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PROBLEMATIC SCLERITES *EURYTHOLIA* FROM THE LOWER AND MIDDLE DEVONIAN OF THE CZECH REPUBLIC

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Abstract: *Problematic phosphatic sclerites Eurytholia are reported for the first time from the Middle Devonian. Unequivocal sclerites were observed in limestones of Emsian to late Eifelian age in six localities of the Barrandian area of the Central Bohemia of the Czech Republic. Formerly observed size and shape variations of Eurytholia sclerites prevent formal description of a new species on few specimens of Emsian and Eifelian age. Therefore the new specimens are identified as Eurytholia aff. bohemica. Their presence indicates longer time range of the Eurytholia animal, covering not only the Ordovician, the Silurian and the earliest Devonian as known formerly, but also late Lower Devonian and the Middle Devonian. Similar features in morphology and histology of Eurytholia indicate relationship to a conodont Pseudooneotodus and a support suggestion about the vertebrate origin of Eurytholia sclerites.*

Key words: *Eurytholia, Pseudooneotodus*, problematica, vertebrata, Eifelian, Emsian, Devonian, Barrandian area, Czech Republic

INTRODUCTION

Small hat-like phosphatic plates of unknown origin were firstly reported by Sutton *et al.* (2001) from the area bordering Mid- to Late Ordovician Iapetus Ocean. The small sclerites were named *Eurytholia*, with two species differentiated: *E. prattensis* Sutton *et al.* (2001) from Middle Ordovician in Alabama and Sweden, and *E. elibata* Sutton *et al.* (2001) of the same age from Wales and Estonia. These authors interpreted the sclerites as small shields arranged in rows in some small slug-like bilaterally symmetrical animal of unknown affinity (Sutton *et al.* 2001; Fig. 4). Similar sclerites, described as the new species *Eurytholia bohemica* were observed by Ferretti *et al.* (2006) in the Silurian and early Devonian beds of the Barrandian area of the Czech Republic. About 400 plates attributed to this species were recovered in six sections of Ludlow and Lochkovian ages. Ferretti et al. (2006) noted the great variability in shape and size of plates, which range from 0.3 mm to 2 mm. The main difference between *Eurytholia bohemica* and the two Ordovician species is the well-developed girdle with inner furrow along entire margin of sclerite. Data of Ferretti *et al.* (2006) and Ferretti & Serpagli (2008) considerably enlarged the geographical extent and stratigraphical range of *Eurytholia*. *Eurytholia* occurred not only along sides of the Iapetus Ocean but also in periphery of Gondwana and margins of the Rheic Ocean. New data now further extend the stratigraphical range of this peculiar fossil.

MATERIAL AND METHODS

All *Eurytholia* sclerites were yielded by dissolution of bioclastic, biodetritic or micritic limestones as by-product of investigation of firstly focused to organophosphatic brachiopods, vertebrate microfossils, and conodonts. In total, more than 100 kg of rocks were etched by 10 % solution of acetic acid in pails for 3 to 5 days. Individual volumes of etched rock vary between 1 kg to more than 30 kg. Residues were not sieved, were repeatedly washed by clean water in Petri dishes and then were left to dry. *Eurytholia* sclerites and other phosphatic microfossils were hand-picked from residues under a OLYMPUS SZ51 binocular microscope. Specimens were mounted on stabs with carbon adhesive and coated by gold. Material was studied with scanning electron microscope (models Jeol

JSM–6300 and JSM–7401F). *Eurytholia* sclerites were very rare in all residues; all localities yielded fewer than 20 sclerites. All material (except of a few very fragmental sclerites) is illustrated herein.

REPOSITORY

All specimens are housed in the palaeontological collections of the Centre of Biology, Earth and Environmental Sciences in the Faculty of Education of the University of West Bohemia in Plzeň (PC-ZCU), Czech Republic.

GEOLOGICAL SETTING

In the Central Bohemia, the Czech Republic, the upper Lower Devonian (Emsian) and Middle Devonian (Eifelian and Givetian) are preserved in the area between Zdice and Prague (Fig. 1) where are represented by several stratigraphic units (Fig. 2).

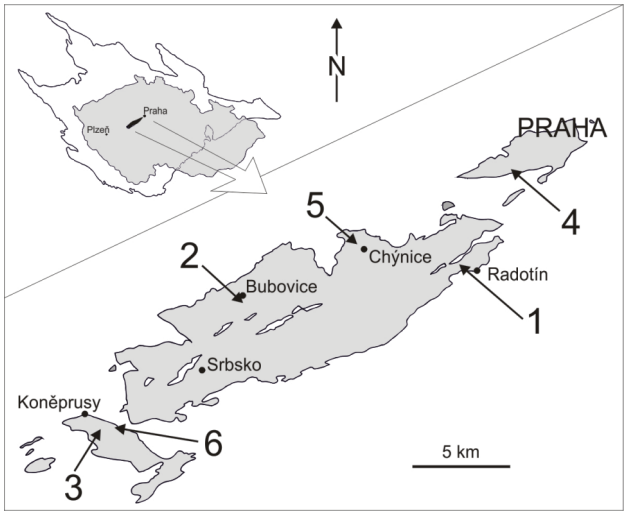


Figure 1. *Sketch maps of the Czech Republic in the Bohemian Massif, the Devonian of the Barrandian area, and positions of described localities. 1 – Praha – Radotín, Hvížďalka Quarry; 2 – Bubovice, Čeřinka ridge; 3 – Koněprusy, Na Voskopě Quarry, main neptunic dyke; 4 – Praha – Holyně, Prastav Quarry; 5 – Chýnice, Na Škrábku Quarry; 6 – Koněprusy, Jirásek Quarry.*

