Rev. bras. paleontol. 17(3):275-288, Setembro/Dezembro 2014

doi: 10.4072/rbp.2014.3.01

# CONTRIBUTION TO THE KNOWLEDGE OF THE GENUS *PYGOCEPHALUS* HUXLEY, 1857: MORPHOLOGY AND TAXONOMY

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ABSTRACT – A morphological revision of the type species of the genus *Pygocephalus* Huxley, *P. cooperi* Huxley, brought out not only its redefinition but also the emend of the diagnosis of *Pygocephalus* and the family Pygocephalidae. Previous works about this genus and related taxa are discussed, as well as the problem involved in the reconstruction of fossil species of Eumalacostraca based on isolate parts.

**Key words:** Paleozoic eumalacostracan, Pygocephalidae, *Pygocephalus cooperi*, taxonomy.

RESUMO – Um melhor conhecimento da morfologia da espécie tipo do gênero *Pygocephalus* Huxley, *P. cooperi* Huxley, conduziu à redefinição da sua diagnose, bem como do gênero *Pygocephalus* e da família Pygocephalidae. É realizada uma discussão dos trabalhos anteriores sobre o gênero e táxons relacionados, e também sobre a problemática da reconstrução de espécies fósseis de Eumalacostraca com base em partes isoladas.

**Palavras-chave:** Eumalacostracos paleozoicos, Pygocephalidae, *Pygocephalus cooperi*, taxonomia.

## INTRODUCTION

Many Paleozoic eumalacostracans were studied and named by researchers in an effort to classify them, based on the carapace morphology and body anatomy contributing to the systematics and phylogeny of the crustaceans (*e.g.* Huxley, 1857; Beurlen, 1930; Brooks, 1962; Schram, 1979, 1980).

Huxley (1857) described *Pygocephalus cooperi* gen. et sp. nov. and was the first author that compared and related several characteristics of this taxa with the living Mysidacea.

Brooks (1962), described all species known at that time and established phylogenetic relationships among those eumalacostracans and Recent taxa. He mentioned that Decapoda and several orders of Peracarida evolved from this ancient stock in the late Paleozoic. Brooks (1962) presents a classification of the eumalacostracan crustaceans, creating a new superorder Eocarida where the new family Pygocephalidae and the genus *Pygocephalus* were included.

Schram (1979) presented a revision of the British Carboniferous malacostracans fauna mentioning the chaotic state of Paleozoic higher malacostracan taxonomy. He observed problems such as the large number of named taxa created based only in minor variations in morphology, size or preservation of the fossils. Other problem that he pointed out is the reconstruction of species based in material from two separated species or related only to part of a specimen. One of the species that he redescribed, *Pygocephalus cooperi*, was based in many fossil specimens preserved as isolated carapaces, abdomens and ventral skeletons.

The genus *Pygocephalus* had drew the attention of many authors. Several fossil specimens from Europe, Canada and Brazil, had generally only the carapace preserved; in others, the ventral parts of the body, well or poorly preserved, were described and placed in the same or in different taxa, producing several taxonomic mistakes.

In the present work it is also discussed the problems in reconstructing Pygocephalomorpha species based only in the fossil isolated parts and making determinations of species and genera. It is also necessary to consider that it is possible to have two or more species very similar in the same place, which after death could be found side by side in the strata. So, *Pygocephalus* could not have an extended abdomen as have been represented by many authors.

The identification of the type species of *Pygocephalus*, the diagnosis of the genus and the family, as well the lists of synonymies, were also controversial issues.

*[† Editors Note. This contribution was written by Professor Irajá Damiani Pinto along the last few years. He died on June 21, 2014, missing a few days to complete 95 years old. Professor Irajá was almost blind for more than a decade, but continued to work with pygocephalomorphs and other fossil arthropods. What is published here, in collaboration with his colleague Norma Luiza Würdig, more than his last contribution to Palaeontology, reflects the dedication to Science that accompanied him throughout his long and productive life.]*

The aim of these work is to present a morphological revision and new taxonomic data of the genus *Pygocephalus*. The morphology of the type species, *P. cooperi* Huxley, 1857, must be the fundamental basis for the systematic of the genus and the remaining family taxa, however, this has not been considered so by many authors. For that reason, it is herein also presented a detailed description of *P. cooperi*.

The authors examined the holotype L10221 from the Manchester Museum, and the plastotype cast I 12892 from the Natural History Museum of London. The drawing presented in the figure 10A is based on excellent photograph of the holotype L10221. The figure 10C shows a superimposed drawing of the anterior region of the cast I 12892.

## COMMENTS ON FUNDAMENTAL PAPERS ABOUT THE GENUS *PYGOCEPHALUS*

**Huxley (1857, 1862)**

Huxley (1857), examined three fossil crustacean specimens from the Carboniferous of England, and choose the most perfect one, from Manchester Museum, to propose the new genus *Pygocephalus* and its type species *P. cooperi*.

*Pygocephalus cooperi* is described (p. 364-366) and illustrated in the plate XIII, figures 1a-c. Huxley compares *P. cooperi* with an unidentified specimen of *Mysis* pointing out that this species is more allied to this taxon than to any other existing one. Huxley mentions also that *P. cooperi* has a carapace short and delicate, antennae with large joints, scales, and the last internal joint characterized by a longitudinal groove which seemingly divides, been continued by a long distal multiarticulate filament. The large abdomen is bent upon itself. With regard to the nature of the oral appendages he mentions that it does not appear (Figure 1).

The figures of plate XIII shows clearly the fundamental characteristics of *Pygocephalus*: no antero-lateral or lateral margins spines and abdomen reflexed. However, in figure 2 the three somites in the back probably could not belong to it, but to another species.

Huxley (1862) presented another possible species (Figure 2) which he called "*Pygocephalus*"(?). The fossil is represented in lateral view, exhibiting the carapace, some cephalic appendages and a curved abdomen. Certainly, it was precipitately classified as *Pygocephalus*. Although the antenna presents a long and narrow scale, the longitudinal groove in the third article of the robust endopodite is not visible.

**Woodward (1907)**

Woodward discussed many important new data on *Pygocephalus*. He represents (p. 405, figure 1) a fossil crustacean as *Pygocephalus cooperi*? from Coal-mesures, Sparth (Figure 3). His figure is represented by two pieces. The upper part, a ventral view of a specimen shows the carapace without the antero-lateral and lateral spines. The last joint of the antenna endopodite is characterized by a longitudinal groove and ends in a multiarticulate filament. Both characteristics had been observed by Huxley in *P. cooperi*. Bellow this, it is illustrated part of a large and broken abdomen (Figure 3).

