Systematik, Phylogenie und Zoogeographie von Tiefsee-Tanaidacea (Crustacea, Malacostraca) des Atlantiks am Beispiel ausgewählter Taxa

Dissertation

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„So eine Arbeit wird eigentlich nie fertig, man muß sie für fertig erklären, wenn man nach Zeit und Umständen das Mögliche getan hat.“

Johann Wolfgang von Goethe

INHALTSVERZEICHNIS

Zusammenfassung

Die Untersuchung der Systematik, Phylogenie und Zoogeographie von Tiefsee-Tanaidacea (Crustacea, Malacostraca) des Atlantiks am Beispiel ausgewählter Taxa basiert auf der Analyse umfangreichen Expeditionsmaterials des Atlantischen Ozeans, insbesondere des Angola Beckens, und benachbarter Gebiete.

Es werden zwei neue Gattungen, *Glabroapseudes* und *Portaratrum,* und 16 neue Arten beschrieben. Die Gattungen *Paraleptognathia* und *Chauliopleona* werden neu definiert und nachbeschrieben. Für die Gattungen *Paraleptognathia, Chauliopleona, Tanaella* und *Paranarthrura* des Atlantischen Ozeans wurden Bestimmungsschlüssel erstellt.

Es wurde eine Artenliste der Tanaidacea des Angola Beckens erstellt, es können 75 Arten unterschieden werden, davon sind acht Arten bekannt und 67 Arten neu für die Wissenschaft; in der vorliegenden Arbeit werden 10 davon beschrieben.

Die phylogenetischen Beziehungen der artenreichsten Gattungen der Akanthophoreinae, *Paraleptognathia, Chauliopleona, Tanaella, Araphura* und *Collettea,* wurden untersucht. *Paraleptognathia* und *Chauliopleona* bilden ein Monophylum, *Tanaella* und *Collettea* ebenso und *Araphura* ein weiteres. Die Akanthophoreinae sind nicht monophyletisch. Die Familien Tanaellidae und Colletteidae werden in Frage gestellt.

Die Untersuchungen zur zoogeographischen Verbreitung zeigten, vor dem Hintergrund der Analyse umfangreichen Expeditionsmaterials, dass die Gattungen eine weltweite Verbreitung und die Arten eine beschränkte lokale Verbreitung aufweisen. Einige Gattungen sind reine Tiefseeformen (*Metagathotanais, Portaratrum*), manche Gattungen haben eurybathe Vertreter (*Paranarthrura angolensis*) und andere zeigen Emergenz an den Polen (*Paraleptognathia*, *Tanaella*, *Paranarthrura*). Die Annahme, dass kosmopolitische oder zumindest bipolare Arten im Atlantischen Ozean vorkommen, konnte nicht bestätigt werden. Bisher als kosmopolitisch angesehene Arten wie *Chauliopleona* (*=Leptognathia) armata* sind in Wirklichkeit Artenkomplexe mit mehreren lokalen Arten.

Abstract

The study of the systematic, phylogeny and zoogeography of deep-sea Tanaidacea (Crustacea, Malacostraca) is based on the analysis of selected taxa form the Atlantic Ocean, with emphasis on the Angola Basin and neighbour areas.

Two new genera *Glabroapseudes* and *Portaratrum* as well as 16 new tanaid species are described. The genera *Paraleptognathia* and *Chauliopleona* were redefined and redescribed. Taxonomic keys are given for the genera *Paraleptognathia*, *Chauliopleona*, *Tanaella* and *Paranarthrura* from the Atlantic Ocean.

75 species of the Tanaidacea from the Angola Basin can be differentiated. Eight of them are known and 67 are new to science and in this study 10 of them are described.

The phylogentic relationship of the genera with a large number of species in the Akanthophoreinae *Paraleptognathia*, *Chauliopleona*, *Tanaella*, *Araphura* and *Collettea* were investigated. *Paraleptognathia* and *Chauliopleona* build a monophylum, *Tanaella* and *Collettea* a second monophylum and *Araphura* a third. The Akanthophoreinae are not monophyletic. The validity of the families Tanaellidae and Colletteidae are in doubt.

Based on the analysis of a large amounts of expedition material, the zoogeographic distribution shows, that the genera have a global distribution and the species have a local distribution. Some genera are exclusively deep-sea forms (*Metagathotanais*, *Portaratrum*) other genera have eurybathic species (*Paranarthrura angolensis*) and others emerge in polar regions (*Paraleptognathia*, *Tanaella*, *Paranarthrura*). The assumption, that cosmopolitan or species with bipolar distribution exist in the Atlantic Ocean, could not be proven. Many species, such as *Chauliopleona* (*Leptognathia*) *armata*,that were considered cosmopolitan are in fact species complex with several local species.

Einleitung

Systematik und Biologie der Tanaidacea

Die Tanaidacea sind eine Ordnung der Crustacea, mit einer weltweiten Verbreitung. Innerhalb der Peracarida gehören sie (mit wenigen Ausnahmen) zu den kleinsten Taxa. Aufgrund ihrer geringen Größe von meist nur 1-3 mm Länge wurden die Tanaidacea in der Vergangenheit oft übersehen oder nicht bearbeitet. Sie sind fast ausschließlich marin, sehr eurybath, und vom Sublitoral bis zum Hadal verbreitet. Aus Tiefen von 9000 m sind mehrere Arten bekannt; unter anderem auch die größte Art *Gigantoapseudes maximus* Gamo, 1984 mit einer Länge von 120 mm.

Bis jetzt sind ca. 800 Arten weltweit bekannt, diese Zahl erhöht sich jährlich und die Artenzahl wird auf mehr als 2000 geschätzt (Sieg 1986), eine Untersuchung von Larsen (2001) zeigt jedoch, dass die Diversität der Tanaidacea unterschätzt wird, den in einem sehr gut untersuchten Gebiet, Botany Bay (Australien), wurden in 4,5 m Tiefe auf nur fünf Quadratmetern drei neue Arten entdeckt wurden. Es ist anzunehmen, dass besonders in der Tiefsee viele neue unbeschriebene Arten leben, da dort die Tanaidacea eines der dominierenden Taxa sind (Borowski & Thiel 1998; Larsen 2001).

Die Tanaidaceen verfügen weder über eine gute oder ausdauernde Schwimmfähigkeit, noch über ein vagiles Verbreitungsstadium, deswegen wird angenommen, dass ein Genfluss von Arten über weite geographische Distanzen nicht möglich ist (Larsen mündl. Mitteilung). Die frühen Entwicklungsstadien werden im Marsupium des Weibchens vollzogen, und die Juvenilen (Mancas) verlassen den Brutbeutel als benthische Formen.

Tanaidaceen sind benthische Tiere und graben in den oberen Sedimentschichten; es ist zu vermuten, dass die Präsenz verschiedener Arten von der Sedimentbeschaffenheit abhängig ist (Bird & Holdich 1989 b, Holdich & Bird 1983, Hassack & Holdich 1987). Bisher konnte nur im flachen Beagle-Kanal (Chile) bis in eine Tiefe von wenigen hundert Metern eine Substratabhängigkeit der Tanaidacea festgestellt werden (Brandt 1997, Schmidt 1999), jedoch nicht in der Tiefsee, wie z. B. auf den tiefen Stationen des grönländischen Kontinentalhanges (Brandt 1997).

Das geologische Alter des Taxons Tanaidacea und ihr Ursprungsort ist bis heute nicht ganz geklärt. Fossile Tanaidacea sind schon aus dem Paläozoikum bekannt und es wird vermutet, dass sie im Devon entstanden sind (Sieg 1988). Die früheste Tanaidacee *Antracocaris scotica* Peach, 1882 stammt aus dem unteren Karbon Schottlands; aus dem oberen Karbon kennt man *Eucryptocaris asherorum* Schram, 1989 und aus dem Perm stammt die Gattung *Ophthalmapseudes,* die auch aus dem Mesozoikum bekannt ist. Eine andere Art aus dem Karbon, *Cryptocaris hootchi* Schram, 1974, die als Tanaidacee beschrieben wurde, ist jedoch ein Vertreter der Remipedia (Schram et al. 1986; Sieg 1988; Schram 2004).

Die „modernen" Tanaidaceen (mit fünf freien Pleoniten und einem Pleotelson) erscheinen im Mesozoikum und es wird angenommen, dass deren Radiation in der späten Kreide und im frühen Tertiär stattgefunden hat. Die Apseudomorpha erscheinen mit Sicherheit im Jura mit *Jurapseudes fredericianus* (Malzahn 1965) und *Carlclausus emersoni* Schram, 1986. Eine weitere Art des frühen Juras, *Paleotanais querstedi* Reiff, 1936, wird auch den Apseudomorpha zugeschrieben. Der älteste Vertreter der Tanaidomorpha ist *Cretitanais giganteus* (Malzahn, 1979) aus der Unteren Kreide. Die Neotanaidomorpha hingegen sind bis jetzt fossil nicht belegt (Schram et al. 1986; Sieg 1983, 1988).

Geschichte der Systematik

Die erste Tanaidacea Art wurde 1808 unter dem Namen *Cancer Gammarus Talpa* Montagu, 1808 (heute *Apseudes talpa*) beschrieben und wurde den Amphipoda Gammaridea zugeordnet (Dojiri & Sieg 1997, Gutu & Sieg 1999). Latreille (1831) zählte diese Art und andere ähnliche zu den Isopoden und nannte sie Heteropoda. Milne-Edwards (1840) ordnete die Isopoden mit Scheren den Idoteides zu. Dana führt 1849 den Terminus Tanaidae ein, um eine Familie von Isopoden mit Scheren zu beschreiben. Drei Jahre später (1852) postuliert er den Namen Anisopoda für alle Isopoden mit Scheren. Bate and Westwood (1868) überführen diese Arten zu den *Isopoda aberrantia* unter der Tribus *Vagantia*. In seiner Arbeit gibt G. O. Sars (1882) den Isopoden mit Scheren den Namen *Isopoda Chelifera*. Claus (1888) erhob die Anisopoda zur Ordnung und Hansen (1895) führte den Begriff Tanaidacea ein, um diese Ordnung zu benennen (Dojiri & Sieg 1997, Gutu & Sieg 1999).
Hansen (1913) beschrieb die Tanaidacea-Fauna von Süd- und Ost-Grönland sowie die aus Island. Seitdem wurden mehrere Arten beschrieben, aber es gab wenig Klarheit über deren Systematik. Viele Arten wurden nur anhand von wenigen Exemplaren beschrieben und oft

sehr mangelhaft. Mit den Arbeiten von Karl Lang (1949-1973) beginnt sich diese Situation zu ändern, obwohl auch er einmal behauptete: „Die Tanaidacea sind die schwierigsten unter den schwierigen Crustaceen“ (Sieg 1973). Schon 1949 beschreibt er den desolaten Zustand der Systematik der Tanaidacea und führt eine neue Familie ein, Paratanaidae. Im Jahre 1956 schlägt er eine neue Systematik für die Tanaidacea vor. Er führt zwei Unterordnungen und fünf Familien ein. Die Gliederung basiert auf männlichen Geschlechtsmerkmalen, Arten mit einem Genitalkegel werden als Monokonophora und solche mit zwei Genitalkegeln werden als Dikonophora zusammengefasst. Die Unterordnung Monokonophora besteht aus den Familien Apseudidae und Kalliapseudidae. Die Unterordnung Dikonophora besteht aus den Familien Neotanaidae, Paratanaidae und Tanaidae. Diese Arbeit ist das erste Versuch mit phylogenetischen Methoden eine Systematik der Tanaidacea zu erstellen. Diese Einteilung war bis 1980 gültig, bis ein Schüler und Nachfolger von Karl Lang, Jürgen Sieg, eine neue Klassifikation vorstellte. Er berücksichtigte auch die fossilen Arten und stellte vier Unterordnungen auf, die auch heute noch anerkannt werden. Anthracocaridomorpha, Apseudomorpha, Neotanaidomorpha und Tanaidomorpha. Somit ersetzte er die Klassifikation von Lang. Die erste phylogenetische Systematik der Tanaidacea auf der Grundlage kladistischer Methoden publiziert Sieg 1984 und postuliert einen hypothetischen Ur-Tanaidacea.

Gutu und Sieg (1999) schlugen eine Systematik vor, die noch heute für viele Gruppen gültig ist und auf der Arbeit von Sieg 1984 basiert. Diese systematische Gliederung beinhaltet noch die vier Unterordnungen und 25 Familien. Von den vier Unterordnungen ist eine fossil, die Antracocaridomorpha mit zwei Familien, drei sind rezent: Apseudomorpha mit zwei Superfamilien Jurapseudoidea (ausgestorben) und Apseudoidea (12 Familien), Neotanaidomorpha (eine Familie) und Tanaidomorpha mit drei Superfamilien Cretitanaidoidea (ausgestorben), Paratanaidoidea (sieben Familien) und Tanaidoidea (eine Familie).

Larsen & Wilson (1998) kritisieren diese Systematik, denn sie zweifeln die Monophylie der Familie Anarthruridae (Paratanaidoidea) an. Die Anzahl von Segmenten in der Antennula des Männchen ist nicht in allen Taxa gleich, einige Arten haben 5 andere 7 Segmente, die Mundwerkzeuge sind nicht bei allen Männchen reduziert. Nach der Definition von Sieg haben die Männchen der Anarthruridae 7 Segmente in der Antennula, keine Mundwerkzeuge und alle Individuen haben einen Dorn oder eine Borste am Merus und Carpus des 1. Peraeopoden. Die Bedornung des Peraeopod 1 ist bei allen Taxa nicht gleich. Diese Bedornung ist ein phylogenetischer Trend, der nicht weiter erklärt wird (Sieg 1986).

Larsen & Wilson (2002) schlagen eine neue Systematik für die Paratanaidoidea vor. Diese Systematik basiert auf Rechner-gestützten Parsimonie-Methoden. Sie haben 81 der 88 anerkannten Gattungen der Paratanaidoidea untersucht. Die Superfamilie wird anhand von 52 Merkmalen analysiert. Die Monophylie einiger Familien konnte bewiesen werden. Alle bekannten Familien wurden neu definiert und zwei neue eingeführt, Tanaellidae und Colletteidae. Das Taxon Anarthruridea besteht aus fünf Familien: Agathotanaididae, Anarthruridae, Leptognathiidae, Tanaellidae und Colletteidae. Die Autoren vermuten, dass die Anzahl von benutzten Merkmalen nicht ausreichend war, um die Phylogenie der Paratanaidoidea zufriedenstellend zu klären. Von den 88 untersuchten Gattungen konnten 28 nicht ins System eingeordnet werden und werden daher als *incertae sedis* betrachtet. Viele dieser Taxa bedürfen dringend einer Revision.