The Zlíchov and Daleje-Třebotov formations represent the Emsian. The lower part of the Zlíchov Formation, apart of persisting grey bedded limestones with chert, is characterized by intercalations of bioclastic limestone of peri-reef and reef origin. These form lenses and layers of the so-called Chapel Coral Horizon. This horizon contains rich fauna of coral, crinoids and brachiopods from now unpreserved shallow parts of the basin (Havlíček 1998).

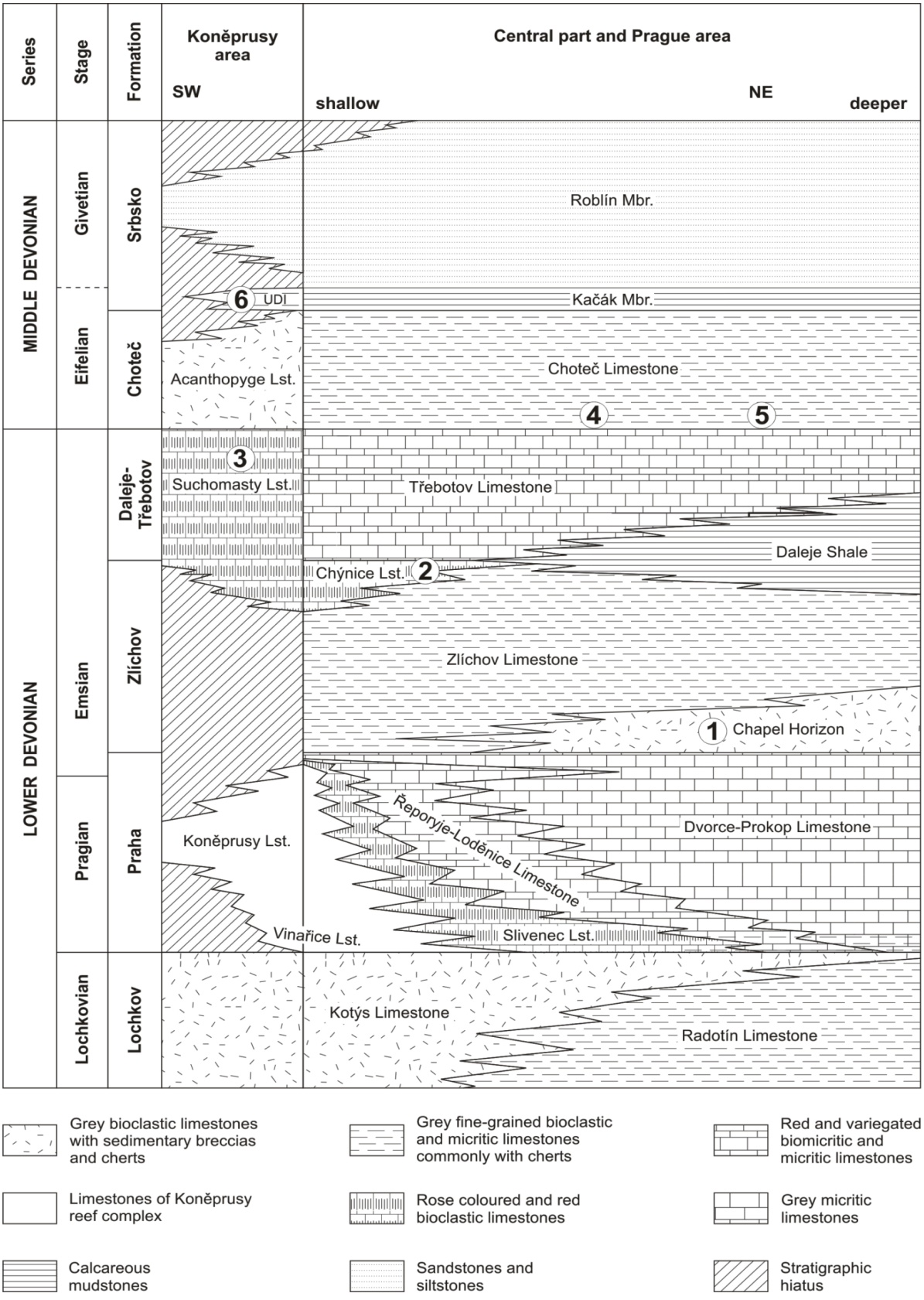
The local facies named Chýnice Limestone is formed by rose-coloured biomicritic and bioclastic limestones rich in crinoids, brachiopods, corals and other fauna (Chlupáč 1998b, Havlíček & Vaněk 1996, Ferrová *et al.* 2012). The unit is confined to the upper part of the Zlíchov Formation. Its thickness ranges from less than 1 m up to 15 m (Chlupáč 1998b).