Woodward also presented a specimen of a new taxon: *Pygocephalus* (*Anthrapalaemon*?) *parkeri* sp. nov. (Figure 4). This specimen presents carapace with antero-lateral and lateral spines, and an extended abdomen. It could probably be *Anthrapalaemon* Salter, 1861, but the characteristic carina of this genus is not clear in the illustration of the specimen figured.

In his plate XVIII, several specimens of *Pygocephalus* are represented (Figure 5). These figures are very important especially because for the first time the male (specimen 1) and females (specimen 5, 6) are distinguished. They show the same characteristics of *P. cooperi* as described by Huxley, specially two ones: the absence of antero-lateral or lateral spines in the carapace and the abdomen reflexed. At figure 4 he made an attempted reconstruction of *Pygocephalus* based on a ventral carapace associated to an extended abdomen, resulting in a misinterpretation.

**Brooks (1962)**

Brooks discussed the validity of the genera *Pygocephalus*, *Anthrapalaemon* and *Necroscilla* Woodward, 1879 making reference to Woodward (1907), Peach (1908) and Copeland (1957) and noted the strong similarity among the first two genera, and remembered that Beurlen (1930) suggested they should be synonymized.

Brooks places *Pygocephalus* and *Anthrapalemon* in synonym, based on the assumption that their type material were actually different parts of the same animal. *Anthrapalemon* became, therefore, a junior synonym of *Pygocephalus*, maintaining *P. cooperi* as its type species.

He put out as characteristics of *Pygocephalus* the absence of a pair of hepatic spines on the carapace and massive development of the sympods of the first two thoracic appendages. Females with six or seven pairs of oostegites and a seminal receptacle on the eighth sternite.

Brooks comments the revision of Van der Heide (1951) and Rhodes & Wilson (1957), which synonymized all European carapaces referred to *Anthrapalemon*. Still, Rhodes & Wilson (1957), by statistical analysis of size frequency and other parameters of the British specimens, attempted to prove that only one species should be valid.

In spite of recognizing *Pygocephalus cooperi* as the type species of *Pygocephalus* (p. 194), Brooks refers to it as *P. dubius* (Milne-Edwards, 1840). *P. cooperi* appears in the synonym list.

For morphological description of *Pygocephalus dubius*, Brooks examined the specimen MCZ 6718 (plate 38, figure 1) and made use of the published illustrations of *Anthrapalemon* and *Pygocephalus* specimens (Figure 6). In his text-figure 6 it is presented a composite restoration of *P. dubius* presenting antero-lateral spines and branchiostegal serrations on the lateral margin of the carapace, a long rostrum and an extended abdomen (Figure 7A). However, in the specimen MCZ 6718 is not visible any marginal spines and the abdomen looks reflexed. So, it is really a representation of *Pygocephalus*, but neither the species *P. cooperi*, which has some little differences, nor *P. dubius* because this last species belongs to the genus *Anthrapalaemon*, a valid genus.

