, Pl. 22, Fig. 26) in morphology, but the poor preservation does not allow examination of the exact arrangement. The species is closely allied with *D. explanata* Buckman in size and morphology, but differs in wider whorls, lower venter, and less sigmoid ribs on the body chamber. Both species are considered as *Dumortieria* microconchs.

*Distribution:* Pseudoradiosa – Aalensis Zones: England, France, Germany, Poland, Bulgaria, Caucasus, Iran. Gerecse Mts: lowermost Aalensis Zone: Kis-Gerecse section.

Genus *Catulloceras* Gemmellaro, 1886

*Type species:* *Ammonites Dumortieri* Thiolliere in Dumortier, 1874; designated by Buckman (1905).

*Diagnosis:* Evolute coiling, wide and moderately deep umbilicus with high and rounded margin. Convex flanks, low, broad and carinate venter with two shallow grooves. Subcircular to subquadrate whorl-section. Strong, simple ribs. Constrictions can appear. Moderately developed suture-line similar to that of *Dumortieria*.

*Remarks:* The genus was recently discussed by Rulleau (1995, 2007), Schweigert (1996), Rulleau and Mouterde (1997), Rulleau et al. (2001), Schulbert (2001), Venturi and Ferri (2001), Goy (2002) and Venturi et al. (2010). *Catulloceras* differs

from *Dumortieria* in appearance of the ventral region and whorl-section, as well as in progressive development of the whorls. The genus is one of the derivatives of *Dumortieria*, appeared in the late Meneghinii/Pseudoradosa Zone, flourished during the Aalensis Zone, and disappeared in the early Opalinum Subzone. It has been regarded as the ancestor of the genus *Tmetoceras*.

The examined sections yielded eight *Catulloceras* specimens which represent three species: *C. dumortieri* (Thiolliere in Dumortier), *C. pannonicum* (Géczy) and *C. raricostatum* (Géczy). A single *C. (?) strictum* (Prinz) was recorded from Nagy-Pisznice Hill by Prinz (1906); unfortunately, the specimen has been lost. *C. dumortieri*, *C. strictum*, *C. pannonicum*, *C. raricostatum*, *C. perroudi* (Dumortier et Fontannes) are known from Bakonycsérnye, *C. pannonicum* from Úrkút and *C. raricostatum* from Szentgál (Géczy 1967, 1968, 1975).

*Distribution:* Upper Toarcian: Europe, North Africa, Madagascar, Thailand, Pamir Mts, South and North America. Upper Toarcian – lowermost Aalenian: Italy, Portugal, Germany.

*Catulloceras dumortieri* (Thiolliere in Dumortier, 1874)  
(Plate 4, Fig. 3)

- 1874 *Ammonites Dumortieri* (Thiolliere) – Dumortier, p. 269, Pl. 57, Figs 3–4  
 v 1967 *Dumortieria dumortieri* (Thiolliere in Dumortier) – Géczy, p. 137, Text-fig. 134; Pl. 30, Fig. 8; Pl. 64, Fig. 48 (cum syn.)  
 1968 *Dumortieria dumortieri* (Thiolliere in Dumortier) – Levi Setti, p. 329, Text-figs 2/9, 3/10; Pl. 30, Fig. 3; Pl. 31, Fig. 1 (cum syn.)  
 1997 *Catulloceras dumortieri* (Thiolliere in Dumortier) – Rulleau and Mouterde, Pl. 1, Fig. 5; Pl. 2, Figs 1–6  
 2001 *Catulloceras dumortieri* (Thiolliere) – Schulbert, p. 60, Pl. 6, Fig. 1 (cum syn.)  
 2002 *Catulloceras dumortieri* (Thiolliere in Dumortier) – Goy, p. 154, Fig. 96  
 2007 *Catulloceras dumortieri* (Thiolliere in Dumortier) – Rulleau, p. 90, Text-fig. 24/7; Pl. 52, Fig. 6  
 2007 *Catulloceras* gr. *dumortieri* (Thiolliere in Dumortier) – Elmi et al., Pl. 2, Fig. 4  
 v 2007 *Catulloceras dumortieri* (Thiolliere in Dumortier) – Galácz et al., p. 346, Fig. 3/2  
 2009 *Catulloceras dumortieri* (Thiolliere in Dumortier) – El Hammichi et al., Pl. 2, Fig. 6

*Material:* One moderately preserved internal mold, and four fragmentary specimens (46.2011–50.2011).

Measurements:	D	H	h	W	w	U	u	RLW
46.2011	68	20	29.4%	16	80%	36	53%	57

*Description:* Evolute form, wide, gradually deepening umbilicus. Vertical umbilical wall, rounded margin. Slightly convex, parallel flanks; low, rounded venter, low keel, bordered by narrow grooves. Wide subrectangular whorl-section. No preserved body chamber. Well-developed, simple, straight, slightly prorsiradiate ribs; 3 deep constrictions on each whorl. Suture-line: wide E, slightly shorter L, short, oblique U lobes; wide ES, wide, asymmetrically divided LS.

*Remarks:* The Gerecse specimens agree with the type (Dumortier, 1874, Pl. 57, Figs 3–4, re-illustrated by Rulleau 1995, Pl. 4, Figs 1–2, and Elmi et al. 1997, Pl. 11, Figs 13–14). The species is close to *C. pannonicum* (Géczy) in style of coiling, but differs by its narrower whorls. It also differs from *C. raricostatum* in having denser ribs.  
*Distribution:* Meneghinii – Aalensis Zones: Algeria. Aalensis Zone: Italy, France, Spain, Austria, Morocco. Levesquei – Opalinum Zones: Portugal, Germany. Yakounensis Zone: Canada. Upper Toarcian: Greece, England, Austria, Poland, Madagascar, Bakonycsérnye (Hungary). Gerecse Mts: Aalensis Zone.

*Catulloceras pannonicum* (Géczy, 1967)  
(Plate 3, Fig. 2)

- v 1904 *Dumortieria Dumortieri* Thioll. – Prinz, p. 65, Text-fig. 8; Pl. 5, Fig. 3; Pl. 31, Fig. 3  
v 1967 *Dumortieria dumortieri pannonica* n. subsp. – Géczy, p. 139, Text-fig. 136; Pl. 31, Figs 1–2; Pl. 64, Fig. 50  
1968 *Dumortieria dumortieri* cf. *pannonica* Géczy – Géczy, Pl. 7, Fig. 2  
1968 *Dumortieria pannonica* Géczy – Levi Setti, p. 334, Text-figs 2/13, 3/2; Pl. 30, Fig. 5  
?1995 *Catulloceras dumortieri* (Thiolliere in Dumortier) – Rulleau, Pl. 4, Figs 3–4 only  
2001 *Dumortieria pannonica* Géczy – Venturi and Ferri, p. 228, Fig. g  
2008 *Dumortieria pannonica* Géczy – Metodiev, Fig. 6/k

*Material:* One moderately preserved internal mold, and one fragmentary specimen (51.2011–52.2011).

Measurements:	D	H	h	W	w	U	u	RLW
51.2011	66	17	25.7%	18	105.8%	34	51.5%	47

*Description:* Evolute, robust form, wide, gradually deepening umbilicus. Rounded umbilical wall and margin, convex flank, broad, low, rounded venter, sharp keel, bordered by narrow sulci. Subcircular whorl-section with maximum width under the mid-flank. The preserved body chamber is a quarter whorl in length. Strong, simple, slightly curved, prorsiradiate ribs; three deep constrictions on each whorl. More widely spaced ribs on the body chamber. Suture-line: very close to that of *C. dumortieri*.

*Remarks:* The Gerecse specimens agree well with the holotype (Géczy 1967, Pl. 31, Figs 1–2), as well as with the specimens shown by Levi Setti (1968, Pl. 30, Fig. 5) and Venturi and Ferri (2001, p. 228, Fig. g). The species differs from *C. dumortieri* in having a subcircular section. The *C. dumortieri* specimen shown by Rulleau (1995, Pl. 4, Figs 3–4, re-illustrated by Rulleau and Mouterde 1997, Pl. 2, Fig. 1) possesses markedly wide whorls; its morphology seems to be closer to that of *C. pannonicum*.

*Distribution:* Pseudoradosa Zone: Bulgaria. Aalensis Zone: France(?). Meneghinii – Aalensis Zones(?): Italy. Upper Toarcian: Southern Spain, Bakony Mts (Hungary). Gerecse Mts: Aalensis Zone: Nagy-Pisznice and Tölgyhát (A) sections.

