

***Lobetelson mclaughlinae* n. gen., n. sp., a new genus and species of belotelsonid malacostracan from the Pennsylvanian of the Mazon Creek area**

Frederick R. SCHRAM

Department of Biology, University of Washington, Seattle, WA (USA)

Mailing address: Post Box 1567, Langley, WA, 98260 (USA)

fschram@u.washington.edu

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ABSTRACT

Lobetelson mclaughlinae n. gen., n. sp. from the well-known Mazon Creek faunas of the Pennsylvanian (Carboniferous) of northeastern Illinois, USA, shares features in common with *Belotelson magister* (Packard, 1886), such as eight pairs of uniramous reptant thoracopods and a generalized caridoid body plan. The similarities are such that specimens of both species originally were mixed in museum and private collections of the fauna. However, *L. mclaughlinae* n. gen., n. sp. is distinguished by its more gracile thoracopods, extremely long rostrum (at least equal in length to the carapace), and a wide tail fan formed by broad lobate uropodal rami. In contrast, *B. magister* is now understood to possess more robust thoracopods, with a relatively short rostrum, and very styliform uropodal rami.

KEY WORDS

Crustacea,
Decapoda,
Belotelsonidea,
Carboniferous,
Mazon Creek fauna,
Belotelson,
Lobetelson n. gen.,
new genus,
new species.

RÉSUMÉ

Lobetelson mclaughlinae n. gen., n. sp., un genre et une espèce nouveaux de malacostracé Belotelsonidae du Pennsylvanien de la région de Mazon Creek.

Lobetelson mclaughlinae n. gen., n. sp., trouvé dans la célèbre faune de Mazon Creek du Pennsylvanien (Carbonifère) du nord-est de l'Illinois, USA, présente des caractères en commun avec *Belotelson magister* (Packard, 1886), tels que huit paires de thoracopodes uniramés servant à la reptation et un plan d'organisation générale du corps de type caride. Les similarités sont telles qu'à l'origine des spécimens des deux espèces ont été mélangés dans les muséums et les collections privées. Néanmoins, *L. mclaughlinae* n. gen., n. sp. se distingue par ses thoracopodes plus graciles, son rostre extrêmement long (au moins égal en longueur à la carapace) et un large éventail caudal formé de grands rami uropodaux lobés. Au contraire, *B. magister* est maintenant interprété comme possédant des thoracopodes plus robustes, avec un rostre relativement court et des rami uropodaux très styliformes.

MOTS CLÉS

Crustacea,
Decapoda,
Belotelsonidea,
Carbonifère,
faune de Mazon Creek,
Belotelson,
Lobetelson n. gen.,
genre nouveau,
espèce nouvelle.

INTRODUCTION

Packard (1886) described the genus and species *Belotelson magister* from a single specimen from the famous Mazon Creek faunas of northeastern Illinois, USA. The single specimen was of a distinctive form and featured the partial preservation of the ventral thorax, the pleon, and the tail fan. In his redescription of the species, Schram (1974) had additional, but still only a limited amount of, material available for study.

However, the problem in studying fossils of these localities resides in the manner of preservation of the Mazon Creek fauna. Not all Konservat-Lagerstätten are alike in preservation. The well-known Middle Pennsylvanian, Mazon Creek area has a fossil biota preserved in ironstone concretions, the study of which can be difficult since fine details are often lacking. While whole bodies can be preserved, these are often expressed only as color differences in the rock and as kaolin replacement of the original organic material. In contrast, Konservat-Lagerstätten such as Bear Gulch (Schram & Horner 1978) and the Pennsylvanian black shales in North America (Schram 1984) are capable of fine, extremely detailed preservation. It was because of these taphonomic constraints and technical limits to the methods of study at that time that the 1974 study of *Belotelson* had problems.

Fortunately, since the 1970s the Mazon Creek collections of the paleo-biota in the Field Museum of Natural History have continued to grow, both through collections made by staff, and as donations and bequests made by amateur collectors. Several thousand specimens of *B. magister* and the new taxon described below are now housed there, at least an order of magnitude greater than what was available for study from all the private collections of northern Illinois in the 1960s and 1970s. The recognition of a new taxon in combination with sufficient material of *B. magister* now allows a more accurate description, reconstruction, and reassessment of the Mazon Creek belotelsonids.

