

Systematics of the genera of Bodotriidae (Crustacea: Cumacea)

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The cumacean family Bodotriidae includes 382 species in 31 genera grouped in three subfamilies: Bodotriinae, Mancocumatinae and Vaunthompsoniinae. Generic diagnoses are based on few characters that often have overlapping states among genera, complicating the understanding of the relationships within the group. The goals of this study are to illuminate the phylogenetic relationships among the genera of the Bodotriidae using morphological characters and to review the systematics of the family. For this purpose, all species within each genus were studied from the literature to code all the variability of genera for 109 variable morphological characters. Phylogenetic analyses show that there is independent reduction of the pleopods in two clades from a plesiomorphic state of five pairs, while the number of exopods of peraeopods has been reduced gradually in more derived groups of bodotriids. The subfamily Bodotriinae is the most derived and the Vaunthompsoniinae the most basal, and is paraphyletic with the Mancocumatinae embedded within it. No discriminatory characters were found between the subfamilies Mancocumatinae and Vaunthompsoniinae and they are not clearly separated in the phylogeny. Mancocumatinae is synonymized with Vaunthompsoniinae and all the genera of the former Mancocumatinae should be included within Vaunthompsoniinae. Analyses of character evolution justify a few other taxonomic changes. All genera were redescribed based on all the coded characters and a complete list of all valid species for each genus is included. Finally, dichotomous keys for identification to genus level are provided. © 2007 The Linnean Society of London, *Zoological Journal of the Linnean Society*, 2007, 151, 1–58.

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INTRODUCTION

The family Bodotriidae Scott, 1901 is the most diverse of the cumacean families and has a worldwide distribution in shallow and deep marine waters. There are 382 species and 31 genera, many of which consist of only a few species or are monotypic. Others, such as *Cyclaspis* Sars, 1865, include over 100 species. Unfortunately, there is no one known unique character that can be used to diagnose bodotriids; instead they are differentiated from other cumaceans by a combination of characters: presence of a pleotelson (articulated tel-

son has been fused to last pleonite), generally five pairs of pleopods (occasionally four, three, two or zero pairs), naviculoid shape on the dorsal part of the mandible, exopods always present in third maxillipeds and in peraeopod 1, endopod of uropod uni- or bi-articulated, branchial apparatus without gill-plates or supports, and hepatic diverticula with four lobes. With the exception of the pleotelson, the other diagnostic characters are not known for all the genera of the Bodotriidae and further studies may reveal that they should not be used to diagnose the group.

The genera of the Bodotriidae are currently arranged into three subfamilies: Bodotriinae Scott, 1901, Mancocumatinae Watling, 1977 and Vaunthompsoniinae Sars, 1878. The differences among the subfamilies relate to the number of pleopods on the

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males and the number of peraeopods with exopods both in males and in females. These two characters and the corresponding character states are based on reductions from an ancestral body plan that most likely had five pairs of pleopods in males, and four pairs of peraeopods with well-developed exopods in both males and females.

The subfamily Bodotriinae is the most speciose one and is characterized by the lack of exopods on peraeopods beyond the first pair, and by five pairs of pleopods in males of most of the genera. It includes the genera *Alticum* Day, 1978, *Apocuma* Jones, 1973, *Austrocuma* Day, 1978, *Bacescuma* Petrescu, 1998, *Bodotria* Goodsir, 1843, *Coricuma* Watling & Breedy, 1988, *Cyclaspis* Sars, 1865, *Cyclaspoides* Bonnier, 1896, *Eocuma* Marcusen, 1894, *Iphinoe* Bate, 1856, *Mossambicum* Day, 1978, *Upselaspis* Jones, 1956 and *Zygosiphon* Calman, 1907a. The Mancocumatinae is the smallest of the subfamilies. The males have fewer than five pairs of pleopods and males and females bear exopods beyond the first pair of peraeopods. The subfamily includes the genera *Mancocuma* Zimmer, 1943, *Pseudoleptocuma* Watling, 1977, *Speleocuma* Corbera, 2002 and *Spilocuma* Watling, 1977. Lastly, in the subfamily Vaunthompsoniinae the males have five pairs of pleopods and bear exopods beyond the first pair of peraeopods. It includes the genera *Bathycuma* Hansen, 1895, *Cumopsis* Sars, 1878, *Gaussicum* Zimmer, 1907, *Gephyrocuma* Hale, 1936, *Gigacuma* Kurian, 1951, *Glyphocuma* Hale, 1944, *Heterocuma* Miers, 1879, *Hypocuma* Jones, 1973, *Leptocuma* Sars, 1873, *Pomacuma* Hale, 1944, *Pseudosymphodomma* Kurian, 1954, *Symphodomma* Stebbing, 1912, *Vaunthompsonia* Bate, 1858 and *Zenocuma* Hale, 1944.

With so many overlapping and not exclusively diagnostic characteristics for the definition of the genera and subfamilies, some genera remain problematic for the current classification. For example, the genus *Apocuma* has been considered a member of the subfamily Bodotriinae due to its general resemblance to genera within this subfamily (Băcescu, 1988). However, when the genus was erected, the author suggested that it be placed in the Vaunthompsoniinae because of the presence of exopods on the second and third peraeopods, its resemblance to *Vaunthompsonia*, absence of a projection on the basis of maxilliped 3, and the three-segmented antenna 2 of females. The position of *Apocuma* should be clarified with a more detailed character analysis.

Other problematic genera are *Coricuma* and *Austrocuma*. *Austrocuma* shows a variable number of pleopods (Day, 1978; Haye, 2004) and its positioning within the Bodotriidae has not been debated. But *Austrocuma* and *Coricuma* have fewer than five pairs of pleopods and are the only exceptions within Bodotriinae. *Coricuma* was originally described as a

member of the Bodotriinae based on the presence of an exopod only on the first peraeopod (Watling & Breedy, 1988). Although it has a naviculoid mandible rather than a truncated one as in leuconids, *Coricuma* was moved to the family Leuconidae based on the presence of only two pairs of pleopods (Watling, 1991). It is very difficult to determine appropriately a priori which is a better character for classification, the shape of the mandible or the number of pleopods. Haye (2004) suggests that *Coricuma* should be placed within the Bodotriinae given its general resemblance to *Austrocuma*, not only in the reduced number of pleopods but also in the modified second antenna of the males and the presence of exopods only on the first pair of peraeopods. A broader suite of characters should help to determine the correct taxonomic position for both *Austrocuma* and *Coricuma*.

The genera of the subfamily Mancocumatinae are quite different from each other and do not have a clear synapomorphy. They have exopods beyond the first pair of peraeopods, but in varying number, and males may have from zero to three pairs of pleopods. *Mancocuma* is characterized by the presence of two pairs of pleopods and by both males and females having fully developed exopods on peraeopods 1–3, and reduced exopods on peraeopod 4. Males of *Pseudoleptocuma* have three pairs of pleopods and fully developed exopods on the first four peraeopods, while females have three pairs of peraeopods with fully developed exopods and the fourth peraeopod bears a reduced exopod. In *Speleocuma*, males have two pairs of pleopods as in *Mancocuma*, but differ from *Mancocuma* in that both males and females have only the first three pairs of peraeopods with exopods. Lastly, *Spilocuma* completely lacks pleopods, and both males and females have fully developed exopods on the first three peraeopods and reduced exopods on the fourth peraeopod. The exopod condition is the same for *Spilocuma* and *Mancocuma*. The relationships among the genera currently considered within the Mancocumatinae, together with the other genera of the Bodotriidae, particularly those of the Vaunthompsoniinae, need to be further examined through analysis of more characteristics.

There were several goals associated with the present work. The first was to shed light on the phylogenetic relationships of all bodotriid genera by means of a phylogenetic reconstruction based on a complete suite of morphological characters. The phylogenetic analysis should help to establish the correct taxonomic positioning of some genera of the Bodotriidae. I also review the classification of the Bodotriidae based on the phylogenetic analysis. The final objective was to redescribe each genus of the family and to provide taxonomic keys to the subfamilial and generic level.

MATERIAL AND METHODS

A database of 109 morphological characters was created using the software DELTA (Dallwitz, 1980; Dallwitz, Paine & Zurcher, 1993). All species that comprise a genus were considered for coding the characters (see Appendix 1 for a list of characters, character states and additional notes for characters, and Appendix 2 for diagrams showing each of the characters and character states). As a result, characters were often coded as polymorphic for a particular genus (more than one character state was coded for a character). This approach results in a data matrix that represents exhaustively all the morphological variability present within each genus. Alternatives would have been to code only the type species of each genus or to code each genus based on a groundplan. Both these alternative approaches imply a series of assumptions with respect to plesiomorphic states for each genus. Thus, even though it was more intensive and posed additional difficulties for analyses, the approach of coding all the variability within the genus was adopted. To this end, the original descriptions, and redescriptions if available, of all species were interpreted for coding the character states present in every genus. Sexually dimorphic characters were also included in the coding, often leading to an even higher level of polymorphism. The genus *Cimmerius* Jones, 1973, from the plesiomorphic family Ceratocumatidae Calman, 1905, was also coded and used as outgroup. Besides Bodotriidae, ceratocumatid males are the only ones that have retained five pairs of pleopods. As many of the characters are quite polymorphic within and among the genera of the Bodotriidae, and several of the states of a character may be present in the outgroup as well, there is a high probability of homoplasy. Nevertheless, a nearly complete data set was compiled, creating a morphological data set that is phylogenetically informative.

Ordering characters when appropriate improves the overall resolution of a phylogenetic analysis (Slowinski, 1993; Schattuck, 1995; Sternberg & Cumberlidge, 2001). For phylogenetic analyses, characters that represent reductions either in number of articles of an appendage, number of appendages, number of rami of appendages or number of somites were treated as ordered (additive or minimally connected). Based on the above, 28 characters were considered as ordered: loss of eye pigment and eye lenses (characters 21 and 22); number of articles on the main flagellum and on the accessory flagellum of antenna 1, on antenna 2 of the female, and on uropodal endopod (characters 26, 31, 37, 97); presence of aesthetascs on distal or proximal article of the main flagellum and on accessory flagellum of antenna 1 (characters 28, 29 and 33); presence of accessory flagellum on antenna 1

(character 30); number of peraeonites covered by carapace (character 48); fusion of peraeonites 2 and 3 (character 50); presence of exopods in males and females on peraeopods 2, 3 and 4 (characters 70, 71, 74, 75, 79, 80); presence of ischium on peraeonites 2, 3, 4 and 5 (characters 72, 76, 81, 82); presence of pleopods on pleonites 1–5 of males (characters 104, 105, 106, 107, 108); and presence of a process on the pleopodal endopod (character 109) (Appendices 1 and 2). As antennal reductions may not occur in an ordered fashion, analyses were performed treating these characters as ordered and unordered to test their effect on tree topology (characters 26, 28–29, 30–31 and 37). Ordered characters are relatively more complex than the others, and were analysed with equal and double weighing with respect to the unordered characters. All ordered characters have states that derive from a presumably plesiomorphic state with no reductions. Other characters were treated as unordered or maximally connected, specifically characters that deal with shape, proportions and expansions of body parts; other shape alterations were not considered ordered. For such characters ordering is difficult due to the high polymorphism within a genus.

For phylogenetic analyses, DELTA was used to generate a NEXUS file with all the coded information. Phylogenetic analyses were performed using PAUP* (Swofford, 2000) with parsimony as optimality criterion with 10 000 heuristic searches to identify shortest trees. Within parsimony settings, multistate characters were treated as polymorphic and gaps as missing data for all analyses. Searches were done starting from random trees using the tree bisection reconnection algorithm for branch swapping. For character state optimization both 'delayed transformation' (deltran; favours convergences) and 'accelerated transformations' (acctrans; favours reversals) were examined. Topology length, consistency index and distance scores for tree topologies were obtained in PAUP*. Trees were evaluated for robustness using bootstrap resampling (Felsenstein, 1985) with 1000 heuristic searches as implemented in PAUP* as well as with the DECAY index (Bremer support; Bremer, 1994). The significance of the decay values is relative to the other nodes of the tree and represents the number of steps necessary for a node to collapse. The software AutoDecay (Eriksson, 1999) was used to obtain decay values by generating a command file with instructions for calculating the shortest tree when each of the nodes was constrained. This file was executed in PAUP*. Finally, character evolution within the resultant phylogenetic tree topology was examined using the software MacClade (Maddison & Maddison, 2000). A list of synapomorphies for each of the nodes of the most reliable tree topology was generated from the character evolution analyses.

The completed DELTA database was used to generate natural language descriptions for each of the genera. A modified version of those descriptions is presented herein. Dichotomous taxonomic keys were generated based on the information contained in these redescriptions.

PHYLOGENETIC ANALYSIS

RESULTS

A total of 109 morphological characters (Appendices 1 and 2) were coded for each genus, of which 73 were parsimony-informative.

When all characters were equally weighted, the shortest tree topologies had 1335 steps and a consistency index (CI) of 0.86. Doubling the weight of ordered characters resulted in an increase of the length of the resulting tree topologies (1434 steps and CI = 0.85). Topologies were the same considering antennal characters as ordered or unordered as well as using deltran or acctran for character state optimization. Bootstrap resampling did not result in significant values for most of the nodes, probably due to the high level of character polymorphism within each genus as all genera (except some of the monotypic genera with low sexual dimorphism) are coded as polymorphic for many of the characters. Some genera, such as *Cyclaspis* and *Bodotria*, have all states coded for some characters because of the high variability present within the genus. The few nodes that resulted in bootstrap support values over 50% are shown in Figure 1. Most decay indices are also low (Fig. 1). Based on Figure 1, it is easy to envisage how the bootstrap consensus tree looks, i.e. a highly unresolved tree with only a few resolved nodes (those with bootstrap values on Figure 1). The data set generated has such a level of polymorphism and overlap in the coding between genera that overall it has a low power of resolution. In spite of this, it is worth exploring the information it does provide.

Forty-seven equally parsimonious trees were found when all characters were equally weighted. The phylogram with the shortest distance score is presented in Figure 1; a 50% majority-rule consensus tree of the ten most parsimonious trees is presented in Figure 2 and includes all the unambiguous synapomorphies at each node (see Maddison & Maddison, 2000). Figure 2 is presented because it has the nodes for which synapomorphies were detected in the character analysis. As Figure 2 can be misleading because it does not represent the complete set of trees that resulted from the heuristic search analysis, the consensus trees that result from all trees are also shown in Figure 3. This is the 50% majority-rule and strict consensus trees including all 47 trees (Fig. 3). As can be seen in Figure 2,

further up from a node with a synapomorphy there may be a terminal or higher internal node that shows a reversal or change of state of the same character. For example, the shape of the merus of maxilliped 3 (character 43) is a synapomorphy for all bodotriids with the exception of *Hypocuma* and for a clade within the Bodotriinae that groups most members of the subfamily excluding *Austrocuma*, *Coricum* and *Iphinoe*. On the more basal node, character 43 changes from having a merus extended dorsally over the carpus to a laterally expanded merus, while on the clade within Bodotriinae, it changes from a merus laterally expanded to a merus extended dorsally over the carpus. In other words, characters that on the tree appear as reversals or convergences can be synapomorphic.

According to the results from all trees presented in Figures 1–3, members of the subfamily Vaunthompsoniinae have a basal position. *Hypocuma* weakly groups with the other members of the family Bodotriidae, and based on the data presented, there are no synapomorphies that support its grouping with the rest of the genera (Figs 1, 2). The node that groups *Apocuma* and other bodotriids excluding *Hypocuma* has a decay index of 1, a bootstrap support value of 51% (Fig. 1) and is supported by three synapomorphies (Fig. 2): (1) reduction of female antenna 1 flagellum from five to three articles (character 37), (2) maxilliped 3 changes from merus extended dorsally over carpus to merus laterally expanded (character 43), and (3) peraeopod 4 in females changes from having a reduced exopod to having no exopod (character 79) (Appendices 1 and 2). Figure 1 shows a series of nodes from which single taxa of the Vaunthompsoniinae branch off in a ladder-like pattern (*Apocuma*, *Gaussicum*, *Bathycuma* and *Vaunthompsonia*). Two clades emerge from the next node, which has a decay index of 2. In Figure 2, the node that groups all these taxa (although it does not show only two clades as in Fig. 1) is supported by two synapomorphies. One clade includes *Leptocuma*, *Glyphocuma*, *Sympodomma*, *Pseudosympodomma* and *Gigacuma* (Fig. 1). Of these, *Leptocuma* is only weakly connected and in the consensus tree it is collapsed to the previous node (Fig. 2). Instead, *Glyphocuma*, *Sympodomma*, *Pseudosympodomma* and *Gigacuma* represent a more robust clade with a decay index of 2 and two synapomorphies (Figs 1–3). Secondly, a node emerges that includes all the rest of the taxa in two clades (Fig. 1).

One of the clades includes the subfamily Mancocumatinae and the operculate genera (i.e. *Gephyrocuma*, *Pomacuma* and *Zenocuma*) as sister taxa supported by a decay index of 1 (Fig. 1) and four synapomorphies (Fig. 2): maxilliped 3 changes from (1) not widened to oviform in shape (character 44), and (2) propodus not widened to distally widened (character 46), (3) peraeopod 1 changes from the absence of setae on the

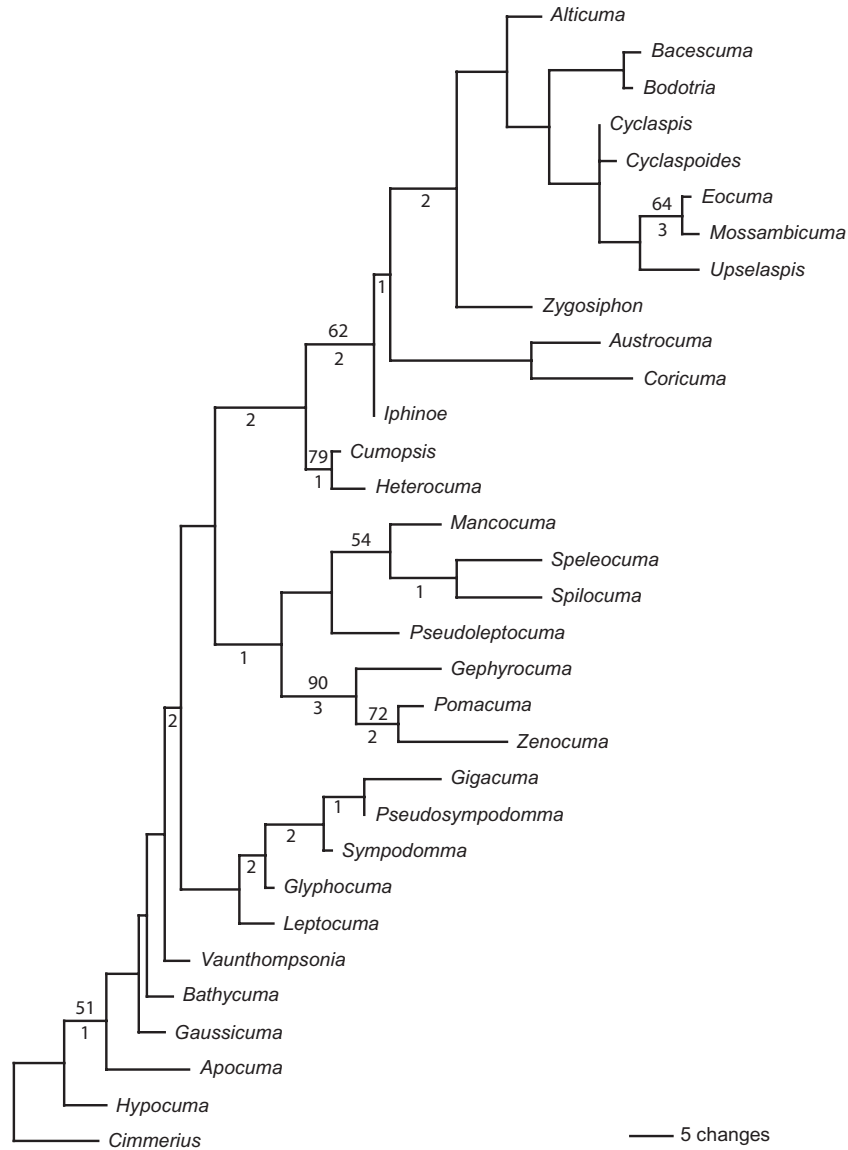


Figure 1. Phylogram of most parsimonious topology with the shortest distance score selected from 47 shortest trees for all the genera of the Bodotriidae. *Cimmerius* is the outgroup. Values above branches represent bootstrap support values > 50%; values below the branches are decay indices.

propodus to bearing a brush of long setae on the propodus (character 66) and (4) peraeopod 4 changes from exopods absent to reduced exopods on the female (character 79) (Appendices 1 and 2). Within this clade, the operculate genera cluster together even in the strict consensus in Figure 3B with a decay index of 3, a bootstrap support value of 90 (Fig. 1) and six synapomorphies (Fig. 2): basis of maxilliped 3 changes from (1) normally expanded to very expanded (with opercular function) (character 39), and (2) expanded dorsally over ischium to ventrally over ischium (character 40), peraeopod 1 changes from (3) normal to basis-carpus expanded and ischium-merus rotated for

opercularity (character 56), (4) ischium not modified to ischium modified as rounded lobe with exterior concavity (opercular) (character 62), (5) carpus with normal shape to oviform (character 63) and (6) peduncle of uropods longer than rami changes to shorter than rami (character 100) (Appendices 1 and 2). The Mancocumatinae, composed of *Spilocuma*, *Speleocuma*, *Mancocuma* and *Pseudoleptocuma*, forms a clade (Figs 1, 2, 3A) supported by three synapomorphies (Fig. 2): (1) peraeopod 1 changes from row of setae on basis absent to present (character 58), changes from males with to without pleopods on (2) pleonite 4 (character 107) and (3) pleonite 5 (character 108)

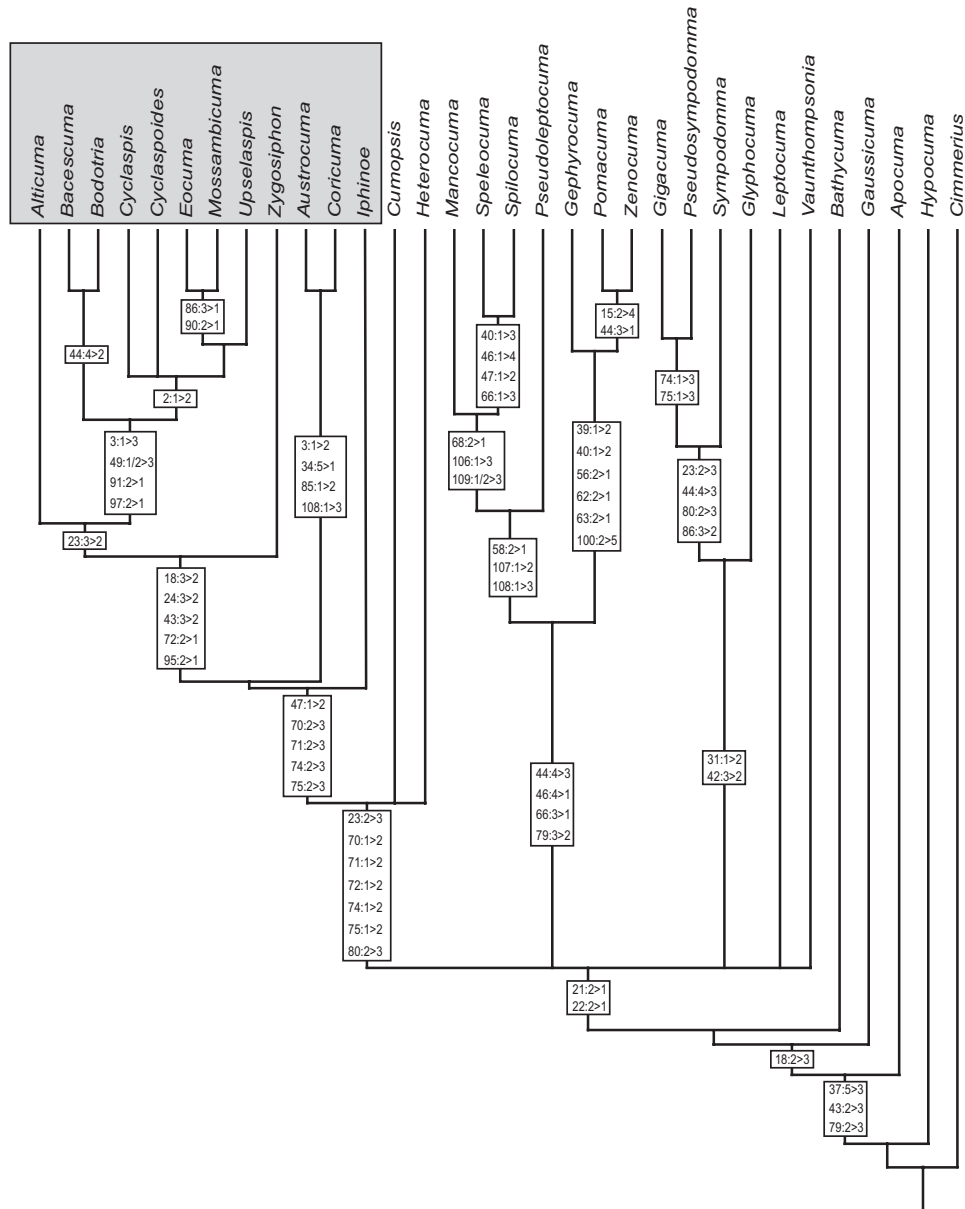


Figure 2. Majority rule (50%) consensus cladogram of the ten most parsimonious trees obtained from 10 000 heuristic searches starting from random trees. Text boxes on branches list synapomorphies supporting the node (unambiguous characters only). The first number indicates the character; after the colon, the first number indicates the plesiomorphic state and the last number the state synapomorphic for the node (see Appendices 1 and 2 for characters and character states). Shaded area corresponds to genera of the subfamily Bodotriinae.

(Appendices 1 and 2). Within the clade, *Pseudoleptocuma* has a basal position, followed by *Mancocuma*, and lastly, a clade with *Speleocuma* and *Spilocuma* as sister taxa (Figs 1, 2, 3A).

The sister clade to that described above includes all the subfamily Bodotriinae and *Cumopsis* and *Heterocuma* as basal taxa (Figs 1–3). The clade is supported by a decay index of 2 (Fig. 1) and seven synapomorphies (Fig. 2): (1) basal article of antenna 1 changes

from arcuate to straight (character 23), exopod on peraeopod 2 changes from fully developed to reduced (2) on females (character 70) and (3) on males (character 71), (4) ischium on peraeopod 2 changes from present to absent, exopod on peraeopod 3 changes from fully developed to reduced (5) on females (character 74) and (6) on males (character 75), and (7) exopod on peraeopod 4 of males changes from reduced to absent (character 75) (Appendices 1 and 2). *Cumopsis* and

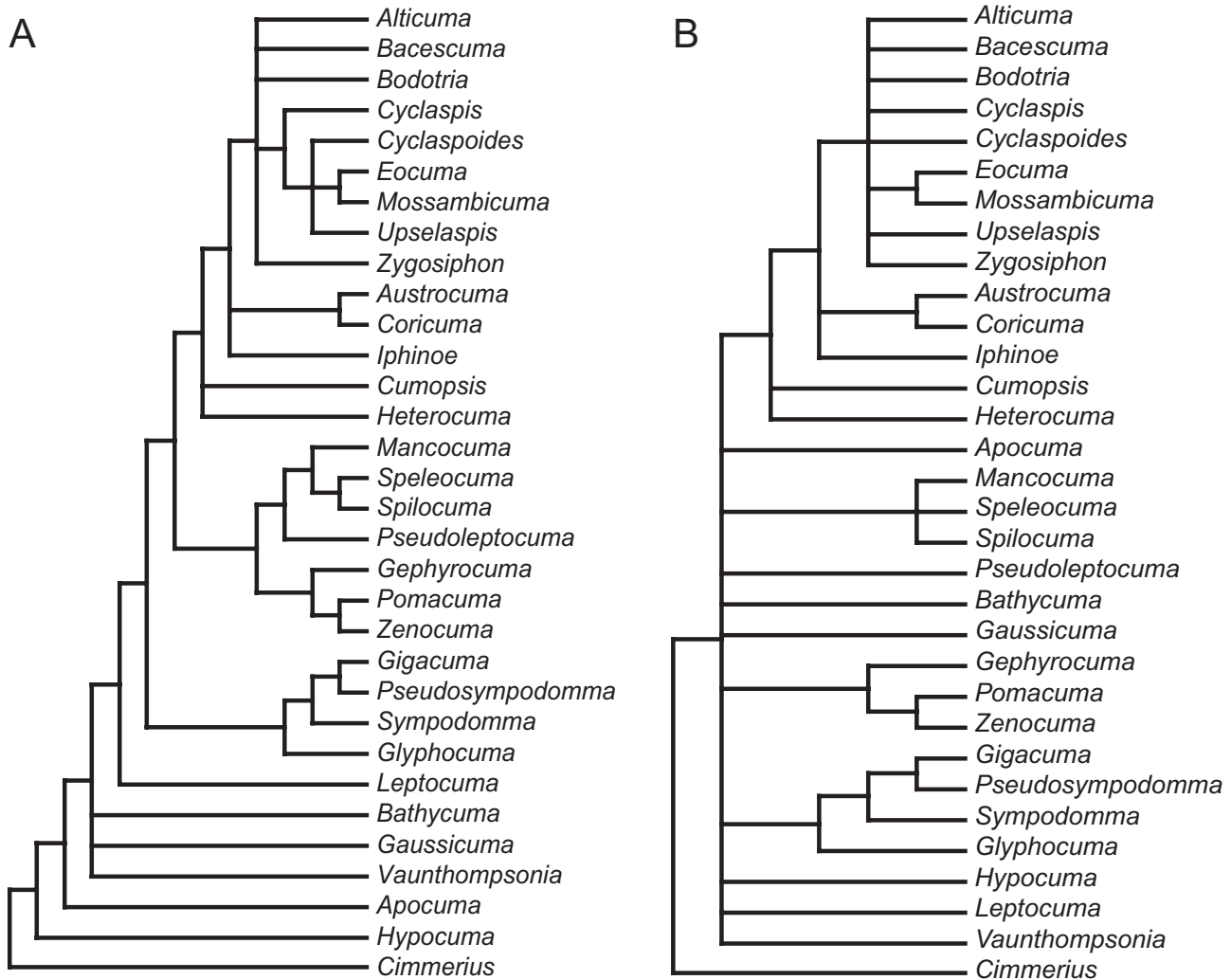


Figure 3. Consensus topologies of all 47 trees resulting from the parsimony heuristic search. A, 50% majority-rule consensus tree. B, strict consensus tree.

