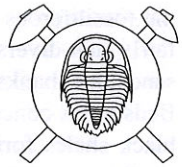
Discovery of the fossiliferous middle Berounian Vinice Formation at Cekov (Ordovician, western part of the Prague Basin)



Výskyt fosiliferních břidlic vinického souvrství (střední beroun) u Cekova (ordovik, západní část pražské pánve) (Czech Summary)

(2 text-figs., 1 plate)

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Occurrence of the fossiliferous Vinice Formation in a highway cutting at Cekov is remarkable in that it was omitted in all geological maps so far published. The black shales of the Vinice Formation are squeezed between the quartzites and sandstones of the Libeň Formation, and the dark clayey shales of the Dobrotivá Formation. The Letná Formation, which underlies the Vinice Formation almost everywhere in the Prague Basin, is either reduced to a few meters or it is absent totally. This anomalous development may be explained by extension of the Cerhovice flexure zone toward south-west up to the Cekov-Kařez area, where this structure acquired in the lower Berounian a form of a rising elevation distinguished by a strongly reduced sedimentation on its top; after this short-lasting rising episode, the marine sedimentation re-appeared again in the middle Berounian. Few typical trilobites and brachiopods are figured to support outr idea about the mid-Berounian age of the fossiliferous sequence.

Key words: Upper Ordovician, Prague Basin, Brachiopods, Trilobites

Along the longitudinal axis of the Prague Basin, the Vinice Formation extends from the Prague territory to Záluží; due to the post-Middle Devonian faulting and erosion, the western part of the Prague Basin is devoid of the mid-Berounian and later deposits with exception of the Plzenec syncline, where the Vinice Formation was discovered by Havlíček and Šnajdr (1957) between Tymákov and the Úslava River as a sequence of dark silty shales bearing fairly common benthic and planktic organisms (including graptolites); unfortunately, they did not compile the list of fossils. Kalat (1946) was the first who recorded the mid-Berounian benthic assemblage of the Vinice Formation in the Plzenec syncline.

Recently, the highway excavations east of Cekov (also western part of the Prague Basin) have discovred another relic of the fossiliferous Vinice Formation, which was omitted in all geological maps so far published. In the geological map 12-34 Hořovice (without Quaternary deposits, 1:50 000, 1984), the black shales, now exposed in the highway cutting, were erroneously attributed to the Dobrotivá Formation, although Bouček (1928) recognized their younger age, compiled a list of fossils, and assigned them correctly to the lowest Zahořany Formation in his concept (Vinice Formation in the present-day stratigraphic scale).

The Vinice Formation between Cekov and Kařez consists of steeply sloping, more than 100 m thick sequence of black shales with numerous flakes of muscovite on bedding planes, intercalated with dark silty shale and siltstone beds (about 6 m thick) in the median part of the outcrop; further, two lamprophyre dykes penetrate the Vinice Formation.

The biostratigraphic investigation in the area between Mýto, Cekov and Kařez was carried out by M. Šnajdr who did not accept the mid-Berounian age of

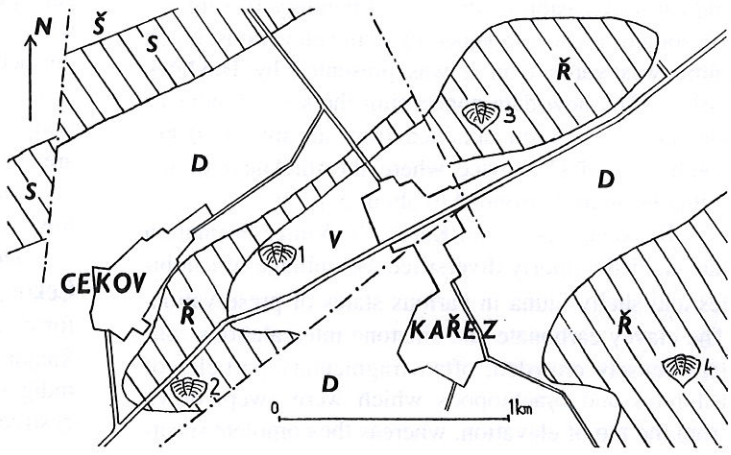


Fig. 1. Geological map of the Cekov-Kařez area (Quaternary deposits omitted)
D - Dobrotivá Formation, black shales with volcaniclastic intercalations; Ř - Libeň Formation, facies of the Řevnice Quartzite (quartzose sandstones intercalated with silty and sandy shales in upper part of the sequence); S - Dobrotivá Formation, facies of the Skalka Quartzite (thinly bedded to laminated dark sandstones and sandy shales; bedding planes overcrowded with flakes of muscovite); Š - Šárka Formation, dark shales with clusters of clayey carbonate ooids; V - Vinice Formation, black shales
Palaeontological localities: 1 - Vinice Formation east of Cekov (shelly fauna and trilobites revised in this paper); 2-4 - Palaeontological localities in the Řevnice Quartzite described by Šnajdr (1956) under the names Cekov (2), Zbiroh (3, south of the railway station), and Kařezská hora (4)