All materials used in this study are deposited in the fossil invertebrate collections of the Field Museum of Natural History, Chicago, Illinois, and the specimen numbers are designated with the prefix PE.

SYSTEMATICS

Order BELOTELSONIDEA Schram, 1981

DIAGNOSIS. — Well-developed carapace free from thoracic segments, covering thorax, with a well-developed optic notch and large lateral branchiostegal expansion; no maxillipeds, all eight thoracopods with robust endopods, without exopods; pleopods as biramous flaps, uropodal rami large and variously developed; telson longer than wide, narrowing distally, with limited sub-terminal lobes.

Family BELOTELSONIDAE Schram, 1974

TYPE GENUS. — *Belotelson* Packard, 1886.

DIAGNOSIS. — The diagnosis of the family is the same as that of the order.

Genus *Belotelson* Packard, 1886

TYPE SPECIES. — *Acanthotelson magister* Packard, 1886.

OTHER SPECIES INCLUDED. — *B. traquairi* (Peach, 1882) (see Schram 1981).

DIAGNOSIS. — Moderate to large belotelsonid, with well-sclerotized cuticle; rostrum half length of carapace, mid-line pore on carapace near posterior margin; uropods styliiform; telson bearing well-developed caudal furca near terminus.

REMARKS

This diagnosis is modified from Schram (1974) in regards to the length of the rostrum and the styliiform nature of the uropods. The original variability of the rostrum and the lobate nature of the uropodal rami arose from mixing and confusing specimens of this species with that of the newly recognized genus and species herein, *Lobelteson mclaughlinae* n. gen., n. sp.

Belotelson magister (Packard, 1886)
(Fig. 1C)

Acanthotelson magister Packard, 1886: 127.

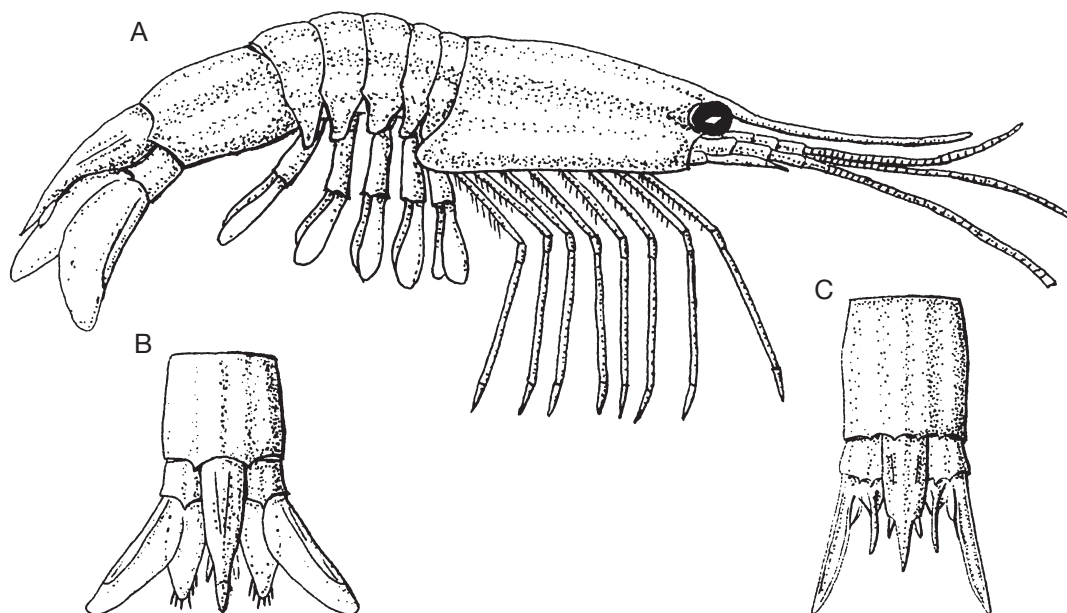


FIG. 1. — Reconstructions of belotelsonids: **A, B**, *Lobetelson mclaughlinae* n. gen., n. sp.; **A**, lateral view; **B**, tail fan; **C**, *Belotelson magister* (Packard, 1886), tail fan.

Belotelson magister (Packard, 1886): 128 (footnote). — Van Straelen 1931: 13. — Brooks 1962: 206; 1969: 343. — Schram 1969: 218; 1974: 30–43 (in part), figs 19–22, 24–26; 1981: 64. — Factor & Feldmann 1985: 344–348, fig. 12.

