



A Jurassic Brachiopod Fauna from the Mitterwand Area near Hallstatt (Upper Austria)

MILOŠ ŠIBLÍK*)

With a contribution by HARALD LOBITZER**)

7 Text-Figures, 5 Plates

Österreichische Karte 1 : 50.000
Blatt 96

Oberösterreich
Nördliche Kalkalpen
Jura
Brachiopoden

Inhalt

Zusammenfassung	59
Abstract	59
1. Introduction	59
1.1. Occurrence and Character of the Preservation of the Brachiopods	61
1.2. Location of the Most Characteristic Sample Points (WGS-84)	61
1.2.1. Lower Jurassic (Localities 2-5, 7, 12-13) – Sinemurian	61
1.2.2. Middle Jurassic (Localities 1, 6, 8-11, 14) – Upper Bajocian	61
2. Descriptions	62
Acknowledgements	76
Plates 1-5	76
References	86

Eine jurassische Brachiopoden-Fauna aus dem Gebiet der Mitterwand bei Hallstatt (Oberösterreich)

Zusammenfassung

Die Bearbeitung neuer Brachiopoden-Aufsammlungen im Gebiet der klassischen Lokalität Mitterwand südwestlich von Hallstatt erbrachte 52 Taxa, die dem unteren Jura zugeordnet werden können, sowie 12 Arten des mittleren Jura. Die Brachiopoden-Vergesellschaftung des unteren Jura zeigt eine weitgehende Übereinstimmung mit jener der klassischen Lokalität des Hierlatzkalks am Feuerkogel im Hierlatzgebiet.

Abstract

New collections in the vicinity of the classical locality of Mitterwand SW of Hallstatt yielded 52 Lower Jurassic and 12 Middle Jurassic brachiopod species. The Lower Jurassic brachiopods show considerable resemblances to the Sinemurian fauna of the type-locality of the Hierlatz Limestone at Feuerkogel on the Dachstein Plateau.

1. Introduction

This paper offers data on the present state of the Lower and Middle Jurassic localities and their Mediterranean brachiopod fauna in the classical region near Mitterwand, SW of Hallstatt.

The first information about abundant brachiopods on the Dachstein was given already by Fr. SIMONY (1850). He found a rich fauna of cephalopods, gastropods, crinoids and the most numerous brachiopods near the Hierlatzalm on the Dachstein Plateau. According to him, similar fossiliferous rocks could be found also on further places on the Dachstein Plateau and in Dürren and Klaus near Hallstatt.

The next to mention Mitterwand (= Dürren) and its vicinity as a locality with rich brachiopod fauna was F. v. HAUER (1852). He named some of them and had determined older collections made there by SIMONY and RAMSAUER. The Middle Jurassic brachiopods from the "Klausalk" of the Mitterwand vicinity and of the near-by Klausalpe were studied in detail by A. OPPEL (1863), who established a series of new species. Later G. GEYER (1894) offered some determinations of the Liassic brachiopods referring to the *oxynotum* Zone from the locality "Alter Herd", southwest of Mitterwand. As stated already by SPENGLER & PIA (1924) the

**) Dr. MILOŠ ŠIBLÍK, Institute of Geology, ASCR, Rozvojová 269, CZ 16500 Praha 6, Czech Republic.

*) Dr. HARALD LOBITZER, Lindaustraße 3, A 4820 Bad Ischl.



Text-Fig. 1.
Location of collecting sites in the vicinity of Mitterwand, SW of Hallstatt (ÖK 96 Bad Ischl).

Lower and Middle Jurassic fossiliferous limestones originally infilled the palaeokarst surface of the underlying Upper Triassic Dachstein Limestone “pocket-like” or occur as post-sedimentary fissures (“neptunian dykes”).

According to the geological map sheet 1 : 50 000, 96 Bad Ischl (G. SCHÄFFER, 1982), our sampling localities should be situated in an olistostromatic megabreccia body with olistoliths of Dachstein limestones and Early to Middle Jurassic limestones up to bigger than house-size. This megabreccia has been designated by SCHÄFFER (1976,

1982) as “Grünanger Formation”. However, according to our opinion, the area studied is not a megabreccia body, but – as described above – consists of irregular bedded, lagoonal Dachstein Limestone with varied occurrences of Jurassic limestones. As a consequence of the insufficient definition of the term Grünanger Formation, H.-J. GAWLICK (2007) proposed to better avoid this formation name.

Our study started in 2001 and was made in the framework of the revision of the Triassic and Jurassic brachiopod localities in the UNESCO World Heritage Site Hallstatt –

Dachstein – Salzkammergut. It was focused on the area between Niederdürren in the SE (localities 5–14) and Klauskögerl (1176 m) in the NW (localities 1–4). The most numerous part of our material comes from the vicinity of Mitterwand, and the following brachiopod descriptions are based on our own material only. No fossiliferous occurrences of the Middle Jurassic around the classical site Klausalpe were ascertained during our samplings (for collecting sites see Text-Fig. 1).

The local Lower Jurassic contains a much richer and more varied brachiopod fauna in comparison to previous lists, while newly ascertained Middle Jurassic brachiopods are less numerous if compared to older, much richer collections (e.g. in the depository of the



Text-Fig. 2.
Terebratulid coquina at locality 12.
Width of sample 15 cm.

Natural History Museum in Vienna). The Liassic yielded a varied Sinemurian brachiopod fauna; the accompanying pelecypods were very scarce and fragmentary. The fauna occurs in white or pink to reddish biosparitic limestones and is dominated by zeilleriids.

In comparison to it, the Middle Jurassic fauna occurs in ruby coloured to reddish brown biosparites, sometimes with dark brown metallic iron-manganese spots of mm-size, in a crinoid-rich variety of the so-called "Klauskalk". A. TOLLMANN (1960) described this special facies development as "crinoid limestones of the Klauskalk Formation" Stratigraphical evaluation of the "Klauskalk" from the local occurrences was published by K. ZITTEL (1868) and by L. KRYSŤYN (1971). Basing on an ammonite fauna, the latter stated Upper Bajocian age for the crinoidal limestones of the Mitterwand. We found only several small smooth ammonites at locality 8, which were kindly determined by J. SCHLÖGL (Bratislava) as Upper Bajocian *Nannolytoceras* cf. *polyhelictum* (BÖCKH), which is in good accord with KRYSŤYN's statement. According to KRYSŤYN (1971) the local Middle Jurassic biosparitic limestones should be better designated as "Vilser Kalk", because the typical "Klauskalk" s.s. is usually represented by basinal red micrites with ammonites.

1.1. Occurrence and Character of the Preservation of the Brachiopods

Natural outcrops are exceptional (loc. 1) and no bed-by-bed sampling was possible. Sometimes the fauna was collected from a talus (loc. 9 and 13, loose material of red limestones at loc. 4) or from a small streak or "neptunian dyke" in the Dachstein Limestone (loc. 5). Locality 12 contained a coquina – "*Terebratula*" lentil (170 x 30 cm, Text-Fig. 2).

The preservation of brachiopod shells is variable and almost all specimens are more or less decorticated and in many cases fragmentary. Rhynchonellids and terebratulids show a low ratio of disarticulated valves, while spiriferinids are predominantly found in isolated valves. Internal characters could not be proved in most species owing to the scarcity of material or to recrystallization of interiors of the specimens. Nearly none of the sectioned specimens showed complete internal features. Most part of the species is thus referred to the genus mainly on external characters. Some hundreds of mostly terebratulid Liassic specimens from the localities 12 and 13 are small (juvenile?), fragmentary and undeterminable. They are not discussed further herein.

1.2. Location of the Most Characteristic Sampling Points (WGS-84)

Loc. 1: 47-32-814, 13-36-020
 Loc. 2: 47-32-773, 13-35-885
 Loc. 5: 47-32-433, 13-36-590
 Loc. 8: 47-32-507, 13-36-750
 Loc. 14: 47-32-470, 13-36-770

1.2.1. Lower Jurassic (Localities 2–5, 7, 12–13) – Sinemurian

Due to the lack of ammonites no more precise stratigraphical evaluation was possible.

Red and whitish micrites, often with crinoids (loc. 2, 3, 4, 7, 13), rarely biosparites or bioclastic packstones, exceptionally with terebratulid coquina (loc. 12), "neptunian dyke"

of light red micrites and crinoid-brachiopod-gastropod limestone (loc. 5).

The following brachiopod species were ascertained:

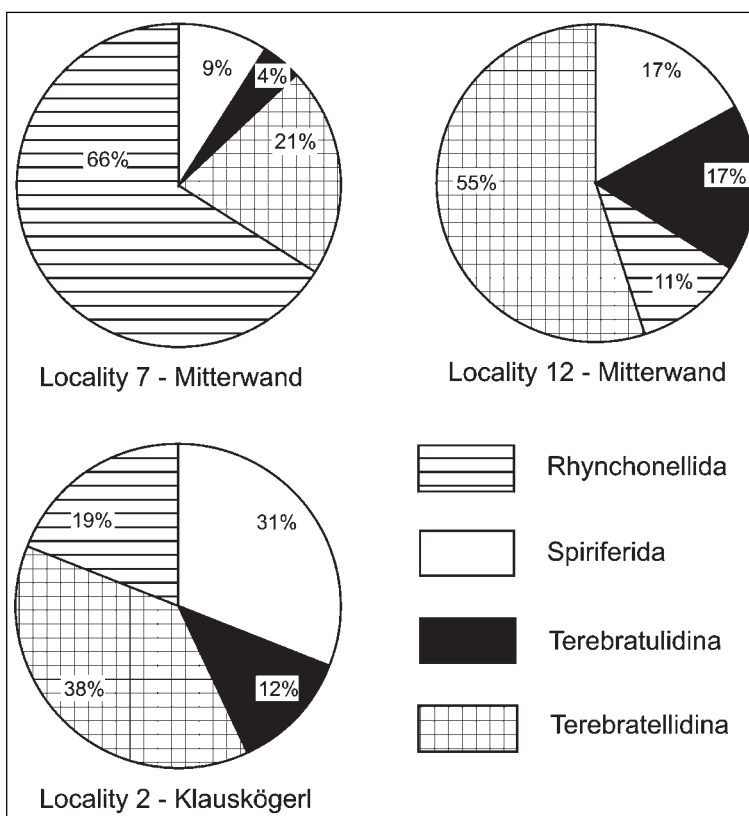
Apringia paolii (locality 5, 12)
Apringia deltoidea (12)
Jakubirhynchia latifrons (4, 2 cf.)
Prionorhynchia fraasi (12, 13)
Prionorhynchia greppini (5, 7)
Prionorhynchia palmata (7)
Prionorhynchia flabellum (3, 5, 7, 12)
Prionorhynchia cf. *forticostata* (7)
Prionorhynchia cf. *pseudoscherina* (7)
Calcirhynchia plicatissima (2, 4, 7, 12, 13)
Calcirhynchia (?) *laevicosta* (7, 13)
Cirpa planifrons (2, 7, 12, 13)
Cirpa (?) aff. *subcostellata* (7)
Salgirella albertii (7)
 "Rhynchonella" *hagaviensis* (5)
 "Rhynchonella" aff. *belemnitica* (2, 7, 12, 13)
 "Rhynchonella" aff. *canevae* (7)
 "Rhynchonella" cf. *latissima* (7)
Homoeorhynchia (?) *prona* (3, 12)
Cuneirhynchia cartieri (2, 7, 12)
Cuneirhynchia retusifrons (7, 12, 13)
Pisirhynchia inversa (3, 4, 5)
Pisirhynchia pisoides (5)
Koninckodonta pichleri (4, 5)
Amphiclinodonta cf. *adnethica* (4)
Liospiriferina acuta (2, 7)
Liospiriferina aff. *aequiglobata* (7)
Liospiriferina alpina (12, 13)
Liospiriferina angulata (4)
Liospiriferina brevirostris (2)
Liospiriferina aff. *globosa* (2)
Liospiriferina aff. *gryphoidea* (7)
Liospiriferina obtusa (4, 7, 12, 13)
Liospiriferina aff. *obtusa* (2, 13)
Liospiriferina sicula (7)
Lobothyris andleri (2, 12, 13)
Lobothyris punctata (3, 7, 12)
Rhapidothyris (?) *beyrichi* (7)
Linguithyris aspasia (5, 7)
Zeilleria alpina (12, 13)
Zeilleria baldaccii (12)
Zeilleria choffati (2, 3, 12)
Zeilleria livingstonei (3, 12, 13)
Zeilleria mutabilis (2, 3, 5, 12, 13)
Zeilleria stapia (12, 13)
Zeilleria thurwieseri (4)
Zeilleria venusta (5 cf., 12, 13)
Bakonyithyris apenninica (7, 12)
Bakonyithyris aff. *apenninica* (7)
Bakonyithyris (?) *engelhardti* (13)
Bakonyithyris ewaldi (5, 7, 12, 13)
Bakonyithyris sp. (7)
Securina partschi (2, 5, 7, 12, 13).

The local Liassic brachiopod fauna shows considerable resemblances to that of the same age at the classical locality at Feuerkogel in the Hierlatz group on the Dachstein Plateau. However, coarsely ribbed rhynchonellids (e.g. *Salgirella albertii*) are very rare, and ribbed spiriferinids are missing completely at newly studied localities. Also the number of smooth spiriferinids is there relatively low.

1.2.2. Middle Jurassic (Localities 1, 6, 8–11, 14) – Upper Bajocian

Mostly biosparites, rarely red micrites with sporadic crinoids (loc. 1 and 9), ruby (loc. 6 and 14) and ruby to reddish-brown (loc. 10 and 11) micrites and biosparites, and dark reddish and greenish biosparites with Protoglobigeri-

Text-Fig. 3.
Composition of the brachiopod fauna at localities 2, 7 and 12.



nas, *Bositra* shells and manganese spots (loc. 8). The old samples from Klausalpe housed in the GBA collections in Vienna showed also red-white spotty biosparites. The following brachiopod species were recently ascertained: *Apringia atla* (loc. 8, 9, 10, 14), *Stolmorhynchia* aff. *viglii* (8, 11), *Septocrurella* (?) cf. *defluxa* (8, 9, 10, 11, 14), *Septocrurella* (?) cf. *micula* (6), "*Rhynchonella*" aff. *etalloni* (1), *Capillirhynchia brentoniaca* (1, 8, 14), *Striirhynchia berchta* (8, 11), *Striirhynchia subechinata* (8, 9, 10, 14), "*Terebratula*" *fylgia* (8, 10, 11, 14), *Karadagithyris gerda* (8, 9, 14), *Linguithyris curviconcha* (8, 6–cf., 9) and *Linguithyris* cf. *redii* (9, 11).

2. Descriptions

Order: Rhynchonellida KUHN, 1949
Superfamily: Pugnacoidea RZHONSNICKAIA, 1956
Family: Basiliolidae COOPER, 1959
Genus: *Apringia* DE GREGORIO, 1886

Apringia paolii (CANAVARI, 1880)

1880 *Rhynchonella Paolii*, nov. form. – CANAVARI, p. 69, Pl. 1, Fig. 1.
 2003 *Apringia paolii* (CANAVARI) – DULAI, p. 8, Pl. 1, Fig. 9–11, Text-Fig. 2 (cum syn.).

Material: 3 damaged specimens. The better preserved ones measure cca. 11 × 12.0 × 7.1 mm and cca. 10 × 12.5 × 7.5 mm.

Remarks: All specimens are equibiconvex and agree well with that figured by DULAI (2003), differing in this respect from the dorsibiconvex specimen depicted from Adnet by SIBLÍK in SIBLÍK & LOBITZER (2003). Plication of anterior commissure slightly undulated. Very faint costellae developed on valves, posterior parts of valves smooth. Beaks missing in both specimens. – Serial sections made by SIBLÍK in SIBLÍK & LOBITZER (2003) and by DULAI (2003) well showed a characteristic internal structure of the species: very short dental lamellae and absent septalium and dorsal septum.

Occurrence: Localities 5 (1 specimen) and 12 (2 spec.).

Age: Sinemurian–Pliensbachian.

Apringia deltoidea (CANAVARI, 1880)

(Pl. 3, Fig. 3)

1880a *Rhynchonella deltoidea* MGH. ms. – CANAVARI, p. 24, Pl. 4, Fig. 1.

Material: 1 specimen with dimensions 11.0 × 10.6 × 5.9 mm.

Remarks: Smooth shell of subtrigonal outline with strong erect beak, and very low, relatively narrow anterior plication are main characters, which make a difference to the similar *Apringia paolii*. Our specimen agrees well with that of CANAVARI, which differs in lesser convexity near to the beak of the brachial valve only.

Occurrence: Locality 12.

Age: This rare species derives from the Middle Liassic of the Central Apennines. It was reported also from the Carixian of the Bakony Mts. in Hungary by VÖRÖS (1997, p. 15).

Apringia atla (OPPEL, 1863)

(Text-Fig. 4)

1863 *Rhynchonella Atla* OPP. – OPPEL, p. 208, Pl. 6, Fig. 1–2 (Fig. 3 var. *polymorpha*).

1863 *Rhynchonella coarctata* OPP. – OPPEL, p. 209, Pl. 6, Fig. 4 (Fig. 5 var. *miscella*).

1982 *Apringia ? atla* (OPPEL) – BENIGNY in BENIGNY et al., p. 59, Pl. 2, Fig. 2, Text-Fig. 10 (cum syn.).

1997 *Apringia atla* (OPPEL) – VÖRÖS, p. 107, Fig. 28.

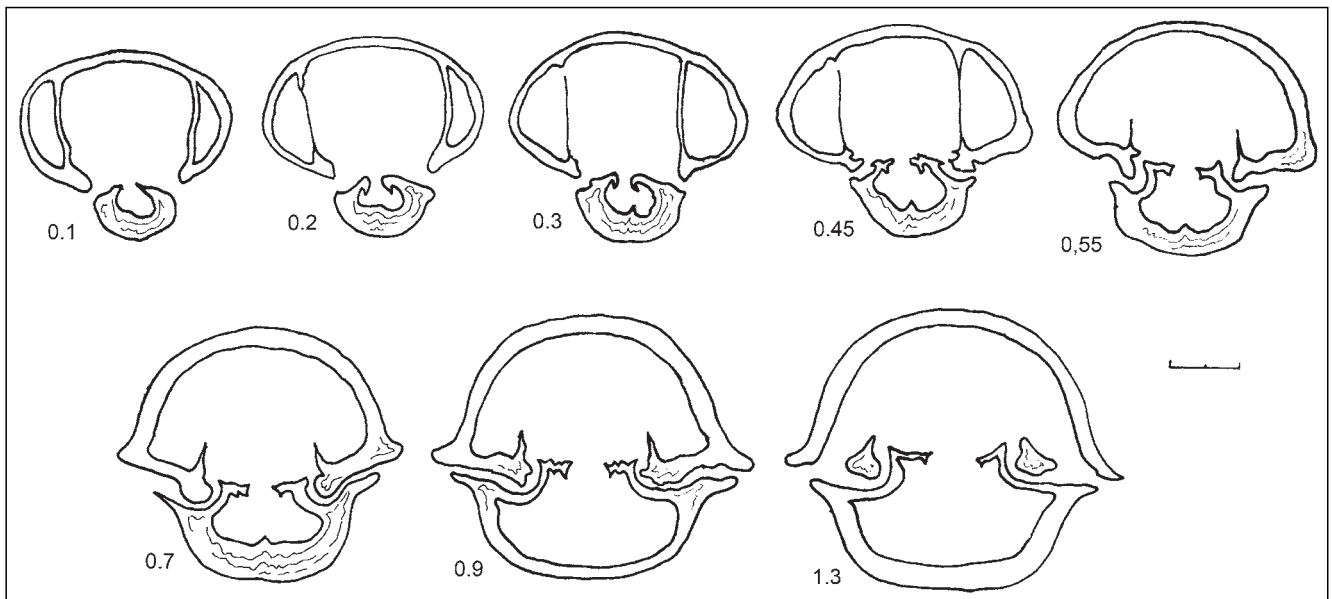
1999 *Apringia atla* (OPPEL) – KROBICKI in WIERZBOWSKI et al., p. 58, Fig. 22: 1 (cum syn.).

2001 *Apringia atla* (OPPEL) – VÖRÖS, Fig. 2: 1.

Material: 12 partially damaged specimens with both valves, 2 brachial and 11 pedicle valves up to 25.5 mm long, 33.0 mm wide and cca. 15.0 mm thick.