the fossiliferous dark shales. Šnajdr (1956) gathered a fairly rich-diversified shelly fauna and trilobites in the sandstone banks of the Libeň Formation (=Drabov Beds in his concept) and believed that the fossiliferous black shales formed only thick interlayers within the sandstone sequence of the Libeň Formation (lower Berounian) in spite of presence of the index mid-Berounian species *Zeliszkella deshayesi*.

The geological position of the mid-Berounian black-shale sequence near Cekov is puzzling. The Vinice Formation is situated between the outcrops of the Libeň Formation (mostly quartzites and sandstones) in the west and north, and the Dobrotivá Formation in the south. The Letná Formation, which everywhere separates the Vinice Formation from the earlier Libeň Formation (including the facies of the Řevnice Quartzite), is missing between Cekov and Kařez. Bouček (1928) supposed that the quartzite and sandstone sequence, with numerous black-shale intercalations in its upper part, ranged from the Drabov Beds to the Letná Formation.

According to our oppinion, the Letná Formation in the Cekov - Kařez area is either maximum few meters thick, or it is missing altogether. The extreme reduction of the Letná Formation cannot be explained in terms of the post-Ordovician (Variscan) faulting; unfortunately, the Quaternary weathering products obscured the contacts between the separate formations.

The presence of the Vinice Formation and supposed absence of the Letná Formation near Cekov indicate synsedimentary deformations of the trough. In the lower Berounian, a significant flexure zone suddenly appeared, which was parallel to the logitudinal axis of the Prague Basin, and ranged from Beroun in the north-east to Zdice, Žebrák, and Cerhovice in the south-west. As shown by Havlíček (1981), this structure was characterized by a short-lasting accelerated subsidence and very steep to vertical dipping of beds along its south-eastern flank. Locally, this structure (called Cerhovice flexure by Havlíček 1981) developed into a gradually rising elevation with strongly reduced deposits of the Libeň and Letná Formations on its top.

The geological situation in the Cekov-Kařez area indicates extension of the synsedimentary flexure zone, sometimes accompanied by rising elevations, much more westwards than it was presented by Havlíček (1981). The new data concerning the synsedimentary elevation have been obtained from an area 9-10 km south-west of Cerhovice where the thickness of the Letná Formation dropped to about 5-10 m.

Between Cekov and Kařez, the Vinice Formation has yielded a poorly diversified assemblage of trilobites and shelly fauna in various states of preservation. The clayey carbonate and siltstone intercalations contain densely crowded, often fragmentary particles of trilobites and brachiopods which were swept down from the top of elevation, whereas the complete specimens of trilobites are fairly common in the black clayey shales due to a temporary low-energy environment.

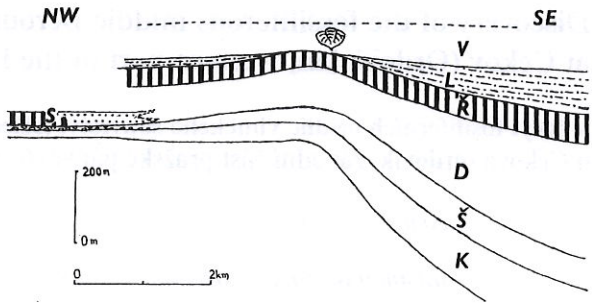


Fig. 2. Position of the Cekov locality (Vinice Formation, lower part of the middle Beroun) at the edge of the Cerhovice flexure
D - Dobrotivá Formation, black shales with volcanoclastic intercalations; K - Klabava Formation, grey-green shales and siltstones, often with tuffaceous admixture, - Letná formation; Ř - Libeň Formation, facies of the Řevnice Quartzite (quartzose sandstones intercalated with silty and sandy shales); S - Dobrotivá Formation, facies of the Skalka Quartzite (quartzites passing laterally into a sequence of thinly bedded to laminated dark sandstones and sandy shales). Š - Šárka Formation, dark shales; north west of the Cerhovice flexure developed as oolithic ironstones; V - Vinice Formation, black shales

The trilobites and brachiopods are accompanied by frequent bivalves (not determined), gastropod *Lophospira viator* (Barr.), hyolithid *Elegantilites* cf. *striatus* (Barr.), and very rare cystoids (*Anomalocystites* sp.).