DIAGNOSIS. — Rostrum thin, rarely exceeding 60% length of carapace; thoracopods reptant in function with relatively short ischium, carpus relatively wide, merus and propodus both very long; thoracic sternites wide; pleomer al pleura deep, rather excavated on their anterior margins, somewhat pointed ventrally, not marked by any noticeably thickened margins; uropodal rami robust, rather styliform or blade-like.

DESCRIPTION (EMENDED FROM SCHRAM 1974)

Tail fan as illustrated (Fig. 1C). Uropodal exopod consists of long, well-sclerotized blade, reinforced along margins with thickened ribs, and bearing short, membranous portion at its proximal medial margin. Exopod about half again as long as endopod. Uropodal endopod consists of a somewhat oval, membranous, proximal proportion from which well sclerotized, posteriorly directed spike arises; spike extends to just short of level of telson terminus. Telson long, sub-triangular, and noticeably nar-

rowing at about 3/4 its length and terminating in narrow pointed process; at narrowing point, pair of posteriorly directed, caudal furca arises. Tail fan features best illustrated on specimens PE 22723, 23724, and 37907.

Rostrum prominent, averaging about 60% length of carapace. Of some 20 specimens for which both lengths could be measured, length of carapace averages 16.68 mm and rostrum averages 9.84 mm.

Certain specimens with palps of maxillules and maxillae preserved (only gnathobases noted in Schram 1974). Specimens PE 9760 and 36969 seem to display maxillules with 4-segment palp re-curved from anterior midline of the gnathobase and directed laterally. Specimens PE 9790 and 13005 indicate that maxilla palp of at least four segments directed anteriorly from anterior aspect of gnathobase.

REMARKS

Belotelson magister was distinguished from *B. traquairi* (Peach, 1882) by Schram (1979). *Belotelson traquairi* generally has a deeper rostrum at its proximal end; the thoracopodal endopods display a relatively