The interior of the shell is characterized by subparallel dental lamellae and hinge teeth without crenulation, by thick subhorizontal hinge plates, by very large sockets and by a very low dorsal ridge. Neither septalium nor dorsal septum were developed. Figured sections by BENIGNY et al. (1982, Text-Fig. 10) showed a well-developed pedicle collar, much narrower sockets and prefal-cifer [= hamiform] crura.

Remarks: A certain similarity between *Rhynchonella atla* and *Rhynchonella coarctata* (above all a very variable shape



Text-Fig. 4.

Apringia atla (OPPEL).

Locality 14. Serial transverse sections through the posterior part of shell. Measured from dorsal umbo. Sections 0.45–0.9 showed very broad hinge sockets. Original length of specimen ?18.0 mm. Magnified.

of the anterior commissure) was already recognized in the original description by OPPEL (1863), and discussed later in detail e.g. by POINTINGHER (1959). The synonymy of both species is supported by our material and is adopted in the present paper, following FERRARI (1962), BENIGNY in BENIGNY et al. (1982) and KROBICKI in WIERZBOWSKI et al. (1999).

Occurrence: Locality 8 (2 specimens), loc. 9 (11 spec.), loc. 10 (4 spec.) and loc. 14 (8 spec.).

Age: Bajocian–Bathonian. KRYSŤYN (1971) reported the species from the Prielgraben (“*Homoeorhynchia coarctata*”). The information about the occurrence in the Italian Aalenian should be revised (BENIGNY et al., 1982).

Genus: *Jakubirhynchia* TOMAŠOVÝCH, 2006

Jakubirhynchia latifrons (STUR in GEYER, 1889)

(Pl. 2, Fig. 1)

1889 *Rhynchonella latifrons* STUR. m. s. – GEYER, p. 54, Pl. 6, Fig. 25–31.

2003 *Cirpa latifrons* (STUR in GEYER) – DULAI, p. 18, Pl. 2, Fig. 4–10 (cum syn.).

2006 *Jakubirhynchia latifrons* (GEYER) new combination – TOMAŠOVÝCH, p. 215, Fig. 2–12 (cum syn.).

Material: 1 complete specimen with dimensions 12.2 × 14.0 × 8.2 mm (figured) and fragments of 2 other specimens.

Remarks: Very detailed original description and remarks by GEYER (1889) were recently enlarged by DULAI (2003). Our specimens have 4 or 5 sharp ribs in the plication. Lateral view of figured specimen shows pedicle valve with inflation in its posterior part. The lack of suitable material precluded getting more detailed information concerning internal characters. The specimen figured by DULAI (2003, Pl. 2, Fig. 7–10) has a low, rounded plication and differs in this respect from the average specimens of “*latifrons*”. Quite recently a new multicostate rhynchonellid genus was established by TOMAŠOVÝCH (2006) with *Rhynchonella latifrons* GEYER as the type species. He

discussed other Lower Liassic multicostate rhynchonellids at length. The synonymy of *J. latifrons* includes, according to him, also material described as *Calcirhynchia* (?) *plicatissima* or *Calcirhynchia* (?) cf. *plicatissima* by SIBLÍK (1993a, 1999) and BÖHM et al. (1999). The confirmation of their appurtenance to *Jakubirhynchia* would need further study, with respect to the obviously large internal variability of *Calcirhynchia*.

Occurrence: Locality 4. Moreover, locality 2 yielded 1 damaged specimen determined as *Jakubirhynchia* cf. *latifrons*.

Age: Middle Hettangian–Sinemurian. The Hettangian occurrence was reported recently from the West Carpathians of Slovakia (TOMAŠOVÝCH, 2006) and from Hungary (DULAI in VÖRÖS et al., 2003).

Genus: *Stolmorhynchia* BUCKMAN, 1918

Stolmorhynchia aff. *vigilii* (LEPSIUS, 1878)

aff. 1878 *Rhynchonella Vigilii* – LEPSIUS, p. 368, Pl. 7, Fig. 8–10 (non vidi).

aff. 1886 *Rhynchonella Vigilii* LEPSIUS – VACEK, p. 116, Pl. 20, Fig. 10–16.

Material: 3 partially damaged specimens with both valves.

Remarks: The specimens show a considerable resemblance to Aalenian *Stolmorhynchia vigilii* and differ from it in larger and higher beaks and less acute ribs. Another Aalenian *Stolmorhynchia* – *S. dubari* ROUSSELLE, 1965, which is mentioned by Vörös (2001) also from the Bajocian of the Transdanubian Central Range – differs from our material mainly in a flat pedicle valve and subcyncephalous brachial valve.

Occurrence: Localities 8 (1 specimen) and 11 (2 spec.).

Age: *Stolmorhynchia vigilii* was described by LEPSIUS (1878) from Capo S. Vigilio in Northern Italy and has been reported from the Upper Toarcian–Aalenian.

Family: Erymnariidae COOPER, 1959
Genus: *Septocrurella* WISNIEWSKA, 1932

Septocrurella (?) *defluxa* (OPPEL, 1863)

(Pl. 5, Fig. 6)

- 1863 *Rhynchonella defluxa* OPP. – OPPEL, p. 212, Pl. 7, Fig. 1–4.
1877 *Rhynchonella defluxa* OPP. – GEMMELLARO, p. 153, Pl. 19, Fig. 14–15.
1999 *Septocrurella* ? *defluxa* (OPPEL) – KROBICKI in WIERZBOWSKI et al., p. 63, Fig. 22: 6 (cum syn.).

Material: 5 partially fragmentary or deformed specimens with both valves, 7 brachial and 5 pedicle valves, up 17.0 mm long, 15.5 mm wide and 12.0 mm thick. The figured one measures cca. 11 × 11.4 × 6.6 mm.

Remarks: The specimens show same variability in outline as those figured by OPPEL (1863) and by later authors. Number of ribs in sulcus of our specimens varies from 1 to 4, and is the same as in the specimens reported by KROBICKI in WIERZBOWSKI et al. (1999) from the Pieniny Klippen in Poland.

Occurrence: Locality 8 (2 specimens), loc. 9 (1 spec.), loc. 10 (12 spec.), loc. 11 (1 spec.) and loc. 14 (1 spec.).

Age: Bajocian–Bathonian.

Septocrurella (?) cf. *micula* (OPPEL, 1863)

cf. 1863 *Rhynchonella micula* OPP. – OPPEL, p. 214, Pl. 7, Fig. 8–10.

Material: 1 fragmentary specimen with dimensions 6.9 × cca. 8.0 × 4.2 mm.

Remarks: Small, smooth specimen with faint marginal undulations in the shallow sulcation and in the antero-lateral margins. In the generic attribution of “*micula*” to *Septocrurella* (?) SULSER’s opinion (1999, p. 113) is followed. The present material of this rare species does not warrant a discussion on its generic appurtenance, however.

Occurrence: Locality 6.

Age: Bajocian–Bathonian.

Superfamily: Rhynchotetradoidea
LICHAREW, 1956
Family: Prionorhynchiidae
MANCEÑIDO & OWEN, 2002
Genus: *Prionorhynchia* BUCKMAN, 1918

Prionorhynchia fraasi (OPPEL, 1861)

(Pl. 1, Fig. 6; Pl. 3, Fig. 1)

- 1861 *Rhynchonella Fraasi* OPP. – OPPEL, p. 543, Pl. 12, Fig. 3.
1861 *Rhynchonella polyptycha* OPP. – OPPEL, p. 544, Pl. 12, Fig. 4.
1999 *Prionorhynchia fraasi* (OPPEL) – SIBLÍK in BÖHM et al., p. 197, Pl. 30, Fig. 1–5, Text-Fig. 49 (cum syn.).
2003 *Cuneirhynchia fraasi* (OPPEL) – DULAI, p. 35, Pl. 6, Fig. 4–6 (cum syn.).
2003 *Prionorhynchia polyptycha* (OPPEL) – DULAI, p. 14, Pl. 5, Fig. 1–3, Text-Fig. 3 (cum syn.).
non 1911 *Rhynchonella Greppini* OPP. n. f. *polyptycha* OPP. – HAHN, p. 559, Pl. 21, Fig. 1.

Material: 16 specimens, up to 17.0 mm long, 18.5 mm wide and 12.0 mm thick. The figured specimens measure 13.8 × 12.4 × 9.6 mm (Pl. 1, Fig. 6) and 16.0 × 17.8 × 11.0 mm (Pl. 3, Fig. 1).

Remarks: The figured specimen differs from other ones in our material in relatively narrow outline and poorly delimited planareas. *Rhynchonella polyptycha* OPPEL is considered here synonymous with “*fraasi*” (see also SIBLÍK in BÖHM et al., 1999). The specimen figured by HAHN (1911) differs from “*polyptycha*” in thinner valves and a dif-

ferent anterior view. Serial sections of “*polyptycha*” and detailed interpretation of its internal characters made by DULAI (1992 and 2003) documented satisfactorily the affiliation to *Prionorhynchia*.

Occurrence: Localities 12 (8 specimens) and 13 (8 spec.).

AGE: Hettangian–Pliensbachian.

Prionorhynchia greppini (OPPEL, 1861)

(Pl. 1, Fig. 1)

- 1861 *Rhynchonella Greppini* OPP. – OPPEL, p. 545, Pl. 13, Fig. 1 only.
1999 *Prionorhynchia greppini* (OPPEL) – SULSER, p. 58, 1 Fig.
2003 *Prionorhynchia greppini* (OPPEL) – DULAI, p. 12, Pl. 4, Fig. 12–17 (cum syn.).

Material: 11 specimens. The biggest one has dimensions 14.4 × 21.6 × 9.8 mm, the figured one measures 14.8 × 17.9 × 9.6 mm.

Remarks: Our specimens agree well in all observed external features with those figured by GEYER (1889). Anterior uniplication and stronger ribs seem to be the only substantial features distinguishing this species from the very similar *P. palmata*. Although external morphological aspects suggest a possible relationship or even synonymy of both species, the material at disposal does not warrant drawing satisfactory conclusions. For other affinities of “*greppini*” see remarks by SIBLÍK in BÖHM et al. (1999, p. 197).

Occurrence: Locality 5 (2 specimens), loc. 7 (9 spec.).

Age: Hettangian–Sinemurian, ?Pliensbachian.

Prionorhynchia palmata (OPPEL, 1861)

(Pl. 3, Fig. 4)

- 1861 *Rhynchonella Greppini* OPP. var. *palmata* – OPPEL, p. 545, Pl. 13, Fig. 2.
1880 *Rhynchonella palmata* OPPEL – UHLIG, p. 298, Pl. 5, Fig. 4.
1889 *Rhynchonella palmata* OPP. (UHLIG) – GEYER, p. 50, Pl. 6, Fig. 11–14 (cum syn.).
1997 *Cuneirhynchia palmata* (OPPEL) – VÖRÖS, p. 103, Fig. 2.
2003 *Cuneirhynchia palmata* (OPPEL) – DULAI in VÖRÖS et al., p. 72, Pl. 6, Fig. 35–37.

Material: 8 damaged specimens; the biggest one measures 14.6 × 19.0 × ca. 10.5 mm. The figured specimen has the dimensions 14.8 × 17.9 × 9.6 mm.

Remarks: Subtrigonal shells and rectimarginate anterior commissures are the most obvious features distinguishing this species from *P. greppini*. Some specimens show blunt ribs. Planareas are well developed in most specimens and are situated symmetrically on flanks of both valves.

Occurrence: Locality 7.

Age: Sinemurian–?Pliensbachian.

Prionorhynchia flabellum
(MENEHINI in GEMMELLARO, 1874)

(Pl. 2, Fig. 3)

- 1874 *Rhynchonella flabellum* MGH. – GEMMELLARO, p. 83, Pl. 11, Fig. 14, 25–27.
1978 *Prionorhynchia flabellum* (GEMMELLARO) – BENIGNY, p. 144, Pl. 14, Fig. 3 (cum syn.).
?2003 *Prionorhynchia flabellum* (MENEHINI in GEMMELLARO) – DULAI in VÖRÖS et al., p. 70, Pl. 6, Fig. 1–3.
?2005 *Prionorhynchia*? cf. *flabellum* (MENEHINI in GEMMELLARO) – SULSER & FURRER, p. 19, Fig. 12a.

Material: 20 specimens. The biggest one measures ?14 × ?16 × 7.2 mm, the figured one 9.6 × 9.8 × 4.9 mm.

Remarks: Small biconvex shells of trigonal outline and relatively flat valves. They correspond well with the descriptions and most figures in literature, and differ in smaller dimensions only. 10–12 rounded ribs developed on each valve, a small smooth area near posterior parts of valves may be present. Anterior commissure nearly rectimarginate or with broad, very low uniplication. Shallow planareas or merely flattenings developed laterally. Our figured specimen seems to be nearly identical with that figured from Arzo by SULSER & FURRER (2005). Locality 5 yielded 1 specimen with dimensions 15.5 × 17.5 × 8.6 mm, which is here determined as *Prionorhynchia* aff. *flabellum*. It differs from the other material in having stronger beak, higher uniplication and flattening only on the flanks. Sharper ribs of the specimen figured by DULAI in VÖRÖS et al. (2003) refer rather to *Prionorhynchia greppini* (OPPEL).

Occurrence: Locality 3 (2 specimens), loc. 5 (2 spec. and 1 specimen aff.), loc. 7 (12 spec.), and loc. 12 (3 spec.).

Age: The species is reported from the Middle Liassic. VÖRÖS (1997) referred also to the occurrence in the Sinemurian of the Bakony and Tata Mts. in Hungary.

***Prionorhynchia* cf. *forticostata* (BÖCKH, 1874)**

cf. 1874 *Rhynchonella forticostata* n. sp. – BÖCKH, p. 165, Pl. 4, Fig. 1–3.

Material: 1 anteriorly damaged specimen with dimensions: ? × 16.0 × 11.2 mm.

Remarks: The specimen is noted for dichotomy of ribs. It has trigonal outline, zig-zagged anterior margin and large ill-defined planareas laterally. Large, very low plication with 3 strong rounded ribs, which dichotomize in mid-length of valves into weak ribs reaching the umbos. The specimen shows considerable resemblances to *Rhynchonella forticostata* BÖCKH, and differs from it essentially in a stronger beak only. A certain similarity could be found also in *Prionorhynchia glycinna* (GEMMELLARO, 1874) from the Pliensbachian. The Italian species differs, apart its greater size, in stronger ribs and higher uniplication. Precise assignment of our specimen depends on the discovery of additional material.

Occurrence: Locality 7.

Age: The species was described by BÖCKH (1874) from the Sinemurian of the Bakony Mts. in Hungary.

***Prionorhynchia* cf. *pseudoscherina* (BÖSE, 1879)**

cf. 1897 *Rhynchonella pseudo-scherina* nov. sp. – BÖSE, p. 198, Pl. 14, Fig. 13–14.

cf. 2003 *Prionorhynchia pseudoscherina* (BÖSE, 1898) – DULAI in VÖRÖS et al., p. 70.

Material: 2 fragmentary specimens.

Remarks: Both specimens remind one very much of *Prionorhynchia pseudoscherina* as figured by BÖSE (1897) in Pl. 14, Fig. 14. Dorsibiconvex shells of subtrigonal outline, strong and moderately acute ribs (4 of them in the fold) extending to the posterior margin, and large planareas are the main external characters of the species. Character of beaks could not be compared as they are broken in our specimens. Similar *Prionorhynchia guembeli* (OPPEL) from the Lower Liassic differs from *P. pseudoscherina* in lower folding and in deeper planareas.

Occurrence: Locality 7.

Age: *Prionorhynchia pseudoscherina* was described by BÖSE from the Middle Liassic of Kramsach in Tyrol and of Schafberg. It was ascertained also in the Sinemurian of

Hungary (VÖRÖS, 1997) and recently at Schafberg (DULAI in VÖRÖS et al., 2003).

Superfamily: Wellerelloidea LICHAREW, 1959
Family: Wellerellidae LICHAREW, 1959
Genus: *Calcirhynchia* BUCKMAN, 1918

***Calcirhynchia plicatissima* (QUENSTEDT, 1852)**

(Pl. 1, Fig. 4; Pl. 2, Fig. 2)

1852 *Terebratula plicatissima* – QUENSTEDT, p. 451, Pl. 36, Fig. 3.

1999 *Calcirhynchia plicatissima* (QUENSTEDT) – SULSER, p. 55, 1 Fig.

2003 *Calcirhynchia plicatissima* (QUENSTEDT) – DULAI, p. 25, Pl. 3, Fig. 13–18; Pl. 4, Fig. 1–7; Text-Fig. 5 (cum syn.).

Material: 37 partially fragmentary specimens. The biggest one measures 15.3 × 17.1 × 10.1 mm and the figured ones 12.9 × 14.4 × 8.8 mm (Pl. 1, Fig. 4) and 12.7 × 13.8 × 7.9 mm (Pl. 2, Fig. 2).

Remark: Nothing new has been ascertained since the papers by DULAI (1992, 2003) and SIBLIK (1993a), where descriptions of external and internal characters of the species and notes to its variability were given. There are 14–21 ribs on each valve of our specimens. The bifurcation occurs sporadically in the posterior parts of the shells.

Occurrence: Locality 2 (1 specimen), loc. 4 (1 spec.), loc. 7 (27 spec.), loc. 12 (7 spec.) and loc. 13 (1 spec.).

Age: Hettangian–Sinemurian, ?Pliensbachian.

***Calcirhynchia* (?) *laevicosta* (STUR in GEYER, 1889)**

1889 *Rhynchonella laevicosta* nov. sp. STUR m. s. – GEYER, p. 66, Pl. 7, Fig. 20–21.

1893 *Rhynchonella laevicosta* STUR. m. s. – BÖSE, p. 644, Pl. 15, Fig. 1.

2003 *Calcirhynchia* (?) *laevicosta* (STUR in GEYER) – SIBLIK in SIBLIK & LOBITZER, p. 74.

Material: 4 fragmentary specimens. The biggest one measures 15.0 × ? × 8.5 mm.

Remarks: There are not so many Lower Liassic rhynchonellids with faint ribs. Our specimens show considerable resemblances to *Calcirhynchia* (?) *laevicosta* and *Calcirhynchia* (?) *matyasovskyi* (BÖCKH, 1877). However, the latter species has a ventribiconvex shell and slightly stronger ribs than our specimens. These can be distinguished from GEYER's figures by their maximum width situated anteriorly, and thus by pentagonal outline. They also have lower beaks and a relatively smaller thickness of shell.

Occurrence: Localities 7 (3 specimens) and 13 (1 spec.)

Age: The species was described from the Sinemurian of Hierlatz and is known also from Hindelang. Recently, it was ascertained in Adnet (quarry XXXVIII). The species is reported also from the same level in the Bakony and Gerecse Mts. in Hungary (VÖRÖS, 1997).

Genus: *Cirpa* DI GREGORIO, 1930

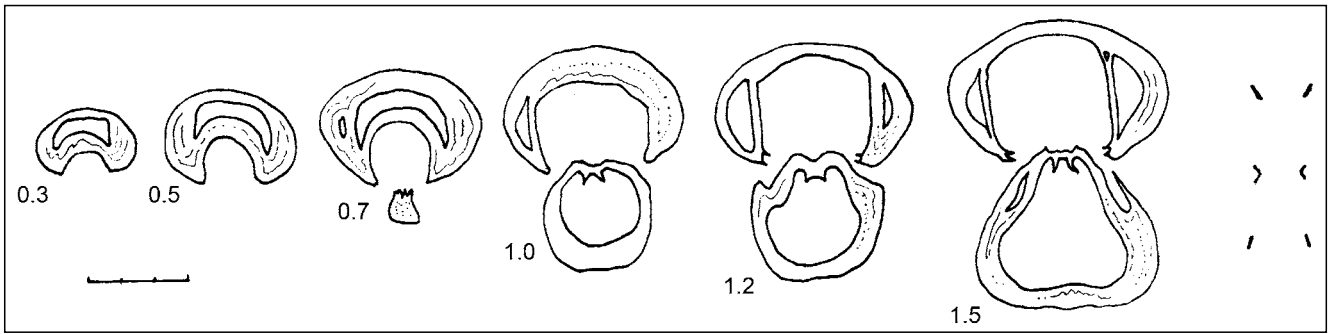
***Cirpa planifrons* (ORMÓS, 1937)**

(Pl. 1, Fig. 9, 1; Text-Fig. 5)

1937 *Rhynchonella planifrons* nov. sp. – ORMÓS, p. 35, 41, Pl. 1, Fig. 19.

1993a *Cirpa planifrons* (ORMÓS) – SIBLIK, p. 967, Pl. 1, Fig. 1–3, Text-Fig. 3.

