

Paroniceratidae (Ammonitina) of the Toarcian from the Gerecse Mts (NE Transdanubian Range, Hungary)

Zoltán KOVÁCS

Department of Pedagogy, Liszt Ferenc University, Budapest (kzkovacsoltan@gmail.com)

Toarci Paroniceratidae (Ammonitina) fauna a Gerecse hegységéből

Összefoglalás

A Gerecse hegység jura (toarci–aalen) ammonoidea faunája közismerten a Mediterrán Provinciához tartozik. A fauna, melynek részletes feldolgozása az 1980-as években kezdődött, nemrég ismét a hazai őslénytan érdeklődési körébe került. Tanulmányom ehhez a kutatáshoz kíván hozzájárulni a Paroniceratidae (Hildocerataceae) családdhoz tartozó három genus (*Frechiella*, *Paroniceras*, *Oxyparoniceras*) gerecsei példányainak bemutatásával; illetve sztratigráfiai és paleobiogeográfiai kérdések áttekintésével. A család tudománytörténete magyar vonatkozásokat is tartalmaz: a *Frechiella* genus PRINZ Gyula alapította 1904-ben; VIGH Gyula 1927-ben ismertette a *Paroniceras* első magyarországi előfordulását; GÉCZY Barnabás pedig két tanulmányban is foglalkozott a *Frechiella* bakonyi elterjedésével (1967a, 1967b). Kilenc faj leírása és ábrázolása található jelen cikkben: *Frechiella subcarinata* (YOUNG & BIRD), *Frechiella kammerkarensis* (STOLLEY), *Frechiella venantii* (CATULLO), *Frechiella achillei* RENZ, *Paroniceras sternale* (BUCH in D'ORBIGNY), *Paroniceras helveticum* RENZ, *Paroniceras* cf. *bisbinensis* RENZ, *Oxyparoniceras (Oxyparoniceras) telemachi* (RENZ), *Oxyparoniceras (Oxyparoniceras) buckmani* (BONARELLI). A gerecsei fauna jelentőségét mutatja, hogy lehetővé vált az *Oxyparoniceras* genus magyarországi dokumentálása.

Tárgyszavak: *Paroniceratidae*, *Ammonitina*, *toarci*, *jura*, *Gerecse hegység*

Abstract

The Toarcian–Aalenian Ammonoidea fauna of the Gerecse Mts belongs to the Mediterranean Province of the Mediterranean–Caucasian Realm. In this paper the Toarcian Paroniceratidae (Hildocerataceae), represented by genera *Frechiella*, *Paroniceras*, and *Oxyparoniceras* are detailed; furthermore, stratigraphical distributions are briefly discussed. Nine species are described and figured: *Frechiella subcarinata* (YOUNG & BIRD), *Frechiella kammerkarensis* (STOLLEY), *Frechiella venantii* (CATULLO), *Frechiella achillei* RENZ, *Paroniceras sternale* (BUCH in D'ORBIGNY), *Paroniceras helveticum* RENZ, *Paroniceras* cf. *bisbinensis* RENZ, *Oxyparoniceras (Oxyparoniceras) telemachi* (RENZ), *Oxyparoniceras (Oxyparoniceras) buckmani* (BONARELLI). The latter are the first *Oxyparoniceras* records from Hungary.

Key words: *Paroniceratidae*, *Ammonitina*, *Toarcian*, *Jurassic*, *Gerecse Mts*, *Hungary*

Introduction

The Toarcian–Aalenian ammonoids of the Gerecse Mts represent a typical Mediterranean fauna with the dominance of Phylloceratina and Lytoceratina; however, characteristic NW European Ammonitina taxa are also recognizable. The Gerecse ammonoid material, and its palaeobiogeographic evaluation was analysed by GÉCZY (1985, 1990), GÉCZY & SZENTE (2007), GÉCZY et al. (2008), KOVÁCS & GÉCZY (2008) and KOVÁCS (2009). The aim of the present paper is

to describe specimens which belong to the family Paroniceratidae.

Here, ammonite successions of four eastern Gerecse exposures are examined (Figure 1). A detailed geological framework of the Jurassic of the Gerecse Mts was recently rendered by CSÁSZÁR et al. (1998) and by GÉCZY & SZENTE (2007). Accordingly, relatively complete Lower Jurassic successions can be studied in the eastern part of the Gerecse Mts. The Upper Triassic Dachstein Limestone is overlain by a sequence of deeper-water limestone. The latter belongs to

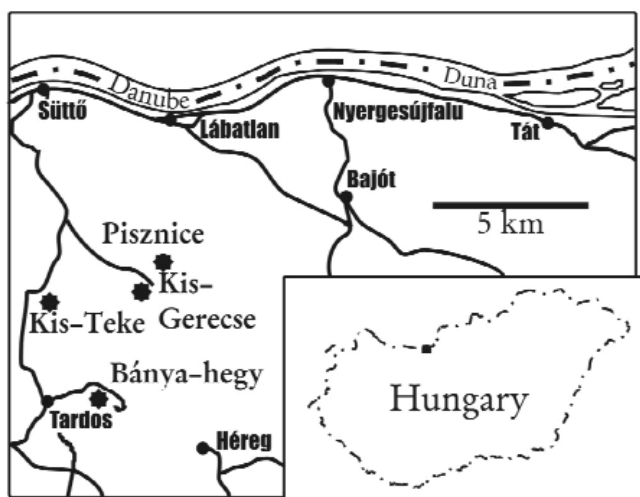


Figure 1. Location of the examined Toarcian sections in the Gerecse Mts

I. ábra. Toarci szelvények a Gerecse hegységben

the mainly pink, rarely grey, well-bedded Pisznice Limestone of 35 m average thickness. This unit is ranged to the Sinemurian and the Lower Pliensbachian. It is overlain by the thinner (1–2 m) Tűzkövesárok Formation, which is thought to represent the Upper Pliensbachian. The carbonate-dominated succession is replaced by the “Ammonitico Rosso” facies, which developed in two subfacies. The thin-bedded, red nodular marl with variable carbonate and clay content (Kisgerecse Marl Formation: 0.5–6 m) is typical of the Toarcian (Tenuicostatum to Meneghinii Zones). It is followed by the Tölgyhát Limestone Formation in the Late Toarcian. This well-bedded, red, hard nodular limestone dominates the Aalenian, and it can be traced up to the Humphriesianum Zone of the Bajocian. Both subfacies are rich in ammonoid assemblages; however the Upper Toarcian – Aalenian fauna mainly consists of moderately preserved internal moulds.

The Middle Toarcian sequences of the Pisznice, Kis-Gerecse, and Bánya-hegy sections were documented by GÉCZY & SZENTE (2007), while the Kis-Teke-hegy section were studied by GÉCZY et al. (2008). The stratigraphic subdivision of the lower Middle Toarcian of the Gerecse sections, which was provided by GÉCZY & SZENTE (2007) on the bases of frequent Hildoceratinae species, is accepted in this paper. Applying the scheme of ELMI et al. (1997) for the Bifrons Zone, two subzones and six horizons can be established: the Sublevisoni Subzone (Sublevisoni, Tethysi, Lusitanicum horizons), and the Bifrons Subzone (Apertum, Bifrons, Semipolitum horizons). However, due to condensation, the Tethysi–Lusitanicum, and the Apertum–Bifrons horizons cannot be distinguished in all sections. As the material is inadequate for such an accurate subdivision of the Gradata Zone, GÉCZY & SZENTE (2007) revised the scheme proposed by PARISI et al. (1998), and subdivided the zone into three subzones. The lower boundary of the Clausus Subzone coincides with the first occurrence of *Merlaites clausus* (MERLA) or *Crassiceras* taxa. The base of the Subregale Subzone is defined by the first appearance of

Pseudogrammoceras subregale PINNA, or *Podagrosites*. The Alticarinus Subzone is indicated by the presence of *Merlaites alticarinus* (MERLA), however, the species persisted in the Bingmanni Subzone as well. The base of the Thouarsense Zone coincides with the appearance of *Pseudogrammoceras bingmanni* (DENCKMANN), or *Grammoceras thouarsense* (D’ORBIGNY).

