

Remarks to the palaeobiology and taphonomy of illaenid trilobites (Ordovician, Barrandian area, Czech Republic)

Poznatky o paleobiologii a tafonomii illaenidních trilobitů (ordovik, Barrandien, Česká republika) (Czech summary)

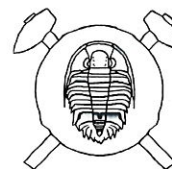
(3 text-figs, 1 plate)

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Recent revision of the Family Illaenidae Hawle et Corda, 1847 in the Ordovician of the Prague Basin has resulted in new observation on their palaeobiology and taphonomy. Concavely bent exoskeletons of *Ectillaenus* Salter, 1867 are here interpreted as of the exuviation origin rather than reflecting the life position interpreted by several previous authors. Specimens of illaenid trilobites showing possible relationships to some ichnofossils are also reported.

Key words: Illaenidae, Trilobita, Ordovician, Prague Basin, Bohemia, palaeobiology, exuviation, ichnofossils, taphonomy



Introduction

The Family Illaenidae Hawle et Corda, 1847 includes the most common Ordovician trilobites of the Prague Basin (Bohemia). More than a half of 18 illaenid species from this area were described by J. Barrande (1846a, b, 1852, 1856, 1872). The first author who discussed their mode of life was Siegfried (1939) who argued that representatives of the genus *Illaenus* Dalman, 1827 actively moved and swam on the sea bottom. The intensive study of illaenid palaeoecology has started in the 80's of our century.

Supposed mode of life

Bergström (1973) found several illaenid trilobites in the Scandinavian Ordovician in what he interpreted as their burrows. The cephalon was in the horizontal position and the rest of the body was directed obliquely to the substrate. Bergström (1973) interpreted this configuration of body as a living position, assuming that the posterior end of trilobite body was hidden in the narrow burrow. He postulated a similar mode of life for the species of genera *Illaenus* Dalman, 1827, *Ectillaenus* Salter, 1867, *Nanillaenus* Jaanusson, 1954, *Panderia* Volborth, 1863, *Platillaenus* Jaanusson, 1954 and *Stenopareia* Holm, 1886.

Příbyl – Vaněk (1976) supposed that illaenids were good swimmers living near the sea bottom in deeper parts of the cold Ordovician sea. According to them, illaenids were able to search for food by scraping the upper layers of the substrate.

Schmalzfuss (1978) concluded that illaenids were filter feeders, resting on the substrate or in a shallow scraping thereon, with the posterior and anterior ends of the exoskeleton elevated. Schmalzfuss (1978) suggested that they generated a flow of water by the action of exites and

filtered it. This configuration of a concavely bent trilobite exoskeleton was regarded as a life position by Seilacher (1985).

The most recent author to discuss the palaeoecology of illaenid trilobites was Whittington (1997) who considered that many illaenids may have been vagrant benthos, particularly well adapted for negotiating over irregular surfaces.

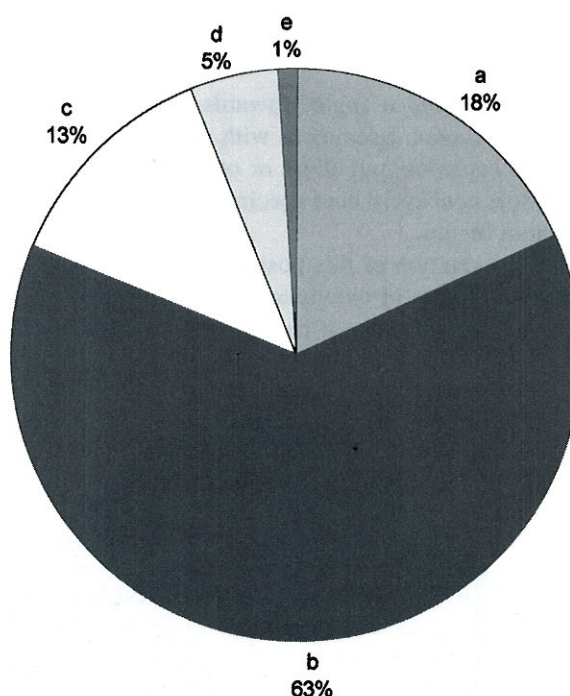


Fig. 1. Graph of the percentual distribution of the different position of the thorax of *Ectillaenus* Salter, 1867. a – enrolled specimens, b – concavely bent specimens, c – specimens with straight thorax, d – convexly bent specimens, e – other positions of thorax.