The Suchomasty Limestone is member of the Daleje-Třebotov Formation. It is developed exclusively in the small Koněprusy area, where it disconformably overlays the Koněprusy Limestone of Pragian age (Chlupáč 1998a). Its thickness is 20–30 m. The Suchomasty Limestone is composed of rose to grey, biomicritic to bioclastic, mainly crinoidal well bedded limestones. It contains diverse shallow-water fauna, mostly of trilobites (Chlupáč 1983), brachiopods (Havlíček & Kukal 1990) and crinoids. The Suchomasty Limestone also fills many deep subvertical neptunian dykes which penetrate the Pragian reef (Chlupáč 1996). The dykes show extremely variable lithology with local accumulations of trilobites, brachiopods, cephalopods and other groups. The conodonts document the *Polygnathus laticostatus* Zone up to the *P. costatus partitus* Zone (Klapper *et al.* 1978) which indicate the late Emsian and early Eifelian age of the member.

The lowermost Middle Devonian is represented by the topmost part of the Daleje-Třebotov Formation. The first occurrence of the index conodont *Polygnathus costatus partitus* falls within the uppermost part of the Třebotov Limestone and, in the Koněprusy area, the uppermost Suchomasty

Figure 2. *Stratigraphy of the Devonian of the Barrandian area with approximate position of localities. 1 – Praha – Radotín, Hvížďalka Quarry; 2 – Bubovice, Čeřinka ridge; 3 – Koněprusy, Na Voskopě Quarry, main neptunic dyke; 4 – Praha – Holyně, Prastav Quarry; 5 – Chýnice, Na Škrábku Quarry; 6 – Koněprusy, Jirásek Quarry (after Vaškaninová & Kraft 2014, modified)*

Figure 2.


Series
Stage
Formation
Koněprusy area
SW
Central part and Prague area
shallow
NE
deeper
MIDDLE DEVONIAN
LOWER DEVONIAN
Givetian
Eifelian
Emsian
Pragian
Lochkovian
Srbsko
Choteč
Daleje-Třebotov
Zlíchov
Praha
Lochkov
Roblín Mbr.
6 UDI
Kačák Mbr.
Choteč Limestone
Acanthopyge Lst.
4
5
3
Suchomasty Lst.
Třebotov Limestone
Daleje Shale
Chýnice Lst.
2
Zlíchov Limestone
1 Chapel Horizon
Řeporyje-Lodénice Limestone
Dvorce-Prokop Limestone
Koněprusy Lst.
Vinařice Lst.
Slivenec Lst.
Kotýs Limestone
Radotín Limestone
Grey bioclastic limestones with sedimentary breccias and cherts
Grey fine-grained bioclastic and micritic limestones commonly with cherts
Red and variegated biomicritic and micritic limestones
Limestones of Koněprusy reef complex
Rose coloured and red bioclastic limestones
Grey micritic limestones
Calcareous mudstones
Sandstones and siltstones
Stratigraphic hiatus

Limestone (Klapper *et al.* 1978, Chlupáč *et al.* 1979). In the Prastav Quarry parastratotype this level is 2.8 m below the Třebotov/Choteč limestones boundary (Chlupáč 1998b).

The overlaying Choteč Formation (Eifelian) is mainly represented by the Choteč Limestone (Chlupáč 1959). It is widespread member apart of the Koněprusy area. The unit comprises built of grey to dark grey well-bedded limestone and fine to grained sparitic bitumenous limestone. In the lower part the grey calcareous mudstone intercalations are frequent. These mudstone layers and associated thin dark limestone beds represent the onset of the Basal Choteč Event (Chlupáč & Kukal 1988). The thickness of the Choteč Limestone is 40–60 m (Chlupáč 1998b).

The Acanthopyge Limestone is other member of the Choteč Formation. The light grey bioclastic crinoidal limestones and yellow to rose coloured micrites are known exclusively in a small area around Koněprusy. The thickness is around 20 m (Chlupáč 1959, 1998b). Unlike the Choteč Limestone, the Acanthopyge Limestone is dominated by diverse corals, smooth shelled brachiopods (Havlíček & Kukal 1990) and trilobites (Chlupáč 1983) living in an extremely shallow marine environment in the area of the former Koněprusy reef.

In the SE part of the Koněprusy area (Jirásek Quarry), 0.7 m thick dark-grey coloured limestone unit (UDI – upper dark interval; Hladil *et al.* 1991, Budil 1995, Mergl 2019, Mergl & Budil 2019) overlays the light-grey Acanthopyge Limestone. The UDI is composed of bedded sparitic limestone with abundant dacryoconarid tentaculites, terrestrial plant remains and other small and fragmented fauna. Above the UDI is a thin bed (<0.5 m) of bioclastic limestone with abundant stromatoporoids, corals and rare brachiopods (Hladil 1993). This stromatypo-coral bed unit is the youngest limestone bed yet observed in the Koněprusy area and is likely to represent a debris flow from shallower but now unpreserved parts of the Koněprusy reef elevation. The UDI and conglomeratic limestones are suggested lateral equivalent of the Kačák Member of the Srbsko Formation (Hladil *et al.* 1991). The conodonts from the UDI indicate the topmost Eifelian *Polygnathus ensensis* Zone (Kalvoda 1992). Outside the Koněprusy area, the Kačák Member is formed by dark grey to black thinly laminated calcareous shales of 2–15 m thickness, dominated by fossils of planktonic, nektonic and suspected epiplanktonic forms (Chlupáč 1960). The most diverse fauna is present in the topmost part of the member.

