A Systematic and Taxonomic Review of the Family Pseudotanaidae (Crustacea: Peracarida: Tanaidacea) Based Primarily on Morphometry Cladistic Analyses

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A SYSTEMATIC AND TAXONOMIC REVIEW OF THE FAMILY PSEUDOTANAIDAE
(CRUSTACEA: PERACARIDA: TANAIDACEA) BASED PRIMARILY ON
MORPHOMETRIC CLADISTIC ANALYSES

by

Jerry Alan McLelland

A Dissertation
Submitted to the Graduate Studies Office
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

May 2008
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ABSTRACT

A SYSTEMATIC AND TAXONOMIC REVIEW OF THE FAMILY PSEUDOTANAIIDAE (CRUSTACEA: PERACARIDA: TANAIDACEA) BASED PRIMARILY ON MORPHOMETRIC CLADISTIC ANALYSES

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Species of the tanaid family Pseudotanaidae, established by Jurgen Sieg in 1973, have been reported from all the world's oceans in depths ranging from near the surface to below 6,000 m. The family currently consists of 46 characteristically small tanaidomorph species residing in two subfamilies, the Cryptocopinae (seven species) and the Pseudotanainae (39 species). Members of the more ancestral Cryptocopinae differ from the Pseudotanainae by having females with four rather than three antennule articles and a complete separation of the maxilliped endites. The primary objective of this study was to test the hypothesis that the current structure of the family Pseudotanaidae should remain intact as a monophyletic group or, alternatively, should be pared to exclude the members of the current subfamily Cryptocopinae. A heuristic search using the parsimony optimality criterion was conducted on 69 unordered and unweighted morphological characters to test the relationships among 53 species of Pseudotanaidae and four out-groups. Six equally parsimonious trees were obtained that showed substantial support values at the node dividing Pseudotanainae from Cryptocopinae, thus providing strong evidence for removing Cryptocopinae from the family Pseudotanaidae. A new family, Cryptocopidae is proposed containing the subfamilies Cryptocopinae (one species), Cryptocopoidinae (three species), and Iungentitanainae (four species). The remaining 46 species of Pseudotanaidae demonstrated inconsistent structure in the cladistic analysis due to the large amount of homoplasy among the characters used, thus suggesting a revised taxonomy based more on observed
groupings of character traits rather than support values. Three subfamilies are recognized: the
Akanthinotanainae (ten species), the Parapseudotanainae (two species) and the Pseudotanainae
(33 species). The more ancestral Akanthinotanainae is represented solely by the new genus
*Akanthinotanais*, a former subgenus of *Pseudotanais*. Two new sub-genera within the
Akanthinotanainae are recognized: *Akanthinotanais, s.s.* with nine species and *Guilleitanais*
represented by a single species, *A. guillei*, with unique ancestral characters. Among the
Pseudotanainae, a single genus, *Pseudotanais*, and two sub-genera, *Pseudotanais, s.s.* and the
new *Mystriocentrus*, are recognized. Seven new taxa including four species of *Pseudotanais,
s.s.*, one of *Pseudotanais (Mystriocentrus)* and one each of the genera *Parapseudotanais* and
*Cryptocopoides* were discovered during this research.
ACKNOWLEDGEMENTS

I wish to thank first and foremost my advisor, Dr. Richard Heard, whom I consider an esteemed friend and colleague, for providing the impetus for this dissertation. His boundless spirit, scientific curiosity and phenomenal grasp of the ‘big picture’ has inspired many students over the years and started them on paths toward their academic goals. Likewise, it was he who piqued my interest in the study of tanaids, as he similarly did when I earlier aspired to study polychaete annelids, and suggested the problem concerning the family Pseudotanaidae.

I have had the help of several outside experts in the field of tanaid zoology. First among these is Dr. Kim Larsen who, in the mold of the late Jurgen Sieg, has become a legend in the tanaid world for his grasp of the systematics of the entire order. In his role as external advisor to my dissertation, he corrected mistakes and misconceptions made early in this study and critiqued an early draft of this dissertation. During his postdoctoral work at Gulf Coast Research Laboratory (GCRL, Ocean Springs, Mississippi), he conducted fine sorting and identification of the Texas A&M Gulf of Mexico samples which provided me with most of the material for this research, and also proved to be a daunting Starcraft opponent. I wish to thank others of the tanaid community including Drs. Graham Bird, Jurgen Guerro-Komritz, Roger Bamber and Magdalena Blazewicz-Paszkowycz for providing literature or commenting on early drafts of species descriptions.

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CHAPTER I
INTRODUCTION

Systematics and General Information about the Study Group

Order Tanaidacea.

The order Tanaidacea belongs to the crustacean superorder Peracarida (Malacostraca: Peracarida) which also contains the common orders Amphipoda, Isopoda, Mysida, and Cumacea (see Martin and Davis 2001:32, for an updated classification of the Peracarida). Peracarids are distinguished from other crustaceans by the presence of a marsupium (brood pouch) in which the females carry eggs until they develop and emerge as “mancas” or juveniles. This degree of parental care and lack of a planktonic larval stage typifies the niche to which this group belongs opposite to that of the more fecund crustacean groups such as decapods and may explain the success of the peracarids in diverse habitats including those in marine, freshwater and even terrestrial environments; the group represents a wide variety of trophic lifestyles (Brusca and Brusca 2003). Tanaidaceans are usually considered to be a minor taxonomic group of peracarids, although they may constitute one of the most bionomically significant groups in a wide range of marine habitats from intertidal (Holdich and Jones 1983) to hadal depths (Wolff 1956). There are currently over 800 species of Tanaidacea known, most of which live at depths greater than 200 m with some species occurring as deep as 9000 m (Sieg 1983, Heard 2002, Larsen 2005, Anderson et al. 2007). Deep water tanaids are among the most abundant and diverse assemblages present in abyssal zones of the world. At depths of 5000 m they comprise as much as one-fifth of the macrobenthic biomass (Wolff 1977) and have thus been regarded as a highly important component in the deep water benthic food web (Gardiner 1977, Ogle et al. 1982, Sieg and Heard 1989, Kneib 1992, Escobar-Briones and Spears 1995, Güütü and Sieg 1999).

Most tanaidaceans are small (2-5 mm long) but adults can range in size from 0.5 to 120 mm (Heard 2002). They were originally separated into two families Apseudidae (Leach 1814)
and Tanaidae (Dana 1849) by Sars (1882) and then reorganized into the suborders
Monokonophora and Dikonophora by Lang (1956) based on characteristics of the ‘genital cones’
in males. Sieg (1980), in his revision of the order, designated the extant suborders
Apseudomorpha, Tanaidomorpha, Neotanaidomorpha, and the extinct Anthracocaridomorpha
based on general morphology of the body and characteristics of the mouthparts; this construction,
which generally reflects differences seen in females, is the standard currently accepted by
tanaidacean workers. In their synopsis of the order, Güttu and Sieg (1999) recognized the above
four suborders consisting of 25 families, 163 genera, and nearly 670 described species. The suite
of characters that are considered (Heard 2002) to characterize the order Tanaidacea include (1) a
carapace formed via fusion of the first two thoracic somites, (2) chelate first pereopods, (3)
usually six free thoracic somites, (4) five abdominal somites usually bearing pleopods and (5) a
pleotelson with a pair of terminal or subterminal uropods. It should be pointed out that none of
these characteristics individually are unique to the Tanaidacea; each can be applied in some
degree to other peracaridean groups.

*Suborder Tanaidomorpha*

Members of the suborder Tanaidomorpha Sieg, 1980, referred to herein as
‘tanaidomorphs’, are distinct from the other major suborder, the Apseudomorpha, by generally
being more cylindrical in shape, having a reduction in body parts such as the loss of mandibular
palps and antennular accessory flagella, and demonstrating strong sexual dimorphism whereby the
males are more eccentric looking than females and are usually smaller and adapted for
swimming. There are 13 families within the suborder Tanaidomorpha and all but one (Tanaidae)
fall within the superfamily Paratanaoidea Lang, 1949.

*Family Pseudotanaidae*

The family Pseudotanaidae was established by Sieg (1973) to include those tanaidomorph
species with the marsupium of females formed by a single pair of sheet-like oostegites emerging
at the basis of the fourth pereopod. Furthermore, Sieg’s original diagnosis of females included
(1) reduced anterior pereionites, (2) fused maxilliped bases and complete or partial fusion of the maxilliped endites, (3) an antennule of three or four articles, and (4) the reduction of the mandible pars molaris, in most cases to a fine point. As Bird and Holdich (1989) observed, none of these characteristics are limited to the Pseudotanaidae, with the possible exception of the marsupium formation, but can be found among other tanaidomorph species. Most members of the family are characteristically small, averaging 1.5 mm in length (Sieg 1986), which is advantageous in deep-sea environments with a limited food supply (Jumars et al. 1990).

In his 1977 monograph of the family, Sieg grouped the 21 known species of Pseudotanaidae into two subfamilies, Cryptocopinae Sieg, 1977 and Pseudotanainae Sieg, 1977, based largely on the number of antenular articles (four and three respectively). The Cryptocopinae was represented by four genera: Cryptocope G.O. Sars, 1882; Cryptocopoides Sieg, 1977; Iungentitanais Sieg, 1977; and Paraiungentitanais Sieg, 1977. The subfamily Pseudotanainae contained most of the family’s described species but had only the type genus Pseudotanais. Sieg further divided Pseudotanais into the subgenera Pseudotanais sensu stricto and Akanthinotanais based largely on the presence in the former of blade-like carpal spines on the posterior three pereopods. Bird and Holdich (1989), in an important work on tanaid fauna of the northeast Atlantic, recorded 14 species, nine of which were new. They added descriptions of two new genera (Mystriocentrus and Parapseudotanais) and six new species of Pseudotanais which represented nearly a 20% increase in the number of taxa. Additionally, Bird and Holdich (1989) reported some specimens of Cryptocopoides arcticus (Hansen, 1887) as having four pairs of oostegites rather than the normal single pair, thus casting uncertainty on the placement of the Cryptocopinae within the family Pseudotanaidae.

Statement of Problem

The primary objective of this study is to test the hypothesis that the current structure of the family Pseudotanaidae should remain intact as a monophyletic group or, alternatively, should be pared to exclude the members of the subfamily Cryptocopinae. Using conventional cladistic
methods, the strength of diagnostic characters that currently define relationships among members of the two subfamilies Pseudotanainae and Cryptocopinae are assessed. Questions addressed include: (1) are the currently accepted genera and subgenera of Pseudotanaidae monophyletic? and (2) can evidence be provided through the analysis of morphological characters to justify either further subdivision into additional monophyletic subgroups or eliminating some members altogether? Secondary objectives to be obtained through this study are the production of uniform diagnoses of all existing species and the description of new species discovered in material from the Gulf of Mexico and the Atlantic east coast.

Significance of Study

Since the establishment of the family Pseudotanaidae in 1973, the taxonomic structure of the family has increased in complexity along with a more than doubling of the number of species assigned to it. In addition to this increased complexity, the question regarding the status of the subfamily Cryptocopinae necessitates a revision of the family systematics. Cladistic methods used in this research reveal evidence of a new working hypothesis of Pseudotanaidae phylogeny which includes the removal of members of the Cryptocopinae and suggests new hierarchies among both, the remaining genera and species of Psedotanaidae and the detached species of Cryptocopinae. The uniform morphological diagnoses of all known species of Pseudotanaidae provides a concise basis of comparison for the addition of new species in the future. Finally, the six new species from the Gulf of Mexico presented in this study represents merely a starting point for further biogeographical investigations in the deep waters of this region; it is likely that at least eight to ten additional species of Pseudotanaidae exist there.
CHAPTER II
REVIEW OF RELATED LITERATURE

Foundational literature

The family Pseudotanaidae was established by Jurgen Sieg in his 1973 doctoral dissertation and formally recognized in his tanaid systematics publication in 1976. The foundation of the family was based in part on a description of *Pseudotanais* by the Norwegian zoologist G.O. Sars in an 1882 paper dealing with a revision of the crustacean order Isopoda back when tanaids were considered a type of isopod, and on some species placed by Karl Lang in the families Tanaidae (Lang 1949) and Paratanidae (Lang 1967). At the time, all related species belonged to the suborder Dikonophora (Lang 1956), which was based on the number of genital cones in males (two vs. one).

Sieg’s 1977 monograph was essentially a publication of the Pseudotanaidae portion of his 1973 dissertation in which he established two new subfamilies, the Cryptocopinae with four genera (two new) and the Pseudotanainae containing the single genus *Pseudotanais* and nine new species. One new genus from his dissertation, *Mortensenia*, later became *Iungentitanais* in the 1977 work after Sieg learned that the former was preoccupied by a genus of Echinoderm. In his monograph, Sieg erected the subgenera *Akanthinotanais* and *Pseudotanais sensu stricto* (indicated hereafter by ‘A’ and ‘P’ in parenthesis), to separate species of the Pseudotanainae based on the presence or absence of carpal blade-like setae on pereopods 2 to 4. In all, Sieg reviewed and described 21 species, either from his personal collections or from museum material sent to him from collections made worldwide. Complete synonymies, illustrations and geodistribution data were provided for the following species: *Iungentitanais primitivus* Sieg, 1977; *Paraiungentitanais longidigitatus* (Kudinova-Pasternak, 1975); *Cryptocope abbreviata* (G.O. Sars, 1866); *Cryptocopoides artica* (Hansen, 1887); *Pseuodotanais (A) longipes* Hansen, 1913; *Pseudotanais (A) gerlachi* Sieg, 1977; *Pseudotanais (A) malayensis* Sieg, 1977; *Pseudotanais (A) mortenseni* Sieg, 1977; *Pseudotanais (A) similis* Sieg, 1977; *Pseudotanais (A)
E. vanh"offen, 1914; Pseudotanais (P) affinis Hansen, 1887; Pseudotanais (P) nordenskioldi Sieg, 1977; Pseudotanais (P) longisetosus Sieg, 1977; Pseudotanais (P) oculatus Hansen, 1913; Pseudotanais (P) liljeborgi G.O. Sars, 1882; Pseudotanais (P) macrocheles G.O. Sars, 1882; Pseudotanais (P) unicus Sieg, 1977; Pseudotanais (P) abyssi Hansen, 1913; Pseudotanais (P) jonesi Sieg, 1977 and Pseudotanais (P) forcipatus (Liljeborg, 1864). Sieg's monograph also proposed a brief phylogeny of the genera and provided keys to the species and maps of their world distribution. Two species, Pseudotanais borceai (Bacescu, 1960) and P. vitjazi (Kudinova-Pasternak, 1966) were listed by Sieg as incertae sedis primarily because he had no specimens of them to study; the type material for P. borceai had been lost and the description of P. vitjazi was confusing and incomplete. Surprisingly, P. vitjazi was apparently later recognized by Sieg since it appears in his 1988 key to the known species of Pseudotanaidae (Sieg and Heard 1988). Their questionable status notwithstanding, these two species apparently belong to the genus Pseudotanais by virtue of their well-illustrated carpal blade-like setae and were thus included in the present study.

The second most important contribution to the knowledge of Pseudotanaidae was by Bird and Holdich (1989) in their work on the tanaidacean fauna of the northeast Atlantic Ocean in which they summarized recent work on the subfamily Pseudotanaainae in the region and provided records of 14 species including two new genera and nine new species descriptions. At the time this represented a substantial portion (40%) of the known species and their nine new species increased the fauna of the family by 20%. In their discussion of family systematics they drew attention to problems relating to the accepted taxonomy of the group such as the fact that of the diagnostic characters used by Sieg (1977), none are in themselves restricted to the Pseudotanaidae but can be found in other tanaidomorph families. For example, the principle defining character - the single pair of oostegites on the fourth pereopod - is also seen in members of the family Tanaidae, although in that family the oostegites are formed by an enclosed sac-like structure ("ovisac"), rather than the lamelliform plates seen in the Pseudotanaidae. Bird and Holdich
(1989) also found evidence that the single oostegite pair character may be limited only to the subfamily Pseudotanainae since specimens of Cryptocopoides cf. arcticus were examined during their study with four pairs of oostegites, thus putting into question the presence of the Cryptocopinae within the family Pseudotanaidae. These authors also provided a dichotomous key and distributional notes on 16 species encountered including detailed descriptions and illustrations of the following new species: Mystriocentrus serratus, Parapseudotanais abyssalis, Pseudotanais (P) scalpellum, Pseudotanais (P) spatula, Pseudotanais (P) longispinus, Pseudotanais (P) denticulatus, Pseudotanais (P) spicatus, Pseudotanais (P) vulsella, and Pseudotanais (P) falciculata. In addition, a re-description of Pseudotanais (P) affinis (Hansen, 1887) was provided and a new species, Pseudotanais (P) corollatus was established that resulted from Sieg’s (1977) mistakes in his re-description of P. affinis. Bird and Holdich (1989) proposed two groups of related taxa — the “forcipatus” group composed of those species with forcipate chelae, and the “affinis” group, a confusing assemblage of eight species supposedly united by similarities in molar structure (note: P. corolatus and P. denticulatus both have broad, truncate molar structures, whereas in the others the molar structure is narrow and pointed).

Geo-distribution.

The family Pseudotanaidae has been reported from all the world’s oceans, but nearly half of the described species (18) are known from the northern Atlantic and Arctic regions probably because more studies have been conducted in these regions (Bird and Holdich 1989). Sieg (1977) incorporated in his monograph (see above) species collected by himself and others including Hansen (1887, 1913), Liljeborg (1864) and G.O. Sars (1866, 1882). Kudinova-Pasternak (1985) studied tanaids from collections made on the Great Meteor Seamount in the North Atlantic. From those taken near the summit (325 – 470 m), she described the new species, Pseudotanais (A) siegi, an oculate species noted for its long spindly appendages and apparently (based on the illustration) with slight serrations on the chela incisive margins. Like other works from this author, the description was incomplete and illustrations were inadequate.
From the Black Sea and Mediterranean Sea, there have been described one and two species respectively. *Pseudotanais (P) borcae*, an oculata species collected near the mouth of the Black Sea in 60 – 70 m, was described by Bačescu (1960) and incorrectly assigned to a new genus, *Pontonais*. Sieg (1977) recognized the species as belonging to *Pseudotanais* but treated it as *incertae sedis* because of “inconsistencies” in the original description and the loss of the type material (Sieg 1977, Sieg and Heard 1988). Sieg included two Mediterranean species in his 1977 monograph, both oculata species from relatively shallow waters off the coast of Naples, Italy. One, *Pseudotanais (P) unicus*, was a new species featuring atypically short third pereopods, and the other, *Pseudotanais (P) mediterraneus*, was described earlier by G.O. Sars in 1882.

Four nominal species of Pseudotanaidae are known from the West Indies and Gulf of Mexico regions of the North Atlantic. In Sieg and Heard (1988), a key to 23 species considered to be valid at that time was provided along with discussion of why other species were disregarded. Also included were new illustrations of *Iungentitanais primitivus* (Sieg 1977) and *Pseudotanais (A) mortenseni* (Sieg 1977), both collected from shallow water off the coast of Florida, and a description of the new species *Pseudotanais (P) mexikolpos* from shallow water (72 m) off the Texas coast. Not surprisingly, all three species are oculata. In his monograph of deep water tanaids of the Gulf of Mexico, Larsen (2005) reviewed the known Gulf species of Pseudotanaidae discussed by Sieg and Heard (1988) and mentioned that several unidentified species were discovered that will be covered in the present study. The remaining pseudotanaid known from the West Indies region, *Pseudotanais (P) baresnauti*, was taken from deep water (935 m) near the Barbados Trench in the Caribbean Sea (Bird 1999).

Based on collections from Atlantic subantarctic waters off South America and off Antarctica, Kudinova-Pasternak (1975) recorded four pseudotanaids: (1) *Cryptocope antarctica*, later synonymized with *Cryptocopoides arcticus* by Sieg (1977); (2) *Pseudotanais gaussi*, which was earlier described from a nearby location by Vanhoffen (1914); (3) *Pseudotanais nordenskioldi*, which Sieg (1973) had earlier described and named in his doctoral dissertation;
and (4) the new species Mortensenia longidigitata, also taken from Sieg’s dissertation and which in his 1977 monograph, he placed in the new genus Paraiungentititanais.

In Antarctic waters of the Indian Ocean, Vanhöffen (1914) reported Pseudotanais abyssi, a species previously found off Greenland, and described a new species, Pseudotanais guassi from samples collected by the German South Pole Expedition of 1901-1903. Sieg (1977) examined Vanhöffen’s specimens of P. abyssi and compared them to Hansen’s (1913) specimens from off Greenland (type locality) and apparently concluded that they were conspecific and considered them to have a bi-polar distribution. Sieg (1977) described a new species, Pseudotanais (P) longisetosus based on material from north of Cumberland Bay, South Georgia collected during the Swedish South Pole expedition to Antarctica. The enigmatic species Pseudotanais (A) guillei Shiino, 1978, was collected from the vicinity of Kerguelen Island off Antarctica. Shiino based his description on a single specimen and did not dissect the mouthparts. Sieg (1986), in a study of tanaids collected aboard the R/V Hero in 1970 in the sub Antarctic region, worked on additional material of P. guillei and included a description and illustrations of the mandibles and pars molaris. This ocular species, while superficially similar to P. mortenseni, is shown by the phylogenetic analysis of the present study to have intrinsic apomorphic differences that set it apart from all other pseudotanaids. In the same work, Sieg also reported additional occurrences of P. abyssi, and P. nordenskioldi from Antarctic waters.

Pseudotanais (A) gerlachi, a shallow-water ocular species, was described by Sieg (1977) from collections made near the Malediven, Addu Attoll in the northern Indian Ocean and is known only from the type locality. In a study of tanaids collected from deep water (3923 – 5060 m) in the Madagascar Basin, Kudinova-Pasternak (1987) described two species belonging to new genera, Latitanais beklemishevi and Curtichelia expressa, but apparently did not assign them to any higher category. They later were placed in Pseudotanaidae, subfamily Cryptocopinae, as a result of a phylogenetic analysis of the superfamily, Paratanaoidea conducted by Larsen and Wilson (2002).
In the South Pacific Ocean, there are only two records of the family Pseudotanaidae. Sieg (1977) included in his monograph a description of *Pseudotanais (A) malayensis*, an oculate species similar to *P. gerlachi*, from shallow water near the Gilbert Islands north of Australia. More recently, Bamber (2005) included in his account of tanaids from Esperance, Western Australia, a description of a new shallow water oculate species, *Pseudotanais (A) scrappi*, which is similar in some ways to *P. guillei* but is unique in that the maxillule endites terminate with seven spiniform setae rather than the usual nine known for other members of the genus.

In the northern Pacific Ocean, pseudotanaids have been reported along the coasts of California and Alaska and in the northwestern abyssal regions. Dojiri and Sieg (1997) described two species, *Pseudotanais (P) californiensis* and *Pseudotanais (A) makrothrix* from the Santa Maria Basin off California. Both species were inadequately described and the illustrations are incomplete. One (*P. makrothrix*) is an oculate while the other is not, even though they were both collected from similar depths (90 to 390 m). *Pseudotanais (P) falciculata*, widespread in the North Sea and Arctic Ocean, was recorded in the Barents Sea off the coast of Alaska by Stappers (1911), as cited in Sieg (1977). Also from the Northeast Pacific, *Pseudotanais (P) oculatus*, another species common in the North Sea, occurred in studies conducted off the coasts of Washington by Hatch (1947) and Departure Bay, Northwest Canada by Fee (1926) – both cited in Sieg (1977).

In the Northwest Pacific, pseudotanaids have been identified in samples collected from the abyssal plain region and also in the Kurile-Kamchatka and Japan Trenches north of Japan. Kudinova-Pasternak (1966) examined specimens collected from the abyssal plain south of the Bering Sea in depths greater than 6,000 m and described the species *Pseudotanais (P) vitjazi*, named for the Soviet research vessel, Vitjaz. Sieg (1977) considered *P. vitjazi* to be *incertae sedis* mainly because material was unavailable for examination and the original description was inadequate. Nevertheless, he included it in his key to the worldwide species (Sieg and Heard, 1988) as distinguished from *P. affinis* by the subequal length of the uropodal rami and distinct
denticulation of the pars molaris. In 1970, Kudinova-Pasternak reported on additional material of *P. vitjazi* collected from 5400 m depth in the Kurile-Kamchatka Trench. She reported the occurrence of *Cryptocope arctica* Hansen, 1887 (= *Cryptocopoides arcticus*) along with an unidentified *Pseudotanais* species and an unidentified male *Cryptocope*, which she partially illustrated. More recently, McLelland (2007) examined pseudotanaid specimens collected from the Kurile-Kamchatka and Japan Trenches by the Japanese research vessel, Hakuho Maru and reported the occurrence of two new species, *Pseudotanais (P) nipponicus* and *Cryptocopoides pacificus*. He considered it probable that Kudinova-Pasternak’s record of *Cryptocopoides arcticus* from the Kurile-Kamchatka Trench actually refers to *C. pacificus*.

**Oculate species and vertical distribution**

Most pseudotanaid species are blind and occur at depths ranging from 1,000 to 6,050 m; however, some occupy shallow water habitats from near surface to near the edge of the photic zone (0 - 300 m). All of the 11 known oculate species (those with either fully functional eyes or eyelobes with missing visual elements) are from depths shallower than 500 m. *Pseudotanais (P) siegi* is the deepest recorded oculate species at 325-470 m in the North Atlantic; the rest are within the photic zone with most inhabiting waters of less than 100 m. In contrast, the absence of eyes does not invariantly predict the depth of occurrence as six species without eyes are known from photic habitats in less than 100 m. For example the non-oculate *P. similis* and *P. jonesi* were collected from the English Channel in 20 and 50 m respectively (Sieg 1977). It is worth noting that seven of the ten species of the more apomorphic subgenus *Akanthinotanais* (70%) have pigmented eyes, which goes along with their shallow water habitat. This gives credence to Bird and Holdich’s (1989) assertion that “this genus originated in shallow water and is currently invading the deep-sea”.
CHAPTER III

METHODOLOGY

Material Studied

Data used in the analysis for this research was taken largely from published records on all known species from the family Pseudotanaidae including two new species described by this author from the North Pacific (McLelland 2007). Additionally, data was used from six new species discovered in pre-sorted material from the northern Gulf of Mexico (Appendix A) and also from a new species discovered in material collected from the South Atlantic Bight off the U.S. east coast. Descriptions of these new species appear in chapter V. Unless otherwise indicated, morphological terminology used in this research follows that of Bird and Holdich (1989) and Larsen (2003).

Laboratory Techniques

Pseudotanaidae specimens were examined using a Wild M5 stereomicroscope and a Leitz Labrolux 11 compound microscope. Dissections were performed using chemically sharpened tungsten wire needles on specimens softened with glycerol. Measurements and sketches of whole animals and dissected appendages were made using an Olympus 1.25X drawing tube attached to the compound microscope. After illustration, dissected appendages were transferred to glycerin jelly for permanent storage. Upon formal description, specimens selected as type material will be deposited in the Smithsonian National Museum of Natural History with additional material placed in the Gulf Coast Research Laboratory Museum.

Data Management and Character Selection

Meristic data was derived from original descriptions of all known species from the family Pseudotanaidae, including those discovered during this research, and species used as out-groups in the phylogenetic analysis. Measurements to the nearest 0.1 mm were made on enlarged illustrations of the holotype and dissected paratypes to generate values including body length percentages of the antennule, cephalothorax, pereon, pleon, pleotelson, and length vs. breadth.
dimensions of articles of the antennae, pereopods, pleopods, and uropods. Text descriptions from
the literature were used to supplement, and in some cases to ascertain, certain character states
such as simple vs. spiniform setae when original illustrations were poorly rendered. Meristic data
and character descriptions were entered into a DELTA database in order to generate a concise
uniform text description for each species and a nexus data matrix for use in the phylogenetic
analyses. The DELTA (Descriptive Language for Taxonomy) format, designed by Dallwitz et al.
(1997), has been adopted as a standard for data exchange by the International Taxonomic
Databases Working Group. In generating the nexus file, characters were selected that not only
provided diagnostic value in defining a taxon but were considered to be reliable in seeking
monophyletic groups defined by shared, derived character states based on comparison with out-
group polarity, thus defining phylogenetic relationships among the various species being
analyzed. In all, 69 characters were selected that were considered to be unambiguous and that
had diagnostic value at the suborder, family, subfamily, generic, subgeneric and specific levels.
Some characters useful for morphological description such as specific numbers or type of setae or
highly subjective descriptions of body features (e.g., shape of the cephalothorax being “sub-
trapezoidal”) were often too variable or ambiguous and thus were not scored for use in the
phylogenetic analysis.

Data Analysis

Out-groups.

_Carpoapseudes prospectnes_, a species from a distant apseudomorph family, and three
representatives from more closely allied tanaidomorph families, were selected as out-group taxa
to establish polarity of the selected character states and to increase the chances of identifying
plesiomorphies (ancestral characters). Three intermediately distant taxa (_Typholtanais parvus,
Hargeria rapax_ and _Sinelobus stanfordi_) were included to strengthen the definition of the ingroup
node, since more closely related taxa increase the number of characters that can be compared
(Nixon and Carpenter 1993), thus assisting the construction of a more robust phylogeny among
the established Pseudotanaidae taxa. Two of the out-group taxa, *C. prospectnes* and *S. stanfordi* provided historic perspective in that they were used as out-groups in Larsen and Wilson’s (2002) phylogenetic analysis of the superfamily Paratanaoidea representing respectively the suborder A pseudomorpha and the superfamily Tanaioidea.

**In-group.**

The in-group consisted of 53 species comprising all known species worldwide of the family Pseudotanaidae plus those newly discovered from this research. Currently the family consists of the subfamilies Pseudotanaainae with 45 and Cryptocopinae with eight species. The former is comprised of three genera, *Mystriocentrus*, *Parapseudotanais* and *Pseudotanais*. *Pseudotanais*, the largest of the three genera, is comprised of two subgenera, *Akanthinentanais* and *Pseudotanais sensu stricto*, which include 10 and 31 species respectively. The Cryptocopinae is more loosely defined with its eight species distributed among six genera, five of which are monospecific.

**Phylogenetic analysis.**

A heuristic search was conducted in PAUP* 4.0b (Swofford 2002) on unordered and unweighted morphological characters using a generalized parsimony optimality criterion to find the most parsimonious trees. Stepwise random addition on 100 replicates starting from random trees with a TBR (tree bisection and reconnection) branch swapping algorithm was employed in two steps as described by Olmstead et al. (1993) – first without saving multiple trees and again with multiple trees saved but starting with trees stored in memory from the first step. In addition, the character state optimization ACCTRAN (Accelerated transformation) was in effect which puts the character change as close as possible to the point of divergence between the out-groups and in-group, and MAXTREES was set at 100,000 trees with multiple trees saved. Each replicate search was continued until $8 \times 10^6$ rearrangements were tried. A strict consensus tree was computed from the most parsimonious trees resulting from the heuristic search described above and trees resulting from both the heuristic search and computed consensus were saved.
Cladograms were generated using the display Print Trees option in PAUP and the resulting PICT files were modified for display in this research using Photoshop 7 (Adobe Systems, Inc.). Since more than one out-group was used, out-groups were set to display as paraphyletic to the in-group.

Various tree statistics were computed to indicate how well the character data fit the tree and the extent to which homoplasy (character state similarity not resulting from shared ancestry) permeates the tree topology. These included tree length (TL) which is the number of steps required to achieve the shortest, most parsimonious tree, consistency index (CI), retention index (RI), rescaled consistency index (RC), and homoplasy index (HI); the latter four being indicators of the amount of homoplasy present in the tree and how well the tree describes the data set. The CI, a ratio of the minimal amount to actual amount of character change in the tree, is sensitive to uninformative characters (autapomorphies and symplesiomorphies) while the RI indicates character similarities, regardless of the autapomorphies and symplesiomorphies present, by measuring the amount of synapomorphy (shared derived characters) in the data set based on homoplasy percentages (actual/maximum possible). The RC is a function of the CI multiplied by the RI and approaches one as homoplasy decreases. The HI is merely the reciprocal of CI and approaches zero with decreasing homoplasy.

In the initial character selection process, CI values were used to assess characters for possible inclusion in or exclusion from the analysis. Character diagnostics resulting from a search conducted on an initial 80-character data set revealed some characters with extremely low (less than 0.08) CI values. These were excluded to arrive at the 69-character array used for analysis. A diagnostic description of the most parsimonious tree including statistics for each of the 69 characters used in this analysis is presented in Appendix B.

Optimal trees were evaluated for support using (1) jackknife resampling, which systematically removes taxa out of resampled data to detect the percent occurrence of a particular clade, thereby determining how much the tree topology is reliant on a single taxon, (2) bootstrap analysis which repeatedly re-samples the data set until a comparably sized pseudo-replicate data
set can be obtained from which a frequency measurement of the re-created individual branches is obtained, and (3) the calculation of decay indices to estimate branch support on the strict consensus of all trees resulting from parsimony analysis. Also known as “Bremer support” (Bremer 1994), decay indices indicate how strongly the data supports a particular hypothesis on the tree based on the number of steps required for the branch or clade to collapse. Jackknife and Bootstrap analyses were performed as PAUP functions and decay indices were obtained using TreeRot v.2 (Sorenson 1999). As compared to their use in analyzing molecular data, Jackknife and bootstrap analyses have been criticized as deficient for analyzing morphological data sets because they have relatively small numbers of dependently distributed characters (Felsenstein 1985). Data sets with such dependent characters often display erroneously high confidence estimates with underestimated high and overestimated low values (Hillis and Bull 1993; Kluge and Wolf 1993; Zharkikh and Li 1995). Notwithstanding, these analyses were employed in this research to primarily examine the node separating the Cryptocopinae from the remainder of the family, thus providing a modicum of supplementary support to the more definitive decay indices.

MacClade 4.06 (Maddison and Maddison 2005) was used to trace individual character evolution among clades observed in a strict consensus of the most parsimonious trees generated by PAUP. Diagnostic characters delineating subfamilies, genera and subgenera were examined, and in some cases detected, and marginal, low-consistent characters were evaluated for possible exclusion from further analysis.

Re-weighted character analysis

Parsimony analyses using differentially weighted characters were also conducted using PAUP, in which characters were re-weighted based on the highest RC, CI or RI for all equally parsimonious trees from the original heuristic search. The value of character weighting in cladistic analysis has been discussed by many authors including Farris (1969, 1982), Carpenter (1988), and summarized by Goloboff (1993). The objective of these re-weighted analyses was to test the effect, if any, of minimizing systematic error by maximizing informative data, assuming
all characters are neither equally informative nor equally reliable. Those trees which imply the characters to be more reliable explain the data better (Goloboff 1993). For these analyses all settings were as in the original, unweighted analysis. Best trees from the re-weighted analyses were added to a file with the best unweighted tree and the Kishino-Hasegawa (K-H) maximum likelihood test was used to determine if any of these were significantly different from the original unweighted set. The K-H test is a parametric test that compares tree lengths between the optimal tree and alternate trees under consideration by generating paired t-values.

_Marsupium development_

Bird and Holdich (1989) reported some specimens of _Cryptocopoides arcticus_ as having four pairs of oostegites rather than the normal single pair as prescribed for the family, thus casting doubt on the validity of that species and thus the systematics of the Cryptocopinae as belonging to Pseudotanaidae. To evaluate the strength of marsupium development as a diagnostic character for the phylogeny of Pseudotanaidae, an additional heuristic search was conducted using the same setup as before except for the exclusion of the character for marsupium development. Consensus trees obtained from this second data set were tested for support using jackknife, bootstrap and decay indices as before. In addition, best trees from each dataset were placed in a “neutral” file with a number of characters different from each dataset and a Kishino-Hasegawa test was conducted to test for significant difference.
CHAPTER IV
RESULTS OF DATA ANALYSIS

Parsimony analyses

General Observations.

The heuristic search conducted on 53 species of pseudotanaids and four out-group species using 69 characters resulted in six equally parsimonious trees with a 'best' tree of length 627 (Table 1). Although a rather high degree of homoplasy was evident (HI = 0.745), a consensus of the trees (Fig. 1) clearly indicated a separation of the taxa associated with the subfamily Cryptocopinae from the remaining members of the family. This separation was supported by a decay index of 4 on the node between Cryptocope abreviata and Pseudotanais (Akanthinotanais) guillei. The nodes on either side of this separation had decay indices of 2 or less. Further evidence for this separation was manifested in the jackknife and bootstrap analyses which produced nearly identical consensus trees (Figs. 2 and 3) with values at this same node of 50 and 47 % respectively, values which were about 4.0 times higher than those of the nodes to either side.

The ten species of the subgenus Akanthinotanais were positioned toward the ancestral end of the tree topology and, although showing poor Bremmer support, appeared as paraphyletic in the consensus of six trees (Fig. 1) with one, Pseudotanais (A) guillei, removed not only from the clade containing the other nine but outside the clade containing the remainder of the family. This subgenus grouping broke down completely in the jackknife and bootstrap analysis (Figs. 2 and 3).

