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

MILOŠ SIBLÍK*)
With a contribution by HARALD LOBITZER**) 7 Text-Figures, 5 Plates

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
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
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. TOLLIMANN (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. TOLLMANN (1960) described this special facies development as “crinoid limestones of the Klauskalk Formation”.

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 species are more or less decorticated and in many cases fragmentary. Rhynchochelids 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 undetereminate. 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. 3: 47-32-433, 13-36-590
Loc. 4: 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 paoli* (locality 5, 12)
- *Apringia deltoidea* (12)
- *Jakubirhynchia latifrons* (4, 2 cf.
- *Prionorhynchia frasii* (12, 13)
- *Prionorhynchia greppini* (5, 7)
- *Prionorhynchia palmata* (7)
- *Prionorhynchia flavibellum* (3, 5, 7, 12)
- *Prionorhynchia conf. forticostata* (7)
- *Prionorhynchia cf. pseudoscheerina* (7)
- *Calcithyris plicatissima* (2, 4, 7, 12, 13)
- *Calcithyris (?) 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. canaveae (7)
- “Rhynchonella” cf. latisisma (7)
- Homoeorhynchia (?) prona (3, 12)
- Cuneirhynchia canteri (2, 7, 12)
- Cuneirhynchia retusifrons (7, 12, 13)
- Psirhynchia inversa (3, 4, 5)
- Psirhynchia pioseides (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 breviolus (2)
- Liospiriferina aff. globosa (2)
- Liospiriferina aff. gryphioidea (7)
- Liospiriferina obtusa (4, 7, 12, 13)
- Liospiriferina aff. obtusa (2, 13)
- Liospiriferina sicula (7)
- Lobothryis andleri (2, 12, 13)
- Lobothryis punctata (3, 7, 12)
- Rhipidothyris (?) beyrichi (7)
- Linguithyris aspasia (5, 7)
- Zeilleria alpina (12, 13)
- Zeilleria baldaacci (12)
- Zeilleria choffati (2, 3, 12)
- Zeilleria livingstonei (3, 12, 13)
- Zeilleria mutabilis (2, 3, 5, 12, 13)
- Zeilleria stipa (12, 13)
- Zeilleria thunwieseri (4)
- Zeilleria venusta (5 cf., 12, 13)
- Bakonyithyris apenninica (7, 12)
- Bakonyithyris aff. apenninica (7)
- Bakonyithyris (?) engelhardtii (13)
- Bakonyithyris ewaldii (5, 7, 12, 13)
- Bakonyithyris sp. (7)
- Secunia 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 rhynchochelids (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-
Apringia paolii (CANAVARI, 1880)

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. 11/50105 12.0/50105 7.1 mm and cca. 10/50105 12.5/50105 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.).

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

2. Descriptions

Apringia paolii (CANAVARI, 1880)

1880 Rhynchonella Paolii, nov. form. – CANAVARI, p. 69, Pl. 1, Fig. 1.

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

Apringia deltoidea (CANAVARI, 1880)

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

Material: 1 specimen with dimensions 11.0 x 10.6 x 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)

2003 Apringia atla (OPPEL) – BENIGNY in BENIGNY et al., p. 59, Pl. 2, Fig. 2, Text-Fig. 10 (cum syn.).

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 prefalci-fere [= hamiform] crura.

Remarks: A certain similarity between Rhynchonella atla and Rhynchonella coarctata (above all a very variable shape...
of the anterior commissure) was already recognized in the original description by Oppe (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. Krystyn (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 Tomášových, 2006

*Jakubirhynchia latifrons* (Stur in Geyer, 1889)

1889 Rhynchonella latifrons Stur. m. s. – Geyer, p. 54, Pl. 6, Fig. 25–31.

2003 Cirpa latifrons (Stur in Geyer) – Dulaí, p. 18, Pl. 2, Fig. 4–10 (cum syn.).

2006 Jakubirhynchia latifrons (Geyer) new combination – Tomášových, 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 Dulaí (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 Dulaí (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 Tomášových (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 Calcarhynchia (?) plicatissima or Calcarhynchia (?) cf. plicatissima by Siblik (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 Calcarhynchia.

**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 (Tomášových, 2006) and from Hungary (Dulaí in Vörös et al., 2003).