*Catulloceras raricostatum* (Géczy, 1967)  
(Plate 5, Fig. 1)

v 1967 *Dumortieria stefaninii?* *raricostata* n. subsp. – Géczy, p. 142, Text-fig. 141; Pl. 31, Fig. 8; Pl. 64, Fig. 55

1968 *Dumortieria raricostata* Géczy – Levi Setti, p. 332, Text-figs 2/1, 3/4; Pl. 32, Fig. 3

1996 *Dumortieria raricostata* Géczy – Jakobs and Smith, p. 127, Pl. 3, Figs 20–21

2001 "*Catulloceras*" *raricostatum* Géczy – Venturi and Ferri, p. 228, Fig. h

*Material*: One moderately preserved internal mold.

<i>Measurements</i> :	D	H	h	W	w	U	u	RLW
53.2011	76	20	26.3%	18	90%	40	52.6%	43

*Description*: Evolute form, wide, gradually deepening umbilicus, slightly convex flank. Low venter, narrow, low keel, bordered by two shallow grooves. Wide-oval whorl-section with maximum width under the mid-height. The preserved body chamber is a quarter-whorl in length. Sharp, simple, rectiradiate ribs, projected at the shoulder, bend forward and fade away on the venter. Wider intercosta than the rib-width. Two wide, deep constrictions on the last whorl of the phragmocone. Suture-line: wide E, and narrower L lobes with equal length, wide ES, asymmetrical LS, short, oblique U lobes.

*Remarks*: Based on the morphology the species is recognized as *Catulloceras* in this paper (see Rulleau and Mouterde 1997, p. 81). The Gerecse specimen is close to the holotype (Géczy 1967, Pl. 31, Fig. 8) in morphology, but differs slightly by less curved ribs, similar to what is illustrated by Levi Setti (1968, Pl. 32, Fig. 3). The species resembles *C. dumortieri* in its style of coiling, but differs by its wider interspaces. It is also similar to *C.(?) strictum* in widely spaced ribs, but differs in having a narrower suboval section (see Géczy 1967, p. 138).

*Distribution*: Levesquei Zone: Southern Spain. Upper Toarcian: Italy, North America, Bakonycsérnye (Hungary). Gerecse Mts: Aalensis Zone: Kis-Gerecse section.

*Catulloceras* sp.  
(Plate 5, Fig. 3)

<i>Measurements</i> :	D	H	h	W	w	U	u	RLW
54.2011	57	15	26.3%	10	66.6%	31	54.3%	45

*Description*: A poorly preserved, wholly septate internal mold. Evolute coiling, shallow umbilicus. Rounded margin and shoulder, slightly convex flank. Narrow, low venter, weakly developed keel bounded by narrow sulci. Subrectangular whorl-section on the inner whorls, narrow suboval section with maximum width at the lower third on the last whorl. Simple, somewhat prorsiradiate, curved ribs, projected on the venter, fade away close to the carina producing ventral grooves. The suture-line cannot be traced in all details, but is typical of *Catulloceras*.

*Remarks:* The morphology (evolute coiling, altering development) resembles that of *Dumortieria meneghinii*. The flattened ventral part with narrow sulci, however, is typical of *Catulloceras*. *C. perroudi* is a similar form in compressed subrectangular section, but differs by gradual development and straight, sharper ribs.

*Distribution:* Meneghinii Zone: Kis-Gerecse section.

#### Genus *Cotteswoldia* Buckman 1902

*Type species:* *Cotteswoldia paucicostata* Buckman 1904 (Pl. S. 23, Figs 1–3).

*Diagnosis:* Moderately evolute coiling, shallow umbilicus, rounded margin. Slightly convex flanks, high and narrow venter, ogival section. Weakly developed, irregular, simple, sinuous ribbing. Suture-line: small and wide E, slightly longer and wide L, weakly developed and straight U lobes, and wide ES and LS.

*Remarks:* The taxonomical validity of four closely related genera introduced by Buckman (*Pleydellia* 1899, *Cotteswoldia* 1902, *Canavarina* 1904, *Walkericeras* 1913) has been disputed in the literature. Arkell (1957), Géczy (1967), Donovan et al. (1981), and Jakobs and Smith (1996) regarded the latter three taxa as synonyms of *Pleydellia*; while others, such as Rulleau (1995, 2007), Rulleau et al. (2001), Seyed-Emami et al. (2008), and Metodiev (2008) classified *Cotteswoldia* and *Walkericeras* as subgenera of *Pleydellia*. For morphological criteria, *Cotteswoldia* and *Pleydellia* were treated at generic level, for instance by Fauré and Cubaynes (1983), Goy and Ureta (1988), Henriques (1992), Ohmert (1993), Schulbert (2001), Fauré (2002), Henriques and Ureta (2002), Pallini et al. (2005), and Arp (2010). As *Cotteswoldia* differs from *Pleydellia* in morphology (evolute coiling, simple, irregular ribbing) and stratigraphic distribution, this classification is adopted here. The genus appears around the boundary between the Meneghinii/Pseudoradosa and Aalensis Zones and seems to precede the first occurrence of *Pleydellia* (Ureta et al. 1999; Rulleau et al. 2001; El Hariri et al. 2006). *Cotteswoldia* disappeared in the Lugdunensis/Buckmani Subzone; it was replaced by *Walkericeras* in NW European localities. The taxonomic revision of some species which were designated primarily as *Cotteswoldia* seems to be reasonable (Ohmert 1993; Schulbert 2001; Arp 2010). The style of coiling and the furcate ribs permit, for example, the reclassification of *C. subcandida* Buckman and *C. misera* Buckman as *Pleydellia*.

In the Gerecse sections four species are represented by 13 specimens: *C. paucicostata* Buckman, *C. tenuiplicata* (Géczy), *C. cf. particostata* Buckman and *C. cf. bifax* Buckman. *C. tenuiplicata* and *C. crinita* Buckman are known from the Bakony Mts (Géczy 1967, 1968). Beside *Pleydellia*, *Cotteswoldia* was used as index taxon of the Aalensis Zone by Kovács and Géczy (2008).

*Distribution:* Meneghinii/Pseudoradosa – Aalensis Zones: Europe, North Africa, Crimea, Caucasus, Iran.

*Cotteswoldia paucicostata* Buckman, 1904  
(Plate 6, Fig. 3)

- 1904 *Cotteswoldia paucicostata* – Buckman, p. S. 133, Pl. S23, Figs 1–3  
 1966 *Cotteswoldia paucicostata* Buckman – Nutsubidze, p. 114, Pl. 23, Fig. 6  
 2001 *Pleydellia* (*Cotteswoldia*) *paucicostata* Buckman – Rulleau et al., Pl. 17, Figs 1–2  
 2002 *Cotteswoldia* gr. *paucicostata* Buckman – Fauré, p. 732, Pl. 22, Figs 15–16; Pl. 25, Fig. 5  
 2005 *Pleydellia* (*Cotteswoldia*) *paucicostata* Buckman – Seyed-Emami et al., p. 363, Fig. 6/H, I  
 2005 *Cotteswoldia paucicostata* Buckman – Pallini et al., p. 10, Pl. 5, Fig. 8  
 2008 *Pleydellia* (*Cotteswoldia*) *paucicostata* Buckman – Metodiev, Fig. 6/x

**Material:** One moderately preserved internal mold.

Measurements:	D	H	h	W	w	U	u
55.2011	100	35	35%	18	51.4%	36	36%

**Description:** Moderately evolute form, shallow umbilicus, high, steep umbilical wall, rounded margin. Slightly convex flank; narrow, high, carinate venter, fastigate on the body chamber. Ogival section with maximum width at the lower third. The body chamber is three-quarters whorl in length. Oblique, slightly projected peristome. Sharp, simple, widely spaced ribs on the inner, and dense, sigmoid, weakly developed ribs on the last whorl. Suture-line: short, wide E, slightly longer, wide L, short, straight U lobes, wide ES and LS.

**Remarks:** The Gerecse specimen agrees with the type (Buckman, 1904, Pl. S23, Figs 1–3) in morphology, but slightly differs in weakly developed ribs on the body chamber. It is very close to the specimen shown by Rulleau et al. (2001, Pl. 17, Fig. 1). *C. particostata* and *C. bifax* are similar forms in morphology, but differ by their denser ribs.

**Distribution:** Aalensis Zone: Great Britain, France, Northern Spain, Portugal, Italy, Bulgaria, North Africa, Crimea, Caucasus, Iran. Gerecse Mts: Aalensis Zone: Nagy-Pisznicse.

