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Nerineaceans from the Ernstbrunn Limestone (Tithonian, Austria)

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(with 2 plates and 1 table)

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Summary

The Tithonian nerineaceans *Eunerinea hoheneggeri* (PETERS), *Cryptoplocus* cf. *picteti* GEMMELLARO, *Ptygmatis pseudobruntrutana* (GEMMELLARO), *Ptygmatis carpathica* (ZEUSCHNER), *Endoplocus staszycii* (ZEUSCHNER), *Itieria globosa* FAVRE, and *Aphanotaenia strigillata* (CREDNER) are described from the Ernstbrunn Limestone of the Dörfles quarry (Waschberg Zone, Lower Austria). These species form a significant component of the diceras-coral- nerineacean assemblage typical for the shallow-water carbonate platform of the northern Tethys during Tithonian time.

Zusammenfassung

Die Nerineacea *Eunerinea hoheneggeri* (PETERS), *Cryptoplocus* cf. *picteti* GEMMELARO, *Ptygmatis pseudobruntrutana* (GEMMELARO), *Ptygmatis carpathica* (ZEUSCHNER), *Endoplocus staszycii* (ZEUSCHNER), *Itieria globosa* FAVRE, and *Aphanotaenia strigillata* (CREDNER) werden aus dem tithonen Ernstbrunner Kalk des Steinbruches von Dörfles, (Waschbergzone, Niederösterreich) beschrieben. Die Arten sind wichtige Bestandteile der Diceras-Korallen-Nerineen-Assemblages, die für die tithone Flachwasser-Plattform des Nordrandes der Tethys charakteristisch sind.

1. Introduction

The present paper provides results of a study of the nerineacean gastropods from the Tithonian deposits cropping out in the environs of Dörfles near Ernstbrunn, Lower Austria. Most of these fossils, which are housed in the Naturhistorisches Museum in Vienna, were collected by the late Dr. Friedrich BACHMAYER. Additional specimens were collected during an excursion with Dr. H. A. KOLLMANN and Mag. T. HOFFMANN.

The occurrence of nerineaceans in the Ernstbrunn area has been mentioned for about one hundred years (see GRILL 1968), but up to now these fossils have not been described. The investigated nerineacean collection from Dörfles comprises nearly a dozen species, but only the best preserved taxa are described. The description of the nerineacean assemblage from the Ernstbrunn Limestone is a contribution to our knowledge of nerineacean distribution along the northern margin of the Tethys at the end of the Jurassic period.

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2. Geological setting

The Ernstbrunn Limestone cropping out in the so-called "External Klippen" or Waschberg Zone (GLAESSNER 1931, GRILL 1968) occurs among thrust-faulted and imbricated Palaeogene and Lower Neogene (pre-Lower Badenian) complexes. The seismic and drilling data prove that these Tithonian "klippen" were detached during Alpine movements from the Mesozoic cover of the Bohemian Massif (ZIMMER & WESSELY 1996).

The Ernstbrunn Limestone, which forms a shallow-water complex of about 100 m thickness is underlain by the basinal Klentnice Formation (marls) and overlain by the Upper Cretaceous Klement Formation of green sandstones. The Ernstbrunn Limestone, which represents deposits of a carbonate platform, is very pure. It has yielded a diverse shallow-water fossil assemblage: green algae, chaetetids, corals, diceratids, nerineaceans (BACHMAYER 1961). Its age is determined by an ammonoid fauna of Middle- to Upper Tithonian (fallauxi-simplisphinctes zone, according to ZEISS & BACHMAYER 1989).

The Ernstbrunn Limestone is distinguished also on Pavlov Hills – a continuation of the Waschberg zone to the Czech Western Carpathians (ELIAS & WESSELY 1990). The facial analysis (ELIAS & ELIASOVA 1984, 1986, REHANEK 1987) proves their deposition on a carbonate platform, without continental influx. Typical reef environments are not known from the Ernstbrunn Limestone.

2. Nerineacean-bearing deposits of Dörfles

In the surroundings of Ernstbrunn, the best outcrops of nerineacean-bearing deposits are known from the Quarry Dörfles-1, situated now in the Wildpark Ernstbrunn. They have recently been studied by Thomas HOFFMANN (personal communication). The nerineaceans occur there as an important, although not dominant component of a diceras-coral-nerineacean assemblage. They occur in a diceras-dominated bank of about 1 m thickness as well as below this level. Nerineacean beds – a very common mode of Upper Jurassic nerineacean occurrence (see WIECZOREK 1979) are not known from the Ernstbrunn Limestone.

The nerineaceans are preserved mainly as moulds, or imprints with a well-visible sculpture, and more rarely as well-preserved shells. The state of their preservation suggests relatively calm to moderately agitated environmental conditions.