The Roblín Member of the Srbsko Formation is the youngest stratigraphic unit in the Barrandian area. It is of Givetian age. It is marked by siliciclastic lithology with rare marine fauna and abundant terrestrial plants. A thin expression of the Roblín Member is present in the Koněprusy area. Calcareous sandstones and siltstones unconformably resting on the Suchomasty and Acanthopyge limestones yielded poorly preserved terrestrial plant fragments and rare and poorly preserved marine fauna (Chlupáč 1960, 1998b).

SURVEY OF LOCALITIES

1. Praha-Radotín, Hvížďalka quarry (Fig. 1–1). Grey bioclastic limestone in the scree of large limestone quarry North of Radotín. The Chapel Coral Horizon, Zlíchov Formation, Lower Emsian, *Polygnathus dehiscens* conodont Zone (Klapper *et al.* 1978); *Nowakia zlichovensis* dacryoconarid Zone (Chlupáč *et al.* 1979). One observed *Eurytholia* sclerite is associated with a diverse coral, crinoid, brachiopod, rostroconch and trilobite fauna of peri-reef environment (Chlupáč 1998b). Among phosphate-shelled fossils, fragments of conulariid tests, byronid tubes, rare lingulate brachiopods (*Paterula* sp.), caudal spines of phyllocarids, scales and tesserae of diverse vertebrates (Mergl *et al.* 2017) were observed.

2. Bubovice, Čeřinka hillside section (Fig. 1–2). Rose to red-brown micritic limestone from the shallow temporary outcrop. Upper Chýnice Limestone, Zlíchov Formation, Lower Emsian, dacryoconarid *Nowakia elegans* Zone; see Ferrová *et al.* (2012) for detailed stratigraphy. *Eurytholia* sclerites are associated with diverse corals, crinoids, mostly smooth-shelled brachiopods, gastropods, trilobites and other fauna of local small biostrome. Among phosphate-shelled fossils, fragments of conulariid tests, sphenothallids, byronid tubes, abundant lingulate brachiopods (*Kosagittella, Paterula, Acrosaccus, Chynithele, Lochkothele, Opatrilkiella, Praeoehlertella, Schizotreta, Havlicekion, Opsiconidion*; Mergl & Ferrová 2009), caudal spines of phyllocarids and other crustaceans, conodonts, tesserae and fin spines of vertebrates (Mergl *et al.* 2017) were observed.

3. Koněprusy, Na Voskopě Quarry, main dyke (Fig. 1–3). Rose bioclastic limestone from the infilling of main neptunic dyke in E wall of the quarry. Suchomasty Limestone, Daleje-Třebotov Formation, Upper Emsian, *Polygnathus laticostatus* to *P. costatus partitus* conodont zones (Klapper *et al.* 1978); *Nowakia elegans* to *N. holynensis* dacryoconarid zones (Chlupáč 1998b). *Eurytholia* sclerites are associated with diverse crinoids, small smooth-shelled brachiopods, trilobites and other fauna. Among phosphate-shelled fossils, the fragments of conulariid tests (Mergl *et al.* 2016), byronid tubes, abundant lingulate brachiopods (*Kosagittella, Chynithele, Lochkothele, Opatrilkiella, Praeoehlertella, Havlicekion, Opsiconidion, Orbaspina*; Mergl & Jiménez-Sánchez 2015), caudal spines of phyllocarids, conodonts and dermal plates and fin spines of vertebrates (Mergl *et al.* 2017) were observed.

4. Praha-Holyně, Prastav Quarry, section in the south wall, grey to dark-grey micritic limestone in mudstone intercalation (Fig. 1–4). Lower part of the Choteč Limestone, Choteč Formation, lower Eifelian, *Polygnathus costatus partitus* conodont Zone (Klapper *et al.* 1978; Chlupáč *et al.* 1979, Berkyová 2009); *Nowakia sulcata* dacryoconarid Zone (Chlupáč 1998b). *Eurytholia* sclerites are associated with small-sized and thin-shelled rhynchonelliform brachiopods *Holynetes, Chlupacina, Chynistrophia, Plicanoplites* (Havlíček 1977, Havlíček & Racheboeuf 1979), trilobite *Cyphalaspides holynensis* and other small-sized fossils. Prasinophytes epibole is present. Among phosphate-shelled fossils, the fragments of conulariid tests, byronid tubes, abundant lingulate brachiopods (*Prastavia, Bicarinatina, Paterula, Orbiculoidea, Lochkothele, Opatrilkiella, Opsiconidion*; Mergl 2001), caudal spines of phyllocarids, fragments of crustacean carapaces, myodocope ostracods, conodonts and acanthodian scales were observed.