*Cotteswoldia tenuiplicata* (Géczy, 1967)  
(Plate 7, Fig. 2)

- v 1904 *Harpoceras* (*Grammoceras*) *laevigatum*, nov. sp. Hantken – Prinz, p. 107, Pl. 23, Fig. 1; Pl. 34–35, Fig. 7  
 v 1967 *Pleydellia laevigata* (Hantken in Prinz) – Géczy, p. 155, Text-fig. 158, Pl. 35, Fig. 1; Pl. 64, Fig. 69  
 v 1967 *Pleydellia laevigata tenuiplicata* n. subsp. – Géczy, p. 156, Text-fig. 159, Pl. 35, Fig. 2; Pl. 64, Fig. 72

**Material:** Eight internal molds in varying states of preservation (56.2011–63.2011).

Measurements:	D	H	h	W	w	U	u
56.2011	114	32	28%	15	46.8%	56	49%
57.2011	106	31	29.2%	14	45%	51	48%
58.2011	98	29	29.5%	13	44.8%	48	49%
59.2011	91	26	28.5%	12	46%	43	47.2%



*Description:* Evolute, compressed form, shallow umbilicus, low umbilical wall, rounded margin. Slightly convex flank; narrow, high, carinate venter. Ogival whorl-section with maximum width at the lower third. The body chamber is about three-quarters whorl in length. Well-developed, simple, straight, rectiradiate ribs, rise from the umbilicus, curve forward on the ventrolateral part, fade away at the keel. The interspaces are the same as the rib-width. About 40 ribs are characteristic on the last whorl of the phragmocone. Weakly-developed sculpture on the body chamber. Suture-line: moderately wide E, longer and wide, somewhat asymmetrical L, short, slightly oblique U lobes, wide ES, narrower LS.

*Remarks:* Since the two *P. laevigata* specimens described by Prinz (1904) differ in ornamentation, a subspecies was designated by Géczy (1967) assigning the specimen illustrated by Prinz (l.c.) on Plate 23 (Fig. 1) as type. All Gerecse specimens with relatively dense ribs are closer to *P. laevigata tenuiplicata* Géczy. Based on this material and the lack of a detailed record of *P. laevigata* from other localities, the subspecies is recognized as a specific form, and emended at species level here. The morphology and the suture construction agree with those of *Cotteswoldia*; therefore the new taxon is placed in this genus. The Gerecse specimens are close to the type; however, the irregular bifurcation of ribs (Géczy 1967, p. 156) cannot be traced. The species differs from other *Cotteswoldia* in morphology by marked evolute coiling. Outside of Hungary *C. tenuiplicata* was recorded from Morocco (Benshili 1989, p. 165) without any description.

*Distribution:* Aalensis Zone: Morocco. Upper Toarcian: Bakony Mts (Hungary). Gerecse Mts: Aalensis Zone: Nagy-Pisznice, Kis-Gerecse.

*Cotteswoldia* cf. *particostata* Buckman, 1904  
(Plate 6, Fig. 2)

1904 *Cotteswoldia particostata* – Buckman, p. S.133, Pl. S23, Figs 5–7

1940 *Cotteswoldia particostata* Buckman – Gérard and Bichelonne, p. 36, Pl. 9, Fig. 1

1995 *Pleydellia (Cotteswoldia) particostata* Buckman – Rulleau, p. 6, Pl. 11, Fig. 7

1995 *Pleydellia (Cotteswoldia) aff. particostata* Buckman – Rulleau, Pl. 12, Fig. 1

2007 *Pleydellia (Cotteswoldia) particostata* Buckman – Rulleau, p. 93, Pl. 53, Fig. 9

*Material:* One deformed internal mold (64.2011: D. appr. 86).

*Description:* Moderately evolute form, shallow umbilicus, low umbilical wall, rounded margin. Slightly convex flank; narrow, high, carinate venter. Ogival section with maximum width at the lower third. The preserved body chamber is a half whorl in length. Sharp, simple ribs on the inner, and denser, sigmoid, weakly developed ribs on the last whorl. The suture line cannot be traced in all details, but is typical of *Cotteswoldia*.

*Remarks:* The Gerecse specimen agrees with the type (Buckman 1904, Pl. S23, Figs 5–7), but differs slightly in somewhat widely spaced ribs on the inner whorls, and weakly developed ribs on the body chamber. It is close to *P. (C.) aff. particostata*

shown by Rulleau (1995, Pl. 12, Figs 1–2). *C. paucicostata* is close in morphology, but characterized by a rounded umbilical wall and stronger ribs. *C. bifax* is similar in style of coiling, but differs in having denser ribs.

*Distribution:* Aalensis Zone: Great Britain, France, Northern Spain, Morocco. Gerecse Mts: Aalensis Zone: Nagy-Pisznicse section.

*Cotteswoldia* cf. *bifax* Buckman, 1904  
(Plate 4, Fig. 2)

- 1904 *Cotteswoldia bifax*– Buckman, p. S136, Fig. 110A  
 1940 *Cotteswoldia bifax* Buckman – Gérard and Bichelonne, p. 36, Pl. 11, Fig. 6  
 1988 *Cotteswoldia bifax* Buckman – Goy and Ureta, p. 25, Pl. 1, Figs 6–7  
 1995 *Pleydellia (Cotteswoldia) bifax* Buckman – Rulleau, Pl. 10, Fig. 7; Pl. 11, Figs 8–9  
 2005 *Pleydellia (Cotteswoldia) bifax* Buckman – Seyed-Emami et al., p. 362, Fig. 6/K, L  
 v 2007 *Pleydellia (Cotteswoldia) bifax* Buckman – Galácz et al., p. 348, Fig. 4/10  
 2008 *Pleydellia (Cotteswoldia) bifax* Buckman – Seyed-Emami et al., p. 252, Fig. 5/P

*Material:* One fragmentary internal mold.

<i>Measurements:</i>	D	H	h	W	w	U	u
65.2011	88	26	29.5%	12	46%	39	44.3%

*Description:* Evolute, compressed form, shallow umbilicus, rounded margin, slightly convex flank, narrow, high, rounded venter. Carina cannot be traced. High suboval whorl-section with maximum width above the margin. The preserved body chamber is a half whorl in length. Strong, rectiradiate ribs on the inner, less developed and more widely-spaced ribs on the external whorls. The suture-line is typical of *Cotteswoldia*.

*Remarks:* The specimen is similar to the type (Buckman 1904, p. S136, Fig. 110A), and to the specimens shown by Rulleau (1995, Pl. 11, Figs 8–9) and Seyed-Emami et al. (2005, Fig. 6/L) in morphology, but differs in having weaker ribs on both the penultimate and the last whorls. The weakly-developed sculpture resembles that of *Pleydellia leura* (Buckman), but it is a more involute form with a higher umbilical wall, and bears widely-spaced simple ribs on the inner whorls.

*Distribution:* Aalensis Zone: England, France, northern Spain, Italy, Bulgaria, Iran. Gerecse Mts: Aalensis Zone: Tölgyhát (A) section.

Genus *Pleydellia* Buckman, 1899

*Type species:* *Ammonites aalensis* Zieten, 1832; designated by Buckman (1904). The mold of the type specimen was re-illustrated by Rulleau (1995, Pl. 13, Figs 8–9) and Elmi et al. (1997, Pl. 11, Figs 15–16).

*Diagnosis:* Moderately evolute to involute, compressed coiling, shallow umbilicus, rounded margin. Slightly convex flanks, high and narrow venter, ogival to subtriangular section. Strong to weak sinuous ribbing. Bifurcation is

characteristic near the margin. Weakly-developed suture line with wide E, slightly longer and wide L, small, straight U lobes, wide ES and LS.

*Remarks:* There is no consensus on the taxonomic interpretation of the genus and the arrangement of species, primarily assigned as *Cotteswoldia*, *Pleydellia*, *Walkericeras* or *Canavarina*. Some arguments suggest reduction in the literature: the elemental constructions of the lobes are almost identical; the morphologies of different species are similar: the differences in the style of coiling might be interpreted within a single genus; the sections resemble each other and the sculptures show only moderate differences. The stratigraphic ranges of the genera, however, differ. Only the validity of *Pleydellia* was accepted by Arkell (1957), Géczy (1967), Donovan et al. (1981), and Jakobs and Smith (1996); the validity of *Walkericeras* was rejected, and the respective species were reclassified as *Cotteswoldia*, for instance by Ohmert (1993), Schulbert (2001) and Arp (2010); *Cotteswoldia*, *Walkericeras* and *Canavarina* (?) were considered as subgenera of *Pleydellia*, among others by Rulleau et al. (2001), while *Cotteswoldia* and *Pleydellia* were recognized at generic level with the subgenus *P.* (*Walkericeras*) by Fauré (2002). *Pleydellia* is thought to derive from *Dumortieria*; it flourished during the Aalensis Zone, and disappeared in the lowermost Opalinum Subzone.