The nerineacean assemblages from the Ernstbrunn Limestone consist of: *Eunerinea hoheneggeri* (PETERS), *Eunerinea posthuma* (ZITTEL), *Euerinea* cf. *sculpta* (ETALLON), *Cryptoplocus* cf. *picteti* GEMMELLARO, *Cryptoplocus* sp., *Ptygmatis pseudobruntrutana* (GEMMELLARO), *Ptygmatis carpathica* (ZEUSCHNER), *Endoplocus staszycii* (ZEUSCHNER), *Endoplocus obtusiceps* (ZITTEL), *Phaneroptyxis rugifera* (ZITTEL), *Itieria globosa* FAVRE, *Aphanotaenia strigillata* (CREDNER), *Aptyxiella* (?) *rustica* FAVRE, and three species of *Diptyxis* (sensu KOLLMANN & PEZA 1997) which unfortunately are not adequately preserved. *Eunerinea hoheneggeri* and *P. pseudobruntrutana* appear to occur most frequently. *Diptyxis* specimens are also not rare. Of these taxa only those are described in this paper which are represented by well-preserved specimens in the collection.

3. Paleobiogeographic remarks on Tithonian nerineaceans

Of numerous Tithonian nerineacean-bearing localities some are situated along the southern margin of the European platform, others on the Adria (Apulia) margin and in the Vardar zone (Shumadija and Mures zones) – see Table 1 and paleogeographic reconstruction of Late Jurassic in: CHANNELL et al. (1979), FOURCADE et al. (1991). The Dörfles area was undoubtedly situated on the northern (European) margin of the Tethys.

At the present state of knowledge of the nerineacean distribution it is impossible to distinguish species typical for the European and Adria margins (see WIECZOREK 1988). The nerineaceans from the Ernstbrunn Limestone show similarities to the nerineaceans from other localities situated along the European margin, as well as from localities on the Adria margin. However, only a few of the Plassenkalk nerineaceans (?Adria margin) are present in the Ernstbrunn Limestone.

The nerineacean-bearing localities of the Vardar zone (a presumed oceanic zone at the end of the Jurassic) have some species in common with the nerineacean assemblage from Ernstbrunn Limestone.

Eunerinea hoheneggeri seems to be the most cosmopolitan species of the Ernstbrunn fauna; moreover, *Ptygmatis carpathica* and *Endoplocus staszycii* occur frequently in Alpine and Carpathian localities. However, *Aphanotaenia strigillata,* for the first time reported from the Carpatho-Alpine realm, has been known only from the European margin (Podolia: ALTH 1882; Holy Cross Mts.: WIECZOREK 1979; and Hannover area: CREDNER 1863) where they occur in slightly older deposits of Kimmeridgian age.

Taxonomic remarks

Taxonomic determinations have taken both internal structures on axial section and external morphology into account. The present paper follows the general taxonomic arrangement for the nerineaceans by PCHELINTSEV (1965) with modifications according to WIECZOREK (1979) and VAUGHAN (1988). Moreover, PCHELINTSEV's genus *Pentaptyxis* is regarded as a synonym of *Endoplocus* COX (1954). The affiliation of *Aphanoatenia* (see COSSMANN 1898) and *Itieria* (see remarks by FISCHER & WEBER 1997) to Nerineaceans is doubtful.

Terminology

The following abbreviations of biometrical indices are used:

AA – apical angle,
D – maximum shell diameter,
h/d – whorl height to whorl diameter ratio,
Hn – total height of n whorls,
n – number of whorls,
PA – pleural angle,
SA – sutural angle.

For number and distribution of the internal folds a fold formula (for example 2130) is given. In this formula, the plaits are represented by the following digits:

first number – columellar folds
second number – parietal folds
third number – labial folds
fourth number – basal folds.

EUROPEAN MARGINS								Vardar zone	ADRIA MARGINS		
Dörfles this paper	Štramberk ZITTEL, 1873 BLASCHKE, 1911	Inwald ZEUSCHNER, 1849	Kruhel WÓJCIK, 1914	Kelheim GEIGER, 1901 SCHLOSSER, 1882	M. Saleve JOUKOVSKY & FAVRE, 1914	Herault YIN, 1931	Wimmis OOSTER, 1869	HERBICH, 1886 VESELINOVIC, 1965	Plassen PETERS, 1855	Friuli PIRONA, 1876	Sicily GEMMELLARO, 1865, 1869
Eunerinea heheneggeri	+	+	+	+	+	+	+	+	+		+
Cryptoplocus cf. *picteti*											+
Diptyxis								+	+		
Ptygmatis pseudobruntrutana		+			+		+	+			
P. carpathica		+		+				+		+	+
Phaneroptyxis rugifera								+			
Endoplocus staszycii	+	+	+		+	+		+		+	+
Endoplocus obtusiceps			+					+			
Itieria globosa	+					+				+	
Aphanotaenia strigillata											

Table 1

4. Systematic part

Genus *Eunerinea* COX, 1949

Eunerinea hoheneggeri PETERS, 1855
(Plate 1, Figures 1–4, 8)