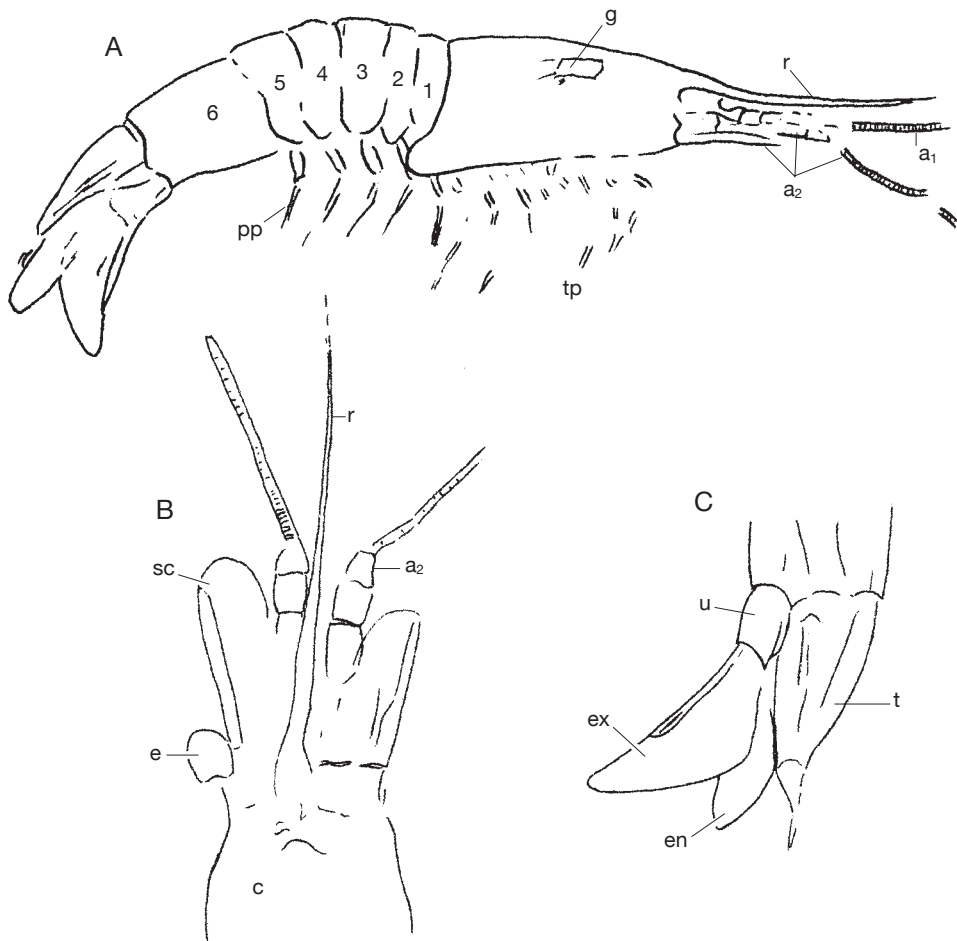


FIG. 2. — *Lobetelson mclaughlinae* n. gen., n. sp., camera lucida drawings of specimens: **A**, lateral view of whole specimen (holotype, PE 21556); **B**, dorsal anterior aspect of the cephalothorax revealing long thin rostrum, antennae and scaphocerite, and large compound eye (PE 34657); **C**, close-up of tail fan with lobate uropods (PE 21556), counterpart. Abbreviations: 1-6, pleomeres 1-6; a₁, antennule; a₂, antenna; c, carapace; e, compound eye; en, endopod; ex, exopod; g, gut trace; pp, pleopods; r, rostrum; sc, scaphocerite; t, telson; tp, thoracopods; u, uropodal protopod.

long ischium; the pleomeral pleura are rounded with well-marked thickened margins. Both species share a rostrum of modest length, prominent optic notches, a posterior median pore on the carapace, and broad thoracic sternite.

Factor & Feldmann (1985) discovered *Belotelson* in the Bear Gulch fauna, in the Upper Mississippian of Montana, USA, not recorded by Schram & Horner (1978). They ascribed their specimens to *B. magister*. This material should be restudied carefully. Factor & Feldmann's (1985: 343, 344)

clear, concise description of the specimens reveals some features distinct from both *B. magister* and *B. traquairi*. The rostrum bears a marginal fold and mid-dorsal ridge; the pleomeral pleura are rather ovoid in outline with thickened margins; the telson bears a medial ridge and two lateral grooves. No note is taken of any posterior medial pore on the carapace. These particular Bear Gulch specimens have not been examined during this study; nevertheless, I suspect that the material may represent a separate species. Hence, the genus *Belotelson* may