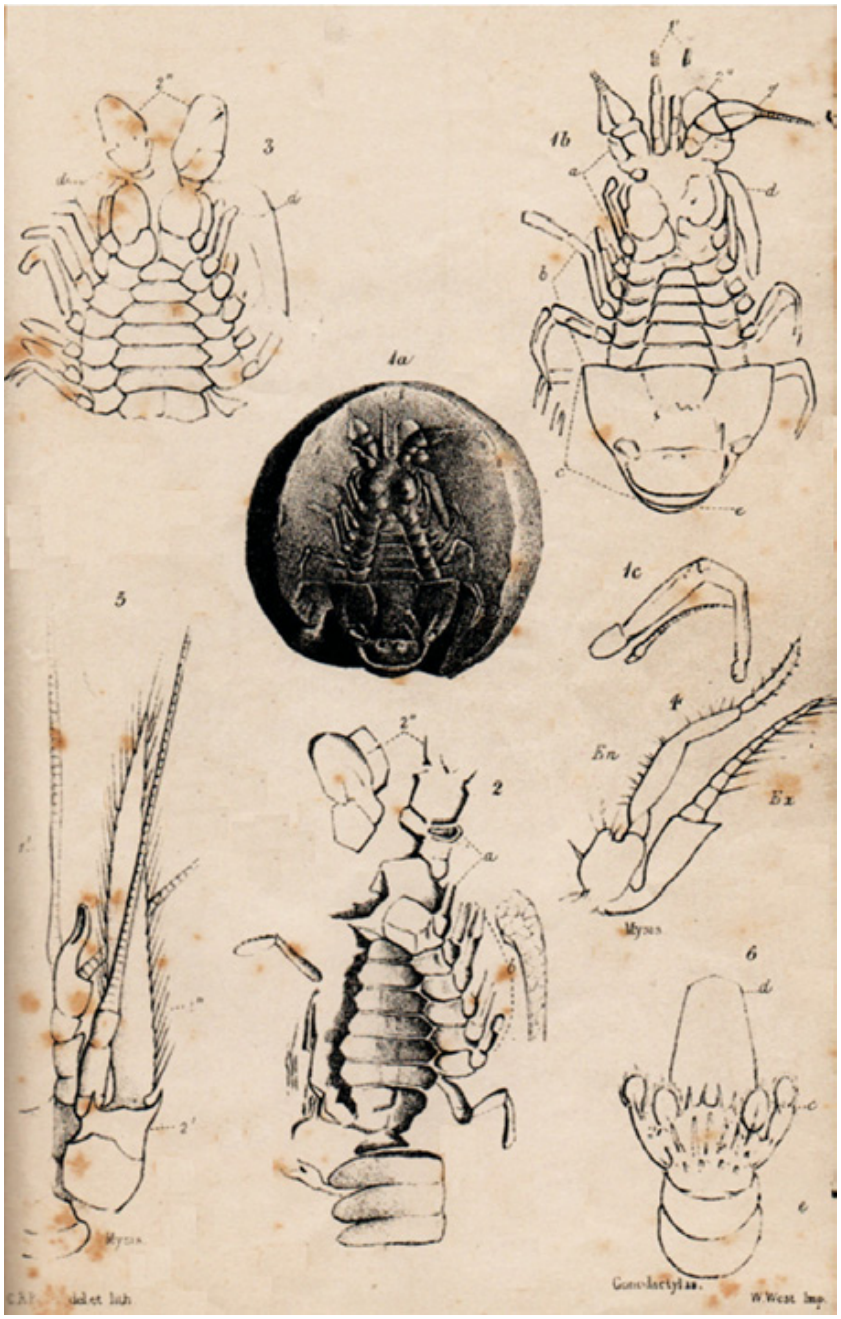

**Figure 1.** Reproduction with modifications, of the plate 13 of Huxley (1857). *Pygocephalus cooperi* Huxley, 1857. Holotype L 10221 from the Manchester Museum, including the original legend as numbered and formatted by Huxley. **Fig. 1a.** *Pygocephalus cooperi*, No. 1: nat. size. The Manchester specimen. **Fig. 1b.** The same: magnified 1½ diameter. **Fig. 1c.** Thoracic appendage of the same: magnified. **Fig. 2.** Mr. Cooper's specimen. Nº. 3: magnified. **Fig. 3.** Mr. Cooper´s specimen, Nº. 2: magnified, **a.** Quadrate disk; **b.** Central part of the body; **c.** Semicircular disk; **d.** Marginal portions of carapace; **e.** Tergal surface of abdominal somites; **en.** Endopodite; **ex.** Exopodite; **1´** Antennules; **2´** Base and inner division of antenna; **2´´** Outer division of antenna, or scale. **Fig. 4.** Thoracic appendage of *Mysis*: magnified. **Fig. 5.** Antennule and antenna of *Mysis*: magnified. **Fig. 6.** *Gonodactylus* bent upon itself, in outline; the appendage being omitted: magnified. Without scale.

**Schram (1979)**

Schram recognized *Pygocephalus cooperi* as type species of *Pygocephalus*, but observed the taxonomic problems of the genus: *"Different genera have been erected for different parts of the body.* Pygocephalus *was used by the old workers to refer to the ventral thorax;* Anthrapalaemon, *the carapace;* Necroscilla, *the abdomen; and* Diplostylus, *a well-preserved tail fan. Combine this with the numerous variations of form species placed in each of these genera, and we arrive at some idea of the confusion".*

Schram mentioned also that it is possible to sort out the confusion if many specimens of *Pygocephalus* could be examined considering its stratigraphical and geographical distributions. These data could be assisted in reconstructing species, being able to associate separate parts to obtain an idea of the entire animal.

**Figure 2.** Reproduction, but with little modifications, of the figure presented by Huxley (1862) as *Pygocephalus*(?) from the Carboniferous Strata near Paisley. Without scale.

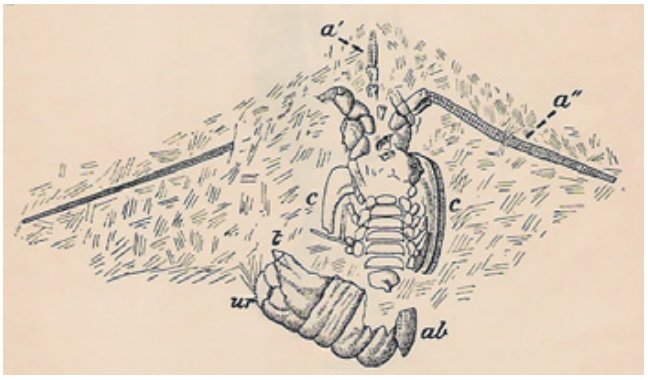


**Figure 3.** Reproduction, but with little modifications, of the figure 1 of Woodward (1907), a fossil crustacean represented and identified by him as *Pygocephalus cooperi*? (Huxley). From Coal-measures, Sparth, near Rochdale, Great Britain. For more details about the morphological **abbreviations** see Woodward (1907). Without scales. Original dimensions: length of antennae = 50 mm; length of thorax = 25 mm.

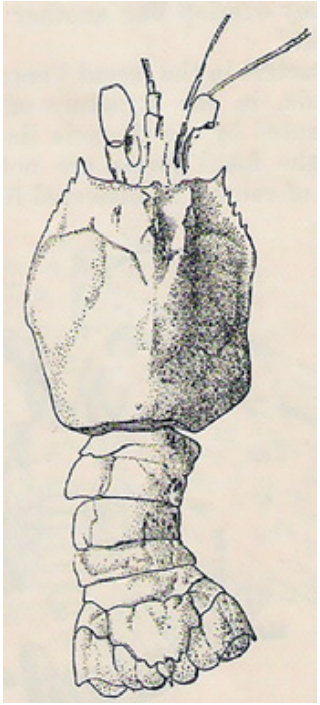

**Figure 4.** Reproduction, with modifications, of the figure 2 of Woodward (1907), *Pygocephalus* (*Anthrapalaemon*?) *parkeri*, sp. nov. From Coal-measures, Sparth, near Rochdale, Great Britain. Without scales.

Schram presented a photo of the holotype (p. 86, fig. 37) of *Pygocephalus cooperi* L. 10221 from the Manchester Museum and in the figure 39a,b (Figure 7B) a reconstruction of the species in dorsal view, very similar with the reconstruction presented by Brooks (1962).

The diagnosis of the genus *Pygocephalus* presented by Schram is similar to that by Brooks (1962): *"Carapace without hepatic spines. Females with oostegites and seminal receptacle. Telson narrows posteriorly in two abrupt steps with furcal lobes at each narrowing"*.

To the species diagnosis Schram pointed out: *"Cuticle smooth. Rostrum falciform. Carapace with six or seven branchiostegal teeth on anterior margin"*.

Further, Schram presents a new description of *Pygocephalus cooperi* based on ten distinct British specimens from different strata and/or location in order to reconstruct the entire species.

Different of Brooks (1962), Schram considered *Pygocephalus dubius* (Prestwich), 1840 a distinct species with the following diagnosis: *"Cuticle papillose. Rostrum not markedly falciform. Carapace with average of 15 branchiostegal teeth along entire margin"*.

## SYSTEMATIC DESCRIPTION

Superorder PERACARIDA Calman, 1904
Order PYGOCEPHALOMORPHA Beurlen, 1930
Family PYGOCEPHALIDAE Brooks, 1962

**Emended diagnosis.** Carapace with or without antero-lateral spines. Antennae very robust with third article of the endopodite centrally depressed, divided longitudinally, presenting distally an annulated and very long flagella. Abdomen extended or reflexed.