The 35 species of Pseudotanainae were loosely grouped in two clades of 19 and 16 species, designated as A and B in Figure 1 and in the figures of Appendix D. Within these structures, clade A consisted solely of 19 Pseudotanais species whereas clade B contained 12 Pseudotanais along with the strongly supported genera Mystriocentrus and Parapseudotanais, each clade with a decay index of 4. Clades A and B, though poorly supported statistically, did
Table 1

Scores of most parsimonious trees from heuristic searches on datasets with (69-character) and without (68-character) the character for marsupium development.

<table>
<thead>
<tr>
<th></th>
<th>69-char</th>
<th>68-char</th>
<th>69-char</th>
<th>68-char</th>
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<td>TL</td>
<td>627</td>
<td>625</td>
<td>815</td>
<td>819</td>
</tr>
<tr>
<td>CI</td>
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<td>0.217</td>
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<tr>
<td>RI</td>
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<td>0.131</td>
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<tr>
<td>HI</td>
<td>0.745</td>
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K-H test:

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<th>s.d. (diff)</th>
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<th>P*</th>
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</thead>
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<td>69-char</td>
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<td>4</td>
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</table>

* Probability of getting a more extreme T-value under the null hypothesis of no difference between the two trees (two-tailed test). Asterisked values in table (if any) indicate significant difference at P < 0.05. Note: The Kishino-Hasegawa test was conducted on adjusted scores from best trees after each was placed in a neutral 80-character file.

reveal some trends of commonality among their respective species based on shared characters. These trends are examined in detail in Appendix D, which presents a synopsis of each character used in the analysis along with illustrated character state tracings for informative characters.

Re-weighted character analysis

Heuristic searches were conducted on the data using three re-weighting methods and the results were compared to the unweighted analysis. The topology of all trees resulting from both unweighted and re-weighted analyses were highly variable among the more apomorphic Pseudotananinae species but showed stability at the ancestral end of the tree containing the
outgroups and the Cryptocopinae. Unweighted tree scores were slightly better (lower TL and higher CI) than all of the weighted trees (Table 2) indicating that, with the current character set, the phylogeny is best described using unweighted data. A Kishino-Hasegawa test comparing the best unweighted tree with trees re-weighted on RC, CI, and RI revealed no significant differences at the P < 0.05 level of significance. Based on the above considerations, it was decided to center the hypothesis on the original unweighted data set.

Table 2

*Score comparison of unweighted and re-weighted trees*

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<th>CI-weighted</th>
<th>RI-weighted</th>
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<tr>
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<td>717</td>
<td>705</td>
<td>697</td>
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<tr>
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Kishino-Hasegawa Test:

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<td>(best)</td>
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<td></td>
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<tr>
<td>CI-weighted</td>
<td>705</td>
<td>9</td>
<td>11.12</td>
<td>0.8096</td>
<td>0.4208</td>
</tr>
<tr>
<td>RI-weighted</td>
<td>697</td>
<td>1</td>
<td>7.73</td>
<td>0.1293</td>
<td>0.8975</td>
</tr>
</tbody>
</table>

Result: there is no significant difference among the trees at the P < 0.05 level

*Marsupium development.*

An additional heuristic search was conducted to test the effect on the data set of excluding the character for marsupium development (one pair of oostegites vs. four pairs), a major diagnostic feature of the Pseudotanaidae. The analysis on the remaining 68 characters produced six equally parsimonious trees with a slightly shorter tree length (625) but otherwise
similar tree scores (Table 1). Bremmer support using TreeRot on the consensus of these trees was nearly identical to the 69 character analysis with a decay value of 4 at the node between the Pseudotanaainae and the more ancestral species, including the Cryptocopinae (Fig. 4). Jackknife and Bootstrap analyses likewise demonstrated support with values of 46 and 47 % respectively although the Pseudotanaainae clades collapsed similar to that seen in the 69 character analyses. Best trees from each dataset were placed in an 80-character file to neutralize the effect of scores being “adjusted” when they are placed in a file altered by different numbers of characters. A Kishino-Hasegawa test revealed no significant difference between the 69 character and 68 character trees (Table 1).
Figure 1. Strict consensus of six equally parsimonious trees of the family Pseudotanaidae. Decay indices calculated from TreeRot v.2. appear at nodes with values of 1 or less omitted. Arrow indicates node with a decay index of 4 that separates Cryptocopinae (shaded) from remainder of the family. Bracket indicates species of the subgenus *Akanthinotanais*. 
Figure 2. Jackknife consensus of six equally parsimonious trees of the family Pseudotanaidae. Arrow indicates node separating the species of Cryptocopinae (shaded) from the Pseudotanainae. Values indicate percent occurrence of a particular clade upon completion of the jackknife analysis.
Figure 3. Bootstrap consensus of six equally parsimonious trees of the family Pseudotanaidae. Arrow indicates node separating the species of Cryptocopinae (shaded) from the Pseudotanainae. Values indicate frequency of re-created individual branches at the completion of the bootstrap analysis.
Figure 4. Strict consensus of six equally parsimonious trees of the family Pseudotanaidae with the character for marsupium development omitted from the analysis. Decay indices calculated from TreeRot v.2. appear at nodes with values of 1 or less omitted. Arrow indicates node with a decay index of 4 that separates Cryptocopinae (shaded) from remainder of the family. Species bracketed are those of the subgenus *Akanthinotanais*.
Summary of Results

1. The results of a cladistic analysis using 69 morphological characters on 53 species of Pseudotanaidae and four out-groups credibly implies that the group of species currently belonging to the subfamily Cryptocopinae are separate from those of the subfamily Pseudotanainae. The main evidence for this conclusion is the strong support indices of decay (Fig. 1), jackknife (Fig. 2) and bootstrap (Fig. 3) at the node where the Pseudotanainae diverges.

2. A separate analysis omitting the character for marsupium development resulted in a tree not significantly different in character diagnostics (Table 1) and with similar support values at the separating node for the two subfamilies (Fig. 4). This implies that, although some species of Cryptocopinae may possess more than one pair of oostegites as suggested by Bird and Holdich (1989), the absence of this character does not alter the hypothesis that the two subfamilies are separate.

3. The cladogram produced by this research suggests the existence of three assemblages within the Pseudotanainae which, although lacking in support, are typified by particular suites of characters, discussed in the previous section, none of which are unique to either clade. These are indicated in Fig. 1 as clades A and B and with a bracket for the species of the subgenus Akanthinotanais, and also in illustrated character tracings presented in Appendix D (Figs. 33 - 92).

4. Clade A, consisting solely of 19 species of the subgenus Pseudotanais sensu stricto, was characterized by twelve species with short, stout spiniform setae on antenna articles 2 and 3 (character 13 – Fig. 43) and maxilliped endites fused up to 2/3 their length (character 24 – Fig. 50), 14 species having a propodus length exceeding 6.1 times its width (character 42 – Fig. 67), 13 species with long carpal blade-like setae, exceeding half the length of the propodus (character 52 – Fig. 77), and seven species with additional carpal specialized setae (character 60 – Fig. 84).

5. Clade B containing 16 species comprised a mixture of three genera including Pseudotanais sensu stricto, Mystriocentrus and Parapseudotanais. The clade was typified by
eleven species with more derived maxilliped endites which were nearly or completely fused (character 24 – Fig. 50), seven species with strongly forcipate chelae (character 26 – Fig. 52), and 14 with short carpal blade-like setae of less than half the propodus length (character 52 – Fig. 77).

6. The subgenus Akanthinotanais, consisting of 10 species (bracketed in Fig. 1), is paraphyletic with one species, *Pseudotanais* (*A*) *guillei*, lying outside a clade containing the other nine. This assemblage is characterized by seven species with eyes (character 2 – Fig. 34), nine with a simple pointed or whip-like pars molaris on the mandibles (character 18 – Fig. 47), seven with the maxilliped endites nearly or completely fused (character 24 – Fig. 50), eight with an apomorphic shortened cheliped propodus of less than or equal to 1.5 times the carpus length (character 30 – Fig. 56), seven with a dactylus distinctly shorter than the propodus on pereopod 1 (character 45 – Fig. 71), and all with the apomorphic lack of blade-like carpal setae on pereopods 2 to 6 (characters 51 and 59 - Figs. 76 and 83).

7. The eight species of the subfamily Cryptocopinae formed a loosely organized, paraphyletic assemblage that contained one monophyletic group composed of the monospecific genera, *Curtichelia expressa*, *Iungentitanais primitivus*, *Paraiungentitanais longidigitatus*, and *Latitanais beklemishevi* with fairly good support values (clade C in Figs. 39, 44, and 87). As a whole, the eight-species assemblage was distinguished by all lacking abbreviated pereonites (character 3 – Fig. 35), seven with a short first antennular article (character 6 and 7 – Figs. 37 and 38), seven with the apomorphic broad and truncate mandible pars molaris terminating with a ring of setae or short denticles (characters 17 and 18 – Figs. 46 and 47), all having completely separate maxilliped endites (character 24 – Fig. 50), all with a short and five with a broad cheliped propodus (characters 29 and 30 – Figs. 55 and 56), seven with 2 inferior setae on the cheliped fixed finger (character 31 – Fig. 57), seven with two or three propodus setae on pereopod 1 (character 43 – Fig. 68), five with a single merus seta on pereopods 2 and 3 (character 49 – Fig. 74), all lacking the dactylus-unguis fusion on pereopods 4 to 6 (character 62 – fig. 86), and as with the *Akanthinotanais* species, all with the apomorphic lack of blade-like carpal setae on
pereopods 2 to 6 (characters 51 and 59 - Figs. 76 and 83). The aforementioned four-species clade within the Cryptocopinae was distinguished from others of the subfamily by having a longer antennular third article (character 8 – Fig. 39) and well-developed pleopods with terminal and lateral setae (character 63 – Fig. 87).
CHAPTER V
SYSTEMATICS AND TAXONOMY

Proposed Systematic Revision

Based on an interpretation of the cladistic analysis presented in chapter IV, a systematic revision of the current family Pseudotanaidae is proposed in this chapter in which a new family and four new subfamilies are created. An illustration of this new phylogeny indicating the position of the subfamilies is presented in Figure 5. Complete diagnoses of all new taxa resulting from this proposal are presented in the following section, including full descriptions for new species discovered during this research. All descriptions and diagnoses are based on females since males for this group remain largely unknown. Keys to the major groups appear within each sub-level and a key to all species is given at the end of this chapter.

As seen in the consensus of six most parsimonious trees (Fig. 1), and in supplementary jackknife and bootstrap analyses (Figs. 2 and 3), there is strong evidence for the removal of eight species currently assigned to the subfamily Cryptocopinae from the family Pseudotanaidae. It is hereby proposed to erect a new family, Cryptocopidae to contain these eight species. Within this family, substantial (though weaker) support is also evident to erect three subfamilies: Cryptocopinae (one species), Cryptocopoidinae (three species), and Lungentitanainae (four species). Cryptocopinae, originally designated by Sieg (1977), contains the genus Cryptocope and diverges from the node separating it from the others of the family and from the Pseudotanaidae with a decay value of 2 and bootstrap and jackknife indices of 13 and 11 respectively. Cryptocopoidinae, containing the three species of Cryptocopoides, is supported with jackknife and bootstrap values of 24 each (Figs. 2 and 3) while Lungentitanainae, containing the four monospecific genera, are supported by bootstrap and jackknife indices of 21 each and with a decay value of 2.

The revised Pseudotanaidae with its large number of species presented a weakly supported structure in the cladistic analysis probably owing to the large amount of homoplasy.
Figure 5. A modification of the consensus of six most parsimonious trees with the proposed phylogeny of Pseudotanaidae and Cryptocopidae. Included are the locations of subfamilies Pseudotanainae, Parapseudotanainae (Paraps.), Akanthinotanainae (Akanth.), Cryptocopinae (C1), Cryptocopoidinae (C2) and Iungentitaninae (lung.). Values shown are decay indices.

Among the characters used. Therefore the following proposed taxonomy is largely conjectural and based more on observed groupings of character traits rather than support values. It is provisional until a more detailed character analysis, possibly involving molecular techniques, can be performed that will hopefully elucidate relationships among this highly variable and widespread family. Three subfamilies are proposed: the Akanthinotanainae (ten species), the Parapseudotanainae (two species) and the Pseudotanainae (33 species).

The Akanthinotanainae is clearly the more ancestral subfamily and is separated from the other two subfamilies chiefly by its less derived carpal setae on pereopods 2 to 6 (Figs. 76 and
The former *Pseudotanais* subgenus *Akanthinotanais* is hereby elevated to generic rank and is the sole representative of the subfamily. Two sub-genera within the Akanthinotanainae are recognized: *Akanthinotanais*, s.s. with nine species and *Guilleitanais* represented by a single species, *A. guillei* which features ancestral characters that place it not only outside the *Akanthinotanais* clade but outside the clade containing the rest of the family as well. These characters include plesiomorphic (more complex) setation of the maxilliped endites (Fig. 51) and less derived setation of some pereopod articles (Figs. 68 and 72).

The Parapseudotanainae is shown as part of clade B (Fig. 1) but has features that sufficiently distinguish it from the remaining members of the family such that its node could also emerge prior to the Pseudotanainae; in fact, this is demonstrated in the jackknife and bootstrap analyses (Figs. 2 and 3). Ancestral features retained by this subfamily include a short antennule article 1 which is less than half the length of the antennule (Fig. 37), a cheliped fixed finger with two inferior setae (Fig. 57), and the first pereopod carpus being more setose than those of all but three of the other family members (Fig. 66). Additionally, this subfamily is unique in that it has an antenna fifth article which is greater than 6.0 times longer than broad (Fig. 45).

The Pseudotanainae is composed of 33 species found in clades A and B, exclusive of the genus Parapseudotanais (Fig. 1). Because of its size, it necessarily shows a wide variety of mostly apomorphic characters but with little or no support among them for further sub-family level division. A single genus, *Pseudotanais*, and two sub-genera, *Pseudotanais*, s.s. and *Mystriocentrus*, are recognized. The latter has some unique features including spatulate setae found on the merus of pereopods 2 and 3 (Fig. 75) and the carpus of pereopods 4 to 6 (Fig. 84), and serrated incisive margins of the chelae (a character not used in this analysis). Other distinguishing characters of this subgenus including a short cheliped dactylus (Fig. 58), an elongate pereopod 4 basis (Fig. 79), and short uropod exopods (Fig. 89) are features shared with other members of the genus. For this reason the former genus *Mystriocentrus* is relegated to subgenus status.
Taxonomy of Pseudotanaidae

Family Pseudotanaidae Sieg, 1976

*Diagnosis*

Eyelobes pigmented, rudimentary or absent. Pereon with six free pereonites, first reduced in length. Pleon with five free pleonites. Antennule with three articles. Antenna with six articles, articles 2 and 3 with or without stout spiniform setae. Mandible pars molaris broad or narrow, with or without terminal setation. Maxillule palp terminating with two setae and endite terminating with usually nine spiniform setae (two exceptions). Maxilla rudimentary. Maxilliped bases completely fused and endites completely or partially fused and bearing simple setae, cusps, or naked. Chelipeds attached to body via sclerite. Chelae forcipate or not. Cheliped carpus with usually two inferior setae (three exceptions). Cheliped fixed finger usually with one inferior setae (four exceptions). Cheliped proximal dactylus seta present or absent. Marsupium formed by one pair of oostegites. Pereopods 2 to 6 carpus with or without modified blade-like setae. Pereopods 4 to 6 ischium with one or two setae, merus with one or two setae and dactylus fused with unguis forming claw. Pleopods usually elongate with terminal setae only (three exceptions). Uropod exopods and endopods with one or two articles or one pseudo-articulate article.

*Remarks*

The diagnosis was modified after Sieg (1977), Larsen and Wilson (2002) and Larsen (2005) from their diagnoses of the family Pseudotanaidae which included the subfamilies Cryptocopinae and Pseudotanainae. The revised family is monophyletic (Fig. 5) and includes the subfamilies Akanthinotanainae, Parapseudotanainae and Pseudotanainae.

*Key to Subfamilies*

1. Modified blade-like carpal setae present on pereopods .................................................. 2

   -- Modified blade-like carpal setae absent from pereopods .................................. Akanthinotanainae

2. Blade-like carpal setae on pereopods 4 to 6; cheliped with two setae on fixed finger............
Subfamily Akanthinotanainae, n. subfam.

**Diagnosis**

As for family except: Eyelobes pigmented or absent. Antenna articles 2 and 3 lacking stout, spiniform setae. Mandible pars molaris narrow, simple pointed (with one exception). Maxillule endite terminating with nine spiniform setae (with one exception). Cheliped carpus with two inferior setae. Cheliped fixed finger with one inferior seta. Pereopods 2 to 6 carpus without modified blade-like setae. Pleopods elongate with terminal setae only.

**Type Genus**

*Akanthinotanais*, n. gen.

**Subgenera Included**

*Akanthinotanais*, s.s., n. subgen.

*Guilleitanais*, n. subgen.

**Remarks**

The original name *Akanthinotanais* was created as a subgenus of *Pseudotanais* by Sieg (1977:30) to account for six species with “normal” carpal setae on the pereopods. In this revision, a new subfamily within Pseudotanainae is created to contain the ten species formerly of this subgenus which are in turn elevated to the new genus *Akanthinotanais*. Within the new genus, two new subgenera, *Akanthinotanais sensu stricto*, and *Guilleitanais*, are created to account for major differences between the species *A. guillei* and the other nine species of the genus.
Akanthinotanais, n. gen.
Subgenus Guilleitanais, n. subgen

Diagnosis

As for subfamily except: Eyelobes pigmented. Antenna second article shorter than third article. Mandible pars molaris narrow, simple pointed. Maxillule endite terminating with nine spiniform setae. Maxilliped endites completely fused and with more complex setation (with cusps and setae). Cheliped chelae weakly forcipate, dactylus subequal in width to fixed finger and possessing proximal seta. Pereopod 1 carpus and propodus each with two setae and dactylus with unguis subequal in length to propodus. Pereopods 2 and 3 basis with more complex setation (broom plus simple setae). Uropod exopods 75 percent length of endopods.

Type species

Akanthinotanais (Guilleitanais) guillei (Shiino, 1978)

Remarks

The cladistic analysis presented in chapter IV resulted in the species Pseudotanais (A) guillei being separate from all other species of the family with a decay value of 2. A comparison of characters reveals that this species has a combination of plesiomorphic features that are sufficient to influence its position at the ancestral end of the cladogram and justify the creation of a new subgenus within Akanthinotanais. These characters include more complex setation of the maxilliped endites (Fig. 51), a greater number (two) of propodal setae on pereopod 1 (Fig. 68), and more complex setation on the basis of pereopods 2 to 6 (Figs. 72 and 80).

Akanthinotanais (Guilleitanais) guillei (Shiino, 1978)

Synonymy

Pseudotanais guillei Shiino, 1978

Diagnosis

As for subgenus.
Type Locality

Indian Ocean: near Kergulen Islands off Antarctica

Depth Range

10 – 32 m.

Distribution

Off Antarctica in the southern Indian Ocean.

Remarks

Shiino's original description lacked dissection of mouthparts because he had only two specimens to work with. Sieg (1986) re-illustrated the species based on additional material, including the mouthparts. This oculate species is similar to A. gerlachi except that the acuminate pars molaris of the mandible is shorter, the two spiniform setae on the merus of pereopods 4 to 6 are unequal in length and the uropodal exopod is about 75 percent the length of the endopod. It differs from A. mortenseni primarily by the shorter cheliped carpus. This species is currently the sole representative of the subgenus.

References


Subgenus Akanthinotanais sensu stricto, n. subgen.

Diagnosis

As for the subfamily.

Type Species

Akanthinotanais (Akanthinotanais) gerlachi (Sieg, 1977)

Species Included

Akanthinotanais (Akanthinotanais) gerlachi (Sieg, 1977)

Akanthinotanais (A) longipes (Hansen, 1913)
Akanthinotanaia (A) malayensis (Sieg, 1977)  
Akanthinotanaia (A) mortenseni (Sieg, 1977)  
Akanthinotanaia (A) similis (Sieg, 1977)  
Akanthinotanaia (A) gaussi (Vanhöffen, 1914)  
Akanthinotanaia (A) scrappi (Bamber, 2005)  
Akanthinotanaia (A) makrothrix (Dojiri and Sieg, 1977)  
Akanthinotanaia (A) siegi (Kudinova-Pasternak, 1985)  

Akanthinotanaia (Akanthinotanaia) gerlachi (Sieg, 1977)  

Synonymy  

Pseudotanaia (Akanthinotanaia) gerlachi Sieg, 1977  

Diagnosis  

As for subfamily except: Eyelobes pigmented. Antennule first article about 5.0 times longer than broad. Antenna second article subequal to third article, fourth article about 6.0 times longer than broad and fifth article less than 4.0 times longer than broad. Mandible pars molaris narrow, simple pointed. Maxillule endite terminating with nine spiniform setae. Maxilliped endites fused except for distal notch and without setation. Cheliped chelae weakly forcipate; dactylus greater than half the length of the propodus, narrower than fixed finger and possessing proximal seta. Pereopod 1 basis about 6.0 times longer than broad, with one simple seta; ischium with two setae, merus without setae, carpus and propodus each with one seta, propodus about 6.0 times longer than broad, and dactylus with unguis distinctly shorter than propodus. Pereopods 2 and 3 basis without setae, ischium with two setae, merus with two setae, dactylus with unguis 2/3 length of propodus. Pereopod 4 basis about 3.0 times longer than broad. Pereopods 4 to 6 basis without setae, ischium with two equal setae, and merus with two setae. Uropod exopods subequal in length to endopods.
Type Locality

Indian Ocean: Malediven and Addu atolls (off coast of India)

Depth Range

5 – 32 m.

Distribution

Indian Ocean from the type locality.

Remarks

This species is designated the type for the subgenus based on its useage by Sieg (1977: 30) as the type for the subgenus Akanthinotanais under Pseudotanais. An occulate species, A. gerlachi is distinguished by its long, thin pars molaris on the mandibles, the merus of pereopods 4 to 6 with two short spiniform setae and with subequal uropodal rami.

Reference


Akanthinotanais (Akanthinotanais) longipes (Hansen, 1913)

Synonymy

Pseudotanais longipes Hansen, 1913: 33.

Pseudotanais (Akanthinotanais) longipes Hansen, 1913 – Sieg (1977:30-34)

Diagnosis

As for subfamily except: Eyelobes lacking. Antennule first article greater than 7.0 times longer than broad. Antenna second article longer than third article, fourth article greater than 12.0 times longer than broad and fifth article 4.0 times longer than broad. Mandible pars molaris narrow with several blunt terminal and subterminal denticles. Maxillule endite terminating with nine spiniform setae. Maxilliped endites fused between 1/3 and 2/3 length, each with one short seta. Cheliped chelae not forcipate, propodus about 4.0 times longer than broad; dactylus greater
than half length of propodus, subequal in width to fixed finger and possessing proximal seta.
Pereopod 1 basis about 10.0 times longer than broad, without setae; ischium, merus, carpus,
propodus and dactylus each with one seta, propodus about 10.0 times longer than broad and
dactylus with unguis distinctly shorter than propodus. Pereopods 2 and 3 basis without setae,
ischium with one seta, merus with two setae, dactylus with unguis 2/3 length of propodus.
Pereopod 4 basis greater than 7.0 times longer than broad. Pereopods 4 to 6 basis without setae,
ischium with two unequal setae, and merus with two setae. Uropod exopods subequal in length to
endopods.

Type Locality

North Atlantic: southwest of Iceland

Depth Range

1280 m.

Distribution

North Atlantic from type locality.

Remarks

This species is distinguished by its elongate cheliped carpus and propodus (3.3 and 4.1
times longer than broad respectively) and the mandible pars molaris with several distal and
subdistal blunt processes (all other members of the subfamily have a simple pointed pars
molaris). It is further unique among its congenitors for having an extremely long antennule first
article and antenna third article (longer than article 2).

References


Akanthinotanais (Akanthinotanais) malayensis (Sieg, 1977)

Synonymy
Pseudotanais (Akanthinotanais) malayensis Sieg, 1977:38

Diagnosis

As for subfamily except: Eyelobes present, with pigment. Antennule first article about 5.0 times longer than broad. Antenna second article subequal to third article, fourth article about 5.0 times longer than broad and fifth article 2.0 times longer than broad. Mandible pars molaris narrow with simple point. Maxillule endite terminating with nine spiniform setae. Maxilliped endites fused except for distal notch, each with one short seta. Cheliped chelae not forcipate, propodus about 3.0 times longer than broad; dactylus less than half length of propodus, subequal in width to fixed finger and possessing proximal seta. Pereopod 1 basis about 8.0 times longer than broad, without setae; ischium with one seta, merus without setae, carpus with one seta, propodus and dactylus without setae, propodus about 7.0 times longer than broad and dactylus with unguis distinctly shorter than propodus. Pereopods 2 and 3 basis without setae, ischium with two equal setae, merus with two setae, dactylus with unguis about half length of propodus. Pereopod 4 basis less than 4.0 times longer than broad. Pereopods 4 to 6 basis without setae, ischium with two equal setae, and merus with two setae. Uropod exopods half length of endopods.

Type Locality

South Pacific Ocean: Gilbert Islands.

Depth Range

Shallow water (no depth provided).

Distribution

Western Pacific Ocean above Australia.

Remarks
This oculate species is similar to *A. gerlachi* except for the comparative difference in uropodal rami length - the exopod is about half as long as the endopod in *A. malayensis* whereas the rami are subequal in *A. gerlachi*.

*Reference*


*Akanthinotanais (Akanthinotanais) mortenseni* (Sieg, 1977)

*Synonymy*

*Pseudotanais (Akathinotanais) mortenseni* Sieg, 1977:42

*Diagnosis*

As for subfamily except: Eyelobes present, with pigment. Antennule first article about 5.0 times longer than broad, distal article 6.0 times longer than broad. Antenna second article subequal to third article, fourth article about 6.0 times longer than broad and fifth article about 5.0 times longer than broad. Mandible pars molaris narrow with simple point. Maxillule endite terminating with nine spiniform setae. Maxilliped endites completely fused, without setae. Cheliped chelae not forcipate, propodus about 4.0 times longer than broad; dactylus greater than half length of propodus, narrower than fixed finger and possessing proximal seta. Pereopod 1 basis about 8.0 times longer than broad, without setae; ischium and merus with one seta, carpus with two setae, propodus with one seta and dactylus without setae, propodus about 5.0 times longer than broad and dactylus with unguis distinctly shorter than propodus. Pereopod 4 basis greater than 6.0 times longer than broad. Pereopods 2 to 6 basis with broom setae, ischium with two unequal setae, and merus with two setae. Uropod exopods 75 percent length of endopods.

*Type Locality*
North Atlantic: St. Thomas (West Indies).

**Depth Range**

18–25 m.

**Distribution**

St. Thomas (West Indies), Florida Keys (USA).

**Remarks**

This oculate species is noted for its long, unusually shaped cheliped, its merus setation on pereopods 4 to 6 (one long and one short spiniform setae) and its shallow distribution in tropical Atlantic waters. It is most similar in appearance to *A. siegi* but differs among other features by having shorter, more convex pereonites, well-developed, more setose pleopods, and shorter uropodal rami.

**References**


*Akanthinotanais* (*Akanthinotanais*) *similis* (Sieg, 1977)

**Synonymy**

*Pseudotanais* (*Akanthinotanais*) *similis* Sieg, 1977:46

**Diagnosis**

As for subfamily except: Eyelobes lacking. Antennule first article about 5.0 times longer than broad. Antenna second article subequal to third article, fourth article about 5.0 times longer than broad and fifth article less than 4.0 times longer than broad. Mandible pars molaris narrow with simple point. Maxillule endite terminating with nine spiniform setae. Maxilliped endites fused except for distal notch, each with short seta. Cheliped chelae not forcipate, propodus 2.5 times longer than broad; dactylus greater than half length of propodus, narrower than fixed finger and possessing proximal seta. Pereopod 1 basis about 5.0 times longer than broad, without setae;
ischium, merus and carpus with one seta, propodus and dactylus without setae, propodus about 6.0 times longer than broad and dactylus with unguis distinctly shorter than propodus. Pereopods 2 and 3 basis with broom setae, ischium and merus with one seta, dactylus with unguis about half length of propodus. Pereopod 4 basis less than 4.0 times longer than broad. Pereopods 4 to 6 basis with broom setae, ischium with one seta and merus with two setae. Uropod exopods slightly shorter than endopods.

Type Locality

North Atlantic: Roscoff/Bloscon - English Channel off the northern coast of France.

Depth Range

20 m.

Distribution

North Atlantic off the northern coast of France (type locality).

Remarks

A non-oculate shallow water species, A. similis is most similar to A. gaussi but differs by having a single distal spiniform seta on pereopods 4 to 6 which is shorter than the claw (A. gaussi has two such setae that extend beyond the claw) and the propodus on the same appendages are about twice the length of the claw, whereas those on A. gaussi are 3.0 times the length.

Reference


Akanthinotanais (Akanthinotanais) gaussi (Vanhöffn, 1914)

Synonymy

Pseudotanais gaussi Vanhöffn, 1914: 438

Pseudotanais (Akanthinotanais) gaussi Vanhöffn, 1914 - Sieg (1977): 50

Diagnosis
As for subfamily except: Eyelobes lacking. Antennule first article about 6.0 times longer than broad. Antenna second article subequal to third article, fourth article about 10.0 times longer than broad and fifth article about 3.0 times longer than broad. Mandible pars molaris narrow with simple point. Maxillule endite terminating with nine spiniform setae. Maxilliped endites fused between 1/3 and 2/3 length, each distally with long simple seta. Cheliped chelae not forcipate, propodus 2.5 times longer than broad; dactylus greater than half length of propodus, narrower than fixed finger and possessing proximal seta. Pereopod 1 basis about 8.0 times longer than broad, with broom seta; ischium and merus with one seta, carpus and propodus without setae and dactylus with short seta, propodus about 11.0 times longer than broad and dactylus with unguis distinctly shorter than propodus. Pereopods 2 and 3 basis with broom setae, ischium and merus with one seta, dactylus with unguis subequal to length of propodus. Pereopod 4 basis about 6.0 times longer than broad. Pereopods 4 to 6 basis with simple and broom setae, ischium and merus with one seta. Uropod exopods about 2/3 length of endopods.

Type Locality

South Atlantic: off Antarctica.

Depth Range

385–1425 m.

Distribution

South Atlantic Ocean off Antarctica.

Remarks

This species is distinctive with its two long infero-distal spiniform setae on the propodus which are longer than the claw which is, in turn, about 1/3 the length of the propodus.

References

Akanthinotanais (Akanthinotanais) scrappi (Bamber, 2005)

Synonymy

Pseudotanais (Akanthinotanais) scrappi Bamber, 2005: 720

Diagnosis

As for subfamily except: Eyelobes present, with pigment. Antennule first article about 3.0 times longer than broad. Antenna second article shorter than third article, fourth article about 5.0 times longer than broad and fifth article about 3.0 times longer than broad. Mandible pars molaris narrow with simple point. Maxillule endite terminating with seven spiniform setae. Maxillipeds endites completely fused, without setae. Cheliped chelae not forcipate, propodus about 3.0 times longer than broad; dactylus less than half length of propodus, subequal in width to fixed finger and lacking proximal seta. Pereopod 1 basis about 7.0 times longer than broad, without setae; ischium, merus, carpus, propodus and dactylus without setae, propodus about 7.0 times longer than broad and dactylus with unguis subequal in length to propodus. Pereopods 2 and 3 basis with simple setae (on pereopod 3), ischium with two equal setae, merus with two setae, dactylus with unguis about half length of propodus. Pereopod 4 basis less than 4.0 times longer than broad. Pereopods 4 to 6 basis without setae, ischium with two equal setae, and merus with two setae. Uropods exopods subequal in length to endopods.

Type Locality

South Pacific: Esperance, South Australia

Depth Range

38 m.

Distribution

Pacific Ocean off the coast of Esperance, South Australia (type locality)

Remarks
In appearance and pereopod setation, this oculate species is most similar to *A. guillei* from the Subantarctic but differs by having a stouter body size of 3.8 times longer than broad (opposed to 5.0 times for *A. guillei*), bi-articulate uropodal rami, and more elongate antennal articles. The unusual armament of the maxillule endite (seven terminal spines rather than the normal nine) is unique for the subfamily.

**Reference**

Bamber (2005): 720–723, Figs. 55, 56.

*Akanthinotanais (Akanthinotanais) makrothrix* (Dojiri and Sieg, 1977)

**Synonymy**

*Pseudotanais makrothrix* Dojiri and Sieg, 1977: 258

**Diagnosis**

As for subfamily except: Eyelobes present, with pigment. Antennule first article about 6.0 times longer than broad. Antenna not described. Mandible pars molaris narrow with simple point. Maxillule not described. Maxilliped endites completely fused, each with short seta. Cheliped chelae not forcipate, propodus about 3.0 times longer than broad; dactylus greater than half length of propodus, narrower than fixed finger and possessing proximal seta. Pereopod 1 not described. Pereopod 2 basis with broom seta, ischium with one setae, merus with two setae, dactylus with unguis about 2/3 length of propodus. Pereopods 4 and 5 not described. Uropod exopods subequal in length to endopods.

**Type Locality**

North Pacific: Santa Maria Basin off California, USA.

**Depth Range**

98–393 m.

**Distribution**
Pacific Ocean off California, USA (type locality).

Remarks

The original description by Dojiri and Sieg is inadequate because the body length and descriptions and illustrations of most appendages were omitted (of the pereopods, only pereopod 2 and part of pereopod 6 were illustrated). As a result, the precision of the analysis was likely affected due to missing data. The authors, in comparing this oculate species to the similar *A. guillei*, stated that it is different by "its slender and longer propodal spines, most noticeable on periopod 6" which in *A. makrothrix* are "more than half as long as the propodus". They erroneously termed these structures as propodal spines when, in fact, they were referring in the illustrations to the carpal spiniform setae which do not appear to be much different than those illustrated for *A. guillei* by Sieg (1986, Fig. 102); the latter species appears to have carpal pereopod spiniform setae that are, in pereopods 2 and 3, subequal to the propodus.

Reference

Dojiri and Sieg (1977): 258, Fig. 3.29.

*Akanthinotanais* (*Akanthinotanais*) siegi (Kudinova-Pasternak, 1985)

Synonymy

*Pseudotanais siegi* Kudinova-Pasternak, 1985:60

Diagnosis

As for subfamily except: Eyelobes present, with pigment. Antennule first article 6.5 times longer than broad, distal article about 9.5 times longer than broad. Antenna second article subequal to third article, fourth article about 11.0 times longer than broad and fifth article more than 6.0 times longer than broad. Mandible pars molaris narrow with simple point. Maxillule endite terminating with nine spiniform setae. Maxilliped endites completely fused, each with short seta. Cheliped chelae not forcipate, propodus about 5.0 times longer than broad; dactylus
greater than half length of propodus, narrower than fixed finger and lacking proximal seta. Pereopod 1 basis about 9.0 times longer than broad, without setae; ischium, merus, carpus and propodus with one seta and dactylus without setae, propodus about 9.0 times longer than broad and dactylus with unguis distinctly shorter than propodus. Pereopods 2 and 3 basis without setae, ischium and merus with one seta, dactylus with unguis 2/3 length of propodus. Pereopod 4 basis about 9.0 times longer than broad. Pereopods 4 to 6 basis without setae, ischium with one seta, and merus with two setae. Uropod exopods 2/3 length of endopods.

**Type Locality**

North Atlantic: Great Meteor Seamount.

**Depth Range**

325–470 m.

**Distribution**

North Atlantic Ocean near the Great Meteor seamount (type locality).

**Remarks**

This species is similar to *A. mortenseni* in some features (see remarks for *A. mortenseni*). Unique characteristics for *A. siegi* include a long seta on the merus of the cheliped supported by a small protuberance, serrate incisive margins on the chela, notably long, spindly pereopods and antennae, and an extremely long distal carpal seta on pereopods 4 to 6 that extends beyond the dactylus. Setation on the pereopods was inadequately described and illustrated and was therefore assumed to be simple setae. Original description is in Russian.

**Reference**


Subfamily Parapseudotanainae, n. subfam.

**Diagnosis**
As for family except: Eyelobes absent. Cephalothorax longer than pereonites 1 to 3. Pereonites 4 and 5 distinctively elongate. Antennule first article less than half length of entire antennule. Antenna second and third articles with simple setae, fifth article greater than 6.0 times longer than broad. Mandible pars molaris narrow, bifid-tipped or with marginal setules. Maxillule endite terminating with nine spiniform setae. Maxilliped endites fused between 1/3 to 2/3 length, bearing cusps or setae. Chelae not forcipate. Cheliped propodus greater than 1.5 times longer than carpus, carpus and fixed finger with two inferior setae, dactylus subequal in width to fixed finger and bearing proximal seta. Pereopod 1 merus with one seta, carpus with three setae, dactylus with exceptionally long seta and dactylus with unguis subequal to length of propodus. Pereopods 2 and 3 carpus with modified blade-like setae, half or less length of propodus; dactylus with unguis about half length of propodus. Pereopods 4 to 6 basis without setae, ischium with one seta, merus with two setae, carpus lacking modified blade-like setae and propodus lacking broom setae. Pleopods lacking or elongate with terminal setae. Uropod exopods with two articles, subequal in length to endopods; endopods with one or two articles.