In the Gerecse material a single species is represented by seven poorly-preserved specimens of *Pleydellia* (*Pleydellia*) *subcompta* (Branco). Prior to the above-mentioned great collection work, two "*Harpoceras aalense* Zieten (var.)" specimens were described by Staff (1906, pp. 208–209) from Nagy-Pisznice Hill. Figures were not provided, but the author referred to the *P. aalensis* specimen illustrated by Buckman (1904, Pl. 32, Fig. 4) as the closest example, which was later regarded as *P.* (*Walkericeras*) *lugdunensis* Elmi et Rulleau by Elmi et al. (1997). Staff's specimens cannot be traced now, and the subsequent collection works have not yielded this important index taxon, so its occurrence in the Gerecse Mts remains uncertain. The diversity of the genus was higher in the Csernye section: six species were recorded by the present classification: *P. subcompta*, *P. aalensis*, *P. mactra* (Dumortier), *P.?* *hammatoceratoides* Géczy, *P.?* (*Walkericeras*) *dudelangensis* Maubeuge and *P.* (*Walkericeras*) *burtonensis* (Buckman) (Géczy 1967). Three species are known from Úrkút: *P.* cf. *aalensis*, *P.* (*Walkericeras*) cf. *dudelangensis*, and *P.* (*Walkericeras*) cf. *burtonensis* (Géczy 1968), and one from Szentgál. The *P.* cf. *subcompta* recorded from the latter section (Géczy 1975) is recognized here as *P.* cf. *aalensis*.

*Distribution:* Aalensis Zone: worldwide range. Aalensis Zone – Opalinum Subzone: Germany, Portugal, northern Spain.

*Pleydellia* (*Pleydellia*) *subcompta* (Branco, 1879)  
(Plate 6, Fig. 1)

1879 *Harpoceras subcomptum* n. sp. – Branco, p. 90, Pl. 5, Figs 3–4

1966 *Grammoceras subcomptum* Branco – Nutsbidze, p. 99, Pl. 22, Figs 1–2 (cum syn.)

- 1967 *Pleydellia* cf. *subcompta* (Branco) – Géczy, p. 150, Text-fig. 151; Pl. 34, Fig. 1; Pl. 64, Fig. 64  
 1985 *Pleydellia subcompta* (Branco) – Seyed-Emami and Nabavi, p. 264, Figs 30–31  
 1994 *Pleydellia (Pleydellia) subcompta* (Branco) – Goy et al., Pl. 2, Fig. 8  
 1995 *Pleydellia subcompta* (Branco) – Rulleau, Pl. 13, Figs 4–6  
 1997 *Pleydellia subcompta* (Branco) – Metodiev, p. 22, Pl. 4, Fig. 6  
 2000 *Pleydellia subcompta* (Branco) – Henriques, Pl. 1, Fig. 2  
 2001 *Cotteswoldia subcompta* (Branco) – Schulbert, p. 85, Text-fig. 4.4/e; Pl. 11, Figs 1–2, 5, 9–10; Pl. 30, Fig. 1 (cum syn.)  
 2002 *Pleydellia (P. ?) subcompta* (Branco) – Fauré, p. 730, Pl. 22, Fig. 11  
 2004 *Pleydellia subcompta* (Branco) – Myczynski, p. 66, Fig. 25/4  
 2005 *Pleydellia (Pleydellia) subcompta* (Branco) – Pallini et al., p. 10, Pl. 4, Fig. 7  
 2008 *Pleydellia (Pleydellia) subcompta* (Branco) – Seyed-Emami et al., p. 251, Fig. 5/H  
 2010 *Pleydellia subcompta* (Branco) – Arp, p. 41, Pl. 2, Figs 17–18

**Material:** Four internal moulds in varying states of preservation (66.2011–69.2011).

Measurements:	D	H	h	W	w	U	u
67.2011	80	26	32.5%	10	38.4%	34	42.5%

**Description:** Moderately evolute, compressed form, shallow umbilicus, low umbilical wall, rounded margin. Slightly convex flank; narrow, high venter, fine, sharp keel. Flattened-oval whorl-section with maximum width at one-fourth of the whorl height. Whole body chamber not preserved. Fine, dense, sinuous ribs bundling in four or five at the margin on the inner whorls. Less developed, widely spaced ribs without bundles on the last whorl of the phragmocone. Suture line: short, wide E, longer, wide L, small, straight U lobes, wide ES and LS.

**Remarks:** The specimens are close to the type (Branco, 1879, Pl. 5, Fig. 3) in morphology, and to the specimens illustrated, for instance, by Benecke (1905, Pl. 46, Fig. 2), Seyed-Emami and Nabavi (1985, Fig. 31), Goy et al. (1994, Pl. 2, Fig. 8), and Rulleau (1995, Pl. 13, Figs 4–6). Apart from the fasciculate ribbing of *P. subcompta*, *P. mactra* (Dumortier) differs in having finer and regular ribs, while *P. aalensis* bears coarser sculpture. The species was classified as *Cotteswoldia* by Ohmert (1993), Ohmert and Rolf (1994), and Schulbert (2001) due to its evolute coiling and suture-construction, but this arrangement has not been accepted in the literature.

**Distribution:** Aalensis Zone: Europe, North Africa, Caucasus, Iran. Upper Toarcian: Bakonycsérnye (Hungary). Gerecse Mts: Aalensis Zone: Nagy-Pisznice and Tölgyhát (A) sections.

Subfamily Tmetoceratinae Spath, 1936  
 Genus *Tmetoceras* Buckman, 1892

**Type species:** *Ammonites scissus* Benecke, 1865; designated by Buckman (1892).

**Diagnosis:** Moderately evolute to evolute, planulate coiling, convex flanks, low venter with deep median groove, subrectangular to subcircular whorl-section.

Sharp, strong, straight, simple ribs; constrictions can be present. Simple suture-line with short E, long L, small, straight U lobes, wide, slightly divided ES and LS. *Remarks:* The genus was recently discussed by Callomon and Chandler (1994), Rulleau and Mouterde (1997), Fernández-López et al. (1999a, 1999b), Rulleau et al. (2001), Venturi and Ferri (2001), Sandoval (2002), Myczynski (2004), Pallini et al. (2005) and Venturi et al. (2010). *Tmetoceras* appeared in the Late Toarcian, flourished during the Aalenian, and disappeared in the Concavum Zone. According to morphologic criteria it is thought to derive from *Catulloceras* but the dissimilar suture constructions raise difficulties in phylogenetic interpretations (Schindewolf 1964). Nor is there any consensus in the literature on the successors of *Tmetoceras*. The genus is characterized by sexual dimorphism; microconchs were recorded from Alaska, South America, England, Spain, Portugal and Poland.

In the Gerecse assemblage a single species is represented by 3 specimens of *T. scissum* (Benecke). The species was abundant in Bakonycsérnye with 39 specimens, and also known from Úrkút (Géczy 1967, 1968). Although in remarkably low numbers, *T. scissum* does occur in three Gerecse sections.

*Distribution:* Upper Aalensis Zone – Aalenian: Mediterranean and NW European Provinces. Aalenian: worldwide range.

*Tmetoceras scissum* (Benecke, 1865)  
(Plate 5, Figs 2, 4)

- 1865 *Ammonites scissus* – Benecke, p. 170, Pl. 6, Fig. 4
- v 1967 *Tmetoceras scissum* (Benecke) – Géczy, p. 160, Text-fig. 162; Pl. 35, Figs 3–7; Pl. 64, Figs 73–74 (cum syn.)
- 1994 *Tmetoceras scissum* (Benecke) – Callomon and Chandler, p. 27, Pl. 5, Figs 2–3; Pl. 6, Fig. 3; Pl. 8, Figs 2–4
- 1999a *Tmetoceras scissum* (Benecke) – Fernández-López et al., p. 94, Text-figs 2–4; Fig. 8/A–N; Fig. 9/F–Q (cum syn.)
- 1999b *Tmetoceras scissum* (Benecke) – Fernández-López et al., Text-figs 4, 8, 10, 12, 14, 16; Fig. 3/A–D, F–G
- 2002 *Tmetoceras scissum* (Benecke) – Sandoval, p. 163, Figs 101–102
- 2004 *Tmetoceras scissum* (Benecke) – Myczynski, p. 71, Fig. 26/4–6
- 2005 *Tmetoceras scissum* (Benecke) – Pallini et al., p. 11, Pl. 5, Figs 1–2
- 2007 *Tmetoceras scissum* (Benecke) – Rulleau, p. 93, Pl. 52, Fig. 7

*Material:* Three poorly preserved internal molds (70.2011–72.2011).

