

REDIAGNOSIS AND REVISION OF SOME NANNASTACIDAE (CRUSTACEA: CUMACEA)

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Abstract.—The genera *Cumella* and *Nannastacus* have become large and diffuse, and are defined by only a few characters. New diagnoses are given for these genera, as well as for the related *Schizotrema*, and the genus *Cumella* is divided into four subgenera. In addition, *Schizocuma* is reinstated, and the new genera *Scherocumella* and *Elassocumella* are created. It is suggested that the genera with separated siphons originated independently, *Schizocuma* in deep water and *Schizotrema* in shallow water.

The taxonomy of the Cumacea has remained quite stable during its history. Few of the earlier genera have been revised or changed in concept, although several genera have been added. As a consequence, some genera have become quite large and their definitions diffuse. In the Nannastacidae, there are 17+ genera, the number varying depending on which of several proposed new genera one is willing to accept. Most of these genera contain only a few species, but three (*Campylaspis*, *Cumella*, and *Nannastacus*) have 30 or more.

Three genera, *Cumella*, *Nannastacus*, and *Schizotrema*, have been defined historically by only a few characters, e.g., general shape of the carapace, condition of the eye, and condition of the branchial siphon and pseudorostral lobes. Often, one or two characters have been given much more weight than others. For example, the possession of a split eyelobe and medially united branchial siphon was reason enough to assign a species to the genus *Nannastacus*. As noted by Zimmer (1941) the genus soon came to consist of two groups—those with a long pseudorostrum and long uropod peduncles, and those with a short pseudorostrum and short uropod peduncles. There is a clear need to define more narrowly these nannastacid genera so that each is homogeneous and is defined by a larger suite of characters.

In this paper I emend the diagnoses of the genera *Cumella*, *Nannastacus*, and *Schizotrema*, divide *Cumella* into several subgenera, reinstate the genus *Schizocuma*, and propose two new genera, one for an odd species previously assigned to *Cumella*, and another for a group of species removed from the genus *Nannastacus*.

Cumella Sars, 1865

Styloptocuma Bacescu & Muradian, 1974.—
Jones, 1984.

Type species.—*Cumella pygmaea* Sars, 1865.

Diagnosis (emended).—Carapace anteroventral corner acute to slightly rounded, not strongly projecting; ocular lobe single, mid-dorsal; siphons united medially, occasionally slightly separated; pseudorostral lobes of varying length, usually slightly to strongly upturned, meeting in front of eyelobe; antenna 1 peduncle article 2 with or without process, subequal to or longer than article 3; female maxilliped 3, pereopods 1 and 2 with exopods; male maxilliped 3 and pereopods 1-4 with exopods; uropod peduncle usually as long as or longer than pleonite 6; uropod exopod basal article short, not submerged in peduncle, exopod much longer than its terminal seta.

Subgenus *Cumella* Sars, 1865

Type species.—*Cumella pygmaea* Sars, 1865.

Diagnosis.—Eyelobe with or without lenses, narrow, short, not reaching end of pseudorostral lobes.

Additional species.—*Cumella* (*Cumella*) *aculeata* Jones, 1984; *C. (C.) africana* Bacescu, 1977; *C. (C.) agglutinanta* Bacescu, 1971; *C. (C.) argentinae* Jones, 1984; *C. (C.) arguta* Gamô, 1962; *C. (C.) australis* Calman, 1907; *C. (C.) cana* Hale, 1945; *C. (C.) carinata* (Hansen, 1887); *C. (C.) compacta* Jones, 1984; *C. (C.) coralicola* Bacescu, 1971; *C. (C.) decipiens* Jones, 1984; *C. (C.) dentata* Lomakina, 1952; *C. (C.) garrityi* Bacescu & Muradian, 1977; *C. (C.) gomoiui* Bacescu & Muradian, 1977; *C. (C.) gurwitchi* Lomakina, 1952; *C. (C.) hastata* Fage, 1945; *C. (C.) hirsuta* (Hansen, 1895), new combination; *C. (C.) hispida* Calman, 1911; *C. (C.) laevis* Calman, 1911; *C. (C.) lima* Hale, 1936; *C. (C.) meredithi* Bacescu, 1971; *C. (C.) meridionalis* Jones, 1984; *C. (C.) michaelseni* Zimmer, 1914; *C. (C.) munroi* Hale, 1945; *C. (C.) pilosa* Bacescu, 1971; *C. (C.) polita* Jones, 1984; *C. (C.) quadrispinosa* Gamô, 1965; *C. (C.) rigida* Gamô, 1963; *C. (C.) sadoensis* Gamô, 1967; *C. (C.) scabera* Gamô, 1962; *C. (C.) similis* Fage, 1945; *C. (C.) spicata* Jones, 1984; *C. (C.) tarda* Hansen, 1920; *C. (C.) tripunctata* Bacescu, 1971; *C. (C.) vicina* Zimmer, 1944; *C. (C.) vulgaris* Hart, 1930.