*Type Genus*

*Parapseudotanais* Bird and Holdich, 1989

*Remarks*

This subfamily currently comprises a single genus and has features that sufficiently distinguish it from the other two subfamilies of Pseudotanaidae. Although poorly supported in the cladistic analysis, as was also the case for Pseudotanainae, it possesses ancestral characters that place it somewhere between the Akanthinotanainae and the more derived Pseudotanainae. These include a short antennule article 1 which is less than half the length of the antennule (Fig. 37), a cheliped fixed finger with two inferior setae (Fig. 57), and a first pereopod carpus that is more setose than most of the other family members (Fig. 66). Additionally, this subfamily is unique in that it has an apomorphic fifth antenna article which is greater than 6.0 times longer than broad (Fig. 45).
Species Included

Parapseudotanais abyssalis Bird and Holdich, 1989

Parapseudotanais sp. A., n. sp.

Parapseudotanais abyssalis Bird and Holdich, 1989

Diagnosis

As for subfamily except: Antennule distal article about 11.0 times longer than broad. Antenna 75 percent length of antennule, second article longer than third, fourth article 7.0 times longer than broad, and fifth article nearly 8.0 times longer than broad. Mandible pars molaris narrow, bifid-tipped. Maxilliped endites bearing marginal cusps. Cheliped carpus twice as long as broad, propodus about 3.0 times longer than broad and dactylus about 60% of propodus length. Pereopod 1 basis 9.0 times longer than broad, without setae; ischium with one seta and propodus 5.0 times longer than broad, with two setae. Pereopods 2 and 3 basis without setae and ischium and merus each with one seta. Pereopod 4 basis 3.0 times longer than broad. Pleopods lacking.

Type Locality

Northeast Atlantic: northern Bay of Biscay.

Depth Range

4226–4327 m.

Distribution

Northeast Atlantic Ocean in the Bay of Biscay (type locality).

Remarks

This species is distinguished by the presence of two inferior setae on the fixed finger of the chela and small blade-like spiniform setae on the carpus of pereopods 2 and 3 which are replaced by stout serrate spiniform setae on pereopods 4–6.

Reference
Parapseudotanais sp. A, n. sp. (Figures 6–9)

Diagnosis

As for the subfamily and *P. abyssalis* except:

Antennule distal article 8.0 times longer than broad. Antenna 82 percent length of antennule, second article shorter than third and fifth article 7.0 times longer than broad.

Mandible pars molaris narrow, bifid-tipped and laterally setulate. Maxilliped endites each bearing short seta. Cheliped carpus 2.5 times longer than broad. Pereopod 1 basis 7.0 times longer than broad, with simple setae; ischium without setae and propodus 6.0 times longer than broad, with one seta. Pereopods 2 and 3 basis with simple setae, ischium without setae and merus with two setae. Pereopod 4 basis 4.0 times longer than broad. Pleopods elongate, with terminal setae.

Type Locality

North Atlantic: Gulf of Mexico, Texas A&M Deepwater Gulf of Mexico Station S35-1 in the western Gulf of Mexico.

Depth Range

533–1460 m.

Distribution

Gulf of Mexico

Material Examined

Holotype, preparatory female, 1.9 mm., DGoM Station S35–1, 29°20.0500’N 87°03.3758’W, western Gulf of Mexico, 11 June 2000, 658 m. Paratypes: one preparatory female, 1.8 mm and two non-ovigerous females, 1.35 mm - one dissected and slide mounted, from type locality. Other paratypes: DGoM Station W4–2, one female, 2.2 mm; DGoM Station S35–5, two females, 0.9 mm; DGoM Station BH-5, two females, 1.5 mm, - one dissected and slide mounted.
Description

Based on holotype (Fig. 6A,B) and non-ovigerous female paratypes. Body 1.4 to 2.2 mm, 4.8 times longer than broad.

Cephalothorax (Fig. 6A) longer than pereonites 1-3, subtriangular, becoming narrow anteriorly, with pair of antero-lateral setae, 17.2 percent total length; eyelobes absent.

Pereon 48.6 percent total length, pereonites 1-3 abbreviated; pereonites 1 and 3–6 with pair of dorso-lateral setae (those of pereonite 1 more prominent).

Pleon shorter than pereonites 5+6, 15.3 percent total length, pleonites 4 and 5 with pair of dorso-lateral setae.

Pleotelson (Fig. 7B) subequal to pleonites 4–5, 7.3 percent total length, subtriangular, with pair of dorso-lateral setae, pair of ventro-lateral setae near emergence of uropod basal article, and four apical setae.

Antennule (Fig. 7D) 26 percent of body length, with three articles; first article 46.4 percent of total length, 4.3 times longer than broad, with two short medial simple setae, five short hair-like medial setae, four short hair-like distal setae and one long distal simple seta; second article 2.8 times longer than broad, with one long distal simple seta and two hair-like distal setae; distal article 7.9 times longer than broad, terminating with four simple setae (three long, one short) and three aesthetasc.

Antenna (Fig. 7E) with six articles, 82.3 percent length of A1; second article 0.6 times longer than broad, about 2/3 length of third article, both articles distally with short, slender spiniform seta; fourth article 6.8 times longer than broad, with four short distal simple setae and one distal broom seta; fifth article 6.7 times longer than broad, distally with one long simple seta; sixth article small, terminating with one aesthetasc and three simple setae (one long, distally bent, apparently fused to aesthetasc).

Mouthparts. Labrum (Fig. 8C) broad, cap-shaped, non-setose. Mandibles (Fig. 8A,B) with distal margins coarsely denticulate (left) and finely denticulate (right), right lacinia mobilis
represented by short, pointed process, left lacinia mobilis well developed and coarsely
denticulate, pars molaris acuminate, minutely bifid (left only) and with 7–10 setules along
anterior margin. Labium (Fig. 8D) broad, medially cleft, lobes non-setulose. Maxillule endite
(Fig. 8E) terminating with nine spiniform setae and pair of long sub-terminal accessory setae.
Maxilla not observed. Maxilliped (Fig. 8F) bases completely fused, with small seta near each
palp articulation; endites fused between 1/3 and 2/3 length, each with one short seta, with lateral
margins smooth; palp with four articles; article 1 without setae; article 2 with two unequal inner-
edge simple setae and one outer-edge simple seta; article 3 with three inner-edge spiniform setae
and one inner-edge simple seta; article 4 with one small outer-edge simple seta and five inner-
edge simple setae. Epignath not observed

_Cheliped_ (Fig. 7A) large, somewhat elongate, chela not forcipate; sclerite well
developed; basis about same size as sclerite and 2.0 times longer than broad, with distal superior
seta; merus triangular, with inferior seta; carpus 2.5 times longer than broad, with two medial
inferior setae, one distal superior seta and one medial superior seta; propodus 3.0 times longer
than broad, about 1.8 times longer than carpus, palm with one long and seven short comb setae;
fixed finger with two inferior setae, three superior setae, one seta near articulation with dactylus
and two low profile teeth on incisive margin; dactylus 57.1 percent of propodus length, width
subequal to fixed finger, with proximal simple seta and subdistal low profile tooth on incisive
margin.

_Pereopod 1_ (Fig. 9A) more slender and longer than pereopods 2 and 3; coxa with seta;
basis 7.0 times longer than broad, with medial superior seta and proximal superior seta; ischium
without setae; merus 1.3 times longer than broad, distally with short inferior seta; carpus 2.0
times longer than broad, 1.4 times length of merus, distally with three short setae; propodus 5.8
times longer than broad, with superior marginal spinules, distally with short inferior seta; dactylus
with long seta, length with unguis subequal to length of propodus.
Pereopod 2 (Fig. 9B) coxa with seta; basis 5.5 times longer than broad, with short proximal inferior seta; ischium with setae lacking; merus 2.1 times longer than broad, distally with two unequal inferior setae; carpus 2.2 times longer than broad, about 0.9 times length of merus, distally with one short superior spiniform seta, one short, broad posterior spiniform seta, inferior bayonet-like seta of about 50 percent length of propodus and four transverse rows of inferior marginal setules; propodus 3.4 times longer than broad, with one short distal inferior spiniform seta (about third length of dactylus-unguis); dactylus stout, completely fused with unguis, and without setae, length about half that of propodus.

Pereopod 3 (Fig. 9C) carpus 1.6 times longer than broad; otherwise similar to pereopod 2.

Pereopod 4 (Fig. 9D) basis 4.1 times longer than broad, tumid, with setae lacking; ischium with one short simple seta; merus 2.0 times longer than broad, distally with two short unequal serrate spiniform setae; carpus 5.4 times longer than broad, 2.7 times longer than merus, distally with one short superior simple seta, four short unequal serrate spiniform setae and four semicircular rows of inferior marginal setules; propodus 5.1 times longer than broad, slightly shorter than carpus, distally with one long superior terminal spiniform seta, two unequal inferior spiniform setae, superior marginal spinules and setulose terminal margin at emergence of dactylus; dactylus fused with unguis to form claw, length with unguis less than half length of propodus.

Pereopod 5 (Fig. 9E) similar to pereopod 4.

Pereopod 6 (Fig. 9F) carpus 3.9 times longer than broad; distally with one less serrate spiniform seta, propodus with additional terminal spiniform seta, otherwise similar to pereopods 4 and 5 but proportionally shorter.

Pleopods (Fig. 7C) rami elongate, with terminal setae only; endopod about 4/5 length of exopod, with five terminal setae; exopod with seven terminal setae.
Uropods (Fig. 7B) rami slender, elongate; exopod with two articles, about 80 percent length of endopod, proximal article about half length of ramus, with one distal simple seta, distal article with two unequal simple setae; endopod with one article, with two medial broom setae, one long sub-terminal simple seta, three long and two short terminal simple setae, and one terminal broom seta.

Remarks

This new species is similar to *P. abyssalis* from the northeast Atlantic, sharing a characteristic body shape with abbreviated first three pereonites, similar proportions and setation for antennae and pereopods, and nearly identical chelifeds. Basic differences that distinguish the new species from its congenitor include (1) having a uni-articulate uropodal endopod, (2) more modified mandible pars molaris with marginal setae, and (3) maxillipeds with basal setae, endites with small setae instead of cusps, and one fewer inner edge setae on the first article of the palp. In addition, the new species appears to have modified bayonet-like spiniform setae on the carpus of pereopods 2 and 3 similar in appearance to the “blade-like” setae illustrated by Bird and Holdich (1989:284). This might just be a matter of interpretation. It should also be noted those authors based their description on just five poorly preserved, non-ovigerous specimens collected from a small area in the Bay of Biscay in much deeper water (below 4000 m) than that observed for the Gulf of Mexico species (533–1460 m).
Figure 6. *Parapseudotanais* sp. A. Holotype, female. A, dorsal view. B, lateral view. Scale = 0.5 mm
Figure 7. *Parapseudotanais* sp. A. Parattype, female. A, Cheliped inner face. B, Pleotelson and uropods, ventral view. C, Pleopods. D, Antennule. E, Antenna. Scale = 0.2mm
Figure 9. *Parapseudotanais* sp. A. Paratype, female. A-F, Pereopods 1 to 6 respectively. Scale = 0.2mm
Subfamily Pseudotanainae Sieg, 1977

*Diagnosis*

As for family except: Antenna fifth article less than 6.0 times longer than broad. Maxillule endite terminating with usually nine spiniform setae (one exception). Cheliped propodus greater than 1.5 times longer than carpus and fixed finger usually with one inferior setae (two exceptions). Pleopods usually elongate with terminal setae only (two exceptions).

*Type Genus*

*Pseudotanais* G.O. Sars, 1882

*Subgenera Included*

*Mystriocentrus*, n. subgen.

*Pseudotanais*, s.s. Sieg, 1977:55

*Remarks*

The diagnosis presented here differs from those presented by Sieg (1977), Bird and Holdich (1989) and Larsen (2005) largely because of the exclusion of the previously discussed subfamilies. It is based entirely on characters used in the cladistic analysis and is necessarily broad given the large number of species (33) with numerous divergent characters.

*Key to Subgenera*

1. Chela strongly forcipate with serrate incisive margins; spatulate-tipped setae present on merus of pereopods 2 and 3 and carpus of pereopods 4 to 6 .............................................. *Mystriocentrus*

2. Chela may be forcipate but incisive margins not serrate; without spatulate-tipped setae as above ........................................................................................................ *Pseudotanais*

Subgenus *Mystriocentrus*, n. subgen.

*Diagnosis*
As for family and subfamily except: Eyelobes absent. Antenna article 2 subequal in length to article 3, both without stout spiniform setae. Mandible pars molaris narrow, with or without bifid tip. Maxillule endite terminating with nine spiniform setae. Maxilliped bases and endites completely fused, endites bearing cusps or naked. Chelae strongly forcipate, with serrate incisor margins. Cheliped carpus with two inferior setae, fixed finger with one inferior seta; dactylus greater than 63 percent of propodus and subequal in width to fixed finger. Pereopod 1 basis without setae, merus with and carpus with one seta, propodus with two setae, dactylus with unguis distinctly shorter than propodus. Pereopods 2 and 3 ischium with one seta, merus with one modified spatulate-tipped seta, carpus with one modified blade-like seta less than half length of propodus. Pereopod 4 basis greater than 6.0 times longer than broad. Pereopods 4 to 6 basis with broom setae, ischium and merus with one seta, carpus with one blade-like seta and one spatulate-tipped seta and propodus with broom seta. Pleopods elongate with terminal setae only.

Type Species

*Pseudotanaïs (Mystriocentrus) serratus* (Bird and Holdich, 1989)

Species Included

*Pseudotanaïs (Mystriocentrus) serratus* (Bird and Holdich, 1989)

*Pseudotanaïs (Mystriocentrus)* sp. A, n. sp.

Remarks

Members of this subgenus possess some unique features such as the derived spatulate-tipped setae and serrate chelae; however, nearly all other diagnostic characters are shared by at least some other members of the family. Therefore the former genus *Mystriocentrus* was relegated to subgenus status.

*Pseudotanaïs (Mystriocentrus) serratus* (Bird and Holdich, 1989)
Synonymy

*Mystriocentrus serratus* Bird and Holdich, 1989: 27

Diagnosis

As for subgenus except: Cephalothorax subequal to pereonites 1 to 3. Pereonite 3 abreviated (shorter than pereonite 2). Antennule 93 percent length of antenna, first article about 6.0 times longer than broad. Antenna fourth article about 9.0 times longer than broad. Mandible pars molaris simple pointed. Maxilliped endites completely fused, naked. Cheliped carpus about 2.5 times longer than broad; propodus greater than 1.5 times longer than carpus, about 3.0 times longer than broad; dactylus 72 percent of propodus length, without proximal seta. Pereopod 1 ischium and dactylus without setae. Pereopods 2 and 3 basis without setae, merus with two setae (in addition to spatulate-tipped setae) and dactylus with unguis distinctly less than half length of propodus. Pereopod 4 basis about 8.0 times longer than broad. Uropod exopods with one pseudo-articulated article, about 75 percent length of endopods; endopods likewise with one pseudo-articulated article.

Type Locality

Northeast Atlantic: Rockall Trough, west of Hebrides Terrace Seamount.

Depth Range

1378–4632 m.

Distribution

North Atlantic Ocean west of Ireland.

Remarks

This species is characterized by forcipate chelae with serrate incisive margins and distinctive spatulate setae on pereopods 2 to 3 (merus) and 4 to 6 (carpus). In addition to the diagnosis, this species also possesses thickened setae on the sixth antennal article and also on the
fourth article of the maxilliped palp. Bird and Holdich (1989) found this species to be widespread both geographically and bathymetrically in Northeast Atlantic stations off Ireland.

Reference


_Pseudotanais (Mystriocentrus)_ sp. A, n. sp. (Figures 10 – 13)

Diagnosis

As for subgenus and _P. serratus_ except: Cephalothorax longer than pereonites 1 to 3. Pereonite 3 not abbreviated. Antennule 82 percent length of antenna, first article about 4.0 times longer than broad. Antenna fourth article about 6.0 times longer than broad. Mandible pars molaris minutely bifid-tipped. Maxilliped endites completely fused, bearing 2 short cusps. Cheliped propodus about 2.5 times longer than broad; dactylus 65 percent of propodus length, with proximal seta. Pereopod 1 ischium and dactylus each with one seta. Pereopods 2 and 3 basis with broom and simple setae, merus with three setae (in addition to spatulate-tipped setae) and dactylus with unguis about half length of propodus. Pereopod 4 basis about 11.0 times longer than broad. Uropod exopods with two articles, half length of endopods; endopods with two articles.

Type Locality

North Atlantic: Gulf of Mexico, Texas A&M Deepwater Gulf of Mexico Station W2–2 in the western Gulf of Mexico.

Depth Range

212–3007 m.

Distribution

Gulf of Mexico

Material Examined
Holotype, preparatory female, 0.85 mm, DGoM station W2–2, 27°24.7019'N 93°20.3849'W, western Gulf of Mexico, 14 May 2000, 625 m. Paratypes: DGoM Station HP-3, one female, 0.95 mm, dissected and slide mounted; DGoM Station MT3–1, one manca; DGoM Station C7–2, one female, one manca; DGoM Station MT2–1, eight females (two preparatory), two specimens, 0.9 mm, mouthparts dissected and slide mounted; DGoM Station MT3–1, two females (one preparatory); DGoM Station MT3–2, one female; DGoM Station RW1–2, two females; DGoM Station RW2–1, one female; DGoM Station RW2–2, two females; DGoM Station RW3–1, one ovigerous female; DGoM Station RW4–1, one female; DGoM Station S35–1, two females, 0.6 mm; DGoM Station S39–1, one preparatory female, 1.0 mm, dissected and slide mounted; DGoM Station W2–1, three females, 0.85 mm, one possible male morph; DGoM Station C1–2, four females (one with spent marsupium); DGoM Station C7–2, two females with marsupium remnants; DGoM Station S35–2, one female; DGoM Station AC1–3, one female; DGoM Station C4–2, one female; DGoM Station MT2–2, five females, 1.0 mm; DGoM Station MT5–3, one female; DGoM Station RW3–3, one female; DGoM Station W2–3, two females, 0.9 mm, dissected and slide mounted; DGoM Station W3–2, two females, 0.8 mm; DGoM Station S44–3, one female 0.6 mm; DGoM Station RW1–3, two mancas (one with nematode parasite); DGoM Station W2–3, one female.

Description based on holotype (Fig. 10A, B) and non-ovigerous female paratype. Body 0.85–1 mm, 3.2 times longer than broad.

Cephalothorax longer than pereonites 1–3, subtriangular, becoming narrow anteriorly, with slight rostrum and pair of antero-lateral setae, 20.1 percent total length; eyelobes absent.

Pereon 54.7 percent total length, pereonite 1 abbreviated; each pereonite with pair of small dorso-lateral setae.

Pleon shorter than pereonites 5+6, 16 percent total length, each pleonite with pair of small dorso-lateral setae.
Pleotelson subequal to pleonites 3–5, 9.4 percent total length, apex slightly produced ventrally, with two apical setae.

Antennule (Fig. 11B) 24.2 percent of body length, with three articles; first article 57.1 percent of total length, 3.8 times longer than broad, with four short medial simple setae, three short distal simple setae and one long distal simple seta; second article 1.8 times longer than broad, with one long distal simple seta and one short distal simple seta; distal article 2.5 times longer than broad, terminating with two simple setae (one long, one short), one aesthetasc, one bifid-tipped seta, two spatulate setae and one hook-tipped seta.

Antenna (Fig. 11C) with six articles, 122 percent length of A1; second article 1.4 times longer than broad, equal in length to third article, both articles distally with short, slender simple seta; fourth article 6.2 times longer than broad, with four short distal simple setae and one long distal simple seta; fifth article 3.8 times longer than broad, distally with one long simple seta; sixth article small, terminating with one spatulate seta and three simple setae (one long, distally bent).

Mouthparts. Labrum (Fig. 12C) cap-shaped, with marginal ridge. Mandibles (Fig. 12A, B) with distal margins denticulate, right lacinia mobilis represented by short, pointed process, left lacinia mobilis well developed and denticulate, pars molaris acuminate, minutely bifid. Labium (Fig. 12D) medially cleft, lobes non-setose. Maxillule (Fig. 12F) palp with two equal setae, terminating with nine spiniform setae, one much thinner than other eight. Maxilla not observed. Maxilliped (Fig. 12E) bases completely fused, without seta near palp articulation; endites completely fused (no notch), each with two short cusps, with lateral margins smooth; palp with four articles; article 1 without setae; article 2 with one medio-distal extremely long simple seta and one inner-edge simple seta; article 3 with five unequal inner-edge simple setae; article 4 with one small outer-edge simple seta, four inner-edge simple setae, and one inner-edge thick spiniform seta. Epignath not observed.
*Cheliped* (Fig. 11A) chela strongly forcipate; sclerite small; basis 1.5 times longer than broad, without setae; merus triangular, with inferior seta; carpus 2.4 times longer than broad, with two unequal medial inferior setae, one distal superior seta and one proximal superior seta; propodus 2.4 times longer than broad, about 1.8 times longer than carpus, palm with seven comb setae (one longer than others); fixed finger with one inferior seta, three superior setae, one seta near articulation with dactylus, two low profile teeth on incisive margin and serrate incisive margin; dactylus 64.7 percent of propodus length, width subequal to fixed finger, with proximal spiniform seta, two low profile sub-terminal teeth on incisive margin and serrate incisive margin.

*Pereopod 1* (Fig. 13A) basis 8.0 times longer than broad, with no setae; ischium with small seta; merus 2.2 times longer than broad, distally with long inferior seta; carpus 3.0 times longer than broad, 1.2 times length of merus, distally with one short superior seta; propodus 5.3 times longer than broad, distally with short superior seta and short inferior seta; dactylus with seta, length with unguis 80 percent length of propodus.

*Pereopod 2* (Fig. 13B) basis 5.0 times longer than broad, with short proximal superior seta; ischium with short inferior seta; merus 1.8 times longer than broad, distally with one long inferior simple seta, one short inferior spiniform seta, long spatulate seta, and two transverse rows of inferior marginal spinules; carpus 1.5 times longer than broad, about 0.8 times length of merus, distally with one short superior simple seta, one short anterior simple seta, one inferior blade-like seta of about 35 percent length of propodus and six transverse rows of inferior marginal setules; propodus 5.3 times longer than broad, with one short distal inferior spiniform seta (about half length of dactylus-unguis), one short distal inferior simple seta, five transverse rows of inferior marginal spinules and setulose terminal margin at emergence of dactylus; dactylus without setae, length with unguis about half length of propodus.

*Pereopod 3* (Fig. 13C) basis 5.8 times longer than broad and with superior medial broom seta; ischium with short superior simple seta; merus with three spatulate distal setae, short distal spiniform seta, and no transverse marginal spinules, merus 2.5 times longer than broad; carpus
2.3 times longer than broad, carpus with inferior blade-like seta of about 45 percent length of propodus and no transverse marginal spinules; with short distal superior seta; dactylus length with unguis about 75 percent length of propodus; otherwise similar to pereopod 2.

**Pereopod 4** (Fig. 13D) basis 10.6 times longer than broad, with one medial broom seta; ischium with one short simple seta; merus 2.0 times longer than broad, distally with one long inferior simple seta; carpus 4.4 times longer than broad, 2.2 times longer than merus, distally with one short anterior simple seta, one short inferior spiniform seta and one superior spatulate seta; propodus 4.7 times longer than broad, slightly shorter than carpus, distally with one long superior terminal spiniform seta, two long inferior spiniform setae and one superior broom seta; dactylus fused with unguis to form claw, with small hook at tip of unguis, length with unguis less than half length of propodus.

**Pereopod 5** (Fig. 13E) basis 7.1 times longer than broad, carpus distally with additional short spiniform seta and inferior blade-like seta of about 25 percent of propodus length, propodus 5.9 times longer than broad and with three transverse rows of superior marginal spinules, otherwise similar to P4.

**Pereopod 6** (Fig. 13F) basis 6.6 times longer than broad and lacking broom seta, carpus distally with additional inferior spiniform seta, propodus with additional terminal spiniform seta and lacking broom seta, otherwise similar to peropod 4.

**Pleopods** (Fig. 11D) rami elongate, with terminal setae only; endopod slightly shorter than exopod, with four terminal setae; exopod with six to eight terminal setae.

**Uropods** (Fig. 11E) exopod with two articles, half length of endopod, proximal article about 2/3 length of ramus, with one distal simple seta, distal article with one long simple seta; endopod with two articles, proximal article slightly greater than half length of ramus, with two distal unequal simple setae, distal article with four long and two short simple setae.

**Remarks**
This new species is very similar in many respects to *Pseudotanaïs (M) serratus* especially in the presence of serrate, forcipate chelae and the spatulate setae on pereopods 2 to 6. It differs however by lacking the abbreviated pereonite 3, having a longer cephalothorax in comparison to pereonites 1 to 3 (subequal in *P. serratus*), having a shorter pleon and longer pleotelson, and having minutely hooked unguis on pereopods 4 to 6. The mandibles show subtle differences in that the pars molaris appears to be minutely bifid (single pointed in *P. serratus*). The maxillipeds are similar in that both species have completely fused endites; however the new species lacks setae on the bases near the articulation point of the palps and possesses a pair of minute cusps submarginally on each endite which are lacking on *P. serratus*. The maxillipedal palps are similar in both species including the presence of a thickened spiniform seta on the fourth article. The forcipate chelipeds are nearly identical in the two species except the dactyl in the new species possesses a short proximal spiniform seta (lacking in *P. serratus*) and lacks the inferior peg-like structure described for *P. serratus*. Additional pereopod characters of the new species which differ from *P. serratus* include (1) pereopod 1 dactylus with a small seta; (2) pereopod 2 with marginal spinules on the merus similar to those on the carpus but fewer in number, carpus with fewer rows of marginal spinules and a blade setae that is longer (35 percent of the propodus length rather than about 20 percent), and a slightly greater dactylus-unguis length; and (3) pereopod 3 with a broom seta on the basis, short seta on the ischium, and a large blade seta (45 percent of Propodus length) on the carpus.
Figure 10. *Pseudotanaia* (*Mystriocentrus*) sp. A. Holotype, female. A,B, dorsal and lateral views. Scale = 0.5 mm
Figure 11. *Pseudotanais (Mystriocentrus)* sp. A. Paratype, female. A, Cheliped inner face. B, Antennule. C, Antenna. D, Pleopods. E, Uropods. Scale = 0.2 mm.
Figure 13. *Pseudotanais (Mystriocentrus)* sp. A. Paratype, female. A-F, Pereopods 1 to 6 respectively. D showing detail of hooked unguis. Scale = 0.2 mm.
Subgenus *Pseudotanais sensu stricto* Sieg, 1977

*Diagnosis*

As for family and subfamily except: Antennule first article greater than half the length of the entire antennule. Antenna article 2 shorter than or subequal to article 3, with or without stout spiniform setae. Pereopods 2 to 6 carpus each with modified blade-like seta.

*Type Species*

*Pseudotanais (Pseudotanais) forcipatus* (Lilljeborg, 1864)

*Species Included*

*Pseudotanais (Pseudotanais) abyssi* Hansen, 1913

*Pseudotanais (Pseudotanais) affinis* Hansen, 1887

*Pseudotanais (Pseudotanais) baresnauti* Bird, 1999

*Pseudotanais (Pseudotanais) borceai* (Bačescu, 1960)

*Pseudotanais (Pseudotanais) californiensis* Dojiri and Sieg, 1997

*Pseudotanais (Pseudotanais) colonus* Bird and Holdich, 1989a

*Pseudotanais (Pseudotanais) corollatus* Bird and Holdich, 1989

*Pseudotanais (Pseudotanais) denticulatus* Bird and Holdich, 1989

*Pseudotanais (Pseudotanais) falciculata* Bird and Holdich, 1989

*Pseudotanais (Pseudotanais) forcipatus* (Lilljeborg, 1864)

*Pseudotanais (Pseudotanais) inflatus* Kudinova-Pasternak, 1973

*Pseudotanais (Pseudotanais) jonesi* Sieg, 1977

*Pseudotanais (Pseudotanais) lilljeborgi, G.O. Sars, 1882

*Pseudotanais (Pseudotanais) longisetosus* Sieg, 1977

*Pseudotanais (Pseudotanais) longispinus* Bird and Holdich, 1989

*Pseudotanais (Pseudotanais) macrochelis* G.O. Sars, 1882

*Pseudotanais (Pseudotanais) mediterraneus* G.O. Sars, 1882
*Pseudotanais (Pseudotanais) mexikolpos* Sieg and Heard, 1988

*Pseudotanais (Pseudotanais) nipponicus* McLelland, 2007

*Pseudotanais (Pseudotanais) nordenskioldi* Sieg, 1977

*Pseudotanais (Pseudotanais) oculatus* Hansen, 1913

*Pseudotanais (Pseudotanais) scalpellum* Bird and Holdich, 1989

*Pseudotanais (Pseudotanais) spatula* Bird and Holdich, 1989

*Pseudotanais (Pseudotanais) spicatus* Bird and Holdich, 1989

*Pseudotanais (Pseudotanais) unicus* Sieg, 1977

*Pseudotanais (Pseudotanais) vitjazi* Kudinova-Pasternak, 1966

*Pseudotanais (Pseudotanais) vulsella* Bird and Holdich, 1989

*Pseudotanais (Pseudotanais) sp. A, n. sp.*

*Pseudotanais (Pseudotanais) sp. C, n. sp.*

*Pseudotanais (Pseudotanais) sp. O, n. sp.*

*Pseudotanais (Pseudotanais) sp. P, n. sp.*

Remarks

With its 27 nominal and four new species, this subgenus is the largest, most diverse taxon in the family. Found in all oceans at all studied depths, it exhibits a wide variety of morphological specializations which is evident in the large degree of homoplasy seen in the phylogenetic analysis.

*Pseudotanais (Pseudotanais) abyssi* Hansen, 1913

Synonymy

*Pseudotanais abyssi* Hansen, 1913: 25

Diagnosis
As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes absent. Antennule first article 60 percent of total antennule length, about 6.0 times longer than broad; distal article about 4.0 times longer than broad. Antenna 92 percent length of antennule; second article subequal in length to third article, both with long slender spiniform setae; fourth article 7.0 times longer than broad and fifth article about 4.0 times longer than broad. Mandible pars molaris narrow and simple pointed. Maxillule endite terminating with nine spiniform setae. Maxilliped bases without seta near palp articulation; endites fused except for marginal notch, each bearing pair of simple setae. Chelifed with strongly forcipate chelae; carpus 2.0 times longer than broad, with three inferior setae; propodus nearly 3.0 times longer than broad, fixed finger lacking inferior setae; dactylus about 60 percent of propodus length, subequal in width to fixed finger and possessing a proximal seta. Pereopod 1 basis 9.0 times longer than broad, with simple and broom setae; ischium, merus and carpus each with one seta; propodus 6.0 times longer than broad, with one seta; dactylus with short seta, length with unguis subequal to propodus length. Pereopods 2 and 3 basis with simple and broom setae; ischium with one seta, merus with two setae, carpus with blade seta less than half length of propodus and dactylus with unguis 2/3 length of propodus. Pereopod 4 basis 6.0 times longer than broad.
Pereopods 4 to 6 basis with broom setae, ischium with one seta, merus with one seta and propodus lacking broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods 75 percent length of endopods.

Type Locality

North Atlantic: Davis Strait, Arctic Ocean

Depth Range

40–2702 m.

Distribution
Known from Davis Strait at the entrance to the Arctic Ocean (type locality) and from coastal Antarctica below the Indian Ocean.

Remarks

This species is one of only two pseudotanaids with known bi-polar distribution, the other being Cryptocopoides arcticus. It is distinctive by having strongly forcipate chelae which are similar to those of Pseudotanais forcipatus, but differs from that species by possessing pleopods (missing in P. forcipatus) and having longer, more slender appendages. In addition, P. abyssi bears a resemblance to P. jonesi but differs first with uropodal exopods extending to about 75 percent the length of the endopods whereas in P. jonesi the exopods are only about half the length of the endopods, and second by having maxilliped endites which possess a pair of small setae and are fused except for a marginal notch whereas, in P. jonesi the maxilliped endites are non-setose and completely fused. Vanhöffen (1914) stated that the Antarctic specimens differed from specimens from the Arctic population only by the more elongate dactylus-unguis on pereopod 1 but attributed the feature as growth related.

References


Pseudotanais (Pseudotanais) affinis Hansen, 1887

Synonymy

Pseudotanais affinis Hansen, 1887: 207–208


Diagnosis
As for the family, subfamily and subgenus except: Cephalothorax subequal to pereonites 1 to 3. Eyelobes absent. Antennule first article 55 percent of total antennule length, about 5.0 times longer than broad; distal article about 5.0 times longer than broad. Antenna same length as antennule; second article subequal in length to third article, both with short, stout spiniform setae; fourth article about 8.0 times longer than broad and fifth article 4.5 times longer than broad. Mandible pars molaris narrow, with four unequal accessory denticles. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with seta near palp articulation; endites fused between 1/3 and 2/3 length, each bearing simple seta. Cheliped with non-forcipate chelae; carpus 2.0 times longer than broad, with two inferior setae; propodus about 2.5 times longer than broad, fixed finger with one inferior seta; dactylus about 60 percent of propodus length, subequal in width to fixed finger and possessing proximal seta. Pereopod 1 basis about 12.0 times longer than broad, with simple seta; ischium and merus each with one seta; carpus with two setae; propodus about 8.0 times longer than broad, without setae; dactylus with short seta, length with unguis about 2/3 propodus length. Pereopods 2 and 3 basis with broom setae; ischium with one seta, merus with two setae, carpus with blade seta about half length of propodus and dactylus with unguis half length of propodus. Pereopod 4 basis 4.5 times longer than broad. Pereopods 4 to 6 basis with broom setae, ischium with two equal setae, merus with one seta and propodus lacking broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods 75 percent length of endopods.

Type Locality

Arctic Ocean: Kara Sea north of Russia (lectotype).

Depth Range

40–2970 m.

Distribution

North Atlantic and Arctic Oceans: North Greenland, Kara Sea, Davis Straits, Norwegian Sea, Faeroe-Shetland Channel.
Remarks

Bird and Holdich redescribed *Pseudotanais affinis* from type material from the Kara Sea and other material from the Norwegian Sea after finding that Sieg's description was based on a "variety" that Hansen had included with his specimens. This variety had sufficient distinguishing characters, in particular the mandible pars molaris structure and antenna setation to justify establishing a new species under the name *P. corollatus*. *Pseudotanais affinis* is distinguished by its acuminate pars molaris that bears terminal denticles, a feature it shares with six other species in the "affinis group" (Bird and Holdich, 1989: 241), and the short, stout spiniform setae on the second and third antenna articles.

References

Hansen (1887): 207–208, PL 21, Fig. 2; Hansen (1913): 30–33; PL III, Figs. 2a-j, l-m, o; male?; Hansen (1913): 32–33, Figs. 3a-b 'variety' and 31, 32, Figs. 2k (non Hansen, 1887); Sieg (1977): 28, 55–59, Figs 39–41, non Hansen, 1887; Bird and Holdich (1989): 241–246, Figs 1B, D, 3–5 (redescription)

*Pseudotanais (Pseudotanais) baresnauti* Bird, 1999

Diagnosis

As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes absent. Antennule 93 percent length of antenna, first article 61 percent of total antennule length, about 4.0 times longer than broad; distal article about 3.0 times longer than broad. Antenna second article subequal in length to third article, both with short, stout spiniform setae; fourth and fifth articles each about 4.0 times longer than broad. Mandible pars molaris narrow with bifid tip. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with seta near palp articulation; endites fused except for marginal notch, each bearing short simple seta. Cheliped with non-forcipate chelae; carpus about 1.5 times longer than broad, with
two inferior setae; propodus nearly 3.0 times longer than broad, fixed finger with one inferior seta; dactylus 62 percent of propodus length, subequal in width to fixed finger and possessing proximal seta. Pereopod 1 basis 8.0 times longer than broad, with simple setae; ischium and merus each with one seta; carpus with two setae; propodus about 4.5 times longer than broad, with one seta; dactylus with short seta, length with unguis subequal to propodus length.

Pereopods 2 and 3 basis without setae; ischium with one seta, merus with two setae, carpus with blade seta less than half length of propodus and dactylus with unguis 2/3 length of propodus.