The Paroniceratidae represent a small, characteristic Tethyan group of the Hildocerataceae. The genera belonging to it were examined extensively in the 1920–30s, but they have come into prominence again in the last ten years. Based on analyses of suture constructions of taxa included previously in the subfamily Bouleiceratinae by ARKELL (1950, 1957), the family (with genera *Frechiella* and *Paroniceras*) was introduced by SCHINDEWOLF (1963), and was also placed in the new superfamily Hammatocerataceae. SCHINDEWOLF’S taxonomic conception was controversial; it was verified by KULLMANN & WIEDMANN (1970), and SCHLEGELMILCH (1976), but ignored by GÜEX (1974), DONOVAN et al. (1981), HOWARTH (1992), and others. The Bouleiceratinae was arranged in three groups by MOUTERDE & ELMI (1991); one of these was assigned to Leukadiellinae — new subfamily (with genera *Leukadiella* and *Renziceras*) — by MACCHIONI & VENTURI (2000). RULLEAU et al. (2003) revised the Paroniceratinae, and emended it as a subfamily within the Hildoceratidae. According to the authors, genera of the Bouleiceratinae represent different lineages of Hildoceratidae. On the bases of palaeogeographical, stratigraphical, morphological, and cladistic arguments, three clusters were separated: the Lower Toarcian Bouleiceratinae (*Bouleiceras*, *Nejdia*, *Kohaticeras*); the Middle Toarcian Leukadiellinae; and the Middle – Upper Toarcian Paroniceratinae with *Frechiella*, *Paroniceras*, *Oxyparoniceras* and *Oxyparoniceras* (*Neoparoniceras*). This arrangement met with acceptance, although the family level classification was renewed by VENTURI & BILOTTA (2008).

The phylogeny of the related taxa was proposed by GÜEX (1974). Accordingly, *Bouleiceras* derived from *Tauromeniceras* (Arieticeratinae), and then the Bouleiceratinae genera developed along a main line with continuous morphological variations by palingenesis, including *Bouleiceras* > *Nejdia* > *Frechiella* > *Paroniceras* > *Oxyparoniceras*. DONOVAN et al. (1981), emphasizing the uncertain origin, adopted the monophyletic scheme, but derived the subfamily from the Harpoceratinae. RULLEAU et al. (2003) revised the monophyletic theory by the cladistic approach, and VENTURI & BILOTTA (2008) also confirmed the polyphyletic evolution of the Bouleiceratinae taxa. Well-founded phylogenetic links at species level were proposed by both RULLEAU et al. (2003), and BÉCAUD (2006); detailed palaeogeographical repartitions of genera were figured by RULLEAU et al. (2003). In the Gerecse Mts, the family appeared in the Sublevisoni Subzone, and ranged to the lower Speciosum Zone (Figure 2).

Notes: The Gerecse material is deposited in the Natural History Museum of the Faculty of Science of Eötvös Loránd University, Budapest.

ZONE	SUBZONE	SPECIES				
SPECIOSUM						
THOUARSENSE	Fallaciosum					1
	Thouarsense					
	Bingmanni					
GRADATA	Alticarinatus	Frechiella	<i>F. subcarinata</i>	<i>F. kammerkarensis</i>	<i>F. venantii</i>	<i>F. achillei</i>
	Subregale					
	Clausus					
BIFRONS	Bifrons		3	4	1	
	Sublevisoni		23	40	11	1
SERPENTINUM	Falciferum					

Paroniceratidae

P. sternale

P. helveticum

P. cf. bisbinensis

Oxyparoniceratidae (Oxyparoniceratidae)

O. (O.) telemachi

O. (O.) buckmani

Figure 2. Chronostratigraphical distribution of the Paroniceratidae of the Gerecse Mts (with numbers of specimens)

2. ábra. Paroniceratidae fajok kronosztratiográfiai elterjedése a Gerecse hegységben (a példányszámmal)

The following abbreviations are used in this paper:

Pa – Paroniceratidae. Sections: P – Pisznice, B – Bányahegy, G – Kis-Gerecse, KT – Kis-Teke-hegy.

The number of the bed, and capitals are given for indicating of the specimens of the same bed (e.g. PaB42A: Paroniceratidae specimen A, Bányahegy section, bed No. 42).

Measurements: D – diameter, H – whorl-height, W – whorl-width, U – umbilical-width, RLW – ribs of the last whorl.

Systematic palaeontology

Superfamily Hildocerataceae HYATT, 1867
 Family Paroniceratidae SCHINDEWOLF, 1963

Genus *Frechiella* PRINZ, 1904

Type species: *Nautilus subcarinatus* YOUNG & BIRD, 1822 (pl. 12, fig. 7).

Synonym: *Achilleia* RENZ, 1913.

Diagnosis: Involute to moderately involute form with narrow and deep umbilicus. Swollen whorls, convex flanks, broad, tricarinate-bisulcate venter. Wide, suboval to subtrapezoidal whorl-section. Strong to weakly-developed ribbing, or smooth whorls. Simplified hildoceratid (“paroniceratid”) suture-line: deep and relatively narrow E, and digitate L lobes with equal length, large and poorly-divided saddles.

Material: The Gerecse assemblage includes 98 *Frechiella* specimens of a mediocre or poor state of preservation.

Remarks: The “generic adventure” (BUCKMAN, 1910: 23b) of *Nautilus subcarinata* YOUNG & BIRD was settled by PRINZ (1904a) by the assignment of *Frechiella* with two species and a subspecies. PRINZ’s well-defined taxon was confirmed by PARISCH & VIALE (1906), and soon became widely accepted.

The specimens classified within the genus by different authors (see below) differ slightly to moderately in morphology, sculpture, and suture construction. Because of this 38 species and subspecies were assigned in the literature (TERUZZI, 1981). However, as *Frechiella* is a rare but widely distributed taxon, small differences in the coiling style, whorl-section or ornamentation can be adequately interpreted as transitional forms. Furthermore, it seems virtually impossible to determine strict correlations between different ornamentations and suture-lines. TERUZZI (1981) and HOWARTH (1992) questioned whether all the specific names that had been proposed represent different taxa. Different authors have reduced the numbers of valid *Frechiella* species since the 1980’s. TERUZZI (l.c.) adopted 5 taxa: *F. subcarinata* (YOUNG & BIRD), *F. kammerkarensis* (STOLLEY), *F. venantii* (CATULLO), *F. helenae* RENZ, and *F. achillei* RENZ, while only 4 taxa were recognized by HOWARTH (l.c.): *F. subcarinata*, *F. kammerkarensis*, *F. helenae*, *F. achillei*. The contemporary papers contain a similar restricted classification (GOY & MARTÍNEZ 1996, 2009; RULLEAU et al. 2003; MORARD 2004; BÉCAUD 2006). The following species can be recorded from the Gerecse Mts: *F. subcarinata*, *F. venantii*, *F. kammerkarensis*, and *F. achillei*.

As the Paroniceratidae has been discussed recently in detail, it seems sufficient to submit only selected synonymy describing the taxa. For the full synonymy see RULLEAU et al. (2003), and BÉCAUD (2006).

Distribution: The highest diversity of the taxon is typical of the Bifrons Zone of the Mediterranean Province. The *F. kammerkarensis* cf. *helvetica* RENZ documented from South America (HILLEBRANDT 1970, 1973; RICCARDI 2008) is also a characteristic Tethyan form. With lower diversity, the genus is known from the NW European Province, and a single specimen (*F. tokurensis* REPIN) was figured by REPIN (1991) from the West Pacific Province. The taxon is frequent in the lower, but sparse in the upper Bifrons Zone. It was also

recorded from the lowermost Variabilis Zone of Spain (SCHMIDT-EFFING 1972) and France (BÉCAUD 2006).

In the Gerecse assemblage, the acme of the genus coincides with that of *Zugodactylites* in the Lusitanicum chronohorizon (GÉCZY & SZENTE 2007), and is restricted to one or two beds with a thickness of 32–59 cm (Bánya-hegy section: beds No. 42–43; Kis-Gerecse section: No. 93–94; Pisznice section: No. 124; Kis-Teke-hegy section: No. K3–4). The total proportion of *Frechiella* achieved 14% of the Ammonitina in these *Frechiella*–*Zugodactylites* faunal horizon (see GÉCZY 1977, 1978, 1981; GÉCZY et al. 2008).

