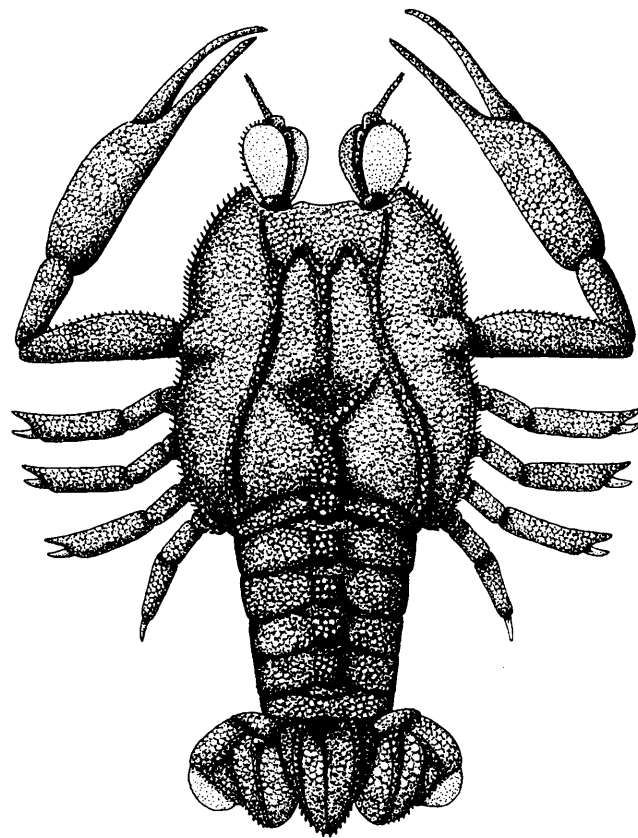


PALEONTOLOGIA LOMBARDA

Nuova serie Volume I

Alessandro Garassino & Giorgio Teruzzi

**A new decapod crustacean assemblage from
the Upper Triassic of Lombardy (N. Italy)**



Società Italiana di Scienze Naturali
Museo Civico di Storia Naturale di Milano

Between 1858 and 1881 Antonio Stoppani, the Lombard geologist and paleontologist, published 56 numbers of "Paléontologie Lombarde", illustrating the fossils of Lombardy in a series of large monographs. This was the first Italian attempt to produce a scientific journal devoted to palaeontology. The chosen method of publication, as a succession of monographs, was in line with a pattern already established in other European countries. It is an indication of Stoppani's aspiration to produce a work of international value, as was also his use of French, at that time the official scientific language.

The Società Italiana di Scienze Naturali and the Museo Civico di Storia Naturale di Milano, heirs to the palaeontological tradition of Antonio Stoppani, have wish to resurrect this prestigious scientific journal, but it not will be restricted solely to the illustration of Lombard fossils.

The new "Paleontologia Lombarda" will be a scientific journal open to contributions from all palaeontologists, and proposes to publish papers on fossils from all parts of the world.

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Sezione di Paleontologia del Museo Civico di Storia Naturale di Milano

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A new decapod crustacean assemblage from the Upper Triassic of Lombardy (N. Italy)

Abstract - The examined sample includes 710 complete or fragmentary specimens belonging to the infraorders Penaeidea (24%), Caridea (0.5%), Astacidea (43.5%) and Palinura (32%). Among the penaeids the genera *Longichela* n.gen. and *Satyrus* n.gen. (family Penaeidae Rafinesque, 1815) are described; penaeids are also represented by *Palaeodusa longipes* Pinna, 1974. *Pinnacaris dentata* n.gen.n.sp. is ascribed to carideans. Among the astacideans we describe *Glaessnericaris macrochela* n.gen.n.sp. (family Platychelidae Glaessner, 1931); palinurans comprehend *Archaeopalinurus levis* Pinna, 1974 (family Palinuridae Latreille, 1802). *Pseudoglyphea gigantea* n.sp. (family Mecochiridae Van Straelen, 1925), *Pseudocoleia mazzolenii* n.gen.n.sp. (family Coleiidae Van Straelen, 1924). The family Coleiidae Van Straelen, 1924 is for the first time signalled in the Triassic.