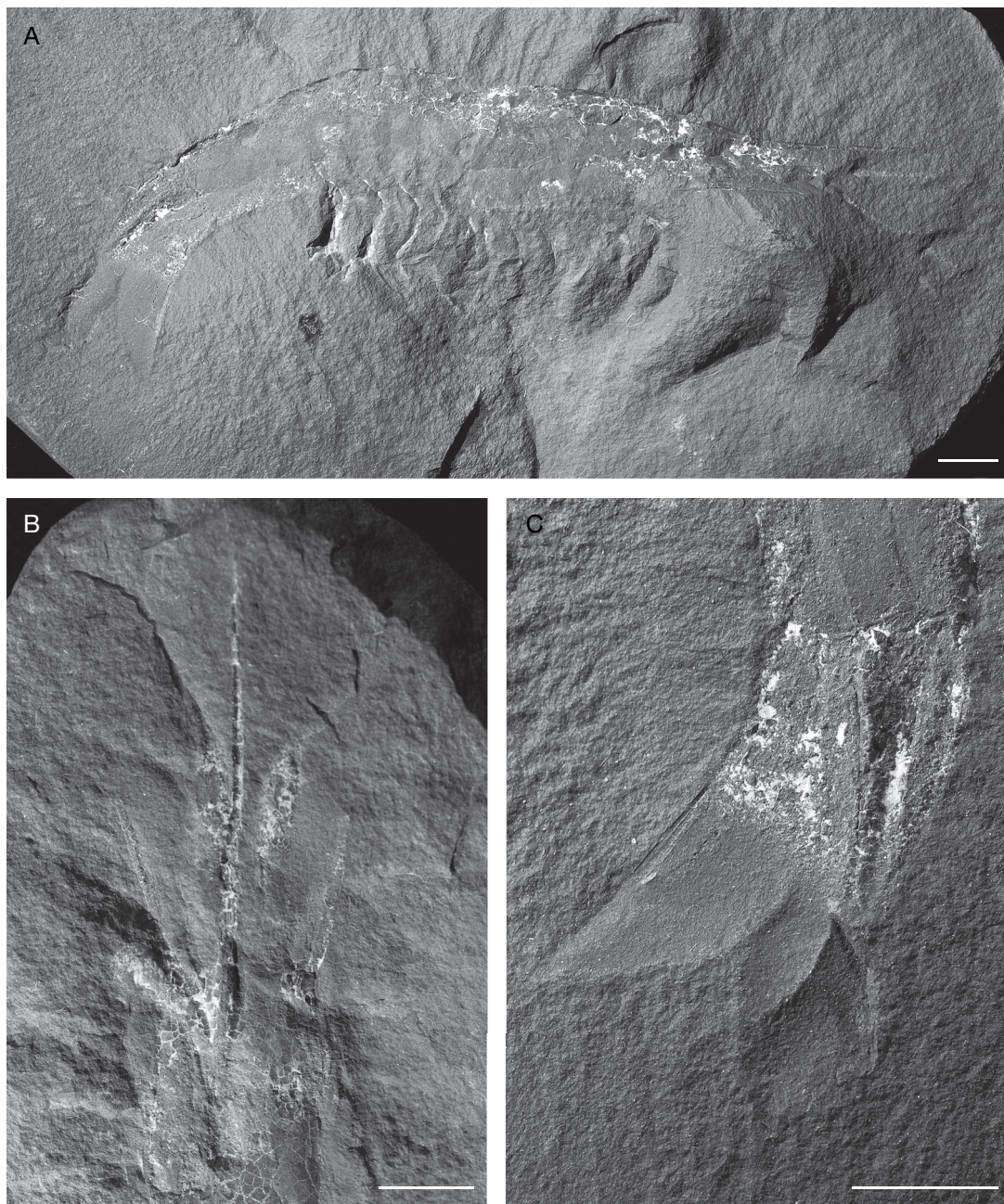


FIG. 3. — *Lobetelson mclaughlinae* n. gen., n. sp.: **A**, lateral view of whole specimen (holotype, PE 21556); **B**, dorsal anterior aspect of the cephalothorax revealing long thin rostrum, antennae and scaphocerite, and large compound eye (PE 34657); **C**, close-up of tail fan with lobate uropods (PE 21556), counterpart. Scale bars: 5 mm.

actually contain three species, or there may be basis for erecting a third genus in the group.

The Bear Gulch *Belotelson* seems to bear some similarities to a single specimen, PE 5102, in the fossil invertebrate collections of the Field Museum. This material, designated simply as *Belotelson* sp. on the label, is from Knox County in Illinois, in Knox Township, T11N, R2E. No details as to stratigraphic horizon are provided. The specimen consists of a large tail fan on black shale. The telson appears to have had a median ridge. The uropodal exopods are equipped with reinforced, well sclerotized lateral margins in addition to what appear to be setose median margins.

Genus *Lobetelson* n. gen.

TYPE SPECIES. — *Lobetelson mclaughlinae* n. sp.

ETYMOLOGY. — Named for the lobate form of the uropodal rami, and an anagram of “Belotelson”.

DIAGNOSIS. — Moderate to small belotelsonid; rostrum length approximately equal to carapace length, gently curving upward along its length. Thoracopodal endopods long, thin, slit-like, with propodus extremely long. Uropodal rami distinctly lobate, apparently thin and not well sclerotized.

REMARKS

The distinctive form of the rostrum and the unique tail fan warrant a separate genus for this species.

Lobetelson mclaughlinae n. sp.

(Figs 1A, B; 2; 3)

Belotelson magister – Schram 1974: 32–40 (in part), figs 23, 28, 29.

DIAGNOSIS. — The diagnosis of the species is the same as that of the genus.

HOLOTYPE. — PE 21556 (Field Museum of Natural History).

ETYMOLOGY. — Named in honor of Dr Pat McLaughlin for her well-recognized work on reptant malacostracans.

HORIZON. — Middle Pennsylvanian, Desmoinesian, Francis Creek Shale.

MATERIAL EXAMINED. — Other specimens specifically examined and/or measured in the fossil invertebrate collections of the Field Museum of Natural History, Chicago: PE 8507, 12308, 13696, 13783, 15286, 15413, 15550, 15824, 15922, 15940, 19836, 22729, 22730, 23728, 30023, 34131, 34218, 34241, 34274, 34275, 34562, 34657, 37317, 37760.