Morphologie

Die morphologische Terminologie der Tanaidacea ist sehr verwirrend. Eine vereinfachte und einheitliche Terminologie für die Tanaidacea wurde von Larsen (2003 a) vorgeschlagen. Sie lehnt sich zum großen Teil an die Terminologie von Sieg (1977), aber fügt Änderungen in der Orientierung der Körperteile an und basiert auf Homologien.
Die hier beschriebenen Tanaidacea mit Ausnahme von *Glabroapseudes larseni* Guerrero-Kommritz & Heard, 2003 gehören zur Unterordnung Tanaidomorpha. Daher wird hier nur die Morphologie dieses Taxons dargestellt.

Habitus

Der Habitus der Tanaidomorpha ist im allgemein zylindrisch und langgestreckt, während der der Apseudomorpha dorsoventral abgeflacht ist.

Der Körper besteht aus drei Tagmata: Cephalothorax, Peraeon und Pleon. Der Cephalothorax wird aus der Fusion des Cephalon mit den ersten zwei Thoracomeren gebildet. Eine kleine branchiale Kammer wird vom Cephalothorax gebildet. Acht Gliedmaßen inserieren am Cephalothorax: die Antennule, die Antenna, das Labrum, die Mandibeln, die Maxillula, die Maxilla, der Maxilliped und der Cheliped (Fig 1, 2). Das Peraeon besteht aus sechs freien Peraeoniten, jeder davon besitzt ein Paar Gliedmaßen, die Peraeopoden (Fig. 1).

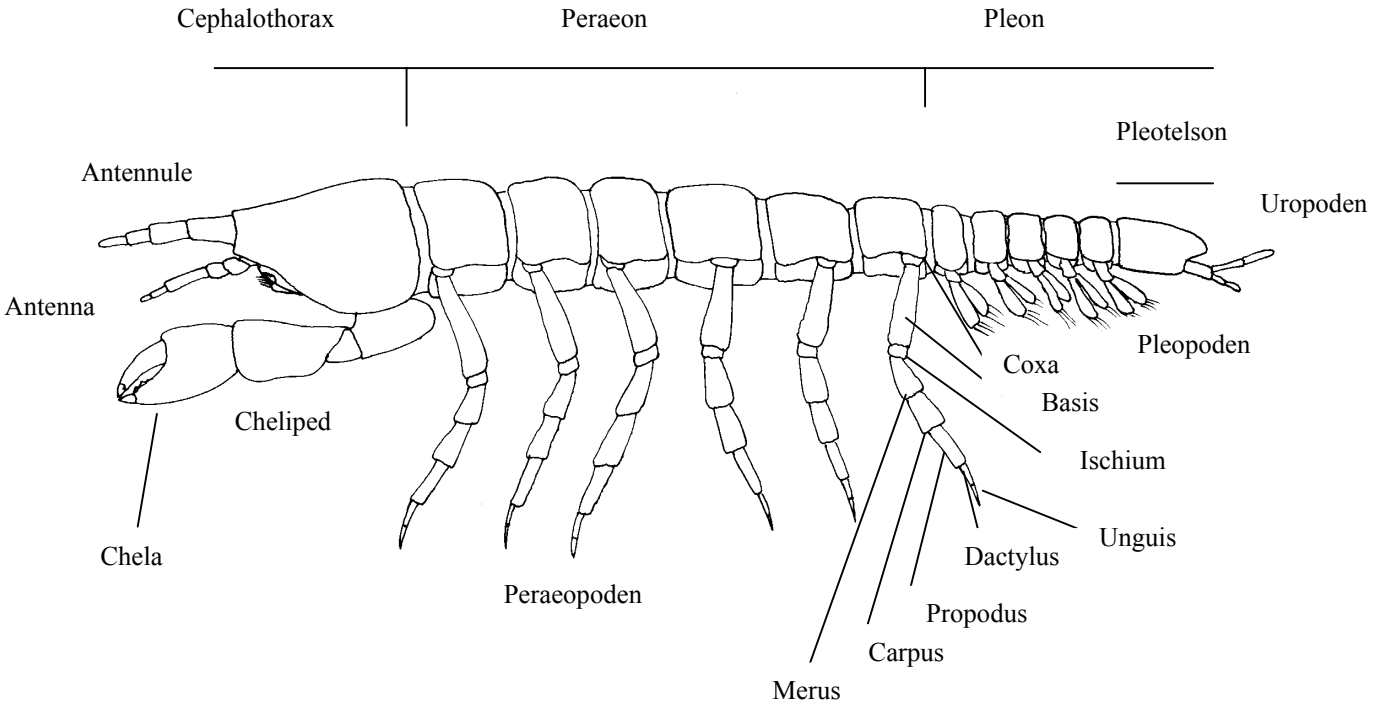

Abb. 1 Bauplan eines typischen Vertreter der Tanaidaca (Paratanaidoidea), Seitenansicht.

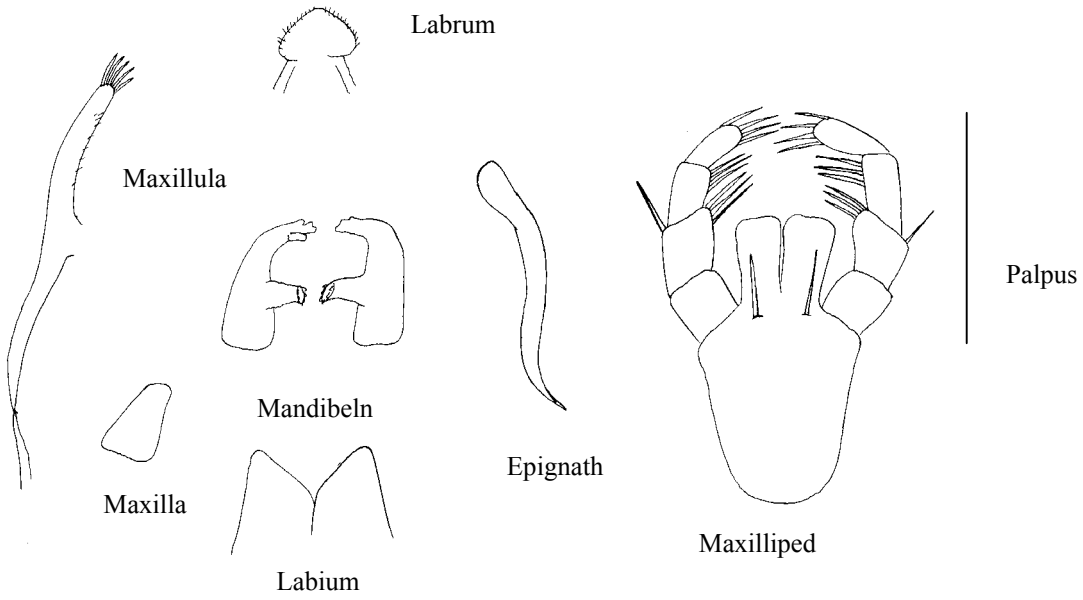

Abb. 2 Mundwerkzeuge eines Vertreters der Tanaidacea (Paratanaidoidea).

Das Pleon besteht aus fünf Pleoniten und einem Pleotelson. An den Pleoniten sind ventral paarweise Pleopoden angeordnet. Am hinteren Teil des Pleotelsons befinden sich die Uropoden (Fig. 1). Die Antennule wird bei den Weibchen aus drei bis fünf Gliedern gebildet, aus fünf bei den jungen Männchen und aus bis zu sieben Gliedern beim erwachsenen Männchen. Die Antenna wird aus ein bis sechs Gliedern gebildet, sie kann aber auch total reduziert sein, wie beim *Agathotanais ahyongi* Larsen, 1999.

Die Mundwerkzeuge werden vom kapuzenförmigen oder lang gestreckten Labrum, einer paarigen Mandibel, einer paarigen Maxillula und Maxilla, einem einfachen Labium, einem Maxilliped mit verschmolzenen Basen und zwei Epignathen gebildet (Abb. 2).
Der Cheliped endet in einer Chela, sie wird von Propodus und Dactylus gebildet.
Die Laufbeine werden Peraeopoden genannt. Die ersten drei Peraeopoden sind sich im Aufbau sehr ähnlich und in der Regel weniger bedornt als die letzten drei Peraeopoden.
Die Pleopoden können zweiästig sein und bestehen aus Endo- und Exopod, alle fünf sind gleich aufgebaut. Die Uropoden bestehen aus einem basalen Glied und einem Exopod sowie einem Endopod; diese können aus mehreren Gliedern bestehen, verkleinert oder völlig reduziert sein.

Taxonomie und Systematik

Aufgrund ihrer geringen Größe von meist nur 1-3 mm wurden die Tanaidacea in der Vergangenheit oft übersehen oder zudem von Netzen mit zu grober Maschenweite nicht erfasst. Durch ihre tubicole oder grabende Lebensweise sind sie meist von lang gestreckter, wurmförmiger Gestalt und viele Arten sind sich daher in ihrem Habitus außerordentlich ähnlich. Das Erkennen und Determinieren von Arten ist bei den Tanaidacea daher besonders schwer.

Für die systematische Bearbeitung oder die Bestimmung von Arten der Tanaidomorpha kommt erschwerend hinzu, dass sie durch eine Armut morphologischer Strukturen gekennzeichnet sind. In vielen Fällen handelt es sich um Reduktionsmerkmale, wobei man annimmt, sie stünden im Zusammenhang mit einer Verkürzung und Abwandlung der postmarsupialen Entwicklung (Sieg 1983, 1988). Viele der Familien besitzen außerdem einen starken Sexualdimorphismus, teilweise so ausgeprägt, dass die verschiedenen Geschlechter einer Art in der Vergangenheit bereits verschiedenen Arten oder sogar Gattungen zugeordnet

wurden. Erst später konnten diese Arten durch exakte morphologische Analysen revidiert und einer Art zugeordnet werden (Sieg 1986). Außerdem unterliegen viele Merkmale (z.B. Körperproportionen oder Uropoden) allometrischen Veränderungen in der Entwicklung (Larsen & Wilson 1998, 2002).

Erste umfangreichere taxonomische Bestandsaufnahmen von Tiefsee-Tanaidacea lieferten Wolff (1956), Lang (1968) und Gardiner (1975), Kudinova-Pasternak & Pasternak (1981), Kudinova-Pasternak (1990, 1993) und Bird & Holdich (1984, 1988, 1989 a). Sie veröffentlichten bedeutende Arbeiten über Tiefsee-Tanaidacea, u.a. auch des Atlantiks. Meistens handelt es sich hauptsächlich um systematische Bestandsaufnahmen verschiedener Tanaidaceentaxa, in denen zahlreiche neue Arten beschrieben werden, aber es finden sich auch Diskussionsansätze zur Herkunft der abyssalen Bodenfauna (Kudinova-Pasternak & Pasternak 1981). Die Kenntnisse über die Tiefsee-Fauna des tropischen und südlichen Atlantiks und deren Verbreitung sind sehr gering (Larsen, 1999). Daten über die Tanaidaceen des südlichen Atlantiks wurden bislang nur von Bamber (2000 b) und Kudinova-Pasternak (1990) publiziert.

Von Januar 2000 bis März 2004 wurden 3 neue Familien, 19 neue Gattungen und 75 neue Arten beschrieben (Angsupanich 2001, Bamber 2000 a, b, 2003, Bird 2000, 2004, Drumm 2003, Gutu 2000, Gutu 2001 a, b, c, Gutu 2002 a, b, Gutu & Heard 2002, Hansknecht & Bamber 2002, Hansknecht et al. 2001, Larsen 2000, 2001, 2002 a, b, Larsen & Blazewicz-Paszkowycz 2002, Larsen & Heard 2002, 2004 a, b, Larsen & Rayment 2000). Diese Flut von Beschreibungen basiert hauptsächlich aus Untersuchungen von Tiefsee-Proben. Viele dieser Taxa können jedoch systematisch nicht als zufriedenstellend eingeordnet werden. Sie gehören zum großen Teil zur Unterfamilie Akanthophoreinae Sieg, 1986. Diese Unterfamilie besteht aus den Gattungen: *Akanthophoreus* Sieg, 1986; *Andrognathia* Sieg, 1983; *Araphura* Bird & Hoodich, 1984; *Araphuroides* Sieg, 1986; *Arthrura* Kudinova-Pasternak, 1966; *Chauliopleona* Dojiri & Sieg, 1997; *Collettea* Lang, 1973; *Filitanais* Kudinova-Pasternak, 1973; *Haplocope* G.O. Sars, 1882; *Latitanais* Kudinova-Pasternak, 1987; *Leptognathiella* Hansen, 1913; *Leptognathioides* Bird & Holdich, 1984; *Libanius* Lang, 1971; *Macrinella* Lang, 1971; *Mimicarhaphura* Sieg, 1986; *Nematotanais* Bird & Holdich, 1985; *Paraleptognathia* Kudinova-Pasternak, 1981; *Robustochelia* Kudinova-Pasternak, 1983; *Safaritanais* Kudinova-Pasternak, 1987; *Scoloura* Sieg & Dojiri, 1991; *Stenotanais* Bird & Holdich, 1984; *Tanabnormia* Gutu, 1986 und *Tanaella* Norman & Stebbing, 1886.

Larsen & Wilson 2002 sind der Auffassung, diese Unterfamilie sei nicht monophyletisch und bezeichnen elf der Taxa als *incertae sedis*.

Ziele der Arbeit

Die vorliegende Arbeit“ Systematik, Phylogenie und Zoogeographie von Tiefsee-Tanaidacea (Crustacea, Malacostraca) des Atlantiks am Beispiel ausgewählter Taxa“ behandelt Tanaidacea der Superfamilie Paratanaidoidea aus verschiedenen Gebieten des Atlantischen Ozeans.
Die Ziele und Inhalte des Projektes lassen sich wie folgt zusammenfassen:

Taxonomie und Systematik

- Beschreibung neuer Arten und Gattungen der Tanaidacea, Differentialdiagnosen, Bestimmungsschlüssel und Verbreitung ausgewählter Taxa.

Phylogenie

- Bearbeitung phylogenetischer Fragen zu ausgewählten Taxa anhand klassischer morphologischer Methoden.