5. Chýnice, Na Škrábku Quarry, section in the south wall, lense of dark micritic limestone in mudstone intercalation (Fig. 1–5). Lower part of the Choteč Limestone, Choteč Formation, lower Eifelian, *Polygnathus costatus partitus* conodont Zone (Klapper *et al.* 1978; Berkyová 2009, Brocke *et al.* 2016); *Nowakia sulcata* dacryoconarid Zone (Chlupáč 1998b). *Eurytholia* sclerites are associated by small-sized and thin-shelled rhynchonelliform brachiopods *Holynetes, Serrulatrypa, Imatrypa*, and *Chynistrophia* (Havlíček 1977, Havlíček & Racheboeuf 1979) and other small-sized fossils. A prasinophytes epibole is present (Brocke *et al.* 2016). Among phosphatic-shelled fossils, the fragments of conulariid tests, byronid tubes, abundant lingulate brachiopods (*Kosagittella, Prastavia, Bicarinatina, Paterula, Orbiculoidea, Lochkothele, Opatrilkiella, Opsiconidion*; Mergl & Vodrážková 2012), caudal spines of phyllocarids, fragments of crustacean carapaces, myodocope ostracods, conodonts, and acanthodian scales were observed.

6. Koněprusy, Jirásek Quarry, Prastav Quarry, section in the east wall, 0.7 m thick dark sparitic limestone beds (UDI) (Fig. 1–6) with rare macrofossils. The "upper dark interval" (= probable equivalent of the Kačák Member; Hladil *et al.* 1991, Hladil 1993, Budil 1995), lower part of the Srbsko Formation, uppermost Eifelian, *Polygnathus ensensis* conodont Zone; ? *Nowakia otomari* dacryoconarid Zone (Berkyová 2004). *Eurytholia* sclerites are associated by crinoids, abundant dacryoconarids, rare and moderately diverse brachiopods, proetid trilobite *Astycoryphe* (Mergl & Budil 2019), and terrestrial plant *Rellimia*. Among phosphatic fossils, the fragments of conulariid tests, byronid tubes, lingulate brachiopods (*Prastavia, Lingulipora, Paterula, Orbiculoidea, Chynithele, Opatrilkiella, Opsiconidion, Orbaspina*; Mergl 2019), caudal spines of phyllocarids, conodonts, scales, bones and teeth of diverse vertebrates (Mergl *et al.* 2017) were observed.

SYSTEMATIC PART

Class, Order, and Family unknown

Genus *Eurytholia* Sutton, Holmer & Cherns, 2001

Type species: *Eurytholia prattensis* Sutton, Holmer & Cherns, 2001; Middle Ordovician, Pratt Ferry Formation; Alabama, USA.

Eurytholia aff. *bohemica* Ferretti, Serpagli & Štorch, 2006

Plates I, II

cf. 2006 *Eurytholia bohemica* new species; Ferretti, Serpagli & Štorch, p. 1027–1031, Plate I, Figs 1–11, Plate II, Fig. 1–12.

Material: One sclerite from the Zlíchov Limestone (PCZCU 2380), two specimens from the Chýnice Limestone (PCZCU 2381, 2382), five specimens from the Suchomasty Limestone