The trilobite association at Cekov is poorly diversified as in other localities of the Vinice Formation and contains the forms, which were able to adapt to less favourble living conditions. Judging from the presence of numerous complete specimens of *Deanaspis senftenbergi* (H. & C.) and nearly complete specimens of *Dalmanitina elfrida* Šn. in the black clayey shales, the trilobites inhabited a quiet, soft-bottom, oxygen deficient, deeper-water environment beyond reach of the wave bases. The preservation of fauna in siltstone interlayers is different as shown by the fact that the valves of bivalves and brachiopods are accompanied by a lot of broken trilobites, namely by incomplete fringes of *Deanaspis senftenbergi* (H. & C.), thus indicating a short episode of a down-slope transport from the top of the rising zone.

The trilobite association contains several ecological types. The most common is *Dalmanitina elfrida* Šn. which is an epibenthic to nectobenthic element distinguished by well-developed eyes. A similar mode of life should be assigned to *Zeliszkella* (Z.) *deshayesi* (Barr.) (only cranidia and pygidia at hand), the eyes of which are clearly larger than those of the preceding species.

Stenopareia aff. *panderi* (Barr.) is a probable shallow-burrowing suspension feader bearing minute eyes.

Deanaspis senftenbergi (H. & C.) is frequent at Cekov; it is a blind sediment feader whose ancestral form *D. goldfussi* (Beyr.) was studied thoroughly by Šnajdr (1987) who called attention to the fine-grained indigested residue of the former sediment filling its digestive track.

Cyclopyge rediviva (Barr.) (only pygidia and cranidia at hand) is supposed to be a mesopelagic element. Further, the Cekov locality has yielded the first dindymenid trilobite so far discovered in the Vinice Formation (collection of Mr. Kozák). Unfortunately, this specimen was not available for our study. The list of trilobites should be completed by findings of fragments of *Selenopeltis inermis beyrichi* H. & C. (pleurae), *Nobiliasaphus* sp. (fragment of a cranidium), and *Prionocheilus pulcher* (Barr.) (only one cranidium).

Brachiopods are also common at Cekov, but they involve only two bottom-dwelling species, namely *Aegiromena aquilina* n. sp. and *Howellites* cf. *macrostoma* (Barr.), and rare epiplanktic elements [*Anx simplex* (Barr.)].

Base of the Vinice Formation: correlation between the Prague Basin (Perunica) and Ibero-Armorica

According to Villas (1992, 1995), the ironstone horizon (lower Fombuena Formation, Peña del Tormo Member), overlying the siltstones and sandstones with *Colpocoryphe grandis* (lower Berounian), is comparable in age not only with other fossiliferous ironstones in the Iberian Peninsula and north-western France, but also with the lowest Vinice Formation which is often developed as the Zdice-Nučice Iron Ore Horizon. The ironstones in the Iberian Peninsula are distinguished by a typical suite of mid-Berounian shelly fauna which supports the corelation of the lowest middle Berounian between the Prague Basin (Perunica) and Ibero-Armorica. In the Iberian Peninsula, the significant brachiopods of this stratigraphical level are *Jezercia chrustenicensis* (in the Prague Basin an index fossil in the Zdice-Nučice Iron Ore Horizon), *Gelidorthis meloui* (closely related to the Bohemian *G. partita*), *Aegiromena aquila intermedia* (closely similar to *A. aquilina* of the Vinice Formation), *Rostricellula ambigena* (in the Prague Basin, ranging from the Zdice-Nučice Iron Ore Horizon to the top of the Bohdalec Formation of the middle and upper Berounian), and *Svbobodaina armoricana* (an index genus in the middle and upper Berounian). With regard to the fact that this brachiopod assemblage overslies the sandstones with *Colpocoryphe grandis* (also present in the lower Berounian of the Prague Basin!), the suggestion published by Villas (1995) seems very probable; we suppose that this idea will be supported by new findings of fauna in the Ibero-Armorican region.