Zoogeographie
Beantwortung folgender Fragen:

- Wie ist die Zoogeographie der Tanaidacea im Atlantischen Ozean?
- Gibt es kosmopolitische Arten?
- Gibt es Indizien für zoogeographische Ausbreitungswege in der Tiefsee?

Material

Die untersuchten Tanaidacea stammen von verschiedenen Forschungsexpeditionen aus mehreren Gebieten des Atlantischen und Antarktischen Ozeans und zum geringen Teil auch aus dem Pazifischen Ozean.

Ein Großteil des Materials kommt aus dem tropischen Atlantik, aus dem Angola Becken. Dieses Material wurde im Juli 2000 während der Diva-1 (**Div**ersity of the abyssal **A**tlantic Ocean) Expedition gesammelt, an Bord des FS „*Meteor*“, Reise 48, in einem Transekt von ca. 700 km von Süd nach Nord aus Tiefen zwischen 5000 und 5450 Metern. Zusätzliches Material stammt von der Reise 42 des FS „*Atlantis II“* aus dem Jahr 1968.

Aus dem Nordatlantik stand Material zur Verfügung, das von Expeditionen stammt: FS „*Diana*” 1900; FS „*Ingolf*” 1898; FS „*Polarstern*”1994, 1995 und FS „*Porsild*” 1998, 1999, aus grönlandischen Gewässern.

Aus dem Südpolarmeer, aus dem Weddellmeer und von der Antarktischen Halbinsel wurde Material von folgenden Reisen untersucht: FS „*Eltanin*” von Reise 8, 1963 und Reise 21, 1965; FS „*Meteor*” 1989/90; FS „*Polarstern, Polarfuchs*” 1984, FS „*Polarstern*” 1983, 1986, 1998; FS „*Victor Hensen*“ 1994; FS „*Walther Herwig*” 1984/85.

Aus dem Pazifik wurde ein Teil des Materials des DISCOL Experiments (**DIS**turbance and re**COL**onization) gesammelt an Bord des FS “*Sonne”,* 1996.

Das bearbeitete und untersuchte Material lagert in folgenden Institutionen: Zoologisches Museum Hamburg (ZMH); Museum für Naturkunde der Humboldt-Universität zu Berlin (ZMB); Zoological Museum, University of Copenhagen, Dänemark (ZMUC); Museum of Comparative Zoology (MCZ), Harvard University, Cambridge, Massachusetts, USA und im U.S. National Museum of Natural History (NMNM), Smithsonian Institution in Washington D.C., USA.

Die weitere Bearbeitung des Materials und genaue Positionsangaben werden in den jeweiligen Abschnitten “Material and Methods” der zugehörigen Veröffentlichungen beschrieben.

Die Karten wurden mit Hilfe des Programms Ocean Data View (Schlitzer 2004) erstellt.

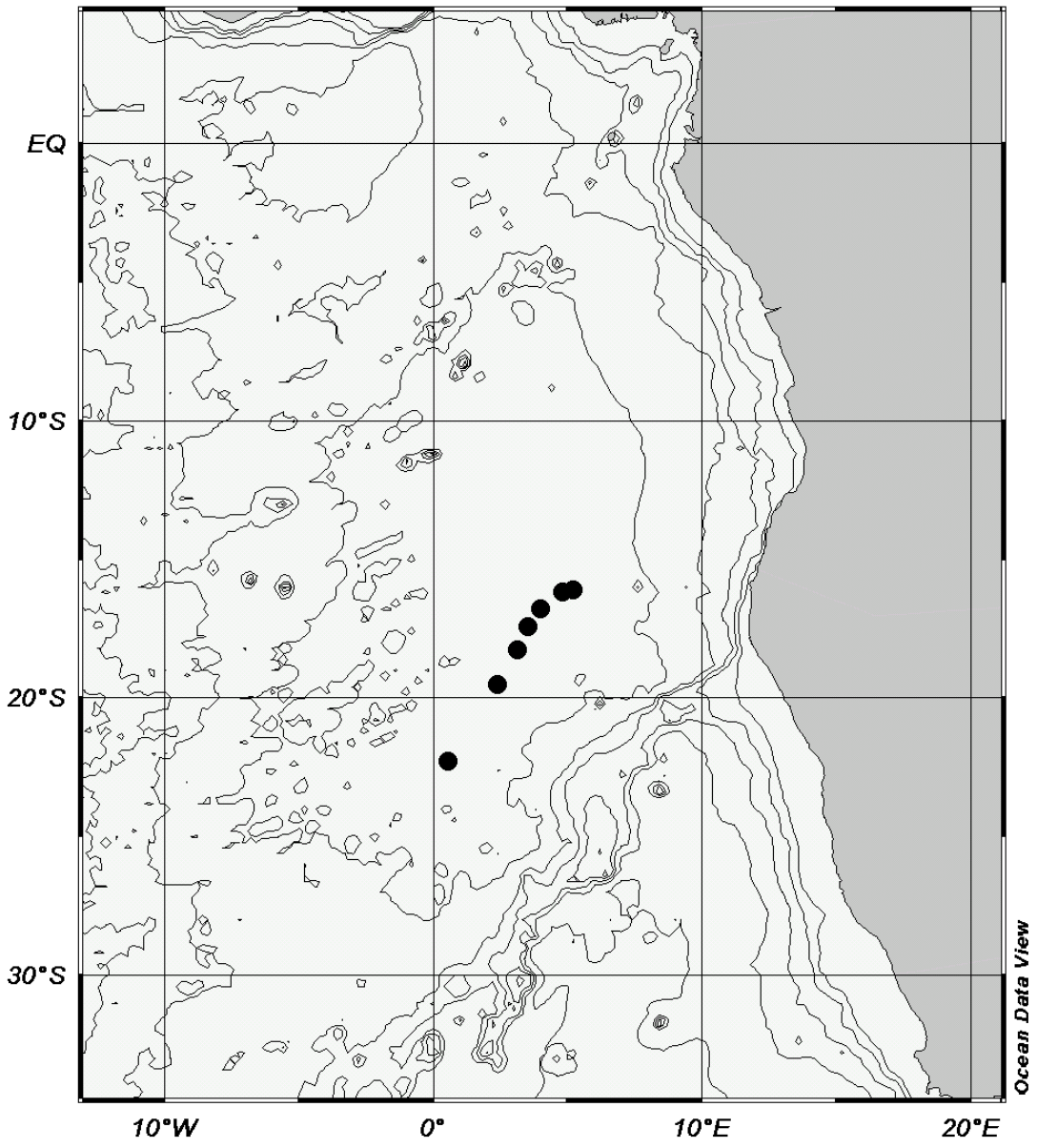

Abb. 3 Angola Becken Süd-Atlantik. Tranksekt der DIVA 1 Expedition. Punkte stellen die Stationen dar, aus dem Material zur Verfügung stand.

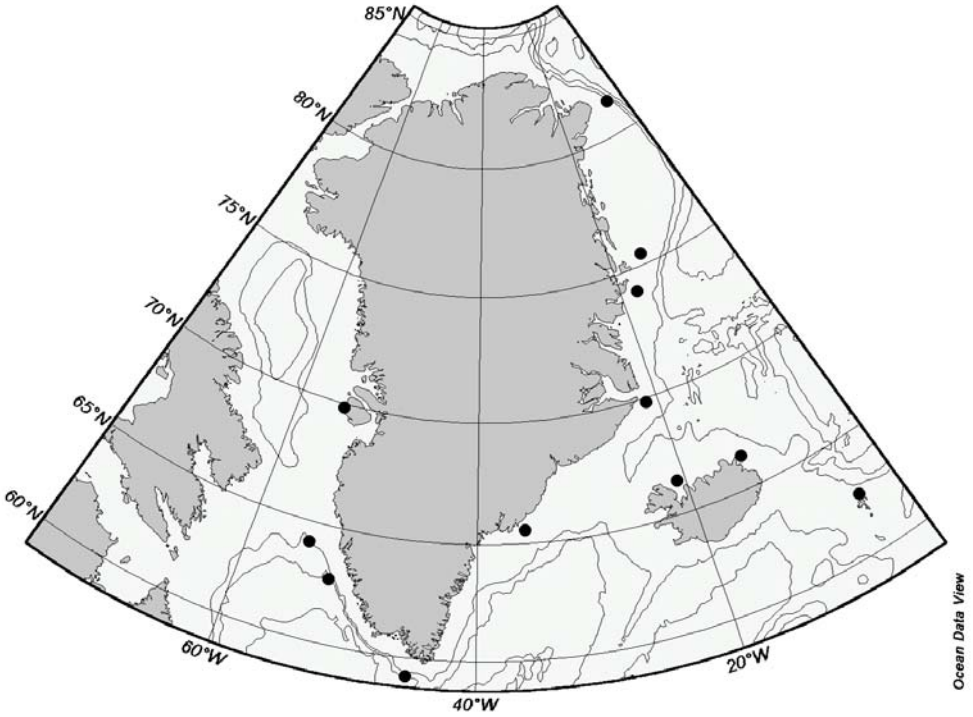

Abb. 4. Grönland und Nord Atlantik. Punkte stellen die Gebiete dar, aus dem Material zur Verfügung stand.

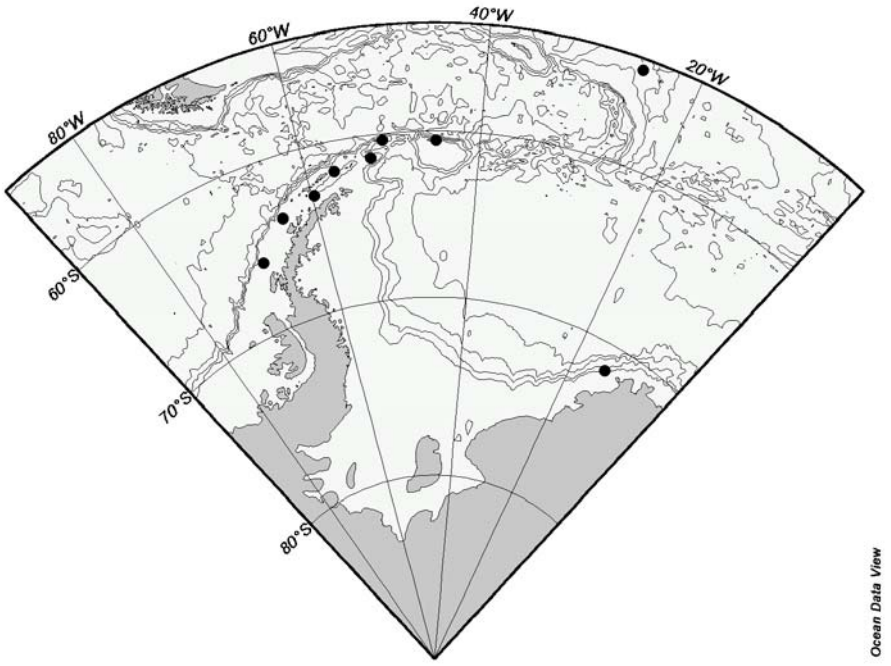

Abb. 5. Weddellmeer und Südpolarmeer Punkte stellen die Gebiete dar, aus den Material zur Verfügung stand.

Veröffentlichungen

Veröffentlichung I

Paranarthrura Hansen, 1913 (Crustacea:Tanaidacea) from the Angola Basin, description of *Paranarthrura angolensis* n. sp.

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Abstract

Tanaidacea were collected from board of RV *Meteor* (M48) and RV *Atlantis II* (42) in the deep Angola Basin. Within the samples containing Tanaidacea, one species of *Paranarthrura* could be identified, *Paranarthrura angolensis* n.sp, which is described on the basis of 42 individuals from depths between 631 to 5464 m off the deep Angola Basin, South Atlantic Ocean. Until now, 10 species of *Paranarthrura* are reported from the Atlantic Ocean. Data on the distribution of these species are presented.

Keywords Tanaidacea, *Paranarthrura*, Angola Basin, Namibia, deep sea, taxonomy

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Introduction

Tanaidacea occur in all world oceans from the shallow shelf down to the deep-sea. The systematic and phylogenetic relationships of the Tanaidacea however is not well understood for many taxa, specially those from the deep-sea.

The genus *Paranarthura* Hansen, 1913 has a world-wide distribution and it is frequently found in the deep sea. For the Atlantic ocean nine species are reported (Bird & Holdrich, 1989), most of them from the North Atlantic Ocean. For the South Atlantic Ocean a new species of *Paranarthura* from the deep Angola Basin is described, and discussed in this paper.

Material and methods

In July 2000 during the **DIVA**-1 expedition (**div**ersity of the deep **A**tlantic Ocean) benthos was collected from the Angola Basin. This material also yielded a high number of Tanaidacea. Sampling was conducted aboard the RV *Meteor* (M48) using an modified epibenthic sledge (Brandt & Barthel 1995) and a box corer in depths between 5000-5450 m. During the examination of the tanaidacea material, 23 individuals of a new species of *Paranarthrura*, the most abundant genus, were found.

In May 1968, benthos was collected, during the cruise 42 of the RV *Atlantis II*, with an anchor dredge in depths between 631 and 979 m from the Angola Basin. Between the Tanaidacea material were 19 *Paranarthrura* specimens of the new species. For station data see Table 1.

We follow Dojiri & Sieg´s (1997) terminology in the description of the species, with some modifications, the terminal spine is called “ungius”, and the terms “sternal” and “tergal” are replaced by ventral and dorsal (Larsen & Rayment 2001).
Length is measured from the tip of the cephalothorax to the tip of the pleotelson.

The holotype and the type series are deposited in the Zoological Museum Hamburg (ZMH) and the Museum of Comparative Zoology (MCZ) Harvard University, Cambridge, Massachusetts, U.S.A.

Table 1. List of stations from which *P. angolensis* is recorded.