Heterocuma appear as the most derived members of the Vaunthompsoniinae. These genera show no morphological differentiation between them when character evolution was analysed with MacClade and their node is supported by 79% bootstrap support (Figs 1, 2).

The subfamily Bodotriinae forms a well-supported clade with the expected exception of *Apocuma*, which groups with the Vaunthompsoniinae (Figs 1–3). The Bodotriinae includes *Coricum* as the sister-genus of *Austrocuma*, even in the strict consensus tree (Fig. 3B). The subfamily has a decay index of 2, a bootstrap support of 62% (Fig. 1) and is supported by five unambiguous synapomorphies (Fig. 2): (1) maxilliped 3 changes from brush of setae on propodus present to absent (character 47), exopods on pereopod 2 change from reduced to absent (2) on females (character 70) and (3) on males (character 71), and exopods on

pereopod 3 change from reduced to absent (4) on females (character 74) and (5) on males (character 75) (Appendices 1 and 2).

The most basal member of Bodotriinae is *Iphinoe*, followed by *Coricum* and *Austrocuma* as sister taxa (Figs 1, 2) sharing four synapomorphies (Fig. 2): (1) carapace changes from laterally compressed anteriorly to laterally compressed posteriorly (character 3), (2) antenna 2 in males changes from long, reaching the end of the pleon, to short, not reaching the end of the pereon (character 34), (3) pleonite 6 changes from longer than wide to as wide as long (character 85) and (4) pleopods on pleonite 5 of males change from present to absent (character 108) (Appendices 1 and 2). The clade with the remaining members of the Bodotriinae (Figs 1–3) has a decay index of 2 (Fig. 1) and is supported by five synapomorphies (Fig. 2). *Zygosiphon* is the basal-most taxon within the clade

and is followed by *Alticum* (Figs 1, 2). From the following node arise two clades, one that includes *Bacescuma* and *Bodotria*, and another with a trichotomy of *Cyclaspis*, *Cyclaspoides*, and a clade with *Upselaspis* as basal taxon sister to one with *Eocuma* and *Mossambicum* (Figs 1, 2). These last two genera show no morphological differentiation and group together with 64% bootstrap support and a decay index of 3 (Fig. 1).

Doubling the weight of ordered characters mostly maintained the relationships in the resulting topologies. Consistent with unweighted analyses, the subfamily Bodotriinae is still monophyletic and the most

derived group of the family Bodotriidae. The clade formed by *Cumopsis* and *Heterocuma* (Fig. 4) is always sister to the clade that includes all members of the Bodotriinae. Within the Bodotriinae *Eocuma* and *Mossambicum* always group together, and are closely related to *Cyclaspis*, *Cyclaspoides* and *Upselaspis*, which form a sister clade to the *Bacescuma*–*Bodotria* clade. *Austrocuma* and *Coricura* always cluster together and *Iphinoe* is the basal-most genus of the Bodotriinae (Figs 1, 4). Within the Vaunthompsoniinae the genera of the Mancocumatinae always appear together as a sister group to the clade formed by the

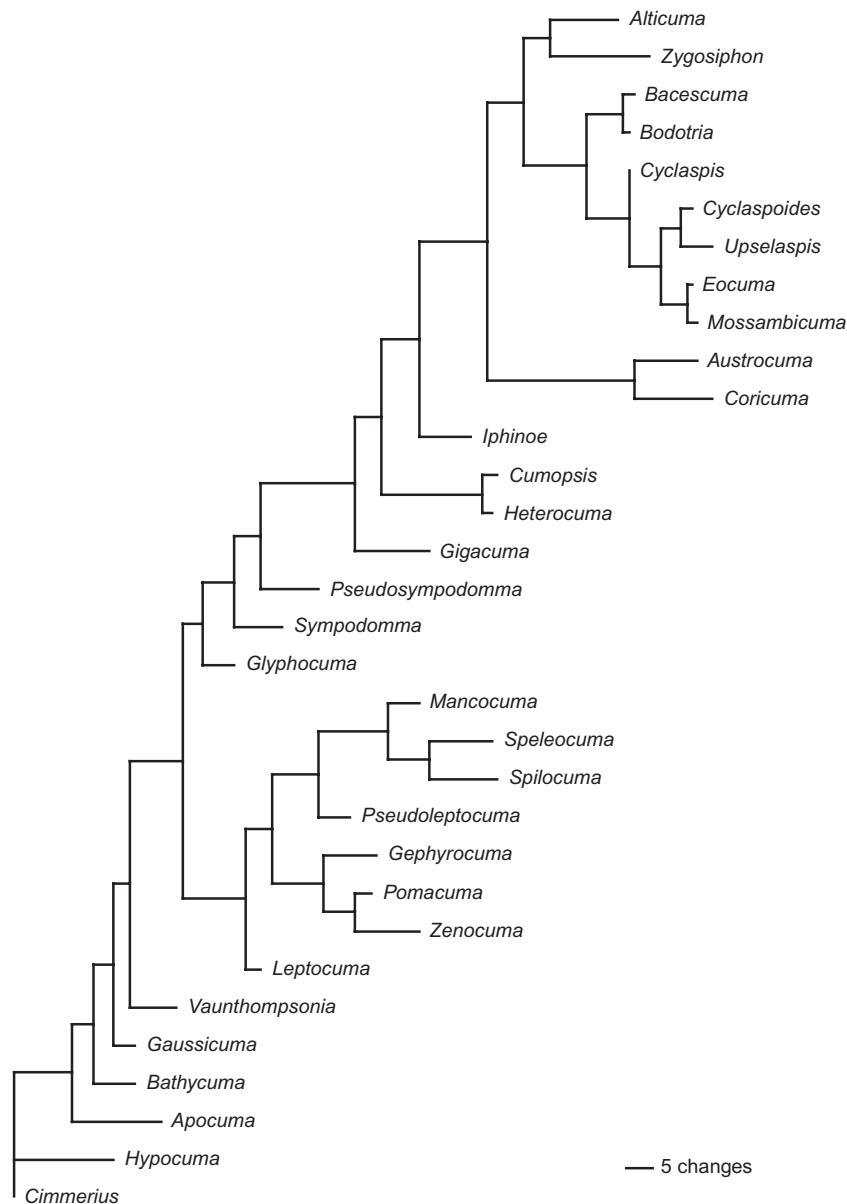


Figure 4. Phylogram of most parsimonious topology with the shortest distance score for all the genera of the Bodotriidae obtained when ordered characters are assigned double weight. *Cimmerius* is the outgroup.

operculate genera. *Hypocuma*, *Apocuma*, *Gaussicum*, *Bathycuma* and *Vaunthompsonia* are always the basal genera but the branching order changes slightly (Figs 1, 4). The most dramatic change in topology with differential weighing of ordered characters relates to the positions of *Glyphocuma*, *Sympodomma*, *Pseudosympodomma* and *Gigacuma*. With double weighing these genera appear in a more derived position within the Vaunthompsoniinae, branching off in a ladder-like fashion, immediately before the clade formed by *Cumopsis* and *Heterocuma* (Fig. 4). *Leptocuma* maintains its position within the tree topology (relatively basal) but when weighing is applied it appears basal to the clade that includes Mancocumatinae and the operculate genera, as the position of the taxa of the clade including *Glyphocuma*, *Sympodomma*, *Pseudosympodomma* and *Gigacuma* moved to a more derived position within the tree.

DISCUSSION

The inferred phylogeny of Bodotriidae shows that reductions have occurred several times in the family. For pleopods, the plesiomorphic condition is five pairs as seen in most bodotriids. However, pleopod reduction occurs four times within the family: in the *Pseudoleptocuma*–*Mancocuma*–*Speleocuma*–*Spilocuma* (Mancocumatinae) clade, in the *Austrocuma*–*Coricum* clade, one species of the genus *Iphinoe*, *I. insolita*, whose male has two instead of five pairs, and one species of the genus *Bodotria*, *B. minuta*, with four pairs of pleopods in the male.

Within the bodotriid lineage the exopods of peraeopods also show reductions. The basal-most genera *Bathycuma*, *Apocuma*, *Gaussicum*, *Bathycuma* and *Vaunthompsonia* have a full set of fully developed exopods in the males, while the exopod of peraeopod 4 is missing in females. Exopods continue to reduce in more derived lineages. Some taxa show inconsistencies, because their placement on the tree implies a reversal to an exopod-bearing condition. For example, *Leptocuma* has reduced exopods on peraeopod 4 of both males and females. The condition of the male is consistent with the tree, because on more basal nodes the males bear a fully developed exopod on peraeopod 4. Females, on the other hand, were lacking exopods on the basal nodes while in *Leptocuma* they bear a reduced exopod. The first reduction of the exopod of peraeopod 3 appears on *Glyphocuma*, where females may have either a fully developed or a reduced exopod. In *Pseudosympodomma* and *Gigacuma*, exopods of peraeopod 3 are absent in males and females for the first time based on topology of Figure 1. In this scenario, the operculate genera (*Gephyrocuma*, *Pomacuma* and *Zenocuma*) and the genera of the Mancocumatinae show another reversal. According to the

inferred tree (Fig. 1) they are at a more derived position than *Pseudosympodomma* and *Gigacuma*, but have fully developed or reduced exopods on peraeopod 3 and reduced or no exopods on peraeopod 4. However, when ordered characters are considered with double weight, the position of *Pseudosympodomma* and *Gigacuma* within the tree is more derived than the position of the Mancocumatinae and operculate genera, so no reversal would need to be invoked for this tree topology (Fig. 4). The most derived of the genera of the Vaunthompsoniinae, *Cumopsis* and *Heterocuma*, are the only genera with reduced exopods on peraeopod 2. All the genera of the subfamily Bodotriinae lack exopods on peraeopods 2, 3 and 4, showing the general tendency towards reductions. There has been a gradual reduction of the peraeopodal exopods within the family Bodotriidae with the most derived genera only bearing exopods on peraeopod 1.

The monophyly of the Bodotriidae

To confirm the monophyly of the Bodotriidae it is necessary to perform a phylogenetic analyses including all the genera of the other pleotelson-bearing families (Leuconidae and Nannastacidae in addition to Bodotriidae), and genera from all other families as outgroup taxa. Molecular phylogenetic analyses (Haye, Watling & Kornfield, 2004) showed that the families with pleotelson form a clade, but failed to recover the monophyly of each of the families. Current analysis focused on relationships within the Bodotriidae to provide a phylogenetic hypothesis that can serve as a starting point for future systematic work on the group as a whole.

The subfamily Bodotriinae

Monophyly of the subfamily Bodotriinae is well supported by decay index values and a series of synapomorphies. *Iphinoe* appears to be the basal genus of the subfamily. Body proportions and carapace ornamentation of this genus often resemble members of the *Vaunthompsonia* belonging to Vaunthompsoniinae.

Analysis of character evolution shows that *Eocuma* and *Mossambicum* should not be separate entities. The genus *Mossambicum* includes two species that are difficult to distinguish from *Eocuma* species. When Day (1978) described *Mossambicum*, she recognized that it was very similar to *Eocuma* but that the characteristic projection on the basis of the first peraeopod as well as the lateral horns were lacking. These two characters are common but not universal within *Eocuma*. *Eocuma muradianae* Petrescu, 1998 also lacks the projection on the basis of peraeopod 1, and many *Eocuma* species lack lateral horns. The present species composition of the genus *Eocuma* does not justify

having *Mossambicuma* species in a separate genus as they bear all the characteristics that define *Eocuma*. I propose that *Mossambicuma elongatum* and *M. victoriae* are placed within *Eocuma*, making *Mossambicuma* unavailable.

Watling (1991) moved the genus *Coricura* from the Bodotriinae to the family Leuconidae based on the presence of two pairs of pleopods. The results of the phylogenetic analysis clearly show that *Austrocuma* and *Coricura* belong to the Family Bodotriidae and represent divergent genera within the subfamily Bodotriinae. Pleopod number has been frequently used as a diagnostic character for the subfamily. Even though *Austrocuma* and *Coricura* have fewer than five pairs of pleopods they have exopods only on peraeopod 1, and thus fall within the Bodotriinae. Here, *Coricura* is considered to be a member of the Bodotriidae closely related to *Austrocuma* (see also Haye, 2004).

The Mancocumatinae and Vaunthompsoniinae

Watling (1977) proposed the subfamily Mancocumatinae to group all genera whose species have fewer than five pairs of pleopods and exopods beyond the first pair of peraeopods. The subfamily Mancocumatinae currently comprises four genera: *Mancocuma*, *Pseudoleptocuma*, *Speleocuma* and *Spilocuma*. The phylogenetic hypothesis presented here indicates that the Mancocumatinae is a sister clade to the operculate genera. Because there are no characters that can be used to differentiate them from the rest of the members of the Bodotriidae (the synapomorphies on Fig. 2 represent convergences or reversals), it is suggested herein that members of the Mancocumatinae be incorporated into the Vaunthompsoniinae.

The genus *Apocuma* has been considered by Băcescu (1988) as a member of the Bodotriinae, although it was initially described as a genus of the Vaunthompsoniinae (Jones, 1973). The phylogenetic analyses here confirm its placement as a basal genus of the Vaunthompsoniinae.

Character analysis shows that *Cumopsis* Sars, 1878 and *Heterocuma* Miers, 1879 lack discriminatory characters. In addition, molecular phylogenetic analyses showed that these two genera are very closely related with fewer differences than is usual in two congeners (Haye *et al.*, 2004). Because of the strong molecular similarity and lack of morphological differentiation, these two genera should be merged, with priority for the name *Cumopsis*.

Origin of the Bodotriidae

Bodotriids show high levels of endemism. Very few species have distributions ranging across oceans or

marine bio-provinces (Day, 1978). The majority of species are present between 20°N and 50°S latitude and they are absent from latitudes greater than 70° (i.e. 'negative amphipolar', Zimmer, 1941). Their latitudinal distribution suggests that bodotriids probably originated in warm waters. Cumaceans are small, have limited mobility and lack a dispersing larval stage. They are benthic and able to swim only for short distances. Nocturnal vertical migration into the water column by males and juveniles may represent the most powerful means for dispersal of cumaceans. For females, swimming activities are restricted to moulting, hatching and copulation. The high endemism and narrow geographical range are probably due to their limited dispersal ability.

Bodotriids follow a distribution consistent with diversification in the newly forming Atlantic during the Jurassic and Cretaceous. At the end of the Jurassic there was a devastating mass extinction, and the warm waters of the Tethys Ocean became a radiation centre for many extant groups, including cumaceans. The North Atlantic started opening during the Jurassic and was still undergoing formation in the Cretaceous, fed by a current from the Tethys Ocean (130 Mya) that may have helped cumaceans reach the Atlantic Ocean (Haq, 1984).

Based on regional diversity, Day (1978) proposed the Indo-West Pacific as centre of origin of the Bodotriidae, with subsequent dispersion into the Atlantic and Pacific Oceans. This is not compatible with the current phylogenetic scheme. Basal bodotriids inhabit the Atlantic and/or the Indian Ocean, the Southern Ocean and the Pacific Ocean (Fig. 5). The two most basal genera, *Hypocuma* and *Apocuma*, only occur in deep waters of the Atlantic Ocean. The current distribution of genera can be explained assuming a centre of origin in the Atlantic Ocean or in the Indian Ocean. But, given that *Hypocuma* and *Apocuma* occur in the Atlantic, and as other basal members of the Vaunthompsoniinae also inhabit the Atlantic, it is likely that bodotriids diverged from other cumaceans within the newly forming Atlantic Ocean, a view also proposed for the Mancocumatinae by Corbera (2002). During the Cretaceous, the Atlantic was increasing in size and localized populations of cumaceans were able to differentiate. Over time these populations with restricted dispersion may have become the propagators/ancestors of endemic lineages currently present in the North (Mediterranean Sea), as well as the Southern Atlantic (Argentinean and African coasts), followed by dispersion into Australian waters. The genus *Vaunthompsonia* is widespread and its distribution can also be explained by an Atlantic origin with subsequent dispersion into the Mediterranean Sea and the Red Sea, the West Indian Ocean, coasts of Australia, into the West and Indo-West

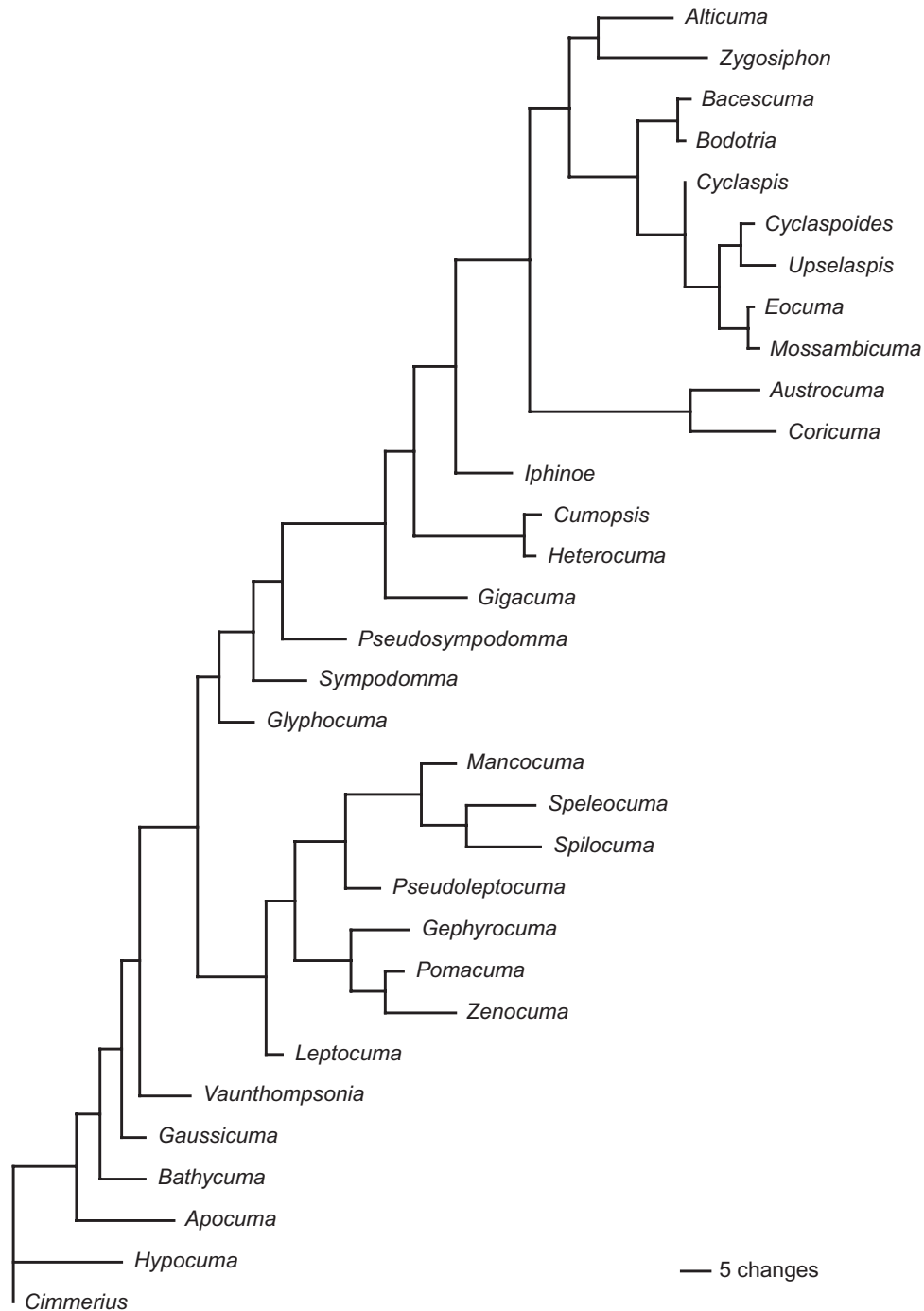


Figure 5. Geographical distribution of genera of the family Bodotriidae. Tree topology corresponds to consensus tree from parsimony analysis (see Fig. 2). Rows of matrix above tree represent a summarized list of geographical areas (oceans, seas or coasts) where bodotriids are well represented. Filled squares indicate presence of the genus in the area.

Pacific, as well as subAntarctic and Antarctic regions. The remaining genera of the Vaunthompsoniinae and the Bodotriinae are well represented along the coasts of Africa, the Indian Ocean, Australia, the Indo-West Pacific, and are also present in the Mediterranean and

Red Seas, Pacific and Southern Oceans, boreal regions, oriental and Japan regions (Fig. 5).

Cumacean fossils are scarce and date back to the Carboniferous in the Palaeozoic (Malzahn, 1972; Schram *et al.*, 2003). The deep-sea cumacean fauna is

likely to have existed through the Mesozoic in oxygenated refuges in the deep waters; a post-Mesozoic colonization of the deep sea from the Tethys Sea is less probable (Horne, 1999; Wilson, 1999). In contrast to these basal deep-sea cumaceans, the family Bodotriidae occupies mainly temperate shallow waters, and is likely to have radiated in the newly forming Atlantic Ocean, originating in the warm waters of the ancient Tethys Ocean. The presence of taxa with plesiomorphic characters within the Atlantic rather than the Indo-West Pacific suggests that the dispersion route of bodotriids was from the Tethys Ocean to the Atlantic Ocean and into the Indian Ocean. Additional fossil material is needed to evaluate this hypothesis.

SYSTEMATICS OF THE BODOTRIIDAE

DIAGNOSIS

Subfamily Bodotriinae: Without exopods on peraeopods 2, 3 and 4. Males usually bear five pairs of pleopods. Generally without ventrolateral expansions on peraeonite 3. Females with at most two articles on antenna 2. Basis of maxilliped three generally expanded ventrally over ischium.

Subfamily Vaunthompsoniinae: Exopods beyond the first pair of peraeopods. Females generally have three or more articles on antenna 2. Uropod endopod generally bi-articulated.

PROPOSED TAXONOMIC CHANGES

Based on this phylogenetic analysis, changes in the taxonomy of the Bodotriidae are proposed. Phylogenetic analyses reveal that the Bodotriinae Scott, 1901 is a derived group of the Bodotriidae (Figs 1, 2). The subfamily Vaunthompsoniinae Sars, 1878 appears to be a paraphyletic group. However, it is suggested that the subfamily Vaunthompsoniinae be retained in the classification of the Bodotriidae for taxonomic convenience. There are morphological traits that diagnose and clearly differentiate these two subfamilies. Within the subfamily Bodotriinae, species bear exopods only on peraeopod 1 and females have at most two articles on antenna 2, while within the Vaunthompsoniinae, species bear exopods beyond the first pair of peraeopods and females usually have at least three articles on antenna 2 (the exceptions are one species of *Vaunthompsonia*, *V. cristata*, and one of *Gaussicuma*, *G. gloriosae*, for which antenna 2 is known).

The following changes to the classification of the Bodotriinae are suggested based on the presented analysis of phylogeny and character evolution: *Apocuma* should be moved to the subfamily Vaunthompsoniinae and *Mossambicum* integrated into *Eocuma*. *Coricum* is replaced in the Bodotriinae as suggested

in Haye (2004). Incorporating these changes, the subfamily Bodotriinae includes 279 species in 11 genera: *Alticum* Day, 1978, *Austrocuma* Day, 1978, *Bacescuma* Petrescu, 1998, *Bodotria* Goodsir, 1843, *Coricum* Watling & Breedy, 1988, *Cyclaspis* Sars, 1865, *Cyclaspoides* Bonnier, 1896, *Eocuma* Marcusen, 1894, *Iphinoe* Bate, 1856, *Upselaspis* Jones, 1955 and *Zygosiphon* Calman, 1907a.

Similarly, a series of changes are suggested for the subfamily Vaunthompsoniinae. The genera currently within the Mancocumatinae (i.e. *Mancocuma*, *Pseudoleptocuma*, *Speleocuma* and *Spilocuma*) will be included in the Vaunthompsoniinae. The genus *Apocuma* is moved from the Bodotriinae to the Vaunthompsoniinae. *Cumopsis* and *Heterocuma* are integrated into a single genus, *Cumopsis*. Thus, the family Vaunthompsoniinae includes 103 species in 18 genera: *Apocuma* Jones, 1973, *Bathycuma* Hansen, 1895, *Cumopsis* Sars, 1878, *Gaussicuma* Zimmer, 1907, *Gephyrocuma* Hale, 1936, *Gigacuma* Kurian, 1951, *Glyphocuma* Hale, 1944, *Hypocuma* Jones, 1973, *Leptocuma* Sars, 1873, *Mancocuma* Zimmer, 1943, *Pomacuma* Hale, 1944, *Pseudoleptocuma* Watling, 1977, *Pseudosymphodomma* Kurian, 1954, *Speleocuma* Corbera, 2002, *Spilocuma* Watling, 1977, *Symphodomma* Stebbing, 1912, *Vaunthompsonia* Bate, 1858 and *Zenocuma* Hale, 1944.

Redescriptions for all genera considered within the Bodotriidae in the present work are provided below. The synonymy already presented in the cumacean Crustaceorum Catalogus (Băcescu, 1988) is not repeated and only new synonyms for both genera and species are included.

REDESCRIPTION OF THE GENERA OF THE BODOTRIIDAE

Unless stated otherwise, the following characters are implicitly assumed in the descriptions of the genera: carapace not oviform posteriorly, longer than wide; median dorsal ridge, dorso-lateral ridges, lateral ridges, anterior transverse ridges, posterior transverse ridges and lateral horns absent; branchial siphons short, extending just beyond pseudorostrum; frontal lobe present; antenna 1, distal margin of peduncle, proximal article of main flagellum and last article of main flagellum without aesthetasc; accessory flagellum of antenna 1 reduced, without brush of setae or aesthetascs; antenna 2, not modified; mandible, with dorsal part to molaris naviculoid; maxilliped 3 basis of normal width, merus without dorsal projection, merus length is without considering projections, carpus not oviform or widened, propodus not oviform or widened, propodus without brush of setae; peraeonite 1 visible; peraeonites 2 and 3 not fused; peraeonite 2 proportional in size to other peraeonites and without ventrolateral expansion; peraeonite 3 without

ventrolateral expansion; peraeonite 4 without ventrolateral expansion; peraeopod 1 not opercular, basis without row of setae, not projected and without inner apical angle; ischium of peraeopod 1 not elongated, not modified; carpus of peraeopod 1 not oviform, without row of setae and shorter than basis; propodus of peraeopod 1 without setae, shorter than basis; dactylus of peraeopod 1 with terminal setae; peraeopod 3 ischium present, merus of normal length, propodus and dactylus not modified; peraeopod 5, ischium present; articular pegs absent; pleonite 5 longer than pleonite 6; pleonite 6, without setae on posterior edge; anal plates not projected beyond posterior margin of pleonite 6 and without setae on posterior edge; uropodal rami with terminal setae.

SUBFAMILY BODOTRIINAE SCOTT, 1901

Type genus: Bodotria Goodsir (1843)

All genera within the Bodotriinae share the following traits: females with one or two articles on antenna 2 and no exopods beyond the first pair of peraeopods on both females and males.

ALTICUMA DAY, 1978

Type species: Alticum carinatum (Zimmer, 1921a).

Body: Carapace shorter than abdomen and similar in length to peraeon; abdomen approximately as long as or shorter than carapace and peraeon together.

Cephalothorax: From dorsal view the carapace appears laterally compressed anteriorly. Carapace with mid-dorsal ridge or mid-dorsal serration, may have anterior transverse ridge. Pseudorostral lappets may extend beyond frontal lobe and meet in midline. Antennal notch as a depression, subacute or acute incision. Anterolateral corner with subacute or acute tooth. Frontal lobe 1/4–1/3 of the total carapace length; as wide as long or longer than wide; anteriorly linguiform or somewhat extended; without ocular pigment or eye lenses.

Antenna 1 with basal article of the peduncle geniculate or arcuate; as long as the other two articles together; males with a group of aesthetascs on distal margin of peduncle. Main flagellum uni- or bi-articulated; with one or two aesthetascs in distal-most article. Accessory flagellum uni-articulated; may have aesthetascs. Antenna 2 in males reaching end of pleon.

Maxilliped 3 with basis geniculate or arcuate; extended dorso-distally over ischium beyond the articulation of the ischium and merus. Ischium as long as merus. Merus extended dorso-distally over carpus. Carpus and propodus may be distally widened. Carpus length equal to or shorter than propodus and dactylus together.

Peraeon: First peraeonite well exposed or visible only above lateral midline. Peraeonites 2 and 3 may be fused. Peraeonite 2 may have ventrolateral expansion overriding peraeonites 3 or 1. Peraeonite 3 may have ventrolateral expansion overriding peraeonites 2 or 4. Peraeonite 4 may have ventrolateral expansions overriding peraeonites 5 or 3 and 5.