1855 *Nerinea Hoheneggeri* PETERS: 357, pl. 3, fig. 3 a–c.
1869 – GEMMELLARO: 30, pl. 5, fig. 6, 7.
1869 – OOSTER: 13, pl.5, fig. 7, 8.
1873 – ZITTEL: 369, pl. 42, fig. 8–10.
1882 – SCHLOSSER: 72, pl. 10, fig. 12.
1897 – ROMAN: 301, pl. 5, fig. 3.
1901 – GEIGER: 288.
1909 – REMES: 182.
1911 – BLASCHKE: 164.
1913 – FAVRE (in: JOUKOVSKY & FAVRE): 444, pl. 29 fig. 1–5.
1925 – DIETRICH: 53.
1931 – PCHELINTSEV: 32.
1931 – YIN: 52, pl. 4, fig. 12–17.

Material: some tens of specimens, mainly moulds and casts.

Dimensions:	n	Hn	D	h/d	PA	SA
	5	54 mm	24 mm	0.52	10	73

Description: High, elongate shell consisting of numerous concave whorls. Sutural ramps asymmetrical, ornamented. Whorl possessing 4–5 spiral ribs. Usually the spiral rib situated in the middle part of the whorls is the most distinct and unique on the first whorls. In the adult whorls, 1–2 less distinct spiral ribs are visible on the upper part and 2 more distinct spirals in the lower part. The spirals are weakly noded.

Whorl cross-section shows a fold pattern typical for *Eunerinea* (1110). The folds are simple.

Discussion: Unfortunately, the holotype from the Plassen is not present in the PETERS collection housed in the Geologische Bundesanstalt in Vienna. The main morphologic features of the shells described before are evidently diagnostic for this species which was described subsequently by many authors. PCHELINTSEV (1965) assigned *E. hoheneggeri* to *Auroraella*. However, I have some doubts about the necessity of creating this genus and its distinction from *Eunerinea*.

Occurrence: This species has been recorded from Inwald, Štramberk, Kruhel, the Plassen mountain, Wimmis, Kelheim, M.Saleve, Palermo. It is mentioned also from Appenines (Latium-Abruzzo – see: SIRNA & MASTROIANNI 1993) and from Crimea (PCHELINTSEV 1931). Poorly preserved forms described as a *E. hoheneggeri* occur in the Apennines (SIRNA 1968), Dinarides (Shumadija zone – VESELINOVIC 1965; Trnovski Gozd – KRIVIC 1974), Csaklya (HERBICH 1886), Kruhel (WÓJCIK 1914) and in the Sulzfluhkalk of the Rhaetikon (SEIDLITZ 1906).

Stratigraphic range: Tithonian.

Genus *Cryptoplocus* PICTET & CAMPICHE, 1861

Cryptoplocus cf. *picteti* GEMMELLARO, 1864

(Plate 1, Figure 5)

1869 *Cryptoplocus Picteti* GEMMELLARO: 39, pl. 11, fig. 3–8.
1897 *Trochalia Picteti* GEMMELLARO – ROMAN: 294, pl. 3, fig. 2.
1898 *Cryptoplocus Picteti* GEMMELLARO – COSSMANN: 160, pl. 13, fig. 9.
1925 *Cryptoplocus Picteti* GEMMELLARO – DIETRICH: 100.
1974 *Cryptoplocus picteti* GEMMELLARO – KRIVIC: 190, textfig. 6.

Material: 1 specimen.

Dimensions:	n	Hn	D	h/d	PA	AA	SA
	12	64 mm	30 mm	0.33	17	28	85

Description: Shells conical to slender-conical. In apical the part of the shell the whorls slightly concave with pronounced sutural ramps. Adult whorls are flat. The axial hole increases in diameter with ontogeny. It attains about 0.4 of the diameter of the last whorl.

Internally, the whorl are constricted by one strong fold. It is slightly rounded at the top and directed to the external whorl wall. Fold formula 0100. The earliest whorls which were studied are constricted also by secondary calcium deposits. In some whorls diagenetic modifications of the internal structure – so called collapse structures (see WIECZOREK 1979) – are visible.

Discussion: I have some doubts about the taxonomic position of this relatively well-preserved specimen, which shows some shell dimorphism. The concavity and the sutural ramp of the apical whorls fit well into diagnostic features of *C. picteti,* but the late ontogenetic flat whorls show similarities to *C. depressus* (see WIECZOREK 1979). The slender spire also makes for similarities to *C. succedens,* from which the Dörfles specimen differs by the lack of the step-like arrangement of the successive whorls.

It is not justified to assign the species *picteti* to the genus *Trochalia* which a few authors (e.g. ROMAN 1897, SIRNA 1968) have regarded as synonym of *Cryptoplocus.*

Occurrence: Typical *C. picteti* forms are known from Sicily (GEMMELLARO 1869). ROMAN (1897) and COSSMANN (1898) mentioned its presence along the southern border of the Massif Central. KRIVIC (1974) has recorded it from the northern Dinarides. Information on its occurrence in the Shumadija zone and the Dinarides (VESELINOVIC 1965), in Velike Kapele (NIKLER 1969) and in Central Appenines (SIRNA 1968) are not entirely convincing.