Ship cruise	Station	Gear	Position 1	Position 2	Date	Depth (m)
Meteor 48	336	KG1	18°16.60´S 4°44.36´E			5437
Meteor 48	340	EBS	18°18.30´S 4°41.00´E	18°19.40´S 4° 41.90´E	22.7.2000	5395
Meteor 48	341	KG1	17°07.97´S 4°42.01´E			5466
		KG6	17°07.96´S 4°41.99´E			5465
		KG8	17°08.06´S 4°41.90´E			5464
Meteor 48	345	KG2	16°16.98´S 5°27.00´E			5434
		KG3	16°16.99´S 5°25.06´E			5433
		KG4	16°16.98´S 5°27.12´E			5434
		KG6	16°17.20´S 5°27.20´E			5433
Meteor 48	348	EBS	16°18.10´S 5°27.20´E	16°19.30´S 5°27.20`E	28.7.2000	5380
Meteor 48	350	EBS	16°14.30´S 5°26.80´E	16°14.90´S 5°26.70`E	29.7.2000	5389
Atlantis II 42	187	AD	22°58.00´S 13°01.00´E		16.5.1968	631
Atlantis II 42	190	AD	23°05.00´S 12°45.00´E		17.5.1968	979

EBS: ephibenthic sledge; KG: box corer; AD: anchor dredge

Type material of the new species has been compared with the syntype of *Paranarthrura lusitanus* Bird & Holdich, 1989, (Zoological Museum University of Copenhagen ZMUC, Sarsia Stn. 11, a type number was not available) and *P. fortispina* Sieg, 1986, Museum für Naturkunde der Humbold-Universität zu Berlin, Jürgen Sieg´s personal type and reference collection (no type number is available).

Results

Taxonomy

Suborder Tanaidomorpha Sieg, 1980

Family Anarthruridae Lang, 1971

Genus *Paranarthrura* Hansen, 1913

Paranarthrura angolensis n. sp. (Figs. 1-3)

Holotype: one female of 2.96 mm length, ZMH K-40073, DIVA M-48 Stn 345 (KG2 16°16.98´S 5°27.00´E; 5434 m).

Paratypes. 12 males of 1.51 - 2.57 mm; 20 females of 1.27 -2.98 mm and nine mancas of 0.96 – 1.27 mm length.

ZMH K-40074 five females: 2.84 mm; 2.96 mm; 2.96 mm; 2.98 mm, 1.27 mm one manca: 1.12 mm; DIVA M-48 Stn 348 (EBS; 16° 18.10´S 5°27.20´E - 16°19.30´S 5°27.20´E; 5380 m).

ZMH K-40075 one female: 2.78 mm DIVA M-48 Stn 345 (KG4; 16°16.98´S 5°27.12´E; 5434 m).

ZMH K-40076, two females: 2.12 mm; 1.93 mm; one male: 2.00 mm DIVA M-48 Stn 340 (EBS; 18°18.30´S 4° 41.30´E - 18° 19.40´S 4° 41.90´E; 5395 m).

ZMH K-40077, one male: 1.75 mm DIVA M-48 Stn 341 (KG6; 17°07.96´S 4°41.99´E; 5465 m).

ZMH K-40078 two males: 1.51 mm; 1.63 mm, one female: 2.48 mm DIVA M-48 Stn 341 (KG8; 17°08.06´S 4°41.90´E; 5464 m).

ZMH K-40079 one male: 2.57 mm DIVA M-48 Stn 345 (KG3; 16°16.99´S 5°25.06´E; 5433 m).

ZMH K-40080 two males: 2.18 mm; 2.12 mm; two females: 1.90 mm; 2.03 mm; two mancas: 0.96 mm; 1.27 mm DIVA M-48 Stn 336 (KG1; 18°16.60´S 4°44.36´E; 5437 m).

ZMH K-40081 one male: 2.15 mm DIVA M-48 Stn 350 (EBS; 16°14.30´S 5°26.80´E; 16°14.90´S 5°26.70`E; 5389 m).

MCZ 16714 one manca: 1.06 mm, *Atlantis II* cruise 42 Stn. 190 (AD; Walvis Bay 23°5´S 12°45´W, 979 m).

MCZ 16723 eight females: 1.54 mm; 2.18 mm; 2.09 mm; 1.69 mm; 2.24 mm; 2.09 mm; 2.06 mm; 1.72 mm; four males: 2.03 mm; 1.57 mm; 1.93 mm; 1.93 mm; five mancas: 1.24 mm; 0.96 mm; 1.21 mm; 1.21 mm; 1.18 mm; *Atlantis II* cruise 42 Stn. 190 (AD; Walvis Bay 23°5´S 12°45´W, 979 m).

MCZ 16732 one female: 2.06 mm, *Atlantis II* cruise 42 St 187 (AD; Walvis Bay 22°58´S 13°1´W, 631 m).

Diagnosis

Cephalothorax as long as pereonites 1 and 2 together. Pleotelson triangular in shape, caudal apex pointed. Inner margin of labium rounded. Pereopod 5 longer than pereopod 4. Uropod endopod of two articles with three setose terminal seta, first article 1.2 times longer than second.

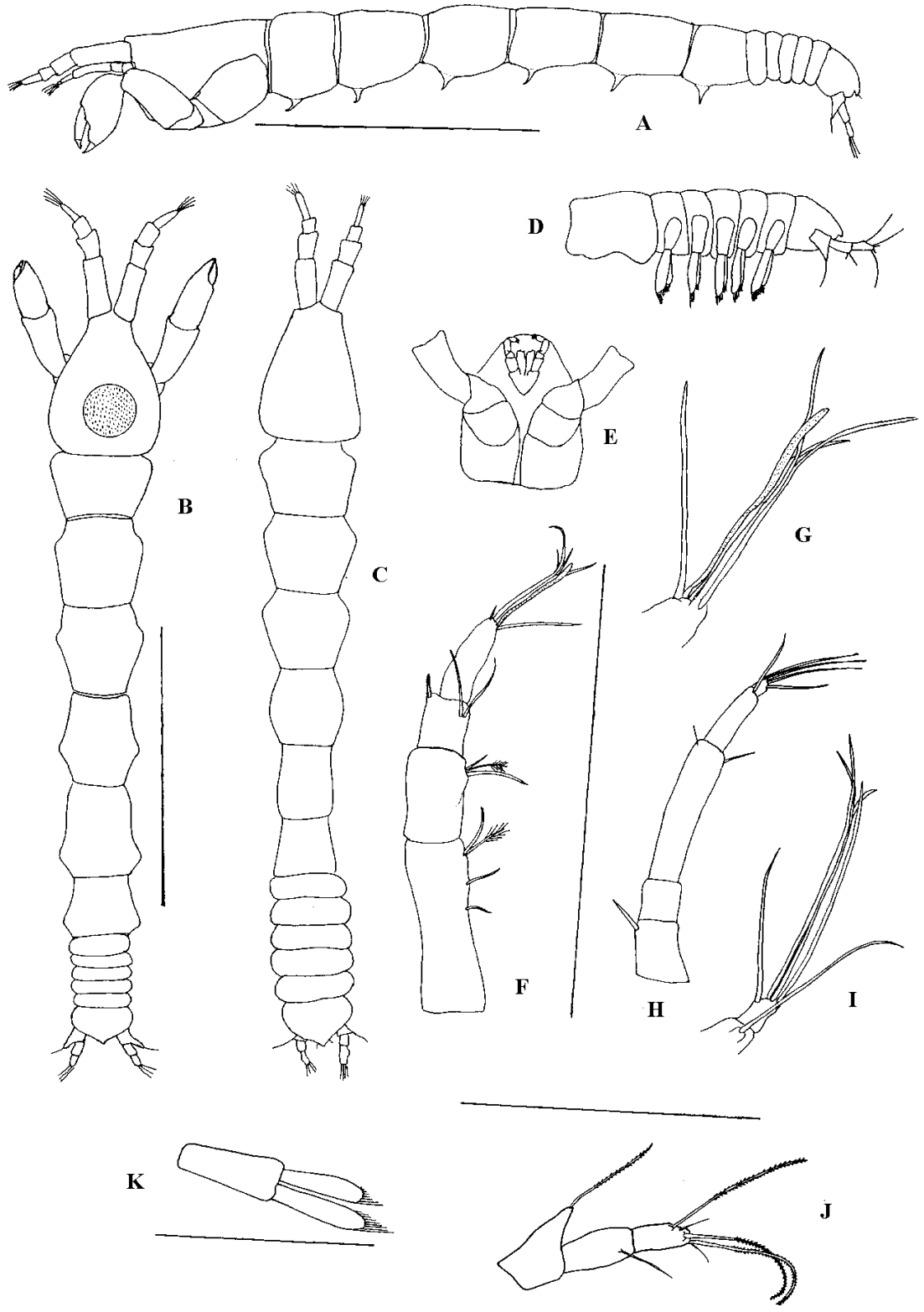

Figure 1. A female lateral view, Paratype ZMH K-40074, B female dorsal view with detail of cuticula, C Male dorsal view, Paratype ZMH K-40081, D pleon male lateral view (Scale bar = 1 mm), E cephalothorax in ventral view, F Antennule, G Detail of antennule tip, H Antenna, I Detail of antenna tip (Scale bar = 0.5 mm), J uropods (Scale bar = 0.05 mm), K Pleopod. (Scale bar = 0.05 mm).

Description

Non ovigerous females: Body (Fig. 1A, 1B) elongated, cylindrical, 6.7 times longer than broad, length 1.27 – 2.98 mm. Cuticula heavy sclerotised and covered with very fine setules (see detail in Fig. 1B). Cephalothorax (Fig. 1A, 1B, ventral view Fig. 1E) about as long as pereonite 1 and 2 together, 0.2 of body length, 1.3 times longer than broad.

Pereon (Fig. 1A) about 0.6 of body length, six free pereonites. Last pereonite shortest, pereonites 2, 4, and 5 longest pereonites and equally long. Pereonite 3 only slightly shorter than pereonite 2. Pereonite 1 broadest. Pereopod shoulders (see dorsal view in Fig. 1B) well developed. Hyposphenian frequently present.

Pleon (Fig. 1A, 1B) short, about 0.05 of body length, composed of five free pleonites, narrower than pereon and pleotelson, as long as pereonite 5, pleopods absent. Pleonite 1 longest, pleonites 2, 3, 4 and 5 subequal in length. Pleotelson as long as preceding three pleonites together, apex triangular.

Antennula (Fig. 1F, 1G) long, about 0.2 body length, and 0.8 cephalothorax length, with four articles, first article longest with three simple and one distally setose seta. Second article as long as fourth, and as broad as first, 0.6 of length of first, with three distolateral seta, two simple seta of different length and 1 distally setose seta. Third article shortest, slightly narrower than second, with two long simple seta and one short setose seta.. Fourth article with five terminal, long and one simple short seta and one aesthetasc.

Antenna (Fig. 1H, 1I) 0.6 of length of antennula, composed of six articles, first article reduced and fused with cephalothorax. Article 2 rectangular, shorter than article 5, with one distolateral simple seta. Article 3 without seta, 0.5 times as long article 2. Article 4 longest, longer than 2 and 3 together, with three simple subterminal seta (one not illustrated). Article 5 slightly larger than 2, with one terminal simple seta. Article 6 shortest, with 5 simple terminal seta of various lengths.

Labrum (Fig. 2B) stout, with fine marginal setules, without special ornamentation.

Mandible (Fig. 2A) molar process week (reduced), minute.

Maxillula (Fig. 2D) endite with ten distinct simple, smooth thick seta, one of these very slender, palp with two long simple seta, one of these as long as palp article.

Maxilla (Fig. 2C) triangular, twice as broad as long.

Labium (Fig. 2G) pointed, medially with short setules and a weak spinelike process on the outer margin.

Figure 2. Paratype ZMH K-40074 A Mandibles, B Labrum, C Maxilla, D Maxillula, E Epignath, F Maxilliped, G Labium.

Maxilliped (Fig. 2F) endite basally fused, endites slightly shorter than basis, reaching midpoint of second palp article, with two distal short seta. Palp 0.9 length of basis and endites, consisting of four articles. First article longest and broadest, roughly rectangular,

without seta, naked; second article 0.6 length of article 1, with three simple and one setose seta; third article about as long as first, with four strong simple seta; last article almost as long as second, with five distal setulated seta, and one medioventral simple seta, medially with a row of fine setules.

Epignath (Fig. 2E) falciform.

Cheliped (Fig. 3A) basis fused to cephalothorax; without seta and with a fine subdivision; merus of triangular shape, with one small simple seta; carpus longest article, twice as long as broad, with two ventral and one dorsal simple seta; chela well developed, twice as long as broad, with a dorsal keel, two seta near incisive process of propodus, one ventral seta; propodus roughly twice as long as dactylus.

Pereopod 1 (Fig. 3B) coxa with one seta; basis without seta; ischium 0.1 of basis length, no seta; merus 0.3 length of basis, one distodorsal simple seta; carpus 0.5 length of basis, with one distodorsal simple seta and a strong ventral setose seta; propodus (twisted in Fig. 3B) 0.6 length of basis, with two distal simple seta and two rows of ventral short setules; dactylus 0.2 length of basis; unguis with rounded tip, 1.5 times dactylar article length.

Pereopod 2 (Fig. 3C) coxa with one seta; basis without seta; ischium 0.07 of basis length, with one simple seta; merus 0.3 length of basis, with two distodorsal simple seta; carpus 0.5 length of basis, with one distodorsal strong setulate seta and two ventral seta, one strong, and setulate, the other simple and shorter; propodus 0.6 length of basis, with one distoventral simple seta and a row of ventral short setules, dorsal margin with 3 minute spines; dactylus 0.2 of length of basis; unguis with rounded tip, 1.5 times as long as dactylar article.

Pereopod 3 (Fig. 3D) coxa with one seta; basis without seta; ischium 0.1 basis length, without seta; merus 0.3 length of basis, with two ventral simple seta; carpus 0.5 length of basis, with one distodorsal simple strong seta and two ventral seta, one setulate, and strong, the other one simple and shorter; propodus 0.5 length of basis, with one distoventral simple seta and a row of ventral short setules; dactylus 0.2 of length of basis; unguis with rounded tip, 1.4 times as long as dactylar article.

Pereopod 4 (Fig. 3E) coxa with one seta; basis without seta; ischium 0.07 basis length, with one simple seta; merus 0.3 length of basis, with one short seta; carpus less than half as long as basis, with three distoventral strong seta; propodus 0.7 length of basis, with one distoventral simple seta, and one minute distal spine; dactylus 0.3 length of basis; unguis with rounded tip, as long as dactylar article.

