Two new cumacean species (Crustacea: Peracarida) from shallow waters off Thailand*

JORDI CORBERA and DANIEL MARTÍN

1 Carrer Gran, 90, 08310 Argentona, Catalunya, Spain. E-mail: corbera@sct.ictnet.es
2 Centre d’Estudis Avançats (CSIC), carrer d’accés a la Cala Sant Francesc, 14, 17300 Blanes (Girona), Catalunya, Spain.

INTRODUCTION

The tropical Indo-West Pacific Region has been considered as being among the areas containing the highest biodiversities in the world from the point of view of terrestrial vegetation (Myers et al., 2000), but this seems to be also true for the marine environment (Clarke and Crame, 1997; Gray, 2001). Although certainly potentially rich, the cumacean fauna of the region is, however, little known.

The first knowledge of the cumaceans of that region was obtained from the material of the Siboga...
Expedition (Calman, 1905) and from the specimens of the Gulf of Siam collected by Th. Mortensen for the Zoological Museum of Copenhagen (Calman, 1907, 1911). Later on, Fage (1945) studied the littoral species from the coast of Vietnam and Jones (1969) those from deep water collected by the Galathea Expedition. Petrescu (1992, 1995, 1997a) published the results of the “Grigore Antipa” Natural History Museum expedition to Indonesia, and described four new species from Malayan waters (Petrescu, 1997b). More recently, Watling and Angsupanich (2002a) described a new species from the Andaman Sea.

The above-mentioned authors recorded up to 67 species in the Indo-West Pacific region (Australian coast excluded). However, only 24 have been found in the Gulf of Thailand (Watling and Angsupanich, 2002b). Thanks to the macrobenthic samples collected by the French company CREOCEAN as part of a large environmental monitoring carried out in the Gulf, the present paper fully describes and illustrates two new species of Cumacea (Crustacea), namely *Pseudosympodomma carinatum* sp. nov. (Bodotiридae, Vaunthompsoniinae) and *Paradiastylis capillata* sp. nov. (Dyastilidae). Additional data on the habitat where the species occur is also provided.

**MATERIAL AND METHODS**

The Gulf of Thailand is a shallow, semi-enclosed bay covering an approximate area of $35\cdot10^4$ km$^2$. The bottom sediments of the Gulf are mainly mud, with sand confined to shallow areas. The average depth is about 45 m, with much of the Gulf being less than 60 m deep (maximally about 85 m deep).

Sampling was performed by CREOCEAN as part of an environmental monitoring in the Gulf (about 180 km east of Songkhla, Thailand). In the study area, water temperature and salinity at the bottom level were 27-28°C and 35‰ respectively. The samples were collected by means of a van Veen grab covering about 0.3 m$^2$. Additional cores were collected for granulometry and organic matter content analyses. The grab contents were mixed in a sufficiently large container, and then sieved out on board by pouring the contents through a 1 mm mesh sieve. The retained sediment was then transferred into a plastic bag, fixed with a 10% formaldehyde/seawater solution, stained with “Rose of Bengal” and stored until sorted. An initial sorting was performed under a dissecting stereomicroscope (Zeiss Stemi 2000-C) to count the number of individuals. Among the sediment samples collected, 4 contained specimens of *Paradiastylis capillata* sp. nov. while *Pseudosympodomma carinatum* sp. nov., occurred only in one sample.

The granulometry, expressed as the % in volume of fine sediments (i.e. < 60 µm), was estimated from a laser grain size distribution performed on dry sediment after sieving through a 2 mm mesh sieve, using a Coulter Ls 230 laser granulometer. Total organic matter content was calculated as the % in volume after calcinations at 550°C.

For the morphological observations, the cumaceans were dissected in lactic acid and stained with Chlorazol black. Material preserved in permanent glass slides was mounted in Fauré medium sealed with nail varnish. Drawings were prepared using a camera lucida on an Olympus microscope. The terminology follows Bacescu and Petrescu (1999). The material is deposited in the cumacean collection of the Institut de Ciències del Mar (ICM), Barcelona.

**RESULTS**

**Order CUMACEA Kröyer, 1846**

**Family BODOTRIIDAE Scott, 1901**

**Subfamily VAUNTHOMPSONIINAE Sars, 1878**

Genus *Pseudosympodomma* Kurian, 1954

*Pseudosympodomma carinatum* sp. nov.

(Figs 1-3)

**Type material.** Holotype: preadult male partially dissected on 2 slides, Gulf of Thailand, station 12, 7°38’05”N 102°41’47”E, 70 m depth, M. Lebas, coll. (ICM: CUM-0031). Paratype: one preadult female partially dissected on 1 slide, same locality as the holotype, M. Lebas, coll. (ICM: CUM-0032).