Pereopod 4 basis about 4.5 times longer than broad. Pereopods 4 to 6 basis with broom setae, ischium and merus each with one seta and propodus lacking broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods slightly shorter than endopods.

Type Locality


Depth Range

5000 m.

Distribution

Known only from the type locality in the Caribbean Sea near the Barbados Trench.

Remarks

Bird (1999) compared this species to similarities with Pseudotanais macrocheles and P. lilljeborgi, both from northern Atlantic waters. Pseudotanais baresnauti differs from the former by the structure of the uropods (uni-articulate in P. macrocheles) and by having smaller pereopodal carpal blade-like setae. It differs from P. lilljeborgi by possessing pleopods, having a longer uropodal exopod and having short, stout spiniform setae distally on the second and third antenna articles (P. lilljeborgi has short simple setae).

Reference

*Pseudotanais (Pseudotanais) borcaei* (Bačescu, 1960)

**Synonymy**

*Pontonais borcaei* Bačescu, 1960: 113

**Diagnosis**

As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes present, with pigment. Antennule 94 percent length of antenna, first article 55 percent of total antennule length, about 4.0 times longer than broad; distal article about 3.0 times longer than broad. Antenna second article subequal in length to third article, both with short, slender simple setae; fourth article 5.0 times longer than broad and fifth article about 3.5 times longer than broad. Mandible pars molaris narrow, simple pointed. Maxillule endite setation not described. Maxilliped basis setation not described; endites fused except for marginal notch, naked. Cheliped with non-forceps chelae; carpus about 1.3 times longer than broad, with two inferior setae; propodus about 2.5 times longer than broad, fixed finger with one inferior seta; dactylus 57 percent of propodus length, narrower than fixed finger and lacking proximal seta. Pereopod 1 basis length not described, without setae; ischium, merus and carpus without setae; propodus about 4.5 times longer than broad, without setae; dactylus without setae, length with unguis distinctly shorter than propodus. Pereopods 2 and 3 basis, ischium and merus setation not described; carpus with blade seta greater than half length of propodus and dactylus with unguis about half length of propodus. Pereopods 4 to 6 basis, ischium and merus not described. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with one article; exopods 2/3 length of endopods.

**Type Locality**

Black Sea.

**Depth Range**
60–70 m.

**Distribution**

Known only from the type locality (Black Sea).

**Remarks**

Sieg (1977:105) treated this species as *incertae sedis* because Bačescu's illustrations were "contradictory" and he had no access to the material. Later, he stated that the type material had been lost (personal communication from Bačescu) and that "inconsistencies in the original and only description" led him to exclude *P. borceai* from his key to the worldwide genera and species of Pseudotanaidae (Sieg and Heard 1988:44). Bačescu published the original description in Romanian and the illustrations are either poorly rendered or some appendages were not drawn; however from the author's illustration of the modified blade-like carpal seta on pereopod 3, it is clear that this species belongs to the subgenus *Pseudotanais s.s.*

**References**

Bačescu (1960): 113–117, Figs. 4 and 5.

*Pseudotanais (Pseudotanais) californiensis* Dojiri and Sieg, 1997

**Diagnosis**

As for the family, subfamily and subgenus except: Cephalothorax longer than peraeonites 1 to 3. Eyelobes absent. Antennule first article 60 percent of total antennule length, about 6.0 times longer than broad; distal article about 3.0 times longer than broad. Antenna not described. Mandible pars molaris narrow, simple pointed. Maxillule not described. Maxilliped bases without seta near palp articulation; endites completely fused, each bearing short simple seta. Cheliped with strongly forcipate chela; carpus slightly longer than broad, with two inferior setae; propodus about 2.0 times longer than broad, fixed finger with one inferior seta; dactylus 58 percent of propodus length, subequal in width to fixed finger and possessing proximal seta.
Pereopod 1 basis 5.0 times longer than broad, without setae; ischium and merus each with one seta; carpus without setae; propodus about 5.0 times longer than broad, with one seta; dactylus without seta, length with unguis distinctly shorter than propodus. Pereopods 2 and 3 basis not described; ischium and merus with one seta, carpus with blade seta about half length of propodus and dactylus with unguis about half length of propodus. Pereopods 4 to 6 not described. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with one article bearing pseudo-articulation; exopods about half length of endopods.

**Type Locality**

North Pacific: Purisima Pt., Santa Maria Basin off California, USA.

**Depth Range**

90–291 m.

**Distribution**

Known only from type locality in the Santa Maria Basin off the coast of California.

**Remarks**

According to the authors, this species is most similar to *Pseudotanais jonesi* and *P. abyssi* because of its forcipate chelae but differs from these by the "strong distal tergal spine" on the propodus of pereopods 2 and 3. As in the case for other species described by these authors, illustrations and descriptions of some appendages are lacking or incomplete, thus diminishing to a degree the accuracy of the phylogenetic analysis conducted on the family as a whole.

**Reference**


*Pseudotanais* (*Pseudotanais*) *colonus* Bird and Holdich, 1989a

**Diagnosis**
As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes absent. Antennule first article 60 percent of total antennule length, about 3.5 times longer than broad; distal article about 3.0 times longer than broad. Antenna 88 percent length of antennule, second article subequal in length to third article, both with short, stout spiniform setae; fourth article about 5.0 times longer than broad and fifth article about 3.0 times longer than broad. Mandible pars molaris narrow, simple pointed. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with seta near palp articulation; endites fused except for marginal notch, without setae. Cheliped with non-forcipate chelae; carpus about 1.3 times longer than broad, with two inferior setae; propodus about 2.5 times longer than broad, fixed finger with one inferior seta; dactylus 60 percent of propodus length, subequal in width to fixed finger and possessing a proximal seta. Pereopod 1 basis about 6.5 times longer than broad, with simple setae; ischium with one seta; merus without setae; carpus with two setae; propodus about 5.5 times longer than broad, with two setae; dactylus without seta, length with unguis slightly longer than propodus. Pereopods 2 and 3 basis with broom setae; ischium with one seta, merus with two setae, carpus with blade seta about half length of propodus and dactylus with unguis 75 percent length of propodus. Pereopod 4 basis about 5.0 times longer than broad. Pereopods 4 to 6 basis with broom setae, ischium with one seta, merus with two setae, and propodus lacking broom seta. Pleopods elongate with terminal setae only. Uropod exopods with one article, 1/3 length of endopod; endopods with two articles.

*Type Locality*

North Atlantic: Meriadzeck Terrace, northern Bay of Biscay.

*Depth Range*

2175 m.

*Distribution*

Known only from the type locality in the northern Bay of Biscay.
Remarks

Specimens of *Pseudotanais colonus* were collected as part of a deep sea re-colonization experiment from enriched artificial sediment suspended at depth. Several unidentified swimming males were also present. This species was deemed most similar to *P. mediterraneus* and *P. unicus* by virtue of its simple acute molar process and non-forcipate chelae but differs by having shorter antennae and a short, uni-articulate uropodal exopod.

Reference


*Pseudotanais (Pseudotanais) corollatus* Bird and Holdich, 1989

Synonymy

*Pseudotanais affinis* Hansen, 1887: Sieg (1977 – in part)

Diagnosis

As for the family, subfamily and subgenus except: Cephalothorax subequal to pereonites 1 to 3. Eyelobes absent. Antennule first article 49 percent of total antennule length, about 3.0 times longer than broad; distal article about 5.5 times longer than broad. Antenna 91 percent length of antennule, second article shorter than third article, both with short, slender spiniform setae; fourth article 6.0 times longer than broad and fifth article about 4.0 times longer than broad. Mandible pars molaris broad with numerous accessory denticles and two short marginal setae. Maxillule endite terminating with nine spiniform setae. Maxilliped bases without seta near palp articulation; endites fused except for marginal notch, naked. Cheliped with non-forcipate chelae; carpus about 2.0 times longer than broad, with three inferior setae; propodus about 3.0 times longer than broad, fixed finger with one inferior seta; dactylus 54 percent of propodus length, subequal in width to fixed finger and possessing a proximal seta. Pereopod 1 basis 5.5 times longer than broad, without setae; ischium, merus and carpus each with one seta; propodus
about 6.5 times longer than broad, with one seta; dactylus without seta, length with unguis distinctly shorter than propodus. Pereopods 2 and 3 basis without setae; ischium with one seta, merus with two setae, carpus with blade seta greater than half length of propodus and dactylus with unguis 2/3 length of propodus. Pereopod 4 basis 5.0 times longer than broad. Pereopods 4 to 6 basis without setae, ischium with two equal setae, merus with two setae and propodus lacking broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods 75 percent length of endopods.

Type Locality

Northwest Atlantic: south of Davis Strait, 'Ingolf' Station 25.

Depth Range

1064 m.

Distribution

Recorded only from the type locality in the Northwest Atlantic.

Remarks

Sieg (1977) originally described this species as Pseudotanais (P.) affinis but it was shown by Bird and Holdich (1989) that the 'variety' Sieg described was in fact a distinct species (see remarks under P. affinis). In addition to the differences in pars molaris and antenna setation mentioned earlier, another immediate difference between P. affinis and P. corrolatus is that the inferior distal seta of pereopods 2 and 3 are much shorter than dactyus with unguis on the latter whereas in P. affinis this terminal seta is subequal to the tip of the unguis. According to Bird and Holdich (1989), P. corrolatus is most similar to P. denticulatus with differentiation shown in pereonite 2 length, pereopod 1 propodus length, and setation on antenna artices 2 and 3 and the merus of pereopods 2 to 6.

References

Pseudotanais (Pseudotanais) denticulatus Bird and Holdich, 1989

Synonymy


Diagnosis

As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes absent. Antennule first article 60 percent of total antennule length, about 6.0 times longer than broad; distal article about 5.0 times longer than broad. Antenna about same length as antennule, second article subequal to third article, both with short, stout spiniform setae; fourth article 9.0 times longer than broad and fifth article about 4.0 times longer than broad. Mandible pars molaris broad with numerous accessory denticles and three short marginal setae. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with two medially located setae; endites fused between 1/3 and 2/3 length, each with one seta. Cheliped with non-forcepitate chelae; carpus 1.5 times longer than broad, with two inferior setae; propodus about 2.5 times longer than broad, fixed finger with one inferior seta; dactylus 61 percent of propodus length, narrower than fixed finger and possessing proximal seta. Pereopod 1 basis about 6.0 times longer than broad, with simple setae; ischium without setae; merus with one seta and carpus with four setae; propodus about 6.0 times longer than broad, with one seta; dactylus without seta, length with unguis subequal in length to propodus. Pereopods 2 and 3 basis with simple setae; ischium with one seta, merus with two setae, carpus with blade seta about half length of propodus and dactylus with unguis 2/3 length of propodus. Pereopod 4 basis about 3.5 times longer than broad. Pereopods 4 to 6 basis with broom setae, ischium with two equal setae, merus with two
setae and propodus with broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods 75 percent length of endopods.

Type Locality


Depth Range

1484 m.

Distribution

Northeast Atlantic Ocean.

Remarks

Bird and Holdich (1989) considered this species to be the most closely allied to *Pseudotanais corollatus* and found it to be the most common and abundant tanaid in their Northeast Atlantic study. In addition to differences between *P. denticulatus* and *P. corollatus* mentioned earlier, *P. denticulatus* can also be distinguished by overal size, the lengths of the cephalothorax and pereonites 1 to 3, and slightly different terminal denticulation on the mandibular pars molaris.

Reference


*Pseudotanais* (*Pseudotanais*) *falciculata* Bird and Holdich, 1989

Synonymy


Diagnosis

As for the family, subfamily and subgenus except: Cephalothorax shorter than pereonites 1 to 3. Eyelobes absent. Antennule 90 percent length of antenna, first article 62 percent of total
antennule length, about 6.0 times longer than broad; distal article about 4.0 times longer than broad. Antenna second article subequal to third article, both with long, slender spiniform setae; fourth article about 6.0 times longer than broad and fifth article about 4.0 times longer than broad. Mandible pars molaris narrow with small denticles along one margin. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with seta near each palp articulation; endites fused except for notch on distal margin, each with two short cusps. Cheliped with strongly forcipate chelae; carpus 1.3 times longer than broad, with two inferior setae; propodus about 2.5 times longer than broad, fixed finger with one inferior seta; dactylus 51 percent of propodus length, subequal in width to fixed finger and possessing proximal seta. Pereopod 1 basis about 10.0 times longer than broad, with broom setae; ischium, merus and carpus each with one seta; propodus about 5.0 times longer than broad, with two setae; dactylus with short seta, length with unguis distinctly shorter than propodus. Pereopods 2 and 3 basis without setae; ischium with one seta, merus with two setae, carpus with blade-like seta less than half length of propodus and dactylus with unguis about half length of propodus. Pereopod 4 basis about 5.5 times longer than broad. Pereopods 4 to 6 basis with broom setae, ischium with two unequal setae, merus with two setae and propodus with broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods subequal to length of endopods.

_Type Locality_

Northeast Atlantic: Rockall Trough, Scottish Marine Biological Association, Permanent Station no. 540, west of Ireland.

.Depth Range

2719–4829 m.

_Distribution_

Northeast Atlantic Ocean, at type locality and Bay of Biscay Abyssal Plains.
Remarks

This species is distinguished, according to Bird and Holdich (1989: 277), by its short dactylus and fixed finger of the cheliped. It is most similar to Pseudotanais vulsella, another forcipate-chela species, differring, not only by the shorter cheliped fingers, but by having smaller cusps on the maxilliped endites and shorter carpal blade-like setae on pereopods 2 to 6.

Reference


Pseudotanais (Pseudotanais) forcipatus (Lilljeborg, 1864)

Synonymy

Tanais forcipatus Lilljeborg, 1864: 16
Paratanais forcipatus Meinert, 1877: 87
Pseudotanais forcipatus Sars, 1882: 46
Pseudotanais lilljeborgi (non Sars) Hansen, 1913: 28

Diagnosis

As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyebrows absent. Antennule first article 64 percent of total antennule length, about 5.5 times longer than broad; distal article about 3.5 times longer than broad. Antenna about same length as antennule, second article subequal to third article, both with short, slender spiniform setae; fourth article about 4.5 times longer than broad and fifth article about 2.5 times longer than broad. Mandible pars molaris narrow, simple pointed. Maxillule endite terminating with nine spiniform setae. Maxilliped bases without seta near each palp articulation; endites completely fused, naked. Cheliped with strongly forcipate chelae; carpus 1.4 times longer than broad, with two inferior setae; propodus about 2.5 times longer than broad, fixed finger with one inferior seta; dactylus 57 percent of propodus length, subequal in width to fixed finger and possessing proximal
seta. Pereopod 1 basis about 7.5 times longer than broad, with simple setae; ischium and merus each with one seta and carpus without setae; propodus about 5.5 times longer than broad, with one seta; dactylus without setae, length with unguis distinctly shorter than propodus. Pereopods 2 and 3 basis with broom and simple setae; ischium with one seta, merus with two setae, carpus with blade-like seta less than half length of propodus and dactylus with unguis about 75 percent length of propodus. Pereopod 4 basis about 4.5 times longer than broad. Pereopods 4 to 6 basis with broom setae, ischium with one unequal seta, merus with two setae and propodus without broom seta. Pleopods absent. Uropod exopods and endopods each with one pseudo-articulated article; exopods 75 percent length of endopods.

Type Locality

Northeast Atlantic: Coast of Norway, off Molde

Depth Range

15–375 m.

Distribution

Widespread in the North Sea and Arctic Ocean off Britain, Norway, Greenland and in the North Pacific south of Alaska.

Remarks

The lack of pleopods and the uni-articulate uropods sets this species apart from all others with forcipate chelae.

Reference


Pseudotanais (Pseudotanais) inflatus Kudinova-Pasternak, 1973

Diagnosis
As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes absent. Antennule 70 percent length of antenna, first article 60 percent of total antennule length, about 8.0 times longer than broad; distal article about 10.0 times longer than broad. Antenna second article shorter than third article, both with short, slender simple setae; fourth article about 11.0 times longer than broad and fifth article about 5.0 times longer than broad. Mandible pars molaris broad, truncate, with numerous accessory denticles. Maxillule endite terminating with seven spiniform setae. Maxilliped bases without seta near each palp articulation; endites completely separate, each with two setae and two short cusps. Cheliped with weakly forcipate chelae; carpus 1.8 times longer than broad, with two inferior setae; propodus about 4.0 times longer than broad, fixed finger without inferior seta; dactylus 60 percent of propodus length, subequal in width to fixed finger and possessing proximal seta. Pereopod 1 basis 10.0 times longer than broad, without setae; ischium with one seta; merus without setae; carpus with one seta; propodus about 6.0 times longer than broad, without setae; dactylus without setae, length with unguis subequal to length of propodus. Pereopods 2 and 3 basis, ischium and merus not described; carpus with blade-like seta less than half length of propodus and dactylus with unguis distinctly less than half length of propodus. Pereopod 4 basis about 4.0 times longer than broad. Pereopods 4 to 6 setation not described. Pleopods elongate, with terminal setae only. Uropod exopods and endopods each with two articles; exopods subequal in length to endopods.

Type Locality

North Pacific: Aleutian Trench off Alaska.

Depth Range

3610 m.

Distribution

Known only from type locality, Aleutian Trench off Alaska in the North Pacific.

Remarks
This species was poorly described and illustrated by Kudinova-Pasternak. Most pereopod setal details were omitted from the above diagnosis, and from the phylogenetic analysis, because their number and structure is unclear. Further inconsistencies include maxilliped endites that are illustrated as completely separate and a maxillule endite with seven terminal spiniform setae rather than the usual nine. Sieg (1977:59) synonymized *Pseudotanais inflatus* with *P. affinis* primarily because of its similar pars molaris, broad with numerous accessory denticles, as illustrated by Kudinova-Pasternak. This synonymy was shown to be invalid by Bird and Holdich (1989) in their redescription of *P. affinis* and description of *P. corollatus* (see remarks under these two species). These authors (1989: 263) suggest that *P. inflatus*, if found to be valid upon re-examination, should be grouped with *P. denticulatus* and *P. corollatus* based on the structure of the pars molaris. The placement of this species in *Pseudotanais* is legitimate owing to the apparent presence of blade-like carpal setae, but until further material can be examined its validity as a species should probably remain questionable.

Reference

Kudinova-Pasternak (1973): 164–166, Fig. 14.

*Pseudotanais (Pseudotanais) jonesi* Sieg, 1977

*Diagnosis*

As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes absent. Antennule first article 55 percent of total antennule length, about 5.0 times longer than broad; distal article about 3.0 times longer than broad. Antenna 95 percent length of antennule, second article subequal in length to third article, both with short, slender spiniform setae; fourth article about 5.0 times longer than broad and fifth article about four times longer than broad. Mandible pars molaris narrow, simple pointed. Maxillule endite terminating with nine spiniform setae. Maxilliped bases without seta near palp articulation; endites
completely fused, naked. Cheliped with strongly forcipate chelae; carpus about 1.5 times longer than broad, with two inferior setae; propodus about 2.5 times longer than broad, fixed finger without inferior seta; dactylus 68 percent of propodus length, broader than fixed finger and possessing proximal seta. Pereopod 1 basis about 6.0 times longer than broad, with simple setae; ischium with one seta; merus with two setae; carpus without setae; propodus about 5.5 times longer than broad, with one seta; dactylus without setae, length with unguis distinctively shorter than propodus. Pereopods 2 and 3 basis with broom setae, ischium and merus with one seta, carpus with blade seta about half length of propodus and dactylus with unguis subequal to length of propodus. Pereopod 4 basis about 4.5 times longer than broad. Pereopods 4 to 6 basis with broom setae, ischium and merus with one seta, and propodus lacking broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods half length of endopods.

Type Locality


Depth Range

50 m.

Distribution

Known only from the type locality near the Isle of Man off Plymouth, England, UK.

Remarks

This Northeast Atlantic species is distinguished from other forcipate-chelae species by its short uropodal exopod which is only half the length of the endopod, its non-setose, completely fused maxilliped endites, and by its lack of an inferior seta on the cheliped fixed finger. In addition, it is the only species in the family in which the cheliped dactylus is broader, if only slightly, than the fixed finger.

References
*Pseudotanais (Pseudotanais) lilljeborgi*, G.O. Sars, 1882

**Diagnosis**

As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes rudimentary, without pigment. Antennule first article 60 percent of total antennule length, about 5.5 times longer than broad; distal article about 3.0 times longer than broad. Antenna about same length as antennule, second article shorter than third article, both with short, slender spiniform setae; fourth article about 4.5 times longer than broad and fifth article about 3.0 times longer than broad. Mandible pars molaris narrow, with three blunt terminal teeth. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with seta near palp articulation; endites fused except for marginal notch, each with short seta. Cheliped with non-forcipate chelae; carpus about 1.3 times longer than broad, with two inferior setae; propodus about 3.0 times longer than broad, fixed finger with one inferior seta; dactylus 51 percent of propodus length, subequal in width to fixed finger and possessing proximal seta. Pereopod 1 basis about 5.0 times longer than broad, with simple setae; ischium and merus with one seta; carpus with two setae; propodus about 4.5 times longer than broad, with one seta; dactylus without setae, length with unguis distinctly longer than propodus. Pereopods 2 and 3 basis with simple setae; ischium with one seta, merus with two setae, carpus with blade seta less than half length of propodus and dactylus with unguis 75 percent length of propodus. Pereopod 4 basis about 4.0 times longer than broad. Pereopods 4 to 6 basis without setae, ischium with one seta, merus with two setae, and propodus lacking broom seta. Pleopods absent. Uropod exopods and exopods each with two articles; exopods half length of endopods.

**Type Locality**

North Atlantic: Varanger Fjord at Vadso off northern Norway (Barent's Sea).
Depth Range

7–536 m.

Distribution

Known from several locations off Iceland, Greenland, Norway, Denmark and the Barents Sea.

Remarks

This species is one of two species of *Pseudotanais*, the other being *P. forcipatus* that completely lack pleopods. It differs from *P. forcipatus* primarily by having non-forcipate chelae but also by having complete articulation in the uropods and a more complex mandible pars molaris. Except for the lack of pleopods it is also similar to *P. baresnauti* (see remarks for that species).

References

Sieg (1977): 72–76, Figs. 52–54, 68; Sars (1889), 40–41, PL. XVII, Fig. 2.

*Pseudotanais (Pseudotanais) longisetosus* Sieg, 1977

Diagnosis

As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes absent. Antennule first article 55 percent of total antennule length, about 4.5 times longer than broad; distal article about 4.0 times longer than broad. Antenna 94 percent length as antennule, second article shorter than third article, both with short, slender spiniform setae; fourth article 5.0 times longer than broad and fifth article 3.5 times longer than broad. Mandible pars molaris narrow with terminal spine-like tooth and six subterminal denticles. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with seta near each palp articulation; endites fused except for notch on distal margin, each with one short seta. Cheliped with non-forcipate chelae; carpus 1.7 times longer than broad, with two inferior setae; propodus
about 3.0 times longer than broad, fixed finger with one inferior seta; dactylus 49 percent of propodus length, subequal in width to fixed finger and possessing proximal seta. Pereopod 1 basis about 6.5 times longer than broad, with simple setae; ischium, merus and carpus each with one seta; propodus about 7.0 times longer than broad, without setae; dactylus without setae, length with unguis subequal in length to propodus. Pereopods 2 and 3 basis with broom and simple setae; ischium with one seta, merus with two setae, carpus with blade setae greater than half length of propodus and dactylus with unguis subequal to length of propodus. Pereopod 4 basis about 4.5 times longer than broad. Pereopods 4 to 6 basis with simple and broom setae, ischium with two equal setae, merus with one seta, carpus with additional exceptionally long superior setae and propodus without broom seta. Pleopods elongate with terminal setae only. Uropod exopods with one article, 2/3 length of endopods; endopods with two articles.

Type Locality

Indian Ocean: North of Cumberland Bay, South Georgia off Antarctica (Swedish South Pole Expedition, station 34).

Depth Range

497–6150 m.

Distribution

Known only from type locality off Antarctica.

Remarks

This Antarctic species resembles *Pseudotanais nordenskioldi* with its similar mandibular molar process but is distinguished from that species by having an extremely long carpal superior seta on pereopods 4 to 6 which is equal to or exceeds the length of the propodus and uni-articulate uropod exopods. It is also apparently closely related to *P. longispinus* from the Northeast Atlantic, bearing similarities in pars molaris structure and the aforementioned carpal superior setae, but differing, among other features, by the short slender spiniform setae on the second and
third antenna articles (short and stout in *P. longispinus*), and also by having uni-articulate uropod exopods.

*Reference*


*Pseudotanais (Pseudotanais) longispinus* Bird and Holdich, 1989

*Synonymy*


*Diagnosis*

As for the family, subfamily and subgenus except: Cephalothorax subequal in length to pereonites 1 to 3. Eyelobes absent. Antennule first article 57 percent of total antennule length, about 5.0 times longer than broad; distal article about 5.0 times longer than broad. Antenna 97 percent length as antennule, second article subequal in length to third article, both with short, stout spiniform setae; fourth article 11.0 times longer than broad and fifth article 4.0 times longer than broad. Mandible pars molaris narrow with terminal setulate spine-like tooth and about eight subterminal denticles. Maxillule endite terminating with nine spiniform setae. Maxillped bases with two medially located setae; endites fused between 1/3 and 2/3 length, each with one strong seta and two short cusps. Cheliped with non-forcipate chelae; carpus 1.7 times longer than broad, with two inferior setae; propodus 3.5 times longer than broad, fixed finger with one inferior seta; dactylus 49 percent of propodus length, narrower than fixed finger and possessing proximal seta. Pereopod 1 basis about 8.0 times longer than broad, with numerous simple setae; ischium and merus each with one seta and carpus with two setae; propodus about 11.0 times longer than broad, with two setae; dactylus with short seta, length with unguis subequal in length to propodus. Pereopods 2 and 3 basis with broom and simple setae; ischium with one seta, merus with two setae, carpus with blade seta greater than half length of propodus and dactylus with unguis 75
percent length of propodus. Pereopod 4 basis about 5.5 times longer than broad. Pereopods 4 to 6 basis with simple and broom setae, ischium with two equal setae, merus with one seta, carpus with additional exceptionally long superior seta and propodus with broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods subequal to length of endopods.

Type Locality

Northeast Atlantic: Northern Bay of Biscay.

Depth Range

2644–4829 m.

Distribution

Rockall Trough, Porcupine Seabight, northern Bay of Biscay (type locality), and the Porcupine and Biscay Abyssal Plains, all in the Northeast Atlantic.

Remarks

Since this species was deemed an important member of the "affinis group", its description by Bird and Holdich (1989) emphasized only those characters differing from Pseudotanais affinis. The authors suggested that its similarity in pars molaris structure allies it closely to the Antarctic species, P. longisetosus and P. nordenskioldi, however its somewhat more complex (setose) pars molaris, as well as its deeper distribution, indicates that it is possibly the most plesiomorphic (ancient) member of that group. The long superior carpal seta of periopods 5 and 6 is a feature shared with P. longisetosus as well as with P. spatula.

Reference


Pseudotanais (Pseudotanais) macrochelis G.O. Sars, 1882

Diagnosis
As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes absent. Antennule 95 percent length of antenna, first article 52 percent of total antennule length, about 4.0 times longer than broad; distal article about 5.0 times longer than broad. Antenna second article shorter than third article, both with short, stout spiniform setae; fourth article 6.5 times longer than broad and fifth article 3.5 times longer than broad. Mandible pars molaris narrow with bifid tip. Maxillule endite terminating with nine spiniform setae. Maxilliped bases without setae near palp articulation; endites fused between 1/3 and 2/3 length, each with one short seta. Cheliped with non-forcipate chelae; carpus 2.0 times longer than broad, with three inferior setae; propodus 3.5 times longer than broad, fixed finger with one inferior seta; dactylus 57 percent of propodus length, narrower than fixed finger and possessing proximal seta. Pereopod 1 basis about 6.0 times longer than broad, with simple seta; ischium and merus each with one seta and carpus with two setae; propodus about 7.5 times longer than broad, without setae; dactylus without setae, length with unguis distinctly shorter than propodus. Pereopods 2 and 3 basis with simple setae; ischium and merus each with one seta, carpus with blade seta greater than half length of propodus and dactylus with unguis half length of propodus. Pereopod 4 basis about 5.0 times longer than broad, with simple seta. Pereopods 4 to 6 ischium with two equal setae, merus with two setae and propodus without broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods half length of endopods.

Type Locality

North Atlantic: coast of Norway.

Depth Range

110–135 m.

Distribution

Known only from off the coast of Norway: Verangerfjord, Bergen and Raunefjorden.
Remarks

This species bears resemblance to *Pseudolanais baresnauti* by its acuminate pars molaris with bifid tips but differs primarily by its larger carpal blade-like spiniform setae on pereopods 2 and 3 which extend for more than half the length of the propodus.

References

Sieg (1977): 76–81, Figs. 55–58.

*Pseudolanais* (*Pseudolanais*) *mediterraneus* G.O. Sars, 1882

Diagnosis

As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes present, with pigment. Antennule first article 55 percent of total antennule length, about 4.0 times longer than broad; distal article about 5.5 times longer than broad. Antenna 95 percent length of antennule, second article subequal in length to third article, both with short, slender spiniform setae; fourth article 6.0 times longer than broad and fifth article 4.5 times longer than broad. Mandible pars molaris narrow, simple pointed. Maxillule endite terminating with nine spiniform setae. Maxilliped bases without setae near palp articulation; endites fused except for notch on distal margin, naked. Cheliped with non-forcipate chelae; carpus 1.5 times longer than broad, with two inferior setae; propodus 2.5 times longer than broad, fixed finger with one inferior seta; dactylus 53 percent of propodus length, subequal in width to fixed finger and possessing proximal seta. Pereopod 1 basis about 7.5 times longer than broad, with simple seta; ischium and merus with two setae; carpus with one seta; propodus about 6.0 times longer than broad, with seta; dactylus without seta, length with unguis subequal to propodus. Pereopods 2 and 3 basis without setae; ischium with two equal setae, merus with two setae, carpus with blade seta less than half length of propodus and dactylus with unguis subequal to length of propodus. Pereopod 4 basis about 3.5 times longer than broad. Pereopods 4 to 6
basis with simple and broom setae, ischium with two equal setae, merus with two setae and propodus without broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods subequal to length of endopods.

Type Locality

Mediterranean Sea: Off the coast of Spezia, Northwest Italy.

Depth Range

Not published.

Distribution

Mediterranean Sea off the coast of Italy (type locality).

Remarks

This oculate species is only one of two pseudotanaids known from the Mediterranean, the other being another oculate species, _Pseudotanais unicus_ from which it differs by having a wider cephalothorax and a longer third pereopod. It is also similar to the oculate _P. mexikolpos_ from the Gulf of Mexico differing mainly by the length of the superior terminal seta on the propodus of pereopods 4 to 6 which is about as long as the claw on _P. mediterraneus_ and much longer than the claw on _P. mexikolpos_. _Pseudotanais mediterraneus_ is unique among members of the subfamily Pseudotanainae for having two ischium setae on the first pereopod, all others have one or none.

Reference


_Pseudotanais_ ( _Pseudotanais_ ) _mexikolpos_ Sieg and Heard, 1988

Synonymy

_Paratanaia_ sp. A, anonymous (Texas A&M University), 1978: 772.

Diagnosis
As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes present, with pigment. Antennule first article 56 percent of total antennule length, about 4.5 times longer than broad; distal article about 4.0 times longer than broad. Antenna about same length as antennule, second article shorter than third article, both with short, slender spiniform setae; fourth article about 4.5 times longer than broad and fifth article 3.0 times longer than broad. Mandible pars molaris narrow, simple pointed. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with seta near each palp articulation; endites completely fused, each with four setae in two rows. Cheliped with weakly-forcipate chelae; carpus 1.7 times longer than broad, with two inferior setae; propodus about 3.0 times longer than broad, fixed finger with one inferior seta; dactylus 54 percent of propodus length, subequal in width to fixed finger and possessing proximal seta. Pereopod 1 basis about 5.0 times longer than broad, without setae; ischium, merus and carpus each with one seta; propodus about 5.0 times longer than broad, with one seta; dactylus without setae, length with unguis subequal in length to propodus. Pereopods 2 and 3 basis with broom setae; ischium with one seta, merus with two setae, carpus with blade seta greater than half length of propodus and dactylus with unguis half length of propodus. Pereopod 4 basis about 4.0 times longer than broad. Pereopods 4 to 6 basis with simple and broom setae, ischium with two equal setae, merus with two setae and propodus without broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods subequal to length of endopods.

Type Locality

North Atlantic: Gulf of Mexico, East Flower Garden Bank off Texas Coast.

Depth Range

72 m.

Distribution
Known only from the type locality and adjacent locations off the Texas coast in the Gulf of Mexico.

**Remarks**

This species appears to be very similar to two Mediterranean species, *Pseudotanais unicus* and *P. mediterraneus*. It is distinguished from the former by having a shorter cephalothorax and longer periopod 3, and from the latter by a much longer superio-terminal spiniform setae on the propodus of pereopods 4 to 6 which extends far beyond the claw. All three species are oculeote, from relatively shallow depths and have similar mouthparts with acuminate pars molaris; however *P. mexikolpos* has narrowly forcipate chelae whereas the other two have chelae which are non-forcipate.

**Reference**


*Pseudotanais (Pseudotanais) nipponicus* McLelland, 2007

**Diagnosis**

As for the family, subfamily and subgenus except: Cephalothorax shorter than pereonites 1 to 3. Eyelobes absent. Antennule first article 56 percent of total antennule length, about 5.5 times longer than broad; distal article about 5.0 times longer than broad. Antenna 96 percent length of antennule, second article subequal in length to third article, both with short, stout spiniform setae; fourth article about 10.0 times longer than broad and fifth article about 4.0 times longer than broad. Mandible pars molaris narrow, with four to five small subdistal denticles. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with small seta near each palp articulation and two longer medially located setae; endites fused between 1/3 and 2/3 length, each with one short seta and two short cusps. Cheliped with non-forcipate chelae; carpus about 2.0 times longer than broad, with two inferior setae; propodus 3.7 times longer than broad,
fixed finger with one inferior seta; dactylus 61 percent of propodus length, narrower in width to
fixed finger and possessing proximal seta. Pereopod 1 basis about 7.5 times longer than broad,
with numerous marginal simple setae; ischium and merus each with one seta; carpus with two
setae; propodus about 7.5 times longer than broad, with one seta; dactylus without setae, length
with unguis subequal in length to propodus. Pereopods 2 and 3 basis with broom and simple
setae; ischium with one seta, merus with two setae, carpus with blade seta greater than half length
of propodus and dactylus with unguis half length of propodus. Pereopod 4 basis about 4.5 times
longer than broad. Pereopods 4 to 6 basis with simple and broom setae, ischium with two
unequal setae, merus with two setae, carpus with additional exceptionally long superior seta and
propodus with broom seta. Pleopods elongate with terminal setae only. Uropod exopods and
endopods each with two articles; exopods subequal to length of endopods.

**Type Locality**

North Pacific: Kamchatka Trench north of Japan.

**Depth Range**

3145–3858 m.

**Distribution**

Known only from the type locality in the Kamchatka Trench, North Pacific Ocean.

**Remarks**

This species appears to be in the group with *Pseudotanais longisetosus*, *P. longispinus*,
and *P. nordenskioldi* as mentioned by Bird and Holdich (1989). In fact, it is nearly indentical with
their description of *P. longispinus* except for minor differences in the setation of the mandible
pars molaris, the presence of dorsal and lateral setae on the thoracic and abdominal segments, a
larger spiniform seta on antenna second article, and unequal merus and carpal superior setae on
pereopod 1 (equal lengths in *P. longispinus*). Both species have a pars molaris with subterminal
teeth except that *P. nipponicus* apparently has less setation with only 4–5 small subterminal teeth
whereas *P. longispinus* has “one long and about eight short terminal denticles” the longest of which is 4 times the length of the others and has secondary spinules. Additionally, the distal half of the long terminal setae on the propodus of pereopods 4–6 are heavily setulose on *P. nipponicus*, a feature either absent in *P. longispinus* or not mentioned by Bird and Holdich, and a few of the spiniform setae of the maxillule endite are equipped with a subterminal setule, a feature also not observed in *P. longispinus*. The setation of the pereopods is nearly identical in both species, differing from *P. nordenskioldi* by having a long superior seta on the carpus of pereopods 4 and 5. The two species appear to have identical maxilliped armature which differs from that of *P. longisetosus* by having two small cusps on the endites.