<i>Measurements:</i>	D	H	h	W	w	U	u	RLW
70.2011	72	20	27.7%	18	90%	37	51.4%	52
71.2011	51	13	25.5%	10	77%	27	53%	44(?)

*Description:* Evolute form, relatively deep umbilicus, rounded margin. Convex flank, low venter, deep median ventral groove. Rounded subrectangular whorl-section. Whole body chamber not preserved. Sharp, straight, rectiradiate, simple ribs interrupted by ventral groove. Three constrictions on the last whorl. No visible suture line.

*Remarks:* The Gerecse specimens are close to the type (Benecke, 1865, Pl. 6, Fig. 4), as well as to the specimens illustrated by Géczy (1967, Pl. 35, Figs 4–7), and more recently for instance by Fernández-López et al. (1999a, Fig. 8/A–C, E–F, J; Fig. 9/K, M–N) and Sandoval (2002, Fig. 102/a–d, k–l). The species is characterized by slight variability in density and direction of the ribs. *T. difalense* (Gemmellaro) differs in more involute coiling and sigmoid ribs, while *T. regleyi* (Thiolliere in Dumortier) is characterized by wider whorls with a subcircular section.

*Distribution:* see the genus. Bakony Mts (Hungary): Aalenian. Gerecse Mts: Opalinum Zone: Kis-Gerecse, Comptum Subzone: Tölgyhát (A), Murchisonae Subzone: Nagy-Pisznice sections.

### Conclusions

The taxonomic study of the Toarcian–Aalenian Ammonitina assemblage of the Gerecse Mts identified 15 species that belong to the Tmetoceratidae. The uppermost Toarcian fauna is characterized by the abundance of the subfamily Dumortieriinae with the dominance of *Dumortieria*. The diversity of *Dumortieria*, *Catulloceras* and *Tmetoceras* is similar to that known from the Bakony Mts, and characterized mainly by Mediterranean taxa, whereas the diversity of the cosmopolitan *Cotteswoldia* is higher, and that of *Pleydellia* much lower. The taxonomic composition of the Tmetoceratidae fauna is very similar to that of other Mediterranean localities. Some genera allowed recognizing the Meneghinii and Aalensis chronozones without, however, further subzonal-level subdivisions. All taxa described from the Meneghinii Zone are typical of the standard Levesquei Subzone; beside the fine-ribbed group of *Dumortieria* the genera *Hudlestonia* and *Pseudolioceras* are absent from the fauna, so the Pseudoradiosa Subzone cannot be recognized. The co-occurrence of *D. meneghinii* and *D. evolutissima* with *Pleydellia* and *Cotteswoldia* in the lower Aalensis Zone is explained by the highly condensed nature of the Upper Toarcian strata of the Gerecse sections. The *Pleydellia* and *Cotteswoldia* species in the studied sections are characteristic of the standard Maetra Subzone, whereas taxa that are typical of the Aalensis/Lugdunensis Subzone in the NW European region (e.g. *Pleydellia buckmani* Maubeuge, *P. fluens* Buckman, *P. leura* Buckman, or the subgenus *Walkericeras*) are unknown from the Gerecse material. *Tmetoceras* is widely distributed in the Aalenian of different Mediterranean localities of Hungary, but is less abundant in the Gerecse than in the Bakony Mts.

### Acknowledgements

I thank the following for professional help: Barnabás Géczy, András Galác, Miklós Kázmér, József Pálfy and István Sente (Eötvös Loránd University, Budapest), Soledad Ureta (Madrid), Louis Rulleau (Lyon), Federico Venturi (Perugia) and Stefano Sassaroli (Rosora). Constructive reviews by José Sandoval (Granada) and Maria Helena Henriques (Coimbra) helped improve the manuscript.

Plate 1

All illustrated specimens are coated with ammonium chloride, and shown in natural size (except Pl. 3, Fig. 1). The beginning of the body chamber is marked by an arrow. Inventory numbers of the Natural History Museum of the Faculty of Science, Eötvös Loránd University, are given in parentheses.

Fig. 1a–b. *Dumortieria meneghinii* (Zittel in Haug), (10.2011), Kis-Gerecse, Meneghinii Zone. Ventral and lateral views

Fig. 2. *Dumortieria meneghinii* (Zittel in Haug), (08.2011), Bánya-hegy, Meneghinii Zone. Lateral view

Plate 2

Fig. 1. *Dumortieria levesquei* (d'Orbigny), (03.2011), Nagy-Pisznice, Meneghinii Zone. Lateral view

Fig. 2. *Dumortieria* cf. *tabulata* Buckman, (45.2011), Kis-Gerecse, Aalensis Zone. Lateral view

Fig. 3a–b. *Dumortieria latumbilicata* (Géczy), (43.2011), Nagy-Pisznice, Aalensis Zone. Lateral and ventral views

Fig. 4. *Dumortieria meneghinii* (Zittel in Haug), (11.2011), Kis-Gerecse, Meneghinii Zone. Lateral view

Plate 3

Fig. 1a–b. *Dumortieria evolutissima* Prinz, (31.2011), Nagy-Pisznice, Aalensis Zone. Ventral and lateral views,  $\times 0.9$

Fig. 2a–b. *Catulloceras panonicum* (Géczy), (51.2011), Nagy-Pisznice, Aalensis Zone. Lateral and ventral views

Plate 4

Fig. 1a–b. *Dumortieria striatulocostata* (Quenstedt), (44.2011), Kis-Gerecse, Meneghinii Zone. Lateral and ventral views

Fig. 2a–b. *Cotteswoldia* cf. *bifax* Buckman, (65.2011), Tölgyhát (A), Aalensis Zone. Lateral and ventral views

Fig. 3. *Catulloceras dumortieri* (Thiolliere in Dumortier), (46.2011), Nagy-Pisznice, Aalensis Zone. Lateral view

Plate 5

Fig. 1a–b. *Catulloceras raricostatum* (Géczy), (53.2011), Kis-Gerecse, Aalensis Zone. Ventral and lateral views

Fig. 2a–b. *Tmetoceras scissum* (Benecke), (71.2011), Tölgyhát (A), Comptum Subzone. Ventral and lateral views

Fig. 3a–b. *Catulloceras* sp., (54.2011), Kis-Gerecse, Meneghinii Zone. Ventral and lateral views

Fig. 4. *Tmetoceras scissum* (Benecke), (70.2011), Nagy-Pisznice, Murchisonae Subzone. Lateral view

Fig. 5. *Dumortieria levesquei* (d'Orbigny), (04.2011), Nagy-Pisznice, Aalensis Zone. Lateral view

Plate 6

Figs 1a–b. *Pleydellia (Pleydellia) subcompta* (Branco), (67.2011), Nagy-Pisznice, Aalensis Zone. Lateral and ventral views

Fig. 2. *Cotteswoldia* cf. *particostata* Buckman, (64.2011), Nagy-Pisznice, Aalensis Zone. Lateral view