Frechiella subcarinata (YOUNG & BIRD, 1822)

(Plate I, figures 1–2, 9–11)

- 1822 *Nautilus subcarinatus* YOUNG & BIRD, p. 255, pl. 12, fig. 7
 1904a *Frechiella subcarinata* YOUNG & BIRD, PRINZ, p. 32, pl. 2, fig. 1
 1904a *Frechiella subcarinata* YOUNG & BIRD var. *truncata* MÜNSTER, PRINZ, p. 33, pl. 2, fig. 2
 1925c *Frechiella subcarinata* YOUNG & BIRD var. *Marcellae*, RENZ, p. 409, pl. 16, fig. 1
 1992 *Frechiella subcarinata* (YOUNG & BIRD), HOWARTH, p. 157, textfig. 39, pl. 29, figs 4–7
 2003 *Frechiella subcarinata* (YOUNG & BIRD), RULLEAU et al., p. 331, figs 13/2, 3, 5, fig. 14/1
 2006 *Frechiella subcarinata* (YOUNG & BIRD), BÉCAUD, p. 96, pl. 21, fig. 3, pl. 22, fig. 2
 2007 *Frechiella subcarinata* (YOUNG & BIRD), RULLEAU, p. 73, pl. 23, figs 1–3
 2009 *Frechiella subcarinata* (YOUNG & BIRD), GOY & MARTÍNEZ, p. 607, figs 12/1–5, figs 13/1–3, 15

Measurements:

specimen	D	H	H/D	W	W/H	U	U/D
PaB42A	87	36	41%	28	78%	25	29%
PaG93A	77	34	44%	32	94%	20	26%
PaG89A	70	38	54%	34	89%	13	18%
PaG?	68	36	53%	32	89%	8	12%
PaB42F	54	28	52%	24	86%	9	16%
PaKT4A	40	19	47%	16	84%	8	20%

Material: 26 internal moulds of different states of preservation.

Description: Medium-sized, involute, robust form with narrow and deep umbilicus, and broad, low, tricarinate-bisulcate venter. The umbilical wall and the margin are rounded, the flanks are convex, the whorl-section is wide-oval with maximum thickness at about the mid-height. The ornamentation consists of weakly-developed ribbing. Rectiradiate or slightly rursiradiate, straight to sinuous ribs emerge from the umbilicus, and fade away on the ventrolateral part of the flank. The preserved body chamber is a half whorl in length. Apertures are missing. The suture-lines are “paroniceratid”, with slight variability in the width of L lobe.

Remarks: The specimens described from the Mediterranean Province agree with the holotype (YOUNG & BIRD 1822, pl. 12, fig. 7; refigured by BUCKMAN 1910, pl. 23; and

SCHLEGELMILCH 1976, pl. 52, fig. 1), and with other examples from the NW European Province. In morphology, however, a slight variability in the ornamentation (somewhat wider and sparser ribs) occurs (see ZANZUCCHI 1963, pl. 20, figs 2, 3; PELOSIO 1968, pl. 22, fig. 13; VENTURI & FERRI 2001, p. 205, p. 209, fig. b). The Gerecse specimens are closer to the Mediterranean variations of the taxon.

The first *Frechiella* record from the Gerecse Mts was published by PRINZ (1906) who described 10 specimens. PRINZ’s material was stored in the Department of Palaeontology of the Eötvös University; unfortunately, however, it cannot now be traced. Only a single specimen (Plate I, figures 9–10: PaG?) was found in the collection of the university’s Natural History Museum, but without any attached notes or details; it was probably collected in the Gerecse Mts in the first half of the 20th century.

Distribution: The species were recorded from the Bifrons Zone of Great Britain, Germany, Austria, Switzerland, France, Spain, Portugal, Italy, Greece, and recently from Slovakia (SCHLÖGL et al. 2004). Its acme was typical of the Sublevisoni Subzone; however, its extended range is also proved. *F. subcarinata* was recorded from the Semipoliticum Subzone, associated with *Hildoceras semipoliticum* BUCKMAN and *H. angustisiphonatum* PRINZ by GALLITELLI WENDT (1969) and, according to PARISI et al. (1998), the taxon occurred in the *H. angustisiphonatum* Subzone (bed CO.29) of the Colle d’Orlando section, under the first appearance of *Collina gemma* BONARELLI and *Paroniceras* sp. in bed CO.30.

Some specimens recorded as *F. kammerkarensis* by GÉCZY & SZENTE (2007) without figures are reidentified as *F. subcarinata* in this paper, so its presence in the Gerecse assemblage is confirmed. The species is typical of the Lusitanicum–Apertum horizons of the Pisznice, Bánya-hegy, and Kis-Teke-hegy sections, associated with *Hildoceras lusitanicum* MEISTER, *H. apertum* GABILLY, *Zugodactylites braunianus* (D’ORBIGNY) and *Z. rotundiventer* BUCKMAN. In the Bifrons horizon of the Kis-Gerecse section, a single specimen occurs above the *Zugodactylites* beds, associated with *H. bifrons* (BRUGUIÈRE) only.

Frechiella kammerkarensis (STOLLEY, 1903)

(Plate I, figures 3–8)

- 1862 *Ammonites subcarinatus* YOUNG & BIRD spec., OPPEL, p. 140, pl. 44, fig. 2
 1903 *Ammonites kammerkarensis* nov. sp., STOLLEY, p. 55
 1906 *Frechiella kammerkarensis* STOLLEY, PRINZ, p. 156, figs 2/1–2, 4
 1906 *Frechiella kammerkarensis* STOLLEY var. *Gerecsensis* nov. var., PRINZ, p. 158, fig. 2/3
 1906 *Frechiella pannonica* nov. sp., PRINZ, p. 159, fig. 2/6, figs 3–4
 1912 *Frechiella kammerkarensis* STOLLEY, RENZ, p. 596, pl. 15, fig. 4
 1922 *Frechiella kammerkarensis* STOLLEY var. *helvetica* (nov. var.), RENZ, p. 158, pl. 7, figs 11, 13
 1925a *Frechiella Stolleyi* (nov. spec.), RENZ, p. 214, pl. 5, fig. 5

- 1925c *Frechiella Liviae* (nov. spec.), RENZ, p. 405, pl. 15, fig. 2
 1925c *Frechiella kammerkarensis* STOLLEY var. *Laviniae* (nov. var.), RENZ, p. 406, pl. 15, fig. 4
 v 1967b *Frechiella kammerkarensis* n. subsp. aff. *helvetica* RENZ, GÉCZY, p. 147, pl. 9, fig. 11
 2001 *Frechiella kammerkarensis*, VENTURI & FERRI, p. 209, fig. a
 2003 *Frechiella kammerkarensis* (STOLLEY), RULLEAU et al., p. 333, fig. 13/4
 2006 *Frechiella kammerkarensis* (STOLLEY), BÉCAUD, p. 97, pl. 21, fig. 2
 2007 *Frechiella kammerkarensis* (STOLLEY), GÉCZY & SZENTE, pl. 4, fig. 6
 2009 *Frechiella kammerkarensis* (STOLLEY), GOY & MARTÍNEZ, p. 611, figs 13/5, 17, figs 14/1, 2

Measurements:

specimen	D	H	H/D	W	W/H	U	U/D	RLW
PaG94A	60	29	48%	28	96%	13	22%	16
PaP124A	54	25	46%	24	96%	12	22%	14
PaB42C	51	22	43%	24	109%	12	23%	12
PaKT3A	50	24	48%	26	108%	10	20%	14
PaP124B	44	21	48%	24	114%	8	18%	18

Material: 44 internal moulds of different states of preservation.

Description: Involute coiling with narrow and deep umbilicus, and broad, low, tricarinate-bisulcate venter. The umbilical wall is high and rounded; both the umbilical and the lateral walls are convex. The whorl-section is rounded subtrapezoidal with maximum width above the umbilical margin. The ornamentation is characterised by moderately strong, rectiradiate and straight ribbing with slightly raised dorso- and ventrolateral nodes. The preserved body chamber is about a half whorl in length; the aperture is missing. The suture-line is “paroniceratid”. The sutures of different specimens show slight variability in the shape and width of the L lobe.

Remarks: Most Gerecse specimens are close to the type (OPPEL 1862, pl. 44, fig. 2), and agree well with those figured by RENZ (1912, pl. 15, fig. 4; 1922, pl. 7, fig. 10), VENTURI & FERRI (2001, p. 209, fig. a), RULLEAU et al. (2003, fig. 13/4), BÉCAUD (2006, pl. 21, fig. 2), and GOY & MARTÍNEZ (2009, figs 14/1, 2). However, a few specimens show affinity to different morphotypes described by RENZ. Some are similar to *F. kammerkarensis helvetica* RENZ (RENZ 1922, pl. 7, figs 11, 13; PELOSIO 1968, p. 180, textfig.; HILLEBRANDT 1973, pl. 2, figs 8–9) by bearing weakly-developed ribs without ventrolateral nodes (Plate I, figure 3: PaKT3A; figures 7–8: PaP124A). This taxon is certainly a transitional form between *F. subcarinata* and *F. kammerkarensis* (see BÉCAUD 2006: 97). The small PaP124B (Plate I, figures 4–5) with more involute coiling, a wider section, and coarser, sigmoid ribbing resembles *F. kammerkarensis lavinae* RENZ (RENZ 1925c, pl. 15, fig. 4). Based on the morphology and ornamentation, in this paper *F. pannonica* PRINZ is considered as a junior synonym of *F. kammerkarensis* in this paper. *F. kammerkarensis* differs from *F.*

subcarinata due to its more depressed and wider whorls (W/H>95%), in its subtrapezoidal section, and with its stronger sculpture.