Remarks.—Included in this list is *C. (C.) hirsuta*, originally assigned to *Nannastacus* by Hansen (1895). While it has a slightly enlarged eyelobe, and appears to have the lenses partitioned into two groups, the uropods are most characteristic of the genus *Cumella*.

Subgenus *Cumewingia* Bacescu, 1971

Type species.—*Cumella caribbeana* Bacescu, 1971.

Diagnosis.—Eyelobe with lenses, narrow,

short, not reaching end of pseudorostrum, in male augmented by lenses on pseudorostrum.

Additional species.—*Cumella* (*Cumewingia*) *alveata* Gamô, 1964a; *C. (C.) clavicauda* Calman, 1911; *C. (C.) forficula* Calman, 1911; *C. (C.) forficuloides* Bacescu & Muradian, 1975; *C. (C.) glaberata* Gamô, 1962; *C. (C.) indosinica* Zimmer, 1952; *C. (C.) leptopus* Calman, 1911; *C. (C.) limicola* Sars, 1879; *C. (C.) limicoloides* Bacescu & Muradian, 1975; *C. (C.) schieckei* Bacescu & Muradian, 1975; *C. (C.) serrata* Calman, 1911; *C. (C.) siamensis* Zimmer, 1952; *C. (C.) turgidula* Hale, 1945.

Subgenus *Styloptocuma* Bacescu & Muradian, 1974

Type species.—*Styloptocuma antipai* Bacescu & Muradian, 1974.

Diagnosis (emended).—Eyelobe without lenses, narrow, generally elongate, reaching to end of or beyond pseudorostral lobes.

Additional species.—*Cumella* (*Styloptocuma*) *acuminata* Jones, 1984; *C. (S.) angustata* Jones, 1984; *C. (S.) bishopi* Jones, 1984; *C. (S.) concinna* Jones, 1984; *C. (S.) cristata* Jones, 1984; *C. (S.) dayae* Jones, 1984; *C. (S.) echinata* Jones, 1984; *C. (S.) egregia* Hansen, 1920; *C. (S.) erecta* Jones, 1984; *C. (S.) exstans* Jones, 1984; *C. (S.) formosa* Jones, 1984; *C. (S.) gracillima* Hansen, 1920; *C. (S.) longisipho* Jones, 1984; *C. (S.) subducta* Jones, 1984.

Remarks.—While the elongate eyelobe strongly typifies this group, they are all also unusually long and slender, both in body and appendages. Jones (1984) described several other species which were also long and slender but are not included in this subgenus because of their short eyelobes. If one hypothesizes that the eyelobe is a synapomorphy characterizing a deep-sea phylogenetic lineage, then the other long and slender species have independently invaded this environment.

Cyclaspocumella, new subgenus

Type species. — *Cumella cyclaspoides* Zimmer, 1914.

Diagnosis. — Eyelobe with or without lenses, broad, reaching end of pseudorostral lobes.

Etymology. — From *Cyclaspis*, a cumacean genus, + *cumella*, referring to the *Cyclaspis*-like shape of the carapace.

Additional species. — *Cumella* (*Cyclaspocumella*) *gibba* Zimmer, 1914.

Remarks. — The two species listed for this subgenus were both described from Shark Bay, Western Australia, one, *C. (C.) cyclaspoides*, from a single female, and the other, *C. (C.) gibba*, from a single male. It is possible, in fact, that they are the same species, but further material will be needed to make this determination. The membership of *C. (C.) gibba* in *Cumella* is questionable since it possesses exopods only on maxilliped 3 and pereopods 1–3, with the last being slightly reduced.

Elassocumella, new genus

Type species. — *Cumella micruropus* Zimmer, 1943.

Diagnosis. — Carapace anteroventral corner broadly rounded; ocular lobe single, mid-dorsal; siphons united medially; pseudorostral lobes of moderate length, not upturned, meeting in front of eyelobe; antenna 1 peduncle article 2 without process, subequal to article 3; exopods absent from maxilliped 3 and pereopods in female; uropod peduncle shorter than pleonite 6; uropod exopod basal article not submerged in peduncle, exopod longer than its terminal seta; abdomen shorter than cephalothorax; male unknown.

Etymology. — From Greek, *elasso*, diminished, + *cumella*; feminine.

Additional species. — No others.