New remarks to the supposed mode of life

Recent revision of the Family Illaenidae Hawle et Corda, 1847 in the Ordovician of Bohemia resulted in several observations on their palaeobiology and taphonomy.

Many complete specimens of the genus *Ectillaenus* Salter, 1867 from the siliceous concretions of the Šárka and Dobrotivá Formations (Darriwilian) were found with the thorax curved concave upwards with the cephalon and pygidium approximately in the horizontal plane. This was previously considered as the life position (see above) and the most common mode of preservation in these trilobites (Fig. 1), enrolled specimens and specimens with the straight thorax are less common.

Old collections from the Šárka and Dobrotivá Formations include several tens of specimens of *Ectillaenus katzeri katzeri* (Barrande, 1856), *E. sarkaensis* (Novák, 1918), *E. advena* (Barrande, 1872), *E. benignensis* (Novák, 1918), bent as described above. In several specimens a disarticulation of exoskeleton is observable. The cephalon does not continuously pass in to the concave-

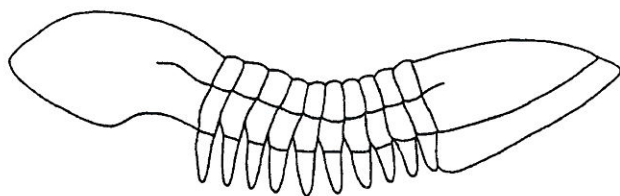


Fig. 2. *Ectillaenus katzeri katzeri* (Barrande, 1856). Lateral view on the concavely bent specimen. x1.

ly bent thorax but it angled towards a left or right side against the thorax. Specimens with some pleurae underlying the cephalon, pygidium or other pleurae are common. Most concavely bent specimens lack librigenae or hypostom in situ.

One explanation of this position could be that it had developed during of exuviation. Henningsmoen (1973) discussed several ways of recognizing moulted exoske-

letons. Two of these characters are open ecdysial lines (cephalic sutures) and the tendency to the same type of position of the exoskeleton. These, combined with the absence of hypostom and librigenae, suggest an exuvial origin in the studied specimens which show the different stages of exoskeleton disarticulation. In several examples the water flow had moved the empty exoskeletons and deposited them above other exuviae.

Remarks to the taphonomy of illaenid trilobites

The specimens of illaenid trilobites showing possible relationships to some ichnofossils were found in the course of their revision.

Cephalae and pygidia of meraspid and early holaspid ontogenetic stages of illaenid trilobites arranged in the rows or clusters and associated with the shells of minute brachiopods, ostracods or gastropods are known from the Barrandian Ordovician. Such a phenomenon occurs in the case of specimens of *Ectillaenus benignensis* (Novák, 1918) from the Dobrotivá Formation (Darriwilian) and *Zetillaenus wahlenbergianus* (Barrande, 1846) from the Králův Dvůr Formation (Ashgillian). Mikuláš – Kordule (1998) described similar arrangements of fossils from the siliceous concretions of the Šárka Formation as ichnofossils representing fecal possibly deposited in tunnels as sites for microbial cultivation and consumption. Illaenid trilobites, especially their early ontogenetic stages, were probably an easy prey of different predators because of their small dimensions.

According to Havlíček – Vaněk (1990) and Havlíček – Vaněk – Fatka (1993) this association of different invertebrates could represent the nature assemblage of specimens, which inhabited algal thalli and lived above the sea floor.