2003 *Cirpa planifrons* (ORMÓS) – DULAI in VÖRÖS et al., p. 70, Pl. 6, Fig. 19–20.



Text-Fig. 5.

Cirpa planifrons (ORMÓS).

Locality 2. All 4 sectioned specimens showed very strong pedicle collars. Original length of specimen 16.2 mm. Magnified.

Material: 13 specimens. The biggest specimen measures $17.0 \times 16.2 \times 10.0$ mm, the figured one $11.8 \times 12.6 \times 8.4$ mm.

Remarks: Typical flattening of anterior margin is well developed in all specimens. The sections show typical characters of *Cirpa*: double deltidial plates, fused hinge plates of subhorizontal orientation, neither septalium nor median septum developed.

Occurrence: Locality 2 (2 specimens), loc. 7 (1 spec.), loc. 12 (2 spec.) and loc. 13 (8 spec.).

Age: Hettangian–Sinemurian.

***Cirpa* (?) aff. *subcostellata* (GEMMELLARO, 1878)**

(Pl. 2, Fig. 6)

aff. 1878 *Rhynchonella subcostellata*, GEMM. – GEMMELLARO, p. 422, Pl. 31, Fig. 75–78.

aff. 2003 *Cirpa subcostellata* (GEMMELLARO) – DULAI, p. 21, Pl. 3, Fig. 1–3 (cum syn.).

Material: 1 specimen measuring $11.8 \times 12.9 \times 6.9$ mm.

Remarks: The specimen resembles considerably *Rhynchonella subcostellata* figured by GEMMELLARO (1878) and recently by DULAI in VÖRÖS et al. (2003, Pl. 6, Fig. 21–23) from Schafberg. Our specimen differs from the mentioned specimens in a rather trigonal outline with maximum width situated nearer to the anterior margin.

Occurrence: Locality 7.

Age: *Rhynchonella subcostellata* originated from the Lower Liassic of Sicily and occurs both in the Lower and Middle Liassic.

Genus: *Salgirella* MOJSEJEV, 1936

***Salgirella albertii* (OPPEL, 1861)**

(Pl. 1, Fig. 2)

1861 *Rhynchonella Albertii* OPP. – OPPEL, p. 546, Pl. 13, Fig. 4.

1880 *Rhynchonella Albertii* OPPEL – UHLIG, p. 290, Pl. 4, Figs. 1–2.

1889 *Rhynchonella Alberti* OPP. – GEYER, p. 43, Pl. 5, Figs. 14–17.

1997 *Salgirella alberti* (OPPEL) – VÖRÖS, p. 103, Fig. 4.

non 2003 *Salgirella* cf. *albertii* (OPPEL) – DULAI, p. 29, Pl. 5, Fig. 7–10 (cum syn.).

Material: 2 specimens. They measure $17.0 \times 21.0 \times 11.6$ mm (figured) and cca. $17 \times 19.5 \times 10.6$ mm.

Remarks: A very detailed description was given already by GEYER (1889). Characteristic specimens have almost flat pedicle valves and strongly convex brachial valves, and sharp uniplication in the anterior commissure. Generic attribution has to await definitive confirmation.

Occurrence: Locality 7.

Age: Hettangian (?), Sinemurian, Pliensbachian (?).

Superfamily: Rhynchonelloidea

D'ORBIGNY, 1847

Family: Rhynchonellidae

D'ORBIGNY, 1847

Genus: *Rhynchonella* FISCHER, 1809: s.l.

***"Rhynchonella" hagaviensis* BÖSE, 1897**

1897 *Rhynchonella Hagaviensis* nov. sp. – BÖSE, p. 206, Pl. 15, Fig. 10–13.

2003 *Prionorhynchia* ? *hagaviensis* (BÖSE, 1898) – DULAI in VÖRÖS et al., p. 70.

2003 *Prionorhynchia* ? *hagaviensis* (BÖSE, 1898) – VÖRÖS in VÖRÖS et al., p. 78, Pl. 8, Fig. 13–14.

2003 *Prionorhynchia* ? aff. *hagaviensis* (BÖSE, 1898) – *ibid.*, p. 78, Pl. 8, Fig. 15–17.

Material: 1 specimen with damaged anterior margin and pedicle beak. It measures $8.5 \times 7.3 \times 5.2$ mm.

Remarks: Biconvex shell, narrowly trigonal in outline, rectimarginate, with flat and large, poorly delimited planareas, straight lateral commissures and 7 (8) blunt plications on valves are the main external features of our specimen. It fits well BÖSE's description and is well comparable to the specimen figured by this author in Pl. 15, Fig. 12. It seems that it is difficult to separate *"Rhynchonella" hagaviensis* from some specimens of the similar species *"Rhynchonella" triquetra* GEMMELLARO and of another new species described in 1898 by BÖSE – *"Rhynchonella" sejuncta*. With regard to existing great external variability in brachiopods the possible mutual synonymy of the mentioned species could not be excluded. Little is known of the internal characters of *"hagaviensis"*, and its generic identification thus may give rise to some doubts. The species was tentatively referred to *Pisirhynchia*? by SULSER (1993, p. 66), later followed by SIBLÍK (2002). Recently, DULAI and VÖRÖS (both in VÖRÖS et al., 2003) attributed the species under consideration to *Prionorhynchia*? However, the definite identification of the generic assignment awaits the discovery of additional material in order to better understand the internal structure of *"hagaviensis"*.

Occurrence: Locality 5.

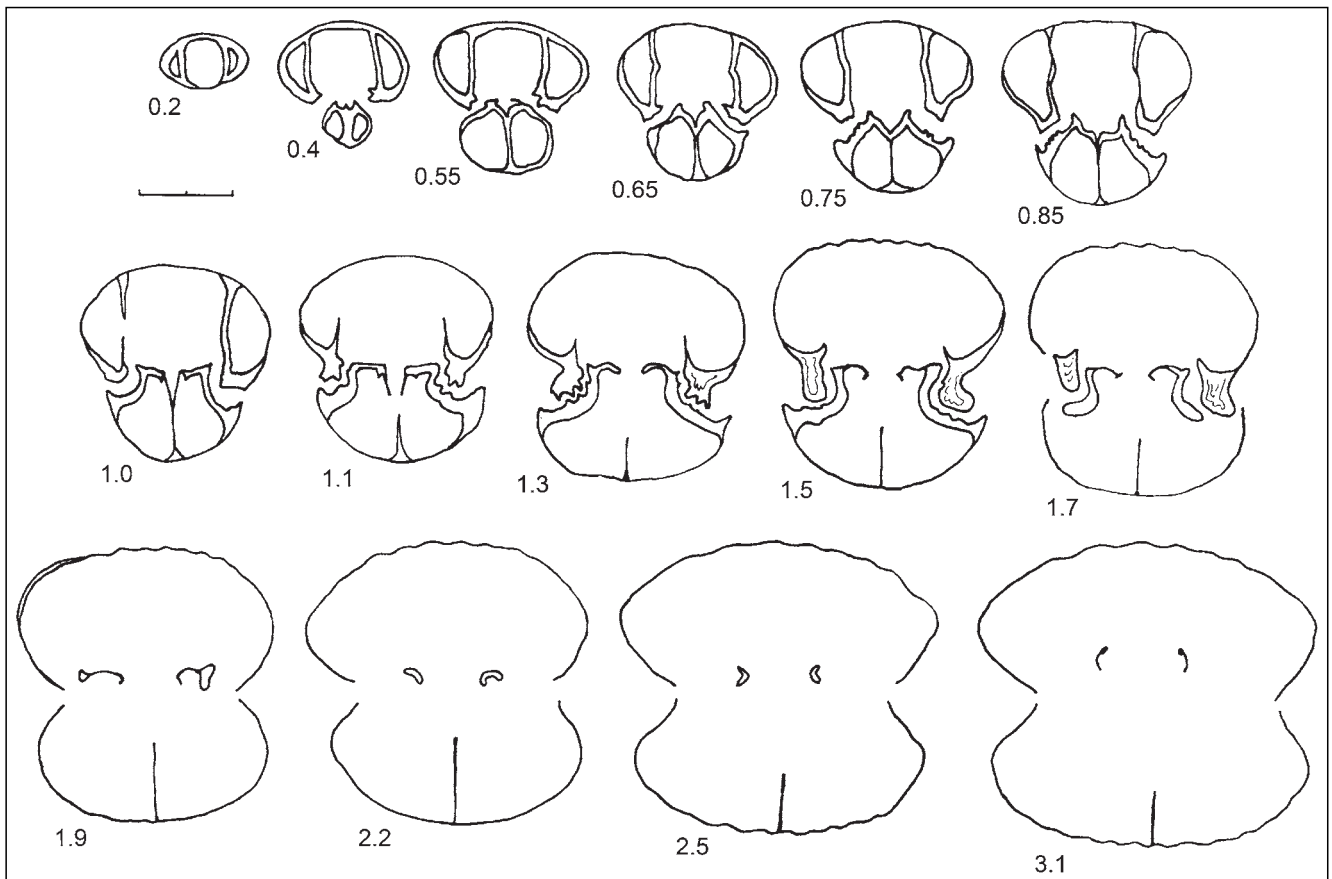
Age: *"Rhynchonella" hagaviensis* comes from the Middle Liassic of Kramsach in Tyrol and of Schafberg (BÖSE, 1898). It was also found in the Sinemurian of Schafberg (DULAI in VÖRÖS et al., 2003).

***"Rhynchonella" aff. belemnitica* (QUENSTEDT, 1858)**

(Pl. 1, Figs. 3, 7; Text-Fig. 6)

non 1858 *Terebratula belemnitica* – QUENSTEDT, p. 73, Pl. 8, Fig. 15.

Material: 49 mostly crashed or incomplete specimens, up to 16.2 mm long, 17.0 mm wide and 9.0 mm thick. The



Text-Fig. 6.
"Rhynchonella" aff. belemnica (QUENSTEDT).
 Locality 13. Transverse sections through the specimen 15.4 mm long. Magnified.

figured ones measure $14.4 \times 16.5 \times 8.9$ mm (Pl. 1, Fig. 3) and $14.2 \times 16.7 \times 8.7$ mm (Pl. 1, Fig. 7).

Description: Subpentagonal dorsibiconvex shells with strong angular uniplication anteriorly. Linguiform extension wide, with convergent sides and straight dorsal edge. Suberect beaks strong, with rounded to sharp beak ridges. Maximum width at mid-length. Lateral flattenings or very shallow planareas developed. Up to 12 coarse costae on valve (up to 6 on fold) radiate on whole valve surface, small smooth umbonal area sometimes present (figured specimens have a little stronger ribs than the average specimens). Very rarely a rib bifurcation occurring near anterior margin (Pl. 1, Fig. 7).

Internal characters: Subparallel dental lamellae delimiting quadrate delthyrial cavity from semicircular lateral umbonal cavities. Double deltidial plates in some specimens. Hinge teeth straight and strongly crenulated. Sockets large, crenulated. Thick subhorizontal hinge plates well delimited from both septalial plates and inner socket ridges. Crural bases developed at inner parts of hinge plates. Large V-shaped septalium. Thin dorsal septum persisting anteriorly beyond crura. Crura hamiform, extending into cavity of pedicle valve.

Remarks: These ordinary looking, ribbed Liassic rhynchonellids are not easily determined. A series of species has been established to cover their large external variability. Only little is known of their internal structures, and their generic appurtenances are in most cases not elucidated. Our specimens show considerable resemblances to *Rhynchonella belemnica* (QUENSTEDT), which was sometimes referred to *Squamirhynchia* BUCKMAN. Topotypical material of *"belemnica"* from Germany was sectioned and studied by SHI & GRANT (1993) and its internal characters

(esp. absent septalium and dorsal septum) documented the appurtenance of *"belemnica"* to *Prionorhynchia*. Very detailed discussion on this rhynchonellid group was already given by GEYER (1889) who included *"belemnica"* into synonymy of the catch-all species *Rhynchonella variabilis* (SCHLOTHEIM). Similar synonymies were dealt with quite recently by SULSER & FURRER (2005, p. 15) under remarks to *Prionorhynchia calderini* (PARONA). Genera, which include species externally similar to our material, are e.g. *Cirpa* DE GREGORIO, *Rudirhynchia* BUCKMAN, *Prionorhynchia* BUCKMAN, *Squamirhynchia* BUCKMAN and *Mediterranirhynchia* SUČIĆ-PROTIĆ (this genus was included into synonymy of *Rudirhynchia* by MANCENÍDO et al., 2002, p. 1334). However, the internal characters ascertained in our specimens differ from those in below mentioned genera above all in a large septalium, high and long dorsal septum and hamiform crura. Further comparisons are made difficult for now owing to the scarcity of sufficient good material. As the hitherto known external and internal characters of our material do not allow evaluating it properly, the open nomenclature is used here.

Occurrence: Locality 2 (2 spec.), loc. 7 (4 spec.), loc. 12 (4 spec.), loc. 13 (28 spec.).

***"Rhynchonella" aff. caneavae* DAL PIAZ, 1907**

aff. 1907 *Rhynchonella Caneavae* n. f. – DAL PIAZ, p. 38, Pl. 2, Fig. 14.

Material: 2 incomplete specimens. The better preserved one measures $11.4 \times ? \times 6.7$ mm.

Remarks: The specimens are noted for their relatively thin shells of subpentagonal outline, with few ribs only (3 in the fold). Ribs are sharp near the anterior margin, leaving posterior parts of valves nearly smooth. Considerable

external resemblances could be only found in "*Rhynchonella*" *canevae* DAL PIAZ. However, our specimens cannot be ascribed definitely to "*Rhynchonella*" *canevae* because they differ substantially from it in a much narrower beak.

Occurrence: Locality 7.

Age: "*Rhynchonella*" *canevae* was described from the Middle Liassic of Sospirolo in Italy and assigned to *Rudirhynchia*? by SULSER (1993, p. 32).

"*Rhynchonella*" aff. *etalloni* (OPPEL, 1863)

(Pl. 2, Fig. 8; Pl. 5, Fig. 7, 10)

aff. 1863 *Rhynchonella Etalloni* OPP. – OPPEL, p. 212, Pl. 6, Fig. 11.

Material: 7 more or less damaged specimens with both valves and 11 fragments of single valves. The figured specimens measure ?11.0 × 11.4 × 6.6 mm (Pl. 5, Fig. 7), 10.2 × 8.0 × 6.4 mm (Pl. 5, Fig. 10) and 9.1 × 10.6 × 6.9 mm (Pl. 2, Fig. 8).

Remarks: Biconvex shells of small dimensions, low rounded ribs poorly visible posteriorly, and narrow and very low uniplication with 3–4 ribs are the main features of material, which reminds one of OPPEL's "*etalloni*". OPPEL (1863) established the species having 1 specimen only at disposal. The variability of this extremely rare species is thus unknown. Our material differs from OPPEL's in subrounded or elongated outline of shell, smaller number of ribs and sharper ventral beak.

Occurrence: Locality 1.

Age: "*Rhynchonella*" *etalloni* was found by OPPEL (1863) in the "Klaus-Schichten" of the Klausalpe.

"*Rhynchonella*" cf. *latissima* (FUCINI, 1895)

cf. 1894 *Rhynchonella latissima* n. sp. – FUCINI, p. 58, Pl. 7, Fig. 5.

Material: 1 fragmentary specimen with dimensions ?23 × ?32 × 12.5 mm and 1 damaged small specimen (juvenile?) most probably belonging here too.

Remarks: The specimen shows a considerable resemblance to FUCINI's mentioned figures and description, incl. characteristic dividing of the fold ribs from the lateral ones. The original specimen has, however, slightly stronger ribs and much stronger development of posterior part of pedicle valve. Characters of beaks cannot be compared since the beak had been damaged in our specimen.

Occurrence: Locality 7.

Age: "*Rhynchonella*" *latissima* was described from the Lower Liassic.

Genus: *Homoeorhynchia* BUCKMAN, 1918

Homoeorhynchia (?) *prona* (OPPEL, 1861)

(Pl. 1, Fig. 5)

1861 *Rhynchonella prona* OPP. – OPPEL, p. 547, Pl. 13, Fig. 7.

1966 "*Rhynchonella*" *prona* OPPEL – PEVNÝ, p. 277.

2003 *Homoeorhynchia* ? *prona* (OPPEL) – DULAI, p. 31, Pl. 5, Fig. 11–13 (cum syn.).

Material: 5 specimens. The biggest one measures 13.0 × 15.1 × 7.6 mm. The figured specimen has dimensions 13.0 × 13.8 × 7.4 mm.

Remarks: The specimens correspond well to GEYER's specimen from Hierlatz figured by him (1889) on Pl. 7, Fig. 24, and differ in having less expressive biplication of anterior commissure. In this respect they agree completely with a specimen depicted by ROTHPLETZ (1886).

Occurrence: Locality 3 (1 specimen), loc. 12 (4 spec.).

Age: Sinemurian.

Genus: *Capillirhynchia* BUCKMAN, 1918

Capillirhynchia brentoniaca (OPPEL, 1863)

(Pl. 3, Fig. 2)

1863 *Rhynchonella Brentoniaca* OPP. – OPPEL, p. 215, Pl. 7, Fig. 12–14.

1896 *Rhynchonella brentoniaca* OPP. – PARONA, p. 35, Pl. 2, Fig. 27–28.

?1973 *Capillirhynchia Paronai* KAMYSCHAN, nom. nov. – KAMYSCHAN in KAMYSCHAN & BABANOVA, p. 99, Pl. 11, Fig. 10–11.

1982 *Rhynchonelloidella brentoniaca* (OPPEL) – BENIGNY in BENIGNY et al., p. 63, Pl. 2, Fig. 4 (cum syn.).

1995 *Capillirhynchia brentoniaca* (OPPEL) – VÖRÖS, p. 190, Text-Fig. 4, Pl. 1, Fig. 5–6 (cum syn.).

1999 *Capillirhynchia brentoniaca* (OPPEL) – KROBICKI in WIERZBOWSKI et al., p. 61, Fig. 22: 2 (cum syn.).

Material: 4 damaged specimens with both valves and fragments of 5 single valves. Dimensions of the figured specimen is ?12.0 × 13.0 × 7.6 mm.

Remarks: The antidichotomous character of ribbing, with striae covering practically the whole surface of the valve is the chief feature of *Capillirhynchia*. The interior features were shown by VÖRÖS (1995): a rudimentary septum, absent septalium and prelaciferous (= hamiform) crura. Our 6 specimens agree well with OPPEL's figures and have a low, gradually rising uniplication. On the contrary, the other 3 specimens approach very much PARONA's figured specimens (1896), and have anteriorly a relatively narrow subangular uniplication with suggestion of 4, resp. 7 short blunt ribs. KAMYSCHAN in KAMYSCHAN & BABANOVA (1973) established a new species "*paronai*" basing on PARONA's material and chose the specimen figured by PARONA (1896) in Pl. 2, Fig. 27 as lectotype. However, the large variability of *C. brentoniaca* should be admitted as seen from the figures in PARONA (1896), BENIGNY in BENIGNY et al. (1982) and VÖRÖS (1995), which differ from OPPEL's original material in relatively greater thickness, broader pedicle beak and different anterior view. The validity of KAMYSCHAN's species seems thus doubtful. KROBICKI in KROBICKI et al. (1999) included "*paronai*" into synonymy of *Capillirhynchia brentoniaca*. Further comparative study of these two species on a larger material is necessary, however. Very similar striate *Rhynchonella solitaria* OPPEL, 1860 from the Callovian differs from *C. brentoniaca* mainly in developing zigzagged lateral commissures.

Occurrence: Locality 1 (1 specimen), loc. 8 (1 spec.), loc. 14 (2 spec.), Prielgraben SE of Gosau (fragments of 5 single valves). TRAUTH (1922) relying upon GEYER's determination reported this rare species also from the "Voralpen" in the Lower Austria.

Age: ?Bajocian–Bathonian. VÖRÖS (1995) mentioned also finds in the Lowermost Callovian of the Mecsek Mts. (Hungary).

Genus: *Striirhynchia* BUCKMAN, 1918

Striirhynchia berchta (OPPEL, 1863)

(Pl. 5, Fig. 2)

1863 *Rhynchonella Berchta* OPP. – OPPEL, p. 207, Pl. 5, Fig. 7–8 (non Fig. 9 var. *microptycha*).

1884 *Rhynchonella Berchta*, OPP. – DI-STEFANO, p. 9, Pl. 1, Fig. 1–4.

1964 "*Rhynchonella*" *berchta* OPPEL – PEVNÝ, p. 166, Pl. 6, Fig. 5.

? 2001 *Striirhynchia berchta* (OPPEL) – VÖRÖS, Fig. 2: 5.