*Pygocephalus* Huxley, 1857

**Emend to the diagnosis.** *Carapace without antero-lateral spines. Massive development of the sympods of the first two thoracic appendages. Abdomen reflexed.*
**Type species.** *Pygocephalus cooperi* Huxley, 1857. L10221 from the Manchester Museum, Great Britain. p. 363-366, pl. XIII, fig. 1a-c.
**Cast.** I 12892 from the British Museum. Great Britain.
**Locality and horizon.** Medlock Park Bridge, Ashton underlyne, Lancashire, Upper Communis Zone, Lower Coal Measures, Great Britain.
**Age.** Carboniferous.
**Species diagnosis.** *"Carapace outline oval elongate, slightly longer than wide, anterior margin straight, without any spine, forming a normal angle with the lateral margins; lateral margins slightly convex outward, without spines. The sternite of the first visible thoracic somite is small and hexagonal. The others five are gradualy larger and with trapeizodal form. The sternites are on an average one half of the total width of the ventral torax. Abdomen reflexed under himself."*

*Pygocephalus cooperi* Huxley, 1857
(Figures 8-13)

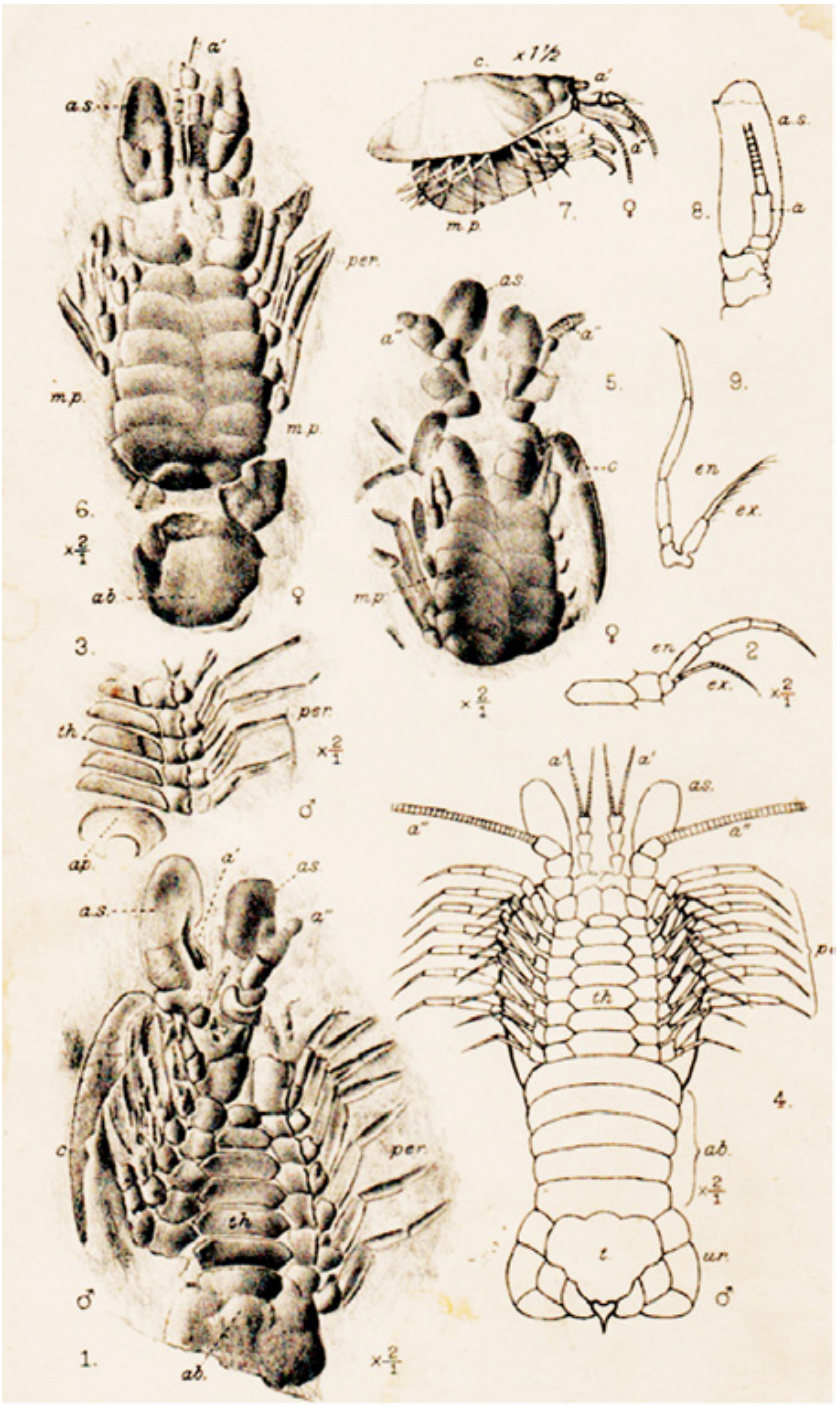


**Figure 5.** Reproduction, with modifications, of the plate 18 of Woodward (1907), representing male and female of *Pygocephalus cooperi* Huxley, 1857, from Coal-Measures, Coseley near Dudley, including the original legend as numbered and formatted by Woodward. **Fig. 1a.** *Pygocephalus cooperi*. View of ventral aspect of male specimen. **Fig. 2.** A single thoracic appendage (after Huxley). **Fig. 3.** Part of another specimen of a male *Pygocephalus*. **Fig. 4.** An attempted restoration of the male underside. **Figs. 5, 6.** Females of *Pygocephalus cooperi*, showing six or seven broad, scale like, imbricated plates (**m.p.**), oostegites, forming the marsupium. **Figs. 7, 8.** Recent female Schizopod (*Eucopia australis*, Dana). **Fig. 9.** One of the legs of *Ceratolepis*. For more details about the morphological **abbreviations** see Woodward (1907). Without scales.

1857 *Pygocephalus cooperi* Huxley, p. 363, pl. 13, figs.1, 3.
1907 *Pygocephalus cooperi* Huxley. Woodward, p. 242, pl. 3, figs. 1, 2.
1979 *Pygocephalus cooperi* Huxley. Schram, p. 86, fig. 37.
1996 *Pygocephalus cooperi* Huxley. Pinto & Adami-Rodrigues, p. 49, pl. 4, figs.1-3.