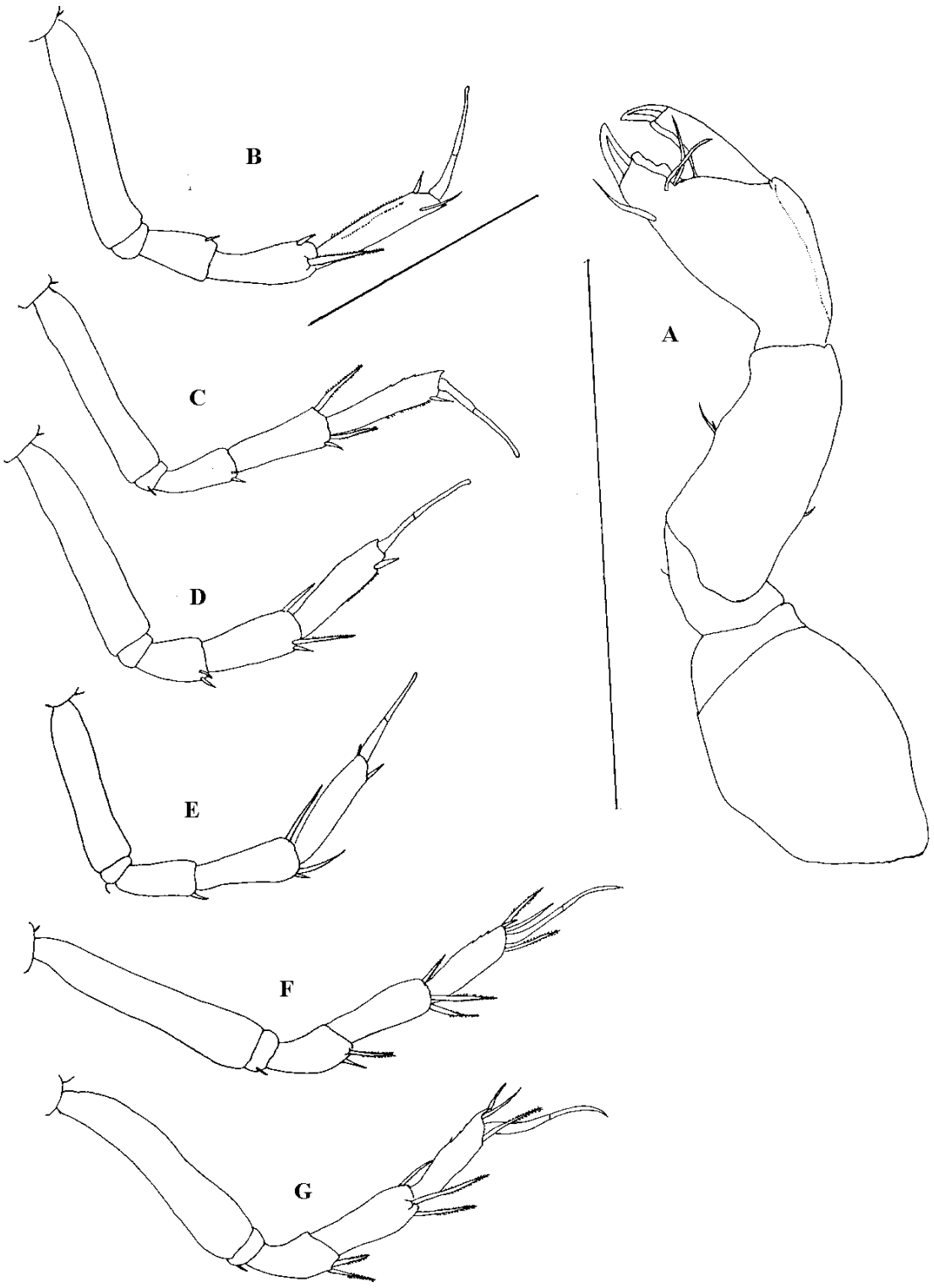

Figure 3. Paratype ZMH K- 40074 A Cheliped, B Pereopod 1, C Pereopod 2, D Pereopod 3, E Pereopod 4, F Pereopod 5, G Pereopod 6. (Scale bar 0.5 mm).

Pereopod 5 (Fig. 3F) coxa with one seta; basis without seta; ischium 0.07 basis length, with one seta; merus 0.3 length of basis, with two distoventral short seta, one setose, one simple; carpus less than half as long as basis, with three setulate seta, two distoventral and one dorsal; propodus with four seta, two long, one short dorsally and one long setose ventrally, three minute spines on dorsal surface. Dactylus about 0.25 of basis length, ungius as long as dactylus and pointed.

Pereopod 6 (Fig 3G) very similar to pereopod 5, but merus with two strong setose seta.

Pleopods in female absent.

Uropods (Fig. 1J) basis with lateral projection being as long as medial margin of article, with one terminal setose seta. Exopodite reduced. Endopodite composed of two articles; first article 1.3 times longer than second and twice as long as wide with a simple distal seta. Last article twice as long as wide, with three long terminal setose seta and two simple short seta.

Ovigerous female: Similar to non-ovigerous females, pereon slightly more compressed dorsoventrally. Oostegites lamelliform, present on pereonites 1 to 4. Body length 2.18 mm.

Males: (Fig. 1C, 1D, 1K) Similar to non-ovigerous female, but pleon well developed, as wide as pleotelson and pereon, pleopods present. Hyposphenian frequently present. Body length 1.51 – 2.57 mm.

Mancas I: Similar to non-ovigerous females but much smaller. Pereonite 6 is not developed and resembles a pleonite. Hyposphenian frequently present. Body length 0.96 – 1.21 mm.

Mancas II: Similar to non-ovigerous females but smaller. Pereonite 6 is well developed with rudiments of pereopods. Hyposphenian frequently present. Body length 1.18 - 1.27 mm.

Type locality: Angola Basin.

Etymology: This species in named after the Angola Basin were the material was sampled.

Remarks:

The occurrence of hyposphenian, ventral thornlike projections, is not uniform. Hyposphenian are common in most specimens (31 of 42 specimens). They are present in manca I, manca II, males and females but absent in ovigerous females. They always are directed downwards. Most of the animals of deep water presents hyposphenians on all their pereonites. Males from shallower waters presents hyposphenian only on pereonites 1 to 3,

males from deeper water present hyphosbaenian on all 6 pereonites. Not ovigerous adult females on all 6 pereonites. Some mancas have hyposphenian and other lack all of them, this character is highly variable.

In the revision of the genus *Paranarthrura* by Bird & Holdich (1989), nine species are reported for the Atlantic Ocean most of them from the North Atlantic. *Paranarthrura angolensis* will be the second species reported for the South Atlantic. The other species *P. fortispina* is reported from Subantarctic and Antarctic waters.

There are five species of *Paranarthrura* that resembles the new species, one from the Indian Ocean *P. bacescui* Kudinova-Pasternak, 1986 and other four from the Atlantic Ocean, *P. crassa*, *P. fortispina*, *P. insignis* and *P. lusitanus* (see table 2). *Paranarthrura bacescui* differs from *P. angolensis* in the shape of the mandible, the cutting edge is broader and the molar process is more developed. The antennule has a different setation, the basis is more slender and has no seta on the middle part of it. The labium of *P. bacescui* has a central groove that is not present in *P. angolensis*.

Table 2. *Paranarthrura* species reported for the Atlantic Ocean

Species	Location	Depth (m)
Paranarthrura borealis Bird & Holdich, 1989	Northeast	903-1600
Paranarthrura crassa Bird & Holdich, 1989	Northeast	463-1739
Paranarthrura fortispina Sieg, 1986	Subantarctic	423-1729
Paranarthrura insignis Hansen, 1913	Northeast	582-5000
Paranarthrura intermedia Kudinova-Pasternak, 1982	Northeast	1170-4190
Paranarthrura kurchatova Kudinova-Pasternak, 1975	Tropical east	6340-6380
Paranarthrura lusitanus Bird & Holdich, 1989	Northeast	173-641
Paranarthrura subtilis Hansen, 1913	Northeast	582-1739
Paranarthrura tridens Bird & Holdich, 1989	Northeast	4426-4829
Paranarthrura angolensis sp. nov.	Southeast	631-5464

Paranarthrura crassa, *P. fortispina*, *P. insignis* and *P. lusitanus* from the Atlantic Ocean resembles *P. angolensis* in body shape and presence of two articled uropods.

In *P. crassa,* the shape of the chela is very characteristic, it is more rounded and the terminal spines of the finger and the chela are rounded, the uropods are shorter as in *P.*

angolensis. As a special feature the hyposphenian on *P. crassa* are pointed frontally while in *P. angolensis* the hyphosbaenian are pointed ventrally.

In *P. fortispina,* the chela is more strongly developed and the pleotelson is more rectangulary shaped. The maxilla is almost round and not triangular as in *P. angolensis*. The strong seta on the propodus of pereopod 1 is very prominent, in *P. angolensis* it is very small.

In *P. insignis* the uropod is very characteristic, bearing the typical „*Anarthrura* basis" without any seta on top of the projection. The chela is larger than in *P. angolensis*. *Paranarthrura lusitanus* is very similar to *P. angolensis*. The finger of the chela has a seta on it, pereopod 6 possesses two distal setose seta on the basis, and the maxilliped has two strong seta on its basis. The first article of the antennule is longer in *P. lusitanus* and the setation is different to *P. angolensis*. The inner edge of the labium is pointed and in *P. angolensis* it is rounded. The bathymetrical distribution is different. *P. lusitanus* is found on shallower waters (to 631 m) and *P. angolensis* on deeper waters (to 5464 m) (see table 2).

The resemblance of *P. angolensis, P. lusitanus* and *P. fortispina* might indicate a close phylogenetic relationship of these species, a future phylogenetic analysis might help to understand the possible colonisation and speciation process of *Paranarthrura* in the deep Atlantic Ocean.

Acknowledgements

Financial support was provided by the German Research Foundation Grant DFG Br- 1121/19-1. We are very grateful to Dr. Jørgen Olesen ZMC for the loan of the syntype material of *P. lusitanus*, to Ardis Johnston for the loan of material from the Museum of Comparative Zoology Harvard university and to Oliver Coleman who allowed the first author to work with the collection of Jürgen Sieg.

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Key for the *Paranarthrura* species of the Atlantic ocean

1 Uropod endopod biarticled.....2

1a Uropod endopod monoarticled.....6

2 Cephalothorax as long as pereonite one and two together.....3

2a Cephalothorax shorter than pereonites one and two together.....4

3 Pleotelson subheptagonal, pleon longer than pereonite six, strong terminal seta on propodus of pereopod one.....*P. fortispina*

3a Pleotelson subpentagonal, pleon as long as pereonite six, no strong terminal seta on propodus of pereopod one.....*P. insignis*

4 Pleon as long as pereonite six, pleotelson subtriangular, propodus and dactylus of chela blunt.....*P. crassa*

4a Pleon shorter than pereonite six, pleotelson different, propodus and dactylus of chela pointed.....5

5 Pleotelson subpentagonal, chela finger without setae dorsally, labium rounded... .....*P. angolensis*

5a Pleotelson subhexagonal, chela finger with small seta dorsally, labium pointed... .....*P. lusitanus*

6 Cephalothorax shorter than pereonites one and two together.....7

6a Cephalothorax as long as pereonites one and two together.....8

7 Pereonite one as long as as wide, pleotelson without lateral projection..*P. subtilis*

7a Pereonite one not as long as wide, pleotelson with lateral projection..... .....*P. intermedia*

8 Pleon as long as pereonite six, dactylus of pereopods four to six with two strong setae in addition to terminal strong seta.....*P. tridens*

8a Pleon longer than pereonite six, dactylus without additional strong setae.....9

9 Peronite with well developed shoulders, three long terminal setae on propodus of pereopod one, maxiliped with scutellum covering the basal part of the endites..... .....*P. kurchatovi*

9a Pereonite without shoulders, no long terminal setae on propodus of pereopod one, maxiliped different.....*P. borealis*

Veröffentlichung II

Portaratrum, a new genus of deep-sea Tanaidacea (Crustacea) with description of two new species

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Abstract

A new genus, *Portaratrum* n. gen. and two new species, one from the Atlantic Ocean and one from the Pacific Ocean are described. The new genus is characterized by a downwardly directed pleonal spur, cheliped basis fused to the cephalothorax, biramous uropods, pars molaris blunt with several terminal spinules. At present the genus is assigned to the family Colletteidae. Both species were collected from depths exceeding 4000 m.

Key words: Tanaidacea, new genus, deep sea, *Portaratrum n. gen., Leptognathia,* abyssal plains, Pacific Ocean, Atlantic Ocean, Angola Basin, taxonomy .

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Introduction

The Tanaidacea is a common marine taxon, one that occurs in all world oceans from the shallow shelf down to the deep sea. The systematics of the Tanaidacea, however, are not well understood for many taxa, especially those from the deep-sea as specimens are difficult to obtain. During the DISCOL Experiment (DISturbance and reCOLonization) carried out in 1998, about 3000 tanaids were collected from the abyssal plains of the East Pacific Ocean south of the Galapagos Islands. These samples contained specimens of a new species and a new genus of Tanaidacea. The new genus was also found in samples collected during the DIVA-1 expedition (DIVersity of the deep Atlantic Ocean; July 2000) from the Angola Basin at depths between 5000–5450 m.

Species of Tanaidomorpha have a long and slender body and are not easy to identify (Larsen 2001). Some tanaidomorphans possess ventral spiniform projections on their bodies. The spur located on pleonite 5 is known as pleonal spur. Tanaidomorphans with a pleonal spur are described for the genera *Leptognathia* G.O. Sars, 1882 and *Chauliopleona* Dojiri & Sieg, 1997. Species of *Leptognathia* which have a pleonal spur occur in all oceans (Hansen 1913, Vanhöffen 1914, Kudinova-Pasternak 1965, 1986). *Chauliopleona* has been reported only from the Northeast Pacific Ocean (Dojiri & Sieg 1997). This contribution describes two new species of a new genus with a pleonal spur from the eastern tropical Pacific Ocean and the tropical east Atlantic Ocean.

Materials and Methods

The material examined came from the Zoological Museum, University of Copenhagen, Denmark, the Santa Barbara Museum of Natural History, California, U.S.A, the DISCOL Experiment and the DIVA-1 Expedition. During the DISCOL Experiment sampling was conducted on board the RV *Sonne* using a box corer (BC) in depths between 4150–4180 m. During the DIVA-1 Expedition, sampling was conducted on board the RV *Meteor* (M48), using a modified epibenthic sledge (EBS) (Brandt & Barthel 1995) and a box corer (BC) at depths between 5000—5450 m.

Dissections were made in glycerine using a Leitz Großfeld TS dissecting microscope; drawings were made using a Leitz Dialux microscope equipped with a camera lucida.

The holotype and the type series of the new species are deposited in the Zoological Museum Hamburg (ZMH). The terminology for the description is based on Dojiri & Sieg (1997) and Guerrero-Kommritz et al. (2002). The following abbreviations are used in this manuscript: Zoological Museum, University of Copenhagen, Denmark (ZMUC), Santa Barbara Museum of Natural History, California, U.S.A. (SBMNH).