Riassunto - Una nuova fauna a Crostacei Decapodi del Triassico superiore della Lombardia (Nord Italia). Viene descritta la fauna a crostacei decapodi del Triassico superiore di Ponte Giurino, Valle Imagna (provincia di Bergamo, N. Italia). Il campione esaminato comprende 710 esemplari tra completi e frammentari appartenenti all'infraordine Penaeidea (24%), Caridea (0.5%), Astacidea (43.5%) e Palinura (32%). Per quanto riguarda i peneidi vengono descritti i due nuovi generi *Longichela* n.gen. e *Satyrus* n.gen. (famiglia Penaeidae Rafinesque, 1815); i peneidi comprendono anche la specie *Palaeodusa longipes* Pinna, 1974. I caridei sono rappresentati dal nuovo genere *Pinnacaris* n.gen.. All'infraordine Astacidea appartiene *Glaessnericaris macrochela* n.gen.n.sp. (famiglia Platychelidae Glaessner, 1931); i palinuridi comprendono *Archaeopalinurus levis* Pinna, 1974 (famiglia Palinuridae Latreille, 1802); *Pseudoglyphea gigantea* n.sp. (famiglia Mecochiridae Van Straelen, 1925); *Pseudocoleia mazzolenii* n.gen.n.sp. (famiglia Coleiidae Van Straelen, 1924). La famiglia Coleiidae Van Straelen, 1924 è segnalata per la prima volta in depositi triassici.

Key words: Crustacea, Decapoda, Upper Triassic, Italy

INTRODUCTION

A new and rich decapod crustacean assemblage from the Upper Triassic of the Southern Alps of Lombardy (N. Italy) is here described. Fossils come from some small outcrops of the Lower Argilliti di Riva di Soltò Formation (AdS) in a small lateral valley (Val Brunone) of Imagna Valley near Ponte Giurino, province of Bergamo (see map Fig. 1, 2), not far from the sulphureous source described by Stoppani, 1876 in "Il Bel Paese".

The AdS consist of grey-blackish or black shaley marls and shales, at times intercalated by compact, dark grey limestones and marly limestones with a generally medium or thin stratification, for a maximum total thickness of about 1000 m in the type-area, in the surrounding of Iseo Lake. In the classic geopaleontological literature the AdS correspond to the sedimentary complex called "Retico in facies sveva" outcropping in Lombardy from western Lugano Lake to eastern Garda Lake.

The upper part of the AdS is in contact with the Rhaetian Calcare di Zu Fm., while the lower part is in contact with the Norian Dolomia Principale, Fm. (DP) and, in certain cases, with the Calcare di Zorzino Fm. (CdZ), a Norian formation which is heteropic with the Dolomia Principale. The AdS in the type-locality and in its close surroundings, in Iseo Lake area, were ascribed to the Rhaetian (Gnaccolini, 1965) on the basis of their mollusc fauna. Jadoul, 1985 hypothesizes an Upper Norian-Rhaetian age for the AdS, while Tintori et al., 1985, support the hypothesis of a Norian age for AdS, by attributing a more limited meaning to the Rhaetian, following Visscher, 1983.

Due to the present uncertainty about the definition of the Rhaetian stage and about the fixation of its biostratigraphical boundaries, in this work we prefer to maintain the attribution of AdS to the Rhaetian, in its

classical lithostratigraphical meaning.

The AdS are sometimes highly fossiliferous, particularly with bivalve mollusc faunae. The fauna of Ponte Giurino, with its remains of fishes and crustaceans representing most of the fossil forms of the outcrop, is quite peculiar. The bony fish fauna of Ponte Giurino is mainly represented by holosteans, with predominant small pholidophorids (Zambelli, 1980, 1986), together with a few other taxa (*Saurichthys*, *Dapedium*, ? *Thoracopterus*, according to Tintori, 1985); the remains of a small shark of the genus *Pseudodalatias* (Tintori, 1980) are also relatively abundant. The crustaceans, very abundant in the deposit, include decapod crustaceans, thylacocephalans and a few rare isopods. The thylacocephalans of the deposit were matter of study by Arduini & Brasca, 1984, who described the



Fig. 1 - Position of Ponte Giurino (Bergamo)

new form *Atropicaris rostrata*, discussed in an additional note by Arduini, 1988. Also odonata insects and coleopterans (Whalley, 1986) can be found in the deposit, as well as pelecypods and gastropods;

furthermore a single specimen of an aphroditid polychaete annelid has been reported (Alessandrello & Teruzzi, 1986), as well as a yet undescribed eunicid polychaete.

PALAEOENVIRONMENTAL SETTING

The Dolomia Principale with the heteropic Calcare di Zorzino, and the superimposed Argilliti di Riva di Solto represent two superimposed basal successions: the lower one (corresponding to the Dolomia Principale and the Calcare di Zorzino) is entirely carbonate, the upper one (corresponding to the Argilliti di Riva di Solto) is largely argillaceous. The Calcare di Zorzino deposited in poorly oxygenated, narrow and elongated basins several metres deep (Jadoul, 1985; Stefani et alii, 1992) originated by tectonic movements, enforced in the very shallow sea of the carbonatic platform; they often had wave resistant margins encrusted by problematica, tube-worms and algae. The Calcare di Zorzino yielded in recent years many fossiliferous localities (Cene, Valvestino, Endenna, Brembilla ecc., cfr. Tintori et al., 1985) with terrestrial, marine and flying reptiles, fishes and crustaceans. This fauna, probably completely allochthonous, lived in the shallow waters of the carbonate platform and on the islands or