? non 1997 *Striirhynchia berchta* (OPPEL) – VÖRÖS, p. 107, Fig. 32 [= ? *S. subechinata*].

Material: 9 complete specimens. The best preserved ones measure 20.5 × cca.18.0 × 9.4 mm, 13.1 × cca.11.0 × 8.0 mm and 10.4 × 9.1 × 4.6 mm (figured).

Remarks: Our specimens show all main characters as those depicted by OPPEL (1863), and differ in having smaller dimensions only. Two specimens show a slight sulcation in the anterior commissure. The species differs in narrower outline, higher straight beak and smooth valves from *Striirhynchia subechinata*.

Occurrence: Localities 8 (4 specimens) and 11 (5 spec.).

Age: Bajocian–Bathonian. KRYSŤYN (1971) reported this species from the Prielgraben, SE of Gosau ("*Rectirhynchia berchta*").

***Striirhynchia subechinata* (OPPEL, 1863)**

(Pl. 5, Fig. 1, 3–4, Text-Fig. 7)

1863 *Rhynchonella subechinata* OPP. – OPPEL, p. 211, Pl. 6, Fig. 8–10.

1863 *Rhynchonella Berchta* OPP. var. *microptycha* – OPPEL, p. 207, Pl. 5, Fig. 9.

?1997 *Striirhynchia berchta* (OPPEL) – VÖRÖS, p. 107, Fig. 32.

?1999 *Striirhynchia* cf. *subechinata* (OPPEL) – KROBICKI in WIERZBOWSKI et al., p. 61, Fig. 22: 3–4 (cum syn.).

?2001 *Striirhynchia berchta* (OPPEL) – VÖRÖS, Fig. 2: 5.

Material: 27 mostly fragmentary internal moulds with both valves and fragments of shell, 19 brachial and 21 pedicle valves, up to 27.0 mm long, 28.5 mm wide and 13.0 mm thick. The well preserved specimens measure 9.5 × 10.0 × 5.7 mm (Pl. 5, Fig. 1) and 15.7 × ?13.5 × 6.8 mm (Pl. 5, Fig. 3). The best preserved juvenile specimens measure 8.6 × 7.1 × 5.8 mm, 7.8 × 6.9 × 5.0 mm and 7.6 × 7.5 × 5.6 mm.

Internal characters: Shortly fused hinge plates not clearly separated from inner socket ridges, oblique hinge teeth, very large, non-crenulated sockets, dorsal septum feeble to absent, hamiform crura.

Remarks: The most specimens in the material are rectimarginate, some specimens develop very low uniplications, and a slight sulcation is exceptional. They are costellate, differing in slightly stronger ornamentation from OPPEL's original figures and have about 50 costellae on valve. These extend to the umbos in well-preserved specimens; some valves of differently decorticated specimens are smooth in the middle. Five specimens from our material are capillate, well comparable to OPPEL's figures. A dichotomy of capillae was ascertained

by KROBICKI (in WIERZBOWSKI et al., 1999) and it was found sporadically in the specimens from Mitterwand, too. According to OPPEL (1863) no dichotomy was recognized in his original material. The juveniles from Mitterwand correspond well to OPPEL's young specimen, figured by him 1863 on Pl. 6, Fig.10, and their shells are distinguished from the grown-ups by relatively higher thickness and largely oval to nearly subquadrate anterior view. Larger, up to subpentagonal outline of shells and radial ornamentation is held here as characteristic of this species in comparison to *Striirhynchia berchta*. Basing on this, the specimen figured by VÖRÖS (1997, resp. 2001) is included with some hesitation into "*subechinata*" despite sharp borders of its shell, as the same feature was ascertained also in the larger material of "*subechinata*" on Mitterwand.

Occurrence: Locality 8 (1 specimen), loc. 9 (45 spec.), loc. 10 (9 spec.) and loc. 14 (12 spec.).

Age: Bajocian–Bathonian.

Genus: *Cuneirhynchia* BUCKMAN, 1918

***Cuneirhynchia cartieri* (OPPEL, 1861)**

1861 *Rhynchonella Cartieri* – OPPEL, p. 545.

1889 *Rhynchonella Cartieri* OPP. – GEYER, p. 63, Pl. 7, Fig. 13–14.

2003 *Cuneirhynchia cartieri* (OPP.) – DULAI, p. 33, Pl. 5, Fig. 14–16; ?Pl. 6, Fig. 1–3; Text-Fig. 6 (cum syn.).

2007 *Cuneirhynchia cartieri* (OPPEL) – ALMÉRAS et al., p. 73, sect. 7–8, Pl. 4, Fig. 7–8.

Material: 8 incomplete specimens. The best preserved ones measure 11.0 × cca.12 × 8.9 mm and ?9.8 × 10.4 × 6.2 mm.

Remarks: Very detailed description and discussion was given by DULAI (1992, 2003). In comparison with *Cuneirhynchia retusifrons*, the species under consideration can be characterized by narrower and thicker shells, and by stronger ribs reaching the umbos.

Occurrence: Locality 2 (1 specimen), loc. 7 (6 spec.) and loc. 12 (1 spec.).

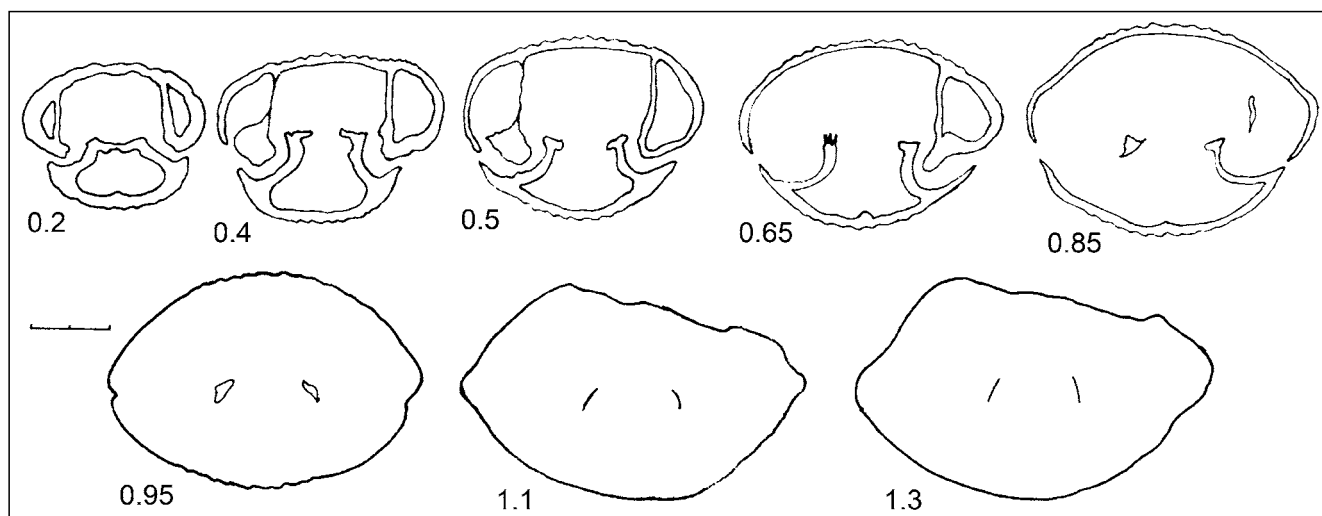
Age: Hettangian–Sinemurian.

***Cuneirhynchia retusifrons* (OPPEL, 1861)**

(Pl. 1, Fig. 8; Pl. 2, Fig. 4–5)

1861 *Rhynchonella retusifrons* OPP. – OPPEL, p. 544, Pl. 12, Fig. 5.

1999 *Cuneirhynchia retusifrons* (OPPEL) – SIBLIK in BÖHM et al., p. 198.



Text-Fig. 7.

Striirhynchia subechinata (OPPEL).

Locality 14. Measured from dorsal umbo. Termination of crura unclear due to recrystallization. Original length of specimen ?11.0 mm. Magnified.

2003 *Cuneirhynchia retusifrons* (OPPEL) – DULAI, p. 37, Pl. 6, Fig. 11–13 (cum syn.).

Material: 21 more or less complete specimens. The biggest one is 13.1 mm long, 15.2 mm wide and 10.5 mm thick (Pl. 2, Fig. 5). Some other well preserved specimens measure 12.9 × 11.9 × 7.6 mm (Pl. 1, Fig. 8), 11.9 × 12.1 × 7.9 mm, 10.5 × 12.8 × 7.8 mm, 10.2 × 11.5 × 7.8 mm, 9.0 × 10.6 × 6.5 mm (Pl. 2, Fig. 4) and 8.9 × 9.8 × 5.6 mm.

Remark: Nothing is to be added to the thorough descriptions of this characteristic species and comments made already by GEYER (1889) and then by DULAI (1992). Our specimens have 4–7 ribs in the plication. The “average” specimens have pedicle valves much less vaulted than their brachial ones (different specimen in Pl. 2, Fig. 5). A relatively narrow specimen with rounded beak ridges is figured in Pl. 1, Fig. 8.

Occurrence: Locality 7 (4 specimens), loc. 12 (5 spec.) and loc. 13 (12 spec.).

Age: Hettangian–Sinemurian, ?Middle Liassic.

Superfamily: Norelloidea AGER, 1959
Family: Norellidae AGER, 1959
Genus: *Pisirhynchia* BUCKMAN, 1918

***Pisirhynchia inversa* (OPPEL, 1861)**

(Pl. 2, Fig. 7)

1861 *Rhynchonella inversa* OPP. – OPPEL, p. 546, Pl. 13, Fig. 5.

2003 *Pisirhynchia inversa* (OPPEL) – DULAI, p. 40, Pl. 1, Fig. 15–17 (cum syn.).

Material: 3 specimens. The biggest one measures 8.0 × 7.1 × 4.9 mm, the figured one 5.2 × 4.9 × 3.1 mm.

Remarks: Our specimens differ from those described and figured by OPPEL (1861) and GEYER (1889) from Hierlatz in a narrower outline and flatter profile only. There are 2 (in 2 specimens) or 3 (in 1 specimen) short ribs in the dorsal sulcation.

Occurrence: Localities 3, 4 and 5 (each 1 specimen).

Age: Sinemurian – ? Carixian.

***Pisirhynchia pisoides* (ZITTEL, 1869)**

1869 *Rhynchonella pisoides* ZITT. – ZITTEL, p. 129, Pl. 14, Fig. 15–16.

2003 *Pisirhynchia pisoides* (ZITTEL) – DULAI, p. 39, Pl. 1, Fig. 12–14.

Material: 1 specimen with dimensions 6.5 × 6.2 × 3.9 mm.

Remarks: The specimen shows narrower outline and lesser globosity in comparison to ZITTEL’s figures. Faint incipient undulation is visible near the anterior margin of the sulcation only. Similar *Pisirhynchia inversa* has relatively wider shells and longer hinge line.

Occurrence: Locality 5.

Age: Sinemurian–Pliensbachian. The species was described by ZITTEL from the Middle Liassic of the Apennines. It is known also from the Sinemurian of the Transdanubian Central Range in Hungary (DULAI, 2003).

Order: Athyridida BOUCOT, JOHNSON & STATON, 1964
Suborder: Koninckinidina HARPER, 1993
Superfamily: Koninckinoidea DAVIDSON, 1853
Family: Koninckinidae DAVIDSON, 1853
Genus: *Koninckodonta* BITTNER, 1894

***Koninckodonta pichleri* (BITTNER, 1894)**

1894 *Koninckina Pichleri* nov. spec. – BITTNER, p. 136, Pl. 4, Fig. 3.

1895 *Koninckina* (*Koninckodonta*?) *Pichleri* BITTN. – FUCINI, p. 26, Pl. 6, Fig. 3–4.

Material: 3 slightly damaged specimens. The greatest one measures 6.0 × 7.0 × 1.8 mm.

Remarks: Tiny concavo-convex shells of elliptical outline and of width apparently exceeding length. The characters observed agree well with those figured and described by BITTNER (1894) and FUCINI (1895). Due to lack of material, the species has not been further studied since that time. For the same reason, attribution of the species to *Koninckodonta* could not yet be definitely verified. Very similar Middle Liassic *Koninckina eberhardi* BITTNER, 1886 differs in a subrounded outline and shorter hinge margin.

Occurrence: Localities 4 (1 spec.) and 5 (2 spec.).

Age: Sinemurian.

Genus: *Amphiclinodonta* BITTNER, 1888

***Amphiclinodonta* cf. *adnethica* BITTNER, 1894**

cf. 1894 *Amphiclinodonta adnethica* nov. spec. – BITTNER, p. 141, Pl. 4, Fig. 13 [in the explanation to the plate as *Amphiclinodonta* (?) *adnethica*].

Material: 1 fragmentary specimen with both length and width cca. 5 mm.

Remarks: Tiny concavo-convex specimen of subtrigonal outline and narrow cardinal margin. The only comparable species is *Amphiclinodonta adnethica* of similar outline. Due to very bad preservation of our specimen further comparison is impossible.

Occurrence: Locality 4.

Age: *A. adnethica* was described by BITTNER from Adnet and it came from the horizon of uncertain age near the Triassic/Jurassic boundary.

Order: Spiriferinida IVANOVA, 1972
Suborder: Spiriferinidina IVANOVA, 1972
Superfamily: Spiriferinoidea DAVIDSON, 1884
Family: Spiriferinidae DAVIDSON, 1884
Genus: *Liospiriferina* ROUSSELLE, 1977

***Liospiriferina acuta* (STUR in GEYER, 1889)**

1889 *Spiriferina acuta* STUR m. s. – GEYER, p. 77, Pl. 9, Fig. 6.

2003 *Liospiriferina acuta* (STUR in GEYER) – DULAI, p. 49, Pl. 7, Fig. 13–15 (cum syn.).

Material: 3 damaged specimens. The best preserved one measures cca. 12.5 × 13.0 × 10.0 mm.

Remarks: The specimens correspond completely to GEYER’s original figure. Narrow, nearly V-shaped anterior uniplication, well-developed fold and sulcus in the anterior thirds of valves, and almost plane ventral interarea are characteristic features distinguishing “*acuta*” from some variants of *Liospiriferina obtusa*.

Occurrence: Locality 2 (1 specimen), loc. 7 (2 spec.).

Age: Hettangian (?) – Sinemurian.

***Liospiriferina* aff. *aequiglobata* (UHLIG, 1900)**

aff. 1900 *Spiriferina aequiglobata* n. sp. – UHLIG, p. 31, Pl. 1, Fig. 8.

? 1999 *Liospiriferina* aff. *obtusa* (OPPEL) – SIBLIK in BÖHM et al., p. 200, Pl. 30, Fig. 10.

aff. 2003 *Liospiriferina aequiglobata* (UHLIG) – DULAI, p. 50, Pl. 8, Fig. 1–3.

Material: One partially damaged specimen cca. 18.0 × 17.8 × 12.5 mm.

Remarks: UHLIG (1900) had one specimen only at his disposal for the description. It is characterized by nearly circular outline, short and straight hinge line, very low, incurved beak and low uniplication of the anterior commissure. Our specimen differs from UHLIG's in a higher beak and its lesser curvature. In this respect, it agrees well with the specimen determined as *Liospiriferina* aff. *obtusa* from the Hettangian of Adnet, figured by SIBLIK in BÖHM et al. (1999). The resemblance of the Adnet specimen to *Liospiriferina aequiglobata* was recognized by DULAI in VÖRÖS et al. (2003, p. 72). The damaged posterior part of the specimen from Adnet makes, however, further comparisons impossible.

Occurrence: Locality 7.

Age: Sinemurian. UHLIG's type specimen (1900) came from the Upper (?) Sinemurian of the Roumanian East Carpathians. Its presence in the collections of the GBA in Vienna was not confirmed recently (M. ŠIBLIK, 2007). DULAI ascertained this species in the Transdanubian Central Range in Hungary and found one juvenile specimen in the vicinity of Mondsee in Austria (DULAI in VÖRÖS et al., 2003).

Liospiriferina alpina (OPPEL, 1861)

(Pl. 4, Fig. 1)

- 1861 *Spiriferina alpina* OPP. – OPPEL, p. 541, Pl. 11, Fig. 5.
? 1967 *Spiriferina alpina* OPPEL – IORDAN, p. 50, Pl. 3, Fig. 3.
1969 *Spiriferina alpina* OPPEL – DELANCE, p. 9, Pl. A, Fig. 4, 6.
1975 *Spiriferina alpina* OPPEL – COMAS-RENGIFO & GOY, p. 315, Pl. 1, Fig. 2.
1988 *Liospiriferina rostrata* (SCHLOTHEIM, 1833) morfo alpina – IÑESTA, p. 55, Pl. 1, Fig. 1.
1993 *Spiriferina alpina* OPPEL – MANCENIDO, p. 87 (cum syn.).
1999 *Liospiriferina alpina* (OPPEL) – SULSER, p. 125, 1 Fig.
2001 *Liospiriferina alpina* (ROUSSELLE) – sic! – POZZA, p. 3, Text-Fig. 3d-3e.
2003 *Liospiriferina alpina* (OPPEL) – DULAI, p. 50, Pl. 8, Fig. 4–6 (cum syn.).

Material: 2 slightly damaged specimens with both valves and 4 pedicle valves. The figured specimen measures 19.5 × ?18.5 × 11.2 mm.

Remarks: This species was described and its variability thoroughly discussed many times in the past literature (recently by SIBLIK, 1993a). The figured specimen from Mitterwand differs in narrower outline and shorter cardinal area from the average.

Occurrence: Localities 12 (2 specimens) and 13 (4 spec.). Moreover, localities 2 and 3 yielded 2 and 5 partly damaged pedicle valves with curved beaks and areas, which could be determined with some hesitation as *L. aff. alpina*.

Age: Early Sinemurian–Domerian.

Liospiriferina angulata (OPPEL, 1861)

- 1861 *Spiriferina angulata* OPP. – OPPEL, p. 541, Pl. 11, Fig. 7.
2003 *Liospiriferina angulata* (OPPEL) – DULAI, p. 53, Pl. 8, Fig. 7–10 (cum syn.).

Material: 2 pedicle valves, the greater of them measures 9.5 × 12.4 × 8.0 mm.

Remarks: Our specimens correspond well to the specimens figured by OPPEL (1861) and by DULAI (1992). The greater of them shows 2 weak initial ribs near the anterior margin on both sides of a deep, sharply delimited sulcus, however. Very detailed description of this characteristic smooth species was given already by GEYER (1889). He figured within his material also one relatively strongly

ribbed pedicle valve of juvenile specimen, which most probably belongs to another species.

Occurrence: Locality 4.

Age: Sinemurian–Pliensbachian.

Liospiriferina brevisrostris (OPPEL, 1861)

- 1861 *Spiriferina brevisrostris* OPP. – OPPEL, p. 541, Pl. 11, Fig. 6.
1889 *Spiriferina brevisrostris* OPP. – GEYER, p. 73, Pl. 8, Fig. 9–12.
1895 *Spiriferina brevisrostris* OPP. – FUCINI, p. 154 (in reprint p. 32), Pl. 6, Fig. 5 (cum syn.).
? 1992 *Liospiriferina* cf. *brevisrostris* (OPPEL) – DULAI, p. 62, Pl. 3, Fig. 5, Text-Fig. 20.
2003 *Liospiriferina brevisrostris* (OPPEL) – DULAI in VÖRÖS et al., p. 74, Pl. 7, Fig. 4–6.
? 2003 *Liospiriferina* cf. *brevisrostris* (OPPEL) – DULAI, p. 55, Pl. 9, Fig. 1–3.
2007 *Liospiriferina brevisrostris* (OPPEL) – ALMÉRAS et al., p. 37, Pl. 1, Fig. 5.

Material: 2 pedicle valves. Their dimensions are 28.0 × 24.4 × cca. 13.5 mm and 17.0 × 14.2 × cca. 7.0 mm.

Remarks: Our specimens correspond well to OPPEL's and GEYER's figures and descriptions. Length greater than width, beak very strongly incurved over dorsal umbo, and missing sulcation are characteristic features of the species.

Occurrence: Locality 2.

Age: Sinemurian.

Liospiriferina aff. *globosa* (BÖSE, 1897)

aff. 1897 *Spiriferina globosa* nov. sp. – BÖSE, p. 216, Pl. 16, Fig. 5–7.

Material: 1 damaged specimen measuring cca. 15 × 14.2 × 10.3 mm.