**Reference**


*Pseudotanais (Pseudotanais) nordenskioldi* Sieg, 1977

**Diagnosis**

As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes absent. Antennule first article 56 percent of total antennule length, about 5.0 times longer than broad; distal article about 4.5 times longer than broad. Antenna 92 percent length of antennule, second article subequal in length to third article, both with short, stout spiniform setae; fourth article about 4.5 times longer than broad and fifth article about 3.0 times longer than broad. Mandible pars molaris narrow, with terminal spine-like tooth and six subterminal denticles. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with seta near each palp articulation; endites fused except for notch on distal margin, each with two setae. Cheliped with non-forcipate chelae; carpus about 1.7 times longer than broad, with two inferior setae; propodus 3.4 times longer than broad, fixed finger with one inferior seta; dactylus 58 percent of propodus length, narrower in width to fixed finger and possessing
proximal seta. Pereopod 1 basis about 5.5 times longer than broad, with simple seta; ischium with one seta; merus with three setae; carpus with one seta; propodus about 5.5 times longer than broad, with one seta; dactylus with short seta, length with unguis subequal in length to propodus. Pereopods 2 and 3 basis with broom and simple setae; ischium with one seta, merus with two setae, carpus with blade seta greater than half length of propodus and dactylus with unguis 75 percent length of propodus. Pereopod 4 basis about 4.0 times longer than broad. Pereopods 4 to 6 basis with broom setae, ischium with one seta, merus with two setae and propodus without broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods subequal to length of endopods.

Type Locality

Indian Ocean: North of Cumberland Bay, South Georgia off Antarctica (Station 34 of the Swedish South Pole Expedition).

Depth Range

497–6150 m.

Distribution

Antarctica (type locality), Southwest Atlantic (nine sites off Antarctica) and South America.

Remarks

This species is similar to Pseudotanais longispinus and P. longisetosus by virtue of its nearly identical pars molaris armature. It differs from both species by lacking the long distal superior carpal seta on pereopods 4 to 6. See remarks for P. longispinus and P. nipponicus regarding its relationship with the "affinis group". Pseudotanais nordenskioldii is unique among the family members by having three pereopod 1 merus setae; all others have two or less.

Reference

Pseudotanais (Pseudotanais) oculatus Hansen, 1913

Synonymy

Paratanais nanaimoensis Fee, 1926: 17.

Diagnosis

As for the family, subfamily and subgenus except: Cephalothorax subequal to pereonites 1 to 3. Eyelobes present, with pigment. Antennule first article 58 percent of total antennule length, about 6.5 times longer than broad; distal article about 4.5 times longer than broad. Antenna 87 percent length of antennule, second article shorter than third article, both with long, slender spiniform setae; fourth article about 5.5 times longer than broad and fifth article about 2.5 times longer than broad. Mandible pars molaris narrow with with four blunt subterminal denticles. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with seta near each palp articulation; endites fused except for marginal notch, each with one short seta. Cheliped with weakly forcipate chelae; carpus about 1.5 times longer than broad, with two inferior setae; propodus about 3.0 times longer than broad, fixed finger with one inferior seta; dactylus 50 percent of propodus length, subequal in width to fixed finger and possessing proximal seta. Pereopod 1 basis 5.5 times longer than broad, with broom seta; ischium, merus and carpus each with one seta; propodus about 6.5 times longer than broad, with one seta; dactylus without seta, length with unguis subequal to propodus. Pereopods 2 and 3 basis with broom setae; ischium and merus each with one seta, carpus with blade seta less than half length of propodus and dactylus with unguis 75 percent length of propodus. Pereopod 4 basis about 5.5 times longer than broad. Pereopods 4 to 6 basis with simple and broom setae, ischium with two equal setae, merus with two setae and propodus lacking broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods subequal in length to endopods.
Type Locality

North Atlantic: Davis Strait off Western Greenland.

Depth Range

101–123 m.

Distribution

North Atlantic Ocean off Greenland and Iceland; North Pacific off Departure Bay, Canada.

Remarks

This oculate species is distinguished from other oculates in the subgenus by its more complex mandibular pars molaris with subterminal denticulations as opposed to the simple pointed pars molaris in *Pseudotanais unicus*, *P. mexikolpos*, and *P. mediterraneus*. In addition, the carpal blade-like setae on pereopods 2 and 3 of *P. oculatus* are shorter in relation to the propodus than on the other three species.

References


*Pseudotanais (Pseudotanais) scalpellum* Bird and Holdich, 1989

Diagnosis

As for the family, subfamily and subgenus except: Cephalothorax subequal to pereonites 1 to 3. Eyelobes absent. Antennule first article 53 percent of total antennule length, about 6.5 times longer than broad; distal article about 6.5 times longer than broad. Antenna about same length as antennule; second article subequal in length to third article, both with short, stout spiniform setae; fourth article about 11.5 times longer than broad and fifth article 4.5 times longer than broad. Mandible pars molaris narrow, with two short subterminal denticles and two longer,
unequal terminal denticles. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with seta near palp articulation; endites fused between 1/3 and 2/3 length, each with one strong seta. Cheliped with non-forcipate chelae; carpus 2.0 times longer than broad, with two inferior setae; propodus about 3.5 times longer than broad, fixed finger with one inferior seta; dactylus about 55 percent of propodus length, narrower in width to fixed finger and possessing proximal seta. Pereopod 1 basis about 8.0 times longer than broad, with numerous simple seta; ischium without setae; merus with one seta; carpus with two setae; propodus about 9.0 times longer than broad, with seta; dactylus with short seta, length with unguis subequal to propodus length. Pereopods 2 and 3 basis with broom and simple setae; ischium with one seta, merus with two setae, carpus with blade greater than half length of propodus and dactylus with unguis half length of propodus. Pereopod 4 basis about 6.5 times longer than broad. Pereopods 4 to 6 basis with broom setae, ischium and merus with one seta, and propodus with broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods 75 percent length of endopods.

Type Locality
Northeast Atlantic: Rockall Trough, west of Hebrides Terrace Seamount.

Depth Range
2081–2634 m.

Distribution
Rockall Trough (type locality) and Porcupine Seabight in the Northeast Atlantic.

Remarks
This species is closely related to *Pseudotanais affinis*, according to Bird and Holdich (1989), with small differences seen in the setation of pereopods and size of the cheliped. The blade-like seta of periopods 2 and 3 in *P. scalpellum* are longer (about 70% of the propodus
length) than in *P. affinis* (about 50%). The terminal denticulation of the mandibular pars molaris is nearly identical in the two species.

**Reference**


*Pseudotanais* (*Pseudotanais*) *spatula* Bird and Holdich, 1989

**Synonymy**


**Diagnosis**

As for the family, subfamily and subgenus except: Cephalothorax shorter than pereonites 1 to 3. Eyelobes absent. Antennule first article 57 percent of total antennule length, about 7.0 times longer than broad; distal article about 6.0 times longer than broad. Antenna slightly longer than antennule; second article subequal in length to third article, both with short, stout spiniform setae; fourth article about 10.0 times longer than broad and fifth article 5.5 times longer than broad. Mandible pars molaris narrow, with four short subterminal denticles and two longer, unequal terminal denticles. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with seta near palp articulation; endites fused between 1/3 and 2/3 length, each with short seta. Cheliped with non-forcepsate chelae; carpus 1.8 times longer than broad, with two inferior setae; propodus about 3.0 times longer than broad, fixed finger with one inferior seta; dactylus about 59 percent of propodus length, narrower in width to fixed finger and possessing proximal seta. Pereopod 1 basis about 9.5 times longer than broad, with numerous simple seta; ischium without setae; merus with one seta; carpus with three setae; propodus about 10.5 times longer than broad, with seta; dactylus with short seta, length with unguis subequal to propodus length. Pereopods 2 and 3 basis with simple setae; ischium with one seta, merus with two setae, carpus with blade greater than half length of propodus and dactylus with unguis 2/3 length of propodus.
Pereopod 4 basis about 4.5 times longer than broad. Pereopods 4 to 6 basis with broom and simple setae, ischium and merus each with one seta, carpus with additional exceptionally long superior seta, and propodus with broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods 75 percent length of endopods.

Type Locality

Northeast Atlantic: Porcupine Seabight, west of Ireland.

Depth Range

1400–2209 m.

Distribution

Porcupine Seabight (type locality), Hebridean Slope, Celtic Slope and southern Biscay, all in the Northeast Atlantic.

Remarks

*Pseudotanais spatula* is another species in the 'affinis' group from the Northeast Atlantic with only minor differences from *P. affinis* including longer carpal setae on pereopods 1, 5 and 6. The mandible pars molaris has two additional subterminal denticles but is otherwise similar to that of *P. affinis* and *P. scalpellum*. The elongate superior carpal setae on pereopods 5 and 6 is a character shared by *P. longispinus* but that species has a distinctive pars molaris featuring a single large terminal spine-like tooth similar to that possessed by *P. longisetosus* and *P. nordenskioldi*.

Reference


*Pseudotanais (Pseudotanais) spicatus* Bird and Holdich, 1989

Synonymy

Diagnosis

As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes absent. Antennule first article 63 percent of total antennule length, about 6.0 times longer than broad; distal article about 4.5 times longer than broad. Antenna slightly longer than antennule, second article subequal to third article, both with short, stout spiniform setae; fourth article 7.5 times longer than broad and fifth article about 5.0 times longer than broad. Mandible pars molaris narrow with several medio-distal rows of setules and numerous terminal and subterminal dentritic denticles. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with seta near each palp articulation; endites fused between 1/3 and 2/3 length, each with one short spiniform seta. Cheliped with non-forcipate chelae; carpus 1.5 times longer than broad, with two inferior setae; propodus about 3.0 times longer than broad, fixed finger with one inferior seta; dactylus 56 percent of propodus length, subequal in width to fixed finger and lacking proximal seta. Pereopod 1 basis 10.0 times longer than broad, with simple seta; ischium and merus each without setae; carpus with four setae; propodus about 6.5 times longer than broad, with one seta; dactylus without seta, length with unguis distinctly longer than propodus. Pereopods 2 and 3 basis without setae; ischium with one seta, merus with two setae, carpus with blade seta less than half length of propodus and dactylus with unguis half length of propodus. Pereopod 4 basis about 3.5 times longer than broad. Pereopods 4 to 6 basis with broom setae, ischium with two equal setae, merus with two setae and propodus with broom seta. Pleopods elongate with terminal setae only. Uropod exopods with two articles, subequal in length to endopods; endopods with one article.

Type Locality

Northeast Atlantic: Porcupine Seabight, west of Ireland.

Depth Range

2227–4829 m.
Distribution

Porcupine Seabight (type locality), Rockall Trough, Porcupine Abyssal Plain, north and south Biscay, all in Northeast Atlantic.

Remarks

This species is unusually large for a pseudotanaid (up to 4 mm) but is otherwise typical of the genus. It is superficially very similar to *Pseudotanais denticulatus*, also from the Northeast Atlantic, but can be distinguished upon dissection by the drastically different mandible pars molaris, a unique feature of *P. spicatus*. Bird and Holdich further commented that *P. spicatus* bears a close similarity to *P. vitjazi* from the North Pacific, differing only in setation features of the antenna and the merus of pereopods 4 to 6.

Reference


*Pseudotanais (Pseudotana) unicus* Sieg, 1977

Diagnosis

As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes present, with pigment. Antennule, first article 54 percent of total antennule length, about 4.0 times longer than broad; distal article about 3.5 times longer than broad. Antenna about same length as antennule, second article subequal in length to third article, both with short, slender spiniform setae; fourth article about 4.0 times longer than broad and fifth article about 3.0 times longer than broad. Mandible pars molaris narrow, simple pointed. Maxillule endite terminating with nine spiniform setae. Maxilliped with seta near each palp articulation; endites fused except for notch on distal margin, each with one short seta. Cheliped with non-forcipate chelae; carpus about 1.4 times longer than broad, with two inferior setae; propodus about 3.0 times longer than broad, fixed finger with one inferior seta; dactylus 52
percent of propodus length, narrower than fixed finger and possessing proximal seta. Pereopod 1 basis about 6.0 times longer than broad, without setae; ischium with one seta; merus and carpus each without setae; propodus about 3.5 times longer than broad, with short seta; dactylus without setae, length with unguis subequal to propodus. Pereopods 2 and 3 basis without setae, ischium and merus each with one seta, carpus with blade seta greater than half length of propodus and dactylus with unguis subequal to length of propodus. Pereopod 3 disproportionately smaller in size than pereopod 2. Pereopod 4 basis about 3.5 times longer than broad. Pereopods 4 to 6 basis with broom setae, ischium with two equal setae, merus with two setae and propodus without broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods 75 percent length of endopods.

Type Locality

Mediterranean Sea: off Naples, Italy in the vicinity of Villa Reale.

Depth Range

52 m.

Distribution

Known only from the type locality in the Mediterranean Sea off Naples, Italy.

Remarks

*Pseudotanais unicus* is distinguished from other oculate members of the subgenus by its undersized pereopod 3 and elongate carapace (longer than broad).

Reference


*Pseudotanais (Pseudotanais) vitjazi* Kudinova-Pasternak, 1966

Diagnosis
As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes absent. Antennule first article 55 percent of total antennule length, about 6.0 times longer than broad; distal article about 6.0 times longer than broad. Antenna slightly longer than antennule, second article subequal to third article, both with short, stout spiniform setae; fourth article 8.5 times longer than broad and fifth article about 5.0 times longer than broad. Mandible pars molaris narrow with several medio-distal rows of setules and numerous terminal and subterminal dentritic denticles. Maxillule endite terminating with nine spiniform setae. Maxilliped bases without seta near each palp articulation; endites fused between 1/3 and 2/3 length, each with one short seta. Cheliped with weakly forcipate chelae; carpus 1.6 times longer than broad, with two inferior setae; propodus about 3.5 times longer than broad, fixed finger with one inferior seta; dactylus 55 percent of propodus length, subequal in width to fixed finger and lacking proximal seta. Pereopod 1 basis about 9.0 times longer than broad, with simple seta; ischium and merus each without setae; carpus with two setae; propodus about 7.0 times longer than broad, without setae; dactylus without seta, length with unguis subequal to propodus. Pereopods 2 and 3 basis without setae; ischium not described or illustrated, merus with two setae, carpus with blade seta less than half length of propodus and dactylus with unguis distinctly less than half length of propodus. Pereopod 4 basis about 5.0 times longer than broad. Pereopods 4 to 6 basis without setae, ischium with one setae, merus setation inconclusively illustrated, and propodus without broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods subequal in length to endopods.

*Type Locality*

North Pacific: abyssal region south of the Bering Sea.

*Depth Range*

6065 m.

*Distribution*
Known only from the type locality in the north central Pacific Ocean.

Remarks

As in other species accredited to Kudinova-Pasternak, *Pseudotanais vitjazi* is inadequately described and poorly illustrated. Pereopod 2 was illustrated without showing the ischium so that proportions assumed for the basis might be inaccurate. *Pseudotanais vitjazi* can definitely be assigned to the subgenus *pseudotanais*, s.s. because of the obvious blade-like setae seen in the illustration of pereopod 2. *Pseudotanais vitjazi* has a noticeably similar pars molaris structure to that of *P. spicatus* from the Northeast Atlantic as noted by Bird and Holdich (1989: 268). They stated that the only differences between the two species are longer denticles on the pars molaris and stronger spiniform setae on the merus of pereopods 4 to 6 of *P. spicatus*, and stronger spiniform setae on antenna articles 2 and 3 of *P. vitjazi* (see remarks under *P. spicatus*); however, given the inadequacies of Kudinova-Pasternak's illustrations, all these character differences are questionable. Sieg (1977: 105) considered *P. vitjazi* to be incertae sedis mainly because he had no material to examine, but likely also because of the meagre description given by its author. Nevertheless, he did include it in his key to the worldwide species (Sieg and Heard, 1988: 43) separating it from *P. affinis* by highlighting the subequal length of the uropodal rami and distinct denticulation of the pars molaris.

References

Kudinova-Pasternak (1966): 532–534, Fig. 12; Sieg and Heard (1988): 43 (key).

*Pseudotanais (Pseudotanais) vulsella* Bird and Holdich, 1989

Diagnosis

As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes absent. Antennule first article 57 percent of total antennule length, about 6.5 times longer than broad; distal article about 5.5 times longer than broad. Antenna about same
length as antennule, second article subequal to length of third article, both with short, slender spiniform setae; fourth article about 7.0 times longer than broad and fifth article about 3.0 times longer than broad. Mandible pars molaris narrow, with small denticles along one margin. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with seta near each palp articulation; endites fused except for notch on distal margin, each with two short cusps. Cheliped with strongly forcipate chelae; carpus 1.6 times longer than broad, with two inferior setae; propodus about 3.0 times longer than broad, fixed finger with one inferior seta; dactylus 60 percent of propodus length, narrower in width to fixed finger and possessing proximal seta. Pereopod 1 basis about 12.5 times longer than broad, without setae; ischium, merus and carpus each with one seta; propodus about 6.0 times longer than broad, with two setae; dactylus with short seta, length with unguis subequal to length of propodus. Pereopods 2 and 3 basis with broom setae, ischium with one seta, merus with two setae, carpus with blade-like seta greater than half length of propodus and dactylus with unguis half length of propodus. Pereopod 4 basis about 4.5 times longer than broad. Pereopods 4 to 6 basis without setae, ischium with two equal setae, merus with two setae and propodus without broom seta. Pleopods elongate, with terminal setae only. Uropod exopods and endopods each with two articles; exopods subequal in length to endopods.

*Type Locality*

Northeast Atlantic: Porcupine Seabight, west of Ireland.

*Depth Range*

1028–1640 m.

*Distribution*

North Feni Ridge, Rockall Trough, Hebridean Slope, Celtic Slope and Porcupine Seabight (type locality), all in the Northeast Atlantic west of Ireland.

*Remarks*
This Northeast Atlantic species can be distinguished from the closely related *Pseudotanais falciculata*, another forcipate-chelae species, by the longer cheliped dactylus (60% length of the propodus/fixed finger) and longer carpal blade-like setae on pereopods 2 and 3. Among other forcipate members of the subgenus, the maxilliped endites are completely fused in *P. forcipatus, P. jonesi, and P. californiensis* and fused except for a distal notch in *P. abyssii*; however in the latter species each endite is armed with a small marginal seta rather than the triangular cusps of *P. vulsella*.

Reference


*Pseudotanais (Pseudotanais*) sp. A, n. sp. (Figures 14 – 17)

**Diagnosis**

As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes absent. Antennule first article 60 percent of total antennule length, about 5.5 times longer than broad; distal article about 3.0 times longer than broad. Antenna slightly longer than antennule, second article shorter than third article, both with short, stout spiniform setae; fourth article about 7.0 times longer than broad and fifth article about 3.0 times longer than broad. Mandible pars molaris broad, truncate, with numerous accessory denticles and two short marginal setae. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with seta near each palp articulation; endites fused between 1/3 and 2/3 length, each with one short seta and two short cusps. Cheliped with non-forcipate chelae; carpus 1.4 times longer than broad, with two inferior setae; propodus about 2.5 times longer than broad, fixed finger with one inferior seta; dactylus 56 percent of propodus length, narrower in width to fixed finger and possessing proximal seta. Pereopod 1 basis about 11.0 times longer than broad, with simple seta; ischium without setae; merus and carpus each with one seta; propodus about 5.0 times longer than broad, with two setae; dactylus without setae, length with unguis subequal to length of propodus.
Pereopods 2 and 3 basis with broom setae, ischium and merus each with one seta, carpus with blade-like seta less than half length of propodus and dactylus with unguis distinctly less than half length of propodus. Pereopod 4 basis about 2.5 times longer than broad. Pereopods 4 to 6 basis with broom setae, ischium with one seta, merus with two setae and propodus with broom seta. Pleopods elongate, with terminal setae only. Uropod exopods and endopods each with two articles; exopods subequal in length to endopods.

Type Locality

North Atlantic: Gulf of Mexico, Texas A&M Deepwater Gulf of Mexico Station RW3–5 in the western Gulf of Mexico.

Depth Range

379–2974 m.

Distribution

Gulf of Mexico.

Material examined.

Holotype, non-ovigerous female, 1.8 mm, DGoM station RW3–5, 27° 00.5014N 95° 5417W, western Gulf of Mexico, 22 May 2000, 1335 m. Paratypes: one manca from type locality; DGoM Station B1–5, one preparatory female, one female with spent marsupium; DGoM Station B2–1, two females, one manca; DGoM Station B2–2, four females; DGoM Station B2–3, seven females, one manca; DGoM Station B3–3, one manca; DGoM Station BH-5, two females, one female dissected and slide mounted; DGoM Station C4–1, one female, one manca; DGoM Station C4–2, one large female, one female dissected and slide mounted; DGoM Station C4–3 one female, one manca; DGoM Station C7–1, four females; DGoM Station C7–2, two females; DGoM Station HP-3, four females, one female with spent marsupium; DGoM Station MT3–1, two females; DGoM Station MT4–2, three females, ten mancas; DGoM Station NB3–3, one large female, one manca; DGoM Station RW2–1, four females; DGoM Station RW2–3, six females, one with marsupium lacking ova; DGoM Station RW3–3, one small female;
DGoM Station RW4–1, three females; DGoM Station RW5–1, two females; DGoM Station RW5–2, five females, two mancas; DGoM Station RW5–3, one large female; DGoM Station S35–1, one large preparatory female, four smaller females; DGoM Station S35–2, two females, one manca; DGoM Station S36–1, two females; DGoM Station S41–2, one female; DGoM Station S42–1, one female; DGoM Station W1–1, four small females; DGoM Station W3–2, one manca; DGoM Station W4–1, one small female; DGoM Station W4–5, four mancas; DGoM Station WC12–1, one small female; DGoM Station WC12–2, one female, two mancas; DGoM Station WC5–1, one manca.

Description

Based on holotype (Figs. 14A, B) and non-ovigerous female paratype. Body 0.8–2.2 mm, 4.1 times longer than broad.

*Cephalothorax* longer than pereonites 1–3, subtriangular, becoming narrow anteriorly, with pair of antero-lateral setae, 19.4 percent total length; eyelobes absent.

*Pereon* 51.8 percent total length, perconite 1 abbreviated.

*Pleon* shorter than perconites 5+6, 17.5 percent total length.

*Pleotelson* subequal to pleonites 3–5, 11 percent total length, apex slightly produced, with one pair of distolateral setae.

*Antennule* (Fig. 15C) 29.1 percent of body length, with three articles; first article 59.7 percent of total length, 5.4 times longer than broad, with one short medial simple seta, one long medial simple seta, one medial broom seta, one short distal simple seta, one long distal simple seta and two distal broom setae; second article 2.6 times longer than broad, with one long distal simple seta and one short distal simple seta; distal article 2.8 times longer than broad, terminating with three simple setae, one aesthetasc and three bidid-tipped setae.

*Antenna* (Fig. 15D) with six articles, 104.2 percent length of A1; second article 1.4 times longer than broad, about 75 percent length of third article, both articles distally with short, stout spiniform seta; fourth article 6.8 times longer than broad, with one short distal simple seta, one
long distal simple seta, one long distal spiniform seta, and three distal broom setae; fifth article
2.9 times longer than broad, distally with one long simple seta; sixth article small, terminating
with six simple setae (two short, four long).

*Mouthparts.* Labrum (Fig. 16C) cap-shaped, distal margin finely setose. Mandibles
(Figs. 16A, B) with distal margins coarsely denticulate (left) and finely denticulate (right), right
lacinia mobilis represented by short, pointed process, left lacinia mobilis well developed and
denticulate, pars molaris broad, with numerous accessory denticles and two short marginal setae.
Maxillule (Fig. 19E) palp with two equal setae, terminating with nine spiniform setae, one with
subterminal setule and two accessory setae. Maxilliped (Fig. 16D) bases completely fused, with
seta near each palp articulation; endites fused between 1/3 and 2/3 length, each with one short
seta and two short cusps, with lateral margins setulose; palp with four articles; article 1 without
setae; article 2 with three unequal inner edge simple setae and one outer-edge simple seta; article
3 with four unequal inner-edge simple setae; article 4 with one small outer-edge simple seta and
five inner-edge simple setae. Epignath (Fig. 16F) falciform, tip unarmored.

*Cheliped* (Fig. 15A) strongly built, chela not forcipate; sclerite well developed; basis 2.0
times longer than broad, without setae; merus triangular, with inferior seta; carpus 1.4 times
longer than broad, with two unequal medial inferior setae and one distal superior setae; propodus
2.5 times longer than broad, about 2.0 times longer than carpus, palm with seven comb setae (one
longer than others); fixed finger with one inferior seta, three superior setae (two simple, one
limbate) and one seta near articulation with dactylus; dactylus 55.6 percent of propodus length,
width narrower than fixed finger, with proximal simple seta.

*Pereopod 1* (Fig. 17A) basis 11.2 times longer than broad, with proximal superior seta;
ischium without setae; merus 1.9 times longer than broad, distally with short inferior seta; carpus
2.9 times longer than broad, 1.5 times length of merus, distally with one short superior spiniform
seta; propodus 4.9 times longer than broad, distally with short superior seta and long inferior seta;
dactylus without seta, length with unguis slightly longer than propodus.
**Pereopod 2** (Fig. 17B) basis 7 times longer than broad, with proximal inferior broom seta; ischium with short inferior spiniform seta; merus 2.2 times longer than broad, distally with one short inferior spiniform seta; carpus 3.9 times longer than broad, about 1.5 times length of merus, distally with one short superior spiniform seta, one short superior simple seta, one inferior blade-like seta of about 30 percent length of propodus and one short, broad inferior spiniform seta; propodus 9.5 times longer than broad, with one long distal inferior spiniform seta (near length of dactylus-unguis); dactylus without setae, length with unguis less than half length of propodus.

**Pereopod 3** (Fig. 17C) basis 5.3 times longer than broad and without broom seta; carpus 3 times longer than broad; propodus 6.2 times longer than broad; dactylus bifid-tipped; otherwise similar to pereopod 2.

**Pereopod 4** (Fig. 17D) basis 2.4 times longer than broad, tumid, with setae lacking; ischium with one short spiniform seta; merus 2.5 times longer than broad, distally with two short inferior spiniform setae; carpus 2.8 times longer than broad, 1.5 times longer than merus, distally with one short superior simple seta, two unequal serrate spiniform setae and one inferior blade-like spiniform seta of about 20 percent length of propodus; propodus 5.7 times longer than broad, 1.2 times longer than carpus, distally with one long superior terminal spiniform seta, two short inferior spiniform setae and one superior broom seta; dactylus fused with unguis to form claw, length with unguis less than half length of propodus.

**Pereopod 5** (Fig. 17E) basis with proximal broom seta; merus distally with two short unequal spiniform setae; otherwise similar to P4.

**Pereopod 6** (Fig. 17F) merus distally with two short unequal spiniform setae; carpus 1.9 times longer than broad; propodus with additional terminal spiniform seta and superior marginal spinules, otherwise similar to peropod 4.

**Pleopods** (Fig. 15E) rami elongate, with terminal setae only; endopod about 4/5 length of exopod, with seven terminal setae; exopod with eleven terminal setae.
Uropods (Fig. 15B) exopod with two articles, slightly shorter than endopod, proximal article slightly less than half length of ramus, with one distal simple seta, distal article with two unequal simple setae; endopod with two articles, proximal article about half length of ramus, with three long distal simple setae, distal article with four long and two short simple setae.

Remarks

This new species is clearly in the same group as Pseudotanais denticulatus, P. corollatus and probably P. inflatus as evidenced by the similar mandibular molar process which is broad and terminally ringed with denticles and setae. Of the three, species A appears to be most similar to P. denticulatus which also has short, stout spiniform setae on the antenna second and third articles, whereas those of P. corollatus are long, slender spiniform and those of P. inflatus are apparently short, slender simple setae. Except where noted below, the appendages are nearly identical in proportions and setation to P. denticulatus, including the bifid-tipped dactyl on pereopod 3. The new species can be distinguished from P. denticulatus by (1) the notably longer percentage of lengths of the pleotelson and antennule to total body length, (2) antenna articles 4 and 5 being more stout, (3) a long distal spiniform seta on antenna article 4 (lacking in P. denticulatus and others of the group), (4) maxilliped endites each bearing two cusps (lacking in P. denticulatus), (5) a limbate seta among the three superior setae on the cheliped fixed finger (all normal simple setae on P. denticulatus), (6) the basis of pereopod 1 longer and more slender, (7) a much longer inferior seta on propodus of pereopod 1, (8) one seta rather than two on merus of pereopods 2 and 3, (9) the blade-like carpal seta on pereopods 2 and 3 are about 30 percent of the length of the propodus (50 percent in P. denticulatus), (10) the dactylus-unguis length of pereopods 2 and 3 is less than half the length of the propodus (greater than half in P. denticulatus), (11) the ischium of pereopods 4 to 6 has a single spiniform seta (an additional simple seta is present in P. denticulatus), (12) the merus of pereopod 4 has two short, stout spiniform setae of equal length (only one is present in P. denticulatus which has an additional simple seta of differing length),
and (13) the uropodal exopod is nearly the same length as the endopod (about 75 percent the length of endopod in *P. denticulatus*).
Figure 14. *Pseudotanaïs (Pseudotanaïs)* sp. A. Holotype, female. A, Dorsal view. B, Lateral view. Scale = 0.5 mm
Figure 15. *Pseudotanais* (*Pseudotanais*) sp. A. Paratype, female. A, Cheliped inner face. B, Uropod. C, Antennule. D, Antenna. E, Pleopod. Scale = 0.2 mm
Figure 17. *Pseudotanais (Pseudotanais)* sp. A. Paratype, female. A – F, Pereopods 1 to 6 respectively. Scale = 0.2 mm
Pseudotanais (Pseudotanais) sp. C, n. sp. (Figures 18 – 21)

Diagnosis

As for the family, subfamily and subgenus except: Cephalothorax longer than pereonites 1 to 3. Eyelobes absent. Antennule first article 55 percent of total antennule length, about 8.5 times longer than broad; distal article about 6.0 times longer than broad. Antenna 96 percent length of antennule, second article shorter than third article, both with short, stout spiniform setae; fourth article 9.5 times longer than broad and fifth article 3.5 times longer than broad. Mandible pars molaris narrow with long terminal spiniform process and 3 subterminal denticles. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with two medially located setae; endites fused between 1/3 and 2/3 length, each with one short seta. Cheliped with non-forcipate chelae; carpus 1.4 times longer than broad, with two inferior setae; propodus 3.8 times longer than broad, fixed finger with one inferior seta; dactylus 62 percent of propodus length, narrower than fixed finger and possessing proximal seta. Pereopod 1 basis about 8.0 times longer than broad, with simple seta; ischium and merus each with one seta and carpus with two setae; propodus about 10.5 times longer than broad, with seta; dactylus without seta, length with unguis distinctly shorter than propodus. Pereopods 2 and 3 basis with broom and simple setae; ischium and merus each with one seta, carpus with blade seta greater than half length of propodus and dactylus with unguis half length of propodus. Pereopod 4 basis about 5.0 times longer than broad, with simple and broom setae. Pereopods 4 to 6 ischium with two unequal setae, merus with two setae, carpus with additional bifid-tipped setae and propodus with broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods 2/3 length of endopods.

Type Locality

North Atlantic: Gulf of Mexico, Texas A&M Deepwater Gulf of Mexico Station B3–2 in the western Gulf of Mexico.

Depth Range
129

212–3145 m.

*Distribution*

Gulf of Mexico.

*Material Examined*

Holotype, non-ovigerous female, 1.1 mm, DGoM Station B3–2, 26°09.9750'N 91°43.9772'W, western Gulf of Mexico, 10 May 2000, 2650 m. *Paratypes*: four females and one manca from type locality; DGoM Station S42–2, two mancas; DGoM Station C7–2, one manca; DGoM Station B2–1, three females, one with nematode parasite; DGoM Station B2–2, one preparatory female; DGoM Station C1–1, four females, one manca; DGoM Station C4–1, three females; DGoM Station RW5–1, six females; DGoM Station RW6–1, one female; DGoM Station S36–1, ten females, one manca; DGoM Station S37–1, four females; DGoM Station S41–1, one female; DGoM Station W2–1, two females; DGoM Station W2–2, four females, one with nematode parasite; DGoM Station W4–1, two females; DGoM Station W6–2, one female; DGoM Station B1–1, one ovigerous female, three females, two mancas; DGoM Station NB5–2, one preparatory female dissected and slide mounted, four females; DGoM Station S35–2, one small female; DGoM Station S37–2, ten females, three mancas; DGoM Station AC1–3, two females; DGoM Station B3–3, one female, one manca; DGoM Station RW5–2, one female; S36–3, one female, three mancas; DGoM Station S37–3, one preparatory female, four females, six mancas; DGoM Station S38–2, one preparatory female; DGoM Station W2–3, three females, three mancas; DGoM Station W5–2, two females, one dissected and slide mounted; DGoM Station WC12–3, two females, three mancas; DGoM Station MT6–4, one small female; DGoM Station S44–3, two females; DGoM Station RW6–5, one female; DGoM Station B1–5, one female; DGoM Station W2–3, one female, one manca; DGoM Station WC5–5, two females.

*Description*

Based on holotype (Figs. 18A, B) and non-ovigerous and preparatory female paratypes. Body 0.8–1.3 mm, 3.2 times longer than broad.
Cephalothorax longer than pereonites 1–3, subtriangular, becoming narrow anteriorly, slightly narrower than pereon, with slight rostrum and pair of antero-lateral setae, 19.1 percent total length; eyelobes absent.

Pereon 53.3 percent total length, pereonite 1 abbreviated; pereonites 1, 4 and 5 with pair of dorso-lateral setae; pereonites 3–6 with additional pair of ventro-lateral setae. Pleon subequal to pereonites 5 + 6, 23.6 percent total length, pleonites 2–5 with pair of dorso-lateral setae, pleonites 1–5 with additional pair of ventro-lateral setae.

Pleotelson subequal to pleonites 4–5, 8 percent total length, apex slightly produced, with two apical setae and one pair of distolateral setae.

Antennule (Fig. 19B) 35.8 percent of body length, with three articles; first article 55.4 percent of total length, 8.5 times longer than broad, with one long medial simple seta, six short medial simple setae, two short distal simple setae, one long distal simple seta and two distal broom setae; second article 3.4 times longer than broad, with one long distal simple seta, one short distal simple seta and one distal broom seta; distal article 6.2 times longer than broad, terminating with three simple setae (two long, one short), one aesthetasc and three bidid-tipped setae.

Antenna (Fig. 19C) with six articles, 96.1 percent length of A1; second article 1.6 times longer than broad, about 75 percent length of third article, both articles distally with short, stout spiniform seta; fourth article 9.3 times longer than broad, with one long medial simple seta, one short distal simple seta, one long distal spiniform seta, three distal broom setae, and one sub-distal broom seta; fifth article 3.6 times longer than broad, distally with one long simple seta; sixth article small, terminating with one aesthetasc and four simple setae.

Mouthparts. Labrum (Fig. 20C) cap-shaped, distal central margin finely setose. Mandibles (Figs. 20A, B) with distal margins coarsely denticulate (left) and finely denticulate (right), right lacinia mobilis represented by short, pointed process, left lacinia mobilis well developed and coarsely denticulate, pars molaris acuminate, with long terminal spiniform process
and three subterminal denticles. Labium (Fig. 20D) medially cleft with submarginal ridges. Maxillule (Fig. 20G) palp with two equal setae, terminating with nine spiniform setae, one with subterminal setule and two accessory setae. Maxilla not observed. Maxilliped (Fig. 20E) bases completely fused, with two medially located setae; endites fused between 1/3 and 2/3 length, each with one short seta, with lateral margins smooth; palp with four articles; article 1 without setae; article 2 with three unequal inner edge simple setae and one outer-edge spiniform seta; article 3 with four unequal inner-edge simple setae; article 4 with one small outer-edge simple seta and five inner-edge simple setae. Epignath (Fig. 20F) elongate, sausage-shaped, tip unarmored.

*Cheliped* (Fig. 19A) strongly built, chela not forcipate; sclerite well developed; basis 1.5 times longer than broad; merus triangular, with inferior seta; carpus 1.4 times longer than broad, with two unequal medial inferior setae, one distal superior seta and one medial superior seta; propodus 3.8 times longer than broad, about 2.1 times longer than carpus, palm with five short setulate comb setae; fixed finger with one inferior seta, three superior setae and one seta near articulation with dactylus; dactylus 62.1 percent of propodus length, width narrower than fixed finger, with proximal spiniform seta.

*Pereopod 1* (Fig. 21A) coxa with seta; basis 8.0 times longer than broad, with medial inferior seta, proximal superior seta, and distal inferior seta; ischium with small seta; merus 2.4 times longer than broad, distally with short superior seta; carpus 3.9 times longer than broad, 1.5 times length of merus, distally with two short simple setae; propodus 10.4 times longer than broad, distally with short inferior seta; dactylus without seta, length with unguis half length of propodus.

*Pereopod 2* (Fig. 21B) coxa with seta; basis 7.7 times longer than broad, with medial superior broom seta, short proximal inferior seta, and short distal inferior seta; ischium with short inferior seta; merus 2.4 times longer than broad, distally with long inferior spiniform seta; carpus 4.5 times longer than broad, about 1.2 times length of merus, distally with one short superior spiniform seta, one inferior blade-like seta of about 65 percent length of propodus and one short
spiniform seta with broad basal collar; propodus 8.9 times longer than broad, with inferior marginal spinules, one long distal inferior spiniform seta (near length of dactylus-unguis) and setulose terminal margin at emergence of dactylus; dactylus without setae, length with unguis slightly longer than half length of propodus.