**Description.** The specimen is a male preserved in ventral view being 35 mm long considering the base of antennules until the abdomen (Figure 8A). The carapace is partially visible only at the ventral left side. It is oval elongate with anterior margin forming a normal angle with the lateral margin which is slightly convex outward, without spines and presenting a

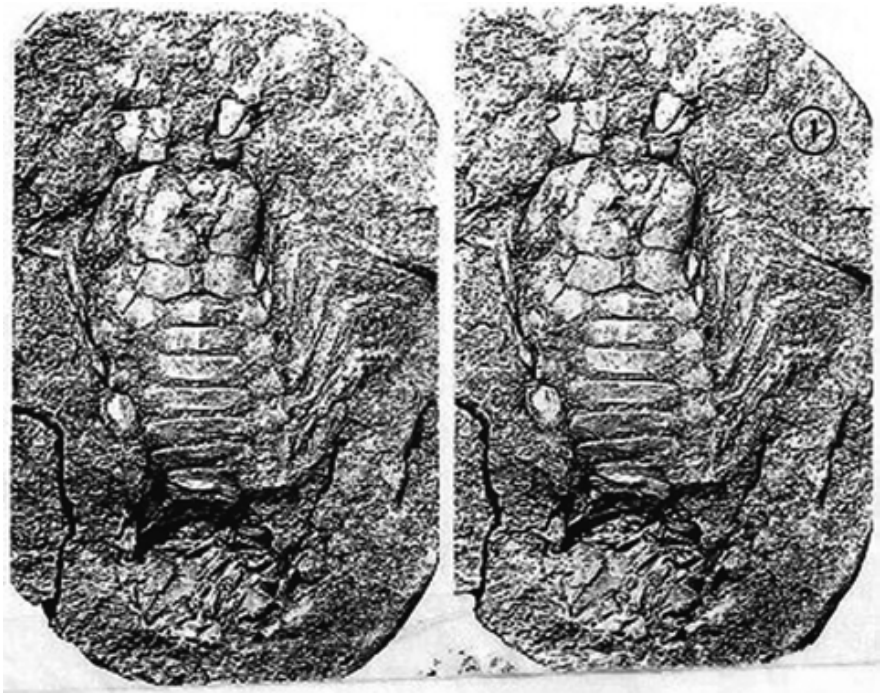

**Figure 6.** Reproduction, but with little modifications, of the plate 38, figure 1, *Pygocephalus dubius* (Milne-Edward) 1840, Pennsylvanian England MCZ678 from Brooks (1962). Without scales.

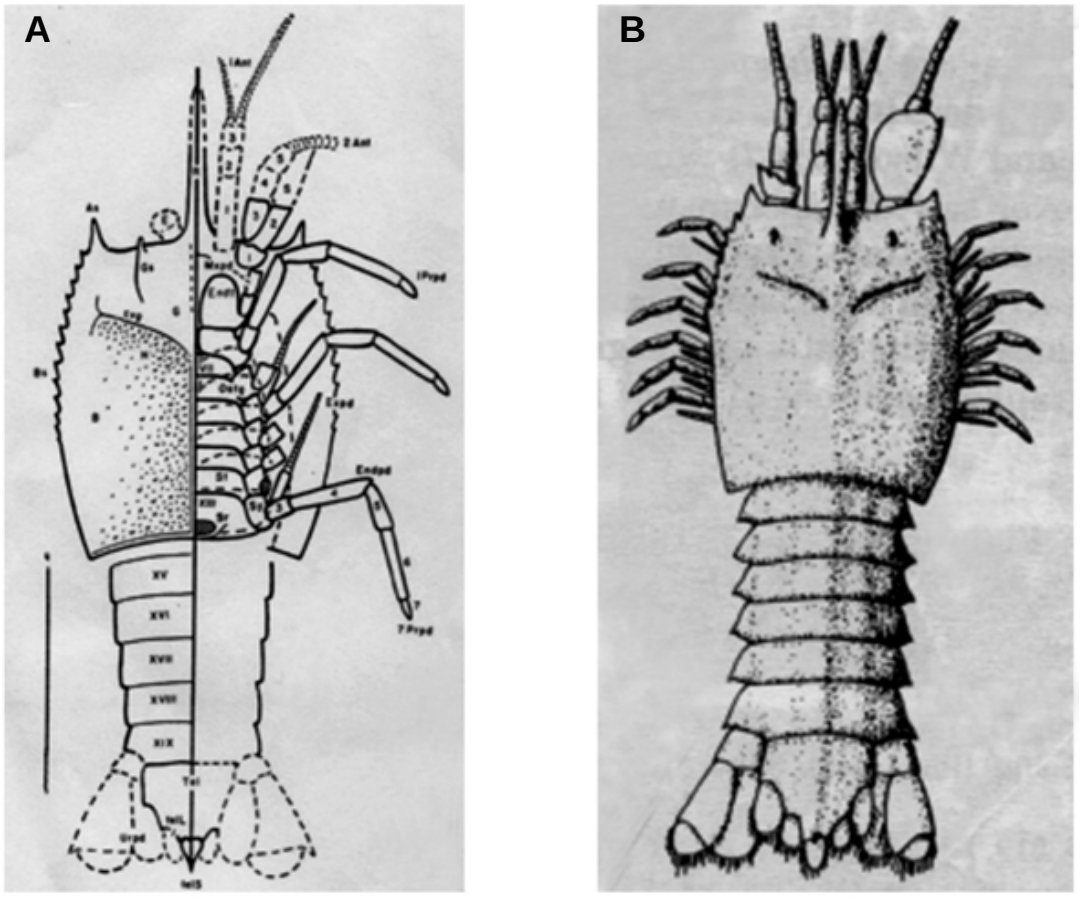


**Figure 7.** Reconstruction of *Pygocephalus cooperi* Huxley, 1857, in dorsal view. **A**, by Brooks (1962); **B**, by Schram (1979). For more details about the morphological **abbreviations** see the original papers. Without scales.

slight doublure (Figures 9A; 10A-C; 11A-B; 13B). It was not possible to observe the rostrum. The specimen in ventral view shows the skeletal structure of the cephalothorax, but the abdomen is poorly preserved. Posterior margin of the abdomen slightly convex forward. (Figures 9A; 10A; 11A-B).

The cephalon presents two conspicuous pairs of antenna. The first pair of antenna arise at the center of the head, forward of the second pair of antenna (Figures 8B; 10A-C; 12A-C). The peduncle is formed by three joints, the proximal one is slightly larger than the other two. The last one presents two thin annulated flagella (not complete), much longer than the peduncle. Among the right antennula and the second antenna can be seen an impression of a very thin peduncle, perhaps a stalked compound eye, not yet observed in *Pygocephalus* specimen (Figures 9A-C; 12B). Laterally to the antennule arise a robust and large second pair of antenna (Figures 8B; 10A-C 12A). The sympod represented by a subcircular basal joint from which arise a large endopodite and the exopodite. The exopodite ramus is not totally clear. Its first joint is large and subrectangular, placed parallel with the first joint of the endopodite. From it arises a scale. The left scale is clearly visible above the second article of the endopodite (Figures 8B; 12A). It is large, oval and seems flattened and ciliate in the border. The endopodite is formed by three subequal joints, the second one much larger than long and the third almost two times longer than the anterior. This third article is centrally depressed, as if divided longitudinally, and presenting distally an annulated and very long flagella that sometimes also seems divided longitudinally (Figures 9A-C; 11A-B; 12A). Close the exopodite first joint it is possible to see a long flagella that could be part of the exopodite or a loose piece of endopodite or exopodite of any appendage.