Systematic part

Aegiromena aquilina n. sp.

Pl. I, Figs. 1-3

Holotype. Pedicle valve figured on Pl. I, fig. 1; Museum at Rokycany, VH 281.

Type horizon and locality. Vinice Formation, Černín.

Exterior. Shell gently concavo-convex to nearly plano-convex, 9.5-14.0 mm wide, and 50-62 % as long as its maximum width. Pedicle valve subcircular to subrectangular, widest at hinge; in transverse and lateral profiles gently convex. Cardinal angles extend into very short ears. Ventral interarea apsacline, flat, striated parallel to its base; pseudodeltidium apical. Brachial valve slightly concave to nearly flat.

Costellae narrow and high, subangular, as broad as intercostal grooves, 12-14 per 2 mm anteriorly. New costellae, originating by intercalation, rapidly acquire the size of the adjacent ones; concentric lamellae sporadic.

Interior. Ventral muscle field as in other species of *Aegiromena*. Vascula media straight, broad, divergent. Papillae elongate, of uniform size. Brachial cavity surrounded by a narrow submarginal ridge.

Brachial valve interior as in *A. praecursor* Havl.; visceral field moderately raised but never undecut. Papillae surrounding the visceral field are somewhat coarser than the others.

Comparison. All bottom-dwelling aegiromenids occupying diverse environments in the Dobrotivá, Libeň and Letná Formations were assigned to *Aegiromena praecursor* Havl., which is more abundant in greywackes than in the shales. The earliest species that separated from the ancestral *A. praecursor* stock, is *A. aquilina* which is gently auriculate, 50-62 % as long as the width at the hinge, and possesses a low submarginal rim in its pedicle valve. On the other hand, *A. praecursor* (based mainly on the Blýskava population, topmost Letná Formation) is 44-53 % as long as wide, lacks the submarginal ridge in the pedicle valve, and its cardinal extremities are not drawn into ears. Although *A. aquilina* replaced *A. praecursor* in the mid-Berounian Vinice Formation, the boundary between them is not sharp. The shells coming from the uppermost Letná Formation at Zahořany are much more similar to *A. aquilina* than to *A. praecursor,* whereas the „typical" *A. praecursor* survived locally to the lowest Vinice Formation (e.g. sandy concretions in the dark shale sequence; Vysočany, former Plešner's brickyard).

A. aquila (Barr.) (Zahořany Formation; Havlíček 1967) is easily distinguishable from the new species in being rather large (13-20 mm wide), having mucronate cardinal extremities and finer costellae, and in lacking a submarginal ridge in the pedicle valve. Further, the length/width ratio ranges from 35 to 44 % in *A. aquila*, that of *A. Aquilina* is 50-62 %.

The coeval species *A. aquila intermedia* Villas (Fombuena Formation, basal ironstone, Iberian Chains; Villas 1992; ironstone above *Neseurethus* Sandstone, basal Cantera Shales, Central-Iberian Zone; Villas 1995) is rather similar to the new

Bohemian species. *A. a. intermedia* differs from *A. aquilina* in being somewhat smaller (maximum 10-11 mm wide) and nearly subcircular in outline with length relative to width ranging from 0.37 to 0.54 (Villas 1992), whereas the L/W ratio in the new species is 0.50-0.62. Further, the mucronation is always more accentuated in *A. a. intermedia* which is variably auriculate.

The pedicle valve interior of the Spanish species is distinguished by very weak impressions of vacula media, whereas the late adult specimens of *A. aquilina* have straight and broad, well-impressed vascula media with gently raised axial parts. Moreover, the pallial markings in the Bohemian species cross two suboval, gently raised pads (recalling those of the upper Berounian *A. descendens* Havl.) which have never been found in *A. a. intermedia.*

Occurrence. Vinice Formation, black-shale lithofacies, Cekov (highway cutting); Trubín; Černín; Modřany; Vysočany (locality Klíčov and area between the railway station and Sokolovská Street); Libeň (Nad Kolčavkou Street).

Howellites cf. *macrostoma* (Barrande, 1848)

Pl. I, Figs. 5, 6

Exterior. By overall shape of shell closely similar to *H. macrostoma* (Barr.) (Zahořany Formation; Havlíček 1977) but equally biconvex with steeply anacline to almost catacline dorsal interarea.