**Pereopod 3** (Fig. 21C) basis lacking proximal inferior seta; carpus 2.6 times longer than broad; propodus 6.4 times longer than broad; dactylus length with unguis about half length of propodus; otherwise similar to pereopod 2.

**Pereopod 4** (Fig. 21D) coxa with seta; basis 5.2 times longer than broad, with one medial broom seta, one proximal broom seta, and one medial inferior simple seta; ischium with two unequal setae, longer seta about half length of merus; merus 2.3 times longer than broad, distally with one short inferior spiniform seta and one long inferior spiniform seta; carpus 3.2 times longer than broad, 1.7 times longer than merus, distally with one short inferior simple seta, one anterior spiniform seta, one inferior blade-like spiniform seta of about 55 percent length of propodus, one bifid-tipped simple seta of about half length of propodus, inferior marginal spinules and four transverse rows of superior marginal setules (very faint); propodus 5.2 times longer than broad, about as long as carpus, distally with one long supero-terminal spiniform seta with heavily setose distal half, two unequal inferior spiniform setae, one superior broom seta, inferior marginal spinules and setulose terminal margin at emergence of dactylus; dactylus fused with unguis to form claw, margins slightly setulose, length with unguis about half length of propodus.

**Pereopod 5** (Fig. 21E) similar to pereopod 4.

**Pereopod 6** (Fig. 21F) basis lacking broom seta, carpus distally with inferior simple seta non-bifid tipped, about 2/3 length of propodus, propodus with additional terminal spiniform seta and lacking broom seta, otherwise similar to peropod 4.

**Pleopods** (Fig. 19D) rami elongate, with terminal setae only; endopod about 4/5 length of exopod, with five terminal setae; exopod with eight terminal setae.
Uropods (Fig. 19E) exopod with two articles, 2/3 length of endopod, proximal article about half length of ramus, with one distal simple seta, distal article with two unequal simple setae; endopod with two articles, proximal article slightly greater than half length of ramus, with one long distal simple seta or one broom seta, distal article with four long and two short simple setae.

Remarks

This new species is similar to those of the "affinis" group of *Pseudotanais* as presented by Bird and Holdich (1989) owing to several characters, primarily its acuminate mandibular molar process with terminal denticulation. By virtue of its inferodistal propodal spiniform setae being subequal in length to the dactylus-unguis of pereopods 2 and 3, it is allied to four members of the group: *P. affinis*, *P. scalpellum*, *P. spatula* and *P. longispinus*. Of these, it appears closest to the subgroup which includes *P. affinis* and *P. scalpellum* because the superior carpal seta of pereopods 5 and 6 are only about half the length of the propodus (as long or longer in the *P. spatula* and *P. longispinus*). It is similar to *P. affinis* because it possesses a short spiniform seta as well as a longer simple seta on the ischium of pereopods 4 to 6 (spiniform seta lacking on *P. scalpellum*) and is similar to *P. scalpellum* by having cephalothorax slightly longer than pereonites 1–3 (shorter in *P. affinis*). It differs from both these species by lacking a long simple seta on the merus of pereopod 1, and having a unique bifid-tip on the aforementioned superior carpal seta of pereopods 5 and 6. The mouthparts of species C appear nearly identical in most respects to other members of the "affinis" group. The molar process terminates in a more elongate process than *P. scalpellum* and *P. affinis*, and as such resembles more the apparatus of *P. longispinus* and *P. spatula*; however the maxillipeds exhibit more derived characters (less setation) than *P. longispinus* and also *P. nordenskioldi*. 
Figure 18. *Pseudotana*is (*Pseudotana*is) sp. C. Holotype, female. A, Dorsal view. B, Lateral view. Scale = 0.5 mm
Figure 19. *Pseudotanaïs (Pseudotanaïs)* sp. C. Paratype, female. A, Cheliped inner face, inset shows detail of comb seta. B, Antennule. C, Antenna. D, Pleopod. E, Uropod. Scale = 0.2 mm
Figure 21. *Pseudotanais (Pseudotanais)* sp. C. Paratype, female. A – F, Pereopods 1 to 6, respectively. Insets at D and E show detail of bifid-tipped setae. Scale = 0.2 mm
Pseudotanais (Pseudotanais) sp. O, n. sp. (Figures 22 – 25)

Diagnosis

As for the family, subfamily and subgenus except: Cephalothorax subequal in length to pereonites 1 to 3. Eyelobes absent. Antennule first article 55 percent of total antennule length, about 3.0 times longer than broad; distal article about 7.5 times longer than broad. Antenna 95 percent length of antennule; second article shorter than third article, both with short, stout spiniform setae; fourth article about 11.0 times longer than broad and fifth article 3.5 times longer than broad. Mandible pars molaris narrow, with with three subterminal denticles. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with two medially located setae; endites fused between 1/3 and 2/3 length, each with short seta. Cheliped with non-forcipate chelae; carpus 1.8 times longer than broad, with two inferior setae; propodus about 3.0 times longer than broad, fixed finger with one inferior seta; dactylus about 62 percent of propodus length, narrower in width to fixed finger and possessing proximal seta. Pereopod 1 basis about 9.5 times longer than broad, with three simple seta; ischium with one seta; merus with two setae; carpus with three setae; propodus about 10.0 times longer than broad, with seta; dactylus without setae, length with unguis subequal to propodus length. Pereopods 2 and 3 basis with broom and simple setae; ischium with one seta, merus with two setae, carpus with blade greater than half length of propodus and dactylus with unguis 2/3 length of propodus. Pereopod 4 basis about 4.5 times longer than broad. Pereopods 4 to 6 basis with broom and simple setae, ischium with two unequal setae, merus with one seta, carpus with additional exceptionally long superior seta and propodus with broom seta. Pleopods elongate with terminal setae only. Uropod exopods and endopods each with two articles; exopods 75 percent length of endopods.

Type Locality

North Atlantic: Gulf of Mexico, Texas A&M Deepwater Gulf of Mexico Station MT2–1 in the western Gulf of Mexico.

Depth Range
625–1401 m.

Distribution

Gulf of Mexico.

Material Examined

Holotype, non-ovigerous female, 1.4 mm DGoM Station MT2–1, 28°27.0646'N 89°40.3563'W, western Gulf of Mexico, 17 June 2000, 676 m. Paratypes: ten females from type locality; DGoM Station S42–2, one manca; DGoM Station MT3–5, one preparatory female; DGoM Station C7–1, two mancas; DGoM Station MT3–1, five females, four mancas; DGoM Station MT3–2, two females - one dissected and slide mounted, one manca; DGoM Station S35–1, one female, one manca; DGoM Station W3–1, three females - one dissected and slide mounted, one with nematode parasite; DGoM Station S35–2, two females; DGoM Station MT2–2, twelve females, four mancas; DGoM Station MT4–2, one manca; DGoM Station W2–3, one female.

Description

Based on holotype (Figs. 22A, B) and non-ovigerous female paratype. Body 1.3–1.6 mm, 3.3 times longer than broad.

*Cephalothorax* subequal to pereonites 1–3, subtriangular, becoming narrow anteriorly, with slight rostrum and pair of antero-lateral setae, 18.2 percent total length; eyeloibes absent.

*Pereon* 49.4 percent total length, perconite 1 abbreviated; perconites 3–4 with pair of dorsolateral setae.

*Pleon* about 1.5 times longer than pereonites 5+6, 24.5 percent total length, all pleonites with pair of dorso-lateral setae and additional pair of ventro-lateral setae. *Pleotelson* shorter than pleonites 4–5, 7.3 percent total length, apex rounded, with pair of mediolateral setae.

*Antennule* (Fig. 23B) 33.3 percent of body length, with three articles; first article 55.1 percent of total length, 3.1 times longer than broad, with one long medial simple seta, three short medial simple setae, one short distal simple seta, one long distal simple seta and three distal broom setae; second article 1.6 times longer than broad, with one long distal simple seta, one...
short distal simple seta and one distal broom seta; distal article 7.5 times longer than broad, terminating with three simple setae, one aesthetasc and three bifid-tipped setae.

Antenna (Fig. 23C) with six articles, 95 percent length of A1; second article 1.2 times longer than broad, about 2/3 length of third article, both articles distally with short, stout spiniform seta (larger on article 2); fourth article 10.9 times longer than broad, with one short distal simple seta, two long distal spiniform setae, one distal broom seta, and one sub-distal broom seta; fifth article 3.5 times longer than broad, distally with one long simple seta; sixth article small, terminating with one aesthetasc and four simple setae (one short, three long).

Mouthparts. Labrum (Fig. 24F) cap-shaped, distal central margin finely setose.

Mandibles (Figs. 24A, B) with distal margins coarsely denticulate (left) and finely denticulate (right), right lacinia mobilis represented by short, pointed process, left lacinia mobilis well developed and coarsely denticulate, pars molaris acuminate, with three subterminal denticles. Labium (Fig. 24E) medially cleft with submarginal ridges. Maxillule (Fig. 24C) palp with two equal setae, terminating with nine spiniform setae, two of which have a subterminal setule. Maxilla not observed. Maxilliped (Fig. 24D) bases completely fused, with two medially located setae; endites fused between 1/3 and 2/3 length, each with one short seta, with lateral margins smooth; palp with four articles; article 1 without setae; article 2 with three unequal inner edge simple setae and one outer-edge simple seta; article 3 with four unequal inner-edge simple setae; article 4 with one small outer-edge simple seta and five inner-edge simple setae. Epignath not observed.

Cheliped (Fig. 23A) strongly built, chela not forcipate; sclerite small; basis 1.5 times longer than broad, without setae; merus nearly oval, with inferior seta; carpus 1.8 times longer than broad, with two unequal medial inferior setae, one distal superior seta and one medial superior seta; propodus 2.8 times longer than broad, about 1.9 times longer than carpus, palm with four setulate comb setae (one long, three short) and two rows of small spinules and setules; fixed finger with one inferior seta, three superior setae and one seta near articulation with
dactylus; dactylus 62.2 percent of propodus length, width narrower than fixed finger, with proximal spiniform seta.

*Pereopod 1* (Fig. 25A) coxa with seta; basis 9.5 times longer than broad, with medial inferior seta, proximal superior seta, and distal inferior seta; ischium with small seta; merus 3.3 times longer than broad, distally with long superior seta and short inferior seta; carpus 2.8 times longer than broad, 1.1 times length of merus, distally with two short simple setae and one long superior seta (subequal in length to that of merus); propodus 10.1 times longer than broad, distally with short superior seta; dactylus without seta, length with unguis slightly shorter than propodus.

*Pereopod 2* (Fig. 25B) basis 6.7 times longer than broad, with proximal superior broom seta, short medial inferior seta, short proximal inferior seta, and short distal inferior seta; ischium with short inferior seta; merus 1.8 times longer than broad, distally with one long inferior serrate spiniform seta and one long inferior simple seta; carpus 4.1 times longer than broad, about 1.4 times length of merus, distally with one short superior spiniform seta, one inferior blade-like seta of about 75 percent length of propodus and one short spiniform seta with broad basal collar; propodus 6.9 times longer than broad, with inferior marginal spinules, one long distal inferior spiniform seta (near length of dactylus-unguis) and setulose terminal margin at emergence of dactylus; dactylus without setae, length with unguis 2/3 length of propodus.

*Pereopod 3* (Fig. 25C) basis lacking medial inferior seta; with superior marginal spinules; otherwise similar to pereopod 2.

*Pereopod 4* (Fig. 25D) basis 4.4 times longer than broad, tumid, with one medial broom seta, one proximal broom seta, one proximal simple seta, and one medial inferior simple seta; ischium with two unequal setae, longer seta about half length of merus; merus 2.2 times longer than broad, distally with one long inferior spiniform seta; carpus 3.8 times longer than broad, 1.7 times longer than merus, distally with one short anterior simple seta, one long superior simple seta of about half length of propodus, one short inferior spiniform seta and one inferior blade-like
spiniform seta of about 45 percent length of propodus; propodus 5.6 times longer than broad, slightly longer than carpus, distally with one long supra-terminal spiniform seta with heavily setose distal half, two unequal inferior spiniform setae, one superior broom seta and superior and inferior marginal spinules; dactylus fused with unguis to form claw, margins slightly setulose, length with unguis less than half length of propodus.

Pereopod 5 (Fig. 25E) basis lacking proximal broom seta and lacking medial simple seta, carpus distally with short anterior spiniform seta (instead of simple seta), superior seta extending beyond propodus, and inferior blade-like seta of about 60 percent of propodus length, propodus 4.3 times longer than broad, otherwise similar to P4.

Pereopod 6 (Fig. 25F) basis 5.1 times longer than broad, lacking medial simple seta, and lacking medial broom seta, carpus distally with superior seta extending beyond propodus, long anterior spiniform seta (instead of simple seta), and inferior blade-like seta of about 65 percent of propodus length, propodus with additional terminal spiniform seta, lacking small subterminal inferior spiniform seta, and lacking broom seta, otherwise similar to peropod 4.

Pleopods (Fig. 23E) rami elongate, with terminal setae only; endopod slightly shorter than exopod, with six terminal setae (innermost very short); exopod with nine terminal setae.

Uropods (Fig. 23D) exopod with two articles, 75 percent length of endopod, proximal article slightly less than half length of ramus, with one distal simple seta, distal article with two unequal simple setae; endopod with two articles, proximal article slightly greater than half length of ramus, with one long distal simple seta and two broom setae, distal article with four long and one short simple setae.

Remarks

Another species of the "affinis" group of Bird and Holdich (1989), this new species is differentiated from those in the Gulf of Mexico by its combination of a long superior carpal seta on pereopods 5 and 6 (shorter in species C and P), an additional long simple seta on the merus of pereopods 2 and 3 (this seta is absent in species C and P), and a long superior seta on the merus
and carpus of the first pereopod (long only on the carpus of species P). In these respects, species O is most similar to the northern Atlantic species *Pseudotanais spatula* and *P. longispinus* as described by Bird and Holdich (1989) and *P. nipponicus* from the north Pacific, especially in the nearly identical setation of the pereopods. Of these species, species O appears most closely allied to *P. spatula*, differing primarily in the more acute, less denticulate mandible pars molaris, but also in the general proportions and setation of the body segments. Species O has a considerably larger pleon (25 percent of the total body length) than *P. spatula* (about 18 percent), has a broader antennule article 1 (length 3.0 times width vs. 7.0 times width in *P. spatula*), and has more segments bearing dolo-lateral setae than illustrated for *P. spatula* by Bird and Holdich. The pars molaris of species O is similar in appearance to that found in *P. longispinus* and also in *P. nipponicus* but has fewer subterminal denticles. In addition, the maxilliped endites of species O lack the short conical cusps present in *P. longispinus* and also in *P. nipponicus*. 
Figure 22. *Pseudotanaïs (Pseudotanaïs)* sp. O. Holotype, female. A, Dorsal view. B, Lateral view. Scale = 0.5 mm
Figure 23. *Pseudotanaia* (*Pseudotanaia*) sp. O. Paratype, female. A, Cheliped inner face. B, Antennule. C, Antenna. D, Uropod. E, Pleopod. Scale = 0.2 mm
Figure 24. *Pseudotanais* (*Pseudotanais*) sp. O. Paratype, female. A, Left mandible. B, Right mandible. C, Maxillule, inset shows detail of spiniform seta with setule (arrow). D, Maxillipeds. E, Labium. F, Labrum. Scale = 0.2 mm
Figure 25. *Pseudotanais (Pseudotanais)* sp. O. Paratype, female. A – F, Pereopods 1 to 6, respectively. Scale = 0.2 mm
Pseudoianais (Pseudotanais) sp. P, n. sp. (Figures 26 – 29)

Diagnosis

As for the family, subfamily and subgenus except: Cephalothorax subequal in length to pereonites 1 to 3. Eyelobes absent. Antennule first article 50 percent of total antennule length, about 3.5 times longer than broad; distal article about 5.5 times longer than broad. Antenna 95 percent length of antennule; second article subequal in length to third article, both with short, stout spiniform setae; fourth article about 9.5 times longer than broad and fifth article 3.5 times longer than broad. Mandible pars molaris narrow, with three to five subterminal denticles. Maxillule endite terminating with nine spiniform setae. Maxilliped bases with two medially located setae; endites fused between 1/3 and 2/3 length, each with short seta. Cheliped with non-forcipate chelae; carpus 2.4 times longer than broad, with two inferior setae; propodus about 3.5 times longer than broad, fixed finger with one inferior seta; dactylus about 69 percent of propodus length, narrower in width to fixed finger and possessing proximal seta. Pereopod 1 basis about 9.0 times longer than broad, with four simple setae; ischium with one seta; merus without setae; carpus with three setae; propodus about 10.5 times longer than broad, with seta; dactylus with exceptionally long seta, length with unguis subequal to propodus length. Percoptopes 2 and 3 basis with broom and simple setae; ischium and merus each with one seta, carpus with blade greater than half length of propodus and dactylus with unguis 75 percent length of propodus. Pereopod 4 basis about 6.5 times longer than broad. Pereopods 4 to 6 basis with broom and simple setae, ischium with two unequal setae, merus with two setae, carpus with additional bifid-tipped seta and propodus with broom seta. Pleopods elongate with terminal setae only. Uropod exopods with one article and endopods with one pseudo-articulated article; exopods about 80 percent length of endopods

Type Locality

North Atlantic: Gulf of Mexico, Texas A&M Deepwater Gulf of Mexico Station WC12–3 in the western Gulf of Mexico.
Depth Range

658–2450 m.

Distribution

Gulf of Mexico

Material Examined

Holotype, non-ovigerous female, 1.25 mm, DGoM Station WC12–3, 27°19.4320′N 91°33.1625′W, western Gulf of Mexico, 5 May 2000, 1175 m. Paratypes: two females and three mancas from type locality; DGoM Station S42–2, one manca; DGoM Station RW3–1, one non-ovigerous female, dissected and slide mounted; DGoM Station RW4–1, one female; DGoM Station S35–1, one female, three mancas; DGoM Station S36–1, one female; DGoM Station AC1–2, two females; DGoM Station C7–2, one female, three mancas; DGoM Station S35–2, one female, two mancas; DGoM Station MT2–2, one male; DGoM Station S36–3, three females, one dissected and slide mounted.

Description

Based on holotype (Figs. 26A, B) and non-ovigerous female paratype. Body 1–1.7 mm, 3.2 times longer than broad.

Cephalothorax subequal to pereonites 1–3, subtrapezoidal, narrowing anteriorly, about equal in width to pereon, with pair of antero-lateral setae, 18.3 percent total length; eyelobes absent.

Pereon 64.4 percent total length, pereonite 1 abreviated; pereonites 1 and 3–6 with dorso-lateral setae, pereonites 3–6 with additional pair of ventro-lateral setae.

Pleon shorter than pereonites 5+6, 16.7 percent total length, all pleonites with pair of dorso-lateral setae and additional pair of ventro-lateral setae.

Pleotelson (Fig. 27E) shorter than pleonites 3–5, 6.9 percent total length, apex slightly produced, with pair of dorso-lateral setae and four apical setae (two simple, two spiniform).
*Antennule* (Fig. 27A) 31.1 percent of body length, with three articles; first article 50.4 percent of total length, 3.7 times longer than broad, with three short medial simple setae, one medial broom seta, one short distal simple seta, one long distal simple seta and three distal broom setae; second article 2 times longer than broad, with one long distal simple seta, one short distal simple seta and one distal broom seta; distal article 5.5 times longer than broad, terminating with two simple setae, one aesthetasc, three bifid-tipped setae and one trifid-tipped seta.

*Antenna* (Fig. 27B) with six articles, 95.4 percent length of A1; second article 1.4 times longer than broad, slightly shorter than third article, both articles distally with short, stout spiniform seta (larger on article 2); fourth article 9.5 times longer than broad, with one short distal simple seta, two long distal spiniform setae, four distal broom setae, and one sub-distal broom seta; fifth article 3.3 times longer than broad, distally with one long simple seta; sixth article small, terminating with two aesthetasc and four simple setae.

*Mouthparts.* Labrum (Fig. 28B) cap-shaped, distal central margin finely setose.

Mandibles (Figs. 28D, E) with distal margins coarsely denticulate (left) and finely denticulate (right), right lacinia mobilis represented by short, pointed process, left lacinia mobilis well developed and coarsely denticulate, pars molaris acuminate, with three to five subterminal denticles. Labium (Fig. 28C) medially cleft with submarginal ridges. Maxillule (Fig. 28G) palp with two unequal setae, terminating with nine spiniform setae, three of which have a subterminal setule. Maxilla not observed. Maxilliped (Fig. 28F) bases completely fused, with two medially located setae; endites fused between 1/3 and 2/3 length, each with one short seta, with lateral margins smooth; palp with four articles; article 1 without setae; article 2 with three unequal inner edge simple setae and one outer-edge simple seta; article 3 with four unequal inner-edge simple setae; article 4 with one small outer-edge simple seta and five inner-edge simple setae. Epignath (Fig. 28A) elongate, sausage-shaped, tip unarmored.

*Chelifed* (Fig. 27D) strongly built, chela not forcipate; sclerite well developed; basis 1.5 times longer than broad, with distal superior seta; merus triangular, with inferior seta; carpus 2.4
times longer than broad, with two unequal medial inferior setae, one distal superior seta and one medial superior seta; propodus 3.7 times longer than broad, about 1.6 times longer than carpus, palm with four setulate comb setae (one long, three short); fixed finger with one inferior seta, three superior setae (two simple, one limbate) and one seta near articulation with dactylus; dactylus 68.8 percent of propodus length, width narrower than fixed finger, with proximal spiniform seta.

*Pereopod 1* (Fig. 29A) coxa with seta; basis 9.1 times longer than broad, with medial inferior seta, proximal superior seta, proximal inferior seta, and distal inferior seta; ischium with small seta; merus 2.2 times longer than broad, distally with no setae; carpus 2.5 times longer than broad, 1.3 times length of merus, distally with two short simple setae and one long superior seta; propodus 10.5 times longer than broad, distally with short superior seta; dactylus with seta, length with unguis subequal to length of propodus.

*Pereopod 2* (Fig. 29B) coxa with seta; basis 7.1 times longer than broad, with medial superior broom seta, short proximal inferior seta, and short distal inferior seta; ischium with short inferior seta; merus 3.2 times longer than broad, distally with long inferior spiniform seta; carpus 4.4 times longer than broad, about 1.2 times length of merus, distally with one short superior spiniform seta, one inferior blade-like seta of about 60 percent length of propodus and one short spiniform seta with broad basal collar; propodus 8.1 times longer than broad, with inferior marginal spinules, superior marginal spinules, one long distal inferior spiniform seta (near length of dactylus-unguis) and setulose terminal margin at emergence of dactylus; dactylus without setae, length with unguis 75 percent length of propodus.

*Pereopod 3* (Fig. 29C) basis without broom seta; carpus with inferior blade-like seta of about 85 percent length of propodus; propodus 5.7 times longer than broad; otherwise similar to pereopod 2.

*Pereopod 4* (Fig. 29D) coxa with seta; basis 6.3 times longer than broad, with two medial broom setae and one medial inferior simple seta; ischium with two short setae; merus 2.5 times
longer than broad, distally with one short inferior simple seta and one long inferior spiniform seta; carpus 3.6 times longer than broad, 1.7 times longer than merus, distally with one bifid-tipped simple seta of about half length of propodus, two short anterior simple setae, one short inferior spiniform seta and one inferior blade-like spiniform seta of about 45 percent length of propodus; propodus 5.4 times longer than broad, slightly longer than carpus, distally with one long supero-terminal spiniform seta with heavily setose distal half, two unequal inferior spiniform setae, one superior broom seta, superior marginal spinules and setulose terminal margin at emergence of dactylus; dactylus fused with unguis to form claw, margins slightly setulose, length with unguis less than half length of propodus.

Pereopod 5 (Fig. 29E) basis 5.1 times longer than broad, carpus distally with long posterior spiniform seta and lacking anterior simple seta, otherwise similar to P4.

Pereopod 6 (Fig. 29F) basis lacking medial broom seta; ischium with two unequal simple setae; merus lacking distal simple seta, carpus distally with long anterior spiniform seta (instead of simple seta), propodus with additional terminal spiniform seta and lacking broom seta, otherwise similar to pereopod 4.

Pleopods (Fig. 27C) rami elongate, with terminal setae only; endopod about 75 percent length of exopod, with six terminal setae (innermost very short); exopod with nine terminal setae.

Uropods (Fig. 27E) exopod with one article, about 80 percent length of endopod, with one medial simple seta and two unequal terminal simple setae; endopod with one article pseudo-articulated about mid-length, with one long simple seta and two broom setae at pseudo-articulation and five long and one short terminal simple setae.

Remarks

This new species is another member of the Gulf of Mexico group which has prominent carpal blade setae on pereopods 2 and 3 that exceed greater than half the length of the propodus (see remarks for species O for differentiation among members of this group). In short, this new species differs from species C by (1) having terminal spiniform setae on propodus of pereopods 2
and 3 shorter by half or 3/4 than the length of the dactylus-unguis (subequal length in species C); (2) pereopods 2 and 3 lack the long spiniform superior carpus seta present on species C, and (3) pereopod 1 has a long simple seta on the carpus (absent in species C). It is probably most closely related to species O, both have the characteristic elongate dactylus-unguis of pereopod 1, but is distinguished from that species by its lack of long superior simple setae on the carpus of pereopods 5 and 6 and the merus of pereopods 2 and 3. Furthermore, species P differs from all others of the group by its uropods which have uni-articulate exopods and pseudo-articulate endopods. The uropods do, however have the usual setae at the location where these articulations would be expected, which lends to the speculation that this lack of articulation is of recent derivation. The uropods notwithstanding, species P falls outside of Bird and Holdich’s (1989) “affinis group” by virtue of its short terminal spiniform propodal setae on pereopods 2 and 3 and may be somewhere near *Pseudotanaïs colonus* which also has uni-articulate, but very short, uropod exopods. Species P, along with species O and *P. spatula*, are unique among members of the subfamily Pseudotanaïinæ in that they have three carpal setae on pereopod 1; all others have two or less. One male specimen of species P was discovered that had the characteristic long carpal blades on peropods 2 and 3, antennule with five articles possessing a typical abundance of setae known for male tanaïds, chelae with strong serations on margin of fixed finger, pleopods present with long, natatory setae, and uni-articulate uropods characteristic of the species.
Figure 26. *Pseudotanaïs (Pseudotanaïs)* sp. P. Holotype, female. A, Dorsal view. B, Lateral view. Scale = 0.5 mm
Figure 27. *Pseudotanaïs (Pseudotanaïs)* sp. P. Paratype, female. A, Antennule. B, Antenna. C, Pleopod. D, Cheliped. E, Pleotelson with uropods, ventral view. Scale = 0.2 mm
Figure 29. *Pseudotanais (Pseudotanais)* sp. P. Paratype, female. A – F, Pereopods 1 to 6, respectively. D,E,F, - insets show detail of bifid-tipped setae (arrows). Scale = 0.2 mm
Family Cryptocopidae, n. fam.

Diagnosis.

Eyelobes pigmented, rudimentary or absent. Pereon with six free pereonites none of which are reduced. Pleon with five free pleonites. Antennule with four articles. Antenna with six articles, second and third articles with simple setae. Mandible pars molaris broad or narrow, with or without terminal ring of setae. Maxillule palp terminating with two setae and endite terminating with five to ten spiniform setae. Maxilla rudimentary. Maxilliped bases completely or partially fused. Maxilliped endites completely separate; with simple setae, cusps, or naked. Cheliped attached to body via sclerite. Chelae not forcipate. Cheliped carpus with one or two inferior setae. Cheliped propodus less than 1.5 times longer than carpus. Cheliped fixed finger with one or two inferior setae. Cheliped dactylus seta present or absent. Marsupium formed by one or possibly four (Bird and Holdich 1989) pairs of oostegites. Pereopods 4 to 6 merus with two setae and without fusion of dactylus and unguis to form claw. Pleopods well developed, with terminal setae only, or rudimentary without setae. Uropod exopods with one or two articles. Uropod endopods with two articles.

Remarks.

The diagnosis was modified after Sieg (1977), Larsen and Wilson (2002) and Larsen (2005) from their diagnoses of the family Pseudotanaidae and the subfamily Cryptocopinae which contained all the members of the new family Cryptocopidae. The new family is currently polyphyletic (Fig. 5) and includes the subfamilies Cryptocopinae, Cryptocopoidinae and Lungentitanainae.

Key to Subfamilies.

1. Pleopods rudimentary, uropod exopods uni-articulate .................................. Cryptocopinae
   -- Pleopods not rudimentary, uropod exopods bi-articulate ................................2

2. Pleopods well developed, lateral setae present .............................................. Lungentitanainae
Pleopods elongate, without lateral setae ........................................ Cryptocopoidinae

Subfamily Cryptocopinae Sieg, 1977

*Diagnosis.*

As for family except: Eyelobes absent. Mandible pars molaris narrow, with bifid tip.
Maxillule endite terminating with nine spiniform setae. Maxilliped endites with simple setae only. Cheliped carpus with two inferior setae. Cheliped fixed finger with one inferior seta.
Cheliped dactylus seta absent. Pleopods rudimentary, without setae. Uropod exopods with one article.

*Type genus.*

*Cryptocope* G.O. Sars, 1882

*Genera included.*

*Cryptocope* G.O. Sars, 1882

*Remarks.*

This subfamily was originally erected by Sieg (1977) to contain four mono-specific genera of Pseudotanaidae with four antennular articles, completely separate maxilliped endites and no claw-like pereopod dactylus - all plesiomorphic characters. Two genera, *Iungentitanais* and *Paraiungentitanais*, were placed in the subfamily with reservations owing to the unknown nature of the marsupium. Two additional mono-specific genera, *Latitanais* and *Curtichelia*, were placed in Cryptocopinae by Larsen and Wilson (2002) based on a cladistic analysis of the Paratananaoidea. In the current revision, a single species, *Cryptocope abreviata*, remains in the subfamily.
*Cryptocope abreviata* (G.O. Sars, 1882)

**Synonymy.**

*Tanais abbreviatus* G.O. Sars, 1886

*Cryptocope abreviata* Greve, 1965: 45

*Cryptocope abreviata* Sieg 1977: 22

**Diagnosis.**

As for subfamily with the following: Antennule first article twice as long as broad, third article about half as long as broad, distal article about twice as long as broad. Antenna second article subequal in length to third article, fourth article 3.5 times longer than broad and fifth article nearly 3.0 times longer than broad. Cheliped propodus about twice longer than broad, dactylus greater than half length of propodus and narrower than fixed finger. Pereopod 1 basis 6.0 times longer than broad, with simple setae; ischium and merus with one seta, carpus and propodus with two setae and dactylus without setae; propodus about 5.0 times longer than broad and dactylus with unguis subequal to length of propodus. Pereopods 2 and 3 basis without setae, ischium with one seta and merus with two setae; dactylus with unguis subequal in length to propodus. Pereopod 4 basis 6.0 times longer than broad. Pereopods 4 to 6 basis without setae and ischium with two equal setae. Uropod exopods half length of endopods.

**Type Locality.**

North Atlantic off Norway.

**Depth Range.**

60–680 m.

**Distribution.**

Known only from the coasts of Norway.

**Remarks.**
Sieg examined material collected by Greve (1965: 45) from near the type locality consisting of nine females of which were three ovigerous or preparatory. The original type material of Sars is apparently lost.

References.


Subfamily Cryptocopoidinae, n. subfam.

Diagnosis.

As for family except: Eyelobes absent. Mandible pars molaris broad with terminal ring of short denticles. Maxillule endite terminating with eight or nine spiniform setae. Maxilliped bases not completely fused. Maxilliped endites with simple setae only. Cheliped carpus with two inferior setae. Cheliped fixed finger with two inferior setae. Pleopod rami elongate with terminal and/or subterminal setae. Uropod exopods with two articles.

Type genus.

Cryptocopoides Sieg (1976)

Genera included.

Cryptocopoides Sieg (1976)

Remarks.

The three species of this subfamily appear as paraphyletic on the cladogram in Fig. 1 and in subsequent cladograms depicting character traces with some character states (e.g., pleopod development) that lie intermediate between the more ancestral Lungentititanainae and the Crytocopinae (character 63, Fig. 87). In contrast, the subfamily shows an ancestral trait with partial separation of the maxillipeds bases (character 23, Fig. 49). The two most recently described species, C. pacificus and C. sp. A form a well supported clade in a more ancestral position than the third member of the genus, C. arcticus.
Genus Cryptocopoides Sieg (1976)

Diagnosis.

As for subfamily.

Species Included.

Cryptocopoides arcticus (Hansen, 1887) – type species

Cryptocopoides pacificus McLelland, 2007

Cryptocopoides sp. A

Cryptocopoides arcticus (Hansen, 1887)

Synonymy

Cryptocope artica Hansen, 1887:209

Cryptocope antarctica Vanhöffen, 1914:482

Cryptocopoides arctica (= arcticus) Sieg, 1977:17

Diagnosis.

As for subfamily with the following: Antennule first article about twice as long as broad, third article about as long as broad, distal article 3.5 times as long as broad. Antenna second article subequal in length to third article, fourth article 3.5 times longer than broad and fifth article about 6.0 times longer than broad. Maxilliped bases fused except for distal notch. Maxillule endite with eight terminal spiniform setae. Cheliped propodus about 2.5 times longer than broad, dactylus greater than half length of propodus, subequal in width to fixed finger and lacking a proximal seta. Pereopod 1 basis 7.0 times longer than broad, with simple setae; ischium and merus with one seta, carpus and propodus with three setae and dactylus without setae; propodus about 4.0 times longer than broad and dactylus with unguis distinctly shorter than propodus. Pereopods 2 and 3 basis with broom setae, ischium and merus with one seta; dactylus with unguis subequal in length to propodus. Pereopod 4 basis 6.0 times longer than broad.
Pereopods 4 to 6 basis without setae and ischium with one seta. Pleopod rami elongate with terminal setae only. Uropod exopods subequal to length of endopods.

*Type locality.*

Kara Sea, Arctic Ocean

*Depth Range.*

103 m (North Atlantic); 4664–5631 m (Antarctica).

*Distribution.*

North Atlantic: North Sea, Arctic Ocean; South Atlantic: Antarctica; Pacific: Japan.

*Remarks.*

Sieg (1977) based his description and synonymy on a combination of specimens from two largely separated areas: *Cryptocope arctica* collected by Hansen (1913) from the north Atlantic and *Cryptocope antarctica* collected off Antarctica by Vanhöff (1914). He determined them to be identical except for some “small variations” and synonymized them under one species, *Cryptocopoides arcticus*. Hopefully, additional specimens from both polar regions will be re-examined in greater detail someday to determine if these “variations” could be interpreted as representing two separate species.

*References.*

Sieg (1977): 17, Figs. 9–11, 15; Vanhöff (1914): 482, Fig. 19a,b.

*Cryptocopoides pacificus* McLelland, 2007

*Diagnosis.*

As for subfamily and *C. arcticus* with the following: Antennule first article about twice as long as broad, third article about as long as broad, distal article 3.5 times as long as broad.
Antenna second article longer than third article, fourth article 3.5 times longer than broad and fifth article about twice as long as broad. Maxilliped bases about half fused. Maxillule endite with eight terminal spiniform setae. Cheliped, dactylus possessing a proximal seta. Pereopod 1 basis 9.0 times longer than broad, with simple setae; ischium and merus with one seta, carpus with four setae, propodus with three setae and dactylus without setae; propodus about 4.0 times longer than broad and dactylus with unguis subequal in length to propodus. Pereopods 2 and 3 basis with simple setae, ischium and merus with one seta; dactylus with unguis subequal in length to propodus. Pereopod 4 basis 5.0 times longer than broad. Pereopods 4 to 6 basis with simple setae, ischium with two unequal setae, carpus with additional spatulate setae and propodus with broom seta. Pleopod rami elongate with terminal and subterminal setae. Uropod exopods subequal to length of endopods.

*Type Locality.*

Kamchatka Trench in the North Pacific off Japan.

*Depth Range.*

3145-5484 m.

*Distribution.*

North Pacific: Kamchatka Trench off Japan.

*Remarks.*

This species differs further from *C. arcticus* by (1) having antenna article 2 with two distal setae instead of one, (2) having a pair of basal setae and pair of submarginal setae on the maxilliped endites, (3) having a small proximal seta on cheliped dactylus, and (4) having two ischium setae and spatulate carpal setae present on pereopods 4 and 5.

*Reference.*


*Cryptocopoides* sp. A, n. sp. (Figs. 30 - 32)
Diagnosis.

As for subfamily and *C. pacificus* except: Pleopods with terminal setae only. Maxillule endites with nine terminal spiniform setae. Pereopod dactylus with unguis distinctly shorter than propodus. Four apical setae on pleotelson.