In the region of the mouth it is not possible to discern clearly the mandible and maxillas. At the anterior side of the head there is a pair of large endite plates embracing the gnathic structures. Laterally to these plates, it is observed the basal joint of an appendage, probably of the first maxilliped. Another article, extended forward, is also visible, probably part of the endopodite. A thin palp directed to the center of the cephalon can be the exopodite (Figures 8B; 9B-C; 10A-C; 11A-B; 13A).

The second maxilliped presents also a large gnatobase. From them arise a rounded base of the sympod and a longer endopodite following up (Figure 8B). The first two joints of the second maxilliped are clearly visible at both sides. An impression of the others three joints can be seen close the exopodite of the antenna (Figures 9A-C; 10A-C; 11A-B; 13A). Centrally, among these endites can be seen the region of the labrum.

The sternite of the first visible thoracic somite is small and hexagonal. The others five sternites are gradualy larger and with trapeizodal form (Figures 8C; 11A-B). The seven and last one is almost two times the length of the others. In proportion, the sternites are on an average one half of the total width of the ventral torax.

In both sides of each somite there is a compressed first joint of the pereiopod sympod, the coxa, followed by the strong oval second joint, the base (Figures 8C; 11A-B; 13A). From it arise the endopod and the exopod of the pereiopods. The endopodite presents four articles. The ischiomerus joint is longer than the others, carpus has a half of its length, propodus is bigger than the carpus and the dactilus is short. The eigth pereiopod is more robust than the others (Figures 11A-B; 13C-D). All pereiopods are birramous presenting a delicate exopodite, which can be clearly observed in the sixth one. It arises from the base of the sympod, being the first two slender joints bigger and continued by a long annulated flagellum (Figures 11A-B; 13B).

The abdomen is ventrally flexioned and the pleopods are not clearly visible. The pleonits are large and robust, the sixth is small. The telson is not very clear at the center of the flexioned abdomen. Laterally to the sixth pleonit and closing to the telson can be seen, but not very clear, arising the uropods and furcal lobes. (Figures 11A-B; 13E). The abdomen is about the same length as the cephalotorax.

**Remarks.** Huxley (1857) described and illustrated a Palaeozoic crustacean that he named *Pygocephalus cooperi* gen. nov. et sp. nov. The fossil is in ventral view and can be observed the carapace lateral margin slightly convex outward, without spines and presenting a slight doublure and the abdomen reflexed. This two morphologic elements, carapace and abdomen, have been choosen by the authors as the most important character in the definition of the genus. The morphologic characteristics presented in the description of the type species *P. cooperi* must be the fundamental base for the systematic of this taxa. The smooth lateral margin of the carapace and the reflexed abdomen are features of this specimen, shared with females and males specimens described by Woodward (1907) and others reported by Schram (1974). The absence of the rostrum in the specimens illustrated by Huxley (1857) and Woodward (1908) is noteworthy. The abdomen seems very large and rounded in *P. cooperi* and it is not possible to see in the Huxley specimen the uropods and the telson with two distinct steps and its associated furcal lobe.

Brooks (1962) redescribed *Pygocephalus dubius* (Milne-Edwards, 1840) putting in synonym with the species *P. cooperi*. He utilized in the description published illustrations of specimens of *Anthrapalaemon* and *Pygocephalus* and the exemplar MCZ 6718 of the Pennsylvanian of England (pl. 38, fig. 1 in his work). This specimen is in ventral view and show part of the lateral margin of the carapace smooth and abdomen parcially reflexed. The cephalic region and the appendices are very similar to *P. cooperi*. Probably, it is another species of *Pygocephalus*. The most evident diferences among them are the sternites form and its proportion size in relation the total width of the ventral thorax and the subquadrats sympods. In *P. cooperi* the sternites gradually increase its size in direction to the abdomen and have trapeizodal form, with exception of the first one that is hexagonal.

## FINAL COMMENTS

Brooks (1962) erected the family Pygocephalidae with the diagnosis: "*Carapace with antero-lateral spines*". In the family he assembled four genera: his new genera *Anthracaris*,