Ornamentation multicostellate; costellae angular, narrower than interspaces, 5-7 per 2 mm anteriorly, crossed by fine concentric rugellae; concave interspaces bear fine capillae much weaker than the adjacent costellae.

Interior. Dental plates short, massive, bounding the muscle field postero-laterally. Ventral muscle field subtriangular, slightly shorter than a third of the valve length, clearly impressed, with anterior margin curved towards the hinge line; diductor tracks moderately longer than the median adductor scar. Pallial markings deeply excavated, closely similar to those of *H. macrostoma*, lemniscate; vascula media split into a poor bundle of secondary branches at about two thirds of the valve length.

Brachiophores divergent, straight, moderately thickened along their bases. Cardinal process triangular in outline, occupying the whole area between the brachiophore bases, posteriorly cleft by a rather deep groove into two lobes. Dental sockets underlain by low pads of secondary shell material, fulcral plates absent. Dorsal muscle field quadripartite, anterior adductor scars slightly larger than the posterior pair.

Remarks. Owing to paucity of well preserved specimens, this species is preliminary described under the name *Howellites* cf. *macrostoma.* Although it is coeval with *„Mesodalmanella" bancrofti* Havl., is cannot be attributed to this species as the latter is distinguished by the ventri-biconvex lateral profile, non-lobate ridge-like cardinal process, and a peculiar arrangement of vascula terminalia which are directed postero-laterally to posteriorly near the cardinal angles as in the *Heterorthidae.* The last feature indicates (in association with other characters) a probable assignement of *„M." bancrofti* to the genus *Paurorthis.*

Occurrence. Vinice Formation (black-shales); highway cutting between Cekov and Kařez.

Deanaspis senftenbergi (Hawle & Corda, 1847)

Pl. I, fig. 4

1847 *Trinucleus Senftenbergii* nobis; Hawle & Corda, p. 156 pl. 3, fig. 17 (partim-non fig. 17b)
1847 *Trinucleus cribrosus* nobis; Hawle & Corda, p. 156
1847 *Trinucleus elegantulus* nobis; Hawle & Corda, p. 156
1847 *Tetrapsellium pulchrum* nobis; Hawle & Corda; p. 158, pl. 3, fig. 18
1852 *Trinucleus ornatus* Stnbg.; Barrande, p. 624 (partim!), pl. 29, figs. 2, 3, 5, 6; pl. 30, figs. 41-50, 53-55, 58-60. Non pl. 29, figs. 1, 4, 7-9 and pl. 30, figs. 51-52, 56-57 = *Marrolithus ornatus* (Stnbg.)
1940 *Onnia ornata* (Stnb.); Whittington, p. 244 (partim), pl. 1, figs. 1-6; pl. 2, figs. 1-7; pl. 3, figs. 1-5.
1959 *Onnia ornata* (Stnbg.); Whittington (in Moore et al.), figs. 100 A-B-C.
1966 *Marrolithus ornatus senftenbergi* (H. & C.); Havlíček & Vaněk, p. 55, pl. 11, fig. 4.
1969 *Marrolithus ornatus senftenbergi* (H. & C.); Přibyl & Vaněk, p. 117, pl. 12, figs. 1-9; pl. 13, figs. 1-8; pl. 14, figs. 1-9, text-fig. 13.
1975 *Marrolithus? senftenbergi* (H & C.); Čech, text-fig. 2, pl. 1, figs. 1-3, 5-6.
1975 *Deanaspis senftenbergii* (H. & C.); Hughes, Ingham & Addison, p. 573.
1976 *Deanaspis senftenbergi* (H. & C.); Přibyl & Vaněk, pl. 7, fig. 2.
1979 *Marrolithus senftenbergi* (H. & C.); Šnajdr, pl. 1, fig. 4.
1984 *Deanaspis senftenbergi* (H. & C.); Šnajdr, p. 191, pl. 1, fig. 8.
1990 *Deanaspis senftenbergi* (H. & C.); Šnajdr, p. 186.
1995 *Deanaspis goldfussi* (Barr.), p. 25 (partim), fig. 13/5, 7, 10, 11, 14 and fig. 14/5, 7. Non fig. 13/1-4, 8, 12 = *Deanaspis goldfussi* (Barr.), non fig. 13/9 = *Deanaspis parviporus* (Přibyl & Vaněk), non fig. 14/2-4, 8 = *Deanaspis goldfussi* (Barr.).