**Genus:** Stolmorhynchia Buckman, 1918

*Stolmorhynchia aff. vigilii* (Leipsius, 1878)

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

aff. 1886 Rhynchonella Vigilii Leipsius – 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 Roussel, 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 subcynocephalous brachial valve.

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

**Age:** Stolmorhynchia vigilii was described by Leipsius (1878) from Capo S. Vigilio in Northern Italy and has been reported from the Upper Toarcian–Aalenian.
Genus: *Septocrurella* Wisniewska, 1932

*Septocrurella* (?) *defluxa* (OPPEL, 1863)  
(Pl. 5, Fig. 6)

1863 *Rhynchonella* defluxa OPP. – OPP. 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 (2 spec.), loc. 11 (1 spec.) and loc. 14 (1 spec.).

Age: Bajocian–Bathonian.

Genus: *Cuneirhynchia* LICHAREW, 1956

Family: *Prionorhynchidae* MANCEÑIDO & OWEN, 2002

Genus: *Prionorhynchia* BUCKMAN, 1918

*Prionorhynchia* *fraasi* (OPPEL, 1861)  
(Pl. 1, Fig. 6; Pl. 3, Fig. 1)

1861 *Rhynchonella* *Fraasi* OPP. – OPP. p. 543, Pl. 12, Fig. 3.
1861 *Rhynchonella* *polyptycha* OPP. – OPP. p. 544, Pl. 12, Fig. 4.
1999 *Prionorhynchia* *fraasi* (OPPEL) – SIBLIK 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.).

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 SIBLIK in BÖHM et al., 1999). The specimen figured by HAHN (1911) differs from *‘polyptycha’* in thinner valves and a different 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. – OPP. 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 SIBLIK in BÖHM et al. (1999, p. 197).

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


*Prionorhynchia palmata* (OPPEL, 1861)  
(Pl. 3, Fig. 4)

1861 *Rhynchonella* *Greppini* OPP. var. *palmata* – OPP. p. 545, Pl. 13, Fig 2.
1880 *Rhynchonella* *palmata* OPP. – 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  
(MENEGHINI 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* (MENEGHINI in GEMMELLARO) – DULAI in VÖRÖS et al., p. 70, Pl. 6, Fig. 1–3.
2005 *Prionorhynchia* cf. *flabellum* (MENEGHINI in GEMMELLARO) – SULSER & FURRER, p. 19, Fig. 12a.

Material: 20 specimens. The biggest one measures 714 × 716 × 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 uniplation. Shalllow 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 x 17.5 x 8.6 mm, which is here determined as Prionorhynchia aff. flabellum. It differs from the other material in having stronger beak, higher uniplation and flattening only on the flanks. Sharper ribs of the specimen figured by Dulai in Voros et al. (2003) refer rather to Prionorhynchia greppini (OppeL).

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

Age: The species is reported from the Middle Liassic.

Prionorhynchia cf. forticostata (BöckH, 1874)
cf. 1874 Rhyhconella forticostata n. sp. – BöckH, p. 165, Pl. 4, Fig. 1–3.

Material: 1 anteriorly damaged specimen with dimensions: 16.0 x 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 umbo. The specimen shows considerable resemblances to Rhyhconella 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 uniplation. 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 and Tata Mts. in Hungary.

Prionorhynchia cf. pseudoscherina (Böse, 1879)
cf. 1897 Rhyhconella pseudo-scherina nov. sp. – Böse, p. 198, Pl. 14, Fig. 13–14.
cf. 2003 Prionorhynchia pseudoscherina (Böse, 1898) – Dulai in Vorós 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 (Vorós, 1997) and recently at Schafberg (Dulai in Vorós et al., 2003).

Genus: Cirpa Di Gregorio, 1930

Cirpa planifrons (ORMOS, 1937)
(Pl. 1, Fig. 9, 1; Text-Fig. 5)

1937 Rhyhconella planifrons nov. sp. – ORmos, p. 35, 41, Pl. 1, Fig. 19.
1993a Cirpa planifrons (ORMOS) – Siblik, p. 967, Pl. 1, Fig. 1–3; Text-Fig. 3.
2003 Cirpa planifrons (ORMos) – Dulai in Vorós et al., p. 70, Pl. 6, Fig. 19–20.