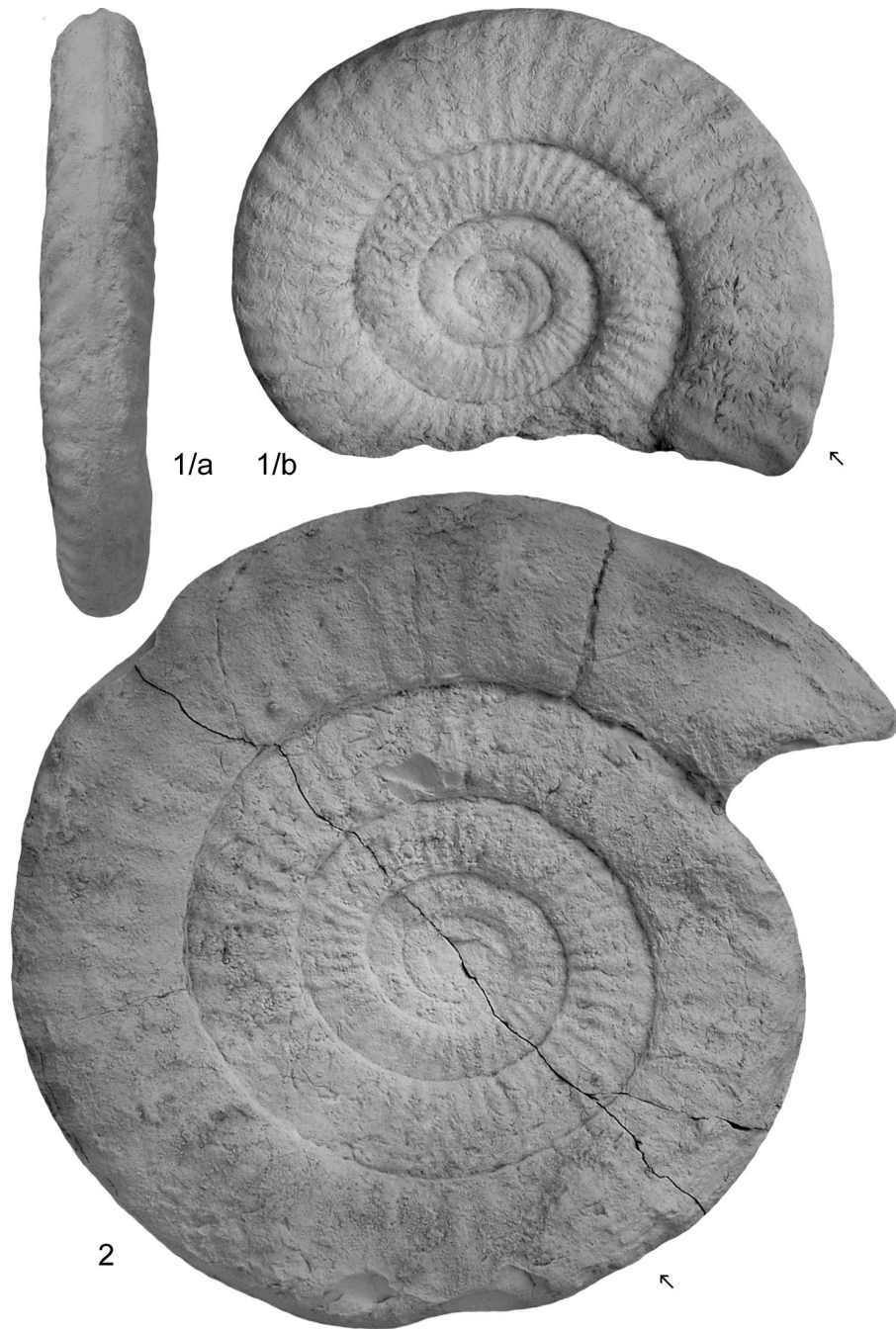
Fig. 3a–b. *Cotteswoldia paucicostata* Buckman, (55.2011), Nagy-Pisznice, Aalensis Zone. Ventral and lateral views

Plate 7

Fig. 1a–b. *Dumortieria evolutissima* Prinz, Tölgyhát (A), (33.2011), Aalensis Zone. Lateral and ventral views

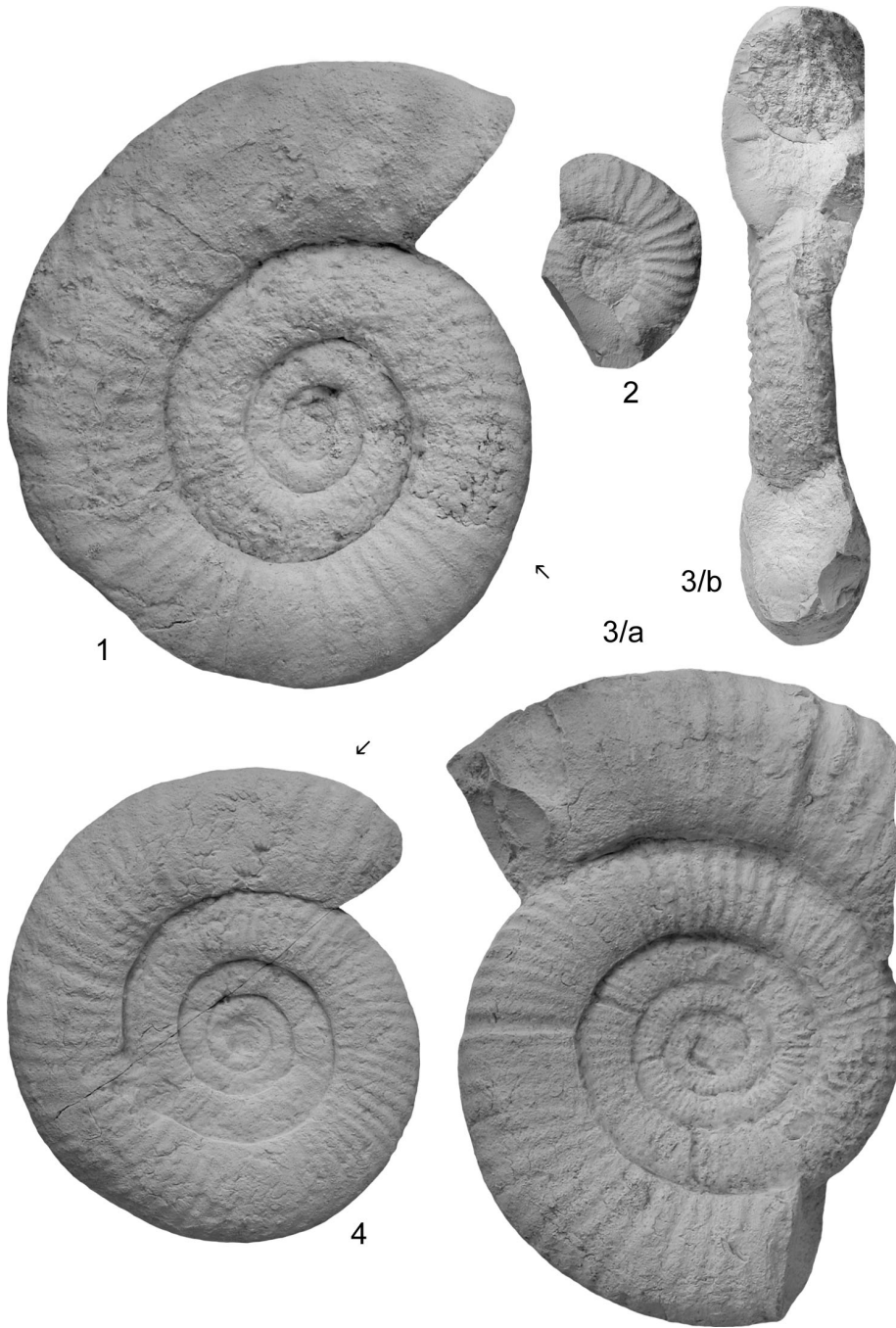
Fig. 2a–b. *Cotteswoldia tenuiplicata* (Géczy), (56.2011), Nagy-Pisznice, Aalensis Zone. Ventral and lateral views