Remarks. After closing our information about the Cekov locality, F. Shaw published a paper dealing with the trinucleid trilobites of the Prague Basin. He (1995) assigned to *Deanaspis goldfussi* (Barrande, 1846) several lower and middle Berounian trinucleids inclu-

ding *D. senftenbergi* (Hawle & Corda, 1847). For this reason, he considers *D. goldfussi* as a long-ranging taxon appearing for the first time in the Řevnice Quartzite of the lowest Berounian (Libeň Formation), and surviving into the Vinice Formation of the middle Berounian. This point of view is peculiar in that almost no bottom dwelling fossils cross the lower/middle Berounian boundary because of a sudden change-over in lithology; the fossiliferous lower Berounian beds (quartzites, greywackes) were overlain with a succession of deeper-water black shales (Vinice Formation) which along a narrow rising zone were substituted by a shallow-water oolitic ironstone (Havlíček 1981, text-fig. 12; Havlíček 1982, text-fig. 6; Havlíček & Vaněk 1990). Due to the post-Ordovician faulting and erosion, no nearshore sediments and no nearshore faunas of the middle Berounian age have been preserved. That is why the Vinice Formation bears weakly diversified benthic fauna except for the proximity of the rising zones (see above).

Shaw (1995) investigated the trinucleids coming from the dark shales having yielded only more or less deformed and crushed specimens. On the other hand, the trilobite collection of one of us (J. V.) contains several undeformed trinucleids collected from the clayey carbonate nodules, not commonly occurring in the black-shale sequence of the Vinice Formation. One of us (J. V.) intends to compare the specimens of the Vinice nodules to those from the quartzites and greywackes of the Řevnice and Letná Formations (lower Berounian) to support - or not to support - the validity of *Deanaspis senftenbergi*, which is surely closely related to its precursor *Deanaspis goldfussi* from the Letná Formation.

Submitted September 14, 1995 *Translated by the authors*

References

Barrande, J. (1852): Systême silurien du centre de la Bohême. I^ere^ partie: Recherches paleontologiques. I. - Crustacés: Trilobites. Prague, Paris.

Bouček, B. (1928): Nález zahořanských vrstev d4 českého ordoviku u Cekova na Zbirožsku. - Čas. Nár. Mus., Odd. přírodověd., 171-172. Praha.

Čech, S. (1975): Cranidial reticulation and functional morphology of the cephalic fringe in Trinucleidae (Trilobita). - Věst. Ústř. Úst. geol., 50, 3, 173-177. Praha.

Havlíček, V. (1967): Brachiopods of the suborder Strophomenidina in Czechoslovakia. - Rozpr. Ústř. Úst. geol., 33. Praha.

- (1977): Brachiopoda of the suborder Orthida in Czechoslovakia. - Rozpr. Ústř. Úst. geol., 44. Praha.
- (1981): Development of a linear sedimentary depression exemplified by the Prague Basin (Ordovician-Middle Devonian; Barrandian area - central Bohemia). - Sbor. geol. Věd, Geol., 35, 7-48. Praha.
- (1982): Ordovician in Bohemia: Development of the Prague Basin and its benthic communities. - Sbor. geol. Věd, Geol., 37, 103-136. Praha.

Havlíček, V. - Šnajdr, M. (1957): Výsledky nového mapování v jižní části plzenecké synklinály. - Zpr. geol. Výzk. v R. 1956, 61-63. Praha.

Havlíček, V. - Vaněk, J. (1966): The biostratigraphy of the Ordovician of Bohemia. - Sbor. geol. Věd, Paleont., 8, 7-69. Praha.

- (1990): Ordovician invertebrate communities in black-shale lithofacies (Prague Basin, Czechoslovakia). - Věst. Ústř. Úst. geol. 65, 4, 223-236. Praha

Hawle, I. - Corda, A. J. C. (1847): Prodrom einer Monographie der Böhmischen Trilobiten. Praha.

Hughes, C. P. - Ingham, J. K. - Addison, R. (1975): The morphology, classification and evolution of the Trinucleidae. - Phil. Trans. Proc. Roy. Soc., 272, 920, 537-607. London.

Kalat, N. (1946): Příspěvek k poznání vrstev zahořanských českého ordoviku na Plzenecku. - Příroda, 28. Brno.

Mergl, M. (1978): Výsledky paleontologického výzkumu ordoviku v širším okolí Starého Plzence. - Sbor. Západočes. Muz., Příroda, 28, 1-70. Plzeň.