Superfamily: Wellerelloidea LICHAREW, 1959

Family: Wellerellidae LICHAREW, 1959

Genus: Calcirhynchia Buckman, 1918

Carcirhynchia plicatissima (Quenstedt, 1852)
(Pl. 1, Fig. 4; Pl. 2, Fig. 2)

1852 Terebratula plicatissima – Quenstedt, p. 451, Pl. 36, Fig. 3.
1999 Carcirhynchia plicatissima (Quenstedt) – Sulser, p. 55, 1 Fig.
2003 Carcirhynchia 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 x 17.1 x 10.1 mm and the figured ones 12.9 x 14.4 x 8.8 mm (Pl. 1, Fig. 4) and 12.7 x 13.8 x 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 specimen), loc. 7 (27 specimens), loc. 12 (7 specimens) and loc. 13 (1 specimen).


Carcirhynchia (?) laevicosta
(Stur in Geyer, 1889)

1889 Rhyhconella laevicosta nov. sp. Stur m. s. – Geyer, p. 66, Pl. 7, Fig. 20–21.
1893 Rhyhconella laevicosta Stur. m. s. – Böse, p. 644, Pl. 15, Fig. 1.

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

Remarks: There are not so many Lower Liassic rhynchonellids with faint ribs. Our specimens show considerable resemblances to Carcirhynchia (?) laevicosta and Carcirhynchia (?) matyaszovskii (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 specimen).

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 (Vorós, 1997).
Material: 13 specimens. The biggest specimen measures 17.0 x 16.2 x 10.0 mm, the figured one 11.8 x 12.6 x 8.4 mm.

Remarks: Typical flattening of anterior margin is well developed in all specimens. The sections show typical characters of Cirpa: double deltoidal 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)

aff. 1878 Rhynchonella subcostellata, Gemm. – Gemmellaro, p. 422, PI. 31, Fig. 75–78.

aff. 2003 Cirpa subcostellata (Gemmellaro) – DULAI in VÖRÖS et al., p. 70.

Material: 1 specimen measuring 11.8 x 12.9 x 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)

(PI. 1, Fig. 2)

1861 Rhynchonella Albertii Opp. – OPPEL, p. 546, PI. 13, Fig. 1, 2, 3, 4, 5, Figs. 14–17.

1889 Rhynchonella Albertii Opp. – GEYER, p. 43, PI. 5, Figs. 1–2.

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

Material: 2 specimens. They measure 17.0 x 21.0 x 11.6 mm (figured) and cca. 17 x 19.5 x 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

Family: Rhynchonellidae

Genus: Rhynchonella FISCHER, 1809: s.l.

"Rhynchonella" hagaviensis BÖSE, 1897

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

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

2003 Pronorhynchia ? hagaviensis (BÖSE, 1898) – VÖRÖS in VÖRÖS et al., p. 78, Fig. 13–14.

2003 Pronorhynchia ? 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 x 7.3 x 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 pllications 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 SIPLIC (2002). Recently, DULAI and VÖRÖS (both in VÖRÖS et al., 2003) attributed the species under consideration to Pronorhynchia? 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. belemnatica (Quenstedt, 1858)

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

non 1858 Terebratula belemnita – Quenstedt, p. 73, PI. 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...
figured ones measure 14.4 × 16.5 × 8.9 mm (Pl. 1, Fig. 3) and 14.2 × 16.7 × 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 deltoidal plates in some specimens. Hinge teeth straight and strongly crenulated. Sockets large, crenulated. Thick subhorizontal hinge plates 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 belemnitica* (QUENSTEDT), which was sometimes referred to *Squamirhynchia BUCKMAN*. Topotypical material of "belemnitica" from Germany was sectioned and studied by SHI & GRANT (1993) and its internal characters (esp. absent septalium and dorsal septum) documented the appurtenance of "belemnitica" to *Prionothyridia*. Very detailed discussion on this rhynchonellid group was already given by GEYER (1889) who included "belemnitica" into synonymy of the catch-all species *Rhynchonella variabilis* (SCHLOTHEIM). Similar synonyms were dealt with quite recently by SULSER & FURRER (2005, p. 15) under remarks to *Prionothyridia calderini* (PARONA). Genera, which include species externally similar to our material, are e.g. *Cirpa DE GREGORIO*, *Rudirhynchia BUCKMAN*, *Prionothyridia BUCKMAN*, *Squamirhynchia BUCKMAN* and *Mediterranirhynchia SUCIĆ-PROTTIC* (this genus was included into synonymy of *Rudirhynchia* by MANCEÑIDO 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. caneva* DAL PIAZ, 1907

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

**Material:** 2 incomplete specimens. The better preserved one measures 11.4 × 7 × 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" canevaes DAL Piaz. However, our specimens cannot be ascribed definitely to "Rhynchonella" canevaes because they differ substantially from it in a much narrower beak.