Stratigraphic range: The typical *C. picteti* occurs in the Tithonian.

Genus *Ptygmatis* SHARPE, 1849

***Ptygmatis pseudobruntrutana* (GEMMELLARO,1865)**
(Plate 1, Figures 6–7, 9–12)

1865 *Nerinea pseudobruntrutana* GEMMELLARO: 6, pl. 1, fig. 4.
1869 –: 12, pl. 2, fig. 6–7.
1869 *Nerinea bruntrutana* THURM.: OOSTER: 7, pl. 2, fig. 12–18.
1873 *Ptygmatis pseudobruntrutana*: ZITTEL: 351, pl. 41, fig. 23–25.
1889 – OPPENHEIM: 457, pl. 20, fig. 1–3.
1897 – ROMAN: 298, pl. 4, fig. 6.
1898 – COSSMANN: 75, pl. 6, fig. 22–26.
1913 – FAVRE (in: JOUKOVSKY & FAVRE): 458, textfig. 46–47, pl. 31, fig. 14–16.
1925 – DIETRICH: 76.
1931 – PCHELINTSEV: 93.
1968 – *Nerinea pseudobruntrutana:* SIRNA: 166, pl. 2, fig. 12, 13, 15.
1972 – *Ptygmatis pseudobruntrutana*: DVALI: 5, pl. 2, fig. 1.
1979 – WIECZOREK: 326.
1989 – DJALILOV & KOROTKOV: 105, pl. 27, fig. 4–5.

Material: 10 specimens, fragments of shells, moulds.

Dimensions:	n	Hn	D	h/d	PA	AA	SA
	9	36 mm	17 mm	3.8	9	25	80

Description: Shelly conical in the apical part to slender-conical in the adult part.

Whorls slightly concave, sutural ramp well visible. Axial hole narrow, diameter about 0.20 of the whorl diameter.

The whorl interior is constricted by 5 folds (formula 2121). The upper labial fold is simple while the others are composite with 2–3 subordinate folds. A typical adult fold pattern is figured in Plate 1, Fig.12. The folds of the earliest whorls are usually simple. The complexity of the internal structure increases during ontogeny. However, due to insufficient state of preservation of the available material it is impossible to reconstruct the ontogenetic development of the fold pattern in detail.

Discussion: The specimens from Dörfles show typical features of *P. pseudobruntrutana.* However, the conical shape of the apical part is similar to *Ptygmatis carpathica.* It has to be emphasised that the internal structure of *P.pseudobruntrutana* is indistinguishable from either *P. bruntrutana* or *P. carpathica.* The differences between *P. bruntrutana* and *P. psudobruntrutana* mentioned by SIRNA & MASTROIANNI (1993) are not convincing. The internal structure of *pseudobruntrutana*-like forms figured by these authors (pl. 2, fig.4) is not well-preserved.

Occurrence: Inwald, Štramberk, Wimmis, M.Saleve, Appenines (Marsica), Capri, Holy Cross Mts., Pamir, Crimea. *Pseudobruntrutana*-like forms are also mentioned from the Alpes Maritimes (STURANI 1967), from the Latium-Abruzzo area in the Apennines (SIRNA & MASTROIANNI 1993), from Sardinia (RUSSO & SIRNA 1986), and from the Dinarides and the Shumadija zone (VESELINOVIC 1965).

Stratigraphic range: The typical form is known from Tithonian beds, although forms assigned to this species also occur in the Kimmeridgian.

Ptygmatis carpathica (ZEUSCHNER, 1849)
(Plate 1, Figures 13–14)

1849 *Nerinea carpathica* ZEUSCHNER: 138, pl. 17, fig. 1–6.
1855 – PETERS: pl. 1, fig. 4–6.
1869 – GEMMELLARO: 31, pl. 5, fig. 10–11.
1873 *Ptygmatis carpathica*: ZITTEL: 355, pl. 41, fig. 20–22.
1876 – PIRONA: 282, pl. 6, fig. 24–27.
1882 – SCHLOSSER: 79, pl. 11, fig. 10.
1886 – HERBICH: 39, pl. 3, fig. 6–11.
1886 – LORIOL (in: LORIOL & BOURGEAT): 80, pl. 5, fig. 11–14.
1898 – COSSMANN: 78, pl. 6, fig. 37, pl. 7, fig. 1–3.
1931 – PCHELINTSEV: 95.
1968 *Nerinea carpathica*: SIRNA: 165, pl. 1, fig. 5, 6, 8, 10, 11.
1986 *Ptygmatis carpathica*: RUSSO & SIRNA: 171, textfig. 7, pl. 2, fig. 3.

Material: 5 specimens with relatively well-preserved internal structure.