Přibyl, A. - Vaněk, J. (1969): Trilobites of the Family Trinucleidae Hawle et Corda, 1848 from the Ordovician of Bohemia. - Sbor. geol. Věd, Paleont., 11, 85-137. Praha.

- (1976): Palaeoecology of Berounian trilobites from the Barrandian area (Bohemia, Czechoslovakia). - Rozpr. Čs. Akad. Věd, Ř. mat.-přír. Věd, 86, 5, 1-40. Praha.

Shaw, F. C. (1995): Ordovician trinucleid trilobites of the Prague Basin, Czech Republic. - J. Paleont., 69, Mem., 40, 1-23. Menasha.

Šnajdr, M. (1956): Trilobiti drabovských a letenských vrstev českého ordoviku. - Sbor. Ústř. Úst. geol., Paleont., 22, 477-533. Praha.

- (1979): Two trinucleid trilobites with repair of traumatic injury. - Věst. Ústř. Úst. geol., 54, 1, 49-50. Praha.
- (1984): Revision of the trilobite type material of I. Hawle and A. J. C. Corda, 1847. - Sbor. Nár. Muz., Ř. B, Přírodověd., 39, 3, 129-311. Praha.
- (1987): On the digestive system of Deanaspis goldfussi (Barrande). - Čas. Nár. Muz., Odd. přírodověd., 256, 1/4, 8-16. Praha.
- (1990): Bohemian Trilobites. - Czech Geol. Surv. Praha.

Villas, E. (1992): New Caradoc brachiopods from the Iberian Chains (Northeastern Spain) and their stratigraphic significance. - J. Paleont., 66, 5, 772-793. Menasha.

- (1995): Caradoc through early Ashgill brachiopods from the Central-Iberian Zone (Central Spain). - Geobios, 28, 1, 49-84. Lyon.

Whittington, H. B. (1940): On some Trinucleidae described by Joachim Barrande. - Amer. J. Sci., 5, 238, 4, 241-259. New Haven.

- (1959) in *R. C. Moore* (edit.): Treatise on Invertebrate Paleontology, Part O, Arthropoda 1. Lawrence, Kansas.

Výskyt fosiliferních břidlic vinického souvrství (střední beroun) u Cekova (ordovik, západní část pražské pánve)

Zářez nově budované dálnice E5 u Cekova je pozoruhodný hojným výskytem fauny v černých břidlicích vinického souvrství, které bylo opomenuto na všech dosud vydaných geologických mapách. Neméně pozoruhodné je geologické postavení vinických břidlic, které jsou mezi Cekovem a Kařezem vklíněny mezi libeňské a dobrotivské souvrství, takže v jejich podloží chybí letenské souvrství na rozdíl od převážné části pražské pánve. Tento anomální vývoj u Cekova nejspíše souvisí s pokračováním cerhovické flexury, která místy přechází do periodicky se zvedajících elevačních zón, vyznačujících se mimořádně malými, několikametrovými mocnostmi letenského souvrství (např. u Žebráku a Cerhovic). U Cekova pak celé letenské souvrství chybí, neboť tam byly křemence s četnými břidličnými vložkami (libeňské souvrství) znovu zaplaveny mořem až ve středním berounu.

Vinické břidlice u Cekova jsou dosti fosiliferní, avšak jejich fauna je málo diversifikována. Převládají trilobiti několika ekologických typů; častí jsou i celí jedinci. Podstatně méně je brachiopodů. *Aegiromena aquilina* je popsána jako nový druh, význačný pro vinické souvrství.

Explanation of plate I

Figs. 1-3, 5, 6: photo V. Vokáč; Figs. 4, 6-10: photo O. Čejchan. All specimens deposited in the Museum at Rokycany.

1-3. *Aegiromena aquilina* n. sp. 1 - internal mould of pedicle valve (holotype), VH 281, x6.2; Černín. 2 - external mould of pedicle valve, VH 12834, x8.1, Trubín. 3 - internal mould of brachial valve, VH 12837b, x5.2, Praha-Vysočany.