Plate I

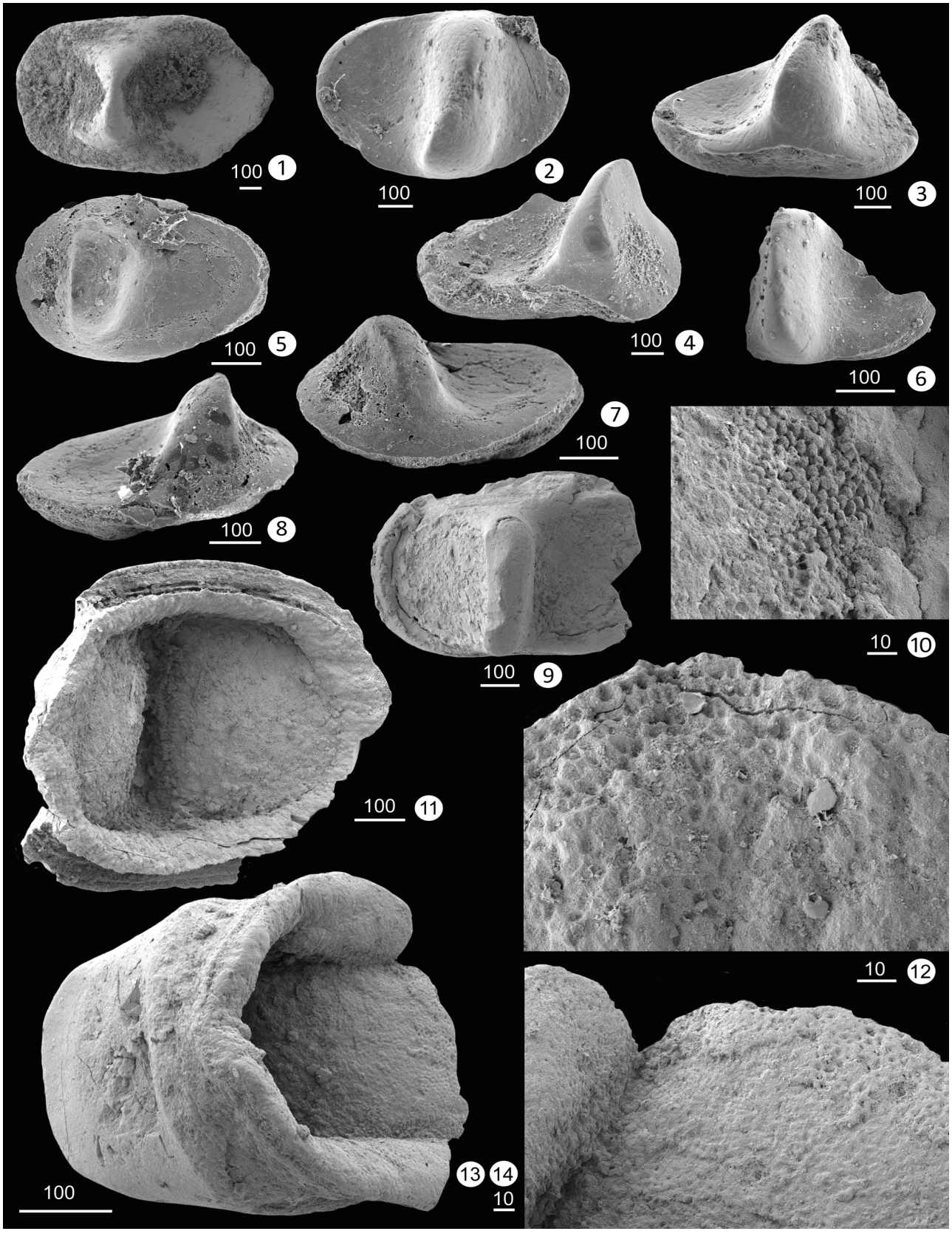

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Plate II

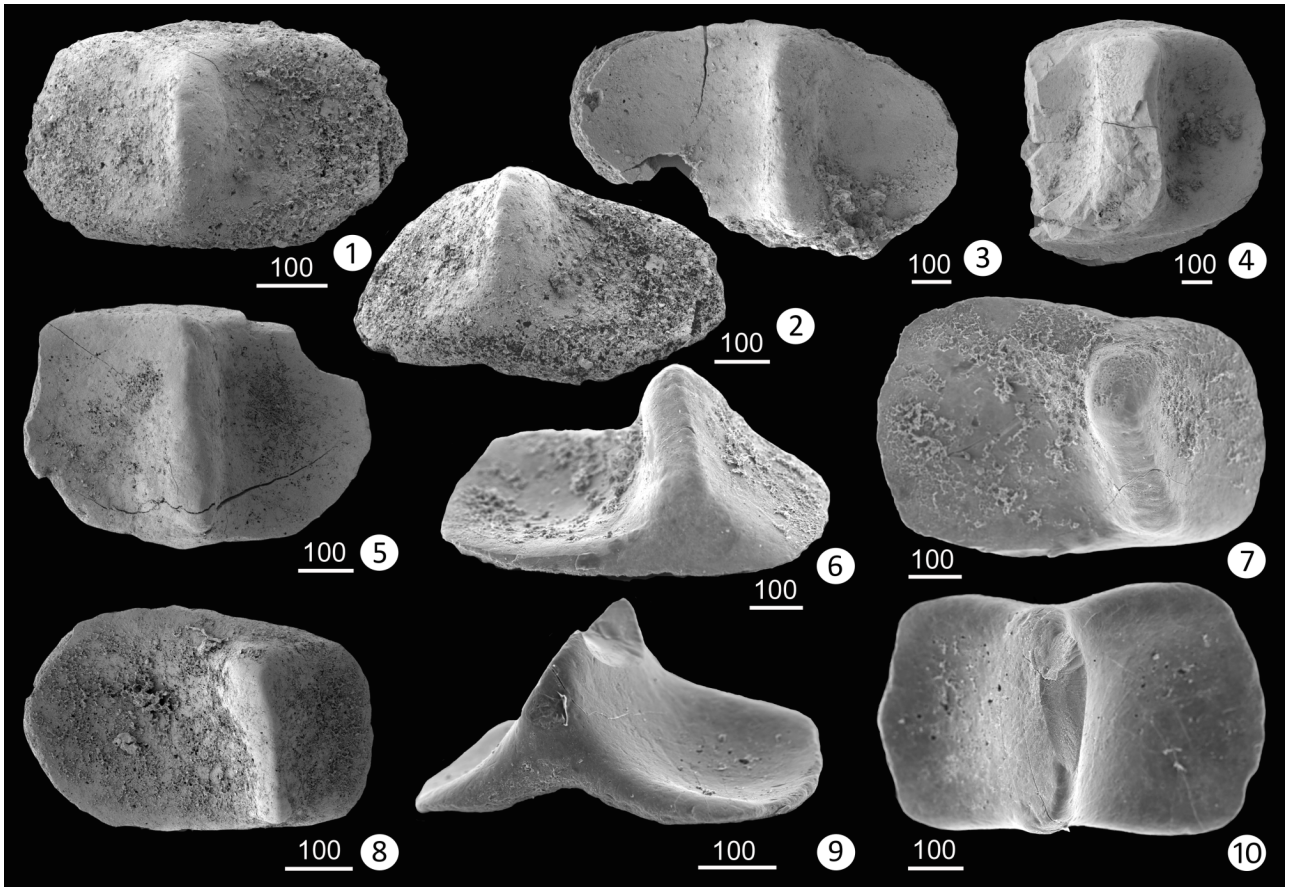

Plate II Scanning electron micrographs of *Eurytholia* aff. *bohemica* Ferretti, Serpagli & Štorch, 2006. 1, 2 – Upper and lateral views of PCZCU 2388, Choteč Formation, Choteč Limestone; Praha – Holyně, Prastav Quuarry, limestone beds of the Choteč Event. 3 – Upper view of PCZCU 2389, Choteč Formation, Choteč Limestone; Praha-Holyně, Prastav Quarry, beds of the Choteč Event. 4 – Upper view of PCZCU 2390, Choteč Formation, Choteč Limestone; Chýnice, Na Škrábku Quarry, beds of the Choteč Event. 5 – Upper view of PCZCU 2391, Srbsko Formation, Upper dark interval (equivalent of the Kačák Member); Koněprusy, Jirásek Quarry. 6, 7 – Lateral and upper views of PCZCU 2393, Srbsko Formation, Upper dark interval (equivalent of the Kačák Member); Koněprusy, Jirásek Quarry. 8 – Upper view of PCZCU 2392, Srbsko Formation, Upper dark interval (equivalent of the Kačák Member); Koněprusy, Jirásek Quarry. 9, 10 – Lateral and upper views of PCZCU 2394, Srbsko Formation, Upper dark interval (equivalent of the Kačák Member); Koněprusy, Jirásek Quarry. Scale bars are in micrometers.

Plate I Scanning electron micrographs of *Eurytholia* aff. *bohemica* Ferretti, Serpagli & Štorch, 2006.
1 – Upper view of PCZCU 2380, Zlíchov Formation, Coral Chapel Horizon; Praha – Radotín, Hvížďalka Quarry. 2, 3 – Upper and lateral views of PCZCU 2381, Zlíchov Formation, Chýnice Limestone; Bubovice, Čeřinka ridge. 4 – Lateral view of PCZCU 2382, Zlíchov Formation, Chýnice Limestone; Bubovice, Čeřinka ridge. 5, 7, 8 – Upper view and two lateral views of PCZCU 2383, Třebotov-Daleje Formation, Suchomasty Limestone; Koněprusy, Na Voskopě, main neptunic dyke. 6 – Upper view of PCZCU 2384, Třebotov-Daleje Formation, Suchomasty Limestone; Koněprusy, Na Voskopě, main neptunic dyke. 9, 10 – Upper view to corroded sclerite and detail of pitted structure on upper surface of sclerite PCZCU 2385, Třebotov-Daleje Formation, Suchomasty Limestone; Koněprusy, Na Voskopě, main neptunic dyke. 11, 12 – Inner view of incomplete sclerite and detail of pitted structure on its inner surface of PCZCU 2386, Třebotov-Daleje Formation, Suchomasty Limestone; Koněprusy, Na Voskopě, main neptunic dyke. 13, 14 – Inner view and detail of pitted structure on inner surface of PCZCU 2387, Třebotov-Daleje Formation, Suchomasty Limestone; Koněprusy, Na Voskopě, main neptunic dyke. Scale bars are in micrometers.