Distribution: The taxon is known from the lower Bifrons Zone of Austria, Germany, Switzerland, France, Spain, Portugal, Italy, Chile, and Argentina. In Hungary, it was documented first from the Gerecse Mts by PRINZ (1906); it was then figured from the Úrkút section (Bakony Mts) by GÉCZY (1967b). The species occurs abundantly in the Gerecse Mts; it is typical of the Lusitanicum horizon of the Bánya-hegy, Kis-Gerecse, and Kis-Teke-hegy sections, as well as the Lusitanicum–Apertum horizons of the Pisznice section. Its coeval range with *Paronicerias* in the Kis-Teke-hegy section (GÉCZY et al. 2008) is noteworthy: poorly-preserved specimens were found associated with *Collina meneghinii* (BONARELLI), *Merlaites gradatus* (MERLA), *M. clausus* (MERLA) and *Paronicerias sternale* (BUCH in D’ORBIGNY). However, due to condensation of the beds above the Bifrons Zone in this section, the exact stratigraphical position is uncertain.

Frechiella venantii (CATULLO, 1853)

(Plate II, figures 1, 12–13)

- 1853 *Ammonites Venantii*, CATULLO, p. 29, pl. 3, figs 3a–b
 v 1904a *Frechiella curvata* n. sp., PRINZ, p. 33, pl. 2, fig. 3
 v 1904b *Frechiella curvata* PRINZ, PRINZ, p. 64, pl. 37, fig. 18
 1906 *Frechiella curvata* PRINZ, PRINZ, p. 155, fig. 1
 1925c *Frechiella Venantii* CATULLO, RENZ, p. 393, textfigs a–b
 1925c *Frechiella Venantii* CATULLO var. *Corneliae*, RENZ, p. 394, pl. 17, fig. 3
 1925c *Frechiella Venantii* CATULLO var. *Porciae*, RENZ, p. 396, pl. 16, fig. 4, pl. 17, figs 2, 4, 6
 1925c *Frechiella Venantii* CATULLO var. *Breggiae*, RENZ, p. 397, pl. 18, fig. 2
 1925c *Frechiella Venantii* CATULLO var. *Vareae*, RENZ, p. 397, pl. 18, fig. 5
 v 1967a *Frechiella curvata* PRINZ, GÉCZY, p. 134, fig. 132, pl. 30, fig. 5 (refig. PRINZ, 1904a, pl. 2, fig. 3)
 v 1967b *Frechiella* sp. aff. *venantii* (CATULLO), GÉCZY, p. 146, pl. 9, fig. 14
 2003 *Frechiella venantii* (CATULLO), RULLEAU et al., p. 333, figs 13/1, 6
 2006 *Frechiella venantii* (CATULLO), BÉCAUD, p. 98, pl. 21, fig. 4, pl. 22, fig. 3
 2009 *Frechiella venantii* (CATULLO), GOY & MARTÍNEZ, p. 609, figs 13/6, 18, fig. 14/3

Measurements:

specimen	D	H	H/D	W	W/H	U	U/D	RLW
PaB42G	40	20	50%	20	100%	9	22%	8
PaKT3B	40	20	50%	20	100%	7	18%	10
PaB42H	38	18	47%	18	100%	?	?	9
PaB42L	32	16	50%	18	112%	5	16%	9

Material: 12 poorly-preserved internal moulds.

Description: Involute coiling with narrow and deep umbilicus, and broad, low, tricarinate-bisulcate venter. Both the umbilical and the lateral walls are convex; the whorl-

section is depressed, rounded subtrapezoidal with maximum thickness at the umbilical margin. The ornamentation is restricted to the lower part of the flanks, and characterised by moderately strong, curved ribs. No entire body chamber is present. “Paroniceratid” suture-line.

Remarks: The ribs of the Gerecse specimens are slightly more projected than those of the type (CATULLO 1853, pl. 3, figs 3a–b); they are closer to the morphotype *Frechiella venantii porciae* as assigned by RENZ (1925c, p. 396, pl. 16, fig. 4, pl. 17, figs 2, 4, 6), as well as to the specimens figured by RULLEAU et al. (2003, fig. 13/6) and BÉCAUD (2006, pl. 21, fig. 4, pl. 22, fig. 3). The type of *F. curvata* PRINZ (deposited in the Geological Institute of Hungary, No. 330) is a poorly-preserved specimen. Both its morphology and ornamentation with weak, short, curved ribs are very close to that of *F. venantii*. In this paper PRINZ’s taxon is regarded as a junior synonym of *F. venantii*.

Distribution: The taxon is known from the lower part of the Bifrons Zone of Switzerland, Italy, France, and Hungary. In the Gerecse Mts, it is typical of the Lusitanicum horizon of the Bánya-hegy section and the Lusitanicum–Apertum horizons of the Kis-Teke-hegy section.

Frechiella achillei RENZ, 1912

(Plate II, figures 6–7)

- 1912 *Frechiella Achillei* (nov. spec.), RENZ, p. 594, pl. 14, figs 5–6
 1922 *Frechiella (Achilleia) Achillei* RENZ, RENZ, p. 161, pl. 7, figs 2, 8
 1925a *Frechiella Achillei* RENZ, RENZ, p. 208, pl. 4, figs 8–8a
 1925c *Frechiella Achillei* RENZ, RENZ, p. 391, pl. 16, figs 3–3a
 1925c *Frechiella Achillei* RENZ var. *Egeriae* RENZ (nov. var.), RENZ, p. 392, pl. 16, figs 2–2a
 1927 *Frechiella Achillei* RENZ, RENZ, p. 426, pl. 13, figs 1–3
 1932 *Frechiella Achillei* RENZ, RENZ, p. 8, pl. 1, figs 2–3
 1932 *Frechiella Achillei* RENZ var. *linariensis* RENZ (nov. var.), RENZ, p. 9, pl. 1, fig. 7
 1947 *Frechiella Achillei* RENZ var., RENZ C. & RENZ O., p. 173, pl. 12, figs 10–11
 v 1967a *Frechiella achillei hungarica* n. subsp., GÉCZY, p. 135, fig. 133, pl. 30, fig. 6, pl. 64, fig. 47
 v 1967b *Frechiella achillei longobardica* RENZ, GÉCZY, p. 145, fig. 27, pl. 9, fig. 13
 v 1967b *Frechiella achillei egeriae* RENZ, GÉCZY, p. 146, fig. 28, pl. 9, fig. 15
 1968 *Frechiella achillei* RENZ f. *lariensis* RENZ, PELOSIO, p. 181, pl. 22, figs 9a–b
 1975 *Frechiella* cfr. *achillei* RENZ, DEZI & RIDOLFI, p. 24, figs 60–60a
 1981 *Frechiella achillei* RENZ, TERUZZI, pl. 1, fig. 6
 1982 *Frechiella achillei* RENZ, VENTURI, p. 78, fig. 118
 2001 *Frechiella achillei*, VENTURI & FERRI, p. 209, fig. c

Measurements:

specimen	D	H	H/D	W	W/H	U	U/D
PaP124C	49	23	47%	22	95%	10	20%

Material: 1 moderately-preserved internal mould.

Description: Involute form with deep umbilicus, and

broad, low, tricarinate-bisulcate venter. The umbilical wall is low and rounded; the flanks are convex. The whorl-section is wide suboval with maximum width at the lower third of the flank. The whorls are almost smooth and only a few fine, loose, irregular ribs can be traced above the umbilicus. No complete body chamber is present. “Paroniceratid” suture-line.

Remarks: The taxon differs from other *Frechiella* species due to the (almost total) absence of ornamentation. According to BÉCAUD (2006, fig. 20), it is probably one of the linking forms between *Frechiella* and *Paroniceras*. The Gerecse specimen differs from the holotype (RENZ 1912, pl. 14, figs 5–6) because of its higher, suboval section, and the very weak ornamentation. It shows good agreement with the morphotype *F. achillei egeriae* RENZ (RENZ 1925c, p. 392, pl. 16, fig. 2) in its morphology and sculpture. On the other hand, it differs from the specimens figured by GÉCZY (1967a, b) due to its higher whorls.