Peraeopod 1, with basis arcuate; may have row of setae. Carpus with variable length with respect to propodus. Peraeopod 2 with ischium; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Articular pegs may be present. Pleonite 6 longer than wide; shorter than peduncle of uropod; wide middle portion of distal end of pleonite 6 well extended past the insertion of the uropods and apex rounded. Anal plates may extend posteriorly beyond distal margin of pleonite 6.

Uropod endopod bi-articulated with proximal article longer than distal one. Uropod exopod with proximal article shorter than the distal one. Peduncle of uropods much longer than rami; rami approximately same length. Males with five pairs of pleopods.

Species included:

1. *A. bellum* Day, 1978
2. *A. carinatum* (Zimmer, 1921a) (Synonymy: *Cyclaspis carinata* Zimmer, 1921a; *A. carinatum* Day, 1978)

Distribution: Commonly found off the East African coast (West Indian Ocean) at depths between 183 and 1300 m.

AUSTROCUMA DAY, 1978

Type species: Austrocuma platyceps Day, 1978

Body: Carapace shorter than abdomen and variable in length with respect to peraeon; abdomen shorter than carapace and peraeon together.

Cephalothorax: From dorsal view the carapace appears laterally compressed anteriorly. Carapace may have mid-dorsal ridge and lateral ridges. Pseudorostral lappets extend beyond frontal lobe and meet in midline. Antennal notch as a depression or subacute incision. Anterolateral corner bluntly rounded or with subacute tooth. Frontal lobe 1/3–1/2 the total carapace length; as wide as long or wider than long; slightly extended; with ocular pigment and eye lenses.

Antenna 1 with basal article of peduncle arcuate or straight; shorter than the other two articles together. Main flagellum bi-articulated; with one or two aesthetascs in distal-most article. Accessory flagellum uni-articulated; may have one aesthetasc. Antenna 2 in males not reaching the end of the peraeon; with sensory setae on anterior margin of article four; anterior margin modified for grasping. Antenna 2 in females with two articles.

Maxilliped 3 basis geniculate or arcuate; extended dorso-distally over ischium beyond the articulation of ischium and merus. Ischium shorter than merus. Merus slightly globular dorsodistally or without dorsal extension. Carpus distally widened, oviform or not widened; shorter than propodus and dactylus together. Propodus oviform.

Peraeon: First peraeonite may be visible only above lateral midline. Peraeonite 2 wide or proportional to other peraeonites; may have ventrolateral expansion overriding peraeonite 1 and/or carapace and peraeonite 3 or peraeonite 3. Peraeonite 3 may have ventrolateral expansion extended backwards overriding peraeonite 4. Peraeonite 4 may have ventrolateral expansion overriding peraeonite 5.

Peraeopod 1 with basis arcuate or straight; inner apical angle may be extended forming a convex process. Carpus may have row of setae. Carpus equal to or longer than propodus. Peraeopod 2 without ischium; dactylus equal to or longer than propodus. Peraeopod 4 without ischium. Peraeopod 3, 4 and 5, with six or seven articles.

Pleon: Pleonite 6 wider than long or as long as wide; shorter than peduncle of uropod. Females may have narrow portion of terminal end of pleonite 6 slightly extended between the bases of the uropods ending in a line. Males may have whole width of terminal end of pleonite 6 slightly extended between the bases of the uropods; terminally concave (with two projections). Anal plates may extend posteriorly beyond distal margin of pleonite six.

Uropod endopod uni-articulated. Uropod exopod with proximal article shorter than distal one. Peduncle approximately as long as or longer than rami; rami approximately same length. Males with three or four pairs of pleopods. Pleopodal endopod with well developed process.

Species included:

1. *A. platyceps* Day, 1978
2. *A. kornfieldi* Haye, 2004

Distribution: *Austrocuma platyceps* inhabits the shallow waters (0–1 m) of the southern tip of South Africa from Muizenberg to Hout Bay on the Cape Peninsula as well as in the south-western Cape coast (Day, 1978). *Austrocuma kornfieldi* (Haye, 2004) inhabits shallow waters (1–5 m) along the East coast of India.

BACESCUMA PETRESCU, 1998

Type species: *Bacescuma tanzaniense* Petrescu, 1998

Body: Carapace shorter than abdomen and longer than peraeon; abdomen approximately as long as carapace and peraeon together.

Cephalothorax: From dorsal view the carapace appears laterally compressed anteriorly. Carapace with mid-dorsal ridge and lateral ridges. Pseudorostral lappets extend beyond frontal lobe and extend towards midline but do not meet (or partially meet leaving a suture between them). Antennal notch as a depression or as a subacute incision. Anterolateral corner bluntly rounded. Frontal lobe 1/4 of carapace length; as wide as long; anteriorly linguiform; with ocular pigment and eye lenses.

Antenna 1 with basal article of the peduncle arcuate; as long as the other two articles together. Main flagellum bi-articulated; with two aesthetascs in distal-most article. Accessory flagellum uni-articulated. Antenna 2 in males reaching almost the end of pleon. Antenna 2 in females with two articles.

Maxilliped 3 basis arcuate; extended dorso-distally over ischium beyond the articulation of the ischium and merus. Ischium as long as merus. Carpus distally widened; equal to or shorter than propodus and dactylus together. Propodus proximally widened.

Peraeon: First peraeonite visible only in males. Peraeonite 2 proportional to or wider than other peraeonites; with ventrolateral expansion not overriding other somites.

Peraeopod 1 with basis arcuate; may have inner apical angle extended to form a convex process. Carpus longer than propodus. Peraeopod 2 with ischium; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Pleonite 6 longer than wide; shorter than peduncle of uropod. Whole width of terminal end of pleonite 6 slightly extended between the bases of the uropods; ending in a point. Anal plates extend posteriorly beyond distal margin of pleonite six.

Uropod endopod uni-articulated. Uropod exopod with proximal article shorter than distal one. Peduncle of uropods longer than rami; rami approximately same length. Males with five pairs of pleopods.

Species included:

1. *B. tanzaniense* Petrescu, 1998

Distribution: Coast of Tanzania in the West Indian Ocean, at 0 m in a shallow reef flat with fine sand and mud.

Notes: Modifications of maxillipeds 1 and 2 with numerous setae and the lack of lacinia mobilis and pars incisiva on the mandible may be related to feeding on small-sized particles (Petrescu, 1998).

BODOTRIA GOODSIR, 1843

Type species: *Bodotria (Bodotria) arenosa arenosa* Goodsir, 1843

Body: Carapace shorter than abdomen and variable in length with respect to peraeon; abdomen variable in length with respect to carapace and peraeon together.

Cephalothorax: From dorsal view the carapace may be laterally compressed anteriorly. Carapace may have mid-dorsal, dorso-lateral and/or lateral ridges. Pseudorostral lappets may extend beyond frontal lobe and meet in midline, extend towards midline but not meet (or partially meet leaving a space between them) or are widely separated. Antennal notch as a depression, subacute or acute incision. Anterolateral corner bluntly rounded, with subacute or acute tooth. Frontal lobe 1/3–1/2 the total carapace length; width and length variable; anteriorly linguiform, may be somewhat extended; may have ocular pigment and/or eye lenses.

Antenna 1 with basal article of the peduncle geniculate, arcuate or straight; longer than or as long as the other two articles together; males may have a group of aesthetascs on distal margin of peduncle. Main flagellum bi- or tri-articulated, with second article longer than third; with one or more aesthetascs in distal-most article; may have two or a group of aesthetascs on proximal article. Accessory flagellum uni-articulated; may have aesthetasc. Males with antenna 2 reaching end of pleon; with sensory setae on anterior margin of article four. Antenna 2 in females with two articles.

Maxilliped 3 basis geniculate or arcuate; slightly extended dorso-distally over ischium or projecting beyond the articulation of the ischium and merus. Ischium longer or same size as merus. Merus may have dorso-distal projection over carpus. Carpus distally widened and/or oviform; variable in length relative to propodus and dactylus together. Propodus may be oviform and/or distally widened.

Peraeon: First peraeonite well exposed, visible only above lateral midline or not visible. Peraeonite 2 wide or proportional to other peraeonites; may have ventrolateral expansion overriding peraeonite 1 and/or carapace, peraeonite 3 or peraeonite 1 and/or carapace and peraeonite 3. Peraeonite 3 may have ventrolateral expansion extended forward overriding peraeonite 2, backwards overriding peraeonite 4 or forward and backwards overriding peraeonites 2 and 4. Peraeonite 4 may have ventrolateral expansion overriding peraeonite 3, peraeonite 5 or peraeonites 3 and 5.

Peraeopod 1 with basis arcuate or straight; may have row of setae; inner apical angle may be extended to form a subtriangular tooth-like process or a convex process; may have row of setae on the carpus; with or without setae in a linear arrangement along propodus; carpus longer than or equal to propodus; dactylus with or without three terminal setae. Peraeopod 2 with or without ischium; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Pleonite 6 longer than wide or as long as wide; shorter than peduncle of uropod; may have two setae close to midline on posterior edge of pleonite 6. Whole width or wide portion of distal end of pleonite 6 may be slightly or well produced between the bases of the uropods; ending in a point, a line or in a rounded apex. Anal plates may extend posteriorly beyond distal margin of pleonite 6, and may bear setae on posterior margin.

Uropod endopod uni- or bi-articulated; proximal article longer than distal one. Uropod exopod with proximal article shorter than distal one. Peduncle of uropods much longer than rami; rami approximately same length or exopod longer than endopod. Males with five pairs of pleopods. Pleopodal endopod with well-developed or reduced process.

Species included:

1. *Bodotria* sp. Gamô, 1963
2. *Bodotria* sp. Toulmond & Truchot, 1964
3. *Bodotria* sp. Le Loeuff & Intès, 1972
4. *Bodortia* sp. (Mühlenhardt-Siegel, 1996b) (*Iphinoe* sp. Mühlenhardt-Siegel, 1996b)

Subgenus *Atlantobodotria* Petrescu, 1998

5. *B. (A.) africana* Zimmer, 1920
6. *B. (A.) armoricana* Le Loeuff & Intès, 1977
7. *B. (A.) australis* Stebbing, 1912
8. *B. (A.) bineti* Le Loeuff & Intès, 1977
9. *B. (A.) choprai* Kurian, 1951
10. *B. (A.) clara* Day, 1978
11. *B. (A.) corallina* Mühlenhardt-Siegel, 2000
12. *B. (A.) cribraria* Le Loeuff & Intès, 1972
13. *B. (A.) elevata* Jones, 1960
14. *B. (A.) falsinus* Day, 1978
15. *B. (A.) gibba* (Sars, 1878)
16. *B. (A.) intermedia* Le Loeuff & Intès, 1977
17. *B. (A.) lata* Jones, 1956
18. *B. (A.) magna* Zimmer, 1921a
19. *B. (A.) montagui* Stebbing, 1912
20. *B. (A.) nitida* Day, 1978
21. *B. (A.) prionura* Zimmer, 1952
22. *B. (A.) pulchella* (Sars, 1878)
23. *B. (A.) quseirensis* Mühlenhardt-Siegel, 2000
24. *B. (A.) scorpioides* (Montagu, 1804)
25. *B. (A.) serica* Day, 1978
26. *B. (A.) tenuis* Day, 1978
27. *B. (A.) vertebrata* Day, 1978
- *B. (A.) vertebrata semicarinata* Day, 1978
- *B. (A.) vertebrata vertebrata* Day, 1978

Subgenus *Bodotria* Goodsir, 1843

28. *B. (B.) alata* Băcescu & Muradian, 1975
29. *B. (B.) angusta* Harada, 1967
30. *B. (B.) arenosa* Goodsir, 1843
- *B. (B.) arenosa arenosa* Goodsir, 1843

- *B. (B.) arenosa leloeuffi* Corbera & Garcia-Rubies, 1998
 – *B. (B.) arenosa mediterranea* (Steuer, 1936)
 31. *B. (B.) arianii* Petrescu, 2003
 32. *B. (B.) armata* Tafe & Greenwood, 1996
 33. *B. (B.) biocellata* Radhadevi & Kurian, 1989
 34. *B. (B.) biplicata* Gamô, 1964a (*B. cf. biplicata* Mühlenhardt-Siegel, 2003)
 35. *B. (B.) carinata* Gamô, 1964b
 36. *B. (B.) cochinchensis* Radhadevi & Kurian, 1989
 37. *B. (B.) depressa* Harada, 1967
 38. *B. (B.) dispar* Harada, 1967
 39. *B. (B.) glabra* Jones, 1955
 40. *B. (B.) iroensis* Harada, 1967
 41. *B. (B.) laevigata* Le Loeuff & Intès, 1977
 42. *B. (B.) maculosa* Hale, 1944
 43. *B. (B.) minuta* Kurian, 1961 (*B. cf. minuta* Mühlenhardt-Siegel, 2003)
 44. *B. (B.) nuda* Harada, 1967
 45. *B. (B.) ovalis* Gamô, 1965
 46. *B. (B.) ozolinshi* Tzareva & Vassilenko, 1993
 47. *B. (B.) parva* Calman, 1907a
 48. *B. (B.) platybasis* Radhadevi & Kurian, 1981a
 49. *B. (B.) pulex* (Zimmer, 1903)
 50. *B. (B.) rugosa* Gamô, 1963
 51. *B. (B.) serrata* Harada, 1967
 52. *B. (B.) serrulata* Gamô, 1965
 53. *B. (B.) setoensis* Harada, 1967
 54. *B. (B.) similis* Calman, 1907a
 55. *B. (B.) spinifera* Gamô, 1986
 60. *B. (B.) sublevis* Calman, 1907a
 61. *B. (B.) tosaensis* Harada, 1967
 62. *B. (B.) unacarina* Mühlenhardt-Siegel, 2003
 63. *B. (B.) sp. nov.* 1 Tafe & Greenwood, 1996

Remarks: *Bodotria minuta* Kurian, 1961 is the only species within the genus in which males bear only four pairs of pleopods.

Petrescu (1998) divided the genus *Bodotria* into two subgenera. Species where the endopod of the uropod is uni-articulated are within the *Bodotria* (*Bodotria*), and those with the endopod of the uropod bi-articulated are within the *Bodotria* (*Atlantobodotria*).

Distribution: The subgenus *Atlantobodotria* is most commonly found in the Eastern Atlantic Ocean and Mediterranean Sea. It can also be found in the Indo-West Pacific and Indian Oceans. Generally found in sand, at depths lower than 80 m, but some species are found at depths of up to 550 m. The subgenus *Bodotria* is mostly found in the shallow waters of the West Pacific between 50 and 300 m. *Bodotria* (*Bodotria*) *arenosa* is distributed in the North-East Atlantic Ocean, and Mediterranean and Black Seas, while *B. (B.) arianii* is found in shallow waters (18–30 m) in Madagascar, West Indian Ocean.

CORICUMA WATLING & BREEDY, 1988

Type species: *Coricura nicoyensis* Watling & Breedy, 1988

Body: Carapace shorter than abdomen and peraeon; abdomen approximately as long as carapace and peraeon together.

Cephalothorax: From dorsal view the carapace appears laterally compressed anteriorly. Carapace with mid-dorsal serration. Pseudorostral lappets do not extend beyond the frontal lobe. Antennal notch as a subacute incision. Anterolateral corner with subacute tooth. Frontal lobe half of carapace length; longer than wide; anteriorly linguiform; without eye lenses.

Antenna 1 with basal article of the peduncle straight; shorter than the other two articles together. Main flagellum tri-articulated; with second article longer than third; with one aesthetasc in distal-most article. Accessory flagellum uni-articulated. Antenna 2 in males not reaching the end of the peraeon; posterior margin modified for grasping. Antenna 2 in females with one article.

Maxilliped 3 basis arcuate; extended dorso-distally over ischium beyond the articulation of the ischium and merus. Ischium shorter than merus. Merus slightly expanded laterally; equal to or shorter than propodus and dactylus together.

Peraeon: Peraeonite 2 wide or proportional to other peraeonites.

Peraeopod 1 with basis arcuate; with inner apical angle extended to form a convex process; carpus longer than propodus. Peraeopod 2, dactylus longer than propodus. Peraeopods 2–5, ischium absent.

Pleon: Pleonite 6 as long as wide; shorter than peduncle of uropod. Pleonite 6 slightly extended between the bases of the uropods.

Uropod endopod bi-articulated; proximal article shorter than distal one. Uropod exopod with proximal article shorter than distal one. Peduncle approximately as long as rami; exopod longer than endopod. Males with two pairs of pleopods. Pleopodal endopod without process.

Species included:

1. *C. nicoyensis* Watling & Breedy, 1988

Distribution: Gulf of Nicoya (western Costa Rica) in a tidal mud flat.

CYCLASPIS SARS, 1865

Synonymy: *Pseudocyclaspis* Radhadevi & Kurian, 1981b.

Type species: *Cyclaspis quadriplicata* Sars, 1865

Body: Carapace shorter than abdomen and longer than peraeon; abdomen longer than carapace and peraeon together.

Cephalothorax: From dorsal view the carapace may be compressed laterally, anteriorly, posteriorly or in the medial portion; carapace may be oviform posteriorly. Carapace may have mid-dorsal ridge, mid-dorsal serration, dorso-lateral, lateral, anterior transverse and/or posterior transverse ridges. Pseudorostral lappets may extend beyond frontal lobe and meet in midline, extend towards midline but not meet (or partially meet leaving a suture between them) or be widely separated. Antennal notch may be distinct as a depression, subacute or acute incision. Anterolateral corner bluntly rounded, with subacute or acute tooth. Frontal lobe may be from 1/5 or less to half of the carapace length; as wide as long or longer than wide; anteriorly linguiform or somewhat extended; may have ocular pigment and bears eye lenses.

Antenna 1 with basal article of the peduncle geniculate, arcuate or straight; variable in length with respect to the other two articles together. Main flagellum uni-, bi- or tri-articulated; with second article longer than third; with zero, one or more aesthetascs in distal-most article. Accessory flagellum reduced or absent. When present, accessory flagellum is uni- or bi-articulated; may have aesthetasc. Antenna 2 in males reaching almost the end or the end of pleon; with sensory setae on anterior margin of article four. Antenna 2 in females with one or two articles.

Maxilliped 3 basis geniculate, arcuate or straight; extended dorso-distally over ischium beyond the articulation of the ischium and merus. Ischium as long as or shorter than merus. Merus extended dorso-distally over carpus or expanded laterally. Carpus may be distally widened or oviform; variable in length with respect to propodus and dactylus together. Propodus may be oviform or distally or proximally widened; may have a brush of setae on propodus.

Peraeon: First peraeonite well exposed, visible only above lateral midline or not visible. Peraeonite 2 narrow or proportional to other peraeonites; may have ventrolateral expansion not overriding other somites, overriding peraeonite 1 and/or carapace, peraeonite 3, peraeonite 1 and/or carapace and peraeonite 3. Peraeonite 3 may have ventrolateral expansion extended forward overriding peraeonite 2, backwards overriding peraeonite 4 or forward and backwards overriding peraeonites 2 and 4. Peraeonite 4 may have a ventrolateral expansion overriding peraeonite 5 or peraeonites 3 and 5.

Peraeopod 1 with basis arcuate or straight; may have row of setae; basis may be slightly projected ventrally; inner apical angle may be extended to form a subtriangular tooth-like or a convex process; may have

a brush (three or more) of long setae on the propodus (setae longer than carpus) or setae in a linear arrangement along propodus; carpus variable in length with respect to propodus; dactylus with or without three terminal setae. Peraeopod 2 with ischium; dactylus and propodus approximately same length or dactylus longer. Peraeopod 4 with ischium.

Pleon: Articular pegs may be present. Pleonite 6 longer than wide; variable in length with respect to peduncle of uropod. Pleonite 6 may or may not be slightly or well extended between the bases of the uropods. When whole width of terminal end of pleonite 6 is extended it ends in a point, concave (with two projections) or a rounded apex. When wide or narrow portion of the distal end of pleonite 6 is extended it ends in a point, line or a rounded apex. Anal plates may extend posteriorly beyond distal margin of pleonite 6.

Uropod endopod uni-articulated. Uropod exopod with proximal article shorter than distal one. Peduncle of uropods variable in length with respect to rami; rami variable in length with respect to each other. Rami with or without terminal setae. Males with five pairs of pleopods. When present, the process of the endopod of the pleopod is well-developed or reduced.

Species included:

1. *C. affinis* Lomakina, 1968
2. *C. agrenosculpta* Tafe & Greenwood, 1996 (*C. cf. agrenosculpta* Mühlenhardt-Siegel, 2003)
3. *C. alba* Roccatagliata, 1986
4. *C. alveosculpta* Tafe & Greenwood, 1996
5. *C. amamiensis* Gamô, 1963
6. *C. andersoni* Tafe & Greenwood, 1996
7. *C. antipai* Petrescu, 1995
8. *C. argus* Zimmer, 1902
9. *C. aspera* Hale, 1944
10. *C. australis* Sars, 1887
11. *C. australora* Day, 1978
12. *C. bacescui* Omholt & Heard, 1982
13. *C. bengalensis* Kurian, 1954
14. *C. bicornis* Zimmer, 1921a
15. *C. bidens* Gamô, 1962
16. *C. bituberculata* Donath-Hernández, 1988
17. *C. bovis* Hale, 1928
18. *C. breedyae* Petrescu & Heard, 2004
19. *C. brevipes* Hale, 1948
20. *C. cana* Hale, 1944
21. *C. candida* Zimmer, 1921b
22. *C. candidoides* Băcescu, 1992
23. *C. caprella* Hale, 1936
24. *C. chaunosculpta* Tafe & Greenwood, 1996
25. *C. cheveyi* Fage, 1945
26. *C. cingulata* Calman, 1907a
27. *C. clarki* Hale, 1944
28. *C. coelebs* Calman, 1917
29. *C. concepcionensis* Donath-Hernández, 1988

30. *C. concinna* Hale, 1944
 31. *C. cooki* Tafe & Greenwood, 1996
 32. *C. costata* Calman, 1904
 33. *C. cottoni* Hale, 1937
 34. *C. cretata* Hale, 1944
 35. *C. cristulata* Gamô, 1987
 36. *C. daviei* Tafe & Greenwood, 1996
 37. *C. dentifrons* Zimmer, 1944
 38. *C. dolera* Zimmer, 1944
 39. *C. elegans* Calman, 1907a
 40. *C. exsculpta* Sars, 1887
 41. *C. formosae* Zimmer, 1921a
 42. *C. fulgida* Hale, 1944
 43. *C. gezamuelleri* Petrescu, 1998
 44. *C. gibba* Hale, 1944
 45. *C. gigas* Zimmer, 1907
 46. *C. globosa* Hale, 1944
 47. *C. goesi* (Sars, 1871) (*Stephanoma goesii* Sars, 1871; *Cyclaspis unicornis* Calman, 1907a; *Cyclaspis goesi* Petrescu, 2002)
 48. *C. granulata* (Radhadevi & Kurian, 1981b) (*Pseudocyclaspis granulata* Radhadevi & Kurian, 1981b; *Cyclaspis granulata* Petrescu, 2002)
 49. *C. granulosa* Hale, 1944
 50. *C. hermani* Calman, 1904
 – *C. hermani hermani* Calman, 1904
 – *C. hermani annamensis* Fage, 1945
 51. *C. indoaustralis* Băcescu, 1992
 52. *C. iorgui* Ortiz & Lalana, 2002
 53. *C. hornelli* Calman, 1904
 54. *C. iphinoides* Băcescu & Muradian, 1975
 55. *C. jamaicensis* Petrescu, Illiffe & Sarbu, 1993
 56. *C. jonesi* Roccatagliata, 1985
 57. *C. juxta* Hale, 1948
 58. *C. kensleyi* Petrescu, 2002
 59. *C. kerguelenensis* Ledoyer, 1977
 60. *C. levis* Thomson, 1892
 61. *C. linguiloba* Lin & Lin, 1990
 62. *C. lissa* Mühlenhardt-Siegel, 2003
 63. *C. longicaudata* Sars, 1865
 64. *C. longipes* Calman, 1907a
 65. *C. lucida* Hale, 1944
 66. *C. marisrubri* Băcescu & Muradian, 1975
 67. *C. mawsonae* Hale, 1944
 68. *C. mexicansis* (Radhadevi & Kurian, 1981b) (*Pseudocyclaspis mexicansis* Radhadevi & Kurian, 1981b)
 69. *C. micans* Roccatagliata, 1985
 70. *C. mjoebergi* Zimmer, 1921a
 71. *C. mollis* Hale, 1944
 72. *C. nalbanti* Petrescu, 1998
 73. *C. munda* Hale, 1944
 74. *C. nitida* Hale, 1944
 75. *C. nubila* Zimmer, 1936
 76. *C. ornosculpta* Tafe & Greenwood, 1996
 77. *C. oxyura* Roccatagliata & Moreira, 1987
 78. *C. perelegans* Roccatagliata & Moreira, 1987
 79. *C. persculpta* Calman, 1905
 80. *C. peruana* Zimmer, 1943
 81. *C. picta* Calman, 1904
 82. *C. pinguis* Hale, 1944
 83. *C. platymerus* Zimmer, 1944
 84. *C. prolifica* Băcescu, 1990
 85. *C. pruinosa* Hale, 1944
 86. *C. pura* Hale, 1936
 87. *C. purpurascens* Gamô, 1964c
 88. *C. pusilla* Sars, 1887
 89. *C. pustulata* Zimmer, 1943
 90. *C. popescugorji* Petrescu, 1998
 91. *C. pseudolongicaudata* Ledoyer, 1997
 92. *C. quadrituberculata* Zimmer, 1907
 93. *C. quadruplicata* Kurian, 1951
 94. *C. reticulata* Roccatagliata, 1985
 95. *C. roccatagliatai* Petrescu, 1995 (Synonymy: *C. roccatagliatae* Petrescu, 1995)
 96. *C. rudis* Hale, 1948
 97. *C. sabulosa* Hale, 1944
 98. *C. sallai* Tafe & Greenwood, 1996
 99. *C. scissa* Day, 1978
 100. *C. sculptilis* Roccatagliata & Moreira, 1987
 101. *C. sheardi* Hale, 1944
 102. *C. sibogae* Calman, 1905
 103. *C. similis* Calman, 1907a
 104. *C. simonae* Petrescu *et al.*, 1993
 105. *C. simula* Hale, 1944
 106. *C. spectabilis* Zimmer, 1908
 107. *C. spilotes* Hale, 1928
 108. *C. sterreri* Petrescu, 2002
 109. *C. stocki* Băcescu, 1990
 110. *C. striata* Roccatagliata & Moreira, 1987
 111. *C. strigilis* Hale, 1944
 112. *C. strumosa* Hale, 1948 (*C. cf. strumosa* Mühlenhardt-Siegel, 2003)
 113. *C. subgrandis* Jones, 1969
 114. *C. sublevis* Hale, 1948
 115. *C. supersculpta* Zimmer, 1921b
 116. *C. tasmanica* Jones, 1969
 117. *C. testudinum* Zimmer, 1943
 118. *C. thomsoni* Calman, 1907a
 119. *C. tranteri* Tafe & Greenwood, 1996
 120. *C. tribulis* Hale, 1928
 121. *C. triplicata* Calman, 1907a
 122. *C. uniplicata* Calman, 1907a
 123. *C. ursulae* Mühlenhardt-Siegel, 2003
 124. *C. usitata* Hale, 1932
 125. *C. vargasae* Petrescu & Heard, 2004
 126. *C. variabilis* Roccatagliata, 1986
 127. *C. varians* Calman, 1912
 128. *Cyclaspis* sp. Kurian, 1954
 129. *Cyclaspis* sp. Lomakina, 1968
 130. *Cyclaspis* sp. Gladfelter, 1975
 131. *Cyclaspis* sp. A Dexter, 1979

132. *Cyclaspis* sp. B Dexter, 1979
 133. *Cyclaspis* sp. nov.1 Tafe & Greenwood, 1996
 134. *Cyclaspis* sp. nov.2 Tafe & Greenwood, 1996

Remarks: *Cyclaspis* is the most speciose of the bodotriid genera. *Cyclaspis* species are not easily diagnosed. This genus had been a 'grab bag' for species of the Bodotriinae (L. Watling, pers. comm.) that share some of a suite of characters, including: pseudorostral lappets not extending beyond the frontal lobe, well-developed eye lenses, distal article of main flagellum of antenna 1 with at least one aesthetasc, basis of maxilliped 3 extended dorso-distally over ischium beyond the articulation of the ischium and merus, peraeopod 2 and 4 with ischium present, articular pegs in the abdomen, pleonite 6 longer than wide and uropod endopod uni-articulated. There is great morphological variability within the genus *Cyclaspis* and, following a detailed analysis, it should be divided into several related genera.

Distribution: Present in all the oceans. Most common at depths lower than 50 m in temperate latitudes of the Southern Hemisphere, particularly in the Indo-West Pacific and Australian coasts.

CYCLASPOIDES BONNIER, 1896

Type species: *Cyclaspoides sarsi* Bonnier, 1896

Body: Carapace shorter than abdomen and longer than peraeon; abdomen approximately as long as or longer than carapace and peraeon together.

Cephalothorax: From dorsal view the carapace may be laterally compressed anteriorly; may be oviform posteriorly; longer than wide; may have anterior transverse ridge. Pseudorostral lappets extend beyond frontal lobe and meet in midline. Antennal notch as a depression or a subacute incision. Anterolateral corner bluntly rounded; with subacute or acute tooth. Branchial siphons long, extending much beyond pseudorostrum, or short, extending just beyond pseudorostrum. Frontal lobe approximately 1/4 of carapace length; as wide as long; may be somewhat extended; without ocular pigment and with or without eye lenses.

Antenna 1 with basal article of the peduncle arcuate or straight; shorter than the other two articles together. Main flagellum uni-, bi- or tri-articulated; with second article longer than third; with one or two aesthetascs in distal-most article. Accessory flagellum uni-articulated. Antenna 2 in males, reaching the end of the pleon.