Order Tanaidacea Dana, 1849

Family Leptognathiidae Sieg, 1976

Genus *Leptognathia* G. O. Sars, 1882

***Leptognathia amdrupii* Hansen, 1913**

Material examined: Holotype, ZMUC CRU-5284, non-ovigerous female, 2.7 mm, Forsbald Fjörd, Greenland.

Remarks: Specimen in good condition, no carpal shield on cheliped. Cheliped basis not fused to the cephalothorax.

***Leptognathia armata* Hansen, 1913**

Material examined: Syntype, ZMUC CRU-5612, non-ovigerous female, 3.8 mm, Ingolf Expedition, station 22, 48°25´N, 58°10´W, 3474 m.

Remarks: Specimen in good condition. Carpal shield of cheliped broad and smooth. Cheliped basis not fused to the cephalothorax.

***Leptognathia hastata* Hansen, 1913**

Material examined: Syntype, ZMUC CRU-6682, non-ovigerous female, 2.8 mm, *Ingolf* Expedition, station 125, 68°08´N 16° 02´W, 1373 m.

Remarks: Specimen in good condition. Carpal shield of cheliped very broad, with ornamentation. Cheliped basis not fused to the cephalothorax.

***Leptognathia tuberculata* Hansen, 1913**

Material examined: Allotype, ZMUC CRU 3762, male, 2.4 mm, *Ingolf* Expedition, station 24 3°06´N, 56°00´W, 2170 m.

Remarks: Specimen in poor condition. Carpal shield of cheliped well developed. Cheliped basis not fused to the cephalothorax.

Incertae sedis

Genus *Chauliopleona* Dojiri & Sieg, 1997

***Chauliopleona dentata* Dojiri & Sieg, 1997**

Material examined: Paratype, SBMNH 144123, non-ovigerous female, 2.4 mm, station 4C, 33°50´40´´N, 118°26´22´´W, 76 m, Santa Monica Bay, California, 08.01.1987.

Remarks: Specimen in good condition. No carpal shield on cheliped. Cheliped basis not fused to the cephalothorax.

Family Colletteidae Larsen & Wilson, 2002

***Portaratrum* n. gen.**

Diagnosis: Antennula with 4 articles, antenna with 6 articles, basis of cheliped fused to cephalothorax, uropods biarticled, uropod exopod uniarticled, pleonal spur directed downwards.

Description: Adult female: body long and slender about 8 times longer than broad, cephalothorax oval. Pereon composed of 6 free pereonites, pleon composed of 5 free pleonites and a pleotelson, ventral pleonal spur on pleonite five. Antennula composed of 4 articles. Antenna composed of 6 articles, article 2 with a row of setules. Labrum hood-shaped with distal setules, mandibles well calcified, pars molaris not acute, with several terminal spinules. Maxillule endite with 9 terminal spines. Maxilliped basis oval, endites not fused. Labium composed of 2 triangular lobes with distal setules. Cheliped basis fused to cephalothorax. Pereopods 1 to 3 with a simple stout seta on merus. No coxa on pereopods. Pleopods biramous. Uropods endopodite composed of two articles, endopod uniarticled.

Neuter: As female except pleopods not well developed.

Males: Unknown.

Type species: *Portaratrum afer* n. sp., here designated.

Included species: In addition to the type species, *Portaratrum fascinatus* n. sp.

Etymology: The name is composed of the Latin words *portare* to carry and *aratrum* the plough, with reference to the pleonal spur, meaning the one who carries a plough.

Distribution: Abyssal plains of the tropical South Atlantic and tropical South Pacific Oceans.

Remarks: Although some Tanaidacea possess ventral spiniform projections on their body, those located on the pereon, called hyposphenia, are very variable and have little

taxonomic value (Lang, 1953; Guerrero-Kommritz et al., 2002). Ventral spines located on pleonite 5 are stable and taxonomically valid. This character is present in *Portaratrum* and also in the genus *Chauliopleona* and in the species *Leptognathia tuberculata* Hansen, 1913, *L. armata* Hansen, 1913, *L. hastata* Hansen, 1913 and *L. amdrupii* Hansen, 1913. *Portaratrum* can easily be differentiated from *Chauliopleona* and *Leptognathia* because the basis of the chelipeds is fused to the cephalothorax. In addition, the new genus has a heavily calcified cuticle that resembles that of the Agathotanaidae. In *Chauliopleona* and *Leptognathia*, the cheliped is inserted into to the cephalothorax via a sclerite, the basis of the cheliped is not fused to the cephalothorax and the body is weakly calcified as in *Portaratrum*. In *Chauliopleona*, *Leptognathia armata*, *L. hastata* and *L. amdrupii* the pleonal spur is directed backwards rather than downwards. The uropod exopod is biarticled in *Chauliopleona,* and the *Leptognathia* species but monoarticled in *Portaratrum*. The form of the pleonal process in *Portaratrum* is quite similar to that of *L. tuberculata*. However, *Portaratrum* can be differentiated by the absence of the carpal shield of the cheliped that is present in *L. tuberculata.*

This genus is here assigned provisionally to the family Colletteidae. The rigid body calcification and the cheliped attachment are more similar to that of the Agathotanaidae, but the form of the molar process and the presence of pleopods on females shows clearly that it does not belongs to that family. The absence of coxa, the form of the mandible and molar process, endites of the maxilliped not fused, place this genus close to Colletteidae. Further analysis will show if this genus belongs to the Colletteidae or a new not yet defined family.

***Portaratrum afer* n. sp. (Figs 1-2)**

Material examined: Holotype ZMH K-40353, non-ovigerous female, 2.2 mm, *Meteor* M48, DIVA station 350, 16° 14.3´-16° 14.9´S S 005° 26.8´-005° 26.7´E, 5389 m, 29.07.2000, EBS.

Paratypes: ZMH K-40354, neuter, (2) 3.07 mm and 3.33 mm, *Meteor* M48, DIVA station 348, 16° 18.1´S 005° 27.2´E - 16°19.3´S 005°27.2´E, 5387 m, 28.07.2000, EBS. ZMH K-40355, neuter (1) 2.6 mm, and (1) dissected non-ovigerous female, *Meteor* M48, DIVA station 350, 16°14.3´S 005°26.8´E - 16°14.9´S, 005°26.7´E, 5389 m, 29.07.2000, EBS. ZMH K-40356, neuter (1) 2.7 mm, *Meteor* M48, DIVA station 340, 18°18.3´S 004°41.3´E – 18°19.4´S 004°41.9´E, 5395 m, 22.07.2000, EBS.

Diagnosis: Cheliped slender, exopod of uropod about a third of endopod first article. Propodus of pereopods 1 to 3 with a ventral row of spinules.

Description: Non-ovigerous female. Body (Fig. 1a, b): long and slender, 9 times as long as wide.

Cephalothorax (Fig.1a, b, c): oval, 1.2 times longer than wide, without ocular process. Pereon (Fig. 1a, b): pereonite 6 shortest, pereonite 1 longer than pereonite 6 and shorter than 2, pereonites 3, 4, 5 subequal in length, pereonite 2 longer than 1 and shorter than 3.
Pleon (Fig. 1a, b): pleonites of equal length, pleonite 5 with a prominent ventral spiniform process, pleotelson pentameral, longer than two pleonites together. Apex rounded.

Antennula (Fig. 1d): composed of four articles. First article longest with two terminal simple setae. Second article with two terminal simple setae. Third article as long as wide, with two simple terminal setae. Fourth article with five long terminal and one simple subterminal setae.

Antenna (Fig. 1e): composed of six articles. First article short and almost fused to the cephalothorax. Second article with comb seta and short simple distal seta. Third article with short distal seta. Fourth article longest, with one long and one short distal simple seta. Fifth article as long as first article, with one distal seta. Sixth article shortest, with two long and two short terminal setae.

Labrum (Fig. 1i): hood-shaped, with two rows of setules distally, with long setules on the lateral margins.

Mandible (Fig. 1j): well developed, pars molaris not pointed, turned downwards.

Maxillule (Fig. 1k): endite with two short, one long serrated, and six long simple spines, one row of setules dorsally.

Maxilla (Fig. 1m): of irregular shape, naked.

Labium (Fig. 1l): composed of two triangular lobes with a row of setules on apex.

Maxilliped (Fig. 1o): basis oval, endites fused basally, palp composed of four articles. First article naked, second article with three long stout serrated inner setae. Second article with three stout simple inner and one outer setae. Fourth article with four long simple and one short simple terminal setae.

Epignath (Fig. 1n): falciform and without setae.

Cheliped (Fig. 1f): basis attached ventrally to cephalothorax, naked. Merus triangular, with 1 ventral seta. Carpus longer than wide, no carpal shield, with 2 short setae ventrally near chela insertion, one tubercle distally at the chela insertion. Propodus 3 times as long as wide, fixed finger comprising 50 % of propodus length, one long and one short simple seta

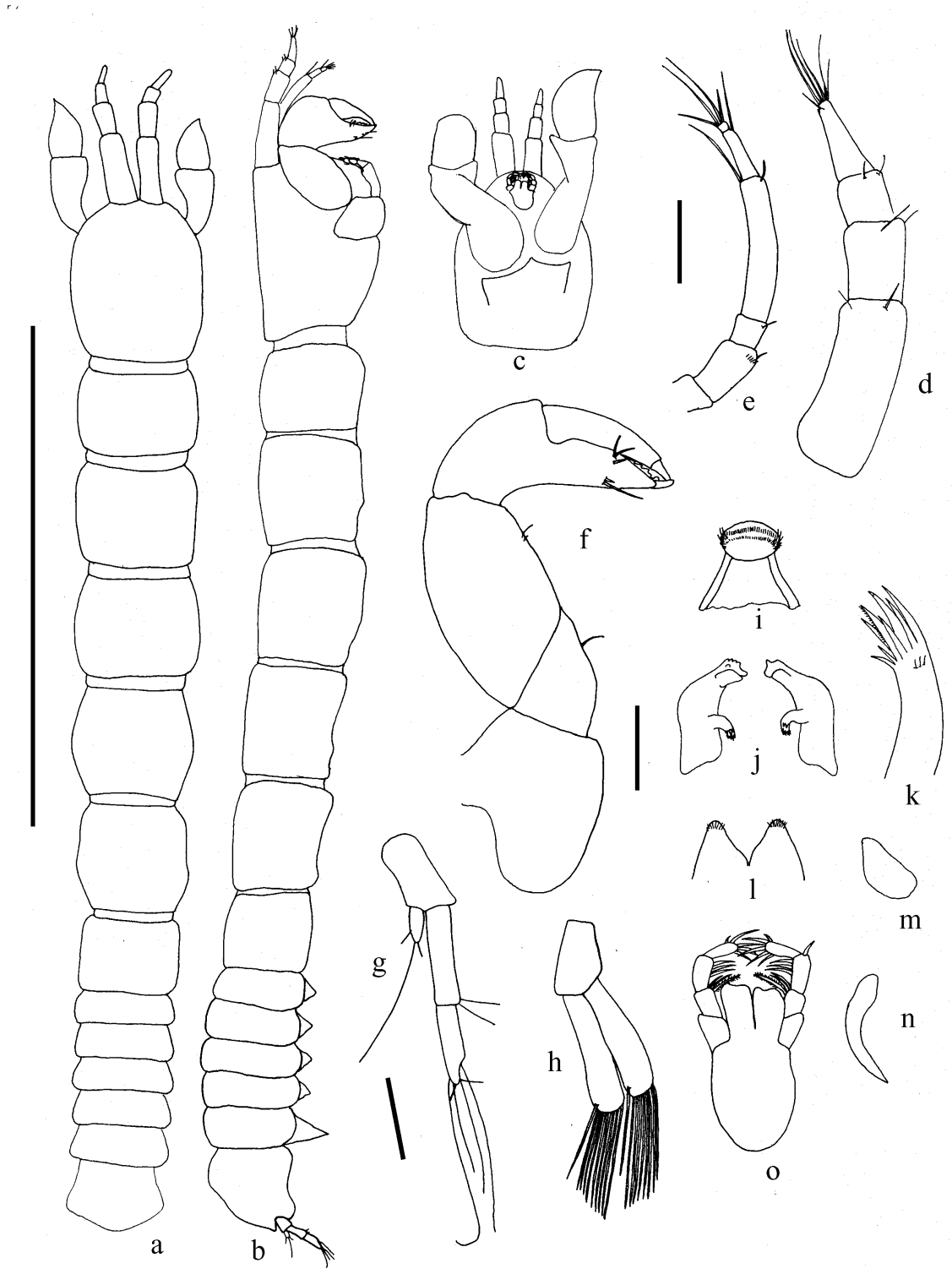

FIGURE 1. *Portaratrum afer* n. sp., holotype ZMH K-40353, non-ovigerous female: a. body, dorsal view; b. body, lateral view; c. cephalothorax, ventral view. Scale bar 1 mm. Paratype ZMH K-40355, non-ovigerous female: d. antennula; e. antenna; f. cheliped; g. uropod; h. pleopod; i. labrum; j. mandibles; k. maxillulae; l. labium; m. maxilla; n. epignath; o. maxilliped. Scale bar 0.1 mm.