Distribution: The taxon is known only from the Bifrons Zone of the Mediterranean Province (Algeria, Greece, Italy, Switzerland, Austria and Hungary). The Gerecse specimen came from the Lusitanicum horizon of the Pisznicze section.

Genus *Paroniceras* (BONARELLI, 1893)

Type species: *Ammonites sternalis* BUCH in D’ORBIGNY, 1845 (pl. 111, figs 1–2).

Diagnosis: Globose, involute form with narrow and deep umbilicus. Broad whorls, inflated flanks, rounded and smooth venter. Ornamentation absent, or consists of hardly visible, radiate, uninterrupted folds. Subcircular whorl-section. “Paroniceratid” suture-line: relatively deep and narrow E; simple, digitate and wide L; large, poorly-divided saddles.

Material: The Gerecse assemblage contains 58 *Paroniceras* specimens in a poor state of preservation.

Remarks: Although the genus shows remarkable variability, only three species are recognized as valid taxa in the contemporary literature: *P. sternale* (BUCH in D’ORBIGNY), *P. helveticum* RENZ (= *P. sternale levantina* RENZ), *P. pelosioi* TERUZZI (= *P. substernale* PELOSIO nom. nud.); however, morphotypes are accepted. Based on its wide range and specific morphology, emendation of *Paroniceras bisbinensis* RENZ is proposed here. This species, as well as *P. pelosioi*, and *P. sternale* var. *subanguleuse* (RULLEAU et al. 2003, fig. 15/2) are rare taxa; it would be plausible to regard them as transition forms between *Paroniceras* and *Oxyparoniceras*. From the Gerecse assemblage 3 species are described here: *P. sternale*, *P. helveticum*, and *P. cf. bisbinensis*.

The first *Paroniceras* record from Hungary was documented by VIGH (1927). Three specimens were figured and described from the Gerecse Mts; as well as stratigraphical and palaeobiogeographical upshots were also detailed by the author. Unfortunately, VIGH’s specimens in the collection of the Geological Institute of Hungary have not been found.

Distribution: The genus appears in the uppermost Bifrons Zone (GOY & MARTÍNEZ 1996, 2009; PARISI et al. 1998), and is typical of the Variabilis/Gradata Zone of France, Spain, Portugal, Germany, Austria, Switzerland, Italy, Greece, Hungary and North Africa; it has also been recorded from the lower Middle Toarcian of North America. It disappears from the fauna in the lower Upper Toarcian.

In the Gerecse assemblage, *Paroniceras* ranges in the Clausus–Subregale Subzones. The proportion of the genus achieves 32% of the Ammonitina in the beds, where it is frequent (Bánya-hegy section: bed No. 35; Kis-Gerecse section: No. 73–74; Pisznice section: No. 113–114, Kis-Teke-hegy section: No. K13–14) (see GÉCZY 1977, 1978, 1981; GÉCZY & SZENTE 2007; GÉCZY et al. 2008).

***Paroniceras sternale* (BUCH in D'ORBIGNY, 1845)**
(Plate II, figures 8–9, 14–15)

- 1845 *Ammonites sternalis* von BUCH, D'ORBIGNY, p. 345, pl. 111, figs 1–2
 1893 *Paroniceras* (n. gen.) *sternale* v. BUCH f., BONARELLI, p. 202
 1922 *Paroniceras sternale* BUCH, RENZ, pl. 6, figs 1, 3, 7, 10
 1922 *Paroniceras sternale* BUCH var., RENZ, pl. 6, figs 2, 5
 1923 *Paroniceras sternale* BUCH, RENZ, pl. 12, figs 1, 7, 11
 1923 *Paroniceras sternale* BUCH var., RENZ, p. 283, pl. 12, figs 2, 6, 9, 13
 1925a *Paroniceras sternale* BUCH var., RENZ, p. 204, pl. 4, fig. 2
 1927 *Paroniceras sternale* BUCH var. (forma *umbra* RENZ), VIGH, p. 249, textfigs 2a–b, pl. 1, figs 2a–c
 1927 *Paroniceras sternale* BUCH var., VIGH, p. 253, pl. 1, fig. 3
 1932 *Paroniceras sternale* BUCH, RENZ, p. 5, pl. 1, figs 1, 6, 8
 1976 *Paroniceras sternale* (v. BUCH), SCHLEGELMILCH, p. 96, pl. 52, fig. 2
 1994 *Paroniceras sternale* (D'ORBIGNY, 1845, von BUCH MS), MOUTERDE & GABILLY, p. 99, pl. 33, figs 7a–c
 1995 *Paroniceras sternale* (BUCH), JAKOBS, p. 96, figs 6/17–18, 19–20
 2001 *Paroniceras sternale* (von BUCH), VENTURI & FERRI, p. 206
 2003 *Paroniceras* gr. *sternale* (D'ORBIGNY), RULLEAU et al., p. 333, fig. 14/3, figs 15/1, 3
 2006 *Paroniceras* gr. *sternale* (D'ORBIGNY), BÉCAUD, p. 99, pl. 22, fig. 4
 2007 *Paroniceras sternale* (D'ORBIGNY), RULLEAU, p. 73, pl. 23, figs 5–6
 2009 *Paroniceras sternale* (D'ORBIGNY), GOY & MARTÍNEZ, p. 615, figs 13/7, 8, 19, figs 15/1–6

Measurements:

specimen	D	H	H/D	W	W/H	U	U/D
PaG73A	64	30	47%	34	113%	16	25%
PaP114A	46	26	56%	30	115%	15	32%
PaG74A	42	20	48%	24	120%	10	24%

Material: 14 internal moulds in a poor state of preservation.

Description: Involute coiling with narrow and deep umbilicus, and broad, rounded, smooth venter. Both the umbilical and the lateral walls are convex. The whorl-

section is subcircular with maximum thickness at the lower third of the flank. No ribs or folds are visible on the whorls. The body chamber is about half a whorl. No apertures are preserved. The suture-line is “paroniceratid”.

Remarks: The Gerecse specimens slightly differ from the type (D'ORBIGNY 1845, pl. 111, figs 1–2) by being more globose and with more inflated flanks. They are closer to the specimens figured by GALLITELLI WENDT (1969, pl. 7, fig. 9), VENTURI & FERRI (2001, p. 206), RULLEAU et al. (2003, figs 15/1, 3), BÉCAUD (2006, pl. 22, fig. 4), RULLEAU (2007, pl. 23, fig. 6) and GOY & MARTÍNEZ (2009, fig. 15/1).

Distribution: *P. sternale* appears in the Semipolium Subzone (GOY & MARTÍNEZ 1996, 2009); its acme is typical of the Variabilis/Gradata Zone of France, Spain, Portugal, Switzerland, Austria, Italy, Greece, Hungary and North Africa; it also occurs in the lower Middle Toarcian of North America. The Gerecse specimens appear first around the border of the Semipolium–Clausus Subzone of the Bánya-hegy section; they are associated with *H. semipolium* in bed No. 35. They are abundant in the Clausus Subzone of the Kis-Teke-hegy section, as well as in the Subregale Subzone of the Pisznice and Kis-Gerecse sections.

***Paroniceras helveticum* RENZ, 1922**
(Plate II, figs 16–19)

- 1922 *Paroniceras helveticum* (nov. spec.), RENZ, p. 139, textfig. 1, pl. 6, figs 8, 9, 11, pl. 7, fig. 4
 1925a *Paroniceras helveticum* RENZ var., RENZ, p. 205, pl. 4, fig. 1
 1925b *Paroniceras sternale* BUCH var. *levantina* (nov. var.), RENZ, p. 375, pl. 14, fig. 6
 1925c *Paroniceras helveticum* RENZ var., RENZ, p. 413, pl. 20, figs 3, 5
 1927 *Paroniceras sternale* BUCH var. *levantina* RENZ, VIGH, p. 253, textfig. 3, pl. 1, figs 1a–d
 1932 *Paroniceras helveticum* RENZ var., RENZ, p. 6, pl. 1, fig. 4
 ? 1963 *Paroniceras* cf. *sternale* (v. BUCH), KOTTEK, p. 121, textfig. 61, pl. 13, fig. 8
 1968 *Paroniceras* cfr. *helveticum* RENZ, PELOSIO, p. 177, pl. 22, fig. 11
 1968 *Paroniceras sternale* (v. BUCH) f. *levantina* RENZ, PELOSIO, p. 176, pl. 22, figs 7–8
 1981 *Paroniceras helveticum* RENZ, TERUZZI, p. 28
 1981 *Paroniceras sternale* f. *levantina* RENZ, TERUZZI, p. 28, pl. 1, fig. 5
 2003 *Paroniceras* gr. *helveticum* RENZ, RULLEAU et al., p. 335, fig. 14/2
 2006 *Paroniceras* gr. *helveticum* RENZ, BÉCAUD, p. 100, pl. 31, fig. 7
 2007 *Paroniceras helveticum* RENZ, RULLEAU, p. 73, pl. 23, fig. 4
 2009 *Paroniceras helveticum* RENZ, GOY & MARTÍNEZ, p. 616, fig. 13/9, figs 15/7–11

Measurements:

specimen	D	H	H/D	W	W/H	U	U/D
PaP114B	70	28	40%	28	100%	16	23%
PaP114C	56	23	41%	24	104%	12	21%
PaG74B	53	22	41%	22	100%	15	23%

PaKT13B	52	23	44%	23	100%	14	27%
PaKT13A	51	23	45%	23	100%	13	25%

Material: 24 internal moulds in different states of preservation.