Occurrence: Locality 7.
Age: "Rhynchonella" canevaes was described from the Middle Liassic of Sospirolo in Italy and assigned to Rudirhynchia? by Sulser (1993, p. 32).

"Rhynchonella" aff. etalloni (OPPEL, 1863)
(PI. 2, Fig. 8; PI. 5, Fig. 7, 10)
aff. 1863 Rhynchonella Etalloni OPP. – OPPEL, p. 212, PI. 6, Fig. 11.
Material: 7 more or less damaged specimens with both valves and 11 fragments of single valves. The figured specimens measure 711.0 x 11.4 x 6.6 mm (PI. 5, Fig. 7), 10.2 x 8.0 x 6.4 mm (PI. 5, Fig. 10) and 9.1 x 10.6 x 6.9 mm (PI. 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. latisima (FUCINI, 1895)
cf. 1894 Rhynchonella latisima n. sp. – FUCINI, p. 58, PI. 7, Fig. 5.
Material: 1 fragmentary specimen with dimensions 723 x 132 x 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" latisima was described from the Lower Liassic.

Genus: Homoeorhynchia BUCKMAN, 1918
Homoeorhynchia (?) prona (OPPEL, 1861)
(PI. 1, Fig. 5)
1861 Rhynchonella prona OPP. – OPPEL, p. 547, PI. 13, Fig. 7.
1866 "Rhynchonella" prona OPPEL – PEVNY, p. 277.
2003 Homoeorhynchia ? prona (OPPEL) – DULAI, p. 31, PI. 5, Fig. 11–13 (cum syn.).
Material: 5 specimens. The biggest one measures 13.0 x 15.1 x 7.6 mm. The figured specimen has dimensions 13.0 x 13.8 x 7.4 mm.
Remarks: The specimens correspond well to Geyer’s specimen from Hierlatz figured by him (1889) on PI. 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)
(PI. 3, Fig. 2)
1863 Rhynchonella Brentoniaca OPP. – OPPEL, p. 215, PI. 7, Fig. 12–14.
1896 Rhynchonella brentoniaca OPP. – PARONA, p. 35, PI. 2, Fig. 27–28.
1973 Capillirhynchia Paronaui KAMYSCHAN, nom. nov. – KAMYSCHAN in KAMYSCHAN & BABANOVA, p. 99, PI. 11, Fig. 10–11.
1982 Rhynchonelloidella brentoniaca (OPPEL) – BENIGNY in BENIGNY et al., p. 63, PI. 2, Fig. 4 (cum syn.).
1995 Capillirhynchia brentoniaca (OPPEL) – VÖRÖS, p. 190, Text-Fig. 4, PI. 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 7120.0 x 13.0 x 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 prefractiferous (= 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 OPPEL (1896) in PI. 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.

Genus: Striirhynchia BUCKMAN, 1918
Striirhynchia berchta (OPPEL, 1863)
(PI. 5, Fig. 2)
1863 Rhynchonella Berchta OPP. – OPPEL, p. 207, PI. 5, Fig. 7–8 (non Fig. 9 var. microptycha).
1884 Rhynchonella Berchta, OPP. – Di-STEFANO, p. 9, PI. 1, Fig. 1–4.
1964 "Rhynchonella" berchta OPPEL – PEVNY, p. 166, PI. 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.

Genus: Cuneirhynchia BUCKMAN, 1918

Cuneirhynchia cartieri (OPPEL, 1861)

(Pl. 1, Fig. 8; Pl. 2, Fig. 4–5)

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 79.8 × 10.4 × 8.2 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.
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 Dulaí (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.