cays emerging from the shallow sea. The end of the deposition of this lower succession and the beginning of the deposition of the Argilliti di Riva di Solto coincided with a transgression linked to a widespread environmental deepening, matched with reduced oxygenation and the starting of a substantial terrigenous influx (Stefani et alii, 1992). In the Lombardy region reefs were killed, probably by nutrient excess, carbonate highs were drowned and calcareous production was interrupted, and a large argillaceous basin formed. Low energy environments developed on the intra-basinal palaeo-highs, not far from the fossil localities, with monotonous faunas dominated by pelecypods (nuculoids, rhaetaviculids) and crustacean coprolites (*Bactryllium*). Condensed levels were deposited on these palaeohighs, while thick argillaceous successions accumulated in the adjacent depressions. The fossiliferous outcrop of Ponte Giurino formed at the bottom of one of such depressions.

PRESERVATION MODALITIES

The fossiliferous rock is a black bituminous shale, easy to crumble and difficult to preserve. Infact the plates of shale tend to crumble as soon as they are extracted because of rapid dehydration, so they must be treated immediately; the best way we found to preserve the specimens is to put them well enrolled in paper under heavy weights; in this way dehydration happens under the pressure of weights. After many weeks, when material has dried up, weights are removed, and the bituminous slabs are very compact.

The crustaceans are preserved compressed and flattened on the layer surface and their preparation is generally not very easy because of their high brittleness. Nevertheless the high number of specimens at our disposal allowed, at least for most of the present species, to carry out a sufficiently accurate reconstruction of the details of the external morphology, getting round the preparation difficulties or the different preservation degree of the various specimens.

MATERIALS

We had 773 specimens at our disposal, 681 of which belonging to the collections of the Museo di Scienze Naturali di Bergamo and 92 to the collections of the Museo di Storia Naturale di Milano. The main component of the studied fauna is made of reptant decapods, 310 of which, representing 43,5% of the examined fauna, can be ascribed to the infraorder Astacidea Latreille, 1803, while 227 specimens, representing 32% of the studied sample, belong to the infraorder Palinura Latreille 1803. The natantian decapods are represented by the infraorder Penaeidea de Haan, 1849 with 171 specimens (24% of the total) and by the infraorder Caridea Dana, 1852, with only 4 specimens (0.5% of the total). 61 specimens are not clearly identifiable.

The infraorder Penaeidea is represented by the two new species *Longichela orobica* n. gen. n. sp. (154 specimens) and *Satyris cristatus* n. gen. n. sp. (9 specimens); *Palaeodusa* Pinna, 1974 (2 specimens) belongs also to the same infraorder; all the species can be ascribed to the family Penaeidae Rafinesque, 1803. The infraorder Caridea is present with the new species *Pinnacaris dentata* n. gen. n. sp. (4 specimens), which family ascription is uncertain. The infraorder Astacidea

includes the new species *Glaessnericaris macrochela* n. gen. n. sp., ascribed to the family Platychelidae Glaessner, 1931 (310 specimens). The infraorder Palinura includes the families Palinuridae Latreille, 1802 with the genus *Archaeopalinurus levis* Pinna, 1974 (8 specimens); the family Mecochiridae Van Straelen, 1925 with the new species *Pseudoglyphea gigantea* n. sp. (183 specimens); the family Coleiidae Van Straelen, 1924 with the new species *Pseudocoleia mazzolenii* n. gen. n. sp. (36 specimens).

Acronyms, MSNM: Museo di Storia Naturale di Milano; MSNB: Museo di Scienze Naturali di Bergamo.

Abbreviations: the following is a list of the abbreviations used in the tables and figures of the text to indicate the different anatomical details:

R	rostrum
A	antennal region
B	branchial region
C	cardiac region

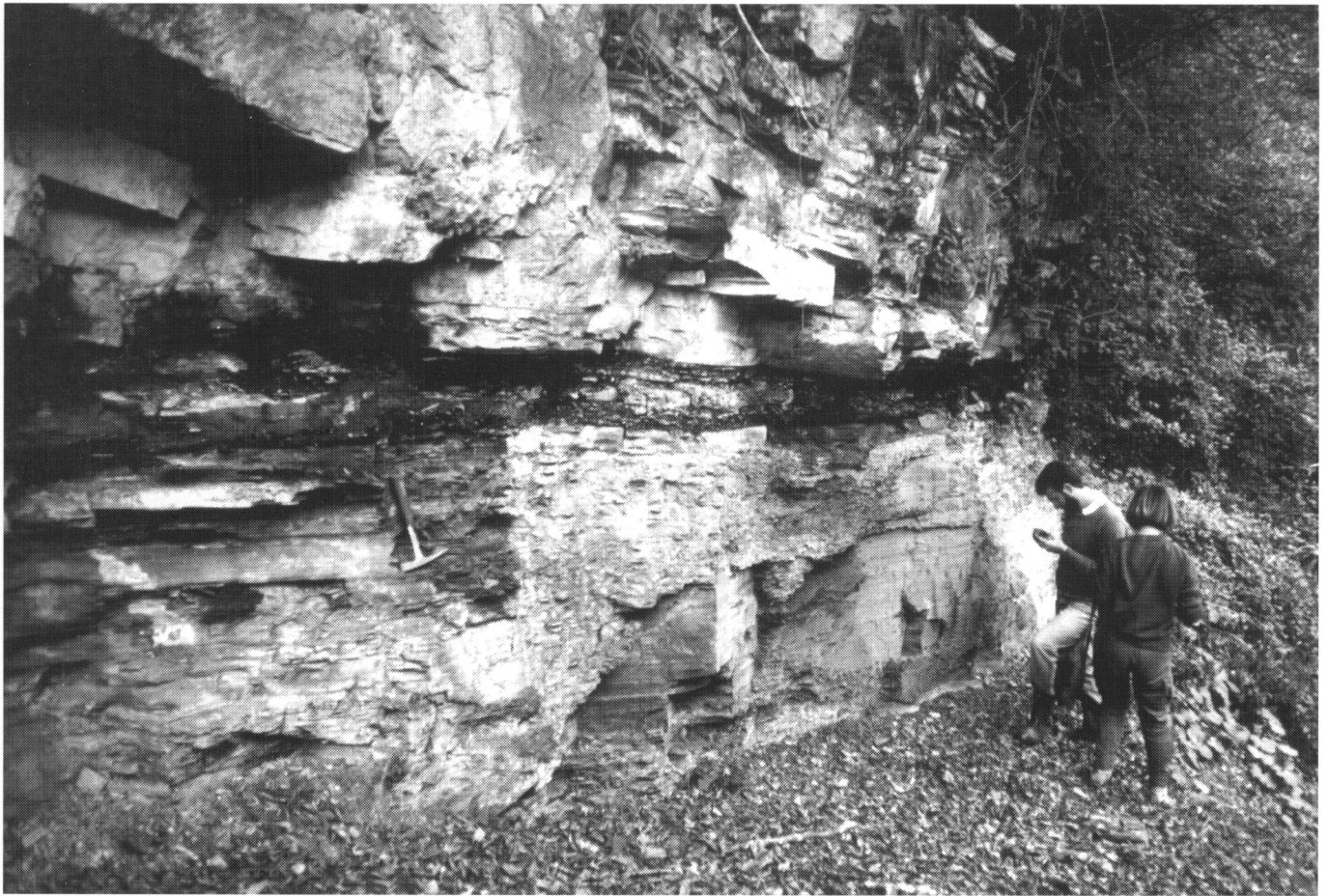


Fig. 2 - Photo of the fossiliferous outcrop

- d gastro-orbital groove
- ee1 cervical groove
- c postcervical groove
- a branchiocardiac groove
- b antennal groove
- An antennal spine
- SE hepatic spine
- X juncture of the posterior dorsoventral muscle
- t telson
- Pt protopodite
- En endopodite
- Ex exopodite
- di diaeresis
- E eye
- A1 antennulae
- A2 antennae
- ca carpocerite
- me merocerite
- i ischiocerite
- Mxp III maxilliped
- pts petasma
- pr pereiopods
- M merus
- Ca carpus
- P propodus
- D dactylus
- I index

SYSTEMATICS

Order Decapoda Latreille, 1803
 Suborder Dendrobranchiata Bate, 1888
 Infraorder Penaeoidea de Haan, 1849
 Superfamily Penaeoidea Rafinesque, 1815
 Family Penaeidae Rafinesque, 1815

Genus *Longichela* nov.

Derivatio nominis: from the well developed chelae of the third pair of pereiopods

Type species: *Longichela orobica* n. sp.

Description: coinciding with that of the type species

Longichela orobica n. sp.

Tab. I: figs. 1, 2

Derivatio nominis: from the Alpi Orobie, where the outcrop of Ponte Giurino is located

Holotype: MSNM i10738

Paratypes: MSNM i10739; i10744; i10751; i10752; MSNB 7725; 7748; 7751; 7760

Type locality: Ponte Giurino, Imagna Valley (Bergamo)

Geological age: U. Norian (?) - L. Rhaetian (?)