Description: Moderately involute form with deep umbilicus. The umbilical wall is high with a rounded margin. The flanks are convex and plain. The venter is rounded and smooth without a lateral shoulder. The whorl-section is wide-oval with maximum thickness at the umbilical margin. The length of the body chamber is about half a whorl and the dorso-lateral part of the whorl is slightly flared at the aperture. The suture-line is “paroniceratid”.

Remarks: The specimens mentioned in the literature show remarkable variability, so it is plausible to consider *Paroniceras sternale levantina* RENZ as *P. helveticum* (see BÉCAUD, 2006). The Gerecse material is close to the type (RENZ, 1922, pl. 6, fig. 8), and the specimens figured by VIGH (1927, pl. 1, figs 1a–d), PELOSIO (1968, pl. 22, figs 7, 8, 11), TERUZZI (1981, pl. 1, fig. 5), RULLEAU et al. (2003, fig. 14/2), BÉCAUD (2006, pl. 31, fig. 7) and RULLEAU (2007, pl. 23, fig. 4). The taxon differs from *P. sternale* by being more compressed, and having wider umbilicus.

Distribution: The taxon ranges in the Variabilis/Gradata Zone of France, Germany, Switzerland, Spain, Italy, and Greece. The Gerecse specimens are known from the Clausus Subzone of the Kis-Teke-hegy section, and from the Subregale Subzone of the Pisznice and Kis-Gerecse sections.

***Paroniceras cf. bisbinensis* RENZ, 1922**

(Plate II, figures 2–3)

1922 *Paroniceras sternale* BUCH var. *bisbinensis*, RENZ, p. 145, pl. 6, figs 4–4a

1923 *Paroniceras sternale* BUCH var. *bisbinensis*, RENZ, p. 291

2003 *Paroniceras sternale* (D’ORBIGNY) var. *bisbinensis* RENZ, RULLEAU et al., fig. 15/5

2009 *Paroniceras sternale* var. *bisbinensis* RENZ, GOY & MARTÍNEZ, fig. 15/4

Measurements:

specimen	D	H	H/D	W	W/H	U	U/D
PaG75	38	19	50%	18	95%	9	24%

Material: 2 poorly-preserved internal moulds.

Description: Small, involute, compressed form with narrow and moderately deep umbilicus. Flanks are slightly convex and plain, the venter is narrow, rounded, and smooth. The whorl-section is high and slightly rounded subtrapezoidal, with maximum width above the umbilical margin. No whole body chamber is preserved. The suture-line is not visible in all details, but the characteristic “paroniceratid” structure (broad and digitate L) can be traced.

Remarks: *Paroniceras sternale* BUCH var. *bisbinensis* RENZ (RENZ 1922, pl. 6, figs 4–4a) differs from both *P. sternale* and *P. helveticum* in the markedly compressed

coiling, which is not specific of the genus. This morphological feature can be interpreted as more than individual variability; therefore it is emended as a *Paroniceras* species in this paper. *P. bisbinensis* is a rare taxon with wide distribution; it was recognised as one of the transitional forms between *Paroniceras* and *Oxyparoniceras* (RULLEAU et al. 2003: 344). The specimen figured here is similar to the type, but differs by being somewhat more compressed. Due to the poor preservation, it cannot be arranged with certainty.

Distribution: The taxon was described from the “oberen Oberlias der Breggiaschlucht” (RENZ 1922). It is also known from the Variabilis–Thouarsense Zones of Spain and France. The Gerecse specimens came from the Subregale Subzone of the Kis-Gerecse section.

Genus *Oxyparoniceras* GUEX, 1974

The taxon with type species *Paroniceras telemachi* RENZ was assigned by GUEX (1974) for *Paroniceras* taxa which differ from the type in ogival section and acute venter. RULLEAU et al. (2003) describing sexual dimorphism, divided the genus into two subgenera: *Oxyparoniceras* (*Oxyparoniceras*) for macroconch, and *Oxyparoniceras* (*Neoparoniceras*) (type species *Paroniceras undulosum* MONESTIER) for microconch forms. The latter subgenus is characterised by small, evolute to moderately evolute coiling with oval section, and rounded, non-carinate venter. It sums up small-size “*Paroniceras*” species recorded by MONESTIER (1921), and RENZ (1925c, 1933). The following taxa were included: *O. (Neoparoniceras) undulosum*, *O. (Neoparoniceras) sulcatum* (MONESTIER), *O. (Neoparoniceras) evolutum* (MONESTIER), *O. (Neoparoniceras) morbiense* (RENZ), *O. (Neoparoniceras) brocardi* RULLEAU, BÉCAUD et NEIGE, and *O. (Neoparoniceras) sciaui* RULLEAU, BÉCAUD et NEIGE. The stratigraphical distribution of both subgenera is the same (Thouarsense – lower Dispansum Zones). Some microconch taxa were lately figured from Spain by GOY & MARTÍNEZ (2009, fig. 16).

Subgenus *Oxyparoniceras* (*Oxyparoniceras*) GUEX, 1974

Type species: *Paroniceras Telemachi* RENZ, 1912 (RENZ, 1912, p. 603, pl. 15, figs 6–7).

Synonym: *Jacobella* JEANNET, 1908 *nomen oblitum* (see RULLEAU et al. 2003: 336).

Diagnosis: Small, involute, compressed coiling, narrow to moderately wide umbilicus, ogival section, with or without ventral keel. Ornamentation is absent, or consists of simple striae. Simplified, “paroniceratid” suture-line with broad L.

Material: The taxon is represented by 2 specimens in the Gerecse assemblage.

Remarks: The subgenus was introduced for macroconch *Oxyparoniceras*, including *O. (Oxyparoniceras) telemachi*,

O. (Oxyparoniceras) buckmani (BONARELLI) and *O. (Oxyparoniceras) suevicum* (RENZ) by RULLEAU et al. (2003).

Distribution: The taxon appears in the Gradata (= lower Erbaense) Zone in Italy; and the coeval range with *P. sternale* is noteworthy (DEZI & RIDOLFI 1978; NICOSIA & PALLINI 1978; VENTURI & FERRI 2001). The subgenus is typical of the Thouarsense–Dispansum/Speciosum Zones in Italy, Greece, Spain, Portugal, France, Great Britain, Germany, Austria, Hungary and Morocco.

***Oxyparoniceras (Oxyparoniceras) telemachi* (RENZ, 1912)**

(Plate II, figures 4–5)

1845 *Ammonites sternalis* von BUCH, D'ORBIGNY, p. 345, pl. 111, figs 4–5

1912 *Paroniceras Telemachi* (nov. spec), RENZ, p. 603, pl. 15, figs 6–7

1975 *Oxyparoniceras telemachi* (RENZ), GUÉX, p. 117, pl. 6, fig. 17, non figs 18–19

non 1989 *Oxyparoniceras telemachi* (RENZ), BENSILILI, pl. 19, fig. 2

1994 *Oxyparoniceras buckmani* (BONARELLI), MOUTERDE & GABILLY, p. 100, pl. 33, figs 9a–b

2003 *Oxyparoniceras (Oxyparoniceras) telemachi* RENZ, RULLEAU et al., p. 339, figs 15/7–8

2009 *Oxyparoniceras (Oxyparoniceras) cf. telemachi* (RENZ), GOY & MARTÍNEZ, p. 617, fig. 16/1

Measurements:

specimen	D	H	H/D	W	W/H	U	U/D
PaG59	32	16	50%	18	112%	3	9%

Material: 1 moderately preserved internal mould.

Description: Small, involute form with narrow and deep umbilicus. Flanks are slightly convex; the venter is high and rounded. The whorl-section is rounded subtriangular with maximum width at above the margin. The length of the body chamber is about a half whorl, the aperture is missing.