Dimensions:	n	Hn	D	h/d	PA	SA
	8	62	~34	0.3	30	

Description: Conical shell with slightly concave whorls and sutural ramp. Axial hole relatively broad; attaining about 0.3 of the diameter of the last whorl. Whorl interior constricted by 5 folds. Fold formula: 2120.

Discussion: The species is similar to *P. pseudobruntrutana*. The most important difference is the conical shape of *P. carpathica*. The step-like arrangement of successive whorls is considered as a typical feature of *C. carpathica*. However, this character is not distinct in poorly preserved shells. The general fold pattern, as well as details of the fold morphology are exactly the same as in *P. pseudobruntrutana*. The differences between the species mentioned by SIRNA (1968) and RUSSO & SIRNA (1986) are not convincing because internal structures are slightly deformed diagenetsis. The same fold pattern as well as similarities of the exterior morphology of *P. pseudobruntrutana* and *P. carpathica* suggest that the erection of the genus *Trochoptygmatis* (see PCHELINTSEV 1965) with *P. carpathica* as a genotype is not justified.

Occurrence: Inwald, Nikolsburg, Kelheim, Csaklya, Sicily, Friuli, Marsica, Crimea. Poorly preserved *carpathica*-like forms are described from the northern Dinarides (KRIVIC 1974, NIKLER 1969), from the Shumadija zone, the Serbian part of the Carpatho-Balkan range (VESELINOVIC 1965), and from Sardegna (RUSSO & SIRNA 1986).

Stratigraphic range: Tithonian, ?Kimmeridgian.

Genus *Endoplocus* COX, 1954

Endoplocus staszycii (ZEUSCHNER, 1849)
(Plate 2, Figures 4–6)

1849 *Acteon Staszyci* ZEUSCHNER: 7, pl. 17 fig. 16–19.
1855 *Nerinea Staszyci*: PETERS: 350 pl. 2, fig. 6–9.
1869 – GEMMELLARO: 16, pl. 3, fig. 8–10.
1873 *Itieria Staszycii*: ZITTEL: 341, pl. 40, fig. 19–27.
1878 – PIRONA: 281, pl. 6, fig. 12–18.
1882 – SCHLOSSER: 83, pl. 12, fig. 7.
1886 – HERBICH: 34, pl. 2 fig. 3–10.
1898 *Phaneroptyxis proboscidea* COSSMANN: 21, pl. 21, fig. 21–22.
1913 *Phaneroptyxis staszycii* (ZEUSCHNER) var.*typica* (ZITT.) FAVRE (in: JOUKOVSKY & FAVRE): 452, pl. 30, fig. 15–16, textfig. 37; var. *helvetica* (ZITT.); var. *proboscidea* COSSM.: 452, pl. 30, fig. 2–3, textfig. 38–39.
1914 *Itieria Staszyci:* WÓJCIK: 41 fig. 12.
1931 *Phaneroptyxis Staszycii*: PCHELINTSEV: 119.
1931 – YIN: 71, pl. 7, fig.1–5.
1965 – VESELINOVIC: 254, pl. 3, fig. 4, pl. 5, fig. 9, 12, 15.
1966 *Pentaptyxis staszycii*: KRJACZKOVA: 30, pl. 1, fig. 7, 8.
1968 *Endoplocus staszycii*: SIRNA: 168, pl. 3, fig. 5–6, pl. 4, fig. 2, 4–5, 7–8, 11.
1993 *Phaneroptyxis staszycii:* SIRNA & MASTROIANNI: 144, pl. 2, fig. 1, text-fig. 5.

Material: 5 specimens with well-preserved internal structure.

Dimensions:

n	Hn	D	PA
8	22 mm	12 mm	37

Description: Shell small, oval, whorls slightly convex. whorl overlaps at least half of the preceding one. Growth lines well visible. Aperture arc-shaped, elongate, with 3 folds visible. Axial hole about 2 mm in diameter. Whorl internally constricted by 5 complex folds (fold formula 2120).

Discussion: The great intra-specific variability of the general morphology of *E. staszycii* has been documented by ZITTEL (1873). The specimens from Dörfles are more similar to the specimen described by ZEUSCHNER (1849) from Inwald.

This species has been designed by COX (1954) as a type species of newly erected *Endoplocus* genus and later by PCHELINTSEV (1965) of a newly erected *Pentaptyxis* genus. *Pentaptyxis* is therefore a synonymous of *Endoplocus*. According to SIRNA & MASTROIANNI (1993) it is not necessary to distinguished *Pentaptyxis* genus as it has similar general morphology to *Phaneroptyxis.*

Occurrence: Štramberk, Kruhel, Inwald, Kelheim, M.Saléve, Appenines (Marsica), Friuli, Sicily, Shumadija zone and Serbian part of the Carpatho-Balkan range, Moesian platform, Crimea. *Staszycii*-like forms have also been described but poorly documented from the Northern Dinarides (KRIVIC 1974, NIKLER 1969).

Stratigraphic range: Tithonian.