Diagnosis: subrectangular carapace, getting slightly narrow anteriorad; rostrum with 14 (?) proverse suprarostal teeth; carapace with gastrofrontal groove, antennal and hepatic spines; elongated and distally sharp scaphocerite; short and spineless 3rd maxilliped; chelate I-III pereiopods of growing length, with very elongated

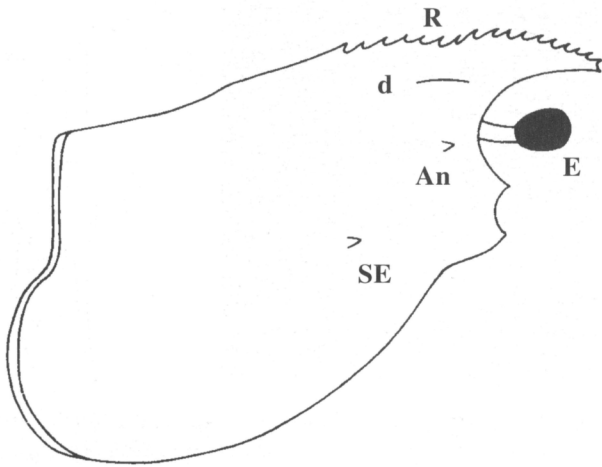


Fig. 3 - *Longichela orobica* n. gen. n. sp., carapace reconstruction, line drawing

merus and carpus and very strong propodus; subrectangular I-V abdominal somites of even length; longer rectangular VI somite; distally bifid triangular telson; exopodite of the uropodite with diaeresis.

Material: we ascribed to the new species 154 specimens in different preservation conditions, with a total length ranging between 2.5 and 6 cm.

Description. It is a medium-size, elongated penaeid, with a thin and completely smooth exoskeleton.

Carapace. The carapace (see Figs. 3, 4), in lateral view, is subrectangular and it shrinks weakly towards the anterior margin. The dorsal margin is straight in the posterior third and it bends upwards in the anterior third. The posterior margin is sinuous; it is slightly concave in the upper third and it bends backwards in the lower third by creating a marked convexity partly covering the first abdominal somite. The posterior margin is delimited by a marginal carina. The ventral margin is bent. The rostrum is slightly convex, with the tip bending downwards and 14 (?) suprarostrals teeth of the same size and shape, all of them forward protuded and occupying the whole upper margin of the rostrum, which completely lacks teeth in its lower margin. Just below the rostrum there is a very wide and deep ocular incision; antennal and pterigostomial angles are both keen, defining a slightly concave antennal incision. As the carapace is very flattened in all specimens, it is impossible to follow in detail the development of the grooves and the carinae; it is nonetheless possible to see traces of a short gastro-orbital groove, of the antennal spine, located near the lower third of the ocu-

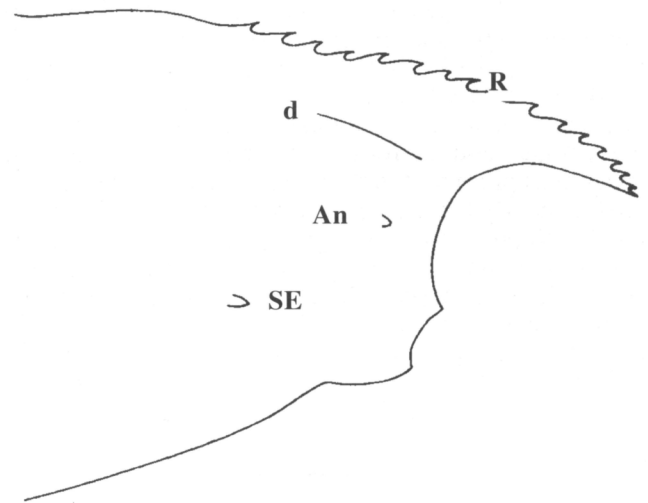
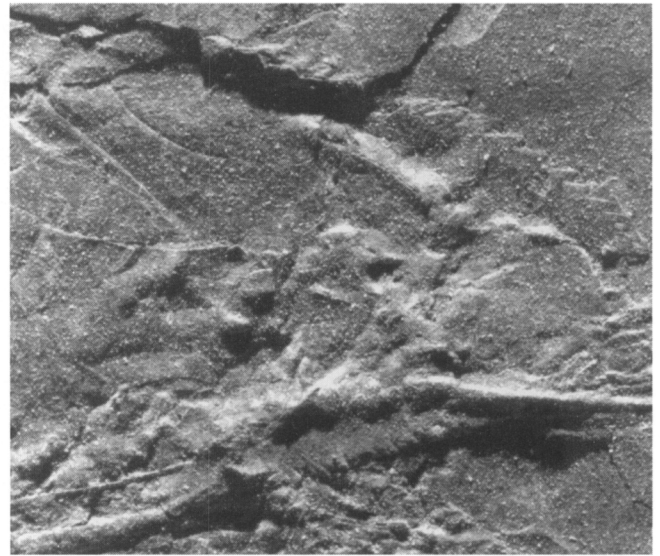


Fig. 4 - *Longichela orobica* n. gen. n. sp., n. cat. MSNM i 10739, carapace antennal region, photo and reconstruction (x 12)

lar incision, and of the hepatic spine.