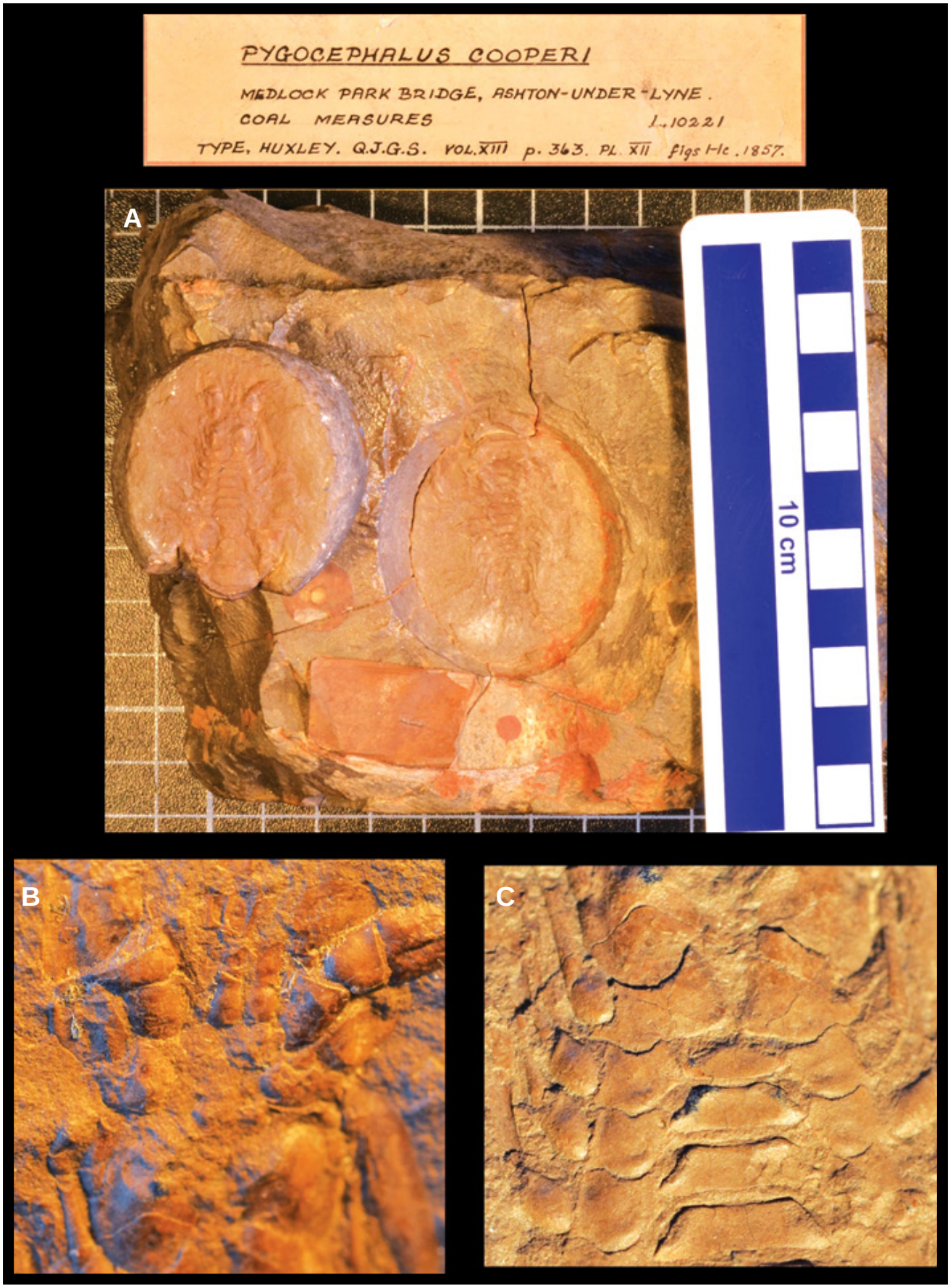


**Figure 8.** *Pygocephalus cooperi* Huxley, 1857. **A**, Holotype L 10221 from the Manchester Museum; **B**, ventral view of the anterior region; **C**, ventral view of the median part of the thorax with detail of the sternites, coxas and bases of the thoracopods. B and C without scales.


**Figure 9.** *Pygocephalus cooperi* Huxley, 1857. **A**, Holotype Cast I 12892 from the British Museum; **B**, ventral view of the anterior region of the mold; **C**, ventral view of the the anterior region of the counter mold. Without scales.

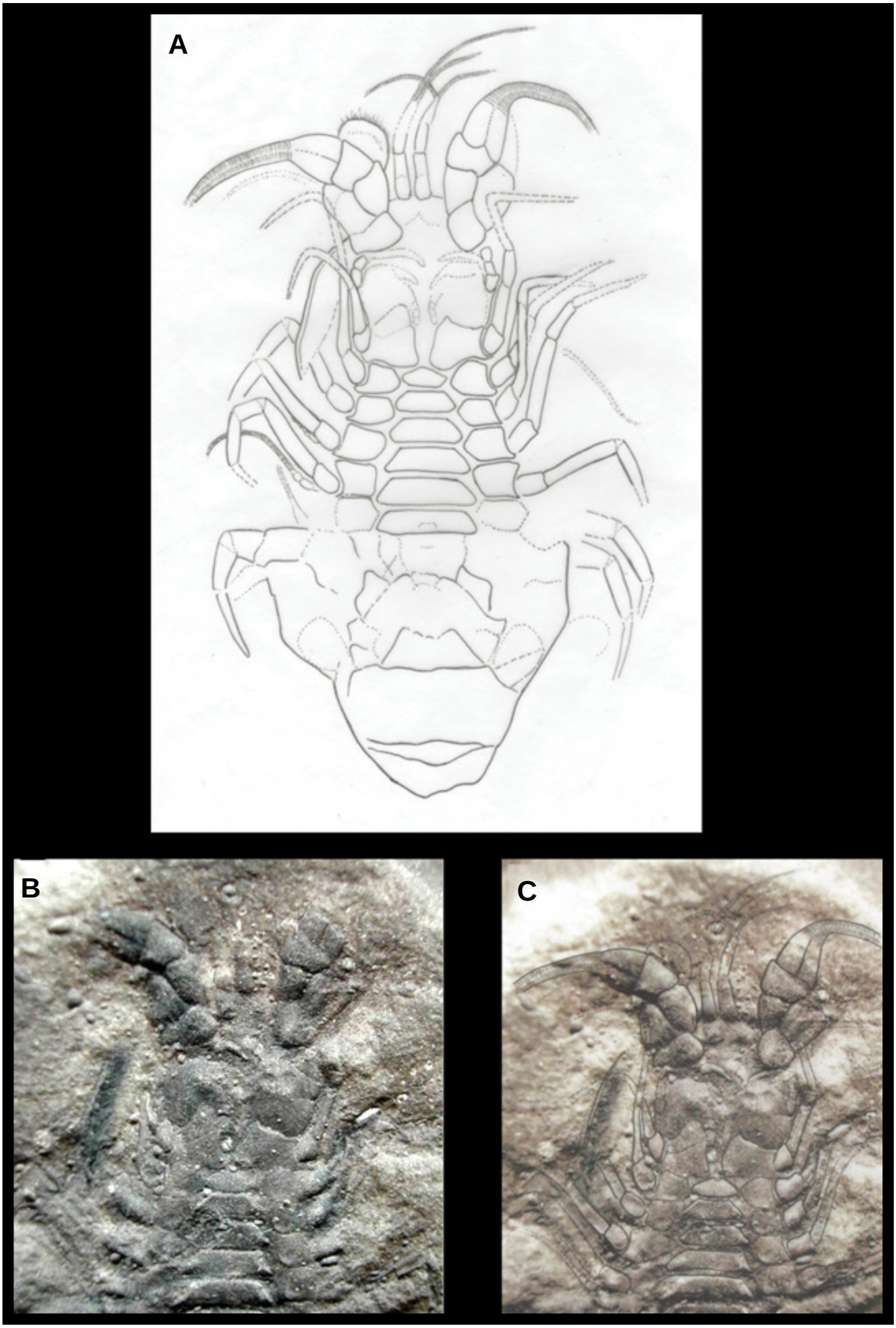


**Figure 10.** *Pygocephalus cooperi* Huxley, 1857. **A**, drawing of the Holotype L 10221 from the Manchester Museum; **B**, ventral view of the anterior region; **C**, ventral view of the anterior region with a superimposed drawing. Without scales.


**Figure 11.** *Pygocephalus cooperi* Huxley,1857. **A**, mold of the Holotype L 10221 from the Manchester Museum; **B**, counter mold of the Holotype L 10221 from the Manchester Museum. Without scales.


**Figure 12.** *Pygocephalus cooperi* Huxley, 1857. **A**, ventral view of the anterior region of the Holotype L 10221; **B**, ventral view of the anterior region with detail of the possible impression of the stalked compound eye; **C**, ventral view of anterior region with detail of the first pair of antenna. Without scales.