Type locality.

Off Kiawah Island, South Carolina, 31° 42.04N, 78° 49.42W, 03 August 2003, 554 m.

Depth Range.

422 – 875 m.

Distribution.

North Atlantic: off east coast of U.S.

Material examined.

Holotype, non-ovigerous female, 1.65 mm., MRRI sample T10031019 collected by the Johnson Sea-Link submersible using a suction device. Paratypes: MRRI submersible collection T10041060 off Jacksonville Beach, Florida, 30° 16.56N, 79° 20.38W, 836 m, 30 August 2004 – 2 non-ovigerous females, 1.4 mm; 1 non-ovigerous female, 1.8 mm, dissected and slide mounted. Johnson Sea-Link submersible collection 2004–0315 (Dive no. 3470) off Jacksonville, Florida, 30° 63.2500N, 79° 73.4722 W, 875 m, 30 August 2004 – 1 female, fragmented. Museum specimens listed as *Cryptocope* sp. A: 1 female (USNM 174730), off Cumberland Island, GA, 30° 54' 04 N, 79° 43' 50 W, 422 m, collected by Texas Instruments, 25 November 1977; 1 neuter/subadult female (USNM 174731), off Jacksonville, FL, 30° 23' N, 80° 10' W, 149 m, collected by Texas Instruments, 1 March 1977.

Description

Based on non-ovigerous females. Body 1.4–1.8 mm in length, 4.4 times longer than broad.
Cephalothorax (Fig. 30A) longer than pereonites 1–3, trapezoidal, becoming narrow anteriorly, slightly wider than percon, with pair of antero-lateral setae, 25.1 percent total length; eyelobes absent.

Pereon 51.9 percent total length; no pereonites abreviated; each pereonite with pair of dorso-lateral and ventro-lateral setae emerging from anterior margin (pereonite 1 with three additional pairs of ventrolateral setae).

Pleon (Fig. 30B) shorter than pereonites 5+6, 15.2 percent total length, pleonites 3–5 with pair of dorso-lateral setae (pleonite 5 with additional pair of extremely long ventro-lateral setae).

Pleotelson (Fig. 30F) shorter than pleonites 3–5, 7.8 percent total length, apex slightly produced ventrally, with one pair of distolateral setae or four apical setae.

Antennule (Fig. 30D) 9.5 percent of body length, with four articles; first article 47.3 percent of total length, 1.6 times longer than broad, with three short medial simple setae, one short distal simple seta, one long distal simple seta and two distal broom setae; second article 0.9 times longer than broad, with one long distal simple seta and two distal broom setae; third article 0.9 times longer than broad, with two long distal simple setae and one distal broom seta; distal article 3.8 times longer than broad, terminating with four simple setae and two aesthetascs.

Antenna (Fig. 30E) with six articles, 88.1 percent length of A1; second article 1.7 times longer than broad, 1.6 times longer than third article, both articles distally with long, slender spiniform seta; fourth article 3.6 times longer than broad, with two medial setules, six short distal simple setae (one thick), and one long distal simple seta; fifth article 2.7 times longer than broad, distally with one long simple seta; sixth article small, terminating with two aesthetascs and three simple setae (one long, two short).

Mouthparts. Labrum (Fig. 31E) cap-shaped, heavily setose with setulate lateral margins. Mandibles (Figs. 31A,B) with distal margins denticulate, right lacinia mobilis absent, left lacinia mobilis well developed and denticulate, pars molaris broad, with six blunt terminal teeth and
three short marginal setae. Labium not observed. Maxillule (Fig. 31D) endite terminating with 9 spiniform setae, including 1 with expanded, slightly bifid tip and two accessory setae. Maxilla not observed. Maxilliped (Fig. 31C) bases about half fused, with seta near each palp articulation; endites completely separate, each with two unequal setae; palp with four articles; article 1 without setae; article 2 with one medio-distal extremely long simple seta, one inner-edge simple seta, one inner-edge setulose spiniform seta, and one outer-edge simple seta; article 3 with one short distal simple seta, two inner-edge setulose spiniform setae, and one inner-edge simple seta; article 4 with one small outer-edge simple seta, four inner-edge setulose spiniform setae, and one inner-edge simple seta. Epignath not observed.

Cheliped (Fig. 30C) chela not forcipate; selerite well developed; basis 1.7 times longer than broad, with medial superior seta; merus triangular, with inferior seta; carpus 1.6 times longer than broad, with two unequal medial inferior setae, one distal superior seta and one medial superior seta; propodus 2.6 times longer than broad, slightly longer than carpus, palm with one long and two short comb setae, plus row of several small setules; fixed finger with two unequal inferior setae, three superior setae, terminal unguis and subterminal inner-margin notch which receives tip of dactylus; dactylus 45 percent of propodus length, width subequal to fixed finger, with proximal spiniform seta and terminal unguis.

Pereopod 1 (Fig. 32A) coxa with seta; basis 8.9 times longer than broad, with proximal superior seta; ischium with small seta; merus 2.2 times longer than broad, distally with minute superior seta and short inferior seta; carpus 3.8 times longer than broad, 1.5 times length of merus, distally with three short simple setae (one inferior, one superior, one anterior) and one minute superior spiniform seta; propodus 5 times longer than broad, distally with long superior spiniform seta and short inferior spiniform seta; dactylus without seta, length with unguis 60 percent length of propodus.

Pereopod 2 (Fig. 32B) coxa with seta; basis 8.8 times longer than broad, with proximal superior broom seta and proximal superior seta; ischium with short inferior seta; merus 2.5 times
longer than broad, distally with long inferior spiniform setae; carpus 3.9 times longer than broad, about 1.5 times length of merus, distally with one short superior simple seta, one long superior spiniform seta and two long inferior spiniform setae; propodus 4.9 times longer than broad, with one short distal superior spiniform seta and one long distal inferior spiniform seta; dactylus without setae, length with unguis 70 percent length of propodus.

Pereopod 3 (Fig. 32C) basis with medial inferior broom seta (proximal superior broom seta lacking); otherwise similar to P2.

Pereopod 4 (Fig. 32D) coxa with seta; basis 5.7 times longer than broad, with two medial inferior broom setae; ischium with two short setae; merus 2.4 times longer than broad, distally with two long inferior spiniform setae; carpus 5.1 times longer than broad, 1.2 times longer than merus, distally with one short spatulate seta and four long spiniform setae; propodus 5.1 times longer than broad, 1.4 times longer than carpus, distally with one long superior terminal spiniform seta, two long inferior spiniform setae, one superior broom seta and setulose terminal margin at emergence of dactylus; dactylus not fused with unguis, length with unguis about 75 percent length of propodus.

Pereopod 5 (Fig. 32E) propodus with shorter, stouter superior terminal spiniform seta, otherwise similar to P4.

Pereopod 6 (Fig. 32F) basis with medial superior broom seta (two inferior broom setae lacking); ischium with single short seta; carpus distally with short simple seta (instead of spatulate seta), propodus with additional terminal spiniform seta and lacking broom seta, otherwise similar to P4.

Pleopods (Fig. 30G) rami elongate, with terminal setae only; endopod about 2/3 length of exopod, with four terminal setae; exopod with seven terminal setae.

Uropods (Fig. 30F) exopod with two articles, 75 percent length of endopod, proximal article slightly less than half length of ramus, with one distal simple seta, distal article with one long simple seta; endopod with two articles, proximal article about half length of ramus, with one
broom seta, distal article with five long simple setae (one subterminal, four terminal) and one broom seta.

Remarks.

_Cryptocopoides_ sp. A is the third species described for the genus. The first, _C. arcticus_ (Hansen, 1887), is well known from northern Atlantic waters and was considered by Sieg (1977) to have a bi-polar distribution (see remarks for _C. arcticus_). Recently McLelland (2007) described an additional species, _C. pacificus_, from the north Pacific Ocean. Of the three species of _Cryptocopoides_, _C_. sp. A has more features in common with _C. pacificus_ than with _C. arcticus_, since both have a greater degree of setation on body segments, mouthparts and pereopods and have a similar cephalothorax length which is comparatively shorter than that of _C. arcticus_. In addition, both have a distinctive spatulate carpal seta on pereopods 4 and 5, a small proximal seta on the cheliped dactylus, a superior seta on the cheliped basis, and a pair of setae on the fused maxilliped bases, all of which appear to be lacking in _C. arcticus_. Furthermore, both species differ from _C. arcticus_ by having two (vs. one) sub-marginal setae on the maxilliped endites, four or five (vs. two) distal setae on pereopods 2 and 3, and a distinctive pair of long setae on the ventro-lateral margins of pleonite 5 (lacking in _C. arcticus_). _Cryptocopoides_ sp. A shares similarities with _C. arcticus_ that distinguish it from _C. pacificus_ including: (1) antenna article 2 with a single spiniform seta rather than two, (2) pereopod dactylus-unguis lengths which are distinctly shorter than the propodus (sub-equal in _C. pacificus_), and (3) the lack of a sub-terminal endopod seta on the pleopods. The new species is unique among its congenitors by having four rather than two apical setae on the pleotelson and nine terminal spiniform setae on the maxillule endite rather than eight.
Figure 30. *Cryptocopoides* sp. A. Holotype female. A, Dorsal view. B, Lateral view. Paratype female. C, cheliped, inner face; D, antennule. E, Antenna. F, Pleotelson and uropods, ventral view. G, Pleopods. Scale bars: A-B = 0.5mm, C-G = 0.2mm
Figure 31. Cryptocopes sp. A. Paratype, female. A, left mandible; B, right mandible; C, maxilliped; D maxillule endite, inset shows spiniform seta with inflated tip; E, labrum. Scale = 0.2mm
Figure 32. Cryptocopoides sp. A. Paratype, female. A–F, pereopods 1–6 respectively. Inset at D shows detail of spatulate seta indicated by arrow. Scale = 0.2mm.
Subfamily lungentitanainae, n. subfam.

*Diagnosis.*

As for family except: Antennule third article 1.5 to 2.5 times longer than broad. Antennule distal article and antenna fourth article both greater than 4.0 times longer than broad. Mandible pars molaris broad, truncate, with terminal ring of denticles. Maxilliped bases completely fused. Pleopods well developed, with terminal and lateral setae. Uropod exopods with two articles.

*Type Genus.*

*Iungentitanais* Sieg, 1977

*Genera Included.*

*Iungentitanais* Sieg, 1977  
*Paraiungentitanais* Sieg, 1977  
*Latitanais* Kudinova-Pasternak, 1987  
*Curtichelia* Kudinova-Pasternak, 1987

*Remarks.*

This subfamily is a provisional repository for four mono-specific genera with questionable affinities. Nonetheless, the group formed a fairly well supported monophyletic clade, ancestral to the other Cryptocopidae subfamilies, as seen in Figure 1 and in subsequent character trace figures.

*Iungentitanais primitivus* Sieg, 1977

*Synonymy*


*Diagnosis*

As for subfamily except: Eyelobes present, with pigment. Antenna fourth article six to 8.0 times longer than broad. Maxillule endite terminating with five spiniform setae. Maxilliped
endites with cusps and setae. Cheliped carpus greater than 4.0 times longer than broad, with one inferior seta. Cheliped fixed finger with one inferior seta. Cheliped propodus greater than 4.0 times longer than broad. Cheliped dactylus less than half length of propodus, narrower than fixed finger and bearing a proximal seta. Pereopod 1 basis without setae, ischium with 1 seta, merus without setae, carpus with two setae, propodus with three setae, and dactylus with one short seta. Pereopods 4 to 6 basis without setae and ischium with one seta. Uropod exopod half length of endopod.

Type Locality

North Atlantic: Saint Thomas in the tropical West Indies.

Depth Range

18 – 33 m.

Distribution

Atlantic West Indies, Caribbean, tropical Gulf of Mexico.

Remarks

This species is characterized by its long, slender chelipeds, pigmented eyes, and five terminal spines on the maxillule endite. The latter characters separate it from its closest relative *Paraiungentitanais longidigitatus*. Mandibles were described from additional specimens collected in the Florida Keys since those from the holotype were lost (Sieg and Heard 1988).

References


*Paraiungentitanais longidigitatus* (Kudinova-Pasternak, 1975)

Synonymy
Mortensenia longidigitata Kudinova-Pasternak, 1975; Paraungentitanais longidigitatus Sieg, 1977:15

Diagnosis

As for subfamily and Ungentitanais except: Eyelobes rudimentary, without pigment. Maxillule endite terminating with nine spiniform setae. Cheliped carpus less than 4.0 times longer than broad, with two inferior seta. Cheliped fixed finger with two inferior setae. Cheliped dactylus broader than fixed finger. Uropod exopod 1/3 length of endopod.

Type Locality

South Atlantic: off Falkland Islands.

Depth Range

1660 m.

Distribution

Southwest Atlantic Ocean off the Falkland Islands.

Remarks

The original description provided only limited information. Characters for periopods and pleopods were assumed to be the same as those for Ungentitanais primitivus; indeed these similarities are stated by both, Kudikova-Pasternak and Sieg. This genus, according to Sieg, is distinguished from Ungentitanais mainly by virtue of its nine terminal maxillule endite spines as opposed to five for Ungentitanais. Sieg further mentioned that since the marsupium is unknown, placement of this species in Pseudotanaidae is questionable.

References

Kudinova-Pasternak (1975): 223-225, Fig. 16; Sieg (1977):15–17, Figs. 8, 15.

Latitanais beklemishevi Kudinova-Pasternak, 1987

Diagnosis
As for subfamily except: Eyelobes rudimentary, without pigment. Antenna fourth article between four and 6.0 times longer than broad. Maxillule endite terminating with nine spiniform setae. Maxilliped endites without setae. Cheliped carpus less than 4.0 times longer than broad, with two inferior setae. Cheliped fixed finger with one inferior seta. Cheliped propodus less than 2.5 times longer than broad. Cheliped dactylus greater than 60% length of propodus, subequal in width to fixed finger and lacking proximal seta. Pereopod 1 basis without setae, ischium without setae, merus with two setae, carpus with two setae, propodus with one seta, and dactylus without setae. Pereopods 4 to 6 basis without setae and ischium with two equal setae. Uropod exopod length subequal to that of endopod.

Type Locality

Indian Ocean: Madagascar Basin

Depth Range

5040–5060 m.

Distribution

Indian Ocean from the type locality.

Remarks

The original description in Russian was very cursory and several appendages were not illustrated. This species, originally a member of the family Leptognathidae, was placed, along with Curtichelia expressa, within the Cryptocopinae by Larsen and Wilson (2002) as a result of a cladistic analysis conducted on genera of Parataninoidea. It is notable among cryptocopids by having well developed pleopods (terminal and lateral setae), a maxillule endite with nine terminal spines, and subequal uropod rami.

References

Kudinova-Pasternak (1987): 29–30, Fig. 1.
Curtichelia expressa Kudinova-Pasternak, 1987

Diagnosis

As for the subfamily except: Eyelobes lacking. Antenna fourth article between four and 6.0 times longer than broad, fifth article nearly 7.0 times longer than broad. Maxillule endite terminating with nine spiniform setae. Maxilliped endites without setae. Cheliped carpus less than 2.0 times longer than broad, with two inferior seta. Cheliped fixed finger with two inferior setae. Cheliped propodus less than 2.5 times longer than broad. Cheliped dactylus greater than 60% length of propodus, broader than fixed finger and lacking proximal seta. Pereopod 1 basis with one simple seta, ischium with one seta, merus with two setae, carpus with two setae, propodus with two setae, and dactylus with one short seta. Pereopods 4 to 6 basis with two broom setae and ischium with two equal setae. Uropod exopod 75 percent length of endopod.

Type Locality

Indian Ocean: off Madagascar.

Depth Range

4987–5025 m.

Distribution

Indian Ocean off Madagascar.

Remarks

As for Latitanais beklemishevi, the original description in Russian was very cursory and some appendages were incompletely rendered. This species, originally a member of the family Leptognathidae, was placed, along with Latitanais beklemishevi, within the Cryptocopinae by Larsen and Wilson (2002) as a result of a cladistic analysis conducted on genera of Paratanapoidea. It is distinguished by its short, massive chelipeds and unusually long mandibles. An atypical arrangement of the maxillule endite terminal setation is seen in the "10 or 11 terminal spines" of
which nine are thick and one has an accessory tooth. The author is likely referring to the usual nine spines with accessory setae.

Reference

Kudinova-Pasternak (1987): 34–35, Fig. 4.

Key to Species of Cryptocopidae and Pseudotanaidae

1. Antennule with four articles; maxilliped endites completely separate ........................................ Family Cryptocopidae .......................... 2

................................................................. -- Antennule with three articles; maxilliped endites partially or completely fused .................................

................................................................. Family Pseudotanaidae .......................... 9

2. Pleopods rudimentary; uropod exopods uni-articulate .................................................................

........ Subfamily Cryptocopinae .................................................. Cryptocope abreviata

-- Pleopods not rudimentary; uropod exopods bi-articulate ................................................................. 3

3. Pleopods well developed, lateral setae present .... Subfamily Lungentitanainae .......................... 4

-- Pleopods elongate, without lateral setae .......... Subfamily Cryptocopoidinae .......................... 7

4. Setae present on basis of pereopods 1 and 6; maxillule endite terminating with ten spiniform setae ........................................ Curtichelia expressa

-- Setae absent on basis of pereopods 1 and 6; maxillule endites with nine or less terminal spiniform setae ................................................................. 5

5. Pereopod 1 ischium and dactylus without setae ................... Latitanais beklemishevi

-- Pereopod 1 ischium and dactylus with setae ................................................................. 6

6. Cheliped carpus and fixed finger each with one inferior seta, maxillule endite terminating .... with five spiniform setae ................................................................. Lungentitanais primitivus

-- Cheliped carpus and fixed finger each with two inferior setae; maxillule endite terminating with nine spiniform setae ................................................................. Paraiungentitanais longidigitatus
7. Cheliped dactylus without proximal seta; pereopods 4 to 6 ischium with one seta
   ............................................................................................................. Cryptocopoides articus
   -- Cheliped dactylus with proximal seta; pereopods 4 to 6 ischium with two setae ............. 8

8. Pereopods 1 to 3 dactylus with unguis distinctly shorter than propodus; maxillule endites
   terminating with nine spiniform setae .................................................. Cryptocopoides sp. A
   -- Pereopods 1 to 3 dactylus with unguis subequal to length of propodus; maxillule endites
     terminating with eight spiniform setae ........................................... Cryptocopoides pacificus

9. Modified blade-like carpal setae absent on pereopods........ Subfamily Akanthinotanainae 10
   -- Modified blade-like carpal setae present on pereopods............................................... 19

10. Pereopod 1 propodus with two setae; maxilliped endites with cusps and setae present ........
    ................................................................................................................. Akanthinotanais (G) guillei
    -- Pereopod 1 propodus with one or no setae; maxilliped endites with or without setae but no
      cusps ........ subgenus Akanthinotanais, s.s .............................................................. 11

11. Eyes absent .............................................................................................................. 12
    -- Eyes present, with pigment................................................................................... 14

12. Pereopods 2 and 3 dactylus with unguis subequal to length of propodus; uropod exopods
    with two articles ........................................................................................................ Akanthinotanais (A) gaussi
    -- Pereopods 2 and 3 dactylus with unguis half to 2/3 length of propodus; uropod exopods with
      one article .............................................................................................................. 13

13. Pereopod 4 basis without setae; pereopod 1 basis about 10.5 times longer than broad .......
    ................................................................................................................. Akanthinotanais (A) longipes
    -- Pereopod 4 basis with broom seta; pereopod 1 basis about 5.0 times longer than broad......
    ......................................................................................................................... Akanthinotanais (A) similis

14. Uropod exopods and endopods each with one pseudo-articulated article
    ......................................................................................................................... Akanthinotanais (A) makrothrix
-- Uropod exopods and endopods each with two articles ........................................ 15
15. Pereopod 1 merus without setae ........................................................................... 16
-- Pereopod 1 merus with one seta ........................................................................... 18
16. Uropod exopods half length of endopods; cephalothorax subequal to pereonites 1 to 3 ....

.................................................................................................. *Akanthinotanais (A) malayensis*
-- Uropod exopods 2/3 to subequal length of endopods; cephalothorax longer than pereonites 1
to 3 ........................................................................................................ 17
17. Cheliped dactylus with proximal seta; pereopod 1 ischium with two setae ................

.................................................................................................. *Akanthinotanais (A) gerlachi*
-- Cheliped dactylus without proximal seta; pereopod 1 ischium without setae ............

.................................................................................................. *Akanthinotanais (A) scrappi*
18. Antennule distal article about 9.5 times longer than broad; cheliped dactylus without
proximal seta ........................................................................................................ *Akanthinotanais (A) siegi*
-- Antennule distal article 6.0 times longer than broad; cheliped dactylus with proximal seta ....

.................................................................................................. *Akanthinotanais (A) mortenseni*
19. Blade-like carpal setae on pereopods 4 to 6; cheliped with two setae on fixed finger ....

.................................................................................................. Subfamily Parapseudotanainae ........20
-- Blade like carpal setae on pereopods 2 to 6; cheliped with one or no setae on fixed finger.....

.................................................................................................. Subfamily Pseudotanainae .............21
20. Uropod endopods with two articles; antenna article 2 longer than article 3 ............

.................................................................................................. *Parapseudotanais abyssalis*
-- Uropod endopods with one article; antenna article 2 shorter than article 3 ............

.................................................................................................. *Parapseudotanais sp. A*
21. Chela strongly forcipate with serrate incisive margins; spatulate-tipped setae present on
merus of pereopods 2 and 3 and carpus of pereopods 4 to 6 .................................
Subgenus Mystriocentrus........22
-- Chela forcipate or not but without serrate incisive margins; without spatulate-tipped setae on pereopods ........................................ Subgenus Pseudotanais..............23
22. Pereonite 3 markedly shorter than pereonite 2; cheliped dactylus without proximal seta ..............
............................................................................................................................................ Pseudotanais (M) serratus
-- Pereonite 3 subequal in length to pereonite 2; cheliped dactylus with proximal seta ..............
............................................................................................................................................ Pseudotanais (M) sp. A
23. Pigmented eyelobes present (oculate).........................................................................................24
   -- Eyelobes absent or without pigment (non-oculate)..............................................................28
24. Pereopod 1 merus without setae; cheliped dactylus narrower than fixed finger .................25
   -- Pereopod 1 merus with one seta; cheliped dactylus width subequal to fixed finger ..............26
25. Pereopod 3 disproportionately smaller than pereopod 2; uropod rami bi-articulate ..........
............................................................................................................................................ Pseudotanais (P) unicus
   -- Pereopod 3 about same proportions as pereopod 2; uropod rami uni-articulate ..........
............................................................................................................................................ Pseudotanais (P) borei
26. Pereopods 1 to 3 ischium with two setae, pereopods 2 and 3 basis without setae ........
............................................................................................................................................ Pseudotanais (P) mediterraneus
   -- Pereopods 1 to 3 ischium with one seta; pereopods 2 and 3 basis with broom setae ..............27
27. Cephalothorax subequal in length to pereonites 1 to 3; pereopod 1 basis with broom seta ..
............................................................................................................................................ Pseudotanais (P) oculatus
   -- Cephalothorax longer than pereonites 1 to 3; pereopod 1 basis without setae ..........
............................................................................................................................................ Pseudotanais (P) mexikolpos
28. Chelae strongly forcipate........................................................................................................29
   -- Chelae not forcipate, or only weakly so .........................................................................34
29. Pereopod 1 carpus with one seta; maxilliped endites fused except for notch on distal margin..
-- Pereopod 1 carpus without setae; maxilliped endites completely fused, with smooth distal margin

30. Cheliped carpus with two inferior setae; pereopods 4 to 6 ischium with two setae

-- Cheliped carpus with three inferior setae; pereopods 4 to 6 ischium with one seta

Pseudotanais (P) abyssi

31. Pereopods 2 and 3 carpus blade-like setae greater than half length of propodus; pereopods 4 and 5 propodus without broom seta

Pseudotanais (P) vulsella

-- Pereopods 2 and 3 carpus blade-like setae less than half length of propodus; pereopods 4 and 5 propodus with broom seta

Pseudotanais (P) falciculata

32. Pleopods present; pereopods 2 and 3 merus with one seta

Pseudotanais (P) forcipatus

-- Pleopods absent; pereopods 2 and 3 merus with two setae

33. Cheliped fixed finger without inferior seta; pereopod 1 merus with two setae

Pseudotanais (P) jonesi

-- Cheliped fixed finger with one inferior seta; pereopod 1 merus with one seta

Pseudotanais (P) californiensis

34. Antenna articles 2 and 3 with short, stout spiniform setae

-- Antenna articles 2 and 3 with setae otherwise (simple or spiniform)

35. Pereopods 2 and 3 carpus with blade-like seta greater than half the propodus length

-- Pereopods 2 and 3 carpus with blade-like setae less than half the propodus length

36. Uropod exopods with one article; pereopod 1 dactylus with unguis subequal to length of propodus

Pseudotanais (P) longisetosus

-- Uropod exopods with two articles; pereopod 1 dactylus with unguis distinctly shorter than propodus

Pseudotanais (P) corollatus

37. Pleopods absent; pereopod 1 dactylus with unguis distinctly longer than propodus
183

- Pleopods present; pereopod 1 dactylus with unguis subequal to length of propodus

- Cephalothorax longer than pereonites 1 to 3

- Cephalothorax subequal or shorter than pereonites 1 to 3

- Maxilliped endites nearly fused except for notch on distal margin

- Maxilliped endites fused 1/3 to 2/3 length

- Uropod exopods with one article; pereopod 1 dactylus without seta

- Uropod exopods with two articles; pereopod 1 dactylus with short seta

- Pereopod 1 merus with three setae and carpus with one seta; cheliped dactylus narrower than fixed finger

- Pereopod 1 merus with one seta and carpus with two setae; cheliped dactylus subequal in width to fixed finger

- Antenna second article subequal in length to third article; pereopods 2 and 3 merus with two setae

- Antenna second article shorter than third article; pereopods 2 and 3 merus with one seta

- Cheliped dactylus narrower than fixed finger; pereopod 1 merus with one seta

- Cheliped dactylus subequal in width to fixed finger; pereopod 1 merus without setae

- Pereopod 1 carpus with four setae, propodus with one seta; pereopods 4 and 5 basis with broom setae

- Pereopod 1 carpus with two setae, propodus without setae; pereopods 4 and 5 basis without setae

- Pereopods 2 and 3 carpus with blade-like setae less than half length of propodus; pereopod 1
ischium without setae .........................................................Pseudotanais (P) sp. A

-- Pereopods 2 and 3 carpus with blade-like setae greater than half length of propodus;

pereopod 1 ischium with seta ..................................................46

46. Cheliped carpus with three inferior setae; pereopod 1 propodus without setae ........

.................................................................................Pseudotanais (P) macrocheles

-- Cheliped carpus with two inferior setae; pereopod 1 propodus with seta

.................................................................................Pseudotanais (P) sp. C

47. Uropod exopods with one article; pereopods 2 and 3 merus with one seta..............

.................................................................................Pseudotanais (P) sp. P

-- Uropod exopods with two articles; pereopods 2 and 3 merus with two setae ..........48

48. Pereopod 1 ischium without setae; pereopods 4 to 6 ischium with one seta ...........

-- Pereopod 1 ischium with one seta; pereopods 4 to 6 ischium with two setae ..........50

49. Pereopod 1 carpus with three setae; pereopods 5 and 6 carpus each with abnormally long superior seta, subequal to length of propodus .........................Pseudotanais (P) spatula

-- Pereopod 1 carpus with two setae; pereopods 5 and 6 without abnormally long setae ........

.................................................................................Pseudotanais (P) scalpellum

50. Pereopod 1 dactylus seta absent; pereopods 4 to 6 ischium with two unequal-length setae ..51

-- Pereopod 1 dactylus seta present; pereopods 4 to 6 ischium with two setae of equal length .52

51. Antenna second article shorter than third article; pereopod 1 merus with two setae ........

.................................................................................Pseudotanais (P) sp. O

-- Antenna second article subequal in length to third article; pereopod 1 merus with one seta ....

.................................................................................Pseudotanais (P) nipponicus

52. Pereopods 2 and 3 carpus with blade-like setae about half length of propodus; pereopod 1 propodus without setae, dactylus with unguis distinctly shorter than propodus ..........................52

.................................................................................Pseudotanais (P) affinis
Pereopods 2 and 3 carpus with blade-like setae greater than half length of propodus;
pereopod 1 propodus with two setae, dactylus with unguis subequal in length to propodus.....
........................................................................................................................................Pseudotanais (P) longispinus
### Gulf of Mexico Station Data for new species of Pseudotanaidae

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APPENDIX B

Description and diagnostics of most parsimonious tree from parsimony analysis

Tree rooted using four out-groups
Tree length = 630
Consistency index (CI) = 0.2540
Homoplasy index (HI) = 0.7460
CI excluding uninformative characters = 0.2432
HI excluding uninformative characters = 0.7568
Retention index (RI) = 0.5179
Rescaled consistency index (RC) = 0.1315

Character summary: 69 characters, all with equal weight and with unordered character states, nine were parsimony-uninformative; gaps were treated as “missing”; character states were optimized with Accelerated transformation (ACCTRAN)

Character diagnostics:

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Character Matrix for Phylogenetic Analysis of Pseudotanaidae

Note: A = character state 10; missing data indicated by "-" or "?"

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APPENDIX D

Synopsis of Characters

The following is an annotated list of the 69 characters used to perform the heuristic parsimony analyses detailed in chapter III; associated character states are in parentheses. An abbreviated list with diagnostics for each character is presented in Appendix B and a complete matrix of species with character states is presented in Appendix C. As mentioned earlier, scores for character states were taken from both, original descriptions of new species discovered during this research, and from published illustrations and text descriptions in the literature. The characters are listed in order from the anterior to posterior ends of the body and character states are, in general, in the suspected order of primitive to derived. Figures depicting the tracing of all characters are given except for characters 4, 10, 16, 19, 20, 22, 36, 54 and 64 which were parsimony-uninformative. Figures in this appendix were produced using McClade from the consensus of six most parsimonious trees (see Figure 1 in chapter III). A summary of results is listed in Chapter IV.

1. Cephalothorax length vs. length of pereonites 1-3 (1 = shorter, 2 = subequal, 3 = longer). A shorter cephalothorax of less than or subequal to the length of the first three pereonites appears to be a plesiomorphic feature based on the out-group and one of the Cryptocopinae clades. A longer cephalothorax is seen in all but twelve of the Pseudotanainae species, including only one of the subgenus Akanthinotanais, and in six of the Cryptocopinae (Fig. 33).

2. Eyelobes present or absent (1 = present with pigment, 2 = rudimentary with no pigment, 3 = absent). The species in this study comprise a mixture of eyed and eyeless representatives including those of the out-group, thus this character has doubtful use in making inferences on phylogeny, but is likely more an indication of bathymetric distribution (Larsen and Wilson 2002, Guerrero-Kommritz and Brandt 2005). It is notable that seven of the ten Akanthinotanais species and four of the Pseudotanainae possess eyes, reflective of their comparatively shallow distribution (Fig. 34).
3. Pereonite abbreviation (1 = no pereonites abbreviated, 2 = at least the first pereonite abbreviated). This character is one of the most defining features of the Pseudotanaidae and one that sets apart the Pseudotanainae from the Cryptocopinae. However, Larsen and Wilson (2002) noted with caution that this feature can also be present in some other tanaid families as an ontogenetic variable. All out-group and Cryptocopinae species lack abbreviated pereonites (Fig. 35) while the species of the Pseudotanainae have the first and sometimes the second pereonites abbreviated.

4. Antennule rami number (1 = biramous, 2 = uniramous). This character was included to resolve out-group relationships – the antennule is biramous in apseudomorphs but uni-ramous in tanaidomorphs (Sieg 1983).

5. Antennule number of articles (1 = more than four articles, 2 = four articles, 3 = three articles). Another diagnostic feature of the Pseudotanainae which all have three antennular articles, this character is also useful in resolving relationships among the out-group species (Fig. 36).

6. Antennule first article percent of total length of antennule (1 = up to 42 %, 2 = 42.1 to 49 %, 3 = 50 to 59.3%, 4 = 59.4 % or greater). The length of the first antennular article tended to be shorter in the apseudomorph out-group and in seven of the Cryptocopinae (length of 49% or less). An apomorphic tendency toward a longer first antennule article in comparison to other antennular articles was apparent in the Pseudotanainae with the exception of four species, including both Parapseudotanais species (Fig 9).

7. Antennule first article length vs. width (1 = up to 2.9 times longer than broad, 2 = 3.5 to 5.0 times longer than broad, 3 = 5.1 to 6.9 times longer than broad, 4 = 7.0 or greater times longer than broad). The same apomorphmic tendency toward a lengthening first antennular article seen in character 6 was also manifested in this character. The first article width tended to be short and broad in the out-group species (except for the apseudomorph), and in most of the Cryptocopinae species, but was longer in all of the Pseudotanainae species (Fig.38).
8. Antennule third article length vs. width (1 = up to 1.0 times longer than broad, 2 = 1.5 to 2.5 times longer than broad, 3 = 4.0 or greater times longer than broad). This character was scored only for those species among the out-group and Cryptocopinae having four antennular articles. It was important in defining a strong clade within the Cryptocopinae (clade C) composed of four monospecific genera, *Iungentitanais, Paraiungentitanais, Latitanais* and *Curtichelia*, all with character state 2 (Fig. 39).

9. Antennular distal article length vs. width (1 = up to 1.9 times longer than broad, 2 = 2.0 to 3.9 times longer than broad, 3 = 4.0 to 6.5 times longer than broad, 4 = 6.6 to 8.0 times longer than broad, 5 = 8.1 or greater times longer than broad). This character showed no clear patterns other than showing most in-group species with a longer distal antennular article than those of the out-groups (Fig. 40). Apparently a longer distal antennular article arose independently among several pseudotanaid species.

10. Antenna number of articles (1 = more than six articles, 2 = six articles). This out-group resolving character sets apart the apseudomorphs from all other species in the study that have only six antenna articles.

11. Antenna length vs. length of antennule (1 = up to 80 % length of antennule, 2 = 80.1 to 108.0 % length of antennule, 3 = 108.1 % or greater length of antennule). An antenna that is shorter than 80% of the antennule is possibly an ancestral trait since it was a feature of the apseudomorph out-group but was most likely independently evolved since it appears in five scattered in-group species. Likewise, an abnormally *long* antenna, as compared to the antennule length, was only found in three Pseudotanainae species (Fig. 41).

12. Antenna second article length compared to that of third article (1 = shorter than third article, 2 = subequal to third article, 3 = longer than third article). A long third article in the antenna was another possible ancestral trait since it appeared in three of the out-group species. This character was more variable in the in-group species and showed a slight tendency to become subequal or shorter in more derived species (Fig. 42).
13. Antenna second and third articles type of seta (1 = short, stout spiniform seta. 2 = seta otherwise – simple or spiniform). Sixteen species of Pseudotanainae have the stout, spiniform version of these antennular setae, twelve of which appeared in clade A, furthest away from the ancestral end of the tree (Fig. 43). This seemingly contradicts the notion that spiniform setae are plesiomorphic and are replaced by simple setae. The state of this character was found to be diagnostic by Bird and Holdich (1989) in distinguishing *Pseudotanais corollatus* from the re-described *P. affinis*.

14. Antenna fourth article length vs. width (1 = up to 4.0 times longer than broad, 2 = 4.1 to 5.9 times longer than broad, 3 = 6.0 to 8.0 times longer than broad, 4 = 8.1 to 10.2 times longer than broad, 5 = 10.3 or more times longer than broad). A shorter antennal fourth article (state 1) was characteristic of the out-groups and half of the Cryptocopinae species and is, thus considered to be ancestral. Varying lengths (states 2-4) are found in one group of Cryptocopinae (clade C) and in all Pseudotanainae but no particular pattern was evident (Fig. 44).

15. Antenna fifth article length vs. width (1 = up to 3.9 times longer than broad, 2 = 4.0 to 5.9 times longer than broad, 3 = 6.0 or more times longer than broad). An elongated fifth article of greater than 4.0 times longer than broad (state 2) was found in only 15 Pseudotanainae species and of these, only three had lengths greater than 6.0 times longer than broad (state 3). The extreme length of the fifth article (state 3) is a defining feature of the genus *Parapseudotanais* (Fig. 45).

16. Pars molaris palp present or absent on mandibles (1 = absent, 2 = present). This character was included to resolve out-group relationships; a palp is present on the mandible pars molaris of apseudomorphs (Sieg 1983) but absent in tanaidomorphs.

17. Width of the mandible pars molaris (1 = broad and truncated, 2 = narrow with acuminate tip). The broad, truncate aspect of this character is apparently an ancestral state given that it is predominantly found in the out-group species and all but one of the Cryptocopinae.
Except for four Pseudotanainae species, the pars molaris is acuminate or tapered to a point (Fig. 46).