Abdomen. The abdomen (see Fig. 5) is well preserved in almost all the specimens and it has the typical bent of penaeids. The somites I-V have an even length and a subrectangular shape; the VI somite has a rectangular shape and its length is twice the width. The somites I-III have rounded pleurae and a sinuous posterior margin. Such sinuosity fades in the third somite, which has an almost straight posterior margin. The

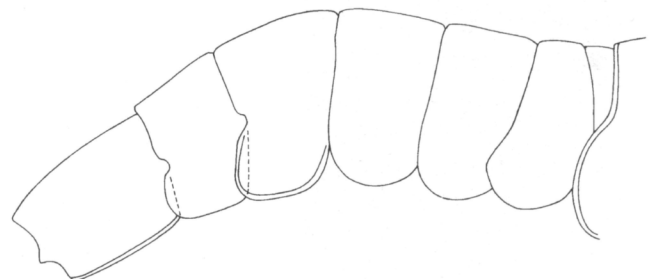
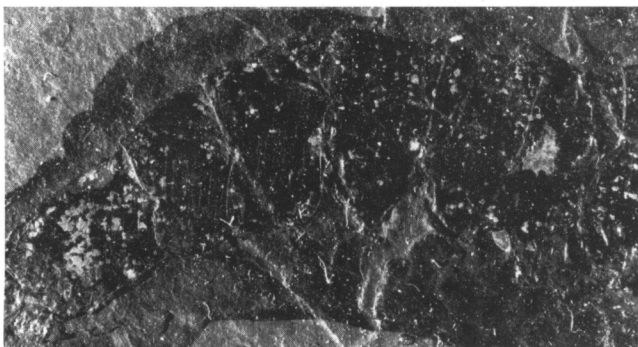


Fig. 5 - *Longichela orobica* n. gen. n. sp., n. cat. MSNB 7783, abdomen, photo and reconstruction (x 2)

posterior margins of the IV and V somites are backwards protuded and they lie over the following somite. The ventral margin of all somites is delimited by a marginal carina. In the holotype the first somite preserves the petasma. The large, triangular-shaped telson seems to be distally bifurcated. Its surface is flat and it does not show any particular ornamentation. The endopodite and the exopodite of the uropodite show a rounded distal extremity: the endopodite is crossed by a median carina; on the exopodite of some specimens (MSNB 8316, 8301, 8261) it is possible to notice a diaeresis. The uropods are about 1/3 longer than the telson (see Fig. 6).

Cephalic appendages. The cephalic appendages are partly preserved: the eye is ovoidal; fragments of the antennules flagella are preserved; the scaphocerite of the antennae is well developed and it is brought by a short basicerite, located in the small concavity formed by the antennal and pterigostomial angles; also fragments of the flagella can be seen.

Thoracic appendages. They are well preserved in almost all the specimens; only the 3rd maxilliped is generally badly preserved: on the holotype it is possible to recognize a short element, maybe the ischium, followed by the long and thin merus; the following elements cannot be recognized. The pereopods I-III are chelate and increasingly longer; almost all the specimens preserve the third pair characterized by long chelae slightly bending at the distal extremity; the merus and the carpus are very elongated; the propodus is strong and a long and a thin dactylus is articulated to it (see Fig. 7). The pereopods IV-V have a terminal dactylus.

Abdominal appendages. They are well preserved in almost all the specimens. The pleopods are made of a subrectangular sympodite supporting two long multiarticulated flagella (MSNM i10739).

Observations

The general morphology of *Longichela* n. gen. (see Fig. 8) is that typical of the family Penaeidae Rafinesque, 1815. As far as its Triassic representatives are concerned, the family Penaeidae includes four genera: *Aeger* Münster, 1839; *Antrimpos* Münster, 1839; *Bombur* Münster, 1839; *Palaeodusa* Pinna, 1974.