(PCZCU 2383–2387), three specimens from the Choteč Limestone (PCZCU 2388–2390) and five specimens from the equivalent of the Kačák Member (= UDI) (PCZCU 2391–2395).

Description: Sclerites are transversely ovoid (Plate I, Fig. 2) to subrectangular (Plate II, Fig. 10) in outline, 1.2 mm wide in one specimen (PCZCU 2388) but generally smaller. Sclerites are thick-shelled. Prominent median ridge is situated at mid-width or shifted laterally to almost one-third of the width. Anterior and posterior margins gently curved or with shallow emargination. Ventral anterior and posterior margins may be gently lifted in some specimens (Plate II, Fig. 9). Lateral slopes moderate to very steep, in almost all sclerites deeply concave along midlength with raised anterior and posterior margins. Lateral slopes may be almost symmetrically developed (Plate II, Fig. 1), but most of available sclerites are weakly to strongly asymmetrical (Plate I, Figs 4, 5) and show shorter, steeper and less concave one lateral slope and longer clearly concave opposite lateral slope. Longitudinal ridge is straight to somewhat sigmoidal curved (Plate I, Fig. 2), with the apex rounded (Plate I, Fig. 2) to subangular (Plate I, fig 4) in transverse section. The ridge may be almost as long as the sclerite with subvertical anterior and posterior slopes (Plate I, Figs 2, 3) or distinctly shorter (Plate I, Fig. 1), with its posterior and anterior slopes steeply and evenly sloping. The crest of longitudinal ridge may be straight to weakly convex in lateral views.

The ventral side is deeply excavated, with deep and narrow slit below the longitudinal ridge. A prominent girdle is developed in some specimens (Plate I, Fig. 11) but imperceptible in others (Plate I, Fig. 13; Plate II, Figs 9, 10). The girdle is not preserved due distinct traces of corrosion of periphery of some sclerites (Plate I, Fig. 7), but it seems that its absence may be original (Plate II, Figs 9, 10) in other sclerites. The layered structure of the sclerite is distinct at the naturally eroded ventral face of the girdle (Plate I, Fig. 11). The ventral surface bears shallow pits of uniform size, approximately 5 μm in diameter densely and regularly arranged in principle honeycomb pattern (Plate I, Fig. 10). Weak asymmetry and uneven depth of pits were observed on the ventral face close to margin of girdle (Plate I, Fig. 12). Each homogeneous inner layer bear this type of pitting. One externally desquamated sclerite (Plate I, Figs 9, 10) shows rows of moulds of pits formed by ventrally accreted layer.