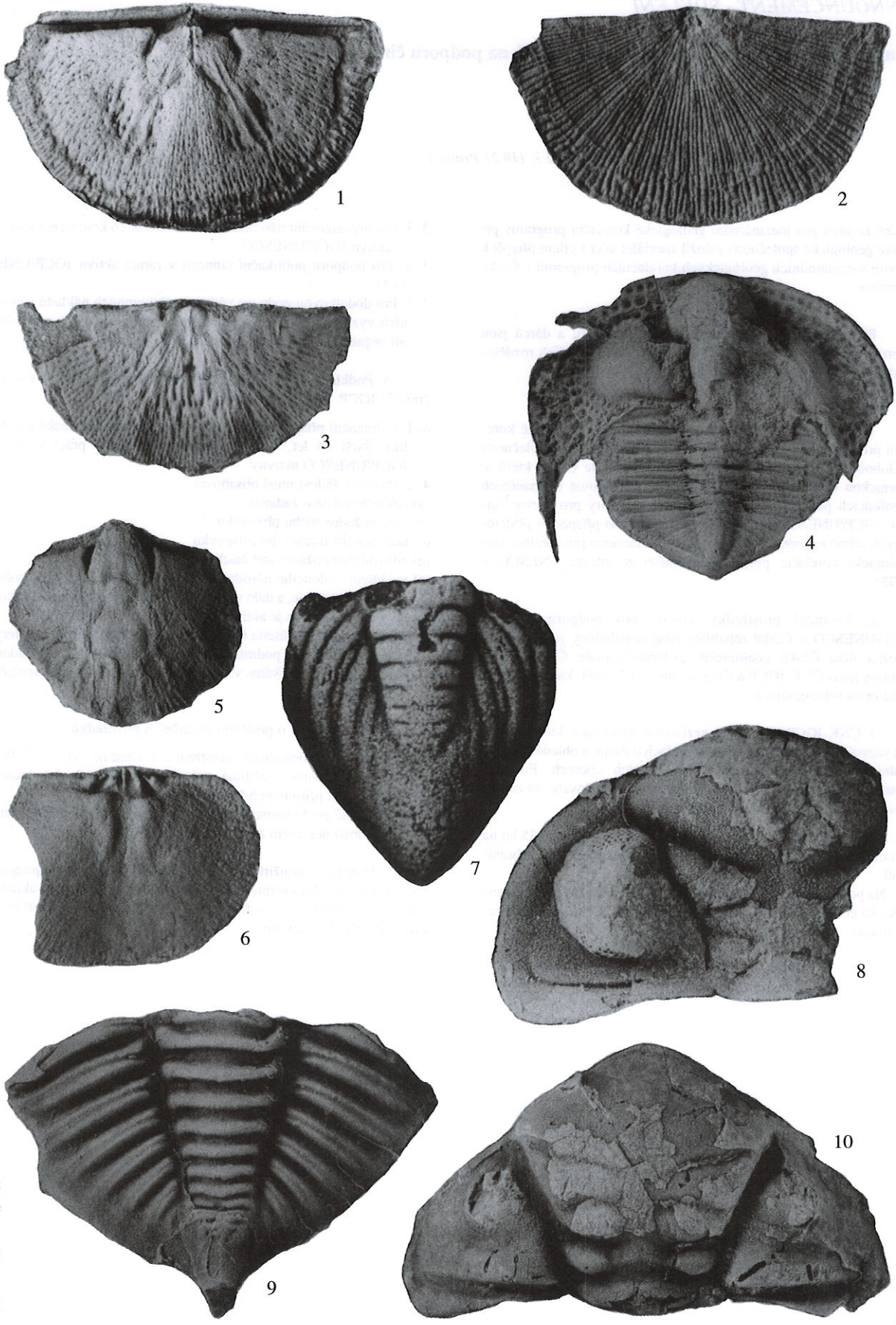
4. *Deanaspis senftenbergi* (Hawle & Corda), OMR, 1031. x2.2, Cekov

5, 6. *Howellites* cf *macrostoma* (Barrande). 5 - internal mould of pedicle valve, VH 12835, x4.2, Cekov. 6 - internal mould of brachial valve, VH 12836a, x5.3, Cekov.

7, 8. *Zeliszkella deshayesi* (Barrande). - pygidium, internal mould, OMR, 1032, x1.7, Cekov. 8 - incomplete cephalon, internal mould, OMR, 1033, x3.9, Cekov.

9, 10. *Dalmanitina elfrida* Šnajdr. 9 - pygidium, internal mould, OMR, 1034, x2.4, Cekov. 10 - cephalon, internal mould, OMR, 1035, x1.7, Cekov.

V. Havlíček - J. Vaněk - V. Vokáč: Discovery of the fossiliferous middle Berounian Vinice Formation at Cekov ....(Pl. I)



For explanation see p. 60