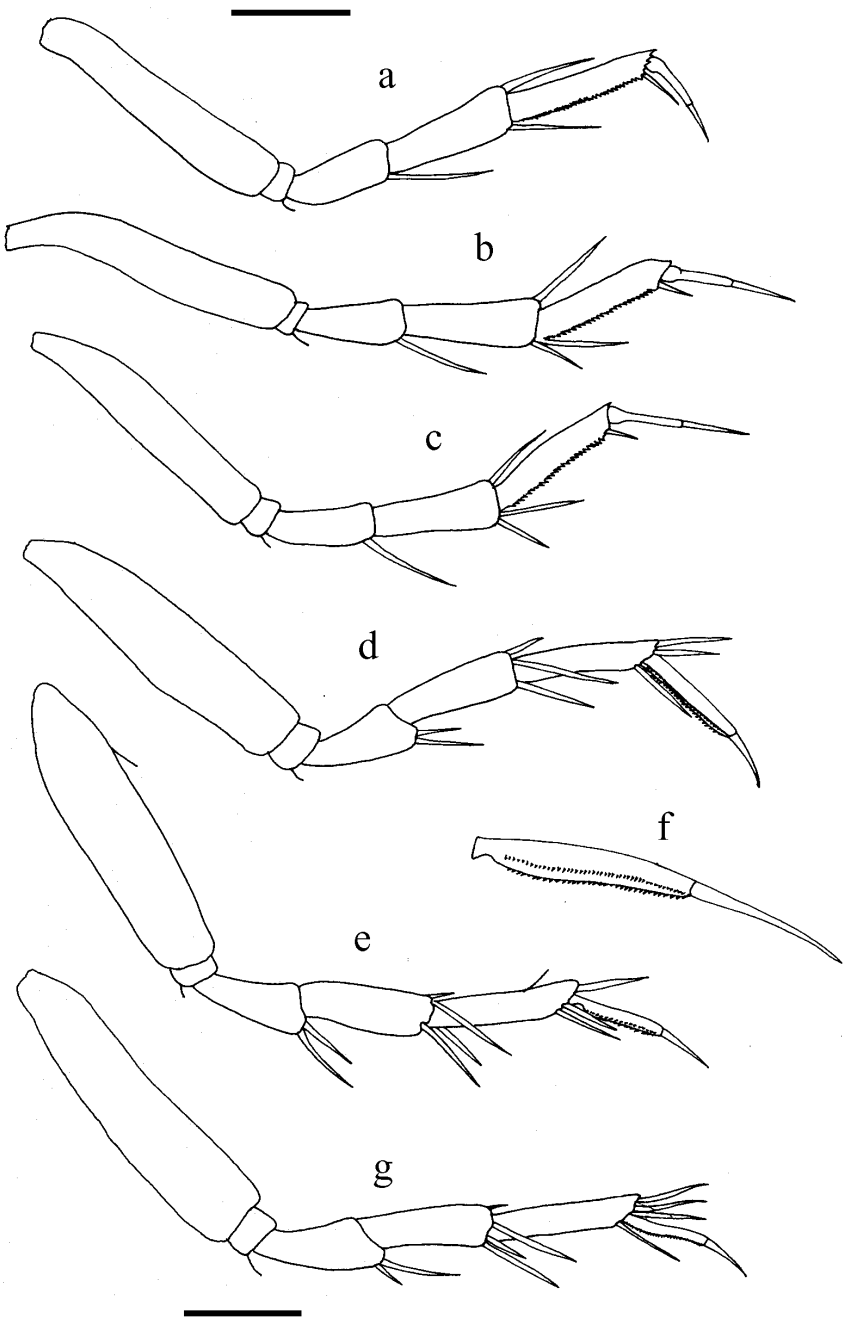

FIGURE 2. *Portaratrum afer* n.sp., paratype ZMH K-40355, non-ovigerous female: a. pereopod 1; b. pereopod 2; c. pereopod 3; d. pereopod 4; e. pereopod 5; f. dactylus and unguis of pereopod 5; g. pereopod 6. Scale bar 0.1 mm

ventrally, three dorsal setae near cutting edge, four blunt teeth dorsally. Dactylus curved, as long as fixed finger, naked.

Pereopod 1 (Fig. 2a): Without coxa. Basis long, 5 times longer than wide, naked. Ischium short, with 1 simple seta. Merus twice as long as wide, with 1 long stout simple distal seta. Carpus longer than merus, with 2 long stout simple distal setae. Propodus longer than carpus, with one terminal spine and one row of spinules ventrally, one simple stout seta below dactylus. Dactylus smooth. Unguis sharp, half as long as dactylus.

Pereopod 2 (Fig. 2b): as pereopod 1 except carpus with three long stout simple distal setae.

Pereopod 3 (Fig. 2c): as pereopod 2.

Pereopod 4 (Fig. 2d): basis long 4 times longer than wide, naked. Ischium short, with one simple seta. Carpus with two stout distal setae. Carpus longer than merus, with two long and one short stout simple distal setae. Propodus longer than carpus, with three long stout simple terminal setae. Dactylus with ventral groove bordered by fine spinules. Unguis sharp and pointed, half as long as dactylus.

Pereopod 5 (Fig. 2e): as pereopod 4 except basis with a simple dorsal seta, carpus with three long and one short stout distal setae. Propodus with one dorsal simple seta.

Pereopod 6 (Fig. 2g): as pereopod 4 except merus with one long and one short stout distal seta. Carpus with two long and two short stout distal simple setae. Propodus with four stout simple terminal setae. Dactylus shaped like flat sigmoidal curve.

Pleopods (Fig. 1h): biramous, basal article pentameral. Endopodite and exopodite of similar shape, with ten terminal long simple setae.

Uropods (Fig. 1g): biramous. Basal article rectangular. Exopod uniarticled, with two short setae and one as long as endopod. Endopod composed of two articles, first article longest with two simple terminal setae. Second article with four long terminal setae and two short subterminal setae.

Neuter: Similar to female except pleopods are not well developed.

Ovigerous female: Not known

Male: Not known

Type locality: M48, DIVA., station 350, 16°14.3′-16°14.9′S 005°26.8′-005°26.7′E, 5389 m, Angola Basin, Atlantic Ocean.

Etymology: the name *afer* is a Latin word for Africa.

Distribution: This species is only known from the Angola Basin.

***Portaratrum fascinatus* n. sp. (Figs 3-4)**

Material examined: Holotype: ZMH K-40357, non-ovigerous female, 2.7 mm, *Sonne* station 105/574, 7°4.156´S, 088°27.786´W, 4179 m, 24.01.1996, BC.

Paratypes: ZMH K-40358, ovigerous female, 2.5 mm, *Sonne* station 105/574, 7°4.203´S, 088°27.94´W, 4166 m, 20.01.1996, BC. ZMH K-40359, non-ovigerous female, 1.6 mm, dissected, *Sonne* station 55/539, 7°4.37´S, 088°27.76´W, 4160 m, 16.01.1996, BC.

Diagnosis: Cheliped robust, chela wide and stout, exopod of uropod about half of the length of endopod first article. First article of maxilliped palp with stout simple seta. Propodus of pereopods 1 to 3 smooth.

Description: Non-ovigerous female. Body (Fig. 3a): long and slender, 6.5 times longer than wide.

Cephalothorax (Fig. 3a, b, c): of oval shape.

Pereon (Fig. 3a, b): pereonite 2 longest, pereonite 3 as long as pereonite 4, pereonite 5 shorter than 4 and longer than 6. Pereonite 1 shortest.

Pleon (Fig. 3a, b): pleonite 1 slightly larger than following pleonites. Pleonites 2–5 of equal length. Pleonite 5 with prominent ventral spiniform process, pleotelson pentameral, narrower than pereon, apex blunt.

Antennula (Fig. 3d): composed of four articles. First article longest, as long as following three articles together, with one simple seta. Second article with two distal simple setae. Third article with three simple setae in longitudinal row. Fourth article with six terminal simple setae and one aesthetasc.

Antenna (Fig. 3e): composed of six articles. First article short, naked. Second article wider than long with a ventral distal spine and four dorsal setules. Third article as long as wide, naked. Fourth article longest, with two long ventral and one simple dorsal setae. Fifth article longer than wide, with one simple long ventral seta. Sixth article shortest, with one short and four long simple terminal setae.

Labrum (Fig. 3f): hood-shaped with many setules on the distal margin.

Mandible (Fig. 3g): well calcified, lacinia mobilis pointed, pars molaris well developed and broad, ending in several spinules.

Maxillule (Fig. 3h): endite naked with four short and five long spines.

Maxilla (Fig. 3i): drop shaped (triangular) with pointed angle.

Labium (Fig. 3j): composed of two lobes, with row of fine setules on distal angle.

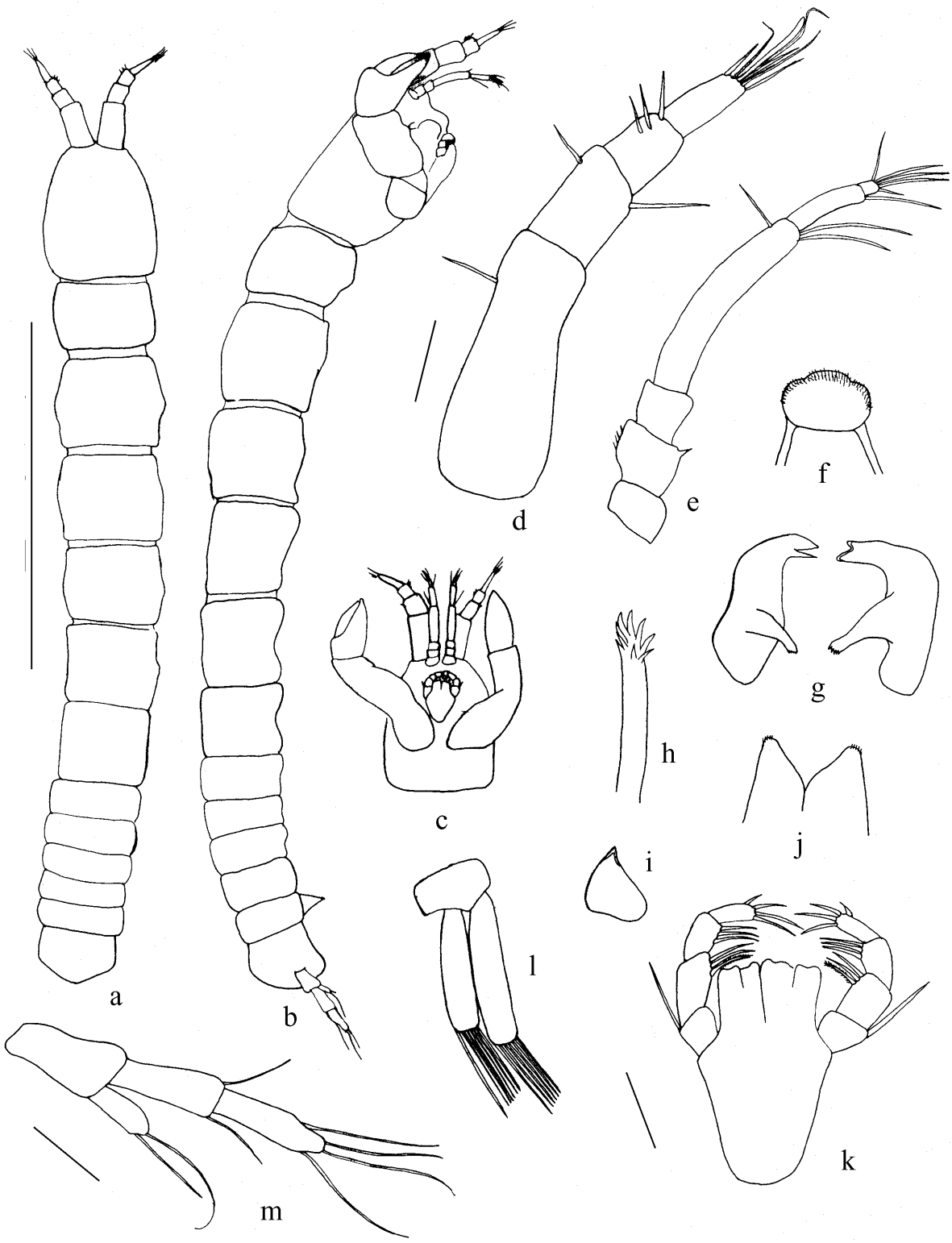

FIGURE 3. *Portaratrum fascinatus* n. sp., holotype ZMH K-40357, non-ovigerous female: a. body, dorsal view; b. body, lateral view; c. cephalothorax, ventral view. Scale bar 1 mm. Paratype ZMH K-40359, non-ovigerous female: d. antennula; e. antenna; f. labrum; g. mandibles; h. maxillula; i. maxilla; j. labium; k. maxilliped; l. pleopod; m. uropod. Scale bar 0.1 mm.

FIGURE 4. *Portaratrum fascinatus* n. sp., paratype ZMH K-40359, non-ovigerous female: a. cheliped, external view; b. pereopod 1; c. pereopod 2; d. pereopod 3; e. pereopod 4; f. pereopod 5; g. pereopod 6. Scale bar 0.1 mm.

Maxilliped (Fig. 3k): basis oval, endites with lobe or 'scale' distally, without setae. Palp composed of four articles. First article with long stout external seta. Second article with two simple and one serrate stout inner setae. Third article with three simple stout setae. Fourth article with four stout simple terminal setae.

Epignath: not recovered.

Cheliped (Fig. 4a): basis fused to cephalothorax, as long as wide. Merus triangular, with one ventral simple seta. Carpus with irregular ventral margin with two ventral simple setae at midlength and one dorsal distal seta. Propodus stout, twice as long as wide, fixed finger half as long as propodus; two ventral simple setae and three short simple dorsal setae near cutting edge. Cutting edge with a cutting plate composed of six weak teeth. Dactylus as long as fixed finger, naked.

Pereopod 1 (Fig. 4b): basis 3.5 times longer than wide, naked. Ischium short with one simple seta. Merus with one stout simple distal seta. Carpus shorter than propodus and longer than merus, with one stout simple distal seta. Propodus naked, as long as dactylus and unguis together, with one small stout distal seta. Dactylus smooth. Unguis sharp and slender about as long as dactylus.

Pereopod 2 (Fig. 4c): as pereopod 1 except carpus with three stout simple distal setae.

Pereopod 3 (Fig. 4d): as pereopod 2 except basis three times as long as broad, with plumose seta at midlength and propodus with three stout simple terminal setae.

Pereopod 4 (Fig. 4e): basis about 4.75 times longer than broad, naked. Ischium short, with one simple seta. Merus shorter than carpus, with two stout simple distal setae. Carpus shorter than propodus, with two stout simple distal setae. Propodus with three stout simple terminal setae. Dactylus smooth. Unguis short and sharp, about one third the length of dactylus.

Pereopod 5 (Fig. 4f): as pereopod 4 except merus with one stout simple distal seta.

Pereopod 6 (Fig. 4g): as pereopod 4 except merus with three stout simple distal setae. Carpus with four stout simple distal setae. Propodus with four simple stout terminal setae.

Pleopods (Fig. 3l): biramous, basal article pentameral, endopod as exopod, with six simple terminal setae.

Uropods (Fig. 3m): biramous, basal article as long as first article of endopod. Exopod uniarticled, about half length of first endopod article, with two long terminal setae. Endopod biarticled, first article with two long distal setae, second article with four long simple distal setae.

Ovigerous female: As for non-ovigerous female, except pereonites compressed dorsoventrally and oostegites are formed on pereonites 1 to 4. Marsupium with 13 eggs.