Remarks. — Zimmer (1943, 1980) recognized that the lack of exopods made this species unique within the genus *Cumella*

but attached no particular significance to the shortness of the uropod peduncles or the abdominal somites. However, in its possession of this combination of features, it has few in common with the other *Cumella* species, and by its inclusion serves only to dilute the concept of that genus.

Nannastacus Bate, 1865

Type species. — *Cuma unguiculata* Bate, 1859.

Diagnosis (emended). — Carapace anteroventral corner large, acute, strongly projecting; ocular lobe divided, eyes when present located dorsolaterally; branchial siphon united medially; pseudorostral lobes short, directed slightly upward; antenna 1 peduncle article 2 usually with process, subequal in length to peduncle article 3; female maxilliped 3 and pereopods 1 and 2 with exopods, occasionally missing on maxilliped 3; male maxilliped 3 and pereopods 1–4 with exopods; uropod peduncle in male shorter than or equal in length to pleonite 6; uropod exopod basal article very short, often submerged in peduncle, exopod shorter than its terminal seta.

Additional species. — *Nannastacus angulifera* Lomakina, 1967; *N. agnatus* Calman, 1911; *N. asper* Hale, 1945; *N. brevicaudatus* Calman, 1905; *N. erinaceus* Zimmer, 1913; *N. euxinicus* Bacescu, 1951; *N. gibbosus* Calman, 1911; *N. goniatus* Gamô, 1962; *N. hanseni* Calman, 1905; *N. inconstans* Hale, 1945; *N. inflatus* Hale, 1945; *N. johnstoni* Hale, 1945; *N. minor* Calman, 1911; *N. mystacinus* Zimmer, 1921; *N. nudus* Gamô, 1962; *N. nyctagineus* Gamô, 1962; *N. pardus* Calman, 1905; *N. parvulus* Bacescu & Muradian, 1975; *N. pectinatus* Gamô, 1962; *N. pruinosis* Gamô, 1962; *N. reptans* Calman, 1911; *N. sauteri* Zimmer, 1921; *N. spinosus* Gamô, 1962; *N. spinulosus* Gamô, 1962; *N. stebbingi* Calman, 1904; *N. subinflatus* Hale, 1945; *N. suhmii* Sars, 1887; *N. tardus* Calman, 1911; *N. turcicus* Baces-

cu, 1982; *N. umbellulifer* Gamô, 1963; *N. zimmeri* Calman, 1911.

Remarks.—Zimmer (1941) noted that the genus consisted of two groups of species—those with a short pseudorostrum and short uropod peduncles, and those with a long pseudorostrum and long uropod peduncles. The first group consists of species most like the type species of the genus, *N. unguiculatus*. The latter group possesses additional characters of its own and has been removed into a separate genus, *Scherocumella* (described below). Fage (1945) subdivided *Nannastacus* into three groups: 1) those which now make up the new genus, *Scherocumella*; 2) those where the uropod exopod is remarkably short and the endopod is fringed with setae; and 3) those where the uropod exopod is relatively long and the endopod is serrate and has several, often long, setae. The second group is distinguished also by the absence of exopods from the third maxillipeds in several species and from both the third maxillipeds and pereopods 1 and 2 in two species. The latter two, *N. reptans* Calman, 1911 and *N. tardus* Calman, 1911, were assigned to a new genus, *Paranannastacus* by Stebbing (1912). Zimmer (1921), Hale (1945), and Fage (1945) did not accept this genus, arguing that the variable loss of exopods is not significant in *Nannastacus*. As more species are found and other characters are considered, it may be that *Paranannastacus* should be reinstated and that a new genus be considered for the species missing exopods only from the third maxillipeds. The evolution of this genus seems to be in the direction of loss of exopods; the natatory function of the exopod (that is, where the basis is enlarged to accommodate the musculature necessary for powerful swimming strokes) is already lost in *N. agnatus* and *N. minor*, for example.

Scherocumella, new genus

Type species.—*Nannastacus longirostris* Sars, 1879.

Diagnosis.—Carapace anteroventral corner in female acute or subacute, not projecting; ocular lobe divided, eyes dorsolateral; siphons united medially; pseudorostral lobes elongate, united in front of head; antenna 1 peduncle article 2 shorter than or equal to 3, with or without process; female maxilliped 3 and pereopods 1 and 2 with exopods; male maxilliped 3 and pereopods 1–4 with exopods; uropod peduncle longer than pleonite 6; uropod exopod basal article normal, exopod usually at least as long as its terminal seta.

Etymology.—*schero*, Greek, in a line, successive, + *cumella*, referring to the apparent derivation of these forms from the genus *Cumella*; feminine.