Maxilliped 3 basis arcuate or geniculated; extended dorso-distally over ischium beyond the articulation of the ischium and merus. Ischium as long as or shorter than merus. Merus extended dorso-distally over car-

pus. Carpus equal to or shorter than propodus and dactylus together; may be oviform or not expanded.

Peraeon: Peraeonites 1 and 2 or 1–3 are fused to carapace in females and 1–3 in males.

Peraeopod 1 with basis arcuate or straight; may have row of setae; inner apical angle may be produced as a convex process; carpus equal to or shorter than propodus; dactylus may or may not have at least three terminal setae. Peraeopod 2 with or without ischium; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Articular pegs may be present. Pleonite 5 variable length with respect to pleonite 6. Pleonite 6 longer than wide; shorter or longer than peduncle of uropod. Whole width of pleonite 6 may be extended between the bases of the uropods or not extended; apex rounded. Anal plates may extend posteriorly beyond distal margin of pleonite 6.

Uropod endopod uni- or bi-articulated; proximal article longer than distal one. Uropod exopod with proximal article shorter than distal one. Peduncle may be slightly longer, same length, slightly shorter or much shorter than rami or peduncle shorter than exopods (equal length to endopod); rami approximately same length or exopod longer than endopod. Males with five pairs of pleopods. Pleopodal endopod with well-developed process.

Species included:

1. *C. bacescui* Petrescu, 1995
2. *C. flokkeri* Mühlenhardt-Siegel, 2000
3. *C. longimerus* Mühlenhardt-Siegel, 2005
4. *C. pellucidus* Day, 1978
5. *C. sarsi* Bonnier, 1896
6. *Cyclaspoides* sp. Calman, 1905

Distribution: Off the coasts of South Africa, Mediterranean Sea and Pacific Ocean at depths greater than 400 m (up to 1900 m).

Notes: The single specimen of *Cyclaspoides* sp. Calman, 1905 was found in the atrial cavity of a tunicate, possibly indicating an endosymbiotic life-style.

EOCUMA MARCUSEN, 1894

Synonymy: *Mossambicum* Day, 1978.

Type species: *Eocuma hilgendorfi* Marcusen, 1894

Body: Carapace shorter than abdomen and longer than peraeon; abdomen longer than carapace and peraeon together.

Cephalothorax: From dorsal view the carapace may appear laterally compressed anteriorly or posteriorly; may be oviform posteriorly. Carapace may have mid-dorsal ridge, dorso-lateral ridges, lateral ridges and/or

lateral horns. Pseudorostral lappets extend beyond frontal lobe; meet in midline or extend towards midline but do not meet (or partially meet leaving a suture between them). Antennal notch not distinct, as a depression or as a subacute or acute incision. Anterolateral corner bluntly rounded, with subacute or acute tooth. Branchial siphons extend just beyond pseudorostrum or more rarely are long, extending much beyond the pseudorostrum. Frontal lobe from 1/5 or less to more than half of the carapace length; variable in length with respect to width; anteriorly linguiform, may be somewhat extended; may have ocular pigment and/or eye lenses.

Antenna 1 with basal article of the peduncle arcuate or straight; as long as or shorter than the other two articles together. Main flagellum uni-, bi- or tri-articulated; with second and third article approximately same length; one, two, three or more aesthetascs in distal-most article; may have two aesthetascs on proximal article. Accessory flagellum reduced or absent; uni-articulated; may have a brush of setae; with or without aesthetasc. Antenna 2 in males reaching half length or end of the pleon; with sensory setae on anterior margin of article four. Antenna 2 in females with one or two articles.

Maxilliped 3 basis geniculate, arcuate or straight; extended dorso-distally over ischium beyond the articulation of the ischium and merus. Ischium variable length with respect to merus. Merus extended dorso-distally over carpus. Carpus may be distally widened; equal to or shorter than propodus and dactylus together. Propodus oviform, may be distally widened; with or without brush of setae.

Peraeon: First peraeonite well exposed, visible only above lateral midline or not visible. Peraeonite 2 variable width with respect to other peraeonites; may have ventrolateral expansion overriding peraeonite 3, carapace and peraeonite 3 or not overriding other somites. Peraeonite 3 without ventrolateral expansion or extended backwards overriding peraeonite 4. Peraeonite 4 without ventrolateral expansion or with ventrolateral expansion overriding peraeonite 3 or 5.

Peraeopod 1 with basis arcuate or straight; may have row of setae; with dorso-distal projection on the basis totally or partially covering the ischium; inner apical angle may be extended to form a subtriangular tooth-like process or a convex process; may have row of setae on the carpus; carpus variable length with respect to basis; with or without a brush (3 or more) of long setae on the propodus (setae longer than carpus) or setae in a linear arrangement along propodus; basis longer than or equal to propodus; carpus longer or equal than propodus; dactylus with or without three terminal setae. Peraeopod 2 without ischium; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Articular pegs may be present. Pleonite 6 longer than wide; longer than peduncle of uropod. Whole width of terminal end of pleonite 6 may be extended between uropods; ending in a point, a line or a rounded apex. A narrow or wide portion of the terminal end of pleonite 6 may be extended between uropods; ending in a line or a rounded apex. Anal plates may extend posteriorly beyond distal margin of pleonite six.

Uropod endopod uni-articulated. Uropod exopod with proximal article shorter than distal one. Rami longer than peduncle; rami approximately same length. Rami with or without terminal setae. Males with five pairs of pleopods. When present, the process of the endopod of the pleopod is well developed or reduced.

Species included:

1. *E. aculeatum* Day, 1978
2. *E. affine* Calman, 1904
3. *E. agrion* Zimmer, 1914
4. *E. amakusense* Gamô, 1967
5. *E. bacescui* Petrescu, 2003
6. *E. cadenati* Fage, 1950
7. *E. calmani* Fage, 1928
8. *E. cochlear* Le Loeuff & Intès, 1972
9. *E. dimorphum* Fage, 1928
10. *E. dollfusi* Calman, 1907b
11. *E. elongatum* (Day, 1978) (*Mossambicum elongatum* Day, 1978)
12. *E. ferox* (Fischer, 1872)
13. *E. foveolatum* Day, 1978
14. *E. gorgasiae* Mühlenhardt-Siegel, 1996a
15. *E. hilgendorfi* Marcusen, 1894
16. *E. kempii* Kurian, 1954
17. *E. lanatum* Le Loeuff & Intès, 1972
18. *E. latum* Calman, 1907a
19. *E. longicorne* Calman, 1907a
20. *E. muradiannae* Petrescu, 1998
21. *E. petrescui* Patel, Haye & Kornfield, 2003
22. *E. sanguineum* Kurian & Radha Devi, 1983
23. *E. sarsii* (Kossmann, 1880)
24. *E. spiniferum* Gamô, 1967
25. *E. stelliferum* Calman, 1907a
26. *E. striatum* Kurian & Radha Devi, 1990
27. *E. taprobanicum* Calman, 1904
28. *E. travancoricum* Kurian, 1951
29. *E. victoriae* (Mühlenhardt-Siegel, 2003) (*Mossambicum victoriae* Mühlenhardt-Siegel, 2003)
30. *E. winri* Day, 1978
31. *Eocuma* sp. Băcescu, 1972
32. *Eocuma* sp. Day, 1978

Distribution: West Indian, Indo-West and West Pacific Oceans, South-West Australia, South-West Atlantic, Mediterranean and Red Seas. They are most commonly found at less than 100 m, although *Eocuma acuelatum* may be found up to 550 m.

IPHINOE BATE, 1856

Type species: Iphinoe trispinosa (Goodsir, 1843)

Body: Carapace shorter than abdomen and similar in length or shorter than peraeon; abdomen approximately as long as carapace and peraeon together.

Cephalothorax: From dorsal view the carapace appears laterally compressed anteriorly, posteriorly or not compressed. Carapace may have mid-dorsal ridge, mid-dorsal serration, dorso-lateral, anterior transverse and/or posterior transverse ridges. Pseudorostral lappets extend beyond frontal lobe and meet in midline. Antennal notch as a depression or as a subacute incision. Anterolateral corner bluntly rounded or as subacute or acute tooth. Frontal lobe from 1/4 to 1/2 of the total carapace length; as wide as long or longer than wide; anteriorly linguiform, may be somewhat extended; may have ocular pigment and/or eye lenses.

Antenna 1 with basal article of the peduncle arcuate or straight; shorter than the other two articles together. Main flagellum uni-, bi- or tri-articulated; with one, two, three or more aesthetascs in distal-most article; may have two or a group of aesthetascs on proximal article. Accessory flagellum uni- or bi-articulated; may have aesthetasc. Antenna 2 in males approximately reaching half length of pleon or reaching end of pleon; with sensory setae on anterior margin of article 4. Antenna 2 in females with one or two articles.

Maxilliped 3 basis geniculate, arcuate or straight; extended dorso-distally over ischium beyond the articulation of the ischium and merus. Ischium variable in length with respect to merus. Merus with dorso-distal projection over carpus. Carpus may be oviform or may be distally widened; carpus equal to or shorter than propodus and dactylus together. Propodus oviform, may be distally widened.

Peraeon: First peraeonite well exposed or visible only above lateral midline. Peraeonite 2 wide or proportional to other peraeonites; may have ventrolateral expansion overriding peraeonite 1 and/or carapace or peraeonite 1 and/or carapace and peraeonite 3. Peraeonite 3 may have ventrolateral expansion extended backwards overriding peraeonite 4 or forward and backwards overriding peraeonites 2 and 4. Peraeonite 4 may have ventrolateral expansion overriding peraeonite 3, peraeonite 5 or peraeonites 3 and 5.

Peraeopod 1 with basis arcuate or straight; may have row of setae; ischium may be elongate (often longer than merus); carpus shorter or equal length than basis; may have setae in a linear arrangement along propodus; carpus longer or equal to propodus; dactylus with or without three terminal setae. Perae-

opod 2 without ischium; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Articular pegs may be present. Pleonite 6 longer than wide or as long as wide; as long as or shorter than peduncle of uropod; may have two setae close to midline on posterior edge of pleonite 6. Pleonite 6 may be slightly extended or well extended between the bases of the uropods. When whole width of terminal end extended, it may end in a point, a line or a rounded apex. Alternatively, when a wide portion of distal end is extended, it may end in a point, a line or a rounded apex. Anal plates may extend posteriorly beyond distal margin of pleonite 6, and may bear setae on posterior margin.

Uropod endopod bi-articulated; articles variable in length with respect to each other. Uropod exopod with proximal article shorter than distal one or with articles approximately same size. Peduncle variable in length with respect to rami; rami variable in length with respect to each other. Males with two or five pairs of pleopods. Pleopodal endopod with well developed or reduced process.

Species included:

1. *I. acutirostris* Ledoyer, 1965
2. *I. adriatica* Băcescu, 1988
3. *I. africana* Zimmer, 1908
4. *I. armata* Ledoyer, 1965
5. *I. brevipes* Hansen, 1895
6. *I. calmani* Fage, 1945
7. *I. canariensis* Corbera, Brito & Núñez, 2002
8. *I. capensis* (Zimmer, 1921a)
9. *I. crassipes* Hansen, 1895
- *I. crassipes crassipes* Hansen, 1895
- *I. crassipers haifae* Băcescu, 1961
10. *I. dayi* Jones, 1960
11. *I. douniae* Ledoyer, 1965
12. *I. elisae* Băcescu, 1950
13. *I. fagei* Jones, 1955
14. *I. gurjanovae* Lomakina, 1960
15. *I. hupferi* Zimmer, 1916
16. *I. inermis* Sars, 1879 (*I. cf. inermis* Corbera, Brito & Núñez, 2002)
17. *I. insolita* Petrescu, 1992
18. *I. ischnura* Zimmer, 1952
19. *I. maculata* Ledoyer, 1965
20. *I. maeotica* (Sowinsky, 1894)
21. *I. marisrubrae* Mühlenhardt-Siegel, 1996a
22. *I. pellucida* Hale, 1944
23. *I. pigmenta* Kurian, 1961
24. *I. plicata* Le Loeuff & Intès, 1972
25. *I. pokoui* Le Loeuff & Intès, 1972
26. *I. producta* Day, 1978
27. *I. rhodaniensis* Ledoyer, 1965)
28. *I. robusta* Hansen, 1895
29. *I. sagamiensis* Gamô, 1958

30. *I. sanguinea* Kemp, 1916
31. *I. senegalensis* Jones, 1956
32. *I. serrata* Norman, 1867
33. *I. stebbingi* Jones, 1956
34. *I. tenella* Sars, 1878
35. *I. tenera* Lomakina, 1960
36. *I. trispinosa* (Goodsir, 1843)
37. *I. truncata* Hale, 1953
38. *I. zimmeri* Stebbing, 1910
39. *Iphinoe* sp. Zimmer, 1920
40. *Iphinoe* sp. Kiseleva, 1964

Remarks: *Iphinoe capensis* and *I. pigmenta* are dubious members of the genus *Iphinoe* because they lack the characteristic dorso-distal expansion of the merus of maxilliped 3. Likewise, *Iphinoe crassipes* and *I. pokoui* are dubious species; they share similarity in the extensions of the pseudorostral lappets beyond the frontal lobe that bear setae close to the midline. In addition, in the latter two species the articles distal to the merus on maxilliped 3 are narrow. *Iphinoe insolita* is the only species of the genus *Iphinoe* with only two pairs of pleopods on the male (Petrescu, 1995).

Distribution: Generally found at depths lower than 100 m, in the East Atlantic and West Pacific Oceans and Mediterranean Sea. *Iphinoe producta* can be found at much deeper waters, between 200 and 800 m.

UPSELASPIS JONES, 1955

Type species: *Upselaspis caparti* (Fage, 1951)

Body: Carapace shorter than abdomen and as long as or longer than peraeon; abdomen approximately as long as or longer than carapace and peraeon together.

Cephalothorax: From dorsal view the carapace appears not to be laterally compressed. Pseudorostral lappets extend beyond frontal lobe and meet in midline. Antennal notch not distinct, as a depression or as a subacute incision. Anterolateral corner bluntly rounded or with subacute tooth. Frontal lobe 1/4 to half of the total carapace length; as wide as long; somewhat extended; without ocular pigment or eye lenses.

Antenna 1 with basal article of the peduncle arcuate; shorter than the other two articles together. Main flagellum bi-articulated; with two aesthetascs in distal-most article. Accessory flagellum uni-articulated; with brush of setae. Antenna 2 in males reaching end of pleon.

Maxilliped 3 basis geniculate or arcuate; extended dorso-distally over ischium beyond the articulation of the ischium and merus. Ischium as long as or shorter than merus. Merus extended dorso-distally over carpus. Carpus equal to or shorter than propodus and dactylus together.

Peraeon: First peraeonite not visible. Peraeonite 2 may have ventrolateral expansion; when present, it overrides peraeonite 3. Peraeonite 4 with ventrolateral expansion overriding peraeonite 5.

Peraeopod 1 with basis arcuate, with row of setae; carpus same size as propodus. Peraeopod 2 without ischium; dactylus longer than propodus.

Pleon: Pleonite 6 as long as wide; shorter than peduncle of uropod. Wide portion of distal end of pleonite 6 well extended between the bases of the uropods; ending somewhat concave. Anal plates may extend posteriorly beyond distal margin of pleonite 6.

Uropod endopod bi-articulated; two articles approximately same length. Uropod exopod with proximal article shorter than distal one. Peduncle slightly shorter than exopods of rami (equal length to endopod); endopod longer than exopod. Males with five pairs of pleopods.

Species included:

1. *U. caparti* (Fage (1951))

Distribution: Most frequently found in the coast of South-West Africa from 0 to 12 m, although it has been found at up to 78 m.

ZYGOSIPHON CALMAN, 1907A

Type species: *Zygosphon mortenseni* Calman, 1907a

Body: Carapace shorter than abdomen and similar in length to peraeon; abdomen longer than carapace and peraeon together.

Cephalothorax: From dorsal view the carapace appears laterally compressed in the medial portion. Carapace with mid-dorsal ridge. Pseudorostral lappets extend beyond frontal lobe; meet in midline or partially meet leaving a suture between them. Antennal notch as a subacute or acute incision. Anterolateral corner with subacute or acute tooth. Branchial siphons long, extending much beyond pseudorostrum and not fused in the midline. Frontal lobe 1/4–1/3 of carapace length; wider than long; with anterior margin notched; with ocular pigment and eye lenses.

Antenna 1 with basal article of the peduncle straight; as long as the other two articles together. Main flagellum bi-articulated; with two aesthetascs in distal-most article. Accessory flagellum uni-articulated. Antenna 2 in males reaching end of pleon; with sensory setae on anterior margin of article four. Antenna 2 in females with one article.

Maxilliped 3 basis geniculate; extended dorso-distally over ischium beyond the articulation of the ischium and merus. Ischium longer than merus. Merus extended dorso-distally over carpus. Carpus equal to or shorter than propodus and dactylus together.

Peraeon: Peraeonite 2 may have ventrolateral expansion, and when present the expansion does not override other somites. Peraeonite 3 extended backwards overriding peraeonite 4. Peraeonite 4 with ventrolateral expansion overriding peraeonite 5.

Peraeopod 1 with basis arcuate; inner apical angle extended to form a convex process; carpus shorter than propodus. Peraeopod 2 with ischium; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Articular pegs may be present. Pleonite 5 as long or longer than pleonite 6. Pleonite 6 longer than wide; shorter than peduncle of uropod. Wide portion of distal end of pleonite 6 well extended between the bases of the uropods; with rounded apex. Anal plates extend posteriorly beyond distal margin of pleonite 6.

Uropod endopod bi-articulated; proximal article longer than distal one. Uropod exopod with proximal article shorter than distal article. Peduncle of uropods longer than rami; exopod longer than endopod. Males with five pairs of pleopods.

Species included:

1. *Z. mortenseni* Calman, 1907a

Distribution: Indo-West Pacific from 7 to 22 m.

SUBFAMILY VAUNTHOMPSONIINAE SARS, 1878

Type genus: *Vaunthompsonia* Bate, 1858

All genera within the Vaunthompsoniinae share the following traits: females generally bear three or more articles on antenna 2 and exopods beyond the first pair of peraeopods on both females and males.

APOCUMA JONES, 1973

Type species: *Apocuma brasiliense* Jones, 1973

Body: Carapace shorter than abdomen and longer than peraeon; abdomen shorter, equal or longer than carapace and peraeon together.

Cephalothorax: From dorsal view the carapace appears not to be laterally compressed. Carapace may have mid-dorsal, dorso-lateral, lateral and posterior transverse ridges, as well as mid-dorsal serration. Pseudorostral lappets extend beyond frontal lobe and meet in midline. Antennal notch as a depression, subacute or acute incision. Anterolateral corner bluntly rounded or with subacute tooth. Branchial siphons long, extending much beyond pseudorostrum or short, extending just beyond carapace. Frontal lobe 1/4 of carapace length; as wide as long; somewhat extended or anteriorly linguiform; without ocular pigment or eye lenses.

Antenna 1 with basal article of the peduncle arcuate or geniculated; longer than the other two articles together. Main flagellum bi-articulated; with two aes-

thetascas in distal-most article. Accessory flagellum uni-articulated, may have a brush of three or more setae. Antenna 2 in males reaching end of pleon. Antenna 2 in females with three articles.

Maxilliped 3 basis arcuate or straight; not projected over ischium. Ischium shorter or same length than merus. Merus slightly expanded laterally. Carpus variable in length with respect to propodus and dactylus together.

Peraeon: Peraeonite 2 with ventrolateral expansion overriding peraeonite 1 and/or carapace and peraeonite 3, or only peraeopod 3. Peraeonite 3 may have ventrolateral expansion extended backwards overlapping peraeonite 4. Peraeonite 4 with ventrolateral expansion overriding peraeonite 5 or peraeonites 3 and 5.

Females with fully developed exopods on peraeopods 1 and 2, and reduced or small exopod on peraeopod 3. Males with fully developed exopods on peraeopods 1–4. Peraeopod 1 with basis arcuate; carpus with or without row of setae, longer than propodus; dactylus with or without terminal setae. Peraeopod 2 with ischium; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Pleonite 6 as long as or longer than wide, shorter than peduncle of uropod, may have three setae on posterior edge. Wide portion of distal end of pleonite 6 slightly extended between the bases of the uropods and ending in a line or slight point. Anal plates may extend posteriorly beyond distal margin of pleonite six.

Uropod endopod uni-articulated. Uropod exopod with proximal article shorter than distal one. Peduncle of uropods longer than rami; rami approximately same length or endopod slightly shorter. Males with five pairs of pleopods that do not bear a process.

Species included:

1. *A. australiense* (Hale, 1949) (Synonymy: *Cumellopsis australiensis* Hale, 1949; *A. australiense* Petrescu, 2004)
2. *A. brasiliense* Jones, 1973
3. *A. mauritaniense* Ledoyer, 1997
4. *A. poorei* Petrescu, 2004

Distribution: Atlantic Ocean (587–2003 m) and New South Wales, Victoria and Tasmania (119–1500 m).

BATHYCUMA HANSEN, 1895

Type species: *Bathycuma elongatum* Hansen, 1895

Body: Carapace shorter than abdomen and similar length or longer than peraeon; abdomen approximately as long as or longer than carapace and peraeon together.

Cephalothorax: From dorsal view the carapace appears laterally compressed anteriorly. Carapace may have mid-dorsal ridge, mid-dorsal serration and/or transverse ridge. Pseudorostral lappets extend beyond frontal lobe and meet in midline or extend towards midline but do not meet. Antennal notch as a depression or as a subacute incision. Anterolateral corner with subacute or acute tooth. Branchial siphons extend just beyond pseudorostrum or are long, extending much beyond pseudorostrum. Frontal lobe 1/4 to half of the total carapace length; longer than wide; anteriorly linguiform, may be somewhat extended; without ocular pigment or eye lenses.

Antenna 1 with basal article of the peduncle geniculate, arcuate or straight; as long as or shorter than the other two articles together. Main flagellum uni-, bi- or tri-articulated; with second and third article approximately same length or with second article longer than third; may have two aesthetascs in distal-most article. Accessory flagellum uni- or bi-articulated; may have a brush of setae on accessory flagellum. Antenna 2 in males approximately reaching half-length of pleon. Antenna 2 in females with three articles.

Maxilliped 3 basis arcuate; extended dorso-distally over ischium beyond the articulation of the ischium and merus. Ischium longer than or as long as merus. Merus slightly expanded laterally. Carpus may be distally widened; carpus equal to or shorter than propodus and dactylus together. Propodus may be distally widened.

Peraeon: First peraeonite well exposed or visible only above lateral midline. Peraeonite 2 may have ventrolateral expansion overriding peraeonite 1 and/or carapace, peraeonite 1 and/or carapace and peraeonite 3 or not overriding other somites. Peraeonite 3 may have ventrolateral expansion extended forward overriding peraeonite 2, backwards overriding peraeonite 4 or forward and backwards overriding peraeonites 2 and 4. Peraeonite 4 may have ventrolateral expansion overriding peraeonite 5 or peraeonites 3 and 5.

Females and males with fully developed exopods on peraeopods 1–3. Males also have fully developed exopods on peraeopod 4. Peraeopod 1 with basis arcuate and may have row of setae; may have row of setae on the carpus; with or without setae in a linear arrangement along propodus; carpus equal to or shorter than propodus; dactylus with or without three terminal setae. Peraeopod 2 with ischium; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Pleonite 6 longer than wide; variable in length with respect to peduncle of uropod; may have many small setae on posterior edge of pleonite 6. Wide portion of the distal end of pleonite 6 strongly or slightly extended past the insertion of the uropods; ending in a

point or a rounded apex. Anal plates may extend posteriorly beyond distal margin of pleonite six and may bear setae on posterior margin.

Uropod endopod bi-articulated; two articles approximately same length or proximal article longer than distal one. Uropod exopod with proximal article shorter than distal one. Peduncle of uropods slightly longer than or as long as rami; rami approximately same length or exopod longer than endopod. Males with five pairs of pleopods.

Species included:

1. *B. brevirostre* (Norman, 1879)
2. *B. capense* (Zimmer, 1921a)
3. *B. datum* Day, 1975
4. *B. declinatum* Gamô, 1989
5. *B. elongatum* Hansen, 1895
6. *B. granulatum* Gamô, 1990
7. *B. longicaudatum* Calman, 1912
8. *B. longirostre* Calman, 1905
9. *B. magnum* Jones, 1969 (Synonymy: *B. magna* Jones, 1969; *B. magnum* Băcescu, 1988)
10. *B. natalense* Stebbing, 1912
11. *B. okinawaense* Gamô, 1989
12. *B. rotunditectorum* Gamô, 1990
13. *B. squamosa* Mühlenhardt-Siegel, 2005
14. *B. vemae* Petrescu, 1995
15. *Bathycuma* sp. Wolff, 1970

Distribution: Deep waters (up to 5000 m) of the North Atlantic, Indian and Pacific Oceans, Mediterranean Sea and off the coasts of South Africa.

CUMOPSIS Sars, 1878

Synonymy: *Heterocuma* Miers, 1879

Type species: *Cumopsis goodsir* Van Beneden, 1861

Body: Carapace shorter than abdomen and variable in length with respect to peraeon; abdomen approximately as long as or longer than carapace and peraeon together.

Cephalothorax: From dorsal view the carapace may appear laterally compressed anteriorly. Carapace may have medial and/or dorso-lateral ridges. Pseudorostral lappets may extend beyond frontal lobe and may meet in the midline (or partially meet leaving a suture between them). Antennal notch not distinct, as a depression, subacute or acute incision. Anterolateral corner bluntly rounded or with subacute tooth. Frontal lobe from 1/3 to half of the total carapace length; as wide as long or longer than wide; anteriorly linguiform, somewhat extended or not extended; with ocular pigment and with eye lenses.

Antenna 1 with basal article of the peduncle straight; as long as or shorter than the other two arti-

cles together; males may have a group of aesthetascs on distal margin of peduncle. Main flagellum uni- or bi-articulated; with two aesthetascs in distal-most article; may have two or a group of aesthetascs on proximal article. Accessory flagellum uni-articulated; may have a brush of setae. Antenna 2 in males reaching end of pleon.

Maxilliped 3 basis geniculate, arcuate or straight; extended dorso-distally over ischium beyond the articulation of the ischium and merus, slightly expanded laterally or not projected over ischium. Ischium variable in length with respect to merus. Merus without dorsal projection, extended dorso-distally over carpus or slightly expanded laterally. Carpus may be distally widened; equal to or shorter than propodus and dactylus together. Propodus may be oviform and may have a brush of setae.

Peraeon: First peraeonite well exposed, visible only above lateral midline or not visible. Peraeonite 2 may have ventrolateral expansion overriding peraeonite 1 and/or carapace, overriding peraeonite 3 or peraeonite 1 and/or carapace and peraeonite 3. Peraeonite 3 may have ventrolateral expansion extended forward overriding peraeonite 2, backwards overriding peraeonite 4 or forward and backwards overriding peraeonites 2 and 4. Peraeonite 4 may have ventrolateral expansion overriding peraeonite 5 or peraeonites 3 and 5.

Females and males with exopod fully developed on peraeopod 1 and reduced on peraeopods 2 and 3. Peraeopod 1 with basis arcuate or straight; may be slightly projected ventrally; carpus may be oviform; may have a brush (three or more) of long setae on the propodus (setae longer than carpus) or setae in a linear arrangement; carpus variable in length with respect to propodus. Peraeopod 2 without ischium; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Pleonite 5 longer, as long as or shorter than pleonite 6. Pleonite 6 with variable length with respect to width; shorter than peduncle of uropod. Pleonite 6 not extended past the insertion of the uropods or narrow portion of distal end slightly extended past the insertion of the uropods; ending somewhat concave or in a rounded apex. Anal plates may extend posteriorly beyond distal margin of pleonite six.

Uropod endopod bi-articulated; articles approximately same length or proximal article longer than distal one. Uropod exopod with proximal article same length, shorter or longer than distal one. Peduncle of uropods longer, as long as or slightly shorter than rami; rami approximately same length or exopod longer than endopod. Males with five pairs of pleopods. Pleopodal endopod with well developed or reduced process.

Species included:

1. *C. africanum* (Zimmer, 1920) (Synonymy: *Heterocuma africana* Zimmer, 1920)
– *C. africanum africanum* (Zimmer, 1920) (Synonymy: *Heterocuma africana* Zimmer, 1920; *H. africanum africanum* Day, 1975; Băcescu, 1988)
– *C. africana intermedia* (Fage, 1924) (Synonymy: *Heterocuma intermedia* Fage, 1924; *H. africana* Jones, 1956; *H. africanum intermedium* Day, 1975; Băcescu, 1988)
2. *C. andamani* (Kurian, 1954) (Synonymy: *Heterocuma andamani* Kurian, 1954)
3. *C. armata* (Kurian, 1954) (Synonymy: *Heterocuma armata* Kurian, 1954; *H. armatum* Băcescu, 1988)
4. *C. elongata* Jones, 1956
5. *C. fagei* Băcescu, 1956
6. *C. goodsir* (Van Beneden, 1861)
7. *C. jonesi* Le Loeuff & Intès, 1972
8. *C. longipes* (Dohrn, 1869)
9. *C. robusta* Day, 1975
10. *C. sarsi* (Miers, 1879) (Synonymy: *Heterocuma sarsi* Miers, 1879; Băcescu, 1988; *Heterocuma sarsi granulata* Miers, 1879; *H. granulatum* Stebbing, 1913; *H. sarsi costata* Lomakina, 1960)
11. *C. wafri* Jones, 1956
12. *Cumopsis* sp. Toulmond & Truchot, 1964

Distribution: Generally found at shallow waters between 0 and 50 m (up to 100 m) of the East Atlantic and West Pacific Oceans and Mediterranean Sea. Only *Cumopsis sarsi* from the West Pacific Ocean is found at greater depths (up to 200 m).