Pisirhynchia inversa (OPPEL, 1861)

(Pl. 2, Fig. 7)

1861 Rhyynchonella 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).


Pisirhynchia pisoides (ZITTEL, 1869)

1869 Rhyynchonella pisoides ZIT., – 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–Plälsbachian. The species was described by ZITTEL from the Middle Liassic of the Apenines. It is known also from the Sinemurian of the Transdanubian Central Range in Hungary (Dulaí, 2003).

Order: Athyrvidida 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 × 7.70 × 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 Liospiriferina 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) – SIBILK in BÖHM et al., p. 200, Pl. 30, Fig. 10.
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 a 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 SÍBLÍK in BÖHM et al. (1999). The resemblance of the Adnet specimen to Liospiriferina aequiliblobata 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 Rumanian East Carpathians. Its presence in the collections of the GBA in Vienna was not confirmed recently (M. SÍBLÍK, 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.
1977 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 – INÉS-TA, p. 55, Pl. 1, Fig. 1.
1993 Spiriferina alpina OPPEL – MANCEÑIDO, 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 SÍBLÍK, 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 with 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 brevirostris (OPPEL, 1861)

1861 Spiriferina brevirostris OPP. – OPPEL, p. 541, Pl. 11, Fig. 6.
1889 Spiriferina brevirostris OPP. – GEYER, p. 73, Pl. 8, Fig. 9–12.
1895 Spiriferina brevirostris OPP. – FUCINI, p. 154 (in reprint p. 32), Pl. 6, Fig. 5 (cum syn.).
1992 Liospiriferina cf. brevirostris (OPPEL) – DULAI, p. 62, Pl. 3, Fig. 5, Text-Fig. 20.
2003 Liospiriferina brevirostris (OPPEL) – DULAI in VÖRÖS et al., p. 74, Pl. 7, Fig. 4–6.
2003 Liospiriferina cf. brevirostris (OPPEL) – DULAI, p. 55, Pl. 9, Fig. 1–3.
2007 Liospiriferina brevirostris (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 Kramesach (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, p. 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 gyrophoidea comes from the Pliensbachian of Sospirolo (Italy). It is known also from the Sinemurian (Mondsee-Eibenberg and Hungary [DULAI, 2003]).

Liosspiriferina obtusa (OPPEL, 1861)  
(PI. 4, Fig. 3)  
1861 Spiriferia obtusa OPP. — OPPEL, p. 542, PI. 11, Fig. 8.  
? non 1988 Liosspiriferina obtusa (OPPEL) — IESTA, p. 55, PI. 1, Fig. 2.  
1993 Liospiriferina obtusa OPP. — MANCENDIO, p. 88 (cum sym.).  
2003 Liosspiriferina obtusa (OPPEL) — DULAI, p. 60, PI. 10, Fig. 1–3 (cum sym.).  
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 VIALLE & CANTALUPPI (1967, PI. 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 9 (4 specimens), loc. 7 (9 spec.), loc.12 (47 spec.), and loc. 13 (20 spec.).

Age: Early Sinemurian – ? Domerian.

Liosspiriferina aff. obtusa (OPPEL, 1861)  
1992 Liosspiriferina aff. obtusa (OPPEL) — DULAI, p. 57, PI. 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 specimens figured and accompanied with the detailed description by DULAI (1992), and differ from Liosspiriferina obtusa in their subrectangular outline and longer hinge line with subangular cardinal extremities.

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

Liosspiriferina sicula (GEMMELLARO, 1874)  
(PI. 3, Fig. 6)  
1874 Spiriferina Sicula, GEM. — GEMMELLARO, p. 55, PI. 10, Fig. 5.  
2003 Liosspiriferina sicula (GEMMELLARO) — DULAI, p. 64, PI. 11, Fig. 4–6 (cum sym.).  
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 PI. 8, Fig. 26–28.

Liosspiriferina sicula belongs indubitably to the obtusa plexus, and some very similar variants of Liosspiriferina 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: Terebratuloidae GRAY, 1840  
Family: Terebratulidae GRAY, 1840  
Genus: Terebratula MÜLLER, 1776; s.l.