DESCRIPTION

Carapace smooth, undecorated, completely enveloping thorax; bearing narrow, pointed, elongate, dorsally curved rostrum approximately equal in length to carapace. Of some 30 specimens measured for carapace and rostrum length, carapace averages 14.24 mm, rostrum 14.46 mm. Pair of large, spherical, compound eyes occupying prominent optic notches (PE 15530, 34657).

Antennules composed of large, very robust peduncle of four segments and well-developed flagella (PE 21556). Antennae with robust peduncle of apparently three segments, bearing long flagellum (PE 23728). Scaphocerite with thickened lateral margin extending forward; medial margin as rounded, membranous scale; scaphocerite about 1/2 length of rostrum; antennal peduncle somewhat longer than scale (PE 34657).

Thoracopods not particularly well preserved except on PE 34269 and PE 45648. Coxa, basis, and ischium short; merus very long. Beyond knee, carpus short, propodus very long, dactylus short and terminally pointed. (Entire battery of thoracopods gives impression of thin and stilt-like array.)

First five pleomeres more or less subequal; pleura somewhat excavated posteriorly, but ventrally slightly rounded (PE 37317); margins of pleura not thickened. Sixth pleomere very long; equal in length to any two anterior pleomeres together (PE 23728). PE 37317 apparently preserves fine setae along posterior margins of proximal endopodal segments. PE 21556 preserves clusters of what appear as dendrobranchiate gills under posterior lateral aspect of carapace and at base of posterior-most thoracopods.

Uropods very elongate and broad. Exopod bears reinforced lateral margin for about 2/3 of length, beyond which exopod developed as more membranous portion; somewhat attenuated medio-distally (PE 21556, 34657). Endopod completely membranous

and somewhat pointed distally (PE 13696, 21556). Telson thin, long, and distally pointed (PE 34657). Because of membranous uropodal rami, determining distal configuration on telson difficult; PE 113696 preserves some indication of two, broad furcal lobes flanking telson terminus; telson with proximally broad, raised, median keel (PE 13696, 21556, 23728, 37076). Finally, while evidence ambiguous, terminal-most portion of telson possibly developed as articulated spine (PE 21556, 34275), though preservation of telson terminus generally not good enough to distinguish between real suture or imperfections of preservation.

DISCUSSION

The recognition of another species of belotelsonid in the Mazon Creek Essex Fauna continues the reassessment of the paleo-biota of this Middle Pennsylvanian locality begun by Schram (in press). More and better specimens as well as improved optical instruments and methods of study allow us to increase our insight into this locality. These will undoubtedly not be the last such discoveries to be made. It is also reassuring to note that the diversity and distribution of the Paleozoic Belotelsonidea continues to improve as well. We now have at least two genera with probably, as a minimum, four species of these Late Paleozoic lobsteroids.

Brooks (1962, 1969) had lumped together a diverse array of Paleozoic malacostracans, including *Belotelson*, into a group he termed Eocaridacea. The problem with this "order" was that it brought together a variety of taxa that were united only based on plesiomorphies, e.g., see the definition in Schram (1974: 30). Some of the taxa that Brooks originally included in the eocaridans have since been allocated to other higher taxa as they were discovered to share apomorphies with these groups, e.g., the palaeostomatopods are now within Hoplocarida, *Peachocaris strongi* (Brooks, 1962) is allied with the Lophogastrida (Schram 1986), and the pygocephalomorphs are currently understood as an order of Peracarida.

Several of the Paleozoic caridoid taxa are still problematical, e.g., *Essoidea epiceron* Schram, 1974,

a caridean-like creature but with eight swimming thoracopods, and the genus *Anthracocephausia* Peach, 1908. To this category of taxa of "uncertain affinities" we also might include the belotelsonids. What the problem entails is a case wherein a series of taxa that together display many primitive features possess a set of distinct derived features unique to each group. Schram (in press) recognized a similar pattern within the proto-mantis shrimp, wherein a diverse array of taxa in effect formed a series of stem-clades that taken together constitute a paraphyletic transition to Unipeltata, the crown-group of stomatopods. The details of the transition series for Eumalacostraca are not yet clearly in focus. However, the belotelsonids, as well as some of the other eocaridans, probably form components of this stem transition. Membership in such a paraphyletic array was strengthened when the analysis of Schram & Hof (1998) uncovered a separate status near the very base of the eumalacostracan clade for the "syncarid" order Bathynellacea separate from their traditional placement with Anaspidacea within a superorder Syncarida.

We have much to learn yet about the early history of the eumalacostracans.

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