Genus *Itieria* MATHERON, 1842

Itieria globosa FAVRE, 1913
(Plate 2, Figures 19–26)

1878 *Itieria Cabanetiana* d'ORBIGNY – PIRONA: 275, pl. 5, fig. 6.
1909 – . REMES: 182, pl. 9, fig. 1–2.
1913 – *Itieria Cabanetiana* d' ORBIGNY var. *globosa* FAVRE (in JOUKOVSKY & FAVRE): 455, pl. 29, fig. 21, pl. 30, fig. 17–18, textfig. 43.

Material: about 20 specimens, juvenile to adult.

Dimensions:

n	Hn	D
13	59 mm	>60mm

Description: Shell oval, consisting of numerous convex whorls. Last whorl higher than the spire, overlapping about 9/10 of the preceding one. In the early stage of shell growth, whorls are completely covered by the succeeding one. Hence the apical part of the shell shows a characteristic depression. The whorl wall smooth and covered by grow lines. The aperture is arc-shaped, narrow, and constricted by a single columellar fold. The siphonal canal is narrow and elongated. The axial section shows 2 folds (fold formula 1010). Of these, the columellar fold is narrow, about 5–6 mm long, and situated in the very low part of the whorl. A labial fold is situated higher up in the whorl. It is shorter and directed to the shell axis. The axial hole is spiral (Plate 2, Figs. 25, 26).

Discussion: In its more convex whorls and therefore more cylindrical shell this species differs significantly from *I. cabanetiana*. A typical form is described from M. Saleve by FAVRE (see JOUKOVSKY & FAVRE 1914) as *I. cabanetiana* var. *globosa.* It is justified, however, to consider this form as a different species. Another species of the *cabanetiana* group is *Itieria japonica* SHIKAMA & YUI, 1973. It differs by having two labial folds although the higher one is very small.

Occurrence: Similar forms are noted also from Friuli (PIRONA 1878), from the Štramberk limestones (REMES 1909) and probably from the Crimea (PCHELINTSEV 1931).

Stratigraphic range: Tithonian. However, *cabanetiana* group ranges from Late Oxfordian to Tithonian.

Genus *Aphanotaenia* COSSMANN, 1898

***Aphanotaenia strigillata* (CREDNER, 1863)**
(Plate 2, Figure 27)

1863 *Nerinea strigillata* CREDNER: 169, pl. 3, fig. 7 a, b.
1874 – LORIOL (in: LORIOL & PELLAT) 51, pl.6, fig. 26–27.
1882 – ALTH: 230, pl. 25, fig. 1.
1893 – GREPPIN: 31, pl. 2, fig. 7.
1898 *Aphanotaenia strigillata*: COSSMANN: 154, pl. 11, fig. 23–27.
1925 – DIETRICH: 98.
1979 – WIECZOREK: 341, pl. 11, fig. 1–2.

Material: 2 specimens

Dimensions:	n	Hn	h/d	PA	SA
	5	50 mm	~0.7	~10	65

Remarks: The material consists of two moulds which could be identified by the are characterised by an internal structure of two folds (fold formula 1010). The columellar fold is located below the middle of the whorl. The labial fold is slightly stronger and inflected upwards. The shell was probably slender, with numerous high whorls. Similar forms were noted only from the Kimmeridgian of the peri-Tethyan area.

Note that the taxonomic position of *Aphanotaenia* is doubtful (COSSMANN 1898).

Occurrence: Haute Marne, Ain , Boulogne-sur-Mer, Hannover, Holy Cross Mts.

Stratigraphic range: Kimmeridgian – Tithonian.

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Tafeln 1 und 2

Plate 1

Fig. 1. *Eunerinea hoheneggeri* PETERS, two moulds, typical state of preservation of specimens from Dörfles. NHMW 1997z0166/0001.

Fig. 2. *Eunerinea hoheneggeri* PETERS, external morphology, cast. NHMW 1997z0166/0002.

Fig. 3. *Eunerinea hoheneggeri* PETERS, external morphology, cast. NHMW 1997z0166/0003.

Fig. 4. *Eunerinea hoheneggeri* PETERS, internal structure, axial section. NHMW 1997z0166/0004.

Fig. 5. *Cryptoplocus* cf. *picteti* GEMMELLARO, internal structure, axial section. NHMW 1997z0166/0006.

Fig. 6. *Ptygmatis pseudobruntrutana* (GEMMELLARO), external morphology. NHMW 1997z0166/0007.

Fig. 7. *Ptygmatis pseudobruntrutana* (GEMMELLARO), external morphology. NHMW 1997z0166/0008.

Fig. 8. *Eunerinea hoheneggeri* PETERS, internal structure, axial section. NHMW 1997z0166/0005.

Fig. 9. *Ptygmatis pseudobruntrutana* (GEMMELLARO), axial section. NHMW 1997z0166/0009.

Fig. 10. *Ptygmatis pseudobruntrutana* (GEMMELLARO), axial section. NHMW 1997z0166/0010.