GAUSSICUMA ZIMMER, 1907

Type species: *Gaussicuma vanhoeffeni* Zimmer, 1907

Body: Carapace shorter than abdomen and similar in length or longer than peraeon; abdomen longer than carapace and peraeon together.

Cephalothorax: From dorsal view the carapace may appear laterally compressed anteriorly. Carapace with mid-dorsal ridge or mid-dorsal serration; may have dorso-lateral ridges. Pseudorostral lappets extend beyond frontal lobe and meet in midline or are widely separated. Antennal notch as a depression or as a subacute incision. Anterolateral corner with subacute or acute tooth. Frontal lobe from 1/3 to half the total carapace length; as wide as long; anteriorly linguiform or somewhat extended; without ocular pigment or eye lenses.

Antenna 1 with basal article of the peduncle arcuate or straight and of variable length with respect to the other two articles together. Main flagellum bi-articulated; with one or two aesthetascs in distal-most

article. Accessory flagellum uni- or bi-articulated. Antenna 2 in females with two articles.

Maxilliped 3 basis arcuate; may be extended dorso-distally over ischium beyond the articulation of the ischium and merus or not projected over ischium. Ischium as long as or shorter than merus. Merus without dorsal projection, extended dorso-distally over carpus or slightly expanded laterally. Carpus may be oviform; equal to or shorter than propodus and dactylus together. Propodus distally widened or not.

Peraeon: First peraeonite well exposed or visible only above lateral midline. Peraeonite 2 may have ventrolateral expansion overriding carapace and/or peraeonite 3, only overriding peraeonite 1 and/or carapace, only peraeonite 3 or not overriding other somites. Peraeonite 3 may have ventrolateral expansion extended backwards overriding peraeonite 4 or forward and backwards overriding peraeonites 2 and 4. Peraeonite 4 may have ventrolateral expansion overriding peraeonite 5 or peraeonites 3 and 5.

Females and males with fully developed exopods on peraeopods 1–3; males also have fully developed exopods on peraeopod 4. Peraeopod 1 with basis arcuate or straight; may have a row of setae. Carpus equal in length to propodus; dactylus with or without three terminal setae. Peraeopod 2 with ischium; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Pleonite 5 variable in length with respect to pleonite 6. Pleonite 6 longer than wide; longer than peduncle of uropod; may have many small setae on posterior edge of pleonite 6. Wide portion of posterior end of pleonite 6 strongly extended past the insertion of the uropods; ending in a point or a rounded apex.

Uropod endopod bi-articulated; proximal article longer than distal one. Uropod exopod with proximal article shorter than distal one. Peduncle of uropods variable in length with respect to rami; rami approximately same length or endopod longer. Males with five pairs of pleopods. Pleopodal endopod with well-developed process.

Species included:

1. *G. dufresnae* Watling & Gerken, 1999
2. *G. gloriosae* Ledoyer, 1988
3. *G. gurjanovae* Lomakina, 1952
4. *G. kermadecense* Jones, 1969
5. *G. scabrum* Jones, 1969
6. *G. vanhoeffeni* Zimmer, 1907

Distribution: Most frequently found in the Southern Ocean at depths ranging from 3400 to 4600 m. Also found in the Indian and South Pacific Oceans. *Gaussicuma gurjanovae* is found in relatively shallower waters (from 42 to 105 m) in the North-West Pacific Ocean. *Gaussicuma dufresnae* is found on the deep South Atlantic off the coast of Brazil.

GEPHYROCUMA HALE, 1936

Type species: Gephyrocuma pala Hale, 1936

Body: Carapace variable in length with respect to abdomen and longer than peraeon; abdomen shorter than carapace and peraeon together.

Cephalothorax: From dorsal view the carapace appears laterally compressed anteriorly. Pseudorostral lappets extend beyond frontal lobe and meet in midline. Antennal notch not distinct or as a depression. Anterolateral corner bluntly rounded. Frontal lobe 1/3–1/2 the total carapace length; as wide as long; somewhat extended; with ocular pigment and eye lenses.

Antenna 1, peduncle articles wide, basal article of the peduncle straight or arcuate; longer than the other two articles together. Main flagellum bi- or tri-articulated; with second article longer than third; with three aesthetascs in distal-most article. Accessory flagellum uni-articulated; may have a brush of setae.

Maxilliped 3 basis straight; ventrally projected over ischium (opercular). Ischium shorter than merus. Merus slightly expanded laterally. Carpus oviform; equal to or shorter than propodus and dactylus together. Propodus distally widened or oviform; with a brush of setae.

Peraeon: First peraeonite visible only above lateral midline. Peraeonite 2 with ventrolateral expansion overriding peraeonite 1 and/or carapace and peraeonite 3. Peraeonite 3 extended backwards overriding peraeonite 4. Peraeonite 4 with ventrolateral expansion overriding peraeonite 5.

Females and males with fully developed exopods on peraeopods 1 and 2 and reduced on peraeopods 3 and 4. Peraeopod 1, opercular; basis arcuate, with ventral opercular projection; basis and carpus expanded, ischium and merus rotated to parallel positions; ischium modified as a rounded lobe with exterior concavity; carpus oviform in shape, with row of setae; brush (three or more) of long setae on the propodus (setae longer than carpus); carpus equal to or shorter than propodus. Peraeopod 2 with ischium; dactylus longer than propodus. Peraeopod 3, merus enlarged (almost as large as basis). Peraeopod 4 with ischium.

Pleon: Pleonite 5 variable in length with respect to pleonite 6. Pleonite 6 longer than wide; longer than peduncle of uropod. Whole width of pleonite 6 well extended past the insertion of the uropods or only narrow portion of distal end of pleonite 6 extended past the insertion of the uropods; apex rounded.

Uropod endopod bi-articulated; proximal article longer than distal one. Uropod exopod with proximal article shorter than distal one. Rami longer than peduncle; rami approximately same length. Males with five pairs of pleopods.

Species included:

1. *G. pala* Hale, 1936
2. *G. repandum* Hale, 1944
3. *G. simile* Hale, 1949
4. *Gephyrocuma* sp. nov.1 Tafe & Greenwood, 1996

Distribution: Shallow waters (0–75 m) of the Australian coast.

GIGACUMA KURIAN, 1951

Type species: *Gigacuma halei* Kurian, 1951

Body: Carapace shorter than abdomen and peraeon; abdomen longer than carapace and peraeon together.

Cephalothorax: From dorsal view the carapace may be laterally compressed anteriorly. Pseudorostral lappets may extend beyond frontal lobe towards midline but do not meet (or partially meet leaving a suture between them). Antennal notch as a depression or as a subacute incision. Anterolateral corner bluntly rounded or with subacute tooth. Frontal lobe 1/5 or less of the carapace length; as wide as long; anteriorly linguiform; with ocular pigment and eye lenses.

Antenna 1 with basal article of the peduncle straight; same length or shorter than the other two articles together. Main flagellum bi-articulated; may have two aesthetascs in distal-most article and/or a group of aesthetascs on proximal article. Accessory flagellum bi-articulated; with brush of setae. Antenna 2 in males reaching end of pleon; with sensory setae on anterior margin of article 4. Antenna 2 in females with three articles.

Maxilliped 3 basis straight or arcuate; extended dorso-distally over ischium beyond the articulation of the ischium and merus. Ischium shorter or same size as merus. Merus expanded laterally. Carpus oviform; equal to or shorter than propodus and dactylus together. Propodus distally widened; with a brush of setae.

Peraeon: First peraeonite visible only above lateral midline. Peraeonite 2 may have ventrolateral expansion overriding peraeonite 1 and/or carapace or not overriding other somites. Peraeonite 3 extended backwards overriding peraeonite 4 or forward and backwards overriding peraeonites 2 and 4. Peraeonite 4 with ventrolateral expansion overriding peraeonite 5.

Females and males with fully developed exopods on peraeopods 1 and 2. Peraeopod 1 with basis arcuate, with row of setae, slightly projected ventrally; brush (3 or more) of long setae on the propodus (setae longer than carpus); carpus shorter than propodus. Peraeopod 2 with ischium; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Pleonite 6 longer than wide; longer than or as long as peduncle of uropod. Wide portion of distal end

of pleonite 6 slightly extended past the insertion of the uropods and apex rounded.

Uropod endopod bi-articulated; proximal article shorter than distal one. Uropod exopod with proximal article shorter than distal one. Peduncle of uropods slightly longer than rami; rami approximately same length. Males with five pairs of pleopods. Pleopodal endopod without process.

Species included:

1. *G. halei* Kurian, 1951

Distribution: Indo-West Pacific from 7 to 27 m.

GLYPHOCUMA HALE, 1944

Type species: *Glyphocuma bakeri* Hale, 1936

Body: Carapace shorter than abdomen and similar in length or longer than peraeon; abdomen longer than carapace and peraeon together.

Cephalothorax: From dorsal view the carapace appears laterally compressed anteriorly. Carapace with mid-dorsal ridge or mid-dorsal serration; may have dorso-lateral ridges. Pseudorostral lappets do not extend beyond the frontal lobe. Antennal notch as a depression or as a subacute incision. Anterolateral corner bluntly rounded or with subacute tooth. Frontal lobe from 1/4 to half of the total carapace length; longer than wide; anteriorly linguiform; with or without ocular pigment and eye lenses.

Antenna 1 with basal article of the peduncle geniculate or arcuate; shorter than the other two articles together. Main flagellum bi- or tri-articulated; with second article longer than third; may have two or three aesthetascs in distal-most article and/or a group of aesthetascs on proximal article. Accessory flagellum bi-articulated; may have a brush of setae. Antenna 2 in females with three articles.

Maxilliped 3 basis arcuate or straight; extended dorso-distally over ischium beyond the articulation of the ischium and merus. Ischium longer than or as long as merus. Carpus equal to or shorter than propodus and dactylus together. Propodus may be oviform; may have a brush of setae.

Peraeon: First peraeonite well exposed or visible only above lateral midline. Peraeonite 2 wide or proportional to other peraeonites; with ventrolateral expansion overriding peraeonite 1 and/or carapace or peraeonite 1 and/or carapace and peraeonite 3. Peraeonite 3 extended forward overriding peraeonite 2 or backwards overriding peraeonite 4. Peraeonite 4 with ventrolateral expansion overriding peraeonite 5 or overriding peraeonites 3 and 5.

Females and males with fully developed exopods on peraeopods 1–3. Males also have a fully developed or reduced exopod on peraeopod 4. Peraeopod 1 with

basis arcuate, with row of setae; may have a brush (three or more) of long setae on the propodus (setae longer than carpus) or setae in a linear arrangement; carpus equal to or shorter than propodus. Peraeopod 2 with or without ischium; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Pleonite 6 longer than wide; shorter than peduncle of uropod. Whole width of terminal end of pleonite 6 well extended past the insertion of the uropods; terminally concave (with two projections) or apex rounded. Anal plates may extend posteriorly beyond distal margin of pleonite 6.

Uropod endopod bi-articulated; articles variable in length with respect to each other. Uropod exopod with proximal article shorter than distal one. Peduncle of uropods longer or same size as rami; rami approximately same length or exopod longer than endopod. Males with five pairs of pleopods.

Species included:

1. *G. bakeri* (Hale, 1936)
2. *G. dentatum* Hale, 1944
3. *G. halei* Greenwood & Johnson, 1967
4. *G. inaequale* Hale, 1944
5. *G. oculodentata* Mühlenhardt-Siegel, 2003
6. *G. serventyi* Hale, 1944
7. *Glyphocuma* sp. Stephenson, Cook & Newlands, 1978

Distribution: From 0 to 100 m in the Southern Australian coasts.

HYPOCUMA JONES, 1973

Type species: *Hypocuma serratifrons* Jones, 1973

Body: Carapace shorter than abdomen and longer than peraeon; abdomen longer than carapace and peraeon together.

Cephalothorax: From dorsal view the carapace appears laterally compressed anteriorly. Carapace with mid-dorsal ridge or mid-dorsal serration. Pseudorostral lappets extend beyond frontal lobe and meet in midline. Antennal notch not distinct. Anterolateral corner bluntly rounded. Frontal lobe from 1/4 of carapace length; as wide as long or wider than long; not extended; without ocular pigment or eye lenses.

Antenna 1 with basal article of the peduncle arcuate or straight; longer than the other two articles together or as long as the other two articles together. Main flagellum uni-, bi- or tri-articulated; with second article longer than third; with two aesthetascs in distal-most article. Accessory flagellum uni- or bi-articulated. Antenna 2 in males with sensory setae on anterior margin of article four. Antenna 2 in females with five articles.

Maxilliped 3 basis geniculate or arcuate; not projected over ischium. Ischium shorter than merus. Merus extended dorso-distally over carpus. Carpus may be oviform; equal to or shorter than propodus and dactylus together. Propodus may be oviform.

Peraeon: First peraeonite well exposed. Peraeonite 2 narrow or proportional to other peraeonites; with ventrolateral expansion overriding peraeonite 1 and/or carapace or peraeonite 3. Peraeonite 3 extended forward overriding peraeonite 2 or backwards overriding peraeonite 4. Peraeonite 4 with ventrolateral expansion overriding peraeonite 3, peraeonite 5 or peraeonites 3 and 5.

Females and males with fully developed exopods on peraeopods 1–3. Females with reduced exopods on peraeopod 4, while males have them fully developed. Peraeopod 1 with basis arcuate; carpus same size as propodus. Peraeopod 2, ischium present; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Pleonite 6 longer than wide; shorter than peduncle of uropod. Wide portion of distal end of pleonite 6 strongly extended past the insertion of the uropods; apex rounded.

Uropod endopod bi-articulated; proximal article longer than distal one. Uropod exopod with proximal article shorter than distal one. Peduncle of uropods slightly longer than rami; exopod longer than endopod. Males with five pairs of pleopods. Pleopodal endopod with well developed process.

Species included:

1. *H. dentatum* Day, 1975
2. *H. serratifrons* Jones, 1973

Distribution: *Heterocuma dentatum* is found off the southern point of South Africa at 400 m, while *Heterocuma serratifrons* is found in the North Atlantic at depths between 1000 and 5000 m.

LEPTOCUMA SARS, 1873

Type species: *Leptocuma kinbergii* Sars, 1873

Body: Carapace shorter than abdomen and similar in length or shorter than peraeon; abdomen longer than carapace and peraeon together.

Cephalothorax: From dorsal view the carapace may be laterally compressed anteriorly. Carapace may have mid-dorsal ridge. Pseudorostral lappets may extend beyond frontal lobe and towards midline but do not meet (or partially meet leaving a suture between them) or are widely separated. Antennal notch as a depression or as a subacute incision. Anterolateral corner bluntly rounded or with subacute tooth. Frontal lobe from 1/5 to half of the total carapace length; as wide as long or longer than wide; anteriorly linguiform

or somewhat extended; may have ocular pigment and/or eye lenses.

Antenna 1 with basal article of the peduncle arcuate or straight; shorter than the other two articles together; males may have a group of aesthetascs on distal margin of peduncle. Main flagellum may have from two to five articles; with third variable in length with respect to second; may have two aesthetascs in distal-most article and/or two aesthetascs on proximal article. Accessory flagellum uni-articulated. Antenna 2 in males reaching almost the end of pleon. Antenna 2 in females with three articles.

Maxilliped 3 basis arcuate; not projected over ischium. Ischium shorter than merus. Merus extended dorso-distally over carpus, slightly expanded laterally or without dorsal projection. Carpus equal to or shorter than propodus and dactylus together. Propodus may have a brush of setae.

Peraeon: First peraeonite may be visible only above lateral midline. Peraeonite 2 with ventrolateral expansion overriding peraeonite 1 and/or carapace or peraeonite 1 and/or carapace and peraeonite 3. Peraeonite 3 without ventrolateral expansions, extended forward overriding peraeonite 2 or forward and backwards overriding peraeonites 2 and 4. Peraeonite 4 with ventrolateral expansion overriding peraeonite 5, peraeonite 3 or peraeonites 3 and 5.

Females and males with fully developed exopods on peraeopods 1–3 and reduced on peraeopod 4. Peraeopod 1 with basis of variable shape (from straight to geniculated); may have row of setae; inner apical angle absent or as a convex process; with or without a brush (three or more) of long setae on the propodus (setae longer than carpus); carpus equal to or shorter than propodus. Peraeopod 2 with ischium; dactylus variable in length with respect to propodus. Peraeopod 4 with ischium.

Pleon: Pleonite 6 longer than wide or as long as wide; as long as or shorter than peduncle of uropod. Pleonite 6 not produced between the bases of the uropods or whole width slightly or well extended past the insertion of the uropods or only portion, wide or narrow, of distal end of pleonite 6 extended; ending in a point or a rounded apex. Anal plates may extend posteriorly beyond distal margin of pleonite six and may bear setae on posterior margin.

Uropod endopod bi-articulated; two articles approximately same length or proximal article longer than distal one. Uropod exopod with proximal article shorter than distal one. Peduncle of uropods slightly longer than or as long as rami or peduncle slightly shorter than exopods of rami (equal length to endopod); rami approximately same length or endopod longer or shorter than exopod. Males with five pairs of pleopods.

Species included:

1. *L. barbarae* Tafe & Greenwood, 1996
2. *L. borzonei* Roccatagliata, 1997
3. *L. forsmanni* Zimmer, 1943
4. *L. intermedium* Hale, 1944
5. *L. kennedyi* Tafe & Greenwood, 1996
6. *L. kinbergii* Sars, 1873
7. *L. longidactylum* Mühlenhardt-Siegel, 2003
8. *L. nichollsi* Hale, 1949
9. *L. obstipum* Hale, 1944
10. *L. patagonicum* Roccatagliata, 1993
11. *L. pulleini* Hale, 1928
12. *L. serriferum* Hale, 1944
13. *L. sheardi* Hale, 1944
14. *L. vicarium* Hale, 1944
15. *Leptocuma* sp. Mühlenhardt-Siegel, 2003

Distribution: With the exception of *Leptocuma forsmanni*, which is present at 10 m off the coast of California in the North-Eastern Pacific Ocean, all species of *Leptocuma* are inhabitants of the Southern Hemisphere. They are found in the Australian and South American coasts between 0 and 190 m.

MANCOCUMA ZIMMER, 1943

Type species: *Mancocuma stelliferum* Zimmer, 1943

Body: Carapace shorter than abdomen and similar in length or shorter than peraeon; abdomen shorter than carapace and peraeon together.

Cephalothorax: In dorsal view the carapace may be laterally compressed anteriorly. Pseudorostral lappets extend beyond frontal lobe and meet in midline. Antennal notch not distinct or as a depression. Anterolateral corner bluntly rounded. Frontal lobe 1/4 to half the total carapace length; as wide as long or wider than long; anteriorly linguiform or not extended; may have ocular pigment and/or lenses.

Antenna 1 with basal article of the peduncle arcuate or straight; shorter than the other two articles together. Main flagellum bi- or tri-articulated; with second article longer than third; with zero, one or two aesthetascs in distal-most article; may have two aesthetascs on proximal article. Accessory flagellum uni-articulated; may have a brush of setae. Males with antenna 2 reaching only to end of peraeon; anterior margin with pad-like sensory setae; without sensory setae on anterior margin of article four. Antenna 2 in females with three articles.

Maxilliped 3 basis arcuate; extended dorso-distally over ischium beyond the articulation of the ischium and merus or slightly expanded dorso-distally. Ischium shorter than merus. Merus slightly expanded laterally. Carpus oviform and equal to or shorter than propodus and dactylus together. Propodus oviform or distally widened; with a brush of setae.

Peraeon: First peraeonite well exposed or visible only above lateral midline. Peraeonite 2 with ventrolateral expansion overriding peraeonite 1 and/or carapace and peraeonite 3. Peraeonite 3 extended backwards overriding peraeonite 4. Peraeonite 4 with ventrolateral expansion overriding peraeonite 5.

Females and males with fully developed exopods on peraeopods 1–3 and reduced on peraeopod 4. Peraeopod 1, opercular (with basis and carpus expanded, ischium and merus rotated to parallel positions); basis straight, with row of setae; carpus oviform in shape, with row of setae; brush of long setae (three or more) on propodus (setae longer than carpus) or setae in a linear arrangement along propodus; carpus longer than propodus. Peraeopod 2 with or without ischium; dactylus and propodus approximately same length. Peraeopod 3, propodus and dactylus small, not articulated at the distal end of the carpus but at its side wall. Peraeopod 4 with ischium.

Pleon: Pleonite 6 longer than wide or as long as wide; shorter than peduncle of uropod. Whole width of terminal end of pleonite 6 slightly extended between the bases of the uropods; ending in a point or a rounded apex.

Uropod endopod bi-articulated; proximal article longer than distal one. Uropod exopod with proximal article shorter than distal one. Peduncle of uropods slightly longer than rami or approximately as long as rami; rami approximately same length or endopod longer than exopod. Males with two pairs of pleopods. Pleopodal endopod without a process.

Species included:

1. *M. alterum* Zimmer, 1943
2. *M. stelliferum* Zimmer, 1943

Distribution: Inhabits brackish waters of the North-Western Atlantic Ocean up to 18 m depth.

POMACUMA HALE, 1944

Type species: *Pomacuma cognatum* Hale, 1944

Body: Carapace shorter than abdomen and similar in length or shorter than peraeon; abdomen approximately as long as or longer than carapace and peraeon together.

Cephalothorax: In dorsal view the carapace may be laterally compressed anteriorly. Carapace may have mid-dorsal ridge. Pseudorostral lappets extend beyond frontal lobe and meet in midline. Antennal notch as an acute incision. Anterolateral corner bluntly rounded. Frontal lobe from 1/3 to half the total carapace length; as wide as long; anteriorly linguiform; with ocular pigment and eye lenses.

Antenna 1 with basal article of the peduncle arcuate; as long as or shorter than the other two articles together. Main flagellum bi-articulated; with two,

three or more aesthetascs in distal-most article. Accessory flagellum uni-articulated. Males with antenna 2 reaching end of pleon.

Maxilliped 3 basis geniculate or arcuate; expanded (opercular); extended dorso-distally and/or ventral over ischium; beyond the articulation of the ischium and merus. Ischium shorter than merus. Merus slightly expanded laterally. Carpus proximally widened; equal to or shorter than propodus and dactylus together. Propodus distally widened or oviform; with a brush of setae.

Peraeon: First peraeonite visible only above lateral midline. Peraeonite 2 wide or proportional to other peraeonites; with ventrolateral expansion overriding peraeonite 1 and/or carapace. Peraeonite 3 extended forward and backwards overriding peraeonites 2 and 4. Peraeonite 4 with ventrolateral expansion overriding peraeonite 5.

Females and males with fully developed exopods on peraeopods 1–3 and reduced on peraeopod 4. Peraeopod 1, opercular (with basis-carpus expanded, ischium and merus rotated to parallel positions); basis arcuate, may have row of setae, with dorso-distal projection totally or partially covering the ischium; ischium modified as a rounded lobe with exterior concavity; carpus oviform in shape, with row of setae; brush (three or more) of long setae on the propodus (setae longer than carpus); carpus equal in length to propodus. Peraeopod 2 with ischium; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Pleonite 6 longer than wide; longer than or as long as peduncle of uropod. Whole width of pleonite 6 well extended past the insertion of the uropods; ending in a point or a rounded apex. Alternatively, a wide portion of the distal end of pleonite 6 well extended past the insertion of the uropods, apex rounded.

Uropod endopod bi-articulated; proximal article longer than distal one. Uropod exopod with proximal article shorter than distal one. Rami longer than peduncle; rami approximately same length. Males with five pairs of pleopods.

Species included:

1. *P. australiae* (Zimmer, 1921b)
2. *P. cognatum* Hale, 1944
3. *Pomacuma* sp. nov. 1 Tafe & Greenwood, 1996

Distribution: Coasts of Australia and New Zealand from 0 to 75 m.

PSEUDOLEPTOCUMA WATLING, 1977

Type species: *Pseudoleptocuma minus* (Calman, 1912)

Body: Carapace shorter than abdomen and similar in length or shorter than peraeon; abdomen longer than carapace and peraeon together.

Cephalothorax: From dorsal view the carapace appears laterally compressed anteriorly. Pseudorostral lappets extend beyond frontal lobe and meet in midline. Antennal notch as a depression or as a subacute incision. Anterolateral corner with subacute tooth. Frontal lobe from 1/3 to half of carapace length; longer than wide; somewhat extended; may have ocular pigment.

Antenna 1 with main flagellum bi-articulated. Accessory flagellum uni-articulated. Males with antenna 2 reaching end of pleon. Antenna 2 in females with three articles.

Maxilliped 3 basis arcuate; slightly expanded laterally over ischium. Ischium shorter than merus. Merus slightly expanded laterally. Carpus oviform; equal to or shorter than propodus and dactylus together. Propodus distally widened or oviform; with a brush of setae.

Peraeon: First peraeonite visible only above lateral midline. Peraeonite 2 with ventrolateral expansion overriding peraeonite 1 and/or carapace or peraeonite 1 and/or carapace and peraeonite 3. Peraeonite 3 extended backwards overriding peraeonite 4 or forward and backwards overriding peraeonites 2 and 4. Peraeonite 4 with ventrolateral expansion overriding peraeonite 5 or peraeonites 3 and 5.

Females and males with fully developed exopods on peraeopods 1–3. Females with reduced and males with fully developed exopods on peraeopod 4. Peraeopod 1 with basis arcuate, with row of setae; may have row of setae on the carpus; brush (three or more) of long setae on the propodus (setae longer than carpus) or setae in a linear arrangement; carpus equal in length to propodus. Peraeopod 2 with ischium; dactylus and propodus approximately same length. Peraeopod 4 with ischium.

Pleon: Pleonite 6 longer than wide; shorter than peduncle of uropod. Whole width of terminal end of pleonite 6 slightly extended between the bases of the uropods; apex rounded.

Uropod endopod bi-articulated; proximal article longer than distal one. Uropod exopod with proximal article shorter than distal one. Peduncle of uropods slightly longer than rami; rami approximately same length or exopod longer than endopod. Males with three pairs of pleopods. Pleopodal endopod with well-developed process.

Species included:

1. *P. minus* (Calman, 1912)

Distribution: North-Western Atlantic Ocean from 15 to 24 m.

PSEUDOSYMPDOMMA KURIAN, 1954

Type species: *Pseudosympdomma indicum* Kurian, 1954

Body: Carapace shorter than abdomen and similar in length or shorter than peraeon; abdomen longer than carapace and peraeon together.

Cephalothorax: In dorsal view the carapace appears not to be laterally compressed. Carapace with mid-dorsal ridge or mid-dorsal serration and may have anterior transverse ridge. Pseudorostral lappets do not extend beyond the frontal lobe. Antennal notch as a depression or as a subacute incision. Anterolateral corner with subacute tooth. Frontal lobe 1/3 to half of carapace length; anteriorly linguiform; with ocular pigment and eye lenses.

Antenna 1 with basal article of the peduncle arcuate or straight; as long as or shorter than the other two articles together. Main flagellum bi- or tri-articulated; with second and third article approximately same length or with second article longer than third; with two aesthetascs in distal-most article. Accessory flagellum uni- or bi-articulated; may have brush of setae. Males with antenna 2 reaching end of pleon. Antenna 2 in females with three articles.

Maxilliped 3 basis arcuate or straight; extended dorso-distally over ischium beyond the articulation of the ischium and merus. Ischium longer than or as long as merus. Merus expanded laterally. Carpus distally widened or oviform; equal to or shorter than propodus and dactylus together. Propodus may be distally widened; with a brush of setae.

Peraeon: First peraeonite well exposed or visible only above lateral midline. Peraeonite 2 may have ventrolateral expansion not overriding other somites or overriding peraeonite 1 and/or carapace. Peraeonite 3 may have ventrolateral expansion extended backwards overriding peraeonite 4 or forward and backwards overriding peraeonites 2 and 4. Peraeonite 4 with ventrolateral expansion overriding peraeonite 5 or peraeonites 3 and 5.

Females and males with fully developed exopods on peraeopods 1 and 2. Peraeopod 1 with basis arcuate or straight, may have row of setae; with or without setae in a linear arrangement along propodus; carpus shorter than propodus. Peraeopod 2 with ischium; dactylus and propodus approximately same length or dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Pleonite 6 longer than wide; as long as or shorter than peduncle of uropod. Wide portion of distal end of pleonite 6 well extended past the insertion of the uropods; ending in a point or in a rounded apex. Anal plates may project posteriorly beyond distal margin of pleonite 6 and may bear setae on posterior margin.

Uropod endopod bi-articulated; two articles approximately same length or proximal article longer than distal one. Uropod exopod with proximal article shorter than distal one. Peduncle of uropods longer

than or as long as rami; rami approximately same length or exopod longer than endopod. Males with five pairs of pleopods. Pleopodal endopod with well developed process.

Species included:

1. *P. africanum* (Stebbing, 1912)
2. *P. carinatum* Corbera & Martín, 2002
3. *P. hoinicae* Petrescu, 1998
4. *P. indicum* Kurian, 1954
5. *Pseudosymphodomma* sp. Mühlenhardt-Siegel, 1996a

Distribution: *Pseudosymphodomma africanum* is found off the coast of South Africa from 85 to 370 m. *Pseudosymphodomma hoinicae* is found in the West Pacific Ocean (coast of Tanzania) and *P. indicum* in shallow waters (0–4 m) of the Indo-West Pacific.

SPELEOCUMA CORBERA, 2002

Type species: *Speleocuma guanche* Corbera, 2002

Body: Carapace shorter than abdomen and peraeon; abdomen approximately as long as or longer than carapace and peraeon together.