Concave, variably long and branched passages are common on the internal moulds of cephalae and pygidia of *Ectillaenus* Salter, 1867 from siliceous concretions and quartz sandstones of the Šárka Formation (Darriwilian) and on cephalae and pygidia of *Stenopareia* Holm, 1886 from the Zahořany Formation (Caradoc). According

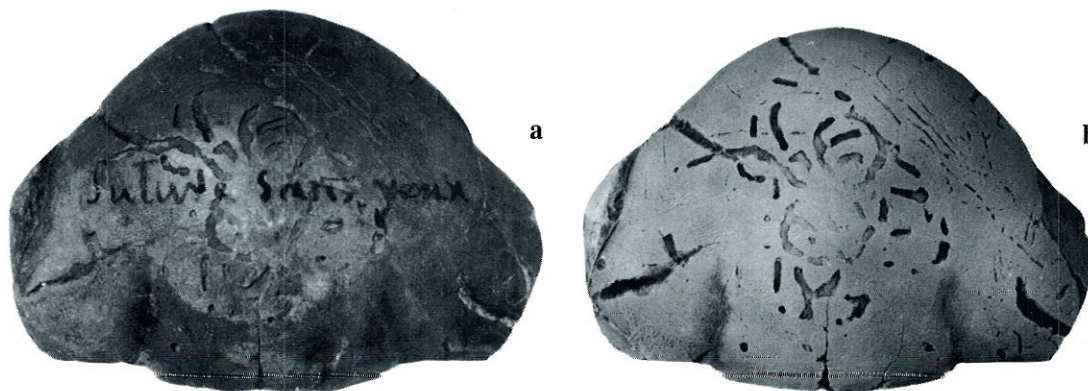


Fig. 3a, b. *Ectillaenus katzeri katzeri* (Barrande, 1856). NM L 32627, x1.2. Cranidium with *Arachnostega* Bertling, 1992. a – cranidium with the original Barrande's hands writing.

to R. Mikuláš (pers. comm.), they represent the ichnogenus *Arachnostega* Bertling, 1992. *Arachnostega* involved net-like passage systems probably after the covering and filling of the exoskeletons by sediment. The organic remains may have been consumed by the trace markers of *Arachnostega* prospectively polychaete worms, or, more probably, they are concerned with the specific domichnia (i.e. dwelling burrows).