Margins of sclerites show more or less distinct narrow girdle (Plate I, Fig. 11).

Remarks: *Eurytholia* sclerites are very variable in outline and size. This variability was noted by Sutton *et al.* (2001) and confirmed by Ferretti *et al.* (2006). Size differences and longitudinal ridge asymmetry led Sutton *et al.* (2001) to suggest that sclerites formed several rows on exterior of a slug-like animal with smallest sclerites in head and caudal ends and along margins of body, with the largest sclerites aligned at axial part of body. The outline and size variations make difficult any serious assessment of taxonomic value of morphological features observed on *Eurytholia* sclerites. Ferreti *et al.* (2006) used presence of girdle as the diagnostic feature which distinguishes *E. bohemica* from the Ordovician species. The girdle was observed in some sclerites from the Devonian and therefore these newly observed sclerites are referred under open nomenclature to the Silurian species *Eurytholia bohemica*. However, some stratigraphically youngest specimens from the UDI of the Koněprusy area (Plate II, Figs 5–10) do not show the girdle and have distinctly concave lateral slopes. These sclerites may represent another species but material is insufficient for critical taxonomic evaluation.

Occurrence: Emsian to late Eifelian, Zlíchov, Daleje–Třebotov and Choteč formations; Barrandian area (territory of Prague, Koněprusy, Choteč and Bubovice), Central Bohemia, Czech Republic.

DISCUSSION

Both Sutton *et al.* (2001) and Ferreti *et al.* (2006) suggested that the living animal has the sclerites on body surface. The pitted excavated "ventral side" of *Eurytholia* sclerite [in terminology of Sutton *et al.* (2001)] was faced towards soft tissues of the animal. The pitted surface of sclerite was likely in direct contact with the soft tissue below. The girdle of the Silurian and Devonian specimens may have facilitated the anchoring of a sclerite in more stiff external layer. Despite these anatomically and histologically reasonable suggestions, the real affinity of *Eurytholia* has been unknown and the reconstruction of Sutton *et al.* (2001) was highly hypothetical.

Sclerite of *Eurytholia* is built of a compact laminar outer cap and inner porous layers (Sutton *et al.* 2001). These structures are similar to histological structure of *Pseudooneotodus* Drygant, 1974. *Pseudooneotodus* is generally interpreted as a conodont. It is represented by squat phosphatic cones with differentiation from a lamellar cap which is underlain by a spherulitic basal tissue (Sansom 1996). The cap is histologically undistinguishable from vertebrate enamel. The basal body has characters indicative of dentine. Sansom (1996) discussed in detail affinity of *Pseudooneotodus* to the conodonts. From its discussion implies that *Pseudooneotodus* elements should be teeth or dermal denticles.

Pseudooneotodus is a conodont genus worldwide distributed from the Middle Ordovician to the Lower Devonian (Corradini 2008). Its vertebrate affinity was confirmed by Sansom (1996) although its peculiar simple conical shape had before led to different interpretations: to pseudoconodonts (Möstler 1968), to problematica (Serpagli 1970) or to fish teeth (Flügel & Schönlaub 1972). Corradini (2008) broadly discussed reconstruction of the apparatus and taxonomy of elements in the light of their geographical and stratigraphical distributions. His stratigraphically latest records of *Pseudooneotodus* come from late Emsian (*Polygnathus serotinus* Zone). Berkyová (2009) reported abundant occurrence of *Pseudooneotodus beckmanni* from the *Polygnathus serotinus* and *P. costatus patulus* zones of the Třebotov Limestone in the Barrandian area indicating its latest occurrence just near the Lower/Middle Devonian boundary. Corradini (2008) also stated that suprageneric classification of *Pseudooneotodus* is still an open question. While some authors (Sweet 1988, Dzik 1991) placed this genus into known conodont orders, Aldridge & Smith (1993) consider *Pseudooneotodus* to be member of a new family belonging to an unknown order.

Sclerites of *Pseudooneotodus* and *Eurytholia* have some shared features. Apart of phosphatic mineralization, both have shape of conical, cap-like or hat-like sclerite, with great variability of apical part and similar wide variation of outline, with excavated basal part, with two distinct layers in sclerite fabrics, which is built of compact lamellar enamel-like cap which is underlain by porous, externally pitted basal layers (= terminal dentine network of Sansom 1996), which should be compared with dentine. The similar type of external pitting and laminate inner layers is observable on deeply excavated basal layer of *Pseudooneotodus beckmanni* (Berkyová 2009, see Fig. 10A, B, D).

CONCLUSION

New investigation indicates that the stratigraphic range of problematic sclerites *Eurytholia* must be extended up to the Middle Devonian (uppermost Eifelian, *Polygnathus ensensis* conodont Zone). Theses sclerites were formerly known from the Middle Ordovician to the Lower Devonian (Sutton *et al.* 2001, Ferretti *et al.* 2006).

Sclerites of *Eurytholia* are similar in structure and range of variability to elements of the probable conodont *Pseudooneotodus*. The sclerites of *Eurytholia* hence likely represent a dental structures from a remain of a vertebrate having closer relationship to the *Pseudooneotodus* animal.

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