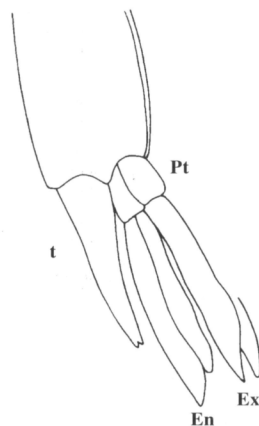


Fig. 6 - *Longichela orobica* n. gen. n. sp., n. cat. MSNM i10738 VI somite and tail fan, photo and reconstruction (x 5)

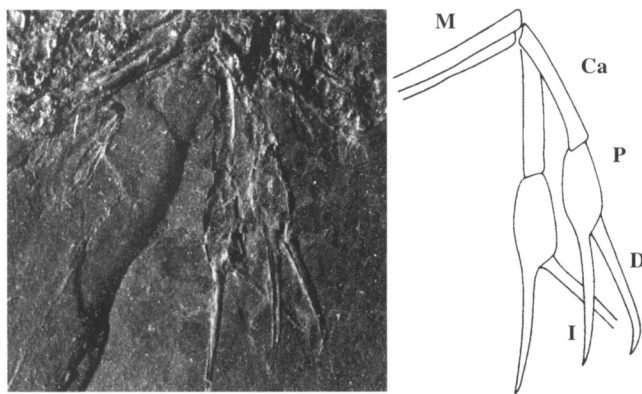


Fig. 7 - *Longichela orobica* n. gen. n. sp., n. cat. MSNM i10738 third pair of pereopods, photo and reconstruction (x 4, 5)

Among the aforementioned genera, the genus *Longichela* n. gen. shows some affinities with the genus *Antrimpos* Münster, 1839.

The genus *Antrimpos* was erected by Münster in 1839 for the species *Antrimpos speciosus*, of Solnhofen Kimmeridgian, Bavaria. According to the author, forms of sometimes good dimensions can be ascribed to this genus; they are characterized by a thin and elongated body with a carapace supplied with a toothed rostrum. The antennulae are short and they have a long peduncle on which two or three flagella are inserted, according to the original description. The antennae are longer and stronger than the antennulae and they have a large foliaceous scaphocerite. The first three pairs of pereopods, increasingly longer from the first to the third, are very developed for the elongation of the carpus and the merus; they terminate with long chelae. According to Münster, also the IV and V pairs are supplied with chelae or at least have a bifid dactylus. Actually, as Oppel, 1862 stressed later on, the dactylus of the last two pairs of pereopods in certain specimens of *Antrimpos* has a deep longitudinal groove that could have misled Münster, by giving him the impression of a real division of the element. The description of the abdomen just stresses, in the last three somites, the presence of a small swelling at about their mid-length (may be the fulcrum of the articulation between the somites) and the remarkable length of the uropods. Van Straelen, 1928 revised the features of the genus *Antrimpos*: a more or less elongated carapace with a rostrum often toothed on both margins, antennulae with two flagella of different length, antennae longer than the antennulae and twice as long as the body, first three pairs of pereopods chelate; to these features Glaessner, 1969 adds the growing length of the first three pereopods and the sixth somite longer than the others.

Many, often poorly known, species from Lower Triassic to Upper Jurassic were ascribed to the genus *Antrimpos*; as other authors before him Glaessner, 1969 stresses that the genus *Antrimpos* is actually a "collective" genus, to which many species of fossil penaeids with affinities with the recent penaeids were ascribed. The status of the genus *Antrimpos* should therefore need a deep revision, which nevertheless lies outside the aim of this work.

The common features of the genus *Longichela* n. gen. and the genus *Antrimpos* Münster, 1839 s. s. are the general shape of the body, the subrectangular carapace, and the abdominal somites with rounded pleurae.