Remarks: The Gerecse specimen is close to the type (RENZ 1912, pl. 15, figs 6–7), as well as the specimens figured by GUÉX (1975, pl. 6, fig. 17), RULLEAU et al. (2003, figs 15/7–8) and GOY & MARTÍNEZ (2009, fig. 16/1). The species differs from *O. (Oxyparoniceras) suevicum* (RENZ) by being not carinate. *P. sternale subanguleuse* (RULLEAU et al. 2003, fig. 15/2) is also a similar form, but differs by being less compressed.

Distribution: The taxon is known from the Thouarsense Zone in Spain; from the Fallaciosum–Insigne Subzones in France; and from the Speciosum/Reynesi Subzone in Morocco. The Gerecse specimen was associated with *Pseudogrammoceras placidum* BUCKMAN and *Geczyceras bonarellii* (PARISCH et VIALE) in the Fallaciosum Subzone of the Kis-Gerecse section (bed No. 59).

***Oxyparoniceras (Oxyparoniceras) buckmani* (BONARELLI, 1895)**

(Plate II, figures 10–11)

1845 *Ammonites sternalis* von BUCH, D'ORBIGNY, p. 345, pl. 111, figs 6–7

1895 *Paroniceras Buckmani* n.f., BONARELLI, p. 236, pl. 4, figs 5–8

1923 *Paroniceras Buckmani* BONARELLI, RENZ, p. 288, pl. 12, fig. 4

1927 *Paroniceras Buckmani* BONARELLI, RENZ, p. 440, textfigs 5–10

1932 *Paroniceras Buckmani* BONARELLI, RENZ, p. 7, pl. 1, fig. 9

1976 *Paroniceras buckmani* BONARELLI, SCHLEGELMILCH, p. 96, pl. 52, fig. 3

1978 *Oxyparoniceras buckmani* BONARELLI, NICOSIA & PALLINI, pl. 1, fig. 15

1978 *Oxyparoniceras telemachi* (RENZ), DEZI & RIDOLFI, p. 24, figs 17–22

1979 *Oxyparoniceras buckmani* (BONARELLI), MARIOTTI et al., pl. 1, fig. 2

1981 *Oxyparoniceras buckmani* (BONARELLI), TERUZZI, p. 29, pl. 1, fig. 2

1993 *Paroniceras buckmani* BONARELLI, JAKSCH, p. 70, pl. 2, fig. 8

2003 *Oxyparoniceras (Oxyparoniceras) buckmani* BONARELLI, RULLEAU et al., p. 339, fig. 15/4, figs 16/4–6

2006 *Oxyparoniceras (Oxyparoniceras) buckmani* (BONARELLI), BÉCAUD, p. 101, pl. 35, fig. 3

2007 *Oxyparoniceras buckmani* (BONARELLI), RULLEAU, p. 73, pl. 24, figs 1–2

2007 *Oxyparoniceras (Oxyparoniceras) buckmani* (BONARELLI), MARTÍNEZ, p. 18, fig. 3

2009 *Oxyparoniceras (Oxyparoniceras) buckmani* (BONARELLI), GOY & MARTÍNEZ, p. 618, figs 13/10–13, figs 16/2–6

Measurements:

specimen	D	H	H/D	W	W/H	U	U/D
PaG56	48	20	42%	12	60%	13	27%

Material: 1 internal mould in mediocre preservation.

Description: Moderately involute, compressed form with acute, carinate venter. The umbilicus is moderately wide and shallow; the lateral wall is slightly rounded. The whorl-section is lanceolate with maximum thickness at the lower third of the flank. The body chamber is about a half whorl in length; the aperture is missing. The suture-line is characteristically “paroniceratid”.

Remarks: The Gerecse specimen agrees with the type (BONARELLI 1895, pl. 4, figs 5–8), and the other specimens figured in the literature. The taxon differs from *O. (Oxyparoniceras) suevicum* in more compressed coiling, and in the absence of ornamentation.

Distribution: The species appears in the Thouarsense Zone in Italy, and it is typical of the Dispansum Zone in France, Spain, Austria, Morocco and Greece. The specimen figured here is the first record from Hungary. It came from the lower Speciosum Zone of the Kis-Gerecse section (bed No. 56), associated with *Pseudolillia emiliana* (REYNÈS), *Geczyceras bonarellii*, *G. speciosum* (JANENSCH) and *Crestaites meneghinii* (BONARELLI).

Conclusion

Within the Toarcian Gerecse ammonite assemblage 158 specimens belong to the family Paroniceratidae. In spite of mediocre or poor state of preservation, 125 specimens were identified at species level; they represent 3 genera with 9 species. Both the proportion and the diversity of the family are in accordance with those of Mediterranean records. The most frequent taxon is *Frechiella*; it achieved a wide distribution extending from South America to Europe and Siberia. It is the most abundant paroniceratid in the Gerecse Mts as well, occurring in all sections with high diversity. The distribution of *Paroniceras* is more restricted, it is characteristic mainly in the Tethyan region, with a single occurrence in North America. The genus is not as frequent as *Frechiella* in the Gerecse Mts, but also known from all sections. *Oxyparoniceras* is typical of Europe, but its abundance and high diversity are characteristic only in the NW European Province.

The stratigraphical range of the Paroniceratidae in the Gerecse successions corresponds to the Tethyan data. Although most Tethyan records account discontinuity concerning the development of the family, some rare occurrences expose the evolutionary connections of the genera. The earliest representative, *Frechiella*, appeared in the Sublevisoni Subzone, achieved the acme in the Lusitanicum–Apertum horizons, and became sparse in the Bifrons Subzone, however, persisted to the lower Variabilis Zone. Similarly, in the Gerecse Mts, the latest *Frechiella* specimens ranged in the Bifrons horizon (Kis-Gerecse

section), and around the boundary of the Semipolium–Clausus Subzones (Kis-Teke-hegy section). Distributions of *Paroniceras* in the Gerecse Mts, and in Spanish and Italian localities are also comparable. The species appeared in the uppermost Bifrons Zone in Spain and Italy; similarly, it was coexistent with *H. semipolium* in the lowermost Clausus Subzone of the Bánya-hegy section. On the other hand, the gap between the stratigraphical distributions of *Paroniceras* and *Oxyparoniceras*, which is typical of almost all European localities, is undoubtedly characteristic of the Gerecse assemblage as well. The only available data of the Upper Toarcian coeval range of both genera were documented from Italy. The overlapping or close occurrence of the paroniceratids can be considered as a Mediterranean characteristic, so the discontinuous record of *Paroniceras* and *Oxyparoniceras* seems to be a NW European feature. The Gerecse ammonites are commonly represented by both Mediterranean and NW European genera; the distribution of the Paroniceratidae confirms again the double affinity.

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Plate I — I. tábla

(The figured specimens are coated with ammonium chloride, and shown in natural size. The beginning of the body chamber is marked by *.)

(Az ábrázolt példányok ammónium-kloriddal vannak bevonva és természetes méretűek. A lakókamra kezdetét * jelzi.)

Figures 1–2. *Frechiella subcarinata* (YOUNG & BIRD), (PaB42A), lateral and ventral views (Bánya-hegy, bed No. 42), Lusitanicum horizon

Figure 3. *Frechiella kammerkarensis* (STOLLEY), (PaKT3A), lateral view (Kis-Teke-hegy, bed No. K3), Lusitanicum horizon

Figures 4–5. *Frechiella kammerkarensis* (STOLLEY), (PaP124B), lateral and ventral views (Nagypisznice, bed No. 124), Lusitanicum horizon

Figure 6. *Frechiella kammerkarensis* (STOLLEY), (PaG94A), lateral view (Kis-Gerecse, bed No. 94), Lusitanicum horizon

Figures 7–8. *Frechiella kammerkarensis* (STOLLEY), (PaP124A), lateral and ventral views (Nagypisznice, bed No. 124), Lusitanicum horizon

Figures 9–10. *Frechiella subcarinata* (YOUNG & BIRD), (PaG?), lateral and ventral views (? Gerecse Mts)

Figure 11. *Frechiella subcarinata* (YOUNG & BIRD), (PaG93A), lateral view (Kis-Gerecse, bed No. 93), Lusitanicum horizon

1–2. *Frechiella subcarinata* (YOUNG & BIRD), (PaB42A), laterális és ventrális nézet (Bánya-hegy, 42. réteg), Lusitanicum horizont

3. *Frechiella kammerkarensis* (STOLLEY), (PaKT3A), laterális nézet (Kis-Teke-hegy, K3. réteg), Lusitanicum horizont