Cephalothorax: In dorsal view the carapace appears laterally compressed anteriorly. Carapace with mid-dorsal serration. Pseudorostral lappets may extend beyond frontal lobe and meet in the midline. Antennal notch as a depression. Anterolateral corner bluntly rounded or with subacute tooth. Frontal lobe 1/3 of the total carapace length; anteriorly linguiform; with ocular pigment and with eye lenses.

Antenna 1 with basal article of the peduncle arcuate; shorter than the other two articles together. Main flagellum bi-articulated; with one or two aesthetascs in distal-most article. Accessory flagellum uni-articulated. Males with antenna 2 not reaching the end of the peraeon.

Maxilliped 3 basis arcuate; not projected over ischium. Ischium shorter than merus. Merus slightly expanded laterally. Carpus oviform; equal to or shorter than propodus and dactylus together.

Peraeon: Peraeonite 2 with ventrolateral expansion overriding peraeonite 1 and/or carapace or peraeonite 1 and/or carapace and peraeonite 3. Peraeonite 3 extended forward overriding peraeonite 2 or backwards overriding peraeonite 4. Peraeonite 4 with ventrolateral expansion overriding peraeonite 5.

Females and males with fully developed exopods on peraeopods 1–3. Peraeopod 1 with basis arcuate. Peraeopod 2 with ischium; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Pleonite 6 longer than wide; shorter than peduncle of uropod. Wide portion of the distal end of

pleonite 6 slightly extended past the insertion of the uropods; apex rounded. Anal plates extend posteriorly beyond distal margin of pleonite 6 and bear setae on posterior margin.

Uropod endopod bi-articulated; proximal article longer than distal one. Uropod exopod with proximal article shorter than distal one. Peduncle approximately as long as rami; endopod longer than exopod. Males with two pairs of pleopods. Pleopodal endopod without process.

Species included:

1. *S. guanche* Corbera, 2002

Distribution: Inhabit caves in the Canary Islands from 3 to 7 m.

SPILOCUMA WATLING, 1977

Type species: *Spilocuma salomani* Watling, 1977

Body: Carapace shorter than abdomen and similar in length to peraeon; abdomen shorter or same size as carapace and peraeon together.

Cephalothorax: From dorsal view the carapace appears laterally compressed anteriorly. Pseudorostral lappets extend beyond frontal lobe and meet in midline. Antennal notch as a subacute or acute incision. Anterolateral corner with acute tooth. Frontal lobe from 1/5 or less to 1/4 of the carapace length; as wide as long; somewhat extended; with ocular pigment and with eye lenses.

Antenna 1 with basal article of the peduncle straight; shorter than the other two articles together. Main flagellum bi-articulated; with two aesthetascs in distal-most article; may have two aesthetascs on proximal article. Accessory flagellum uni-articulated; may have a brush of setae. Males with antenna 2 not reaching the end of the peraeon; anterior margin with pad-like sensory setae; without sensory setae on anterior margin of article four. Antenna 2 in females with four articles.

Maxilliped 3 basis arcuate; not projected over ischium. Ischium shorter than merus. Merus extended dorso-distally over carpus or merus slightly expanded laterally. Carpus equal to or shorter than propodus and dactylus together.

Peraeon: Peraeonite 2 narrow; with ventrolateral expansion; overriding peraeonite 3 or overriding peraeonite 1 and peraeonite 3. Peraeonite 3 may have ventrolateral expansion extended backwards overriding peraeonite 4. Peraeonite 4 may have ventrolateral expansion overriding peraeonite 5.

Females and males with fully developed exopods on peraeopods 1–3 and reduced on peraeopod 4. Peraeopod 1 with basis arcuate, with row of setae; may have

row of setae on the carpus; carpus longer than propodus. Peraeopod 2 with ischium; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Pleonite 6 shorter than peduncle of uropods. Pleonite 6 slightly extended past the insertion of the uropods.

Uropod endopod bi-articulated; proximal article longer than distal one. Uropod exopod with proximal article shorter than distal one. Peduncle of uropods slightly longer than rami; rami approximately same length. Males without pleopods.

Species included:

1. *S. salomani* Watling, 1977
2. *S. watlingi* Omholt & Heard, 1979

Distribution: Inhabit brackish waters of the Gulf of Mexico, USA, from 0 to 3.6 m.

SYMPODOMMA STEBBING, 1912

Type species: *Sympodomma diomedae* (Calman, 1912)

Body: Carapace shorter than abdomen and variable in length with respect to peraeon; abdomen longer than carapace and peraeon together.

Cephalothorax: From dorsal view the carapace appears laterally compressed anteriorly or posteriorly. Carapace with mid-dorsal ridge or mid-dorsal serration and with lateral ridges; may have dorso-lateral, anterior transverse and/or posterior transverse ridges. Pseudorostral lappets do not extend beyond the frontal lobe or slightly extend but do not meet. Antennal notch not distinct, as a depression or as a subacute incision. Anterolateral corner bluntly rounded or with subacute or acute tooth. Frontal lobe from 1/3 to 1/2 of the total carapace length; longer than wide; anteriorly linguiform; with ocular pigment and with eye lenses.

Antenna 1 with basal article of the peduncle geniculate or straight; as long as or shorter than the other two articles together. Main flagellum bi- or tri-articulated; with second article longer than third; with two aesthetascs in distal-most article; males may have a group of aesthetascs on proximal article. Accessory flagellum uni- or bi-articulated; males may have a brush of setae; with or without aesthetasc. Males with antenna 2 reaching end of pleon.

Maxilliped 3 basis arcuate or straight; extended dorso-distally over ischium beyond the articulation of the ischium and merus. Ischium as long as or longer than merus. Merus extended dorso-distally over carpus or expanded laterally. Carpus distally widened or oviform; equal to or shorter than propodus and dactylus together. Propodus may be distally widened; with a brush of setae.

Peraeon: First peraeonite well exposed, visible only above lateral midline or not visible. Peraeonite 2 may have ventrolateral expansion overriding peraeonite 1 and/or carapace, peraeonite 3 or peraeonite 1 and/or carapace and peraeonite 3. Peraeonite 3 may have ventrolateral expansion extended backwards overriding peraeonite 4 or forward and backwards overriding peraeonites 2 and 4. Peraeonite 4 may have ventrolateral expansion overriding peraeonite 5 or peraeonites 3 and 5.

Females and males with fully developed exopods on peraeopods 1–3. Peraeopod 1 with basis arcuate or straight, may have row of setae; with or without setae in a linear arrangement along propodus; carpus shorter than propodus. Peraeopod 2 with ischium; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Pleonite 6 longer than wide; longer than or as long as peduncle of uropod; may have many small setae on posterior edge of pleonite 6. Whole width of distal end of pleonite 6 slightly or well extended past the insertion of the uropods; ending in a point or a line. Alternatively, wide portion of distal end of pleonite 6 extended between bases of uropods; ending in a line or in a rounded apex. Anal plates may extend posteriorly beyond distal margin of pleonite 6 and may bear setae on posterior margin.

Uropod endopod bi-articulated; relative length of articles variable. Uropod exopod with proximal article shorter than distal one. Peduncle of uropods longer than or as long as rami; rami approximately same length or endopod shorter or longer than exopod. Males with five pairs of pleopods. Pleopodal endopod with well developed process.

Species included:

1. *S. anomalum* (Sars, 1871)
2. *S. australiense* Foxon, 1932
3. *S. diomedae* (Calman, 1912)
4. *S. hatagumoanum* Gamô, 1969
5. *S. incertum* Hale, 1949
6. *S. vitreum* Lomakina, 1967
7. *S. weberi* (Calman, 1905)
8. *S. whitleyi* Hale, 1949

Distribution: West Indian Ocean, Indo-West and West Pacific, Australian coasts and South Pacific, from 11 to 1158 m.

VAUNTHOMPSONIA BATE, 1858

Type species: *Vaunthompsonia cristata* Bate, 1858

Body: Carapace shorter than abdomen and similar in length or shorter than peraeon; abdomen longer than carapace and peraeon together.

Cephalothorax: In dorsal view the carapace appears laterally compressed anteriorly. Carapace with mid-

dorsal ridge or mid-dorsal serration; may have dorso-lateral and/or lateral ridges. Pseudorostral lappets may extend beyond frontal lobe and meet in midline, extend towards midline but not meet (or partially meet leaving a suture between them), be widely separated or not extended beyond the frontal lobe. Antennal notch not distinct, as a depression or as a subacute incision. Anterolateral corner bluntly rounded, as subacute or acute tooth. Branchial siphons extend just beyond pseudorostrum or are long, extending much beyond pseudorostrum. Frontal lobe from 1/4 to half of the total carapace length; as wide as long; anteriorly linguiform or somewhat extended; with ocular pigment and with eye lenses.

Antenna 1 with basal article of the peduncle arcuate or straight; as long as or shorter than the other two articles together. Main flagellum may be uni-, bi-articulated or tri-articulated; with second article longer than third; with one or two aesthetascs in distal-most article. Accessory flagellum uni-articulated; may have a brush of setae. Males with antenna 2 reaching only to end of peraeon; with sensory setae on anterior margin of article 4. Antenna 2 in females with two or three articles.

Maxilliped 3 basis arcuate or straight; not projected or projected dorsally over ischium and slightly expanded. Ischium shorter than merus. Merus without dorsal projection, extended dorso-distally over carpus or slightly expanded laterally. Carpus oviform, may be distally widened; equal to or shorter than propodus and dactylus together.

Peraeon: First peraeonite may be well exposed, visible only above lateral midline or not visible. Peraeonite 2 wide or proportional to other peraeonites; may have ventrolateral expansion overriding peraeonite 1 and/or carapace or peraeonite 1 and/or carapace and peraeonite 3. Peraeonite 3 may have ventrolateral expansion extended forward overriding peraeonite 2, backwards overriding peraeonite 4 or forward and backwards overriding peraeonites 2 and 4. Peraeonite 4 with ventrolateral expansion overriding peraeonite 5 or peraeonites 3 and 5.

Females with fully developed exopods on peraeopods 1–3 and males on peraeopods 1–4. Peraeopod 1 with basis arcuate or straight, may have row of setae; carpus longer than, equal to or shorter than propodus; dactylus with or without three terminal setae. Peraeopod 2 generally without ischium (except *V. inermis*); dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Pleonite 6 longer than wide; longer, as long as or shorter than peduncle of uropod; may have two or many setae on posterior edge of pleonite 6. Whole width of terminal end of pleonite 6 slightly or well extended past the insertion of the uropods; ending in a

point or a rounded apex. Alternatively, wide portion of distal end of pleonite 6 extended between bases of uropods; ending in a point, a line or a rounded apex. Anal plates may extend posteriorly beyond distal margin of pleonite 6 and bear setae on posterior margin.

Uropod endopod bi-articulated; proximal article longer than distal one. Uropod exopod with proximal article shorter or longer than distal one. Peduncle of uropods variable in length with respect to rami; endopod longer or shorter than exopod. Males with five pairs of pleopods. Pleopodal endopod with well-developed or reduced process.

Species included:

1. *V. arabica* Calman, 1907a
- *V. arabica arabica* Calman, 1907a
- *V. arabica nana* Hale, 1944
2. *V. cristata* Bate, 1858 (*V. cf. cristata* Mühlenhardt-Siegel, 2003; *V. cf. cristata* Petrescu, 2002, 2003, 2004).
3. *V. dawydoffi* Zimmer, 1952
4. *V. floridana* Băcescu, 1971
5. *V. inermis* Zimmer, 1909
6. *V. laevifrons* Gamô, 1987
7. *V. media* Zimmer, 1952
8. *V. meridionalis* Sars, 1887
9. *V. natalensis* Day, 1975
10. *V. pacifica* Zimmer, 1943
11. *V. serratifrons* Gamô, 1964a
12. *Vaunthompsonia* sp. Belyaev, 1966
13. *Vaunthompsonia* sp. Day, 1975
14. *Vaunthompsonia* sp. Mühlenhardt-Siegel, 1996b

Distribution: Generally found in shallow waters (and up to 280 m) in the Mediterranean and Red Seas, Indo-West and North Pacific, North-west tropical Atlantic (Caribbean Sea), Indian and Southern Oceans.

ZENOCUMA HALE, 1944

Type species: *Zenocuma rugosum* Hale, 1944

Body: Carapace shorter than abdomen and similar in length to peraeon; abdomen approximately as long as carapace and peraeon together.

Cephalothorax: From dorsal view the carapace appears not to be laterally compressed. Carapace with mid-dorsal ridge and with anterior transverse ridge. Pseudorostral lappets extend beyond frontal lobe and towards midline but do not meet (or partially meet leaving a suture between them). Antennal notch as an acute incision. Anterolateral corner bluntly rounded. Frontal lobe half of carapace length; as wide as long; anteriorly linguiform; with ocular pigment and eye lenses.

Antenna 1 with basal article of the peduncle arcuate; as long as the other two articles together. Main

flagellum bi-articulated. Accessory flagellum uni-articulated; with brush of setae.

Maxilliped 3 basis arcuate; expanded (opercular); ventrally projected over ischium. Ischium shorter than merus. Carpus proximally widened; equal to or shorter than propodus and dactylus together. Propodus distally widened or oviform; with a brush of setae.

Peraeon: First peraeonite visible only above lateral midline. Peraeonite 2 with ventrolateral expansion; overriding peraeonite 1 and/or carapace and peraeonite 3. Peraeonite 3 extended backwards overriding peraeonite 4. Peraeonite 4 with ventrolateral expansion overriding peraeonite 5.

Females with fully developed exopods on peraeopods 1–3 and reduced on peraeopod 4. Peraeopod 1, opercular (with basis-carpus expanded, ischium and merus rotated to parallel positions); basis arcuate; ischium modified as a rounded lobe with exterior concavity;

carpus oviform in shape with row of setae; brush (three or more) of long setae on the propodus (setae longer than carpus); carpus shorter than propodus. Peraeopod 2 with ischium; dactylus longer than propodus. Peraeopod 4 with ischium.

Pleon: Pleonite 6 as long as wide; shorter than peduncle of uropod. Pleonite 6 not extended past the insertion of the uropods. Anal plates extend posteriorly beyond distal margin of pleonite 6.

Uropod endopod bi-articulated; proximal article longer than distal one. Uropod exopod with proximal article shorter than distal one. Peduncle shorter than rami; endopod longer than exopod.

Species included:

1. *Z. rugosum* Hale, 1944

Distribution: South-East Australia from 30 to 75 m.

TAXONOMIC KEYS

KEY TO THE SUBFAMILIES OF BODOTRIIDAE

- 1a. Exopods present only on first peraeopod Bodotriinae
- 1b. Exopods present beyond first peraeopod..... Vaunthompsoniinae

KEY TO GENERA IN THE SUBFAMILY BODOTRIINAE

- 1a. Branchial siphons long (Appendix 2, character 17) 2
- 1b. Branchial siphons short (Appendix 2, character 17)..... 3
- 2a. Eye lenses present (Appendix 2, character 22) *Zygosiphon*
- 2b. Eye lenses absent (Appendix 2, character 22)..... *Cyclaspoides*
- 3a. Males with pleopods on pleonite 5 (Appendix 2, character 108)..... 4
- 3b. Males without pleopods on pleonite 5 (Appendix 2, character 108) 8
- 4a. Uropodal endopod uni-articulated (Appendix 2, character 97) 9
- 4b. Uropodal endopod bi-articulated (Appendix 2, character 97)..... 5
- 5a. Proximal article of peduncle of antenna 1 same length or longer than following two articles together (Appendix 2, character 24) 6
- 5b. Proximal article of peduncle of antenna 1 shorter than following two articles together (Appendix 2, character 24) 7
- 6a. Carapace with lateral ridges (sometimes only ovigerous females) (Appendix 2, character 8) or peraeopod 2 without distinct ischium (Appendix 2, character 72) *Bodotria* (*Atlantobodotria*)
- 6b. Carapace without lateral ridges (Appendix 2, character 8) and peraeopod 2 with ischium (Appendix 2, character 72) *Alticuma*
- 7a. Peraeonite 1 not visible (Appendix 2, character 49) and ventrolateral expansion of peraeonite 2 does not override the carapace (Appendix 2, character 52) *Upselaspis*
- 7b. Peraeonite 1 usually visible (Appendix 2, character 49) and ventrolateral expansion of peraeonite 2 overrides carapace and/or peraeonite 1 (Appendix 2, character 52)..... *Iphinoo*
- 8a. Pseudorostrum projected beyond frontal lobe (Appendix 2, character 13)..... *Austrocuma*
- 8b. Pseudorostrum not projected beyond frontal lobe (Appendix 2, character 13) *Coricum*
- 9a. Peduncle of uropods longer, equal or slightly shorter than rami (Appendix 2, character 100) 10
- 9b. Peduncle of uropods much shorter than rami (Appendix 2, character 100)..... *Eocuma*
- 10a. Mandible without pars incisiva and lacinia mobilis *Bacescuma*
- 10b. Mandible with pars incisiva and lacinia mobilis 11
- 11a. Peraeopod 2, with ischium (Appendix 2, character 72)..... 13
- 11b. Peraeopod 2, without ischium (Appendix 2, character 72) 12

- 12a. Proximal article of peduncle of antenna 1 same length or longer than other two articles together (Appendix 2, character 24) *Bodotria* (*Bodotria*)
 12b. Proximal article of peduncle of antenna 1 shorter than other two articles together (Appendix 2, character 24) ... 7
 13a. Carapace with strongly marked lateral ridges (Appendix 2, character 9) or expansion of the merus of maxilliped 3 not reaching propodus-carpus joint..... *Bodotria* (*Bodotria*)
 13b. Carapace without strongly marked lateral ridges (Appendix 2, character 9) or expansion of the merus of maxilliped 3 reaching the propodus-carpus joint *Cyclaspis*

KEY TO GENERA IN THE SUBFAMILY VAUNTHOMPSONIINAE

- 1a. Male, antenna 2 modified (Appendix 2, character 35) with pad-like sensory setae 2
 1b. Male, antenna 2 not modified (Appendix 2, character 35) 3
 2a. Maxilliped 3 with basis projected over ischium (Appendix 2, character 41) *Mancocuma*
 2b. Maxilliped 3 with basis not projected over ischium (Appendix 2, character 41) *Spilocuma*
 3a. Maxilliped 3 with brush of setae on propodus (Appendix 2, character 47) 4
 3b. Maxilliped 3 without brush of setae on propodus (Appendix 2, character 47) 13
 4a. Peraeopod 2 with exopod reduced (Appendix 2, characters 70–71) *Cumopsis*
 4b. Peraeopod 2 with exopod fully developed (Appendix 2, characters 70–71) 5
 5a. Female, peraeopod 4 with exopod reduced (Appendix 2, characters 79–80) 6
 5b. Female, peraeopod 4 without exopod (Appendix 2, characters 79–80) 10
 6a. Peraeopod 1 nonopercular (Appendix 2, character 56) 7
 6b. Peraeopod 1 opercular (Appendix 2, character 56) 8
 7a. Male with pleopods on pleonite 5 (Appendix 2, character 108) *Leptocuma*
 7b. Male without pleopods on pleonite 5 (Appendix 2, character 108) *Pseudoleptocuma*
 8a. Peraeopod 3, exopod fully developed (Appendix 2, characters 74–75) 9
 8b. Peraeopod 3, exopod reduced (Appendix 2, characters 74–75) *Gephyrocuma*
 9a. Pleonite 6 as long as wide (Appendix 2, character 85) and not produced between the bases of the uropods (Appendix 2, character 89) *Zenocuma*
 9b. Pleonite 6 longer than wide (Appendix 2, character 85) and produced between the bases of the uropods (Appendix 2, character 89) *Pomacuma*
 10a. Peraeopod 3 without exopod (Appendix 2, characters 74–75) 11
 10b. Peraeopod 3 with exopod (Appendix 2, characters 74–75) 12
 11a. Uropodal endopod with proximal article equal to or longer than distal one (Appendix 2, character 98)
 *Pseudosymphodomma*
 11b. Uropodal endopod with proximal article shorter than distal one (Appendix 2, character 98) *Gigacuma*
 12a. Pleonite 6 equal or longer than peduncle of uropods (Appendix 2, character 86) *Symphodomma*
 12b. Pleonite 6 shorter than peduncle of uropods (Appendix 2, character 86) *Glyphocuma*
 13a. With ocular pigment (Appendix 2, character 21) and eye lenses (Appendix 2, character 22) 14
 13b. Without ocular pigment (Appendix 2, character 21) and eye lenses (Appendix 2, character 22) 15
 14a. Males with five pairs of pleopods (Appendix 2, characters 105–108) *Vaunthompsonia*
 14b. Males with two pairs of pleopods (Appendix 2, characters 105–108) *Speleocuma*
 15a. Uropodal endopod with one article (Appendix 2, character 97) *Apocuma*
 15b. Uropodal Endopod with two articles (Appendix 2, character 97) 16
 16a. Female, peraeopod 4 with exopod reduced (Appendix 2, character 79) *Hypocuma*
 16b. Female, peraeopod 4 without exopod (Appendix 2, character 79) 17
 17a. Frontal lobe as wide as long (Appendix 2, character 19) *Gaussicum*
 17b. Frontal lobe longer than wide (Appendix 2, character 19) *Bathycuma*

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APPENDIX 1

CHARACTERS AND CHARACTER STATES

Character number is followed by (U) or (O), indicating if the character was treated as unordered or ordered, and then by the character name and states. The notes section contains further information about characters and may include information of taxa that bear a particular state. Drawings of each character state are in Appendix 2.

1. (U) Carapace versus pleon length. States: (1) equal, (2) shorter, (3) longer.

Notes: State 2 is the most common among genera of the Bodotriidae. They usually have a comma shape with a long pleon and a smaller carapace. Only *Gephyrocuma* shows all three states.

2. (U) Carapace and peraeon versus pleon length. States: (1) equal, (2) shorter, (3) longer.

Notes: All states are common. There is great variability both among and many times within genera with respect to length of carapace-peraeon versus pleon.

3. (U) Carapace versus peraeon length. States: (1) equal, (2) shorter, (3) longer.

Notes: All states are common and the character is quite polymorphic even within genera.

4. (U) Carapace viewed from dorsal. States: (1) laterally compressed anteriorly, (2) laterally compressed posteriorly, (3) laterally compressed in the medial portion, (4) not compressed.

Notes: Most genera display states 1, 4 or both, i.e. the carapace is usually laterally compressed anteriorly or not compressed. State 3 is only present in *Cyclaspis* (all states present in this genus) and on *Zygosiphon* (that only displays state 3). State 2 is not as common as 1 and 4 but present in a few genera that are polymorphic and is never the only state for a genus.

5. (U) When carapace is laterally compressed anteriorly. States: (1) oviform posteriorly, (2) not oviform.

Notes: This character is inapplicable for taxa coded for states 2, 3 and 4 of character 4. All genera that have state 1 for character 4, have state 2 for this character. *Eocuma*, *Cyclaspoides* and *Cyclaspis* also display state 1.

6. (U) Carapace shape in dorsal view. States: (1) longer than wide, (2) wider than long, (3) as wide as long.

Notes: Most bodotriids have a carapace that is longer than wide (state 1). *Austrocuma* is polymorphic for this character and shows all three states.

7. (U) Median dorsal ridge on carapace. States: (1) present, (2) absent, (3) as a dorsal serration.

Notes: Highly variable character both among and within genera of the Bodotriidae.

8. (U) Dorso-lateral ridges on carapace. States: (1) present, (2) absent.

Notes: Most genera display state 2 (dorso-lateral ridges absent). Many taxa also show state 1 and *Apocuma* is the only genus that only shows state 1.

9. (U) Lateral ridges on carapace. States: (1) present, (2) absent.

Notes: Most genera have state 2 (lateral ridges absent) either alone or also with 1. *Apocuma*, *Bacescuma* and *Sympodomma* only display state 1.

10. (U) Anterior transverse ridge on carapace. States: (1) present, (2) absent.

Notes: Most genera have state 2 (anterior transverse ridge absent) either alone or with state 1. *Zenocuma* only displays state 1.

11. (U) Posterior transverse ridge on carapace. States: (1) present, (2) absent.

Notes: Most members of the Bodotriidae do not have a posterior transverse ridge on carapace (state 2). There are a few polymorphic genera that display both states 1 and 2 (*Apocuma*, *Cyclaspis*, *Iphinoe*, *Bathycuma* and *Sympodomma*).

12. (U) Lateral horns on carapace. States: (1) present, (2) absent.

Notes: Most genera only have state 2 (absence of lateral horns). *Eocuma* is the exception and displays both states.

13. (U) Pseudorostral lappets. States: (1) extend beyond frontal lobe, (2) do not extend beyond the frontal lobe.

Notes: Most genera have state 1 (pseudorostral lappets extend beyond frontal lobe) either alone or in combination with 2. Some genera only have state 2 (*Coricuma*, *Glyphocuma* and *Pseudosympodomma*).

14. (U) When pseudorostral lobes extend beyond frontal lobe they. States: (1) meet in midline, (2) extend towards midline but do not meet (or partially meet leaving suture between them), (3) widely separated.

Notes: This character is inapplicable for taxa that only have state 2 for character 13. The most common state in the genera of the Bodotriidae is that the pseudorostral lobes extend beyond the eyelobe and meet in midline (state 1). Many genera are polymorphic for this character showing all three states. In *Bacescuma*, *Gigacuma*, *Sympodomma* and *Zenocuma* the only state present is 2.

15. (U) Antennal notch. States: (1) not distinct, (2) depression, (3) subacute incision, (4) acute incision.

Notes: This is an extremely variable character both within and among genera. The most common state is 2 (antennal notch as a depression), but within a genus it is generally present together with other states. *Hypocuma* is characterized by only showing state 1 (antennal notch not distinct). *Mossambicum* and *Speleocuma* only show state 2 and *Coricuma* state 3 (antennal notch as a subacute incision). *Pomacuma* and *Zenocuma* only display state 4 (antennal notch as an acute incision). All other taxa are polymorphic for this character.

16. (U) Anterolateral corner of carapace. States: (1) bluntly rounded (poorly defined, obtuse angle greater than 90 degrees), (2) subacute tooth, (3) acute tooth.

Notes: This character is very variable. Most genera show state 1 (anterolateral corner bluntly rounded) in combination with states 2 and/or 3. *Coricuma*, *Pseudo-leptocuma* and *Pseudosympodomma* only show state 2 (anterolateral corner with subacute tooth), and *Spilocuma* only has state 3 (anterolateral corner with acute tooth).

17. (U) Branchial siphons. States: (1) extend just beyond pseudorostrum, (2) long, extending much beyond pseudorostrum.

Notes: In most genera the branchial siphons only extend beyond the pseudorostrum (state 1). *Apocuma*, *Cyclaspoides*, *Bathycuma* and *Vaunthompsonia* display states 1 and 2, and *Zygosiphon* only shows state 2, and thus is characterized by its long branchial siphons.

18. (U) Frontal lobe size. States: (1) 1/5 or less of carapace length, (2) 1/4 of carapace length, (3) 1/3 of carapace length, (4) half of carapace length, (5) more than half of carapace length.

Notes: Highly variable character, most common states are 2, 3 and 4. State 5 (frontal lobe more than half the carapace length) is only present in *Cyclaspis* (which has all states present).

19. (U) Frontal lobe shape. States: (1) as wide as long, (2) wider than long, (3) longer than wide.

Notes: Most bodotriids have the frontal lobe as wide as long (state 1) and sometimes within the same genera states 2 and/or 3 may also be present.

20. (U) Frontal lobe. States: (1) anteriorly linguiform (extended), (2) somewhat extended, (3) notched anteriorly, (4) not extended.

Notes: Highly variable character, most genera display state 1 and/or 2 (frontal lobe anteriorly linguiform or somewhat extended, respectively). *Zygosiphon* only has state 3 (frontal lobe notched anteriorly) and *Mossambicum* and *Hypocuma* only have state 4 (frontal lobe not extended).

21. (O) Ocular pigment. States: (1) present, (2) absent.

Notes: In most genera ocular pigment is present at least in some species, although in a considerable number of genera the ocular pigment is always absent.

22. (O) Eye lenses. States: (1) present, (2) absent.

Notes: Even though in most genera eye lenses are present, in many genera they are lacking.

23. (U) Antenna 1, basal article of the peduncle. States: (1) geniculated, (2) arcuate, (3) straight.

Notes: The most common situation is that the basal article of the peduncle of antenna 1 is either arcuate or straight (states 2 and 3).

24. (U) Antenna 1, length of basal article of peduncle. States: (1) longer than the other two articles together,

(2) same length than the other two articles together, (3) shorter than the other two articles together.

Notes: Most genera have state 3 and/or 2 (basal article of peduncle shorter or equal length than other two articles, respectively). In *Apocuma* and *Gephyrocuma* the basal article of the peduncle is always longer than the other two together (state 1), in *Bodotria* and *Hypocuma* it can be longer or same length (states 1 and 2), and in *Cyclaspis* and *Gaussicuma* all three states are present.

25. (U) Antenna 1, males with a group of aesthetasc on distal margin of peduncle. States: (1) present, (2) absent.

Notes: In most genera males do not have a group of aesthetascs on the distal margin of the peduncle of antenna 1 (state 2). *Alticum* and *Mossambicum* only have state 1, while *Bodotria*, *Cumopsis* and *Leptocuma* display both states 1 and 2.

26. (O) Antenna 1, main flagellum. States: (1) uni-articulated, (2) bi-articulated, (3) tri-articulated, (4) with 4 articles, (5) with 5 articles.

Notes: Most genera have states 1, 2 and/or 3 (antenna 1 uni-, bi- or tri-articulated, respectively). *Leptocuma* is the only genus that displays states 2, 3, 4 and 5, the last two states are generally absent in the Bodotriidae.

27. (U) Antenna 1, when main flagellum has three or more articles. States: (1) third article longer than second, (2) second and third articles same length, (3) second article longer than third.