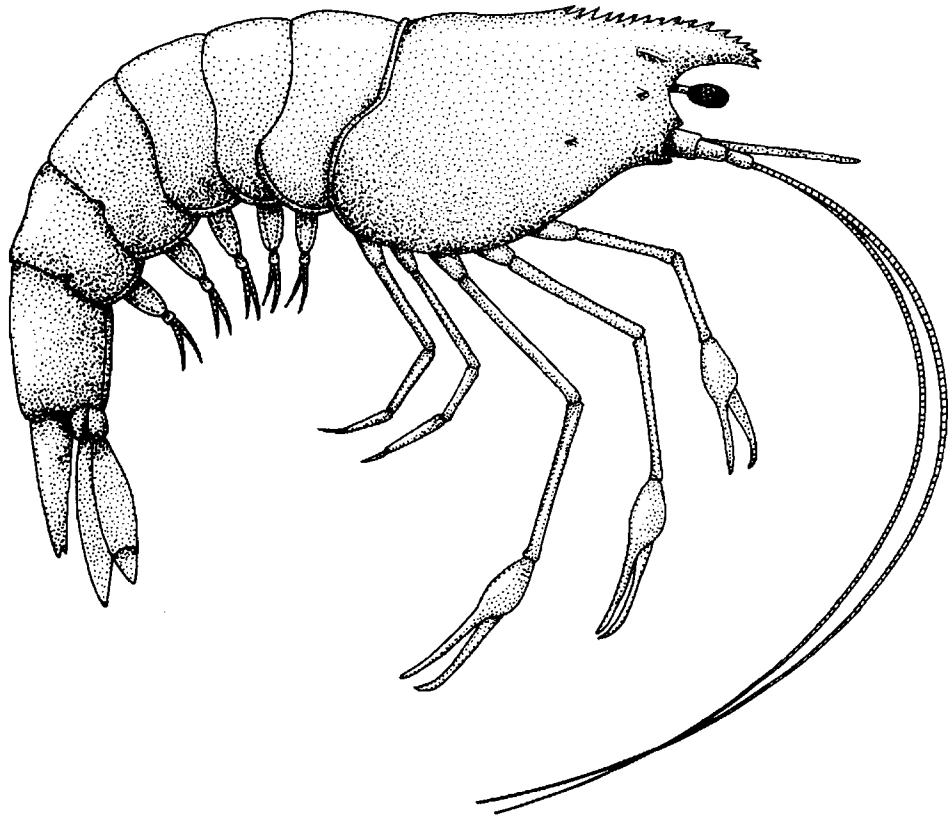


Fig. 8 - *Longichela orobica* n. gen. n. sp., reconstruction

Yet, if we take as a reference the type species *A. speciosus* Münster, 1839, the genus *Longichela* n. gen. shows morphological features that definitely distinguish it from this species: the structure of the rostrum, whose teeth are not distinguished between anterior and posterior; the lack of the subrostral tooth; the characteristic trend of the anterior margin of the carapace, that shows a very deep ocular incision below which the antennal and pterigostomial angles are just sketched; the presence on the carapace of the antennal and hepatic spines, lacking in *A. speciosus*; the third pair of pereopods showing a marked elongation of the merus, the carpus and the propodus with very big chelae. On the basis of these morphological differences we justify the inclusion of *L. orobica* in a genus of its own.

Cfr. *Longichela orobica* n. gen. n. sp.
Tab. I: fig. 3

Material: MSNB 8199-8200 (part and counterpart)

Description. Elongated, rather big penaeid (total length 7 cm), with a thin and completely smooth exoskeleton.

Carapace. The carapace (see Figs. 9, 10), visible in lateral view, is subrectangular and it shrinks slightly anteriorly. The dorsal margin is straight. The posterior margin is sinuous: it is slightly concave in the upper third and backward protuded in the lower third, thus creating a slight convexity. The posterior margin is delimited by a marginal carina. The ventral margin has a curved trend. The dorsal margin stretches into a very elongated straight, distally pointed rostrum, supplied with 20 (?) suprarostreal teeth; teeth originate in the upper third of the dorsal margin of the carapace and cover regularly the whole upper margin of the rostrum.

There are no teeth in the lower margin of the rostrum. The anterior margin of the carapace creates a narrow and shallow ocular incision, delimited by a light antennal angle. It is not possible to observe the pterigostomial angle. The bad preservation of the surface of the carapace does not allow to recognize the presence of grooves and carinas. It is nevertheless possible to observe the presence of an hepatic spine.

Abdomen. The abdomen is well preserved. The rectangular somites I-III are increasingly longer and have sinuous pleural margins. The posterior margins of the somites IV-V are backward protuded. The VI somite is rectangular and very elongated. The telson and the uropods are only partially preserved.

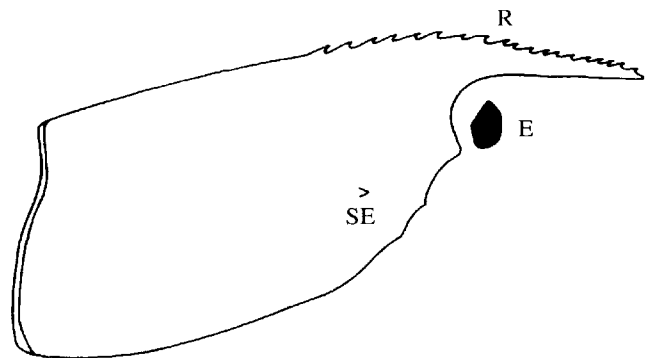


Fig. 9 - Cfr. *Longichela orobica* n. gen. n. sp., carapace reconstruction, line drawing, based on specimen MSNB 8200

Cephalic appendages. The cephalic appendages are partly preserved: it is possible to detect the presence of the right (?) eye, ovoidal in shape; the scaphocerite of the antennae is elongated, with a rounded distal extremity.