*Plate 1*

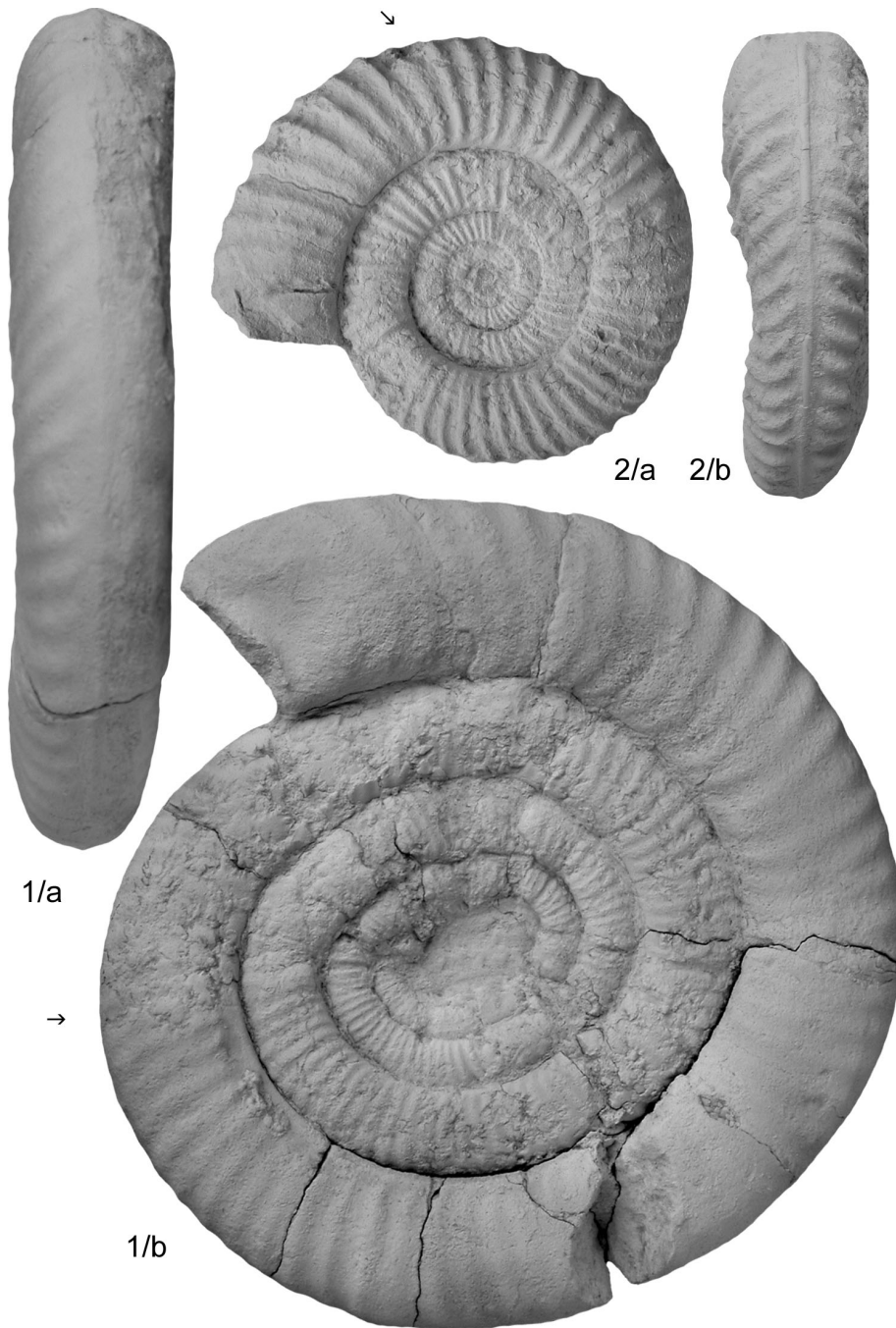




**Plate 2**



*Plate 3*



**Plate 4**

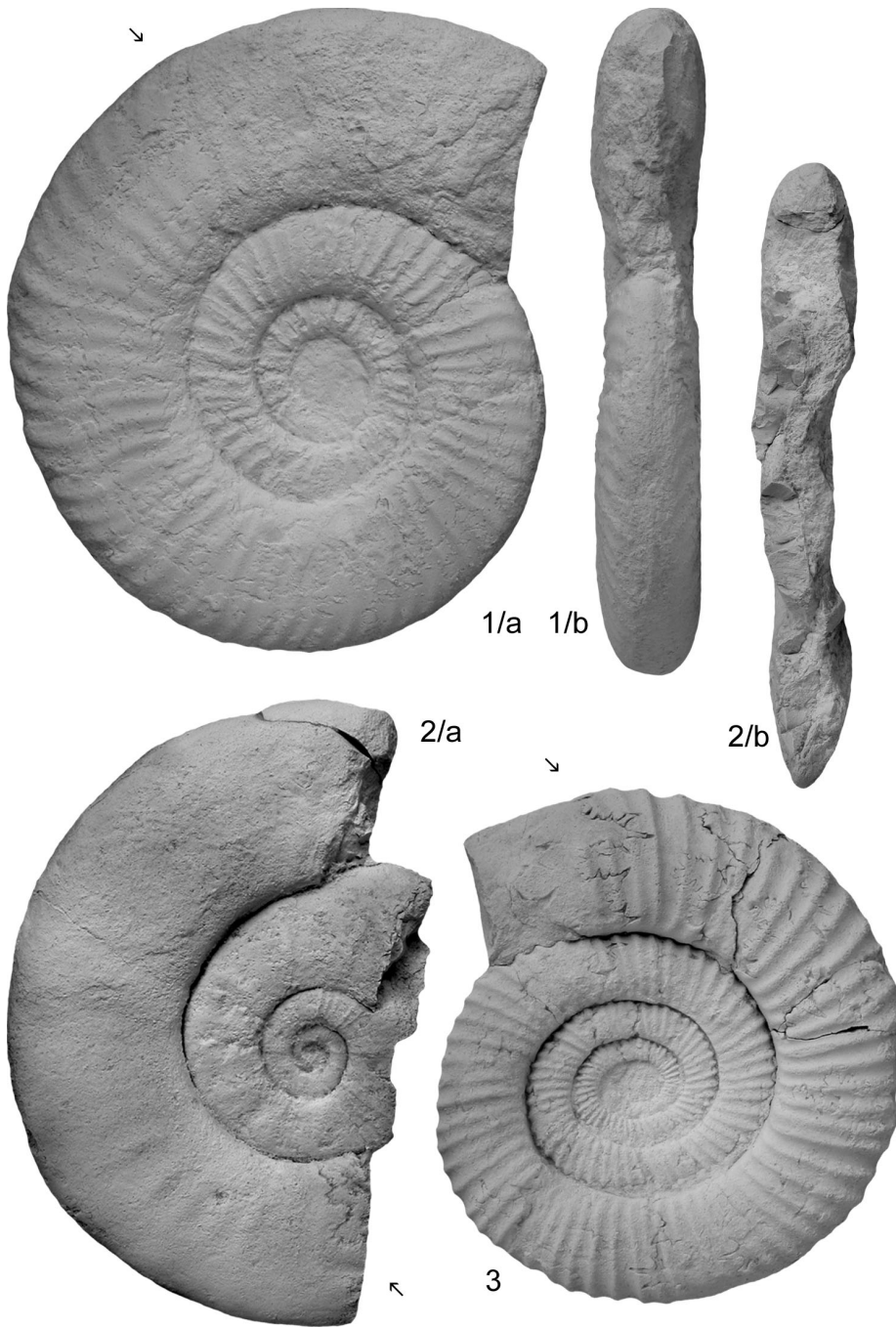
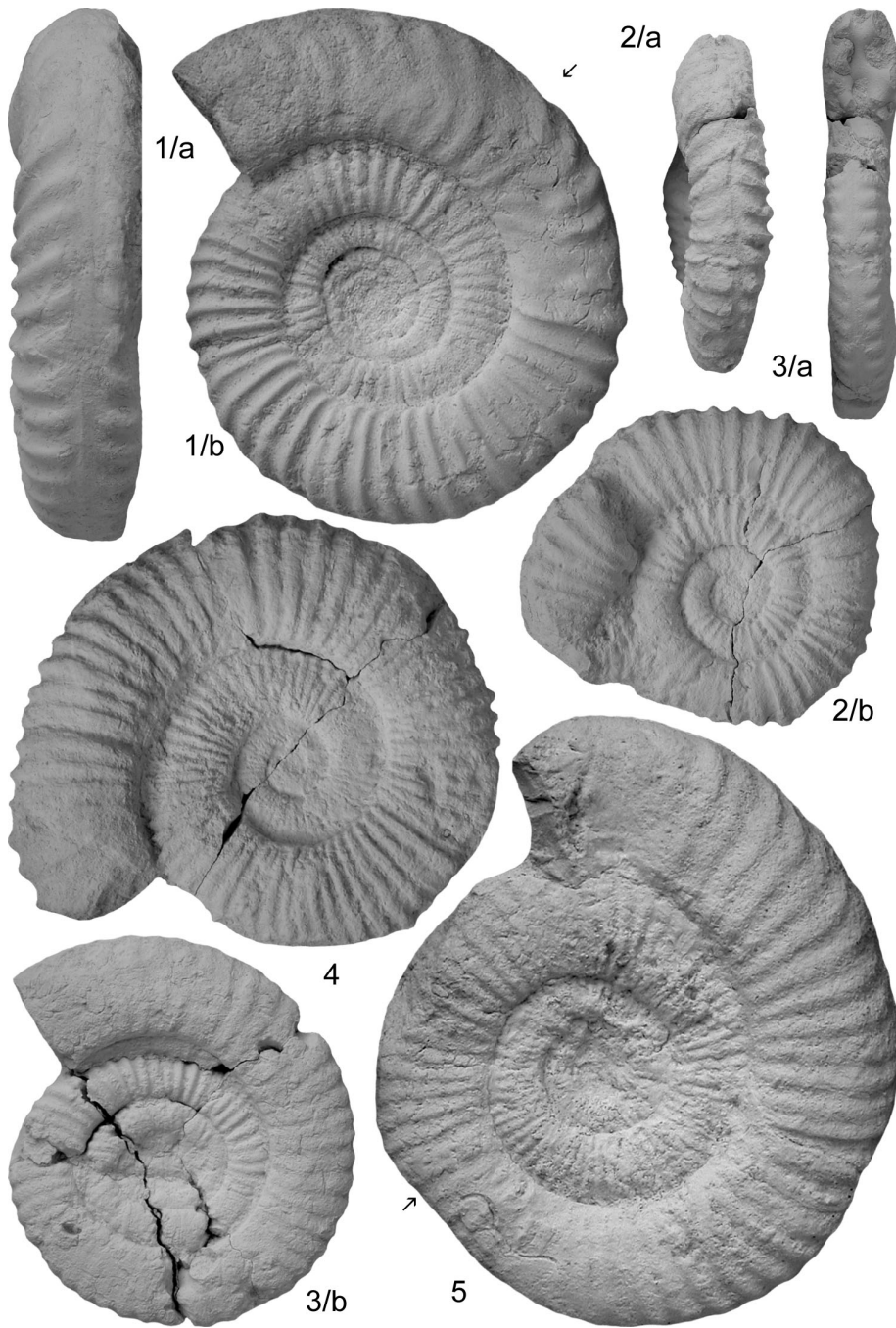
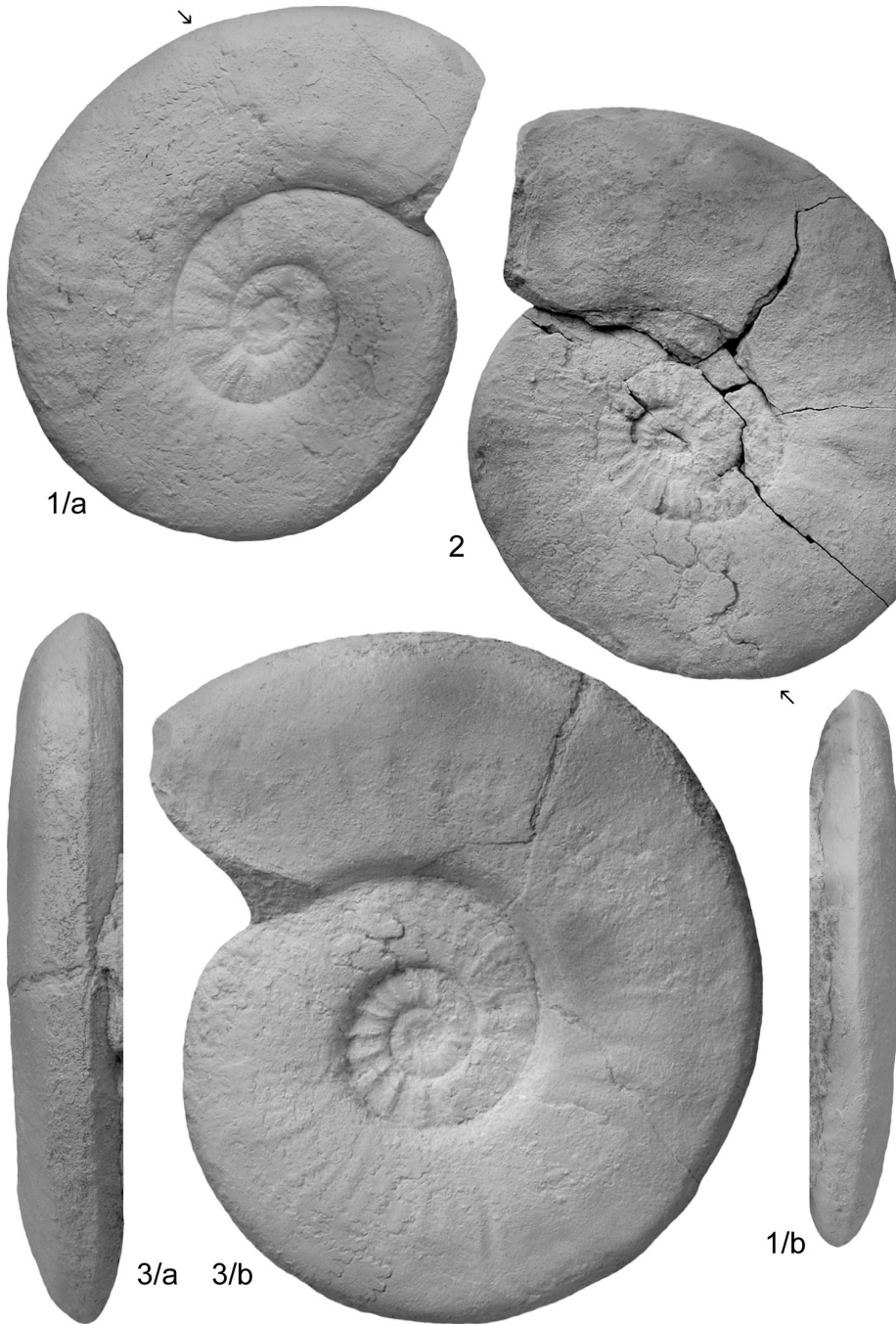