Fig. 11. *Ptygmatis pseudobruntrutana* (GEMMELLARO), external morphology. NHMW 1997z0166/0011.

Fig. 12. *Ptygmatis pseudobruntrutana* (GEMMELLARO), axial section. NHMW 1997z0166/0012.

Fig. 13. *Ptygmatis carpathica* (ZEUSCHNER), axial section. NHMW 1997z0166/0013.

Fig. 14. *Ptygmatis carpathica* (ZEUSCHNER), axial section. NHMW 1997z0166/0014.

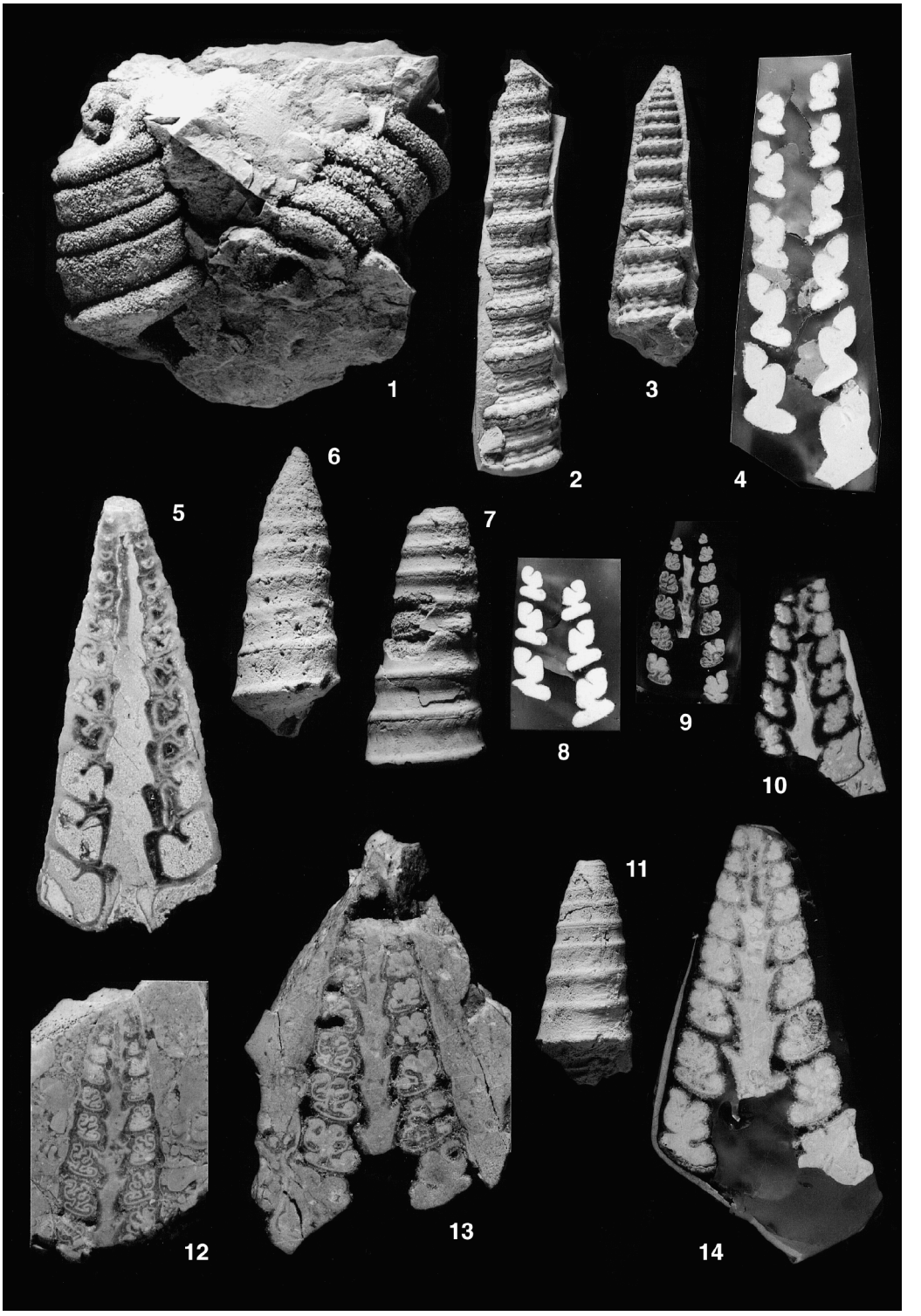
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Plate 2

Fig. 15. *Endoplocus staszycii* (ZEUSCHNER), axial section. NHMW 1997z0166/0015.

Fig. 16. *Endoplocus staszycii* (ZEUSCHNER), external morphology, cast. NHMW 1997z0166/0016.

Fig. 17. *Endoplocus staszycii* (ZEUSCHNER), external morphology, cast. NHMW 1997z0166/0017.

Fig. 18. *Endoplocus obtusiceps* (ZITTEL), internal structure, axial section. NHMW 1997z0166/0018.