Remarks: The specimen cannot be ascribed definitely to *L. globosa* due to its poor preservation. It has narrow outline, short hinge line, straight commissure, slightly curved beak and neither fold nor sulcus (a slight flattening only). It is quite well comparable to *Spiriferina globosa* BÖSE, 1897, esp. to his specimen figured on Pl. 16, Fig. 6. Our specimen can be distinguished from BÖSE's species by its relatively flat brachial valve. Owing to the scarcity of the material further comparison is impossible at present.

Occurrence: Locality 2.

Age: *Liospiriferina globosa* was described by BÖSE from the Middle Liassic of Kramsach (Tyrol).

Liospiriferina aff. *gryphoidea* (UHLIG, 1880)

- aff. 1880 *Spiriferina gryphoidea* n. f. – UHLIG, p. 273, Pl. 1, Fig. 1–3.
aff. 2003 *Liospiriferina gryphoidea* (UHLIG, 1879) – DULAI in VÖRÖS et al., p. 74.
aff. 2003 *Liospiriferina gryphoidea* (UHLIG, 1879) – DULAI, Pl. 57, Pl. 9, Fig. 6–8 (cum syn.).

Material: 1 damaged pedicle valve with length cca. 15 mm and width ?14 mm.

Remarks: The specimen reminds one very much of *L. gryphoidea* due to its massive and curved beak and to 3 strong rounded rugae near the anterior margin (the latter are well visible in the original paper by UHLIG, 1880, Pl. 1, Fig. 1). However, it differs from *L. gryphoidea* in smaller dimensions, in larger outline and in lesser curvature of beak. No rugae are to be seen on the pedicle valve of the specimen figured by DULAI (2003). Owing to the scarcity of the material better comparison is impossible.

Occurrence: Locality 7.

Age: *Liospiriferina gryphoidea* comes from the Pliensbachian of Sospirolo (Italy). It is known also from the Sinemurian (Mondsee-Eibenberg and Hungary [DULAI, 2003]).

***Liospiriferina obtusa* (OPPEL, 1861)**

(Pl. 4, Fig. 3)

- 1861 *Spiriferina obtusa* OPP. – OPPEL, p. 542, Pl. 11, Fig. 8.
? non 1888 *Liospiriferina obtusa* (OPPEL) – IÑESTA, p. 55, Pl. 1, Fig. 2.
1993 *Spiriferina obtusa* OPPEL – MANCENIDO, p. 88 (cum syn.).
2003 *Liospiriferina obtusa* (OPPEL) – DULAI, p. 60, Pl. 10, Fig. 1–3 (cum syn.).

Material: 23 partly fragmentary specimens with both valves and 5 brachial and 4 pedicle valves, up to 23.0 mm long, 25.0 mm wide and 19.5 mm thick. The dimensions of the best-preserved specimens: 16.3 × 17.8 × 11.9 mm, 16.0 × 18.0 × 12.8 mm (figured), 15.0 × 15.3 × 10.2 mm and 11.9 × 13.8 × 9.2 mm. Moreover, 22 brachial and 31 pedicle damaged valves with very variable depth of ventral sulcus were found. They almost certainly belong to the species under consideration.

Remarks: The figured specimen differs from our other specimens and from OPPEL's (1861) and GEYER's (1889) material from Hierlatz in having shorter hinge line. A similar specimen was figured e.g. by SACCHI VIALLI & CANTALUPPI (1967, Pl. 13, Fig. 8) from Gozzano. One fragmentary specimen from locality 12 shows a very faint initial ribbing in the anterior margin. That occurred according to GEYER exceptionally also in his material of "*obtusa*" (GEYER, 1889, p. 76).

Occurrence: Locality 4 (9 specimens), loc. 7 (9 spec.), loc. 12 (47 spec.), and loc. 13 (20 spec.).

Age: Early Sinemurian – ? Domerian.

***Liospiriferina aff. obtusa* (OPPEL, 1861)**

- 1992 *Liospiriferina aff. obtusa* (OPPEL) – DULAI, p. 57, Pl. 2, Fig. 6, Text-Fig. 15.

Material: 9 fragmentary specimens have been seen up to about 16.0 mm long, 18.0 mm wide and 13.0 mm thick.

Remarks: Studied specimens agree well with the specimen figured and accompanied with the detailed description by DULAI (1992), and differ from *Liospiriferina obtusa* in their subrectangular outline and longer hinge line with subangular cardinal extremities.

Occurrence: Localities 2 (1 spec.) and 13 (8 spec.).

***Liospiriferina sicula* (GEMMELLARO, 1874)**

(Pl. 3, Fig. 6)

- 1874 *Spiriferina Sicula*, GEMM. – GEMMELLARO, p. 55, Pl. 10, Fig. 5.
2003 *Liospiriferina sicula* (GEMMELLARO) – DULAI, p. 64, Pl. 11, Fig. 4–6 (cum syn.).

Material: 1 specimen with damaged posterior part of pedicle valve. It measures 18.0 × 17.8 × 12.4 mm.

Remarks: The specimen is noted for its equidimensional brachial valve, moderate uniplication in the anterior commissure, shallow sulcus reaching umbonal part of the pedicle valve, and slightly curved pedicle beak. Shells of the Italian specimens are, on the average, bigger, much wider than long and have a larger sulcus in the pedicle valve accompanied with higher uniplication in the anterior commissure. Our specimen resembles much the Middle Liassic specimen, figured by VÖRÖS in VÖRÖS et al. (2003) in Pl. 8, Fig. 26–28.

Liospiriferina sicula belongs indubitably to the *obtusa* plexus, and some very similar variants of *Liospiriferina obtusa* may produce problems in determination.

Occurrence: Locality 7.

Age: The species came from the Middle Liassic. The Sinemurian occurrence is reported e.g. from the Bakony Mts. in Hungary (DULAI, 1992).

Order: Terebratulida WAAGEN, 1883
Suborder: Terebratulidina WAAGEN, 1883
Superfamily: Terebratuloidea GRAY, 1840
Family: Terebratulidae GRAY, 1840
Genus: *Terebratula* MÜLLER, 1776; s.l.

"*Terebratula*" *fylgia* OPPEL, 1863

(Pl. 5, Fig. 5)

- 1863 *Terebratula Fylgia* OPP. – OPPEL, p. 205, Pl. 5, Fig. 3–4.
1997 "*Terebratula*" *fylgia* OPPEL – VÖRÖS, p. 107, Fig. 35.
2001 "*Terebratula*" *fylgia* OPPEL – VÖRÖS, Fig. 2: 9.

Material: 9 partly damaged specimens up to 23.0 mm long, 20.0 mm wide and 13.5 mm thick. The figured one measures 19.4 × 13.0 × 12.4 mm.

Remarks: Specimens are massive, relatively thick. They agree well with those figured by OPPEL (1863) varying from larger – subtrigonal to longer – oval ones in outline. Some of our specimens develop stronger beaks if compared to those in OPPEL, however. Gentle situation of anterior commissure, shallow sulcation of anterior half of brachial valve and conspicuous concentric ornamentation on valves are characteristic of the species.

Occurrence: Locality 8 (1 specimen), loc. 10 (5 spec.), loc. 11 (1 spec.) and loc. 14 (2 spec.).

Age: Bajocian–Bathonian.

Superfamily: Loboidothyridoidea MAKRIDIN, 1964

Family: Lobothyrididae MAKRIDIN, 1964
Genus: *Lobothyris* BUCKMAN, 1918

***Lobothyris andleri* (OPPEL, 1861)**

(Pl. 4, Fig. 2, 8)

- 1861 *Terebratula Andleri* OPP. – OPPEL, p. 536, Pl. 10, Fig. 4.
2003 *Lobothyris andleri* (OPPEL) – DULAI, p. 69, Pl. 10, Fig. 5–7, Text-Fig. 10 (cum syn.).

Material: 43 specimens. The figured specimens measure: 21.0 × 17.8 × 12.0 mm (Pl. 4, Fig. 2) and 26.6 × 21.6 × 14.4 mm (Pl. 4, Fig. 8). In addition, about 60 damaged and juvenile specimens, which may belong to this species or to *Lobothyris punctata*.

Remarks: Very detailed descriptions of "*andleri*" were given already by GEYER (1889, dealt with as a "variety" of *Terebratula punctata* [SOW.]) and recently by DULAI (2003) who discussed thoroughly its affinities. The outline of the prevailing number of our specimens varies from oval to subpentagonal, their maximum-width is situated near mid-length and anterior commissure varies from rectimarginate to slightly uniplicate.

There is a series of Liassic terebratulids, which can be distinguished from *L. andleri* with difficulties only. The distinguishing features may often be e.g. the subpentagonal outline of *L. andleri* (contrary to subrounded *L. punctata* [SOW.]) or lower and wider beak (contrary to the massive beak of *L. delta* [NEUMAYR]) etc. Short dorsal groove visible on specimen figured on Pl. 2, Fig. 2 is "no more than the ridge left between deeply recessed adductor muscle scars" (AGER, 1990, p. 17 in description of *L. punctata*).

Occurrence: Locality 2 (3 specimens), loc. 12 (35 spec.) and loc. 13 (5 spec.).

Age: Hettangian–Sinemurian.

***Lobothyris punctata* (SOWERBY, 1812)**

- 1812 *Terebratula punctata* – SOWERBY, p. 46, Pl. 15, Fig. 4 (non vidi).
2003 *Lobothyris punctata* (SOWERBY) – DULAI, p. 74, Pl. 13, Fig. 7–9 (cum syn.).
2005 *Lobothyris punctata* (J. SOWERBY) – SULSER & FURRER, p. 37, Fig. 26–27 (cum syn.).
2007 *Lobothyris punctata* (J. SOWERBY) – ALMÉRAS et al., p. 88, Pl. 6, Fig. 5–13 (cum syn.).

Material: 4 specimens. The biggest one measures 24.5 × 20.6 × 11.4 mm.

Remarks: Our specimens have relatively flat rectimarginate shells of rounded to subcircular outline. “*Terebratula*” *punctata* has been interpreted very variably in the literature and the name has frequently been misused for any Liassic smooth terebratulid of subrounded outline. Very detailed synonymies and discussions to this species were published e.g. by AGER (1990), DULAI (2003) and quite recently by SULSER & FURRER (2005). It could be distinguished from *Lobothyris andleri* by its relatively thinner shells of rounded outline and maximum-width situated in the anterior third of shell.

Occurrence: Locality 3 (2 specimens), loc. 7 (1 spec.) and loc. 12 (1 spec.).

Age: The species was described from the Middle Liassic and it is the commonest terebratulid in the British Liassic. It is reported also from many Lower Liassic localities (DULAI, 2003).

Genus: *Rhapidothyris* TULUWEIT, 1965

***Rhapidothyris* (?) *beyrichi* (OPPEL, 1861)**

- 1861 *Terebratula Beyrichi* OPP. (*Waldheimia* ?) – OPPEL, p. 539, Pl. 11, Fig. 3.
1999 *Linguithyris beyrichi* (OPPEL) – SIBLÍK in BÖHM et al., p. 201, Pl. 30, Fig. 9 (cum syn.).
non 2003 *Rhapidothyris* ? cf. *beyrichi* (OPPEL) – DULAI, p. 81, Pl. 20, Fig. 1–6, Text-Fig. 15 (cum syn.).

Material: 1 slightly damaged specimen with dimensions ?17.5 × 18.3 × 10.0 mm.

Remarks: Our specimen corresponds well to the figures and detailed description of the Hierlatz material by GEYER (1889), and has also a faint radial ornamentation in the sulcus of the brachial valve. DULAI (2003) discussed the generic appurtenance of the species and offered transverse serial sections of his material. However, his figured specimens are lacking in characteristic deep sulcation of the anterior commissure and seem to be quite different from “*beyrichi*”.

Occurrence: Locality 7.

Age: Hettangian (?) – Sinemurian. The species is also reported from the Slovak West Carpathians (SIBLÍK, 1964) and from the Vértes, Pilis and Bakony Mts. in Hungary (VÖRÖS, 1997).

Family: Muirwoodellidae
TCHORSZHEVSKY, 1974
Genus: *Karadagithyris* TCHORSZHEVSKY, 1974

***Karadagithyris gerda* (OPPEL, 1863)**

- 1863 *Terebratula Gerda* OPP. – OPPEL, p. 204, Pl. 5, Fig. 1.
1880 *Terebratula Gerda* OPP. – PARONA, p. 268.
1884 *Terebratula Gerda* OPP. – DI-STEFANO, p. 17 (cum syn.).
1962 *Lobothyris gerda* (OPPEL) – FERRARI, p. 133, Text-Fig. 9.
1993 *Karadagithyris gerda* (OPPEL) – RADULOVIĆ & RABRENOVIĆ, p. 119, Pl. 1, Fig. 11–12.
1997 *Karadagithyris gerda* (OPPEL) – VÖRÖS, p. 107, Fig. 33.

- 2001 *Karadagithyris gerda* (OPPEL) – VÖRÖS, Fig. 2: 6.
non 1984 *Karadagithyris gerda* (OPPEL) – TCHORSZHEVSKY & RADULOVIĆ, p. 152, Pl. 3, Fig. 13–20, Text-Fig. 15 [= *K. eduardi* VÖRÖS, 1995].

Material: 4 brachial and 3 ventral valves up to 38.0 mm long and 36.0 mm wide. Moreover, 2 juvenile most probably conspecific specimens with both valves (the better preserved one with the dimensions 14.0 × cca 12.5 × 10.2 mm).

Remarks: Relatively large specimens of subpentagonal outline with a length/width ratio slightly over 1, of rectimarginate anterior commissure, and of strong, incurved beak. Usually well-developed concentric ornamentation present in the exteriors of some valves is sometimes unclear, presumably due to mechanical wear.

Occurrence: Locality 8 (1 specimen), loc. 9 (5 spec.) and loc. 14 (3 spec.).

Age: Bajocian–Bathonian.

Superfamily: Dyscolioidea
FISCHER & OEHLERT, 1891
Family: Nucleatidae SCHUCHERT, 1929
Genus: *Linguithyris* BUCKMAN, 1918

***Linguithyris aspasia* (ZITTEL, 1869)**

(Pl. 4, Fig. 4)

- 1869 *Terebratula Aspasia* MENEGH. – ZITTEL, p. 126, Pl. 14, Fig. 1–4.
2003 *Linguithyris aspasia* (ZITTEL) – SIBLÍK in SIBLÍK & LOBITZER, p. 75 (cum syn.).
2003 *Linguithyris aspasia* (ZITTEL) – DULAI, p. 84, Pl. 14, Fig. 6–12 (cum syn.).
2005 *Linguithyris aspasia* (ZITTEL) – SULSER in SULSER & FURRER, p. 35, Fig. 24 (cum syn.).
2007 *Linguithyris aspasia* (ZITTEL) – ALMÉRAS et al., p. 99, Pl. 8, Fig. 17 (cum syn.).

Material: 8 specimens. The figured one measures ?10.5 × 11.5 × 6.0 mm.

Remarks: Our material contains except 5 characteristic, broadly trigonal and deeply sulcate specimens also 3 relatively narrow specimens. They are very much similar to those figured by DULAI (2003) in Pl. 14, Fig. 6–12. The large variability of this species was discussed by many authors in the past and a series of “varieties” was established. Very detailed remarks on the species and its relation to similar *Linguithyris nimbata* were made by DULAI (2003).

Occurrence: Localities 5 (4 specimens) and 7 (4 spec.).

Age: Upper Hettangian–Lower Toarcian.

***Linguithyris curviconcha* (OPPEL, 1863)**

- 1863 *Terebratula curviconcha* OPP. – OPPEL, p. 206, Pl. 5, Fig. 6.
1880 *Terebratula curviconcha* OPP. – PARONA, p. 269, Pl. 5, Fig. 16.
? 1993 *Linguithyris curviconcha* (OPPEL) – RADULOVIĆ & RABRENOVIĆ, p. 119, Pl. 2, Fig. 6.
1994 *Linguithyris curviconcha* (OPPEL) – SIBLÍK in MIŠÍK et al., p. 261, Pl. 4, Fig. 3 (cum syn.).
1999 *Linguithyris curviconcha* (OPPEL) – KROBICKI in WIERZBOWSKI et al., p. 65, Fig. 23: 2 (cum syn.).

Material: 1 fragmentary specimen measuring cca. 14.0 × cca. 15.0 × 7.5 mm, and 2 damaged brachial valves.

Remarks: The specimens are well determinable, despite their unfavourable preservation. They differ from “average” material of the species in having a shallower anterior sulcation. Large external variability of “*curviconcha*” and of other *Linguithyris* species is well known and was summarized in detail by KROBICKI in WIERZBOWSKI et al. (1999). He discussed also the relation of *L. curviconcha* to

the similar *L. nepos* (CAN.) and *L. bifida* (ROTHPL.). The differences among species are subtle, causing difficulties in the determinations. Some other damaged specimens with length slightly overpassing width and with shallow, large sulcation are determined as *Linguithyris* cf. *curviconcha*.

Occurrence: Localities 8 (1 specimen) and 9 (2 spec.). Locality 6 yielded 5 specimens determined as *Linguithyris* cf. *curviconcha*.

Age: Aalenian (FERRARI, 1962) – Callovian, relatively common in Bajocian–Bathonian.

***Linguithyris* cf. *redii* (Di-Stefano, 1884)**

cf. 1884 *Pygope Redii*, DI-STEF. – DI-STEFANO, p. 20, Pl. 2, Fig. 1–3.

Material: 2 damaged specimens. The better preserved one measures 17.5 × 22 × 11.2 mm.

Remarks: Our specimens may remind one of several other Middle Jurassic terebratulids described in literature, like *L. pteroncha* (GEMM.), *L. bifida* (ROTHPL.), *L. nepos* (CAN.) and *L. Gemmellaro* (DI-STEF.) (the latter species can be synonymous with “*redii*”). However, they can be distinguished from them by the width distinctly overpassing the length, by the trigonal bilobate dorsal view, and by a high and narrow pedicle beak with an apical angle of about 90°. Due to the bad preservation of the anterior, resp. anterolateral parts of the shell, the depth of the anterior sulcation is not well ascertainable.

Occurrence: Localities 9 (1 specimen) and 11 (1 spec.).

Age: *Linguithyris redii* (DI-STEF.) is known from the Bathonian of Sicily.

Suborder: Terebratellidina
Muir-Wood, 1955
Superfamily: Zeillerioidea ALLAN, 1940
Family: Zeilleriidae ALLAN, 1940
Genus: Zeilleria BAYLE, 1878

***Zeilleria alpina* (GEYER, 1889)**

(Pl. 3, Fig. 8)

1889 *Waldheimia alpina* nov. sp. – GEYER, p. 29, Pl. 3, Fig. 33–38.

1999 *Zeilleria alpina* (GEYER) – SIBLIK, p. 202 (cum syn.).

2003 *Zeilleria alpina* (GEYER) – DULAI in VÖRÖS et al., p. 75.

2003 *Zeilleria alpina* (GEYER) – DULAI, p. 90, Pl. 15, Fig. 4–6; Text-Fig. 17 (cum syn.).

Material: 10 specimens up to 15.0 × 16.0 × 8.0 mm. The best preserved specimens measure 13.6 × 14.3 × 7.0 mm (figured) and 11.8 × 12.3 × 6.4 mm.

Remarks: The detailed description of this flat species accompanied by the discussion and serial sections was given by DULAI (2003).

Occurrence: Locality 12 (7 spec.), loc. 13 (3 spec.).

Age: Upper Hettangian–Lower Pliensbachian.

***Zeilleria baldaccii* GEMMELLARO, 1878**

(Pl. 4, Fig. 6)

1878 *Zeilleria Baldaccii*, GEMM. – GEMMELLARO, p. 416, Pl. 31, Fig. 8–12.

2003 *Zeilleria baldaccii* GEMMELLARO, 1874 – DULAI in VÖRÖS et al., p. 76, Pl. 7, Fig. 24–26.

Material: 2 specimens. The figured one measures 18.2 × 15.7 × 7.5 mm, the second slightly damaged specimen has the dimensions 11.8 × cca. 10.5 × 5.0 mm.

Remarks: The species is noted for its flat shells of ovate outline and rectimarginate anterior commissure, and for its high and sharpened beak. Our specimens differ from GEMMELLARO’s specimen only in the absence of the slight concentric ornamentation in the anterior half of shell, and completely resemble the specimen figured by DULAI in VÖRÖS et al. (2003) from the Schafberg area.

Occurrence: Locality 12.

Age: Sinemurian. VÖRÖS (1997) reported *Zeilleria* sp., aff. *baldaccii* from the Upper Sinemurian of the Bakony Mts. in Hungary.