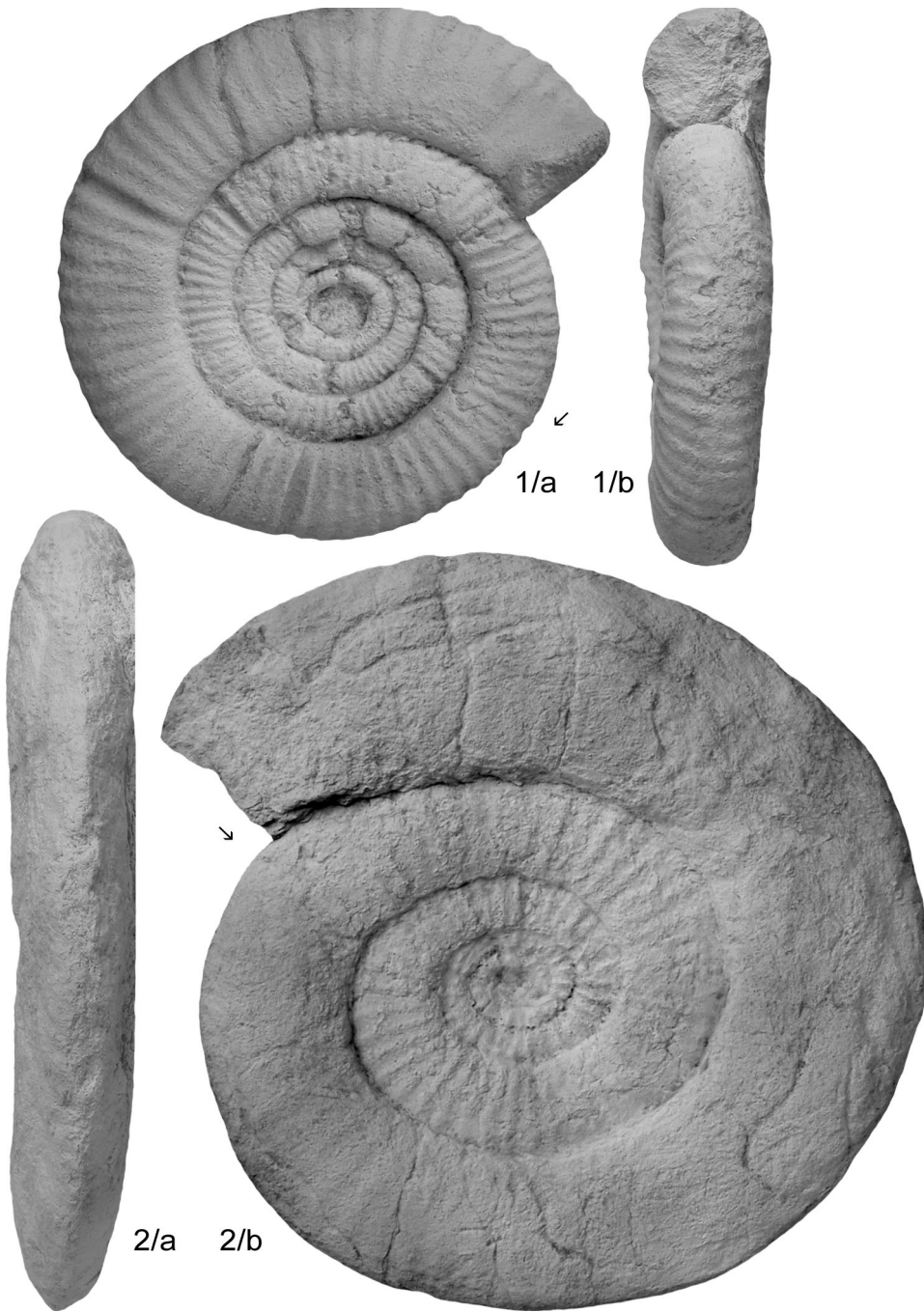
Plate 5



**Plate 6**



*Plate 7*



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