Terebratula fylgia OPPEL, 1863  
(PI. 5, Fig. 5)  
1863 Terebratula Fylgia OPP. — OPPEL, p. 205, PI. 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 sinuation 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: Loboidothyridioidea MAKRIDIN, 1964  
Family: Lobothyrididae MAKRIDIN, 1964  
Genus: Lobothyris BUCKMAN, 1918

Lobothyris andleri (OPPEL, 1861)  
(PI. 4, Fig. 2, 8)  
1861 Terebratula Andleri OPP. — OPPEL, p. 536, PI. 10, Fig. 4.  
2003 Lobothyris andleri (OPPEL) — DULAI, p. 69, PI. 10, Fig. 5–7, Text-Fig. 10 (cum sym.).

Material: 43 specimens. The figured specimens measure: 21.0 × 17.8 × 12.0 mm (PI. 4, Fig. 2) and 26.6 × 21.6 × 14.4 mm (PI. 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 PI. 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: Localities 2 (3 specimens), loc. 12 (35 spec.) and loc. 13 (5 spec.).

Age: Hettangian–Sinemurian.
**Genus: Lobothyris**

**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.).

**Remarks:** Our specimen corresponds well to the figures of *Terebratula gerda*.

**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 Agér (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 7 (2 specimens), loc. 7 (1 spec.) and loc. 12 (1 spec.).

**Age:** Hettangian (?) – Sinemurian. The species is also reported from many Lower Liassic localities (Dulai, 2003).

**Genus: Rhaphidothyris** Tuluweit, 1965

**Raphidothyris (?) beyrichi** (OppeL, 1861)

1861 *Terebratula Beyrichi* Opp. (Waldeimia ?) – Oppel, p. 539, Pl. 11, Fig. 3.
1999 *Linguithyris beyrichi* (OPPEL) – Siblik in Böhm et al., p. 201, Pl. 30, Fig. 9 (cum syn.).
non 2003 *Raphidothyris ? cf. beyrichi* (OPPEL) – Dulai, p. 81, Pl. 20, Fig. 1–2 (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 (Siblik, 1964) and from the Vértes, Pilis and Bakony Mts. in Hungary (Vörös, 1997).

**Family:** Muirwoodellidae

**Genus:** Karadagithyris Tchorschhevsky, 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) – Ferrapi, p. 133, Fig. 2 (cum syn.).
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.

**Remarks:** Our material contains except 5 characteristic, relative 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 is 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

**Family:** Nucleitidae 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) – Siblik in Siblik & 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) – Siblik in Siblik et al., p. 261, Pl. 4, Fig. 3 (cum syn.).
1999 *Linguithyris curviconcha* (OPPEL) – Krôbick in Wierzbowski et al., p. 69, 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 species 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 other species.
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.

**Zeilleria alpina** (GEYER, 1889)

**Remarks:** Our specimens may remind one of several Middle Jurassic *Terebratulidae* described in literature, like L. pteroconcha (GEMM.), L. bifida (Rothpl.), L. nepos (Can.) and L. Gemmellaro (DI-STEF.) (cf. 1884) – DULAI in VÖRÖS et al., p. 76. (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*

**Superfamily:** *Zeillerioidea*

**Family:** *Zeilleriidae*

**Genus:** *Zeilleria*

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

1999 *Zeilleria* alpina (GEYER) – SIBLÍK, 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 (1 spec.).

**Age:** Upper Hettangian–Lower Pliensbachian.

**Zeilleria baldaccii** GEMMELLARO, 1878

**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.

**Suborder:** *Terebratellidina*

**Superfamily:** *Zeillerioidea*

**Family:** *Zeilleriidae*

**Genus:** *Zeilleria*

1878 *Zeilleria* livingstonei 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 species 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) – SIBLÍK in BOHM 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).
Remarks: Remarkable thickness and high flanks of shell.

Occurrence: Locality 5 (1 specimen cf.), 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. – GEMMELLARIO, p. 67, Pl. 10, Fig. 14.

1933a Zeilleria stapia (OPPEL) – SÍBLÍK, p. 975, Pl. 2, Fig. 2, Text-Fig. 10 (cum syn.).

1999 Zeilleria stapia (OPPEL) – SÍBLÍK 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 sub-rounded 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 15.5 × 13.5 × 7.0 mm. The specimen figured in Pl. 5, Fig. 8 differs from the average in sub-rounded anterior margin and in strongly convex pedicle valve.