**Etymology.** Referring to the high development of middorsal carina on the pereon.

**Description:** Preadult male, total length 11.9 mm. Carapace (partially damaged) about one fifth of total length; dorsal median carina with three teeth directed forwards occupying two thirds of dorsal margin. Eyelobe narrow and linguiform reaching beyond the pseudorostral lobes. Anterolateral angle rounded, with three small teeth on the lower margin. Pereon as long as the carapace, first somite very short, somites second to fourth with a developed median carina acute in front; fifth somite with a dou-
ble median carina less developed than in preceding somites.

Peduncle of first antenna three-articulated, first article as long as the other two combined, second and third article of the same length; accessory flagellum two-articulated. Mandible with four teeth on the pars incisiva, lacinia mobilis exceeding pars incisiva and with three teeth; with 20 setae on the left mandible and 22 on the right. Second maxilla, protopod with a row of setules and some plumose setae; endites exceeding protopod and with simple setae. Basis of first maxilliped with eight plumose setae on inner margin, its endite with two retinacula, a pair of broad spines, two plumose setae and some
simple ones; carpus with eight flattened hand-like setae on inner margin; propodus with a long plumose seta. Basis of second maxilliped longer than the rest of appendage, with plumose setae on distal outer corner and simple setae on the distal third of inner margin; carpus as long as propodus and dactylus combined. Third maxilliped, first and second pereopods with exopods. Basis of third maxilliped one and a half times as long as the rest of appendage, with plumose setae on inner margin and

Fig. 2. – Pseudosymphodoma carinatum sp. nov., preadult male Holotype (ICM: CUM-0031); a, third maxilliped; b, first pereopod; c, second pereopod; d, third pereopod; e, uropod.
simple setae on outer margin, produced distally reaching the end of merus; ischium longer than merus with three plumose setae on inner margin. Basis of the first pereopod less than two thirds of the total appendage length, with a row of plumose setae and four slender spines on the inner margin; propodus as long as the three preceding segments, with some simple setae; dactylus as long as merus, with two claws. Basis of second pereopod about one third of total appendage, with plumose setae on the outer margin; merus slightly shorter than carpus with a long spine-like seta on the outer distal corner; carpus with three spine-like setae on the outer distal corner; propodus very short; dactylus long and slender with five short acuminate setae on the proximal third of the outer margin and a distal spine-like seta longer than half dactylus. Basis of the third pereopod shorter than the rest of appendage, carpus longer than merus, with four setae longer than propodus and dactylus.

Uropod peduncle 1.4 times longer than rami, with 30 acuminate setae on inner margin. Endopod as long as exopod, two-segmented; first segment shorter than second, with 14 acuminate setae on inner margin and eight simple setae on the outer; second segment with 15 acuminate setae on inner margin, two distally and 14 simple setae on outer margin. Second segment of exopod with a row of long plumose setae on inner margin, a row of simple setae on outer margin and four terminal spine-like setae.

Preadult female, total length 12.1 mm. Closely resembles the preadult male. Carapace with a single median dorsal carina on its hinder half; anterolateral angle with two teeth. Uropods as in male but with less acuminate setae (11) on the first segment of endopod.

**Taxonomical remarks:** Only four species are known for the genus *Pseudosympodomma* (Table 1): *P. africanum* (Stebbing, 1912) from south east Africa, *P. indicum* Kurian, 1954 from south east India, *P. hoinicae* Petrescu, 1998 from the coast of Tanzania and *Pseudosympodomma* sp. from the Red Sea (Mühlenhardt-Siegel, 1996). *P. carinatum* sp. nov. and *P. indicum* are related because both have the first article of the uropodal endopod shorter than the second. The former differs from the latter by having a larger number of setae on the mandible and a highly developed median carina on pedigerous somites two to four, and by lacking spines on the articles of the third maxilliped. In addition, *P. carinatum* differs from all other species of the genus in the extent to which the teeth occupy the dorsal margin.
Ecological remarks: The density of *P. carinatum* at the studied location was 7 ind. m\(^{-2}\). The environmental characteristics of the bottoms where the species was found are summarized in Table 2.

Family DIASYSTILIDAE Say, 1818

Genus *Paradiastylis* Calman, 1904

*Paradiastylis capillata* sp. nov.  
(Figs. 4-5)

Type material. Holotype: one adult female partially dissected on 2 slides, Gulf of Thailand, station 5, 7°36’03’’N 102°50’32’’E, 64 m depth, M. Lebas, coll. (ICM: CUM-0037). Paratypes: one adult male (carapace damaged), station 15, M. Lebas, coll. (ICM: CUM-0038); one adult female, station 16, M. Lebas, coll. (ICM: CUM-0039); one adult female, station 10, M. Lebas, coll. (ICM: CUM-0040).

Etymology. From the Latin *capillus* meaning hair, referring to the long setae on the carapace.