Notes: This character is inapplicable to taxa that have states 1 or 2 for character 26. Most genera display state 3 (second article of main flagellum of antenna 1 longer than third), *Eocuma* only shows state 2, *Bathycuma* and *Pseudosymphodomma* states 1 and 3, and all three states are present in *Leptocuma*.

28. (O) Antenna 1, number of aesthetascs in last article of main flagellum (sometimes only males). States: (1) three or more, (2) two, (3) one, (4) none.

Notes: Most genera with state 2 and/or 3 (two or one aesthetascs on last article of main flagellum). *Glyphocuma* displays only state 1, and *Pseudoleptocuma* and *Zenocuma* only display state 4.

29. (O) Antenna 1, number of aesthetascs on proximal article of main flagellum (sometimes only males). States: (1) three or more, (2) two, (3) none.

Notes: Most genera display state 3 (absence of aesthetascs on proximal article of main flagellum) either alone or in combination with another state. *Mossambicum* only has state 2.

30. (O) Antenna 1, accessory flagellum. States: (1) not reduced, (2) reduced, (3) absent.

Notes: Most genera only display state 2 (accessory flagellum of antenna 1 reduced). *Cyclaspis* and *Eocuma* have states 2 and 3. State 1 is not present within the Bodotriidae.

31. (O) Antenna 1, accessory flagellum. States: (1) uni-articulated, (2) bi-articulated.

Notes: This character is inapplicable to taxa that have state 3 for character 30. Most genera have a bi-articulated accessory flagellum (state 2) either as only state or in combination with 1. *Gigacuma* and *Glyphocuma* only have state 2.

32. (U) Antenna 1, brush of at least three setae on accessory flagellum. States: (1) present, (2) absent.

Notes: This character is inapplicable to taxa that have state 3 for character 30. Most have state 2 (brush of setae on accessory flagellum of antenna 1 absent) alone or in combination with 1 (present). *Austrocuma* only shows state 1.

33. (O) Antenna 1, aesthetasc on accessory flagellum. States: (1) present, (2) absent.

Notes: This character is inapplicable to taxa that have state 3 for character 30. Most have state 2 (aesthetasc on accessory flagellum of antenna 1 absent) alone or in combination with 1 (present). *Austrocuma* only shows state 1.

34. (U) Antenna 2 in males. States: (1) not reaching the end of peraeon, (2) reaching to end of peraeon, (3) reaching approximately half length of pleon, (4) reaching almost the end of pleon, (5) reaching the end of pleon.

Notes: Most common states are 5, 4 and 3 (all referring to relatively long antenna 2 in males). *Austrocuma*, *Coricum*, *Speleocuma* and *Spilocuma* only display state 1 (antenna 2 in males not reaching the end of the peraeon), and *Mancocuma* and *Vaunthompsonia* only display state 2 (antenna 2 reaching the end of the peraeon).

35. (U) Antenna 2 in males, modifications for grasping. States: (1) on anterior margin, (2) on posterior margin, (3) absent.

Notes: Most genera have state 3 (no modifications on antenna 2). *Austrocuma*, *Mancocuma* and *Spilocuma* only have state 1 (antenna 2 in males modified on its anterior margin), and *Coricum* only has state 2 (antenna 2 in males modified on its posterior margin).

36. (U) Male antenna 2, sensory setae on anterior margin of article 4. States: (1) present, (2) absent.

Notes: In most genera males have sensory setae on the anterior margin of article 4 of antenna 2 (state 1). *Mancocuma* and *Spilocuma* only display state 2.

37. (O) Female antenna 2, number of articles. States: (1) one, (2) two, (3) three, (4) four, (5) five.

Notes: Most genera within the *Vaunthompsoniinae* only display states 3, 4 and/or 5 (females with 3, 4 and 5 articles on antenna 2, respectively), excepting *Vaunthompsonia* that also shows state 2 and *Gaussicum* only with state 2. Only *Spilocuma* shows state 4 and *Hypocuma* state 5. *Coricum* and *Zygosiphon* display state 1, and *Cyclaspis*, *Eocuma* and *Iphinoe* display states 1 and 2.

38. (U) Maxilliped 3, basis shape. States: (1) geniculated, (2) arcuate, (3) straight.

Notes: Most genera display states 2 and/or 1, i.e. basis of maxilliped 3 generally arcuate or geniculated. *Gigacuma*, *Glyphocuma*, *Pseudosympodomma*, *Sympodomma* and *Vaunthompsonia* display states 2 and 3. *Gephyrocuma* only shows state 3 (basis of maxilliped 3 always straight).

39. (U) Maxilliped 3, basis shape. States: (1) normal, (2) very expanded (with opercular functions).

Notes: All genera have a normal shape of basis of maxilliped 3 (state 1), except *Gephyrocuma*, *Pomacuma* and *Zenocuma* which have an expanded basis of maxilliped 3 with opercular functions (state 2).

40. (U) Maxilliped 3, extension of basis. States: (1) dorsally over ischium, (2) ventrally over ischium, (3) absent.

Notes: Most genera have state 3 (basis of maxilliped 3 not extended), however there is variability. The genera that do not display state 3 are *Pomacuma* which has states 1 and 2, and *Gephyrocuma* and *Zenocuma* which only show state 2.

41. (U) Maxilliped 3, when basis has a dorsal extension. States: (1) extends beyond the articulation of the ischium and merus, (2) slightly expanded dorsally.

Notes: This character is inapplicable to taxa that have states 2 or 3 for character 40. Most genera only display state 1. *Bodotria*, *Mancocuma* and *Cumopsis* show states 1 and 2 and *Pseudoleptocuma* and *Vaunthompsonia* only have state 2.

42. (U) Maxilliped 3, ischium length relative to merus (without considering extensions). States: (1) longer, (2) equal, (3) shorter.

Notes: Highly variable character. In general the ischium is shorter than or equal in length to merus in maxilliped 3 (states 3 and 2), however a number of genera have state 1 either alone or in combination with 2 and/or 3.

43. (U) Maxilliped 3, merus. States: (1) without dorsal extension, (2) extended dorsally over carpus, (3) laterally expanded.

Notes: Highly variable character. Most bodotriids have some expansion of the merus of maxilliped 3, either dorsally (state 2) or laterally (state 3).

44. (U) Maxilliped 3, carpus shape. States: (1) proximally widened, (2) distally widened, (3) oviform, (4) not widened.

Notes: States 2, 3 and 4 are the most common. In general there is great variation both within and among genera. *Pomacuma* and *Zenocuma* only show state 1.

45. (U) Maxilliped 3, length of carpus relative to propodus plus dactylus. States: (1) longer, (2) equal or shorter.

Notes: Most genera show state 2 either alone or in combination with state 1.

46. (U) Maxilliped 3, propodus shape. States: (1) distally widened, (2) proximally widened, (3) oviform, (4) not widened.

Notes: Character highly variable with respect to presence of states. State 2 is the least common and is present as only state in *Bacescuma*, and with all other states in *Cyclaspis*.

47. (U) Maxilliped 3, brush setae on propodus. States: (1) present, (2) absent.

Notes: Most do not have the brush of setae (state 2), some genera have some species that have them (*Cyclaspis*, *Eocuma*, *Glyphocuma*, *Heterocuma* and *Leptocuma*), while others only have state 1 (*Cumopsis*, *Mancocuma*, *Gephyrocuma*, *Gigacuma*, *Pomacuma*, *Pseudoleptocuma*, *Pseudosympodomma*, *Sympodomma* and *Zenocuma*).

48. (O) Number of peraeonites covered by carapace. States: (1) one, (2) three.

Notes: All genera show state 1 (one peraeonite covered by carapace), except *Cyclaspoides* which only shows state 2.

49. (U) Visibility of first peraeonite. States: (1) well exposed, (2) visible only above lateral midline, (3) not visible.

Notes: This character is inapplicable to taxa that have state 2 for character 48 (*Cyclaspoides*). There is high variability, many genera show two or three states.

50. (O) Peraeonite 2 and 3. States: (1) fused, (2) not fused.

Notes: This character is inapplicable to taxa that have state 2 for character 48 (*Cyclaspoides*). All genera show state 2 (peraeonites 2 and 3 not fused), except *Alticuma* which only shows state 1 and the fusion of these peraeonites is a diagnostic feature of the genus.

51. (U) Peraeonite 2, length. States: (1) proportional to other peraeonites, (2) narrow (not wider than the third), (3) wide.

Notes: This character is inapplicable to taxa that have state 2 for character 48 (*Cyclaspoides*). Most common are states 1 (peraeonite 2 proportional in length to other peraeonites) and 3 (wide). Only a few genera

show state 2 (*Cyclaspis*, *Eocuma* and *Hypocuma*) always in combination with other state(s).

52. (U) Peraeonite 2, ventrolateral expansion. States: (1) present, (2) absent.

Notes: This character is inapplicable to taxa that have state 2 for character 48 (*Cyclaspoides*). This character is very variable and many genera display both states.

53. (U) Ventrolateral expansion of peraeonite 2. States: (1) not overriding other somites, (2) overriding peraeonite 1 and/or carapace, (3) overriding peraeonite 3, (4) overriding peraeonite 1 and/or carapace, and peraeonite 3.

Notes: This character is inapplicable to taxa that have state 2 for character 52. There is great variability both among and within genera.

54. (U) Peraeonite 3, ventrolateral expansion. States: (1) absent, (2) overriding peraeonite 2, (3) overriding peraeonite 4, (4) overriding peraeonites 2 and 4.

Notes: There is great variability both among and within genera.

55. (U) Peraeonite 4, ventrolateral expansion. States: (1) absent, (2) overriding peraeonite 3, (3) overriding peraeonite 5, (4) overriding peraeonite 3 and 5.

Notes: There is great variability both among and within genera.

56. (U) Peraeopod 1, basis-carpus expanded and ischium-merus rotated for opercularity. States: (1) present, (2) absent.

Notes: Most genera only show state 2, except *Mancocuma*, *Gephyrocuma*, *Pomacuma* and *Zenocuma* which show a basis-carpus expanded and ischium-merus rotated on peraeopod 1 (state 1) which has opercular functions.

57. (U) Peraeopod 1, basis shape. States: (1) geniculated, (2) arcuate, (3) straight.

Notes: Most genera have states 2 and 3 (basis of peraeopod 1 arcuate or straight, respectively). The only one that shows state 1 is *Leptocuma* (also with states 2 and 3).

58. (U) Peraeopod 1, row of setae on basis. States: (1) present, (2) absent.

Notes: This character shows variability both within and among genera.

59. (U) Peraeopod 1, extension on the basis. States: (1) with dorso-distal extension on totally or partially covering the ischium, (2) ventral opercular extension, (3) ventral slight extension, (4) absent.

Notes: Most genera show state 4 (basis of peraeopod 1 not expanded). *Cyclaspis*, *Cumopsis* and *Heterocuma* show states 3 and 4. *Eocuma* and *Pomacuma* only display state 1, while *Gephyrocuma* only has state 2 and *Gigacuma* state 3.

60. (U) Peraeopod 1, basis inner apical angle. States: (1) extended to form a subtriangular tooth-like process, (2) extended to form a convex process, (3) process absent.

Notes: Most genera have state 3 (basis of peraeopod 1 with no evident inner apical angle) as only state present although a few have it in combination with states 1 and 2. *Coricuma* and *Zygosiphon* only display state 2.

61. (U) Peraeopod 1, ischium length. States: (1) elongate, often longer than merus, (2) normal size (small).

Notes: All genera have state 2 (ischium of normal size) except *Iphinoe* which has both 1 and 2.

62. (U) Peraeopod 1, ischium shape. States: (1) modified as a rounded lobe with exterior concavity (opercular), (2) not modified.

Notes: Most genera have state 2 (ischium shape not modified). *Gephyrocuma*, *Pomacuma* and *Zenocuma* (the 'operculate' genera) have the ischium of peraeopod 1 modified (state 1).

63. (U) Peraeopod 1, carpus shape. States: (1) oviform, (2) not oviform.

Notes: Most genera have state 2 (carpus of peraeopod 1 not oviform). *Gephyrocuma*, *Heterocuma*, *Mancocuma*, *Pomacuma* and *Zenocuma* have state 1.

64. (U) Peraeopod 1, row of setae on carpus. States: (1) present, (2) absent.

Notes: Most genera do not have a row of setae on the carpus of peraeopod 1 (state 2) but may also show state 1. *Mancocuma*, *Gephyrocuma*, *Pomacuma* and *Zenocuma* have state 1.

65. (U) Peraeopod 1, length of carpus relative to basis. States: (1) shorter, (2) equal.

Notes: Most genera have the carpus shorter than the basis on peraeopod 1 (state 1). *Eocuma* and *Iphinoe* show states 1 and 2.

66. (U) Peraeopod 1, presence and number of setae on the propodus. States: (1) with a brush (3 or more) of long setae on the propodus (setae longer than carpus), (2) at least three setae in a linear arrangement along propodus, (3) setae absent.

Notes: Highly variable both within and among genera. States 1 and 3 are the most common.

67. (U) Peraeopod 1, length of basis relative to propodus. States: (1) longer, (2) equal.

Notes: All genera display state 1 alone (basis of peraeopod 1 longer than propodus), except *Eocuma* which has state 1 and 2.

68. (U) Peraeopod 1, length of carpus relative to propodus. States: (1) longer, (2) equal, (3) shorter.

Notes: Highly variable within and among genera.

69. (U) Peraeopod 1, at least three terminal setae on dactylus. States: (1) present, (2) absent.

Notes: Most genera display state 1 (with terminal setae on peraeopod 1) either alone or in combination with 2.

70. (O) Peraeopod 2, exopod in females. States: (1) fully developed, (2) reduced, (3) absent.

Notes: All Bodotriinae (except *Apocuma*) display state 3 (exopod on peraeopod 2 absent in females). Among the Vaunthompsoniinae, *Cumopsis* and *Heterocuma* have state 2 and all the rest show state 1.

71. (O) Peraeopod 2, exopod in males. States: (1) fully developed, (2) reduced, (3) absent.

Notes: All Bodotriinae (except *Apocuma*) display state 3 (exopod on peraeopod 2 absent in males). Among the Vaunthompsoniinae, *Cumopsis* and *Heterocuma* have state 2 and all the rest show state 1.

72. (O) Peraeopod 2, ischium. States: (1) present, (2) absent.

Notes: Highly variable, overall state 1 (ischium present on peraeopod 1) is most common but 2 is also very frequent.

73. (U) Peraeopod 2, length of dactylus relative to propodus. States: (1) shorter, (2) equal, (3) longer.

Notes: Most genera have state 3 (dactylus longer than propodus in peraeopod 2). *Leptocuma* shows all three states. *Austrocuma*, *Cyclaspis* and *Pseudosymphodomma* have states 2 and 3, and *Mancocuma* and *Pseudoleptocuma* only have state 2.

74. (O) Peraeopod 3, exopod in females. States: (1) fully developed, (2) reduced, (3) absent.

Notes: Variable but most Bodotriinae display state 3 (exopod on peraeopod 3 absent in females). State 2 is present as only state in *Apocuma*, *Cumopsis*, *Gephyrocuma* and *Heterocuma*, and together with state 1 in *Gephyrocuma*.

75. (O) Peraeopod 3, exopod in males. States: (1) fully developed, (2) reduced, (3) absent.

Notes: Variable but most Bodotriinae display state 3 (exopod on peraeopod 3 absent in males). *Cumopsis*, *Gephyrocuma* and *Heterocuma* only show state 2.

76. (O) Peraeopod 3, number of articles. States: (1) seven, (2) six.

Notes: Most genera only display state 1 (all articles peraeopod 3 present). *Coricuma* shows state 2 and *Austrocuma* states 1 and 2.

77. (U) Peraeopod 3, merus length. States: (1) normal (much smaller than basis), (2) enlarged (almost as large as basis).

Notes: All genera have state 1 (merus of peraeopod 3 much smaller than basis), except *Gephyrocuma* that only shows state 2.

78. (U) Peraeopod 3, modification of articulation of carpus and propodus. States: (1) normal, articulated at the distal end of the carpus, (2) articulated on side wall of carpus.

Notes: All genera have state 1 (normal articulation of the carpus and propodus on peraeopod 3), excepting *Mancocuma* that only shows state 2 (carpus articulates at the side of the propodus).

79. (O) Peraeopod 4, exopod in females. States: (1) fully developed, (2) reduced, (3) absent.

Notes: Genera of the Bodotriinae display state 3 (exopod on peraeopod 4 absent in females) while the Vaunthompsoniinae has state 2 or 3.

80. (O) Peraeopod 4, exopod in males. States: (1) fully developed, (2) reduced, (3) absent.

Notes: Most genera show state 3 (exopod on peraeopod 4 absent in males) or 1 (fully developed). *Mancocuma*, *Spilocuma*, *Gephyrocuma*, *Leptocuma* and *Pomacuma* only have state 2 and *Glyphocuma* has states 1 and 2.

81. (O) Peraeopod 4, number of articles. States: (1) seven, (2) six.

Notes: Most genera have all articles present on peraeopod 1 (state 1). *Austrocuma* and *Cyclaspis* show states 1 and 2 and *Coricuma* only state 2.

82. (O) Peraeopod 5, number of articles. States: (1) seven, (2) six.

Notes: Most genera display state 1 (all articles present). *Austrocuma* shows states 1 and 2 and *Coricuma* state 2.

83. (U) Articular pegs on pleon. States: (1) present, (2) absent.

Notes: All genera display state 2. *Alticuma*, *Cyclaspis*, *Cyclaspoides*, *Eocuma*, *Iphinoe* and *Zygosiphon* may have articular pegs (state 2).

84. (U) Size of pleonite 5 relative to pleonite 6. States: (1) longer, (2) as long as or shorter.

Notes: All genera display state 1 (pleonite 5 longer than 6). *Cyclaspoides*, *Gaussicuma*, *Gephyrocuma* and *Zygosiphon* also show state 2.

85. (U) Pleonite 6, shape. States: (1) longer than wide, (2) as wide as long, (3) wider than long.

Notes: In most genera pleonite 6 is longer than wide (state 1), but there is high polymorphism and most genera display more than one state.

86. (U) Length of pleonite 6 relative to peduncle of uropods. States: (1) longer, (2) equal, (3) shorter.

Notes: Most genera have state 3 (pleonite 6 shorter than peduncle of uropods), but there is high polymorphism and most genera display more than one state.

87. (U) Setae on posterior edge of pleonite 6. States: (1) present, (2) absent.

Notes: All genera have state 2 either alone or in combination with state 1.

88. (U) Pleonite 6, when setae present on posterior edge. States: (1) two setae close to midline, (2) more than two setae at posterior end.

Notes: This character is inapplicable to genera with state 2 for character 87. *Bodotria* and *Iphinoe* show state 1, *Vaunthompsonia* shows state 1 and 2, and *Apocuma*, *Bathycuma*, *Gaussicuma* and *Sympodomma* only have state 2.

89. (U) Pleonite 6. States: (1) not extended past the insertion of the uropods, (2) extended past the insertion of the uropods.

Notes: Most genera have state 2 (pleonite 6 extended past the insertion of the uropods) either alone or with state 1. *Heterocuma* and *Zenocuma* only display state 1.

90. (U) Pleonite 6, amount extended between uropods. States: (1) slightly extended, (2) well extended, (3) strongly extended.

Notes: This character is inapplicable to taxa that have state 1 for character 89. Most genera have states 1 and 2 (pleonite 6 slightly or well extended between the uropods). State 3 is present in *Bathycuma* (that has all three states) and on *Gaussicuma* and *Hypocuma* that only have state 3.

91. (U) Pleonite 6, amount extended between uropods. States: (1) whole width of terminal end, (2) middle portion of distal end.

Notes: This character is inapplicable to taxa that have state 1 for character 89. There is variability both within and among genera for this character; both states are commonly found.

92. (U) Pleonite 6, when whole terminal end extended. States: (1) ends in a point, (2) ends in a line, (3) ends concave, (4) ends in a rounded apex.

Notes: This character is inapplicable to taxa that have state 2 for character 91. This is a highly variable character both within and among genera.

93. (U) Pleonite 6, width of the extension when only middle portion of terminal end extended. States: (1) wide, (2) narrow.

Notes: This character is inapplicable to taxa that have state 3 for character 91. Most genera show state 1 either alone or in combination with state 2, while some taxa only display state 2 (*Austrocuma*, *Cumopsis* and *Gephyrocuma*).

94. (U) Pleonite 6, when only middle portion of terminal end extended. States: (1) ends in a point, (2) ends in a line, (3) ends concave, (4) ends rounded apex.

Notes: This character is inapplicable to taxa that have state 1 for character 91. State 4 is the most common

and it is present either alone or in combination with other states; there is variability among genera and usually polymorphism within genera.

95. (U) Anal plates, extension beyond posterior margin of pleonite 6. States: (1) present, (2) absent.

Notes: Most genera have state 2 either alone or in combination with 1. More than half of the genera display both states.

96. (U) Anal plates, setae on posterior edge. States: (1) present, (2) absent.

Notes: Most genera have state 2, a few have both states (*Bodotria*, *Iphinoe*, *Leptocuma*, *Pseudosympodomma*, *Sympodomma* and *Vaunthompsonia*), while *Speleocuma* only has state 1.

97. (O) Number of articles of uropod endopod. States: (1) one, (2) two, (3) three.

Notes: States 1 and 2 are common. State 1 is generally more common in the Bodotriinae. State 3 is not present within Bodotriidae.

98. (U) Length of articles of uropod endopod. States: (1) articles approximately equal, (2) proximal article longer, (3) proximal article shorter.

Notes: This character is inapplicable to taxa that have states 1 or 3 for character 97. The most common state is 2, present in most genera either as only state or in combination with others.

99. (U) Length of articles of uropod exopod. States: (1) proximal article shorter, (2) proximal article longer, (3) articles approximately equal.

Notes: Most genera display state 1. *Cumopsis* shows all three states, *Iphinoe* and *Heterocuma* show states 1 and 3, and *Vaunthompsonia* 1 and 2.

100. (U) Uropods, length of peduncle relative to rami. States: (1) much longer than rami (more than 50% longer), (2) longer, (3) equal, (4) slightly shorter than exopods only, (5) shorter.

Notes: Highly variable character, some genera display all five states while others only one.

101. (U) Uropods, length of rami with respect to each other. States: (1) equal, (2) endopod longer, (3) endopod shorter.

Notes: Most genera display state 1 (rami same length) either alone or together with state 3 and/or 2. *Upse-laspis*, *Speleocuma* and *Zenocuma* only display state 2, while *Coricuma*, *Zygosiphon*, *Heterocuma* and *Hypocuma* only have state 3.

102. (U) Uropod, terminal setae on endopod. States: (1) present, (2) absent.

Notes: In most genera uropodal endopod has terminal setae (state 1). *Cyclaspis* and *Eocuma* show states 1 and 2 and *Hypocuma* only state 2.

103. (U) Uropod, terminal setae on exopod. States: (1) present, (2) absent.

Notes: In most genera uropodal exopod has terminal setae (state 1). *Cyclaspis* and *Eocuma* show states 1 and 2 and *Hypocuma* only state 2.

104. (O) Males, pleopods on pleonite 1. States: (1) present, (2) absent.

Notes: Most genera have state 1 for all pleonite characters (104–108). Most Bodotriinae have 5 pairs of pleopods.

105. (O) Males, pleopods on pleonite 2. States: (1) present, (2) reduced, (3) absent.

Notes: In most genera males have pleopods on pleonite 2 (state 1). *Spilocuma* has state 3.

106. (O) Males, pleopods on pleonite 3. States: (1) present, (2) reduced, (3) absent.

Notes: In most genera males have pleopods on pleonite 3 (state 1). *Coricura*, *Iphinoe*, *Mancocuma*, *Speleocuma* and *Spilocuma* have state 3, of these *Iphinoe* is the only one that shows polymorphism (only one species of *Iphinoe* lacks pleopods on pleonite 3). State 2 not present within the Bodotriidae.

107. (O) Males, pleopods on pleonite 4. States: (1) present, (2) absent.

Notes: In most genera males have pleopods on pleonite 4 (state 1). *Austrocuma*, *Coricura*, *Iphinoe*, *Mancocuma*, *Pseudoleptocuma*, *Speleocuma* and *Spilocuma* have state 2, of these *Austrocuma* and *Iphinoe* are the only ones that show polymorphism (only one species of each genus lacks pleopods on pleonite 3).

108. (O) Males, pleopods on pleonite 5. States: (1) present, (2) reduced, (3) absent.

Notes: In most genera males have pleopods on pleonite 5 (state 1). *Austrocuma*, *Bodotria*, *Coricura*, *Iphinoe*, *Mancocuma*, *Pseudoleptocuma*, *Speleocuma* and *Spilocuma* have state 3, of these *Iphinoe* and *Bodotria* are the only ones that show polymorphism (only one species of each genus lacks pleopods on pleonite 3).

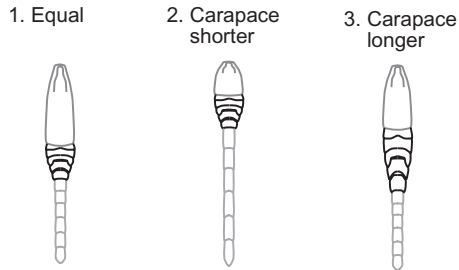
109. (O) Males, process on pleopodal endopod. States: (1) well developed, (2) reduced, (3) absent.

Notes: This character is inapplicable to taxa that have state 2 for character 104. There is high variability among genera.

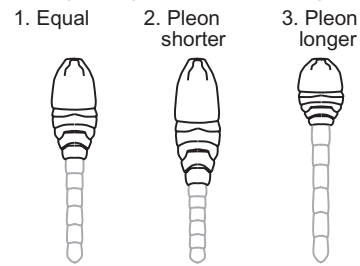
APPENDIX 2

Figures of morphological characters for the family Bodotriidae. All characters used for phylogenetic analysis (Appendix 1) are illustrated here.