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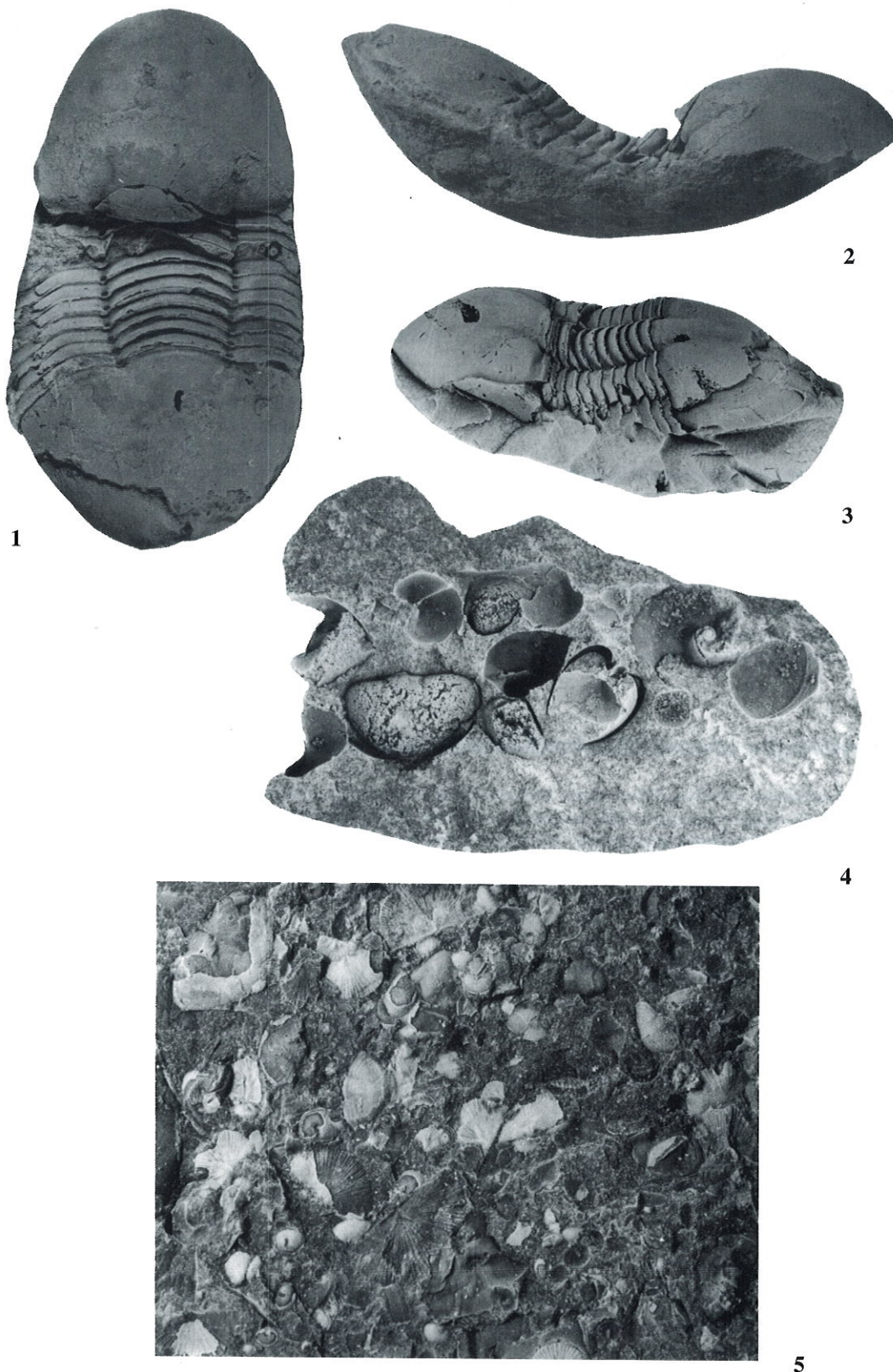
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Při revizi illaenidních trilobitů z ordoviku pražské pánve byly zjištěny některé nové poznatky o jejich paleobiologii a tafonomii. V práci je interpretována exuviace jako jedna z možností vzniku konkávně prohnutého exoskeletonu zástupců rodu *Ectillaenus* Salter, 1967 z křemitých konkrecí šáreckého souvrství. Některými badateli byla tato pozice krunýře illaenidních trilobitů považována za životní polohu. Dále jsou uvedeny vztahy illaenidních trilobitů k některým ichnofosiliím.

J. Slavíčková: Remarks to the palaeobiology and taphonomy of illaenid trilobites (Pl. I)



1. *Ectillaenus katzeri katzeri* (Barrande, 1856). Almost complete specimen. NM L 32636, x1.4. Osek, Šárka Formation.
 2. *Ectillaenus katzeri katzeri* (Barrande, 1856). Lateral view. NM L 32 636, x1.5. Osek, Šárka Formation.
 3. *Ectillaenus katzeri katzeri* (Barrande, 1856). Lateral view. NM L 33037. x1.5. Šárka, Šárka Formation.
 4. *Ectillaenus benignensis* (Novák, 1918). Cranidium of young meraspid specimen. NM L 33041, x4. Šárka, Šárka Formation.
 5. *Zetillaenus wahlenbergianus* (Barrande, 1846). 3 pygidia of young meraspid specimens. NM L 33040, x4. Levín, Králův Dvůr Formation.
- All figured specimens deposited in the National Museum of Prague.