***Zeilleria choffati* HAAS, 1885**

(Pl. 3, Fig. 5)

1885 *Waldheimia* (*Zeilleria*) *Choffati*, nov. spec., 1884 – HAAS, p. 61, Pl. 4, Figs. 20–24.

1999 *Zeilleria choffati* HAAS – SIBLIK in BÖHM et al., p. 202, Pl. 30, Fig. 11 (cum syn.).

2003 *Zeilleria choffati* (HAAS, 1885) – DULAI in VÖRÖS et al., p. 76.

2003 *Zeilleria choffati* (HAAS, H., 1884) – DULAI, p. 92, Pl. 15, Fig. 10–13, Text-Fig. 18 (cum syn.).

Material: 6 fragmentary specimens.

Remarks: This species can be differentiated from some variants of *Z. mutabilis* by its sinuate (slightly concave) anterior outline.

Occurrence: Locality 2 (3 spec.), loc. 3 (1 spec.) and loc. 12 (2 spec.).

Age: Sinemurian.

***Zeilleria livingstonei* GEMMELLARO, 1878**

1878 *Zeilleria Livingstonei*, GEMM. – GEMMELLARO, p. 418, Pl. 29, Fig. 28–33.

? 2003 *Zeilleria* cf. *livingstonei* GEMMELLARO – DULAI, p. 95, Pl. 16, Fig. 1–4, Text-Fig. 19.

Material: 3 specimens. The biggest of them with slightly damaged pedicle valve measures 20.0 × 17.3 × 9.0 mm.

Remarks: The species is characterized by tear-like outline, relatively thin profile and high and narrow beak. Our specimens agree very well with that with stronger beak figured by GEMMELLARO in Figs. 31–33. The specimen figured by DULAI (2003) belongs most probably to the species under consideration.

Occurrence: Locality 3 (1 spec.), loc. 12 (1 spec.) and loc. 13 (1 spec.).

Age: Sinemurian. VÖRÖS (1997) reported the occurrence in the Pliensbachian of the Bakony Mts.

***Zeilleria mutabilis* (OPPEL, 1861)**

1861 *Terebratula mutabilis* OPP. (*Waldheimia*) – OPPEL, p. 538, Pl. 10, Fig. 7.

1999 *Zeilleria mutabilis* (OPPEL) – SIBLIK in BÖHM et al., p. 202, Pl. 3, Fig. 8 (cum syn.).

? 2003 *Zeilleria mutabilis* (OPPEL) – VÖRÖS in VÖRÖS et al., p. 80, Pl. 8, Fig. 46–8.

2003 *Zeilleria mutabilis* (OPPEL) – DULAI, p. 96, Pl. 16, Fig. 5–17; Text-Fig. 20 (cum syn.).

? 2007 *Zeilleria* (*Zeilleria*) *mutabilis* (OPPEL) – ALMÉRAS et al., p. 121, Pl. 10, Fig. 9–11 (cum syn.).

Material: 14 specimens. The biggest of them measures 19.5 × 16.4 × 8.8 mm.

Remarks: This very common species with its external and internal variability was discussed in detail by DULAI (2003).

Occurrence: Locality 2 (4 specimens), loc. 3 (1 spec.), loc. 5 (2 spec.), loc. 12 (5 spec.) and loc. 13 (2 spec.).

Age: Sinemurian–Pliensbachian.

***Zeilleria stapia* (OPPEL, 1861)**

(Pl. 4, Fig. 5; Pl. 5, Fig. 8)

- 1861 *Terebratula stapia* OPP. (*Waldheimia*) – OPPEL, p. 539, Pl. 11, Fig. 2.
1874 *Waldheimia stapia* OPP. – GEMMELLARO, p. 67, Pl. 10, Fig. 14.
1993a *Zeilleria stapia* (OPPEL) – SIBLÍK, p. 975, Pl. 2, Fig. 2, Text-Fig. 10 (cum syn.).
1999 *Zeilleria stapia* (OPPEL) – SIBLÍK in BÖHM et al., p. 203, Text-Fig. 53.
2007 *Zeilleria (Zeilleria) stapia* (OPPEL) – ALMÉRAS et al., p. 122, Pl. 10, Fig. 12 (cum syn.).

Material: 8 specimens. The figured specimens measure 18.8 × 15.8 × 10.9 mm (Pl. 4, Fig. 5) and 12.7 × 10.4 × 7.5 mm (Pl. 5, Fig. 8). Other well preserved specimens measure 18.6 × 15.5 × 10.3 mm and 18.0 × 13.4 × 9.0 mm.

Remarks: Elongated outline is practically the only feature distinguishing this species from *Z. mutabilis*. The specimen figured in Pl. 5, Fig. 8 differs from the average in subrounded anterior margin and in strongly convex pedicle valve.

Occurrence: Localities 12 (7 specimens) and 13 (1 spec.).

Age: Upper Hettangian–Sinemurian.

***Zeilleria thurwieseri* (BÖSE, 1897)**

- 1897 *Waldheimia Thurwieseri* nov. sp. – BÖSE, p. 175, Pl. 13, Fig. 2–10.

Material: 3 specimens without beaks, the biggest one measures 15.0 × 13.5 × 7.0 mm.

Remarks: Subtrigonal to subpentagonal smooth biconvex shells, typically rectimarginate and lobate. Sulci developed in the anterior thirds of the valves. Beak suberect, broad with long subangular beak ridges. The characteristic external feature of this species is a deeply indented (emarginate) anterior margin. Our specimens correspond well to BÖSE's description and figures (esp. in outline and profile to those in Pl. 13, Fig. 3 and 7) and differ from them in shorter sulcations on the valves.

Occurrence: Locality 4.

Age: The species was described by BÖSE (1897) from the Middle Liassic of Kramsach in Tyrol. It was ascertained also by one of the present authors (M. SIBLÍK) in the Middle Liassic of Erlakogel Mt. near Gmunden, Upper Austria.

***Zeilleria venusta* (UHLIG, 1880)**

(Pl. 4, Fig. 7)

- 1880 *Waldheimia venusta* n. f. – UHLIG, p. 285, Pl. 3, Figs. 7–8.
2003 *Zeilleria venusta* (UHLIG) – DULAI, p. 102, Pl. 17, Figs. 5–7 (cum syn.).

Material: 5 specimens. The figured one measures 22.0 × 18.0 × 12.6 mm.

Remarks: Remarkable thickness and high flanks of shell are the characteristic features of this species. The specimen figured by DULAI (2003) thus may belong to another species.

Occurrence: Locality 5 (1 specimen cf.), loc. 12 (1 spec.) and loc. 13 (3 spec.).

Age: Sinemurian.

Genus: *Bakonyithyris* VÖRÖS, 1983

***Bakonyithyris apenninica* (ZITTEL, 1869)**

- 1869 *Terebratula (Waldheimia) Apenninica* ZITT. – ZITTEL, p. 127, Pl. 14, Fig. 9.
2003 *Bakonyithyris apenninica* (ZITTEL) – SIBLÍK in SIBLÍK & LOBITZER, p. 76, Text-Fig. 3 (cum syn.).

Material: 3 partially damaged specimens. The best preserved one measures 12 × 12.4 × 7.8 mm.

Remarks: The detailed description of this deeply sulcated species was given by GEYER (1889, p. 33). Our specimens agree very well externally with that figured by GEYER (1889) on Pl. 4, Fig. 9, while the specimen from Adnet depicted by SIBLÍK in SIBLÍK & LOBITZER (2003) developed a flatter brachial valve. In addition to the mentioned 3 specimens, one specimen (8.6 × 9.0 × 6.0 mm) from locality 7 was determined as *B. aff. apenninica* and figured in Pl. 5, Fig. 11. It differs from ZITTEL's original specimen in having shallower sulcation and straight lateral commissure.

Occurrence: Locality 7 (1 specimen), loc. 12 (2 spec.).

Age: Sinemurian–Pliensbachian. The species was described by ZITTEL from the Middle Liassic of the Apennines. The occurrence in the Pliensbachian is reported also by VÖRÖS (1997) from the Bakony Mts.

***Bakonyithyris* (?) *engelhardti* (OPPEL, 1861)**

- 1861 *Terebratula Engelhardti* OPP. (*Waldheimia*) – OPPEL, p. 537, Pl. 10, Fig. 5.
1999 *Bakonyithyris* (?) *engelhardti* (OPPEL) – SIBLÍK in BÖHM et al., p. 203 (cum syn.).

Material: 1 slightly damaged specimen.

Remarks: Our specimen with a slight sulcation and subrounded anterior outline is well comparable to the specimen figured by GEYER (1889) in Pl. 4, Fig. 2. Insufficient material did not bring new information on the relations between "*engelhardti*" and "*ewaldi*".

Occurrence: Locality 13.

Age: Sinemurian.

***Bakonyithyris ewaldi* (OPPEL, 1861)**

(Pl. 3, Fig. 7; Pl. 5, Fig. 12)

- 1861 *Terebratula Ewaldi* OPP. (*Waldheimia*) – OPPEL, p. 539, Pl. 11, Fig. 1.
2003 *Bakonyithyris ewaldi* (OPPEL) – DULAI, p. 109, Pl. 19, Figs. 5–6 (cum syn.).

Material: 35 specimens up to 16.5 mm length, 16.5 mm width and 9.5 mm thick. The figured specimens measure 14.5 × 14.2 × 9.0 mm (Pl. 3, Fig. 7) and 13.7 × 10.8 × 7.7 mm (Pl. 5, Fig. 12).

Remarks: Very variable species, which is often difficult to separate from *B. apenninica* or *B. engelhardti*. Our figured specimens are relatively thicker than the "average" specimens in the material. Their rounded anterior views are well comparable to GEYER's specimen figured 1889 in Plate 4, Fig. 6b.

Occurrence: Locality 5 (6 specimens), loc. 7 (18 spec.), loc. 12 (2 specimens), loc. 13 (9 spec.).

Age: Sinemurian.

***Bakonyithyris* sp.**

(Pl. 5, Fig. 9)

Material: One damaged specimen with dimensions 15.5 × 16.2 × 7.6 mm.

Description: Ventribiconvex, relatively flat shell of sub-circular outline, brachial valve with broad and shallow sulcation developed in its anterior third, straight lateral commissures, and anterior commissure with moderately shallow sulcation.

Internal characters: Traces of short dorsal septum and of dental lamellae only poorly ascertainable.

Remarks: The specimen shows considerable resemblances to larger variants of the Middle Liassic *Bakonythyris ovimontana* (BÖSE) but differs from them in having a flat shell of subcircular outline, and a great difference in thickness of valves visible well on lateral view. Further comparison is made difficult owing to the scarcity of material and to the damage to the posterior part of our specimen.

Occurrence: Locality 7.

Genus: *Securina* VÖRÖS, 1983

Securina partschi (OPPEL, 1861)

1861 *Terebratula Partschi* OPP. (*Waldheimia*) – OPPEL, p. 538, Pl. 10, Fig. 6.

1861 *Terebratula Hierlatzica* – OPPEL, p. 539.

? 1988 *Securina partschi* (OPPEL) – IÑESTA, p. 62, Pl. 2, Fig. 4.

1997 *Securina hierlatzica* (OPPEL) – VÖRÖS, p. 103, Fig. 8.

2003 *Securina partschi* (OPPEL) – DULAI, p. 105, Pl. 23, Fig. 1–4, Text-Fig. 23 (cum syn.).

2007 *Securina hierlatzica* (OPPEL) – ALMÉRAS et al., p. 134, Pl. 11, Fig. 17 (cum syn.).

Material: 21 partially damaged specimens, up to 23.0 mm long, 22.0 mm wide and 13.0 mm thick.

Remarks: Our specimens agree well with the detailed description and figures by GEYER (1889). A thorough comment on this species and its variability was given recently by DULAI (2003). He discussed also the similar species *S. hierlatzica* (OPPEL) and reasonably put it into synonymy of *S. partschi*. The former species was differentiated from “partschi” above all by its sharply trigonal outline.

Occurrence: Locality 2 (1 spec.), locality 5 (3 spec.), loc. 7 (7 spec.), loc. 12 (1 spec.) and loc. 13 (9 spec.)

Age: Sinemurian–Pliensbachian.

Acknowledgements

We are grateful to Dr. G. SCHÄFFER (Vienna) for his introductory guidance in the field. The bulk of brachiopod study was made possible thanks to the grant of the Grant Agency of the Czech Republic no. 205/00/0944 [Research program of the Institute of Geology ASCR, v.v.i. AV 02 30130516]. One of us (M. SIBLÍK) heartily acknowledges the possibility of a short stay in the GBA in Vienna (2007) through the scientific exchange programme between the Geological Surveys in Prague and Vienna. He thanks Dr. F. STOJASPAL and Dr. I. ZORN (Geologische Bundesanstalt, Wien) and Dr. H. SUMMESBERGER (Naturhistorisches Museum, Wien) for access to the collections and kind assistance.

Plate 1

- Fig. 1: *Prionorhynchia greppini* (OPPEL).
Mitterwand, loc. 7.
GBA 2007/7/2; × 2.
- Fig. 2: *Salgirella albertii* (OPPEL).
Mitterwand, loc. 7.
GBA 2007/8/1; × 2.
- Fig. 3: “*Rhynchonella*” aff. *belemnitica* (QUENSTEDT).
Mitterwand, loc. 7.
GBA 2007/8/2; × 2.
- Fig. 4: *Calcirhynchia* (?) *plicatissima* (QUENSTEDT).
Mitterwand, loc. 7.
GBA 2007/8/3; × 2.
- Fig. 5: *Homoeorhynchia* (?) *prona* (OPPEL).
Mitterwand, loc. 12.
GBA 2007/7/11; × 2.
- Fig. 6: *Cuneirhynchia fraasi* (OPPEL).
Mitterwand, loc. 13.
GBA 2007/8/4; × 2.
- Fig. 7: “*Rhynchonella*” aff. *belemnitica* (QUENSTEDT).
Mitterwand, loc. 12.
GBA 2007/8/5; × 2.
- Fig. 8: *Cuneirhynchia retusifrons* (OPPEL).
Narrow specimen.
Mitterwand, loc. 7.
GBA 2007/8/6; × 2.
- Fig. 9: *Cirpa planifrons* (ORMÓS).
Mitterwand, loc. 7.
GBA 2007/8/7; × 2.

All specimens in the Plates were coated with ammonium chloride before photographing and are housed in the collections of the Geologische Bundesanstalt, Wien (GBA).
Photographs by Mr. J. BROŽEK (Prague).

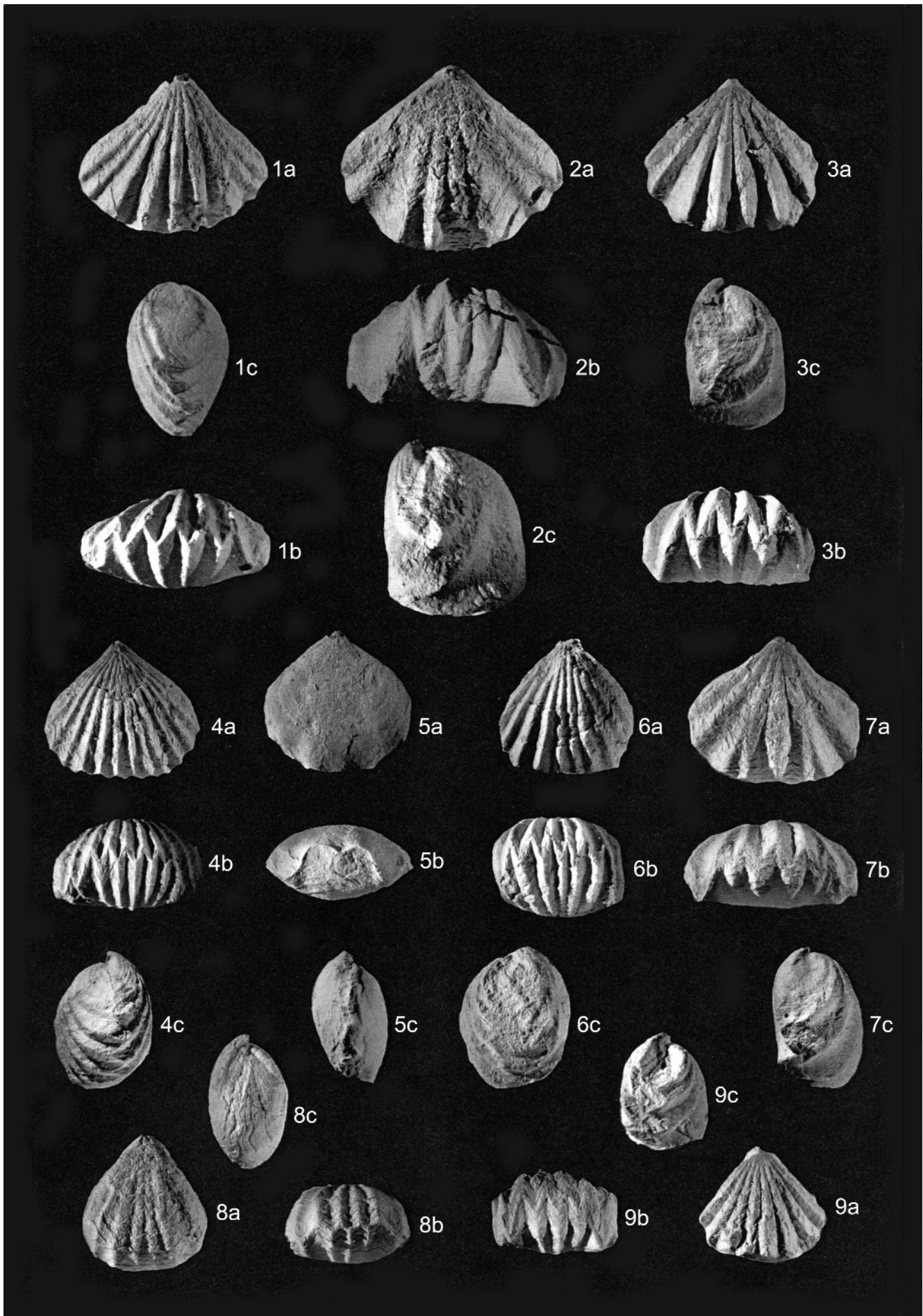


Plate 2

- Fig. 1: *Jakubirhynchia latifrons* (STUR in GEYER).
Klauskögerl, loc. 4.
GBA 2007/8/8; x 2.
- Fig. 2: *Calcirhynchia* (?) *plicatissima* (QUENSTEDT).
Mitterwand, loc. 7.
GBA 2007/8/9; x 2.
- Fig. 3: *Prionorhynchia flabellum* (MENEHINI in GEMMELLARO).
Klauskögerl, loc. 3.
GBA 2007/8/10; x 3.
- Fig. 4: *Cuneirhynchia retusifrons* (OPPEL).
Mitterwand, loc. 7.
GBA 2007/8/11; x 2.
- Fig. 5: *Cuneirhynchia retusifrons* (OPPEL).
Thicker specimen.
Mitterwand, loc. 12.
GBA 2007/8/12; x 2.
- Fig. 6: *Cirpa* (?) aff. *subcostellata* (GEMMELLARO).
Mitterwand, loc. 7.
GBA 2007/8/13; x 2.
- Fig. 7: *Pisirhynchia inversa* (OPPEL).
Klauskögerl, loc. 4.
GBA 2007/7/12; x 4.
- Fig. 8: "*Rhynchonella*" aff. *etalloni* (OPPEL).
Klauskögerl, loc. 1.
GBA 2007/8/14; x 2.

All specimens in the Plates were coated with ammonium chloride before photographing and are housed in the collections of the Geologische Bundesanstalt, Wien (GBA).
Photographs by Mr. J. BROŽEK (Prague).