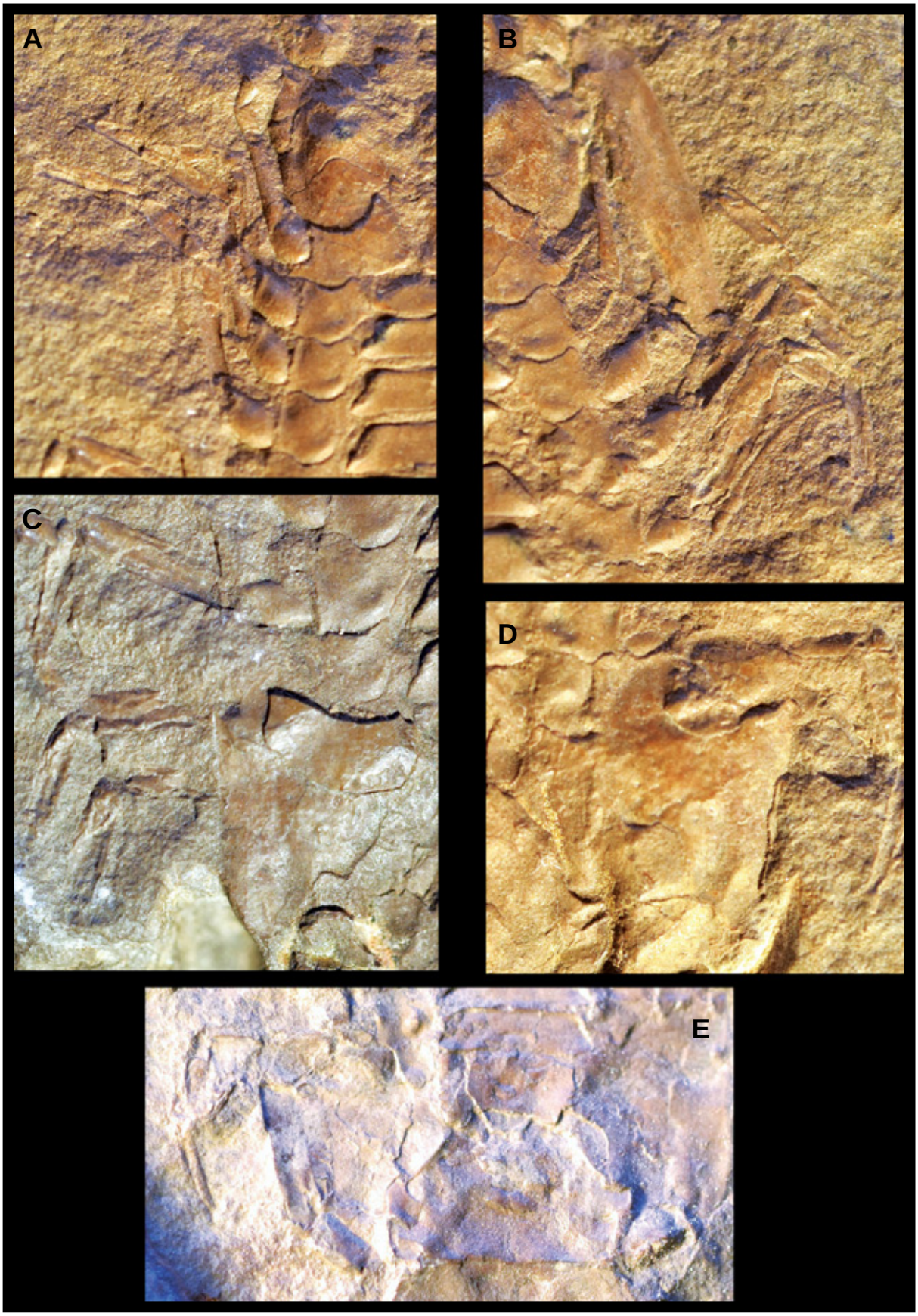


**Figure 13.** *Pygocephalus cooperi* Huxley, 1857. **A**, ventral view of the anterior right side of the thorax with detail of pereiopods; **B**, ventral view of the anterior left side with detail of pereiopods; **C**, ventral view of the posterior right side with detail of pereiopods; **D**, ventral view of the posterior left side with detail of pereiopods; **E**, ventral view of the abdomen. Without scales.

*Mamayocaris* and *Pseudotealliocaris*, and *Pygocephalus* that not present antero-lateral spines, which is an incongruence. Schram (1974) recognized the family Pygocephalidae Brooks, 1962 and redescribed *Pygocephalus cooperi* under the diagnosis: *"carapace with six or seven branchiostegal teeth on anterior margin"*; and *Pygocephalus dubius* (Prestwich), 1840 under the diagnosis: *"carapace with average of fifteen branchiostegal teeth along entire margin"*, what seems an artificial criteria that do not include specimens without spines in the carapace. Schram (1974) classified the genus *Pygocephalus* under the superordem Peracarida Calman, 1904 and not Eocaridacea, a new order erected by Brooks (1962). Once that it is found oostegites forming a marsupium in *Pygocephalus* female specimens, this character was fundamental to classify them as Eumalacostraca Peracarida.

The present authors recognize also the family Pygocephalidae, but with an emended diagnosis including the species of the genus *Pygocephalus* that do not present antero-lateral or lateral spines in the carapace. The new diagnosis proposed for the family include characteristics of the antenna that has the third article of the endopodite centrally depressed, divided longitudinally, presenting distally an annulated and very long flagella. These characteristic antennae can be seen in the species of the genus *Anthracaris* and *Mamayocaris* figurated by Brooks (1962), as well as in *Pygocephalus*. *Pseudotealliocaris* is not illustrated and Brooks (1962) comments that the antennae and other appendages of the cephalotorax are poorly portrayed for interpretation.

Concluding, the morphologic characteristics presented in the description of the type species *Pygocephalus cooperi* should be considered and certainly are the fundamental base for the systematics of the taxa, according with the ICZN (2012). In addition, as it is possible to see similar species living together, it is plausible to expect a similar pattern in the past. So, to put isolate carapaces or pieces of the body like extended abdomens in synonym with *P. cooperi*, seems not advisable.

## ACKNOWLEDGEMENTS

The authors want to thank I. Moreno (Ceclimar/IB/UFRGS) for the pictures taken of the type species *Pygocephalus cooperi* at the Manchester Museum, Great Britain, and Q.K. Zanona (Ceclimar/IB/UFRGS) and W.A. Chaves (Instituto de Biociências/UFRGS) for help with the figures. Special thanks to Y. Sanguinetti and I. Purper for their helpfull along the development of this work, and their previous comments on the text. To the revisors C.T. Bergue and K.A. Rodrigues many thanks.

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*Received in January, 2014; accepted in September, 2014.*