Occurrence: Locality 4.

Age: The species was described by BÖSE (1897) from the Middle Liassic of Kramskach in Tyrol. It was ascertained also by one of the present authors (M. SÍBLÍK) 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: Localities 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 ZITTEL. – ZITTEL, p. 127, Pl. 14, Fig. 9.

2003 Bakonyithyris apenninica (ZITTEL) – SÍBLÍK in SÍBLÍK & LOBITZER, p. 76, Text-Fig. 3 (cum syn.).

Material: 3 partially damaged specimens. The best preserved one measures 7.12 × 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 SÍBLÍK in SÍBLÍK & 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) – SÍBLÍK in BÖHM et al., p. 203 (cum syn.).

Material: 1 slightly damaged specimen.

Remarks: Our specimen with a slight sulcation and sub-rounded anterior outline is well comparable to the specimens 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, Fig. 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: Localities 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 7.15 × 16.2 × 7.6 mm.
Description: Ventribiconvex, relatively flat shell of subcircular 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 resemblance to larger variants of the Middle Liassic Bakonyithys 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. 599.
1988 Securina partschi (OPPEL) – INESTA, 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.).

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 0Z 30139516). 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; x 2.

Fig. 2: Salgirella albenti (OPPEL).
Mitterwand, loc. 7.
GBA 2007/8/1; x 2.

Fig. 3: "Rhyconchella" aff. belemnilitca (QUENSTEDT).
Mitterwand, loc. 7.
GBA 2007/8/2; x 2.

Fig. 4: Calcirhynchia (?) picatasisima (QUENSTEDT).
Mitterwand, loc. 7.
GBA 2007/8/3; x 2.

Fig. 5: Homoeorhynchia (?) prona (OPPEL).
Mitterwand, loc. 12.
GBA 2007/7/111; x 2.

Fig. 6: Cuneirhynchia fraisii (OPPEL).
Mitterwand, loc. 13.
GBA 2007/8/4; x 2.

Fig. 7: "Rhyconchella" aff. belemnilitca (QUENSTEDT).
Mitterwand, loc. 12.
GBA 2007/8/5; x 2.

Fig. 8: Cuneirhynchia retusifrons (OPPEL).
Narrow specimen.
Mitterwand, loc. 7.
GBA 2007/8/6; x 2.

Fig. 9: Cirpa planifrons (ORMÓS).
Mitterwand, loc. 7.
GBA 2007/8/7; 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. BROZEK (Prague).
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: Pionorhynchia flabellum (MENEGHINI 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. BROZEK (Prague).
Fig. 1: *Prionorhynchia fraasi* (OPPEL).
Mitterwand, loc. 13.
GBA 2007/8/15; X 2.

Fig. 2: *Capillirhynchia brettoniaca* (OPPEL).
Mitterwand, loc. 14.
GBA 2007/8/16; X 2.

Fig. 3: *Apringia deltoides* (CANAVARI).
Mitterwand, loc. 12.
GBA 2007/8/17; X 2.

Fig. 4: *Prionorhynchia palmata* (OPPEL).
Mitterwand, loc. 7.
GBA 2007/8/18; X 2.

Fig. 5: *Zeilleria choffati* HAAS.
Klauskögler, loc. 2.
GBA 2007/8/19; X 2.

Fig. 6: *Liospiniferina sicula* (GEMMELLARO).
Mitterwand, loc. 7.
GBA 2007/8/20; X 2.

Fig. 7: *Bakonythyris ewaldi* (OPPEL).
Mitterwand, loc. 13.
GBA 2007/8/21; X 2.

Fig. 8: *Zeilleria alpina* (GEYER).
Mitterwand, loc. 12.
GBA 2007/8/22; 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. BHOZEK (Prague).
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.

Fig. 5: *Zelleria stapia* (OPPEL).
Mitterwand, loc. 12.
GBA 2007/8/26; × 2.

Fig. 6: *Zelleria baldacci* GEMMELLARO.
Mitterwand, loc. 12.

Fig. 7: *Zelleria 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. BHOZEK (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” fylgia (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. Klauskoglerl, 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. Klauskoglerl, 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. BHOZEK (Prague).


POZZA, G.C. (2001): An answer to the proposal of synonymy Spinitia