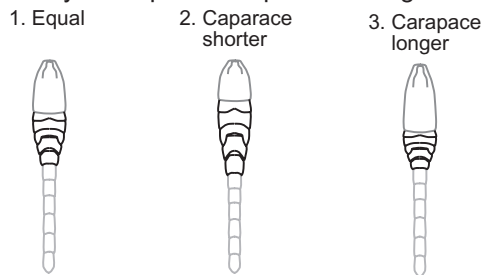
1. Body - carapace and pleon length



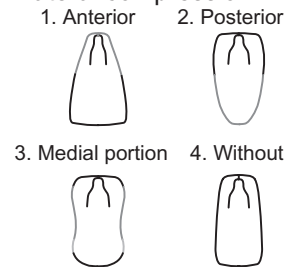
2. Body - carapace-peraeon versus pleon length



3. Body - carapace and peraeon length



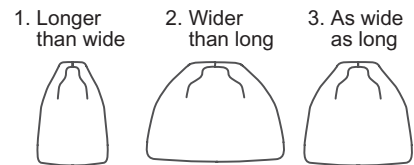
4. Carapace - lateral compression



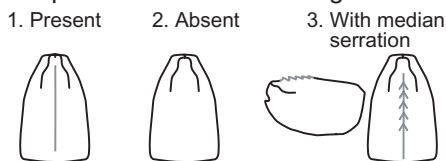
5. Carapace - shape when laterally compressed anteriorly



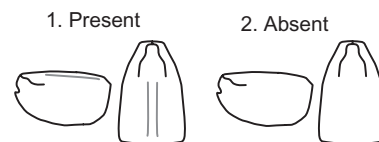
6. Carapace - shape



7. Carapace - median dorsal ridges



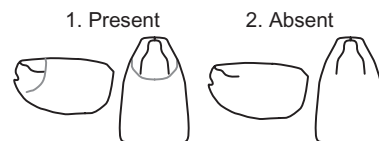
8. Carapace - dorso-lateral ridges



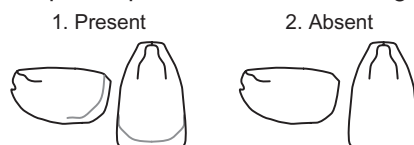
9. Carapace - lateral ridges



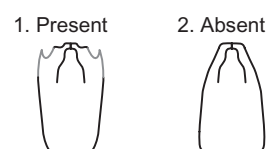
10. Carapace - anterior transverse ridge



11. Carapace - posterior transverse ridge



12. Carapace - lateral horns



13. Carapace - extension of pseudorostral lappets with respect to ocular lobe

1. Extend beyond 2. Do not extend



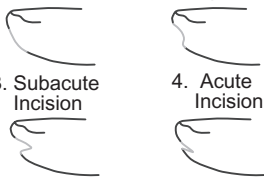
14. Carapace - projection of pseudorostral lappets beyond frontal lobe

1. Meet in midline 2. Extend towards midline (may partially meet) 3. Widely separated



15. Carapace - antennal notch

1. Not distinct 2. Depression
3. Subacute Incision 4. Acute Incision



16. Carapace - anterolateral corner

1. Blountly rounded 2. Subacute tooth 3. Acute tooth



17. Carapace - branchial siphons

1. Short 2. Long



18. Carapace - frontal lobe length relative to carapace

1. 1/5 2. 1/4 3. 1/3



4. 1/2 5. more than 1/2



19. Carapace - frontal lobe shape

1. As wide as long 2. Wider than long 3. Longer than wide



20. Carapace - frontal lobe extension

1. Anteriorly linguiform 2. Somewhat extended 3. Notched anteriorly 4. Not extended



21. Carapace - frontal lobe: ocular pigment

1. Present 2. Absent



22. Carapace - frontal lobe: eye lenses

1. Present (one or more) 2. Absent



23. Antenna 1 - peduncle geniculation

1. Geniculated 2. Arcuate 3. Straight



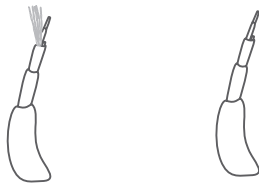
24. Antenna 1 - peduncle - length of basal article relative to other two articles

1. Longer 2. Same size 3. Shorter



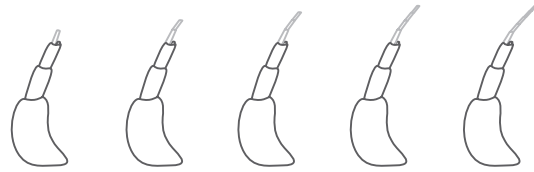
25. Antenna 1, male - peduncle - group of aesthetasc on distal article

1. Present 2. Absent



26. Antenna 1 - number of articles of main flagellum

1. One 2. Two 3. Three 4. Four 5. Five



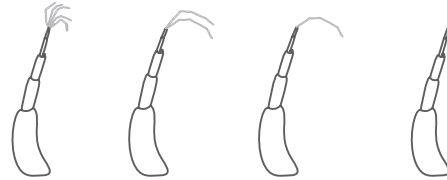
27. Antenna 1 - main flagellum - length of second and third articles

1. Third longer 2. Same size 3. Second longer



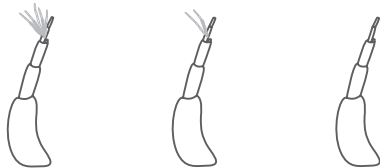
28. Antenna 1 - main flagellum - number of aesthetascs on last article

1. Three or more 2. Two 3. One 4. None



29. Antenna 1 - main flagellum - aesthetascs on proximal article.

1. Three or more 2. Two 3. None



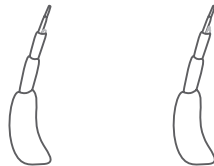
30. Antenna 1 - accessory flagellum - size

1. Not reduced 2. Reduced 3. Absent



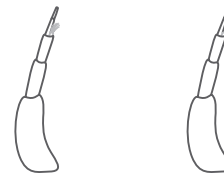
31. Antenna 1 - accessory flagellum - number of articles

1. One 2. Two



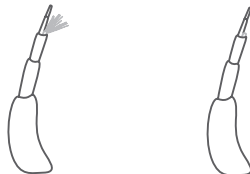
32. Antenna 1 - accessory flagellum - brush of setae

1. Present 2. Absent



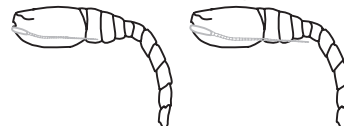
33. Antenna 1 - accessory flagellum - aesthetasc

1. Present 2. Absent

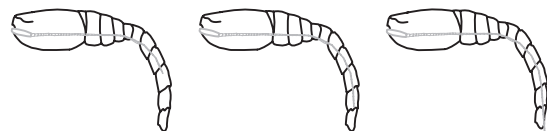


34. Antenna 2, males - length

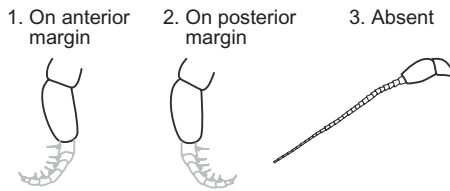
1. Not reaching end of peraeon 2. Reaching end of peraeon



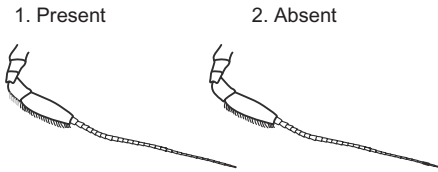
3. Reaching half length of pleon 4. Reaching almost end of pleon 5. Reaching end of pleon



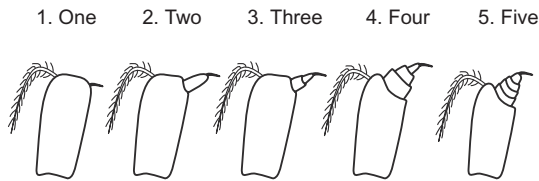
35. Antenna 2, males - modifications



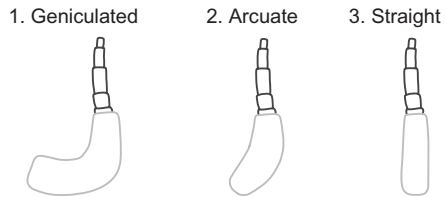
36. Antenna 2, males - sensory setae on anterior margin of article 4



37. Antenna 2, females - number of articles



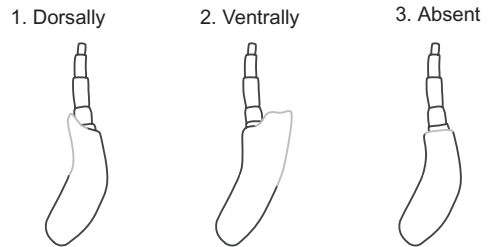
38. Maxilliped 3 - basis shape



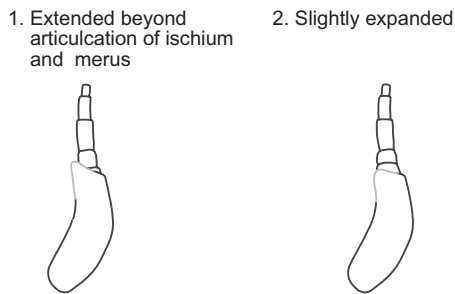
39. Maxilliped 3 - modification of basis



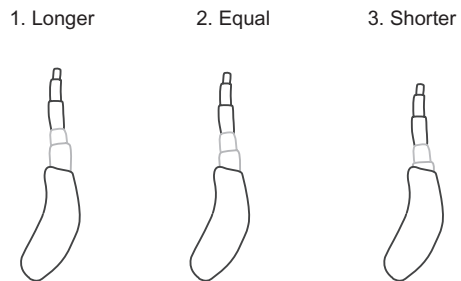
40. Maxilliped 3 - extension of basis



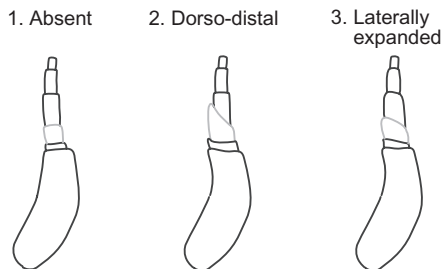
41. Maxilliped 3 - dorsal extension of basis



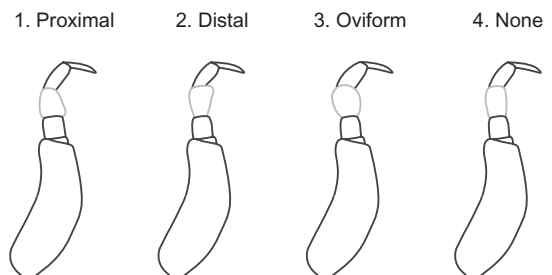
42. Maxilliped 3 - ischium length relative to merus



43. Maxilliped 3 - extension of merus

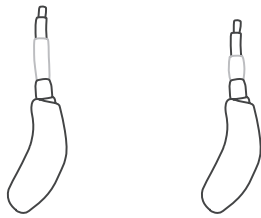


44. Maxilliped 3 - carpus expansion



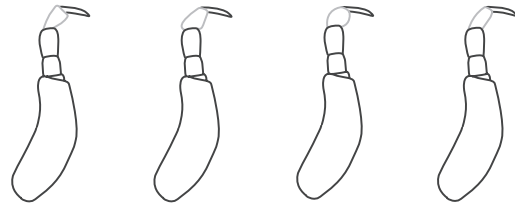
45. Maxilliped 3 - carpus length relative to length of propodus-dactylus

1. Longer 2. Equal or shorter



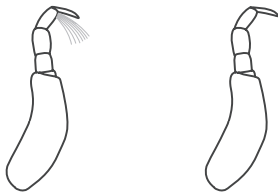
46. Maxilliped 3 - propodus expansion

1. Distally 2. Proximally 3. Oviform 4. None



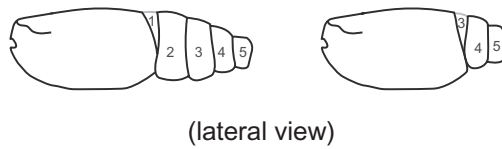
47. Maxilliped 3 - Brush of setae on propodus

1. Present 2. Absent



48. Peraeon - number of peraeonites covered by carapace

1. One 2. Three



49. Peraeon - first peraeonite

1. Well exposed 2. Visible only above lateral midline 3. Not visible



50. Peraeon - fusion of peraeonites 2 and 3

1. Fused 2. Not fused



51. Peraeon - length of peraeonite 2

1. Proportional 2. Narrow 3. Wide



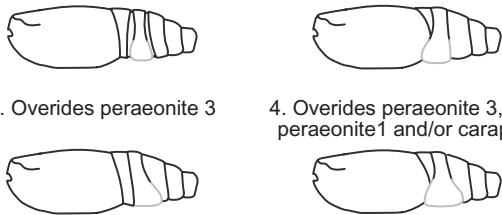
52. Peraeon - peraeonite 2 ventrolateral expansion

1. Present 2. Absent



53. Peraeon - expansion of peraeonite 2

1. Does not override other somites 2. Overrides peraeonite 1 and/or carapace
3. Overrides peraeonite 3 4. Overrides peraeonite 3, and peraeonite 1 and/or carapace



54. Peraeon - expansion of peraeonite 3

1. Absent 2. Overriding peraeonite 2



3. Overriding peraeopod 4 4. Overriding peraeonite 2 and 4



55. Peraeon - expansion of peraeonite 4

1. Absent 2. Overriding peraeonite 3

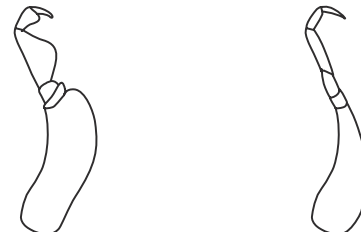


3. Overriding peraeonite 5 4. Overriding peraeonite 3 and 5

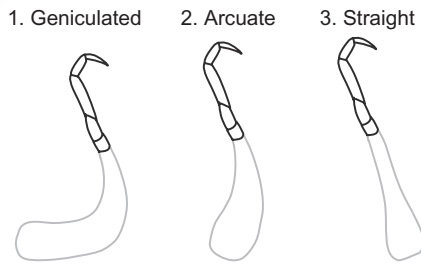


56. Peraeopod 1 - opercularity

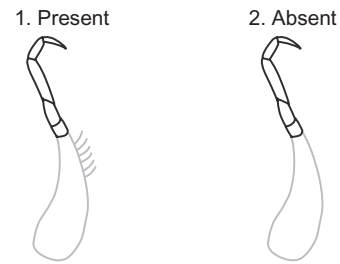
1. Opercular 2. Non-opercular



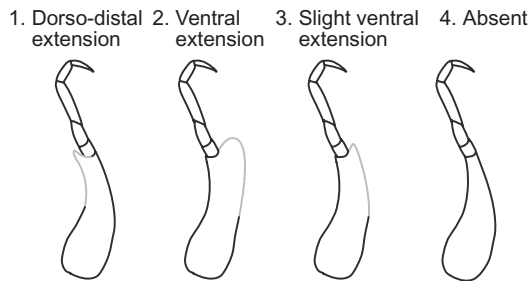
57. Peraeopod 1 - basis shape



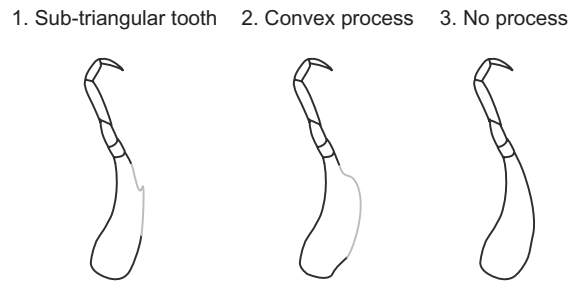
58. Peraeopod 1 - row of setae on basis



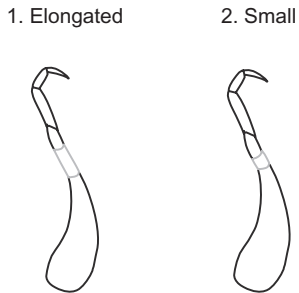
59. Peraeopod 1 - distal extension of basis



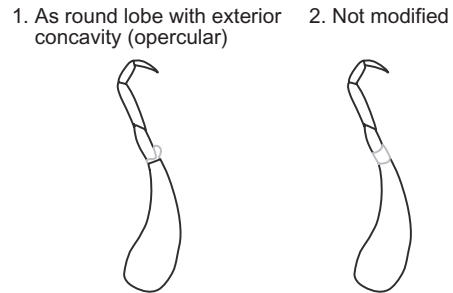
60. Peraeopod 1 - basis inner apical angle



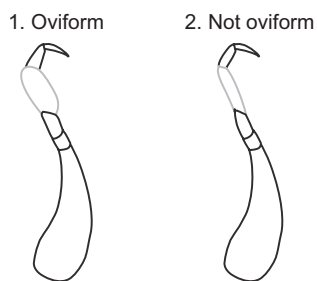
61. Peraeopod 1 - length of ischium



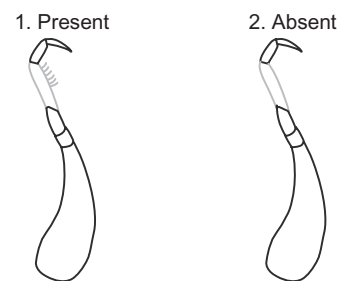
62. Peraeopod 1 - ischium modification



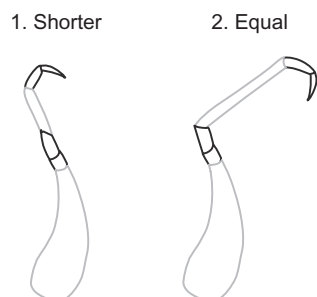
63. Peraeopod 1 - carpus shape



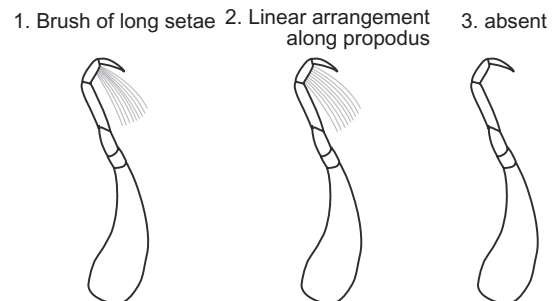
64. Peraeopod 1 - row of setae on carpus



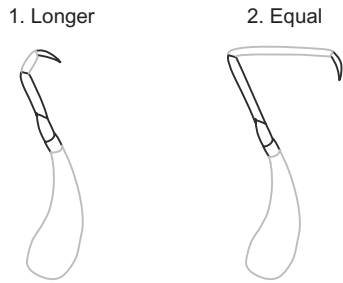
65. Peraeopod 1 - carpus length relative to basis



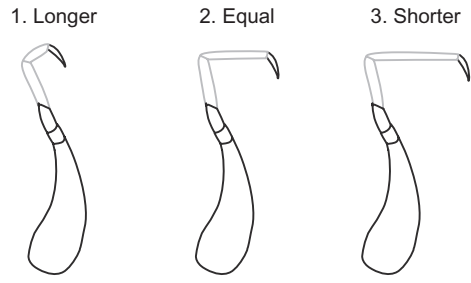
66. Peraeopod 1 - setae on propodus



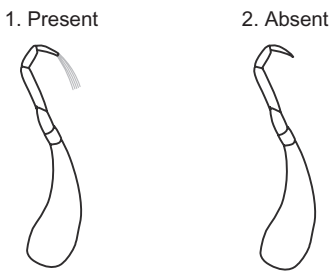
67. Paraeopod 1 - basis length relative to propodus



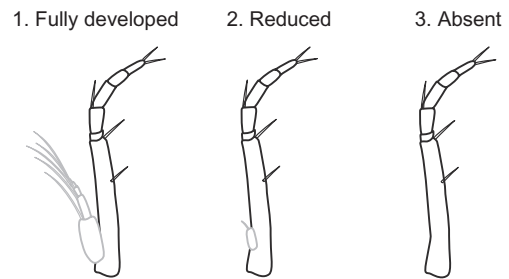
68. Paraeopod 1 - carpus length relative to propodus



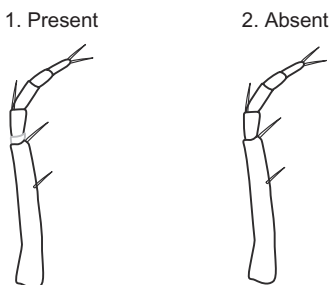
69. Paraeopod 1 - brush of setae on dactylus



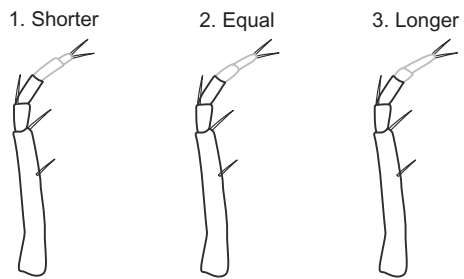
70 (females)-71 (males). Paraeopod 2 - exopod



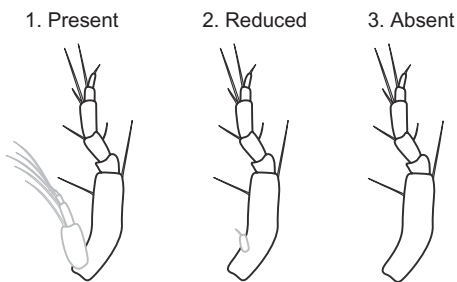
72. Paraeopod 2 - ischium



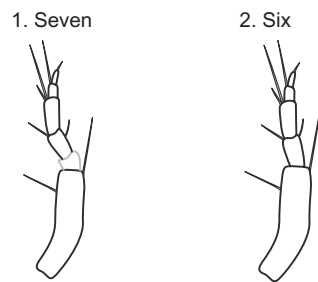
73. Paraeopod 2 - dactylus size relative to propodus



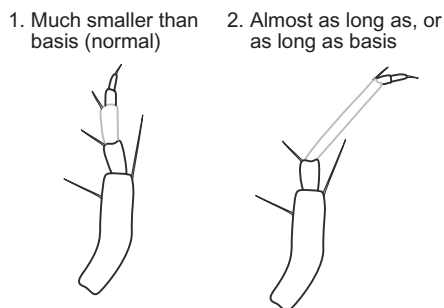
74 (females)-75 (males). Paraeopod 3 - exopod



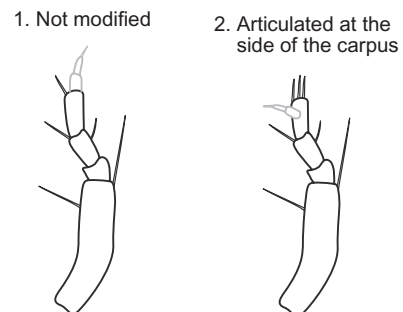
76. Paraeopod 3 - number of articles



77. Paraeopod 3 - size of merus

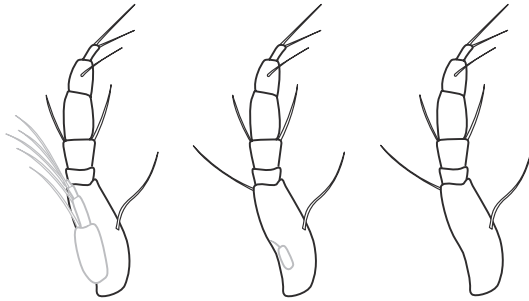


78. Paraeopod 3 - articulation of propodus



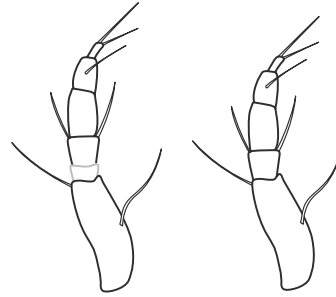
79 (females)-80 (males). Peraeopod 4 - exopod

1. Present 2. Reduced 3. Absent



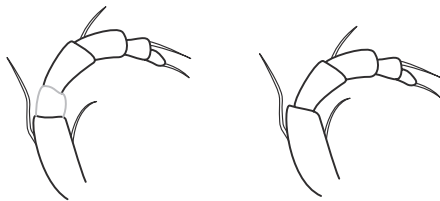
81. Peraeopod 4 - number of articles

1. Seven 2. Six



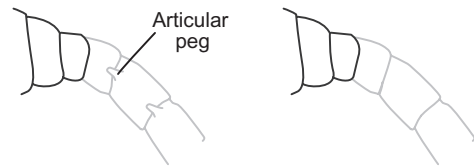
82. Peraeopod 5 - number of articles

1. Seven 2. Six



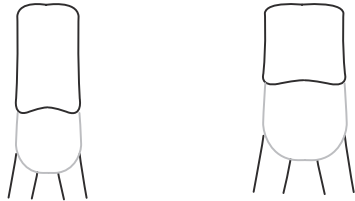
83. Pleon - articular pegs

1. Present 2. Absent



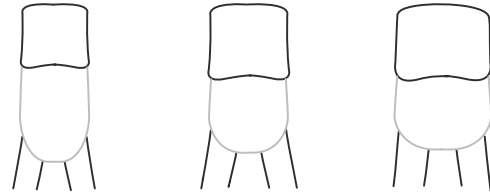
84. Pleonite 5 - length relative to pleonite 6

1. Longer 2. As long or shorter



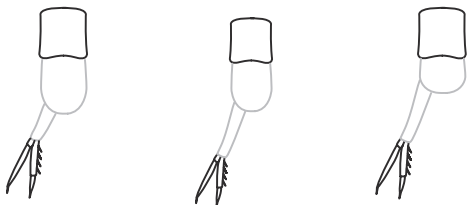
85. Pleonite 6 - shape

1. Longer than wide 2. As wide as long 3. Wider than long



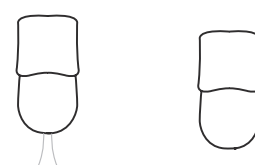
86. Pleonite 6 - length relative to peduncle of uropod

1. Longer 2. Equal 3. Shorter



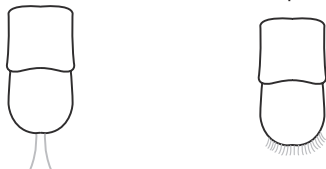
87. Pleonite 6 - setae on posterior edge

1. Present 2. Absent



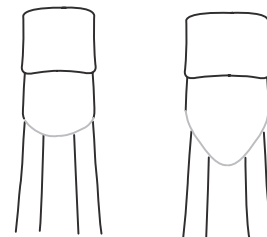
88. Pleonite 6 - conditions when setae present

1. Two setae close to midline 2. More than two setae at posterior end



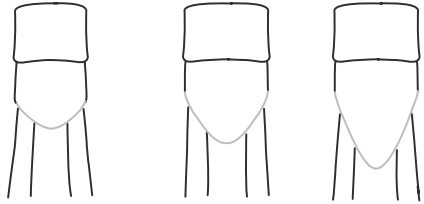
89. Pleonite 6 - extension past insertion of uropods

1. Absent 2. Present



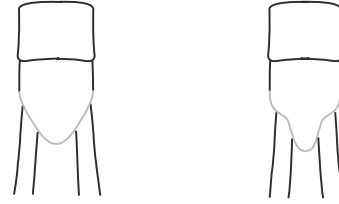
90. Pleonite 6 - degree of extension past insertion of the uropods

1. Slightly extended 2. Well extended 3. Strongly extended



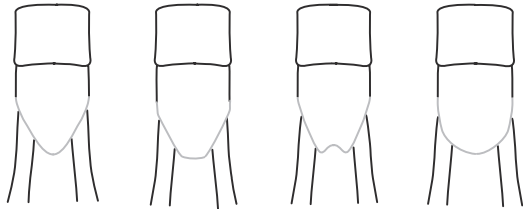
91. Pleonite 6 - type of extension

1. Whole width extended 2. Middle portion extended



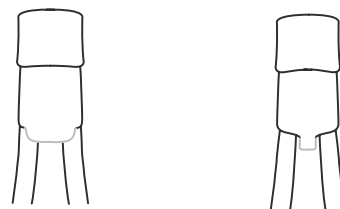
92. Pleonite 6 - terminal end shape of whole width extension

1. Point 2. Line 3. Concave 4. Rounded apex



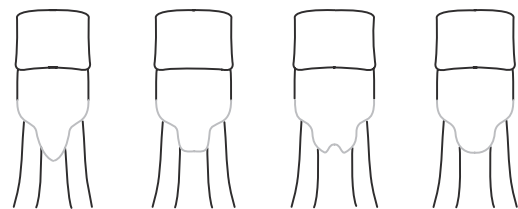
93. Pleonite 6 - width of middle portion extension

1. Wide 2. Narrow



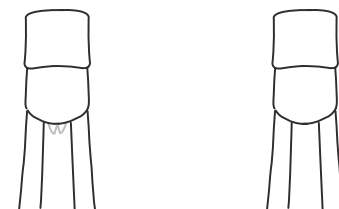
94. Pleonite 6 - terminal end shape of middle portion extensions

1. Point 2. Line 3. Concave 4. Rounded apex



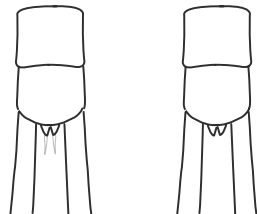
95. Anal Plates - extension

1. Extends posteriorly beyond distal margin of pleonite 6 2. Does not extend



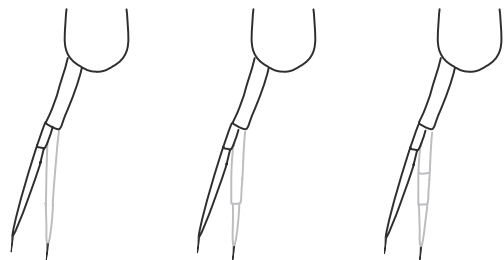
96. Anal Plates - setae

1. Present 2. Absent



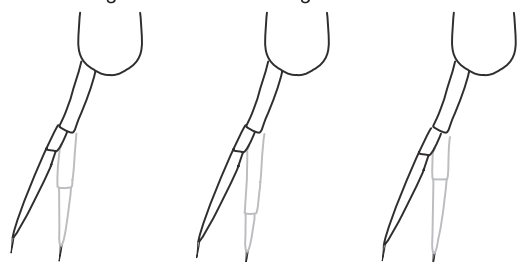
97. Pleon - uropod endopod - number of articles

1. uni-articulated 2. bi-articulated 3. tri-articulated



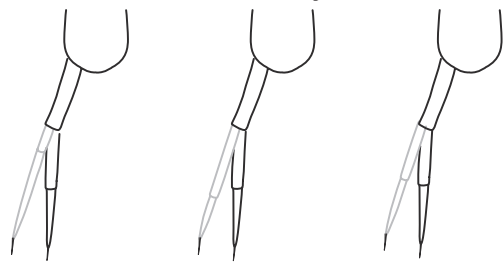
98. Pleon - uropod endopod - length of proximal and distal articles

1. Same length 2. Proximal longer 3. Proximal shorter



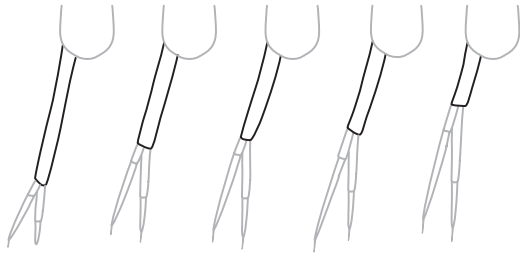
99. Pleon - uropod exopod - length of proximal and distal articles

1. Proximal shorter 2. Proximal longer 3. Same size



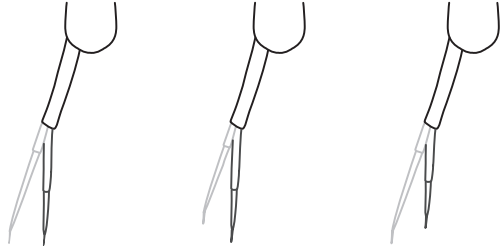
100. Pleon - uropods - peduncle length with respect to rami

1. Much longer (> 50%) 2. Longer 3. Equal 4. Slightly shorter 5. Shorter



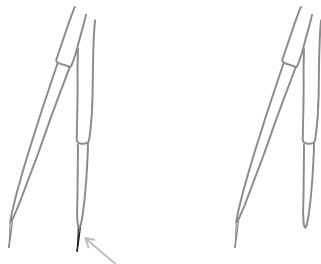
101. Pleon - uropod - rami length with respect to each other

1. Same size 2. Endopod longer 3. Endopod shorter



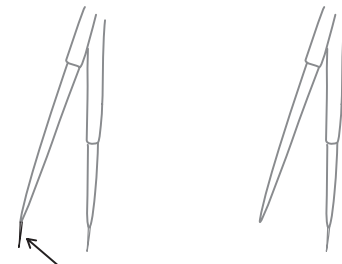
102. Pleon - uropod endopod - terminal setae

1. Present 2. Absent



103. Pleon - uropod exopod - terminal setae

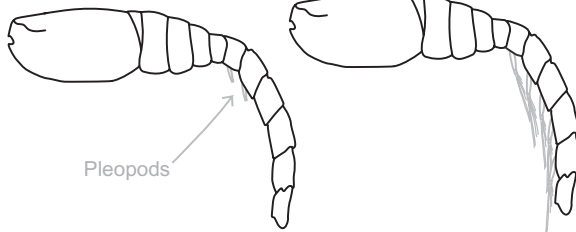
1. Present 2. Absent



104-108. Pleon, male - number of pleopods

Two pairs of reduced pleopods

Five pairs of well developed pleopods



109. Pleon, male - process on pleopodal endopod

1. Well developed 2. Reduced 3. Absent