18. Mandible pars molaris complexity (1 = unarmored, 2 = with pad-like grinding surface, 3 = with non-setose crest, 4 = with ring of setae and/or short denticles, 5 = with spine-like process and five or more denticles, 6 = with five or more denticles but no long processes, 7 = with three to four blunt terminal/subterminal denticles, 8 = with bifid tip, 9 = with some marginal setules, 10 = simple pointed). The wide variety of pars molaris tip secondary characters, together with the nature of its width as seen in the previous character, is reflective of independently evolved feeding strategies among widely dispersed species of tanaids. Although highly plastic when seen in the context of 57 species, the decrease in complexity of the pars molaris structure was viewed as a transition from primitive to a more derived state (Sieg 1977). This trend was seen to some degree in the phylogeny presented in this research (Fig. 47). In general, the broad, truncated pars molaris found in the out-group and Cryptocopinae species had the more complex tips, whereas in most of the Pseudotanainae species with a narrower pars molaris, the tips were reduced in complexity. Four species of Pseudotanainae (*Pseudotanaia denticulatus*, *P. corollatus*, *P. inflatus*, and *P. sp. A*) retained the ancestral broad pars molaris with a terminal ring of spines and setae. In contrast, in all but one species of the subgenus *Akanthotanaia*, the pars molaris was reduced to a simple or whip-like point.

19. Number of maxillule endites (1 = two endites, 2 = one endite). This character was included to resolve out-group relationships; the maxillule is biramous in aspseudomorphs and uniramous in all tanaidomorphs (Sieg 1983).

20. Number of terminal setae on the maxillule palp (1 = more than two setae, 2 = two setae). This character was included to resolve out-group relationships; aspseudomorphs and some members of the Tanaeoidea have more than two maxillule palp setae (Sieg 1983). It must be noted here that *Sinelobus stanfordi* with its two terminal maxillule palp setae differs in that respect from others of the Tanaeoidea and was incorrectly coded by Larsen and Wilson (2002).
Twenty in-group species were not coded for this character in the analysis because of literature deficiencies (not described or illustrated), but these species presumably have only two setae since they are members of the Paratanaioidea.

21. Number of terminal spiniform setae on the maxillule endite (1 = eleven, 2 = ten, 3 = nine, 4 = eight, 5 = seven, 6 = five). This character was assumed by Sieg (1977) to be diagnostic in separating genera of the Pseudotanaidae, especially among the Cryptocopinae whose members have setae numbering from five to ten (Fig. 48). In fact, the chief distinguishing character between Iungentitanais and Paraiungentitanais is that the latter has nine maxillule endite spines and the former has five. Nine setae is universal among the Pseudotanainae except for Pseudotnais (A) scrappi and P. (P) inflatus, both with seven. The reliability of this character is questionable because the small structural size of the endite, and subsequent difficulty in orientation, renders it subject to misinterpretation.

22. Maxilla complexity (1 = well developed, 2 = rudimentary). This character was included to resolve out-group relationships; apsedomorphs have a maxilla with multiple lobes and specialized setae whereas in tanaidomorphs, the maxilla is small, oval and featureless (Sieg 1983).

23. Maxilliped basis degree of fusion (1 = completely separate, 2 = about half fused, 3 = fused except for a distal notch, 4 = completely fused). This character shows transition between the primitive (apseudomorph) and apomorphic (tanaidomorph) states and is used here to resolve relationships among the four out-groups (Fig. 49). Some degree of separation is seen in the three species of Cryptocopoides and in one species (Pseudotnais boreei) of the Pseudotanainae, although the coding of the latter was based on a questionable illustration (Bacescu 1960).

24. Maxilliped endites degree of fusion (1 = completely separate, 2 = fused between 1/3 and 2/3 length, 3 = fused except for notch on the distal margin, 4 = completely fused). As in the previous character, the degree of fusion of the maxilliped endites is considered to indicate a transition between primitive and derived states (Sieg 1983). The endites are completely separate
in the out-groups and all the Cryptocopinae thus; this character is diagnostic for the Pseudotanainae whose members display varying degrees of endite fusion (Fig. 50). Species with the more derived degrees of fusion (states 2 and 3) were found in the *Akanthinotanais* clade and in clade B while those with a lesser degree of fusion were predominantly in clade A. States 4 and 2 were diagnostic on a generic level for *Mystriocentrus* and *Parapseudotanais* respectively. *Pseudotanais (P) inflatus* was coded as state 1 based on a questionable illustration (Kudinova-Pasternak 1973).

25. Maxilliped endite setation (1 = numerous complex setae and coupling hooks present, 2 = two plumose setae, 3 = cusps plus setae, 4 = cusps only, 5 = setae only, 6 = without setation). As in the mandible pars molaris complexity, this character is highly plastic and probably reflects individually evolved feeding strategies. The first two highly complex character states are found only in the out-groups and less complex states 3 to 6 varied widely among the Pseudotanaidae ingroup species with no apparent trends discernable (Fig. 51).

26. Cheliped degree of forcipation (1 = strongly forcipate, 2 = weakly forcipate – small gap present, 3 = not forcipate). Cheliped forcipation is a derived condition probably related to feeding mode and is likely evidence of an independently evolved response to food type or availability. The seven species with strongly forcipate chelae (state 1), including the genus *Mystriocentrus* for which this feature is diagnostic, were all in clade B (Fig. 52). Six other Pseudotanainae species with lesser degrees of forcipation (state 2) were scattered among the subfamily.

27. Cheliped carpus length vs. width (1 = up to 1.9 times longer than broad, 2 = from 2.0 to 3.9 times longer than broad, 3 = greater than 4.0 times longer than broad). The trait for a shorter cheliped carpus (state 1) was the most common condition among the species tested and was dispersed equally among all clades. No apparent trends for a longer carpus (state 2) were evident and only one species, *Iungentitanais primitivus*, had a carpus of 4.0 times longer than broad (Fig. 53).
28. Cheliped carpus number of inferior setae (1 = ten or more, 2 = three, 3 = two, 4 = one). The number of inferior carpal setae was useful for resolving relationships among the out-groups (ten or more in pseudomorphs) but showed only slight variation among the pseudotanaid species with nearly all having the normal two inferior setae condition (Fig. 54).

29. Cheliped propodus length vs. width (1 = up to 2.4 times longer than broad, 2 = 2.5 to 4.0 times longer than broad, 3 = greater than 4.1 times longer than broad). Even though the overall consistency index was low for this character (0.182), the propodus length appeared to be diagnostic in that the shorter length was prevalent in the out-group and in five of the eight Cryptocopinae species (Fig. 55). All but five of the Pseudotanainae had a propodus length of greater than 2.5 times longer than broad (character state 2) and two of these, both of the subgenus Akanthintanaia, had a propodus length of greater than 4.0 times longer than broad; this may indicate that an elongated propodus is a derived condition among pseudotanaids.

30. Cheliped propodus length vs. carpus length (1 = less than or equal to 1.5 times length of carpus, 2 = greater than 1.5 times length of carpus). A lengthened propodus in comparison to the carpus length (state 2) is apparently a derived feature seen in most of the Pseudotanainae, with the notable exception of eight species of the subgenus Akanthintanaia (Fig. 56). All species of Pseudotanaia sensu stricto as well as those of the Mystriocentrus and Parapseudotanaia had a cheliped propodus of greater than 1.5 the length of the carpus, whereas all out-group and Cryptocopinae species characteristically have shorter, more compact chelae (state 1).

31. Cheliped fixed finger number of inferior setae (1 = numerous, 2 = two, 3 = one, 4 = none). The number of inferior setae on the cheliped fixed finger was useful in resolving relationships among the out-group species as well as among some in-group species of Pseudotanainae. Pseudomorphs generally have numerous inferior setae (six to seven in Carpoapseudes) while all but two of the Cryptocopinae species have two (Fig. 57). The normal presumably derived condition among Pseudotanainae is one inferior seta; however, one of the diagnostic characters for the genus Parapseudotanaia is the ancestral state of two inferior setae.
This character was excluded from Larsen and Wilson’s (2003) analysis of the Paratanaidoidea since it was earlier shown to be unstable in a molecular analysis of *Paratanais* (Larsen 2001) but was used as a diagnostic character by Guerrero-Komritz and Brandt (2005) in an analysis of the Akanthophoreinae group of tanaids.

32. Cheliped dactylus percent of propodus length (1 = up to 49.9 %, 2 = 50.0 to 63.0 %, 3 = greater than 63.1%). The dactylus percentage of propodus length is likely reflective of independently evolved feeding modes, similar to that exhibited by degree of forcipation. There were no clear patterns among the clades for dactylus percentage length except that a percentage longer than 63.1% (state 3) appeared to be diagnostic for the genus *Mystriocentrus* (Fig. 58).

33. Cheliped dactylus width vs. fixed finger width (1 = narrower, 2 = subequal, 3 = broader). The comparative widths of the dactylus vs. the fixed finger appeared to be a highly variable among all species tested with no clear trends exhibited. It is noticeable that six of the ten species of the subgenus *Akanthinotanais* have a dactylus that is narrower than the fixed finger, but this fact is probably non-diagnostic given that the trait also appeared in 13 other species of Pseudotanainae as well as in two out-group and two Cryptocopinae species (Fig. 59). The three species that had broad dactylus widths (state 3), *Pseudotanais (P) jonesi*, *Curtichelia expressa*, and *Paraiungentitanae longidigitatus*, all had chelipeds that were drastically dissimilar, further lessening the importance of this character.

34. Cheliped dactylus proximal seta (1 = present, 2 = absent). A proximal seta on the cheliped dactylus was present in all but six of the Pseudotanainae species but absent in half of the Cryptocopinae and three of the four out-group species (Fig. 60). The fact that this seta was mostly absent in the out-groups and present in the in-groups is counter-intuitive to the assumption that loss of setae is evidence of a derived character state. Thus, this character with its low CI value (0.100) was less essential in establishing polarity between the out-group and in-group species tested.
35. Marsupium formation (1 = by four pairs of oostegites, 2 = by one pair of oostegites, 3 = by ovisacs). The formation of the marsupium has long been the most definitive character separating the Pseudotanaidae from other tanaidomorphs, all of which possess four pairs of oostegites. In spite of Bird and Holdich's (1989) discovery of some specimens of Cryptocopoides arcticus possessing four oostegites which made questionable the placement of the genus in Pseudotanaidae, it was decided to study the phylogeny using the original description of only a single pair for that species. In reality, most species descriptions of pseudotanaids lack mention of the ovigerous state so in this research a single pair of oostegites was assumed and was coded as such (Fig. 61). The ovisac character state found only in the Tanaidae, was represented here by Sinelobus stanfordi. A separate search for the most parsimonious tree was conducted to test the effect of omitting this character, the results of which appear elsewhere.

36. Pereopod ischium presence on all pereopods (1 = present, 2 = absent). The character for presence or absence of the pereopod ischium was included to resolve relationships among the out-groups. Sinelobus stanfordi of the family Tanaidae lacks an ischium article on all pereopods, whereas the article is present in all other species being tested, both out-group and in-group.

37. Pereopod 1 basis length vs. width (1 = up to 5.0 times longer than broad, 2 = 5.1 to 7.9 times longer than broad, 3 = 8.0 to 9.9 times longer than broad, 4 = greater than 10 times longer than broad). A pereopod basis length of less than 5.0 times greater than broad, seen in the four out-group species, is apparently a derived condition given that ratios of greater length, though variable, were present in all in-group species (Fig. 62). Extreme basis lengths of greater than 10.0 times longer than broad were seen in only six Pseudotanainae species.

38. Pereopod 1 basis setation (1 = four or more setae, 2 = one to three simple plus broom setae, 3 = broom setae only, 4 = one to three simple setae only, 5 = setae lacking). Evidence of transition from primitive to derived as demonstrated by pereopod 1 basis setation was only sparingly indicated for some clades and was considered a weak character since two of the four out-group species showed sparse setation (state 4), thus polarity was not firmly established. Most
notably, six of the ten *Akanthinotanais* species lacked setae (state 5), somewhat strengthening this clade, but in more than half of the remaining pseudotanaid species, setation complexity equaled or surpassed that of the out-groups (Fig. 63). Crytocopinae species had shorter propodus lengths (state 1); but with the large number of Pseudotanainae species also having short propodus lengths, this character had dubious phylogenetic value.

39. Pereopod 1 ischium number of setae (1 = two setae, 2 = one seta, 3 = lacking setae). The setation of pereopod 1 ischium showed no systematic change from primitive to derived (Fig. 64). All out-group species and 44 of the 57 in-group species had a pereopod 1 ischium with a single seta. Of the others, 11 species from four different genera lacked setae and only two, *Pseudotanais (A) gerlachi* and *P. (P) mediterraneus* had two setae on the ischium.

40. Pereopod 1 merus setation (1 = numerous including several marginal setae, 2 = three setae, 3 = two setae, 4 = one seta, 5 = setae lacking). The merus setation of pereopod 1 showed various degrees of reduction from plesiomorphic seen in the apseudomorph out-group (state 1) to the more apomorphic condition present in the other out-group species as well as the in-group species of Pseudotanaiidae (Fig. 65). The typical state was either one or two setae, with setae lacking in 12 species, and three setae being present in only one, *Pseudotanais (P) nodensioldi*. No clear-cut trends were apparent for this character.

41. Pereopod 1 carpus setation (1 = numerous setae including several simple and spiniform, 2 = five setae, 3 = four setae, 4 = three setae, 5 = two setae, 6 = one seta, 7 = setae lacking). As in the previous character, the varying degrees of reduced pereopod 1 carpal setation showed no clear-cut transition among the in-group species (Fig. 66). The apomorphic state with numerous setae exhibited by the apseudomorph out-group appeared to be distant from the reduced number present in the other out-group and the in-group species, the latter having two or less setae (states 5-7) as the most common condition. In one case, the presence of four carpal setae appeared to help define a clade consisting of *Cryptocopoides pacificus* and *C. sp. A* as distinguished from the type species of the genus, *C. arcticus*. 
42. Pereopod 1 propodus length vs. width (1 = less than 6.0 times longer than broad, 2 = 6.1 to 8.0 times longer than broad, 3 = greater than 8.1 times longer than broad). A trend toward increasing length of the pereopod 1 propodus appeared to be evident, especially among species in clade A (Fig. 67). Six of the 10 species of the subgenus Akanthinotanais had a propodus exceeding 6.0 times longer than broad (states 2 and 3) and seven of the Pseudotanais sensu stricto species had a propodus length exceeding 8.1 times longer than broad (state 3). Meanwhile, all out-group species and five of the eight Cryptocopinae species had shorter propodus lengths (state 1); but with the large number of Pseudotanainae species also having short propodus lengths, this character had dubious phylogenetic value.

43. Peropod 1 propodus setation (1 = numerous setae including several distal simple setae, 2 = four setae, 3 = three setae, 4 = two setae, 5 = one seta, 6 = setae lacking). The number of propodal setae on pereopod 1 showed a general trend of reduction in number from out-group species with four or more to in-group species having three or less (Fig. 68). The trend in reduction was also manifested in species of the in-group subfamilies Cryptocopinae and Pseudotanainae. Seven of the eight Cryptocopinae species exhibited two to three propodal setae (states 3 and 4) while only nine of the 49 Pseudotanainae species had two setae (state 4), the rest showing a reduction in setae from zero to one (states 5 and 6).

44. Pereopod 1 dactylus setation presence or absence (1 = setae present, 2 = lacking setae). Even though the dactylus seta was present on two of the out-group species including the apseudomorph with its highly setose dactylus, its importance in establishing polarity was lessened by its sporadic occurrence among in-group species (Fig. 69).

45. Pereopod 1 dactylus setal type (1 = numerous or complex, 2 = single and exceptionally long, 3 = single and short). The character describing the dactylus seta on pereopod 1 was included to make distinctions among those species with a setose dactylus (Fig. 70). It served mainly to further define the genus Parapseudotanais, both species of which have a single elongate dactyl seta on the first pereopod.
46. Pereopod 1 length of dactylus-plus-unguis compared to length of propodus (1 = distinctly longer, 2 = subequal, 3 = distinctly shorter). The comparative length of the terminal article vs. the propodus of pereopod 1 had diagnostic value for the *Pseudotanais* subgenus *Akanthinotanais* (Fig. 71) as all but two species bore a short dactylus (state 3). This character also further defined the genus *Mystriocentrus*, both species of which were state 3. The elongate condition (state 1) of the dactylus was found only in two species, *Pseudotanais* (P) *lilljeborgi* and *P. (P) spicatus*.

47. Pereopods 2 and 3 basis setation (1 = broom plus simple setae, 2 = broom setae only, 3 = simple setae only, 4 = setae lacking). The basis setation of the second and third pereopods displayed no definite trends (Fig. 72). All four character states appeared to be evenly distributed among the clades and no polarity could be established from the out-groups. A complete loss of setae was evident in only 16 in-group species and four others were not scored due to lack of information from the original descriptions.

48. Pereopods 2 and 3 ischium setation (1 = three setae, 2 = two setae, 3 = one seta, 4 = setae lacking). The number of ischium setae on the second and third pereopods, with a few exceptions, showed a reduction from three in the apseudomorph out-group to one in the majority (43) of in-group species (Fig. 73). Two ischium setae were present in three species of the subgenus *Akanthinotanais*, in *Pseudotanais* (P) *mediterraneus*, and in the out-group species, *Hargeria rapax*. Only in one species, *Parapseudotanais sp. A*, was the ischium setae lacking on the second and third pereopods.

49. Pereopods 2 and 3 merus setation (1 = numerous marginal setae, 2 = three setae, 3 = two setae, 4 = one seta). The number of merus setae on the second and third pereopods showed a reduction from two or more in the out-groups to one in only a few of the in-group species (Fig. 74), the majority retained the ancestral two setae on this article and one species, *Mystriocentrus* sp. A, had three setae. Reduction was more evident in the Cryptocopinae. Of the eight species of that sub-family, five had only one seta, two were unknown due inadequate description and only
one, *Cryptocope abreviata*, was with two meral setae. In the Pseudotanainae, reduction to one seta was seen in only eleven scattered species.

50. Pereopods 2 and 3 merus spatulate setae presence or absence (1 = present, 2 = absent). The character for spatulate setae on the merus of the second and third pereopods was included as diagnostic for the genus *Mystriocentrus*; all other species lacked these specialized setae on that particular article (Fig. 75).

51. Pereopods 2 and 3 carpus blade-like setae presence or absence (1 = absent – all simple or spiniform, 2 = present). The presence of specialized blade-like setae on the carpus of the second and third pereopods was the chief diagnostic character used by Sieg (1977) to separate species of the subgenus *Pseudotanais*, *sensu stricto*, from the subgenus *Acanthotanais* which lack such setae, having simple non-modified setae instead. Accordingly, in this research specialized blade-like setae are clearly seen as a distinct apomorphic character defining those species that have them as separate from species more ancestral including the *Acanthotanais* as well as the Cryptocopinae and species of the out-groups (Fig. 76).

52. Pereopods 2 and 3 carpal blade-like setae length vs. length of propodus (1 = half or less the length of the propodus, 2 = greater than half the length). Of the 36 species having blade-like setae, 21 have blades shorter than half the length of the propodus (state 1) and 15 have longer blades (state 2). These two types were separated mostly into two groups designated as clades A and B with 19 and 16 species respectively (Fig. 77). Clade A was composed mostly of long-bladed types (13 to 6) while short-bladed types predominated in clade B (14 to 2). The 31 species of *Pseudotanais sensu stricto*, were almost equally divided into 15 with long blade-like setae (13 in clade A, two in clade B) and 16 short-bladed types (ten in clade B, six in clade A).

53. Pereopods 2 and 3 length of dactylus-plus-unguis compared to length of propodus (1 = subequal, 2 = 2/3 to 3/4 length, 3 = about half length, 4 = distinctly less than half length). Even though a longer dactylus length (states 1 and 2) was a feature of three of the out-group species, no clear trends toward modification of this trait could be seen among any of the in-group
clades (Fig. 78); thus no phylogenetic importance could be placed on this highly inconsistent character.

54. Pereopod 3 size comparison to pereopod 2 (1 = similar in proportion, 2 = disproportionately smaller). *Pseudotanais* (*P*) *unicus* is distinct from its congenitors in that the third pereopod is smaller than the second in all proportions.

55. Pereopod 4 basis length vs. width (1 = up to 4.0 times longer than broad, 2 = 4.1 to 5.9 times longer than broad, 3 = greater than 6.0 times longer than broad). The length of the fourth pereopod basis appeared to have little diagnostic value among the species tested even though three of the four out-group species had the shortened form of this character (state 1). The two other character states for greater lengths were evenly spread among the in-group species. An elongate basis (state 3) was characteristic of the genus *Myristiocentrus* but was found in only six species of Pseudotanainae and two species of Cryptocopinae (Fig. 79).

56. Pereopods 4 to 6 basis setation (1 = simple and broom setae, 2 = broom setae only, 3 = simple setae only, 4 = setae lacking). Simple and broom setae on the basis of the fourth through sixth pereopods were present in both combinations (states 1 and 2) for a majority of species tested with only a slight trend toward reduction seen in the *Akanthinoseta* group (Fig. 80). It is worth noting that the highest number of species with broom setae only (state 2) was in Pseudotanae clade B where 63% shared this feature and the majority of those with a combination of broom and simple setae (state 1) were in clade A. Of the 16 species lacking basis setae (state 4), five each were in the *Akanthinoseta* and Cryptocopinae groups.

57. Pereopods 4 to 6 ischium setation (1 = two unequal setae, 2 = two equal setae, 3 = one seta). Ischium setae on pereopods 4 to 6 did not demonstrate polarity in that reduction in setae between the out-group and in-group species was not apparent, thus phylogenetic importance attributed to that character is limited in this case. However, Pseudotanae clades A and B were distinctive for this character, with few exceptions, in that the species in them possessed two and one setae respectively (Fig. 81).
58. Pereopods 4 to 6 merus setation (1 = numerous setae, 2 = two setae, 3 = one seta).
The number of meral setae on pereopods 4 to 6 ranged from numerous in the apseudomorph out-group to one or two in all other species including the other three out-groups, thus limiting its value as a polarizing feature (Fig. 82). The character had no major diagnostic value among the in-groups except that it helped define the genera Parapseudotanais (state 2) and Mystriocentrus (state 3). The dominant condition for this character was two setae (state 2) which occurred in all but twelve of the in-group species.

59. Pereopods 4 to 6 carpus blade-like setae presence or absence (1 = absent, 2 = present). As for the carpal blade-like setae on pereopods 2 and 3 (character 51), the presence of these modified setae was likewise used by Sieg (1977) to define the subgenus Pseudotanais, senso stricto, as separate from the subgenus Akanthotanais (Fig. 83). An exception is that species of the genus Parapseudotanais have blade-like setae only on pereopod 2, thus the absence of these specialized setae on pereopods 4 to 6 (state 1) is diagnostic for that genus.

60. Pereopods 4 to 6 carpus presence of additional specialized setae (1 = with additional bifid-tipped setae, 2 = with additional spatulate setae, 3 = with abnormally long superior simple seta equaling or exceeding length of propodus). The presence of these additional specialized setae served to resolve or define certain clades among the Pseudotanaidae and also in the genus Cryptocopoides. Specifically, both species of Mystriocentrus and two species of Cryptocopoides have spatulate setae. Seven species in Pseudotanainae clade A were equipped either with additional superior elongate or bifid-tipped setae, thus adding strength to that particular grouping (Fig. 84).

61. Pereopods 4 to 6 propodus broom setae presence or absence (1 = present, 2 = absent). Broom setae on the propodus of pereopods 4 to 6, an apparent apomorphic character, occurred in 13 Pseudotanainae species, nine in clade A and four in clade B (Fig. 85). A single Akanthotanais species, Pseudotanais (A) similis, and two species of Cryptocopoides, C. pacificus and C. sp. A, also possessed these broom setae. The quality of this character is
somewhat in doubt because of its sporadic appearance in the literature, possibly resulting from
the study of poor quality specimens – broom setae are easily lost or overlooked.

62. Pereopods 4 to 6 dactylus fusion with unguis (1 = fused with unguis to form a claw,
2 = not fused with unguis). The fusion of the pereopod dactylus and unguis forming a “claw” is
considered apomorphically primarily in tanaidomorphs (Larsen 2005) and is generally associated
with shallow water species (Larsen and Wilson 2002). In the Pseudotanaidae, Sieg (1977) used
this character to distinguish members of the subfamily Pseudotaninae (fusion present) from the
Cryptocopinae (no fusion). In accordance with Sieg’s hypothesis, the fused dactylus (state 1) was
strongly diagnostic for separating the Pseudotanainae from Cryptocopinae in this research (Fig.
86).

63. Pleopod complexity (1 = rami well developed with terminal and lateral setae, 2 =
rami elongate with terminal and subterminal setae, 3 = rami elongate with terminal setae only, 4 =
rami vestigial without setae, 5 = pleopods lacking). The reduction in complexity of pleopods
from well-developed to elongate with terminal setae clearly separates the subfamily
Pseudotanainae from the out-groups as well as from most of the Cryptocopinae (Fig. 87). The
presence of well-developed pleopods helped define a clade within the Cryptocopinae (clade C)
composed of four monospecific genera (Curtichelia, Iungentitanais, Paraiungentitanais, and
Latitanais) as separate from four others with less complex or vestigial pleopods.

64. Uropod complexity (1 = biramous, 2 = uniramous). The character for uropod
complexity was included to resolve out-group relationships; The Tanaidae representative,
Sinelobus stanfordi, lacks uropod exopods.

65. Uropod exopods number of articles (1 = more than two articles, 2 = two articles, 3 =
one article with pseudo-articulation, 4 = one article). A reduction in the number of exopods
articles occurred in all species tested other than the apseudomorph out-group (Fig. 88). The large
majority of Pseudotanaidae species had two exopods articles but there were seven occurrences of
a single article and four species with a “pseudo-articulated” article.
66. Uropod exopods length vs. endopod (1 = less than 1/6 length of endopod, 2 = 1/3 to half length of endopod, 3 = from 2/3 to subequal length of endopod). Comparative lengths of the endopod and exopods appeared to be diagnostic at the family level (Fig. 89) as most had an exopods length of at least 2/3 the length of the endopod (state 3) whereas two of the out-group species (*Carpoapseudes prospectnes* and *Typhlotanais parvus*) had much shorter exopods (state 1). Of the eight species of Pseudotanainae having a short exopod (state 2), six were present in clade B. Among these, character state 2 helped to define the genus *Mystriocentrus*.

67. Uropod exopods proximal article proportion of ramus (1 = about 1/4 length of ramus, 2 = 1/3 to 1/2 length of ramus, 3 = about 2/3 length of ramus). The character for the uropodal exopod proximal article length proportion had little value within the family Pseudotanaidae other than to enhance the description of individual species and in some cases distinguish between otherwise closely related species (Fig. 90). For example, character state 3 is diagnostic in separating *Cryptocopoides arcticus* from its congenitors, *C. pacificus* and *C. sp. A*, both of which are state 2. This character was apomorphic (state 1) only in the apseudomorph out-group and state 3 occurred only in five in-group species.

68. Uropod endopod number of articles (1 = more than two articles, 2 = two articles, 3 = one article with pseudo-articulation, 4 = one article). A reduction in number of endopod articles, similar to that of the exopod, occurred for all in-group species (Fig. 91). Three of the out-group species had three or more endopod articles (state 1) and all of the in-group species had two or less. In the Pseudotanainae there were five species with pseudo-articulated endopods and five with a single article (states 3 and 4). No particular distributional pattern was noticed for this character among in-group species.

69. Uropod endopod proximal article proportion of ramus (1 = 1/10 to 1/4 length of ramus, 2 = 1/2 to 1/3 length of ramus). The short proximal article of the endopod (state 1) was seen only in two of the tanaidomorph out-group species (*Sinelobus stanfordi* and *Hargeria rapax*), whereas in all in-group species the length of this article was at least half the ramus length.
(state 2). Thus, no diagnostic value other than out-group polarity could be attributed to this character (Fig. 92).
Figure 33. Trace for character 1 – cephalothorax length
Figure 34. Trace for character 2 – eyelobes present or absent
Figure 35. Trace for character 3 – pereonite abbreviation
Antennule number of articles

- more than four articles
- four articles
- three articles
- equivocal

Figure 36. Character 5 trace – antennule, number of articles
Figure 37. Character 6 trace – antennule, article 1 percent of total length of antennule
Figure 38. Character 7 trace – antennule, article 1 length vs. width
Figure 39. Character 8 trace – antennule, article 3 length vs. width
Antennule distal article length vs. width

- 1 < 2 x longer than broad
- 2 to 3.9 x longer than broad
- 4 to 5.5 x longer than broad
- 5.6 to 8 x longer than broad
- > 8 x longer than broad
- equivocal

Figure 40. Character 9 trace – antennule, distal article length vs. width
Antenna length vs. antennule length

- < 80 percent length of antennule
- 80 to 108 percent of antennule
- > 108 percent of antennule

Figure 41. Character 11 trace – antenna, length vs. antennule length
Figure 42. Character 12 trace – antenna, article 2 length vs. article 3 length
Figure 43. Character 13 trace – antenna, articles 2 and 3 setal type
Antenna article 4
length vs. width

- < 4 x longer than broad
- 4.1 to 5.0 x longer than broad
- 6 to 6 x longer than broad
- 8.1 to 10.2 x longer than broad
- > 10.2 x longer than broad
- equivocal

Figure 44. Character 14 trace – antenna, article 4 length vs. width
Figure 45. Character 15 trace – antenna, article 5 length vs. width
Figure 46. Character 17 trace – mandible, pars molaris width
Mandible pars molaris complexity

- Unarmed
- With ped-like grinding surface
- With non-setose crest
- With ring of setae/short denticles
- With spine-like process & 5+ denticles
- With 5+ denticles but no spineous process
- With 3-4 blunt terminal/subterminal denticles
- With bifid tip
- With some marginal setules
- Simple pointed
- Equivocal

Figure 47. Character 18 trace - mandible, pars molaris complexity
Maxillule endite terminal setation

Figure 48. Character 21 trace – maxillule, number of endite terminal spiniform setae
Figure 49. Character 23 trace – maxilliped, basis degree of fusion
Maxilliped endite degree of fusion

- Completely separate
- Fused between 1/3 - 2/3 length
- Fused except for distal notch
- Completely fused (no notch)
- Equivocal

Figure 50. Character 24 trace – maxilliped, endite degree of fusion
Figure 51. Character 25 trace – maxilliped, endite setation
Figure 52. Character 26 trace – cheliped, degree of forcipation
Figure 53. Character 27 trace – cheliped, carpus length vs. width
Figure 54. Character 28 trace – cheiiped, carpus number inferior setae
Cheiliped propodus length vs. width

- up to 2.4 x longer than broad
- 2.5 - 4.0 x longer than broad
- more than 4.0 x longer than broad

Figure 55. Character 29 trace - cheiliped, propodus length vs. width
Figure 56. Character 30 trace – cheliped, propodus length vs. length of carpus
Figure 57. Character 31 trace – cheliped, fixed finger number inferior setae
Figure 58. Character 32 trace – cheiliped, dactylus percent of propodus length
Figure 59. Character 33 trace – cheliped, dactylus width vs. fixed finger width
Figure 60. Character 34 trace – cheliped, dactylus setation
Figure 61. Character 35 trace – marsupium formation
Pereopod 1 basis length vs. width

- < 5 x longer than broad
- 5.1 to 7.9 x longer than broad
- 8 to 9.9 x longer than broad
- ≥ 10 x longer than broad
- equivocal

Figure 62. Character 37 trace – pereopod 1, basis length vs. width
Figure 63. Character 38 trace – pereopod 1, basis setation
Figure 64. Character 39 trace – pereopod 1, ischium setation
Figure 65. Character 40 trace – pereopod 1, merus setation
Figure 66. Character 41 trace – pereopod 1, carpus setation
Figure 67. Character 42 trace – pereopod 1, propodus length vs. width
Figure 68. Character 43 trace – pereopod 1, propodus setation
Figure 69. Character 44 trace – pereopod 1, dactylus setation
Figure 70. Character 45 trace – pereopod 1, dactylus setal type
Figure 71. Character 46 trace – pereopod 1, length of dactylus + unguis
Figure 72. Character 47 trace – pereopods 2 and 3, basis setation
Figure 73. Character 48 trace – pereopods 2 and 3, ischium setation
Figure 74. Character 49 trace – pereopods 2 and 3, merus setation
Figure 75. Character 50 trace – pereopods 2 and 3, merus spatulate setae
Figure 76. Character 51 trace – pereopods 2 and 3, carpus blade-like setae
Pereopods 2 and 3 carpal blade setae length

- half or less length of propodus
- greater than half length of propodus

Figure 77. Character 52 trace – pereopods 2 and 3, carpus blade-like setae length
Figure 78. Character 53 trace – pereopods 2 and 3, dactylius + unguis length
Figure 79. Character 55 trace – pereopod 4, basis length vs. width
Figure 80. Character 56 trace – pereopods 4 to 6, basis setation
Figure 81. Character 57 trace – pereopods 4 to 6, ischium setation
Figure 82. Character 58 trace – pereopods 4 to 6, merus setation
Pereopods 4 - 6 carpus modified setae

- blade-like setae absent
- blade-like setae present
- equivocal

Figure 83. Character 59 trace – pereopods 4 to 6, carpus blade-like setae
Figure 84. Character 60 trace – pereopods 4 to 6, carpus additional specialized setae
Figure 85. Character 61 trace – pereopods 4 to 6, propodus broom setae
Pereopods 4-6 dactylus

- Pseudotanais (P) sp. patula
- Pseudotanais (P) sp. O
- Pseudotanais (P) sp. P
- Pseudotanais (P) affinis
- Pseudotanais (P) calpellum
- Pseudotanais (P) longispinus
- Pseudotanais (P) denticulatus
- Pseudotanais (P) spinatus
- Pseudotanais (P) viljazi
- Pseudotanais (P) nipponicus
- Pseudotanais (P) macrocheles
- Pseudotanais (P) sp. C
- Pseudotanais (P) longiselosus
- Pseudotanais (P) corollatus
- Pseudotanais (P) eculatus
- Pseudotanais (P) mexikolpos
- Pseudotanais (P) boreai
- Pseudotanais (P) unicus
- Pseudotanais (P) mediterraneus
- Pseudotanais (P) inflatus
- Pseudotanais (P) sp. A
- Pseudotanais (P) vulsella
- Pseudotanais (P) taliculata
- Mystiocentrus serratus
- Mystiocentrus sp. A
- Pseudotanais (A) abyssi
- Pseudotanais (P) baresnathi
- Pseudotanais (P) californiensis
- Pseudotanais (P) foreipatus
- Pseudotanais (P) jonesi
- Pseudotanais (P) colonus
- Pseudotanais (P) liliborgi
- Pseudotanais (P) nodenskioldii
- Parapseudotanais sp. A
- Parapseudotanais abyssalis
- Parapseudotanais (A) longipes
- Parapseudotanais (A) siegi
- Parapseudotanais (A) makrothrix
- Parapseudotanais (A) mortenseni
- Parapseudotanais (A) geiachi
- Parapseudotanais (A) gaussi
- Parapseudotanais (A) similis
- Parapseudotanais (A) malayensis
- Parapseudotanais (A) crappi
- Parapseudotanais (A) guillei
- Cryptocope abreviata
- Cryptocopoides arcticus
- Cryptocopoides pacificus
- Cryptocopoides sp. A
- Cryptoactinias primitivas
- Paraiungititanais longidigitatus
- Lalitanais belemensis
- Curtichelia expressa
- Sinelobus stanfordi
- Hargeria rapax
- Typhlotanais parvus
- Carpoapsueus prospectus

Figure 86. Character 62 trace – pereopods 4 to 6, dactylus fusion with unguis
Figure 87. Character 63 trace – pleopod complexity
Uropod exopod number of articles

- More than 2 articles
- 2 articles
- 1 plus pseudo-articulation
- 1 article
- Equivocal

Figure 88. Character 65 trace – uropod, number of exopod articles
Uropod exopod length vs. endopod length

- less than 1/8 length
- 1/8 to 1/2 length
- from 1/3 to subequal length
- 2/3 to equal length
- equal

Figure 89. Character 66 trace – uropod, exopod length vs. endopod length
Figure 90. Character 67 trace - uropod, exopod proximal article proportion of ramus
Figure 91. Character 68 trace – uropod, number of endopod articles
Figure 92. Character 69 trace – uropod endopod proximal article proportion of ramus
REFERENCES


Fee, A.R. 1926. The Isopoda of Departure Bay and vicinity, with descriptions of new species, variations and colour notes. Contributions Canadian Biology and Fisheries, n.s. 3: 15-34.


Greve, L. 1965. The biology of some Tanaidacea from Raunefjorden Western Norway. Sarsia 20: 43-54


Sorenson, M.D. 1999. TreeRot, version 2. Boston University, Boston, MA.