Additional species.—*Scherocumella brachydactyla* (Calman, 1905), new combination; *S. clavata* (Hale, 1945), new combination; *S. gurneyi* (Calman, 1927), new combination (more completely described in Bacescu & Muradian, 1975); *S. japonica* (Gamô, 1962), new combination; *S. leptura* (Calman, 1911), new combination; *S. nasuta* (Zimmer, 1914), new combination; *S. nichollsi* (Hale, 1949), new combination; *S. pilgrimi* (Jones, 1963), new combination; *S. sheardi* (Hale, 1945), new combination; *S. stephensi* (Fage, 1945), new combination; *S. vieta* (Hale, 1949), new combination.

Remarks.—Of the above listed species, *S. nichollsi*, *S. vieta*, *S. clavata*, *S. stephensi*, and *S. pilgrimi* seem to be transitional in form between *Nannastacus* and *Scherocumella*. *S. nichollsi* shows the characters of the new genus most strongly, whereas the others, which are known only from the male, lack the elongate pseudorostral lobes but have very long uropod peduncles. The latter species may ultimately have to be removed to another genus. The name chosen for this genus refers to its apparent derivation from *Cumella* rather than *Nannastacus*, the genus from which all the species have been removed. This is based on the strong similarity of carapace shape and uropod structure between *Cumella* and *Scherocumella*. The form of the uropod in *Nannastacus*,

with its very short peduncle and highly reduced exopod, would seem to be more apomorphic, and perhaps derived independently from a *Cumella*-like form.

Schizotrema Calman, 1911

Type species.—*Schizotrema depressum* Calman, 1911.

Diagnosis (emended).—Carapace anteroventral corner acute, projecting; ocular lobe divided, eyes located dorsolaterally; branchial siphons separate, located laterally; pseudorostral lobes located dorsolaterally; antenna 1 peduncle article 2 usually shorter than 3, with process; female maxilliped 3 and pereopods 1 and 2 with exopods; male maxilliped 3 and pereopods 1–4 with exopods; uropod peduncle shorter than or equal in length to pleonite 6; uropod exopod basal article minute, nearly submerged in peduncle, exopod nearly as long as or longer than its terminal seta.

Additional species.—*Schizotrema aculeatum* Hale, 1936; *S. atlanticum* Bacescu & Muradian, 1972; *S. bidens* Fage, 1945; *S. bifrons* Calman, 1911; *S. depressum* Calman, 1911; *S. leopardinum* Hale, 1949; *S. macrodactylus* Fage, 1945; *S. resimum* Hale, 1949; *S. sakaii* Gamô, 1964b; *S. sordidum* Calman, 1911.

Remarks.—The members of this genus, until the discovery of the most recent species, were known only from very shallow waters in the Indo-Pacific. *S. atlanticum* is unique in being found at greater than 200 m depth.

Schizocuma Bacescu, 1972

Type species.—*Schizocuma vema* Bacescu, 1972.

Diagnosis (emended).—Carapace anteroventral corner rounded or subacute; ocular lobe incompletely subdivided, located medially; branchial siphons separated, located medially to dorsolaterally; pseudorostral lobes separated; antenna 1 peduncle article 2 without process, subequal in length to article 3; maxilliped 3 and pereopods 1 and

2 with exopods in female; maxilliped 3 and pereopods 1–4 with exopods in male; uropod peduncle much longer than pleonite 6; uropod exopod basal article normal, exopod shorter than its terminal seta.

Additional species.—*Schizocuma calmani* (Stebbing, 1912), new combination; *S. divisa* (Jones, 1984), new combination; *S. molossa* (Zimmer, 1907), new combination; *S. spinoculata* (Jones, 1984), new combination; *S. spinosa* (Jones, 1984), new combination.

Remarks.—This genus was distinguished from *Cumella* by Bacescu (1972) chiefly on the basis of its separated siphons, but also using as criteria the slenderness and elongation of the body and appendages. Jones (1984) argued that since there seemed to be a gradation in body and appendage form with no obvious grouping of species in the genus *Cumella*, he could not accept *Schizocuma* as a valid genus, and that *S. vema*, *S. calmani*, and *S. molossa* should remain in *Cumella*. On the other hand, he recognized that *S. calmani* did not belong in the genus *Schizotrema*. In my opinion, the combination of separated siphons, dorsolaterally located pseudorostral lobes, and single eyelobe (although in some species it may be indented) serves to unite this rather disparate deep-dwelling group of species. From a phylogenetic perspective, it is likely that this apomorphic genus evolved from *Cumella* in deep waters, whereas *Schizotrema*, which also has separated siphons, evolved from *Nannastacus* in shallow waters.

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