Description: Adult female, total length 5.7 mm. Carapace more than a third of total length, about twice as long as broad, covered by long hairs mainly dorsally and on the anterior half; pseudoorostral lobes acutely pointed, without antennal notch; anterolateral margin finely serrated. Eyelobe rounded with few lenses.

Peduncle of first antenna three-segmented, the second segment being the longest; main flagellum three-segmented, longer than the last peduncle segment and with two aesthetasc distally; accessory flagellum three-segmented, the first and the third being very short, the whole longer than the proximal segment of the main flagellum. Mandible with three teeth on the pars incisiva as well as on lacinia mobilis, 14 seta between pars incisiva and truncated pars molaris. Palp of first maxilla with two unequal filaments; inner endite with four setae, two acuminate, one trifid and one microsetulated; outer endite with seven acuminate setae. Second maxilla with the endites exceeding the protopod and with plumose setae. Basis of first maxilliped with five simple setae and one plumose short seta, two retinacula and a pair of broad spines; merus with a long seta on the distal outer corner; carpus with seven flattened hand-like setae and few rows of simple setae on the inner margin, and a long plumose seta on the distal outer corner; propodus with two long plumose setae on the distal margin and simple setae on the inner margin.
Basis of the second maxilliped as long as the rest of appendage, with three plumose setae on the inner margin; carpus longer than ischium and merus combined; propodus with a long plumose seta on the distal outer corner. Third maxilliped without exopod; basis longer than the rest of appendage, produced distally reaching the end of merus, with simple setae on inner margin and plumose setae on the process; carpus shorter than propodus; dactylus shorter than its claws. Exopods on pereopods first and second. Basis of first pereopod shorter than the three following segments combined, with long plumose setae on the inner margin; merus twice ischium; carpus long and slender, shorter than propodus; dactylus broken. Basis of second pereopod less than half length of the appendage with plumose setae on outer and inner margins; merus shorter than carpus; carpus with a simple and four acuminate setae distally; dactylus slightly shorter than carpus. Basis of third pereopod with long plumose setae on anterior margin.

Telson one and a half times as long as the last abdominal somite; pre-anal part cylindrical, post-anal part one sixth of the whole length, with three pairs of lateral acuminate setae and a pair of distal ones. Peduncle of uropod slightly longer than telson, with nine acuminate setae on inner margin; endopod longer than exopod, three-segmented, ten acuminate setae on the first segment, three on the second and two on the third; second segment of exopod with simple setae on outer and inner margin and two long spine-like setae distally.

Adult male, third segment of first antenna with a dense brush of sensory setae. With exopods on third maxilliped and first to fourth pereopods; basis of four first pereopods expanded. Two pairs of pleopods.
Taxonomical remarks: The genus Paradiastylis may be identified by a singular feature among Diastylidae: the absence of exopod on the third maxillipede of females. This is a feature shared with the members of the family Gynodiastylidae, the males of which do not have pleopods (for a discussion about differences between the two families see Day, 1980). As far as is known, the species of this genus are living in shallow waters of the Indo-West Pacific region (Petrescu, 1997), have folds on the carapace and a short telson, except for *P. bathyalis* Jones, 1969, which lives in deep water, does not

Fig. 5. – *Paradiastylis capillata* sp. nov., adult female Holotype (ICM: CUM-0037): a, second maxilliped; b, third maxilliped; c, first pereopod; d, second pereopod; e, third pereopod; f, last abdominal somite with the telson and the left uropod.
have folds on the carapace and has a long telson with a cylindrical pre-anal part like those of the genera *Makrokylindrus* or *Dic*. In spite of these differences, “with some hesitation” Jones (1969) placed this species in the genus *Paradiastylis* due to the absence of exopod on the third maxilliped of the female. Although *P. capillata* nov. sp. has been collected in shallow waters, it is more related to *P. bathyalis* than to the rest of the species in the genus due to the absence of folds on the carapace and the telson morphology. However, the two species may be differentiated by the relative lengths of the uropod endopod that is longer than the exopod in *P. capillata* and by the basis of the third maxilliped which is shorter, more compact and produced distally in *P. capillata*. The long legs and the long telson indicate a deep-water origin for the species described herein but differences in the morphology of the third maxilliped suggest that resemblances with *P. bathyalis* could be convergences.

The loss of the exopod of the third maxilliped could have happened several times and there may be several lineages within the Diastylidae in which that feature was present. Consequently, a new genus could be erected for the species here described. However, in the original description of the only two known specimens of *P. bathyalis* (Jones 1969), the mouthparts were not figured. Therefore, the fact that they cannot be examined makes it advisable at the moment to include the new species in the genus *Paradiastylis*.

**Ecological remarks:** The densities of *P. capillata* sp. nov. at the studied locations ranged from 3 to 7 ind. m⁻². The average environmental characteristics of the bottoms where the species was found are 68.6 ± 7.0 m deep, 91.7 ± 1.6% of fine sediments and 8.1 ± 1.4% of total organic matter (Table 2).

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