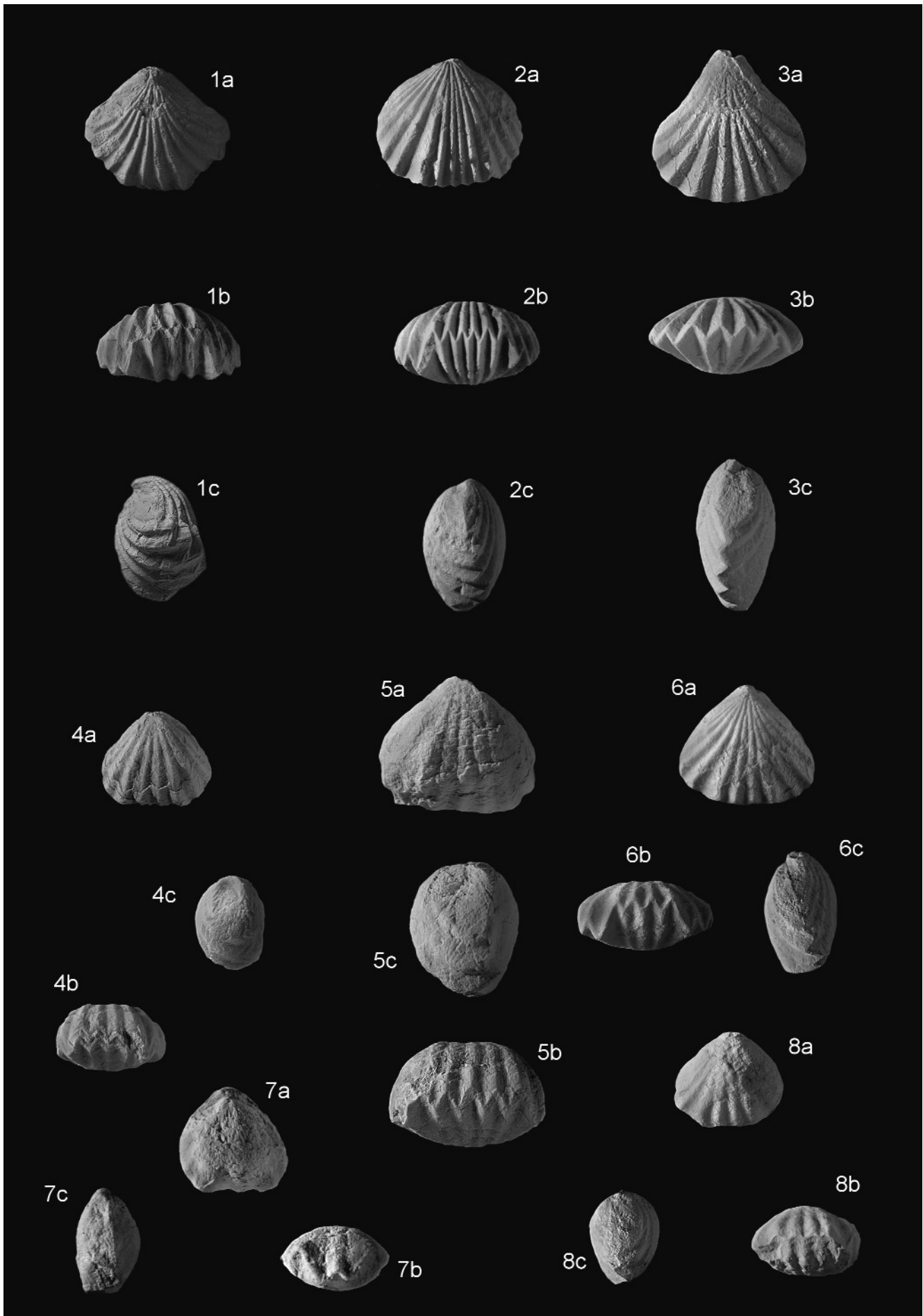


Plate 3

- Fig. 1: *Prionorhynchia fraasi* (OPPEL).
Mitterwand, loc. 13.
GBA 2007/8/15; × 2.
- Fig. 2: *Capillirhynchia bretoniaca* (OPPEL).
Mitterwand, loc. 14.
GBA 2007/8/16; × 2.
- Fig. 3: *Apringia deltoidea* (CANAVARI).
Mitterwand, loc. 12.
GBA 2007/8/17; × 2.
- Fig. 4: *Prionorhynchia palmata* (OPPEL).
Mitterwand, loc. 7.
GBA 2007/8/18; × 2.
- Fig. 5: *Zeilleria choffati* HAAS.
Klauskögerl, loc. 2.
GBA 2007/8/19; × 2.
- Fig. 6: *Liospiriferina sicula* (GEMMELLARO).
Mitterwand, loc. 7.
GBA 2007/8/20; × 2.
- Fig. 7: *Bakonyithyris ewaldi* (OPPEL).
Mitterwand, loc. 13.
GBA 2007/8/21; × 2.
- Fig. 8: *Zeilleria alpina* (GEYER).
Mitterwand, loc. 12.
GBA 2007/8/22; × 2.

All specimens in the Plates were coated with ammonium chloride before photographing and are housed in the collections of the Geologische Bundesanstalt, Wien (GBA).
Photographs by Mr. J. BROŽEK (Prague).

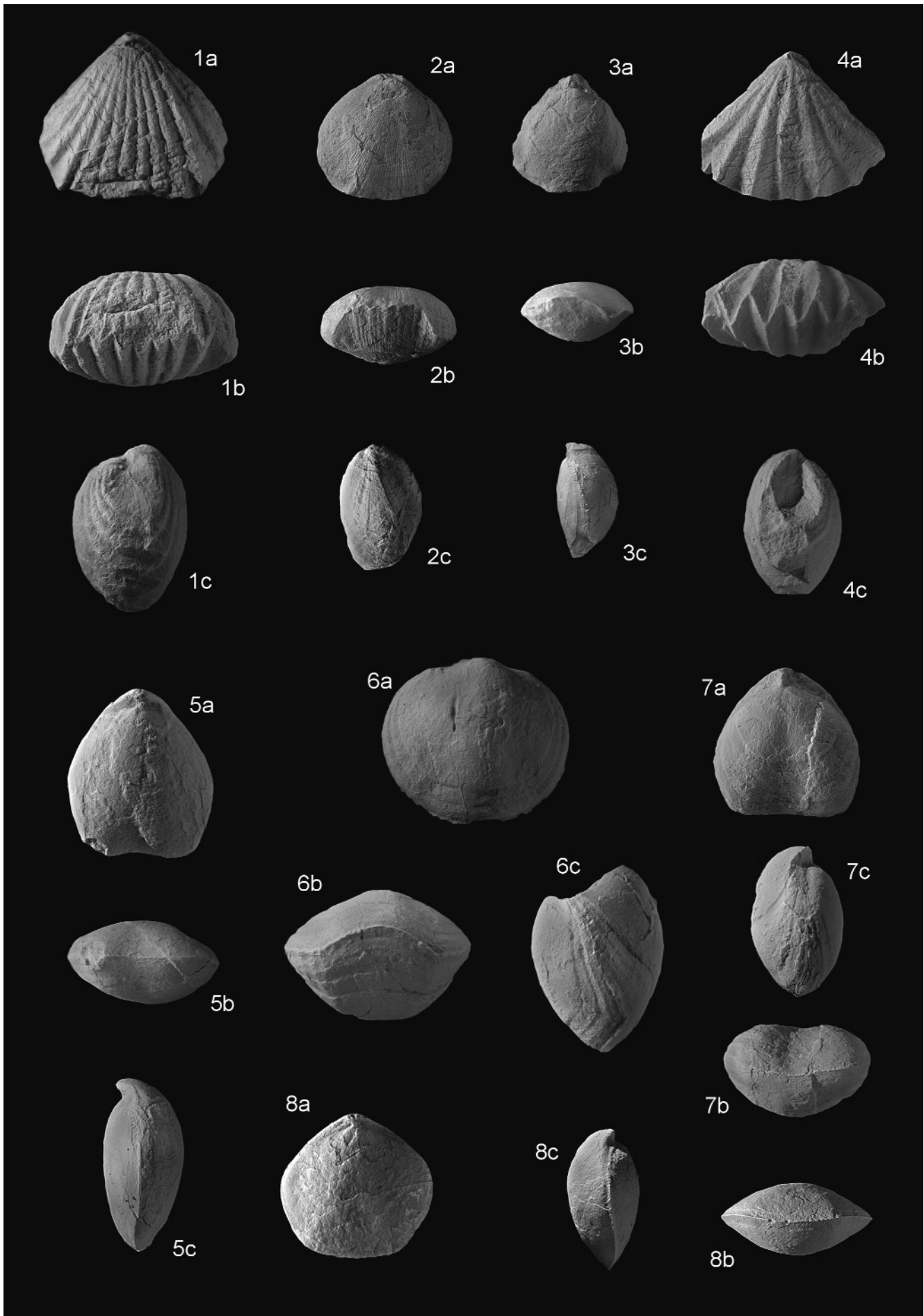


Plate 4

- Fig. 1: *Liospiriferina alpina* (OPPEL).
Mitterwand, loc. 13.
GBA 2007/7/3; × 2.
- Fig. 2: *Lobothyris andleri* (OPPEL).
Mitterwand, loc. 13.
GBA 2007/8/23; × 1.5.
- Fig. 3: *Liospiriferina obtusa* (OPPEL).
Mitterwand, loc. 12.
GBA 2007/8/24; × 2.
- Fig. 4: *Linguithyris aspasia* (ZITTEL).
Mitterwand, loc. 7.
GBA 2007/8/25; × 2.
- Fig. 5: *Zeilleria stapia* (OPPEL).
Mitterwand, loc. 12.
GBA 2007/8/26; × 2.
- Fig. 6: *Zeilleria baldaccii* GEMMELLARO.
Mitterwand, loc. 12.
GBA 2007/8/27; × 2.
- Fig. 7: *Zeilleria venusta* (UHLIG).
Mitterwand, loc. 13.
GBA 2007/8/28; × 1.5.
- Fig. 8: *Lobothyris andleri* (OPPEL).
Mitterwand, loc. 12.
GBA 2007/8/29; × 1.5.

All specimens in the Plates were coated with ammonium chloride before photographing and are housed in the collections of the Geologische Bundesanstalt, Wien (GBA).
Photographs by Mr. J. BROŽEK (Prague).

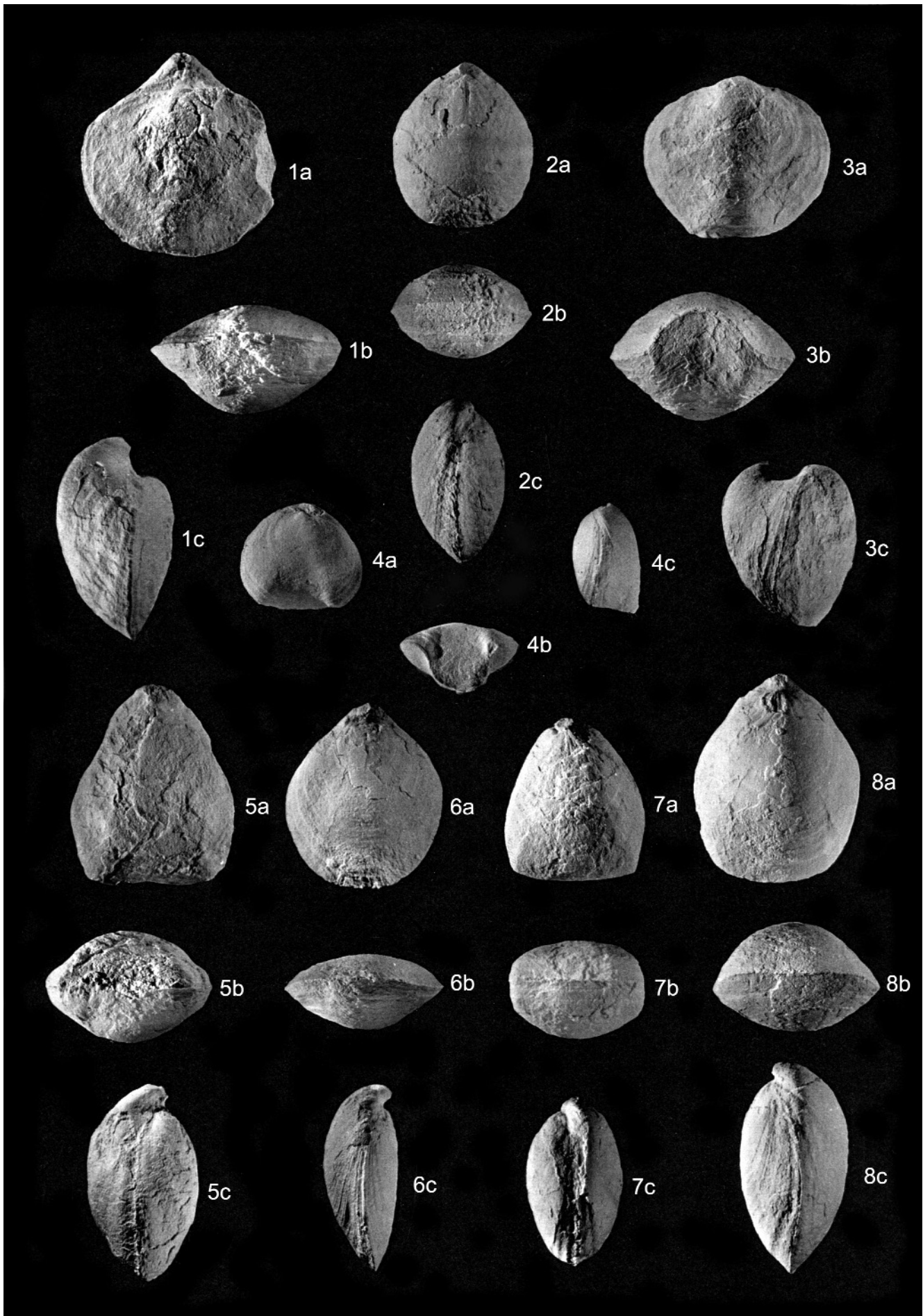
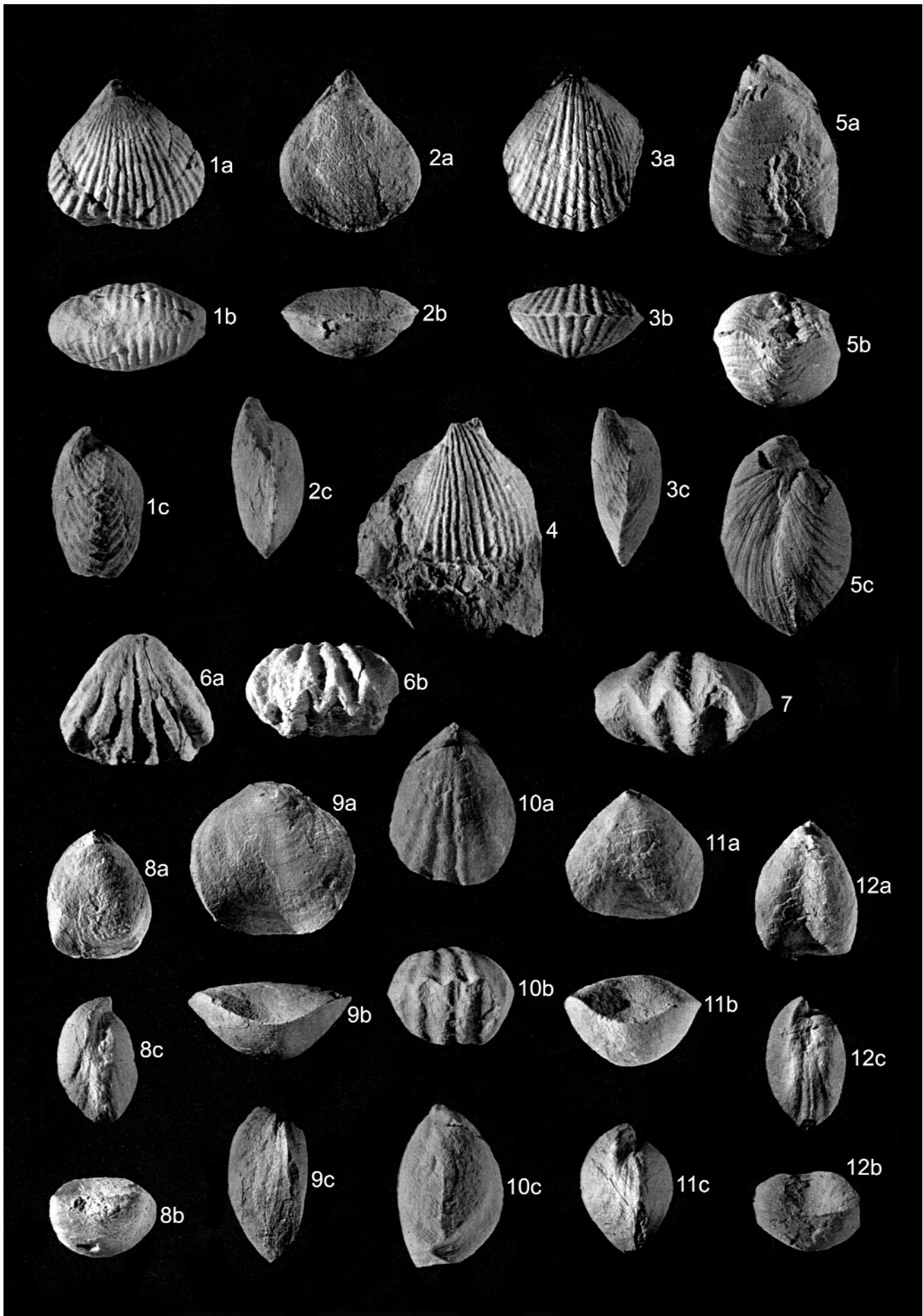


Plate 5

- Fig. 1: *Striirhynchia subechinata* (OPPEL).
Mitterwand, loc. 10.
GBA 2007/7/13; × 3.
- Fig. 2: *Striirhynchia berchta* (OPPEL).
Mitterwand, loc. 8.
GBA 2007/8/30; × 3.
- Fig. 3: *Striirhynchia subechinata* (OPPEL).
Mitterwand, loc. 9.
GBA 2007/8/31; × 2.
- Fig. 4: *Striirhynchia subechinata* (OPPEL).
Mitterwand, loc. 9.
GBA 2007/8/32; × 1.5.
- Fig. 5: "*Terebratula*" *fyglia* OPPEL.
Mitterwand, loc. 10.
GBA 2007/7/14; × 2.
- Fig. 6: *Septocrurella defluxa* (OPPEL).
Mitterwand, loc. 11.
GBA 2007/8/33; × 2.
- Fig. 7: "*Rhynchonella*" aff. *etalloni* OPPEL.
Specimen with stronger ribs.
Klauskögerl, loc. 1.
GBA 2007/8/34; × 3.
- Fig. 8: *Zeilleria stapia* (OPPEL).
Mitterwand, loc. 12.
GBA 2007/8/35; × 2.
- Fig. 9: *Bakonyithyris* sp.
Mitterwand, loc. 7.
GBA 2007/8/36; × 2.
- Fig. 10: "*Rhynchonella*" aff. *etalloni* OPPEL.
Narrow specimen.
Klauskögerl, loc. 1.
GBA 2007/8/37; × 3.
- Fig. 11: *Bakonyithyris* aff. *apenninica* (ZITTEL).
Mitterwand, loc. 7.
GBA 2007/8/38; × 3.
- Fig. 12: *Bakonyithyris ewaldi* (OPPEL).
Mitterwand, loc. 12.
GBA 2007/8/39; × 2.

All specimens in the Plates were coated with ammonium chloride before photographing and are housed in the collections of the Geologische Bundesanstalt, Wien (GBA).
Photographs by Mr. J. BROŽEK (Prague).