Fig. 19. *Itieria globosa* FAVRE, mould. NHMW 1997z0166/0019.

Fig. 20. *Itieria globosa* FAVRE, axial section. NHMW 1997z0166/0020.

Fig. 21. *Itieria globosa* FAVRE, mould. NHMW. 1997z0166/0021.

Fig. 22 *Itieria globosa* FAVRE, young specimen, axial section. NHMW 1997z0166/0019.

Fig. 23. *Itieria globosa* FAVRE, young specimens, axial section. NHMW 1997z0166/0023.

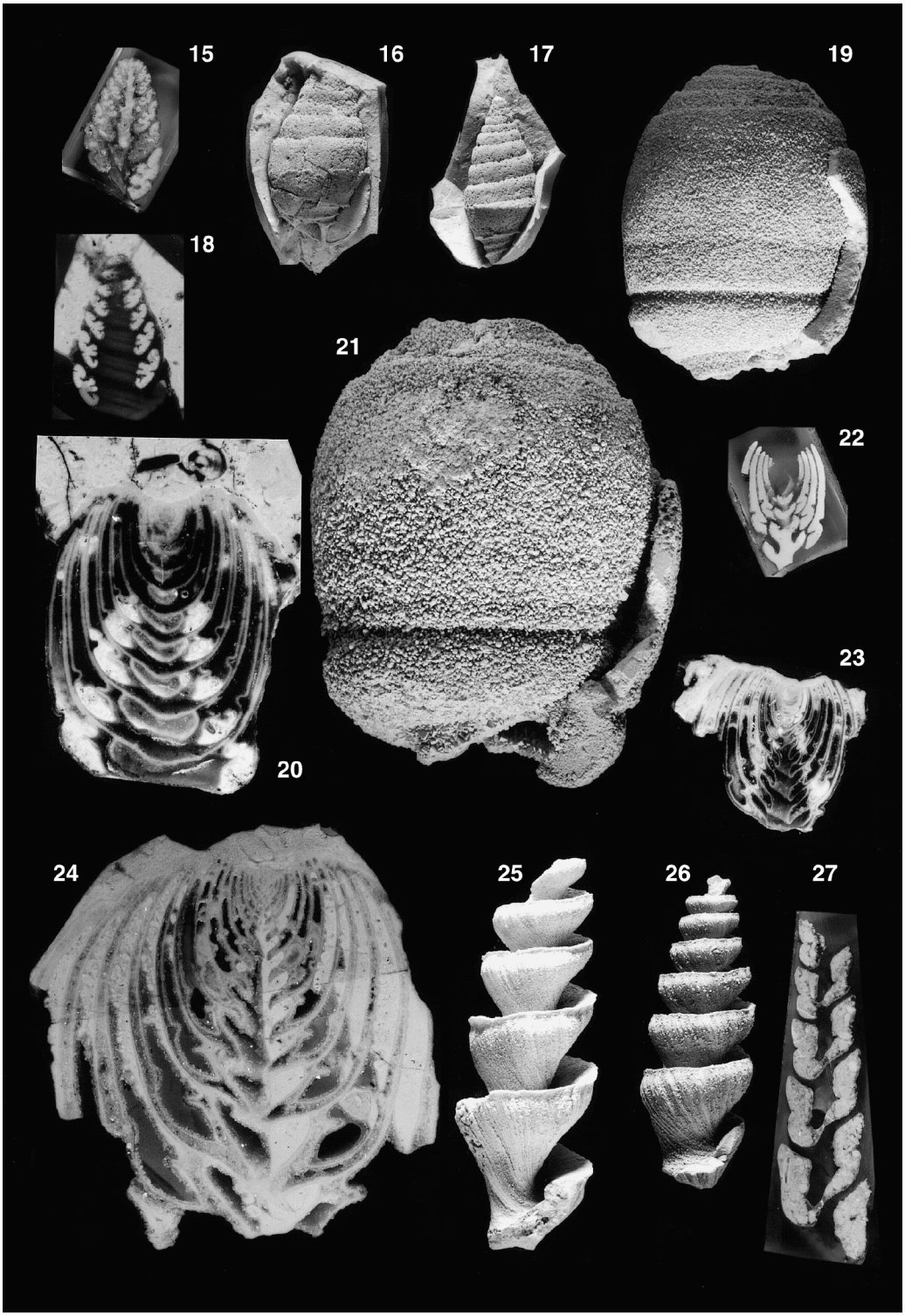
Fig. 24. *Itieria globosa* FAVRE, axial section. 1997z0166/0024.

Fig. 25. *Itieria globosa* FAVRE, mould of central hole of columella. NHMW 1997z0166/0025.

Fig. 26 *Itieria globosa* FAVRE, mould of central hole of columella. NHMW 1997z0166/0026.

Fig. 27. *Aphanotaenia strigillata* (CREDNER), axial section. NHMW 1997z0166/0027.

Photographs: Alice SCHUMACHER, Naturhistorisches Museum Wien.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