4–5. *Frechiella kammerkarensis* (STOLLEY), (PaP124B), laterális és ventrális nézet (Nagypisznice, 124. réteg), Lusitanicum horizont

6. *Frechiella kammerkarensis* (STOLLEY), (PaG94A), laterális nézet (Kis-Gerecse, 94. réteg), Lusitanicum horizont

7–8. *Frechiella kammerkarensis* (STOLLEY), (PaP124A), laterális és ventrális nézet (Nagypisznice, 124. réteg), Lusitanicum horizont

9–10. *Frechiella subcarinata* (YOUNG & BIRD), (PaG?), laterális és ventrális nézet (? Gerecse hegység)

11. *Frechiella subcarinata* (YOUNG & BIRD), (PaG93A), laterális nézet (Kis-Gerecse, 93. réteg), Lusitanicum horizont

Plate II — II. tábla

Figure 1. *Frechiella venantii* (CATULLO), (PaKT3B), lateral view (Kis-Teke-hegy, bed No. K3), Lusitanicum horizon

Figures 2–3. *Paroniceras* cf. *bisbinensis* RENZ, (PaG75), lateral and ventral views (Kis-Gerecse, bed No. 75), Subregale Subzone

Figures 4–5. *Oxyparoniceras* (*Oxyparoniceras*) *telemachi* (RENZ), (PaG59), lateral and ventral views, (Kis-Gerecse, bed No. 59), Fallaciosum Subzone

Figures 6–7. *Frechiella achillei* RENZ, (PaP124C), lateral and ventral views (Nagypisznice, bed No. 124), Lusitanicum horizon

Figures 8–9. *Paroniceras sternale* (BUCH in D'ORBIGNY), (PaG74A), lateral and ventral views (Kis-Gerecse, bed No. 74), Subregale Subzone

Figures 10–11. *Oxyparoniceras* (*Oxyparoniceras*) *buckmani* (BONARELLI), (PaG56), lateral and ventral views (Kis-Gerecse, bed No. 56), lower Speciosum Zone

Figures 12–13. *Frechiella venantii* (CATULLO), (PaB42G), lateral and ventral views (Bánya-hegy, bed No. 42), Lusitanicum horizon

Figures 14–15. *Paroniceras sternale* (BUCH in D'ORBIGNY), (PaP114A), lateral and ventral views (Nagypisznice, bed No. 114), Subregale Subzone

Figures 16–17. *Paroniceras helveticum* RENZ, (PaKT13B), lateral and ventral views (Kis-Teke-hegy, bed No. K13), Clausus Subzone

Figures 18–19. *Paroniceras helveticum* RENZ, (PaG74B), lateral and ventral views (Kis-Gerecse, bed No. 74), Subregale Subzone

1. *Frechiella venantii* (CATULLO), (PaKT3B), laterális nézet (Kis-Teke-hegy, K3. réteg), Lusitanicum horizont

2–3. *Paroniceras* cf. *bisbinensis* RENZ, (PaG75), laterális és ventrális nézet (Kis-Gerecse, 75. réteg), Subregale szubzóna

4–5. *Oxyparoniceras* (*Oxyparoniceras*) *telemachi* (RENZ), (PaG59), laterális és ventrális nézet (Kis-Gerecse, 59. réteg), Fallaciosum szubzóna

6–7. *Frechiella achillei* RENZ, (PaP124C), laterális és ventrális nézet (Nagypisznice, bed No. 124), Lusitanicum horizont

8–9. *Paroniceras sternale* (BUCH in D'ORBIGNY), (PaG74A), laterális és ventrális nézet (Kis-Gerecse, 74. réteg), Subregale szubzóna

10–11. *Oxyparoniceras* (*Oxyparoniceras*) *buckmani* (BONARELLI), (PaG56), laterális és ventrális nézet (Kis-Gerecse, 56. réteg), alsó Speciosum zóna

12–13. *Frechiella venantii* (CATULLO), (PaB42G), laterális és ventrális nézet (Bánya-hegy, 42. réteg), Lusitanicum horizont

14–15. *Paroniceras sternale* (BUCH in D'ORBIGNY), (PaP114A), laterális és ventrális nézet (Nagypisznice, 114. réteg), Subregale szubzóna

16–17. *Paroniceras helveticum* RENZ, (PaKT13B), laterális és ventrális nézet (Kis-Teke-hegy, K13. réteg), Clausus szubzóna

18–19. *Paroniceras helveticum* RENZ, (PaG74B), laterális és ventrális nézet (Kis-Gerecse, 74. réteg), Subregale szubzóna

Kézirat beérkezett: 2010. 02. 26.

Plate I — I. tábla

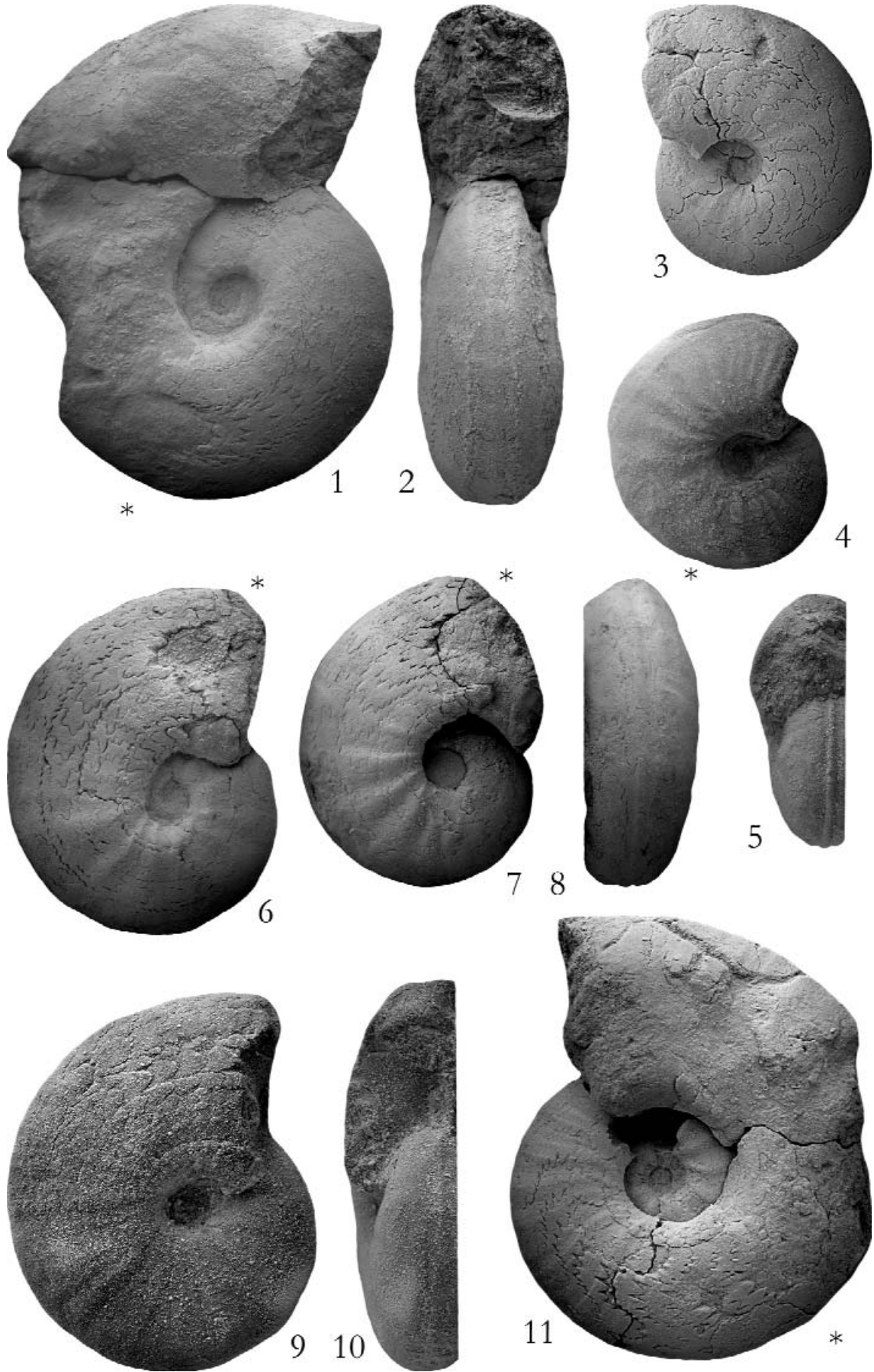


Plate II — II. tábla