References

- AGER, D.V. (1990): British Liassic Terebratulida (Brachiopoda). – Pt. 1. Monogr. Palaeont. Soc., **143** (1989), No. 582, 1–39, Pls. 1–2, London.
- ALMÉRAS, Y. & FAURÉ, P. (2000): Les Brachiopodes liasiques des Pyrénées. Paléontologie, Biostratigraphie, Paléobiogéographie et Paléoenvironnements. – Actes Labor. Géol. Sédim. Paléont. Univ. Paul-Sabatier (2), Mém., **36**, 1–395, Pls. 1–23, Toulouse.
- ALMÉRAS, Y., ELMI, S. & FAURÉ, P. (2007): Les Brachiopodes liasiques d'Algérie occidentale. – Docum. Lab. Géol. Lyon, **163**, 1–241, Pls. 1–11, Lyon.
- BENIGNI, C. (1978): Revisione tassonomica dei Rhynchonellida liasici di Ra Stua (Belluno) e Fanes (Bolzano). – Riv. It. Paleont. Strat., **84**, 121–159, Pls. 13–16, Milano.
- BENIGNI, C., CASATI, P. & PIRINI RADRIZZANI, C. (1982): Stratigrafia del Giurassico dei dintorni di Fozza (Altopiano di Asiago). – Riv. It. Paleont. Strat., **88**, 45–74, Pl. 2, Milano.
- BITTNER, A. (1894): Neue Koninckiniden des alpinen Lias. – Jb. k.k. Geol. Reichsanst., **43** (1893), 133–144, Pl. 4, Wien.
- BÖCKH, J. (1874): Die geologischen Verhältnisse des südlichen Theiles des Bakony. 2. Theil. – Mittheil. Jahrb. kön. ung. Geol. Anst., **3**, 1–180, Pls. 1–7, Pest.
- BÖHM, F., EBLI, O., KRYSSTYN, L., LOBITZER, H., RAKÚS, M. & SIBLÍK, M. (1999): Fauna, Stratigraphy and Depositional Environment of the Hettangian–Sinemurian (Early Jurassic) of Adnet (Salzburg, Austria). – Abh. Geol. B.-A., **56/2**, 143–271, Pls. 1–30, Wien.
- BÖSE, E. (1893): Die Fauna der liasischen Brachiopodenschichten bei Hindelang (Algäu). – Jb. k.k. geol. Reichsanst., **42** (1892), 627–650, Pls. 14–15, Wien.
- BÖSE, E. (1897): Die mittelliasische Brachiopodenfauna der östlichen Nordalpen. – Palaeontographica, **44**, 145–224, Pls. 11–16, Stuttgart.
- BUCH L. de (1840): Essai d'une classification et d'une description des *Delthyris* ou *Spirifer* et *Orthis*. – Mém. Soc. géol. France, t. **4**, pt. 1, mém. 3, 153–224, Pls. 8–12, Paris.
- CANAVARI, M. (1880): La Montagna del Suavicino. – Boll. R. Com. geol. Italia, **11** (sér. 2, vol. 1), nr. 1–2, 54–73, Pl. 1, Roma.
- CANAVARI, M. (1880a): I brachiopodi degli Strati a *Terebratulina aspasia* MGH. nell' Appennino centrale. – Atti R. Accad. Lincei (3), Mem. Cl. Sc. Fis. Mat. Nat., **8**, 329–360 (reprint 1–32), Pls. 1–4, Roma.
- CANTALUPPI, G. (1966): Fossili Sinemuriani e Domeriani nel "Corso bianco" ad Est di Brescia. – Atti Ist. Geol. Univ. Pavia, **17**, 103–120, Pls. 16–17, Pavia.
- COMAS-RENGIFO, M.J. & GOY, A. (1975): Estratigrafía y Paleontología del Jurásico de Ribarredonda (Guadalajara). – Estud. geol., **31**, 297–327, Pls. 1–6, Madrid.
- DAL PIAZ, G. (1907): Sulla fauna liasica delle tranze di Sospirolo. – Mém. Soc. Paléont. Suisse, **33** (1906), 1–64, Pls. 1–3, Genève.
- DELANCE, J.H. (1969): Étude de quelques Brachiopodes liasiques du nord-est de l'Espagne. – Ann. Paléont., Invert., **55**, 1, 1–44, Pls. A–B, Paris.
- DI-STEFANO, G. (1884): Sui brachiopodi della Zona con *Posidonomya alpina* di M. Ucina presso Galati. – Giorn. Sc. nat. econ. Palermo, **17**, 1–27, Pls. 1–2, Palermo.
- DULAI, A. (1992): The Early Sinemurian (Jurassic) brachiopod fauna of the Lókút Hill (Bakony Mts., Hungary). – Fragm. Miner. Palaeont., **15**, 41–94, Pls. 1–6, Budapest.
- DULAI, A. (1993): Hettangian (Early Jurassic) brachiopod fauna of the Bakony Mts. (Hungary). – Fragm. Miner. Palaeont., **16**, 27–50, Pls. 1–2, Budapest.
- DULAI, A. (1998): Early Jurassic brachiopods from the basal layers of the Pisznice Limestone of Lábattlan (Gerecse Mts., Hungary). – Ann. hist.-nat. Mus. nat. hung., **90**, 35–55, Budapest.
- DULAI, A. (2003): Hettangian and Early Sinemurian (Early Jurassic) brachiopods of the Transdanubian Central Range (Hungary) I. Systematic descriptions. – A Bakony Term. Tud. Kut. Eredm., **27**, 1–124, Pls. 1–20, Zirc (in Hung.).
- DULAI, A. (2003a): Taxonomic composition of Mediterranean Early Jurassic brachiopod faunas from Hungary: niche replacement and depth control. – Fragm. Palaeont. Hung., **21**, 43–50, Budapest.
- FERRARI, A. (1962): Brachiopodi giurassici dei dintorni di Rovereto (Trentino). – Giorn. Geol., ser. 2a, **29**, 91–153, Pls. 8–10, Bologna.
- FUCINI, A. (1895): Fauna dei calcari bianchi ceroidi con *Phylloceras cylindricum* SOW. sp. del Monte Pisano. – Atti Soc. tosc. Sci. nat., A, Mem., **14**, 125–351 (reprint 1–229), Pls. 6–13, Pisa.
- FÜLÖP, J., HÁMOR, G., HETÉNYI, R. & VÍGH, G. (1960): Über die Jurabildungen des Vértessgebirges. – Földt. Közl., **90**, 15–26, Pls. 1–5, Budapest (in Hungarian).
- GAWLICK, H.-J. (2007): Revision der Grünanger-Schichten (Schäffer, 1982) im Salzkammergut. – In: EGGER, H. & RUPP, Ch. (Eds.): Beiträge zur Geologie Oberösterreichs. Arbeitstagung der Geologischen Bundesanstalt 2007, Blatt 67 Grünau im Almtal und Blatt 47 Ried im Innkreis, 7.–11. Mai 2007, 159–164, Linz.
- GEMMELLARO, G.G. (1874, 1877, 1878): Sopra alcune faune giuresi e liasiche di Sicilia. Studi paleontologici. Parts 3, 5, 6. – Giorn. Sci. nat. econ. Palermo, **10**, **12**, **13**, 53–112, 125–155, 233–434, Pls. 10–12, 18–20, 22–31, Palermo.
- GEYER, G. (1889): Über die liasischen Brachiopoden des Hierlatz bei Hallstatt. – Abh. k.k. geol. Reichsanst., **15**, 1, 1–88, Pls. 1–9, Wien.
- GEYER, G. (1894): Eine neue Fundstelle von Hierlatz-Fossilien auf dem Dachsteingebirge. – Verh. geol. Reichsanst., **5**, 156–162, Wien.
- GIOVANNONI, M.A. (1983): Revisione critica di alcune specie di brachiopodi mesozoici europei conservati nel Museo del Servizio Geologico d'Italia. – Boll. Serv. Geol. d'Italia, **102** (1981), 199–224, Pls. 1–7, Roma.
- HAAS, H. (1885): Étude monographique et critique des Brachiopodes rhétiens et jurassiques des Alpes Vaudoises et des contrées environnantes. – Mém. Soc. Paléont. Suisse, **11**, 1–66, Pls. 1–4, Bâle – Genève.
- HAAS, O. (1912): Die Fauna des mittleren Lias von Ballino in Südtirol. 1. Teil. – Beitr. Paläont. Geol. Österr.-Ung. Oriens, **25**, 223–285, Pls. 19–20, Wien – Leipzig.
- HAHN, F.F. (1911): Neue Funde in nordalpinem Lias der Achenseegegend und bei Ehrwald. – N. Jb. Min. Geol. Pal., B.-B., **32**, 535–576, Pls. 20–21, Stuttgart.
- HAUER, F. von (1852): Vorlage von Fossilien von der Dürrn- und Klaus-Alpe bei Hallstatt. – Jb. k.k. geol. Reichsanst., **3/XVI**, 184–186, Wien.
- IÑESTA, M. (1988): Braquiópodos liasicos del Cerro de la Cruz (La Romana, prov. Alicante, España). – Mediterránea, ser. geol., **7**, 46–64, Pls. 1–2, Alicante.
- KAMYSCHAN, V.P. & BABANOVA, L.I. (1973): Middle and Late Jurassic brachiopods of the SW Caucasus and the mountainous Crimea. – 173 pp., Pls. 1–18, Univ. Kharkov (in Russ.).
- KRYSSTYN, L. (1971): Stratigraphie, Fauna und Fazies der Klaus-Schichten (Aalenium–Oxford) in den Östlichen Nordalpen. – Verh. Geol. B.-A., **1971/3**, 486–509, Pls. 1–3, Wien.
- LEPSIUS, R. (1878): Das westliche Süd-Tirol, geologisch dargestellt. – 375 p., 10 Pls., Berlin (non vidi).
- LOBITZER, H., BODROGI, I., FILACZ, E., HLADÍKOVÁ, J., KRISTAN-TOLLMANN, E., PIROS, O., RAKÚS, M., RONIEWICZ, E., SIBLÍK, M., SZABÓ, J. & VÖRÖS, A. (1994): Mesozoic of Northern Calcareous Alps of Salzburg and Salzkammergut area, Austria. – Shallow Tethys, **4**, guidebook, 1–32, Pls. 1–12, Albrechtsberg.
- MANCEÑO, M.O. (1993): Early Jurassic brachiopods from Greece: A review. – In PÁLFY, J. & VÖRÖS, A. (Eds.): Mesozoic Brachiopods of Alpine Europe, 79–100, Pls. 1–2, Budapest.
- MANCEÑO, M.O., OWEN, E.F., SUN DONG-LI & DAGYS, A.S. (2002): Superfamily Hemithiridoidea. – Treatise on Invertebrate Paleontology, vol. H Brachiopoda, revised, 1326–1369, Geol. Soc. America, Inc. and University of Kansas.
- MÍŠÍK, M., SIBLÍK, M., ŠYKORA, M. & AUBRECHT, R. (1994): Jurassic brachiopods and sedimentological study of the Babiná Klippe near Bohunice (Czorsztyn Unit, Pieniny Klippen Belt). – Miner. slov., **26**, 255–266, Pls. 1–4, Bratislava.
- OPPEL, A. (1861): Über die Brachiopoden des untern Lias. – Zeitschr. deutsch. geol. Ges., **13**, 529–550, Pls. 10–13, Berlin.
- OPPEL, A. (1863): Ueber das Vorkommen von jurassischen Posidonomyen-Gesteinen in den Alpen. – Zeitschr. deutsch. geol. Ges., **15**, 188–216, Pls. 5–7, Berlin.
- ORMÓS, E. (1937): Die Brachiopoden-Fauna der unteren Lias in Kékhegy (Bakonyerwald). – Abh. miner.-geol. Inst. St. Tisza Univ., **9**, 1–45, Pl. 1, Debrecen.
- PARONA, C.F. (1880): I fossili degli strati a *Posidonomya alpina* di Campovere nei Sette Comuni. – Atti Soc. ital. Sc. natur., **23**, 244–276, 1 Pl., Milano.

- PARONA, C.F. (1896): Nuove osservazioni sopra la fauna e l'età degli strati con *Posidonomya alpina* nei Sette Comuni. – Paleont. Ital., Mem. Paleont., **1** (1895), 1–42, Pls. 1–2, Pisa.
- PEVNÝ, J. (1964): On brachiopods from northern Little Carpathians. – Geol. Práce, Zpr., **33**, 157–172, Pls. 4–6, Bratislava (in Slovak).
- PEVNÝ, J. (1966): Liassic Brachiopoda from the Mountains Čachtické pohorie, West Slovakia. – Geol. Sbor., **17**, 271–282, Pls. 11–12, Bratislava.
- POINTINGHER, D. (1959): I Brachiopodi di M. Najarda nelle Prealpi Carniche (Lias–Dogger). – Atti Ist. Ven. Sc. Lett. Arti, **117**, 77–109, Pls. 1–2, Venezia.
- POZZA, G.C. (2001): An answer to the proposal of synonymy *Spiriferina* D'Orbigny, 1847 (= *Liospiriferina* Rousselle, 1977) and *Calyptoria* Cooper, 1989 (= *Cingolospiriferina* Pozza, 1992) in J.L. Carter et al., 1994. – Revue Paléobiol., **20** (1), 1–7, Genève.
- QUENSTEDT, F.A. (1852): Handbuch der Petrefaktenkunde. – 755 p., 62 Pls., Tübingen.
- QUENSTEDT, F.A. (1858): Der Jura. – 842 p., 100 Pls., Tübingen.
- RADULOVIĆ, V. & RABRENOVIĆ, D. (1993): Brachiopods from the “Klaus Beds” of the Yugoslavian Carpatho-Balkanides. – In: PÁLFY, J. & VÖRÖS, A. (Eds.): Mesozoic Brachiopods of Alpine Europe, 13–126, Pls. 1–2, Budapest.
- ROTHPLETZ, A. (1886): Geologisch-palaeontologische Monographie der Vilser Alpen mit besonderer Berücksichtigung der Brachiopoden-Systematik. – Palaeontographica, **33**, 1–180, Pls. 1–17, Stuttgart.
- SCHÄFFER, G. (1976): Einführung zur geologischen Karte der Republik Österreich. Blatt 96 Bad Ischl. – In: GATTINGER, T., SCHÄFFER, G., HUSEN VAN, D. & DRAXLER, I. (Eds.): Arbeitstagung der GBA 1976 Bad Ischl, 6–26, Bad Ischl.
- SCHÄFFER, G. (1982): Geologische Karte der Republik Österreich 1 : 50 000 ÖK 96 Bad Ischl. – Geol. B.-A., Wien.
- SHI, X.-Y. & GRANT, R.E. (1993): Jurassic Rhynchonellids: Internal Structures and Taxonomic Revisions. – Smiths. Contrib. Paleobiol., **73**, 1–190, Pls. 1–18, Washington.
- SIBLÍK, M. (1964): Liassic brachiopods from the upper part of the Belá Valley (Belanská dolina) in the Velká Fatra Mts. – Geol. Práce, Zpr., **31**, 157–181, Pls. 7–8, Bratislava (in Czech, Engl. summ.).
- SIBLÍK, M. (1966): The Brachiopods of the Kostelec-Klippe. – Geol. Práce, Zpr., **38**, 137–157, Pls. 1–4, Bratislava (in Czech).
- SIBLÍK, M. (1993): Review of the Early Liassic brachiopods of the Northern Calcareous Alps. – In: PÁLFY, J. & VÖRÖS, A. (Eds.): Mesozoic Brachiopods of Alpine Europe, 127–132, Pls. 1–2, Budapest.
- SIBLÍK, M. (1993a): Lower Liassic Brachiopods from the Steinplatte-Kammerköhralm area near Waidring (Northern Calcareous Alps, Salzburg). – Jb. Geol. B.-A., **136**, 965–982, Pls. 1–2, Wien.
- SIBLÍK, M. (1999): New data on the Hettangian brachiopod fauna of the Northern Calcareous Alps (Austria, Bavaria). – Abh. Geol. B.-A., **56/2**, 419–438, Pls. 1–4, Wien.
- SIBLÍK, M. (2002): Liassic Brachiopods of the Northern Calcareous Alps and their Generic Attributions. – Anz., Abt. I, Österr. Akad. Wiss., **136** (2001), 3–17, Wien.
- SIBLÍK, M. & LOBITZER, H. (2003): The Brachiopod Fauna of the Adnet Limestone at its Type Locality (Adnet, Austria). – Jb. Geol. B.-A., **143**, 73–77, Wien.
- SIMONY, F. (1850): Bericht über die Arbeiten der Sektion V. – Jb. Geol. Reichsanst., **1** (4), 651–657, Wien.
- SPENGLER, E. & PIA, J. VON (1924): Geologischer Führer durch die Salzburger Alpen und das Salzkammergut. – Sammlung geol. Führer, **26**, X+152 p., 17 Fig., 10 Pl., Berlin (Borntraeger).
- Suess, E. (1852): Ueber die Brachiopoden der Hierlatzer-Schichten. – Jb. Geol. Reichsanst., **3**, p. 171, Wien.
- SULSER, H. (1993): Rhynchonellida mesozoica. – Fossilium Catalogus. I. Animalia (edit. Westfal, F.), **132**, 281 p., Amsterdam, New York (Kugler Publ.).
- SULSER, H. (1999): Die fossilen Brachiopoden der Schweiz und der angrenzenden Gebiete. Juragebirge und Alpen. – Paläont. Inst. Mus. Univ. Zürich, 1–315, Zürich.
- SULSER, H. & FURRER, H. (2005): Die Brachiopoden des südalpinen Lias von Arzo (Kt. Tessin, Schweiz) – Taxonomie und Stratigraphie. – Geol. Insubr., **8/1**, 1–52, Figs. 1–32, Morbio Inf.
- TCHORSZHEVSKY, E.S. & RADULOVIĆ, V. (1984): New data of Middle Jurassic terebratulids (Brachiopoda) of the Carpathians (USSR) and Carpatho-Balkanides (Yugoslavia). – Geološki anali Balk. Pol., **48**, 129–184, Pl. 1–5, Beograd (in Serb., Engl. summ.).
- TOLLMANN, A. (1960): Die Hallstätterzone des östlichen Salzkammergutes und ihr Rahmen. – Jb. Geol. B.-A., **103**, 37–131, Pls. 2–5; Pl. 2: Geologische Karte des steirischen Salzkammergutes zwischen Aussee und Grimming 1 : 25 000, Wien.
- TOMAŠOVÝCH, A. (2006): A new Early Jurassic rhynchonellid brachiopod from the Western Tethys and implications for systematics of rhynchonellids from the Triassic-Jurassic boundary. – J. Paleont., **80** (2), 212–228, Figs. 1–12, Lawrence, Kansas.
- TRAUTH, F. (1922): Ueber die Stellung der „pieninischen Klippenzone“ und die Entwicklung des Jura in den niederösterreichischen Voralpen. – Mitteil. Geol. Ges. Wien, **14** (1921), 105–264, Pls. 3–4, Wien.
- UCHMAN, A. & TCHOUMATCHENCO, P. (1994): Remarks on the stratigraphy and brachiopod palaeobiogeography in the Lower Jurassic Hierlatz type limestone facies: the Choč unit, Central Western Carpathians. – Geol. Carp., **45**, 195–202, Pl. 1, Bratislava.
- UHLIG, V. (1880): Über die liassische Brachiopodenfauna von Sospirolo bei Belluno. – Sitzungsber. Akad. Wiss., **80** (1879), 259–310, Pls. 1–5, Wien.
- UHLIG, V. (1900): Über eine unterliassische Fauna aus der Bukowina. – Abh. Deutsch. naturwiss.-mediz. Ver. Böhmen „Lotos“, **2**, 1–31, 1 Pl., Prag.
- UROŠEVIĆ, D. & RADULOVIĆ, V. (1990): The Uppermost Rhaetian – Lower Liassic continental terrigenous Senokos Fm. in the Yugoslavian Carpatho-Balkanides (Stara Planina Mts). – Geol. Paläont. Mitt. Innsbruck, **17**, 25–30, Innsbruck.
- VACEK, M. (1886): Über die Fauna der Oolithe von Cap. S. Vigilio, verbunden mit einer Studie über die obere Liasgrenze. – Abh. k. k. geol. Reichsanst., **12**, 57–212, Pl. 1–20, Wien.
- VÖRÖS, A. (1983): Some new genera of Brachiopoda from the Mediterranean Jurassic. – Ann. hist.-nat. Mus. Hung., **75**, 5–25, Budapest.
- VÖRÖS, A. (1995): Bathonian brachiopods of the Mecsek Mts. (Hungary). – Ann. Univ. Sci. Budap., Sect. geol., **30**, 181–208, Pls. 1–2, Budapest.
- VÖRÖS, A. (1997): Jurassic brachiopods of Hungary. – Studia natur., **11**, 1–110, Budapest (in Hung., Engl. summary).
- VÖRÖS, A. (2001): Bajocian and Bathonian brachiopods in Hungary: a review. – Hantkeniana, **3**, 177–182, Budapest.
- VÖRÖS, A., SZABÓ, J., DULAI, A., EBLI, O. & LOBITZER, H. (2003): Early Jurassic fauna and facies of the Schafberg area (Salzkammergut, Austria). – Fragm. Palaeont. Hung., **21**, 51–82, Pls. 1–8, Budapest.
- WIERZBOWSKI, A., JAWORSKA, M. & KROBICKI, M. (1999): Jurassic (Upper Bajocian – lowest Oxfordian) ammonitico rosso facies in the Pieniny Klippen Belt, Carpathians, Poland: its fauna, age, microfacies and sedimentary environment. – Studia geol. Pol., **115**, 7–74, Pls. 1–23, Kraków.
- ZITTEL, K.A. (1868): Paläontologische Notizen über Lias-, Jura- und Kreide-Schichten in den bayerischen und österreichischen Alpen. – Jb. k.k. geol. Reichsanst., **18**, 599–610, Wien.
- ZITTEL, K.A. (1869): Geologische Beobachtungen aus den Central-Apenninen. – Benecke Geogn.-Paläont. Beitr., **2**, 2, 91–176, Pls. 13–15, München.