Neuter: Not known.

Male: Not known.

Type locality: Abyssal plains of the tropical East Pacific. DISCOL station 105/574, 7° 4.156´S 088° 27.786´W, 4179 m.

Etymology: The latin *fascinatus* (enchanted); refering to the Enchanted Island (Islas Encantadas) the former Spanish name of the Galapagos Islands, located to the north of the sampling area; a part of the 'Enchanted' Sea.

Remarks: *Portaratrum afer* and *P. fascinatus* differs in the form of the cheliped: in *P. fascinatus* the carpus is shorter and wider, the ventral setae are larger than in *P. afer*. The propodus of pereopods 1 to 3 is serrated in *P. afer* and smooth in *P. fascinatus*. The dactyli of pereopods 4 to 6 in *P. afer* have a ventral groove bordered by spinules; in *P. fascinatus* the dactyli of the pereopods 4 to 6 do not have a groove or spinules. The uropod exopod is about a third of the length of the first article of the endopod in *P. afer* and is about the half of the length in *P. fascinatus*.

Distribution: Known only from the abyssal plains of the tropical East Pacific Ocean.

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Veröffentlichung III

Agathotanaididae (Crustacea: Tanaidacea) from the Angola Basin

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Abstract

The family Agathotanaididae Lang, 1971 has a worldwide distribution, with only three species known from the Angola Basin: *Paranarthrura insignis* Hansen, 1913, *Paranarthrura intermedia* Kudinova-Pasternak, 1982 and *Paranarthura angolensis* Guerrero-Kommritz, Schmidt & Brandt, 2002. Furthermore, three additional species are reported from the region: one *Agathotanais*, one *Metagathotanais* and one *Paragathotanais*. Agathotanaididae is represented by four of its five genera in this area.

Key words: Tanaidacea, Agathotanaididae, *Agathotanais*, *Metagathotanais*, *Paragathotanais*, *Paranarthrura*, Angola Basin, deep-sea.

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Introduction

The family Agathotanaidae was erected in 1971 by Karl Lang to contain a distinct group of Tanaidacea previously placed in the family Anarthruridae Lang, 1971. In his revision of the tanaidomorphan families, Sieg (1986) reduced this family to a tribe Agathotanaini within the subfamily Anarthrurinae of the family Anarthruridae. Bird & Holdich (1988) revised the tribe Agathotanaini and found one new genus *Metagathotanais* and four new species for the North Atlantic Ocean (Table 2). Larsen & Wilson (2002), in their appraisal on tanaidomorphan phylogeny considered the Agathothanaini to be an apomorphic taxon and elevated it to family rank as the Agathotanaididae. The name Agathotanaidae as proposed by Lang (1971) was misspelled and was later corrected by Larsen & Wilson (2003) according to the ICZN rules.

In the north Atlantic Ocean, 13 species of the Agathotanaididae are currently known (Table 2). Four families and six species of Tanaidacea have been reported for the Angola Basin (Bamber 2000): *Sphyrapus malleolus* Norman & Stebbing, 1886 (Sphyrapidae), *Pseudotanais denticulatus* Bird & Holdich, 1989 (Pseudotanaidae), *Colletea pegmata* Bamber, 2000 (Colletteidae), and three Agathotanaididae, *Paranarthrura angolensis* Guerrero-Kommritz, Schmidt & Brandt, 2002, *Paranarthrura intermedia* Kudinova-Pasternak, 1982, and *Paranarthrura insignis* Hansen, 1913. The present paper reports three more species from the region.

Material and Methods

Material was collected from the Angola Basin, during cruise 42 of the RV *Atlantis II* in 1968, using an anchor dredge (AD) at depths between 631 and 979 m. Additional material was collected from the Angola Basin in July 2000 during the **DIVA**-1 expedition (**div**ersity of the deep **A**tlantic Ocean) aboard the RV *Meteor* (M48) using a modified epibenthic sledge (EBS) (Brandt & Barthel 1995), a box corer (BC) and a Multicorer (Muc) in depths between 5000 and 5450 m. This material yielded a high number of Tanaidacea. For station data see Table 1.

Terminology used for the descriptions follows that of Dojiri & Sieg (1997) and Guerrero-Kommritz et al. (2002). Overall length was measured from the tip of the cephalothorax to the tip of the pleotelson. All drawings were made using a MI 50 Leitz Dialux microscope with a camera lucida. The holotype and the type series are deposited in the Zoological Museum Hamburg (ZMH) and the Museum of Comparative Zoology (MCZ) Harvard University, Cambridge, Massachusetts, U.S.A.

Table 1 Station data

Ship cruise	Station	Gear	Position 1	Position 2	Date	Depth (m)
Atlantis II	193	AD	22°56´S 012°18´E		17.5.1968	2094-2191
Meteor	318	EBS	22°18.7´S 003°17.7´E	22°20.2´S 003°18.4´E	09.07.2000	5144
Meteor	325	Muc 1	19°58.1´S 002°59.8´E	-	14.07.2000	5450
Meteor	325	Muc 2	19°58.2´S 002°59.7´E	-	14.07.2000	5448
Meteor	330	BC	19°07.0´S 003°52.0´E		17.07.2000	5423
Meteor	331	Muc1	19°07.0´S 003°52,0´E		18.07.2000	5424
Meteor	336	BC	18°16.7´S 004°44.4´E	-	20.07.2000	5442
Meteor	340	EBS	18°17.3´S 004°41.2´E	18°19.4´S 004°41.9´E	23.07.2000	5394
Meteor	341	BC	18°17.3´S 004°41.2´E		23.07.2000	5394
Meteor	342	Muc1	17°08.0´S 004°42.0´E		24.07.2000	5447
Meteor	344	EBS	17°04.9´S 004°40.8´E	17°07.5´S 004°42.3É	25.07.2000	5415
Meteor	345	BC	16°17.0´S 005°27.0´E	-	26.07.2000	5347
Meteor	346	Muc1	16°17.0´S 005°27.0´E	-	27.07.2000	5388

Table 2. Agathotanaididae species reported for the Atlantic Ocean

Species	Location	Depth (m)
Agathotanais brevis Kudinova Pasternak 1990	Equatorial east	5218-5180
Agathotanais ingolfi Hansen , 1913	Northeast	200 - 2900
Agathotanais hanseni Lang, 1971	Northwest	2864-3761
Agathotanais sp AB 1	Equatorial east	2094-2191
Metagathotanais insulcatus Bird & Holdich, 1988	Northeast	4632-4829
Metagathotanais loerzae n. sp.	Equatorial east	5394-5442
Paragathotanais gracilis Bird *&* Holdich, 1988	Northeast	3338–3859
Paragathotanais nanus Bird *&* Holdich, 1988	Northeast	1160–2227
Paragathotanais robustus Bird & Holdich, 1988	Northeast	1398–2379
Paragathotanais insolitus n. sp.	Equatorial east	5347-5450
Paranarthrura angolensis Guerrero-Kommritz *et al.,* 2002	Equatorial east	631-5464
Paranarthrura borealis Bird & Holdich 1989	Northeast	903-1600
Paranarthrura crassa Bird & Holdich, 1989	Northeast	463-1739
Paranarthrura fortispina Sieg, 1986	Subantarctic	423-1729
Paranarthrura insignis Hansen, 1913	Northeast	582-5000
Paranarthrura intermedia Kudinova-Pasternak, 1982	Northeast	1170-4190
Paranarthrura kurchatova Kudinova-Pasternak, 1975	Tropical east	6340-6380
Paranarthrura lusitanus Bird & Holdich, 1989	Northeast	173-641
Paranarthrura meridionalis Sieg, 1986	Subantarctic	289-423
Paranarthrura subtilis Hansen, 1913	Northeast	582-1739
Paranarthrura tridens Bird & Holdich, 1989	Northeast	4426-4829

Systematics

Order Tanaidacea Dana, 1849

Suborder Tanaidomorpha Sieg, 1980

Family Agathotanaididae Lang, 1971

Genus *Paragathotanais* Bird & Holdich, 1988

Diagnosis: (modified after Lang 1971; Bird & Holdich 1989) Cuticle heavily calcified and pitted. Antennule with four articles. Antenna with four to six articles. Pleon narrower or as wide as pereon. Mandibles with acuminate or reduced pars molaris. Left mandible with spiniform lacina mobliis. Maxillule with eight to eleven terminal spines. Labium with or without small lateral spines. Maxilliped basis and endites together, oval or heart-shaped. Epignath without terminal spine. Pereopods 1–3 usually with one strong ventral seta on propodus. Pereopods 4 to 6 usually with two to four strong terminal setae on propodus. Uropod endopod and basal article not fused.

Type species: *Paragathotanais typicus* Lang, 1971, original designation.

***Paragathotanais insolitus* n. sp. (Figs. 1-2)**

Material: 3 specimens; Holotype ZMH K-40345, 1 non-ovigerous female, 1.52 mm, RV Meteor 48, DIVA-1, Station 325, 5450 m, Muc. Paratypes: ZMH K-40346, 1 non-ovigerous female, dissected, RV Meteor 48, DIVA-1, Station 325, 5448 m, Muc. ZMH K-40347, 1 non-ovigerous female (pleon missing). RV Meteor 48, DIVA-1 station 346, 5388 m, Muc.

Description : Non-ovigerous female. Body: (Fig. 1a, b) length 1.52 to 1.64 mm, long and slender, cylindrical. 7.5 times as long as broad. Cephalothorax: (Fig. 1c) 1.5 times as long as broad, longer than pleon. Pereon: (Fig. 1a, b) pereonite 1 as long as pereonite 6. Pereonites 2, 3, 4 and 5 of equal length. Pleon: (Fig. 1a, b) pleonite 1 narrower than pereon, pereonites 2 to 5 decreasing in width towards posterior. Pleotelson as wide as pleonite 1, triangular in shape, apex pointed.

Antennule: (Fig. 1d) composed of four articles. Article 1 longest, longer than the rest of the antennule, with two simple setae. Article 2 with one long, one short, and two thin distal setae. Article 3 as long as broad, with two distal setae. Article 4 with five terminal setae and one aesthetasc.

Antenna: (Fig. 1e) composed of four articles. Article 1 as long as broad, naked. Article 2 as long as broad, with one distal spine. Article 3 longest, with three dorsal combs of setae,

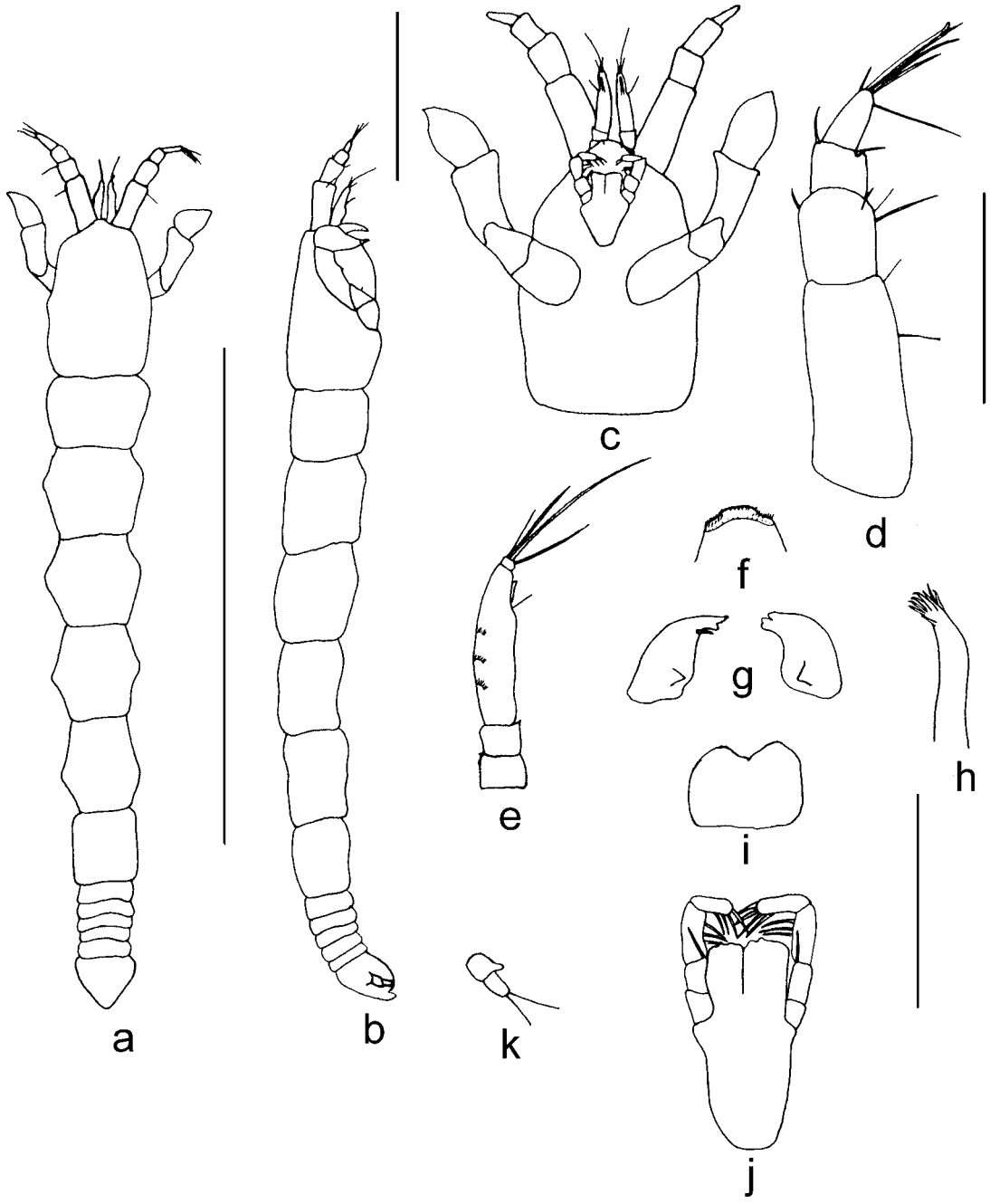

FIGURE 1. *Paragathotanais insolitus* n. sp. Holotype ZMH K-40345, a. body, dorsal view; b. body, lateral view; c. cephalothorax, ventral view. Paratype ZMH K-40346, d. antennule; e. antenna; f. labrum; g. mandibles; h. maxillule; i. labium; j. maxilliped; k. uropod. Scale bars: a., b. 1 mm; c. 0.2 mm; all others 0.1 mm.

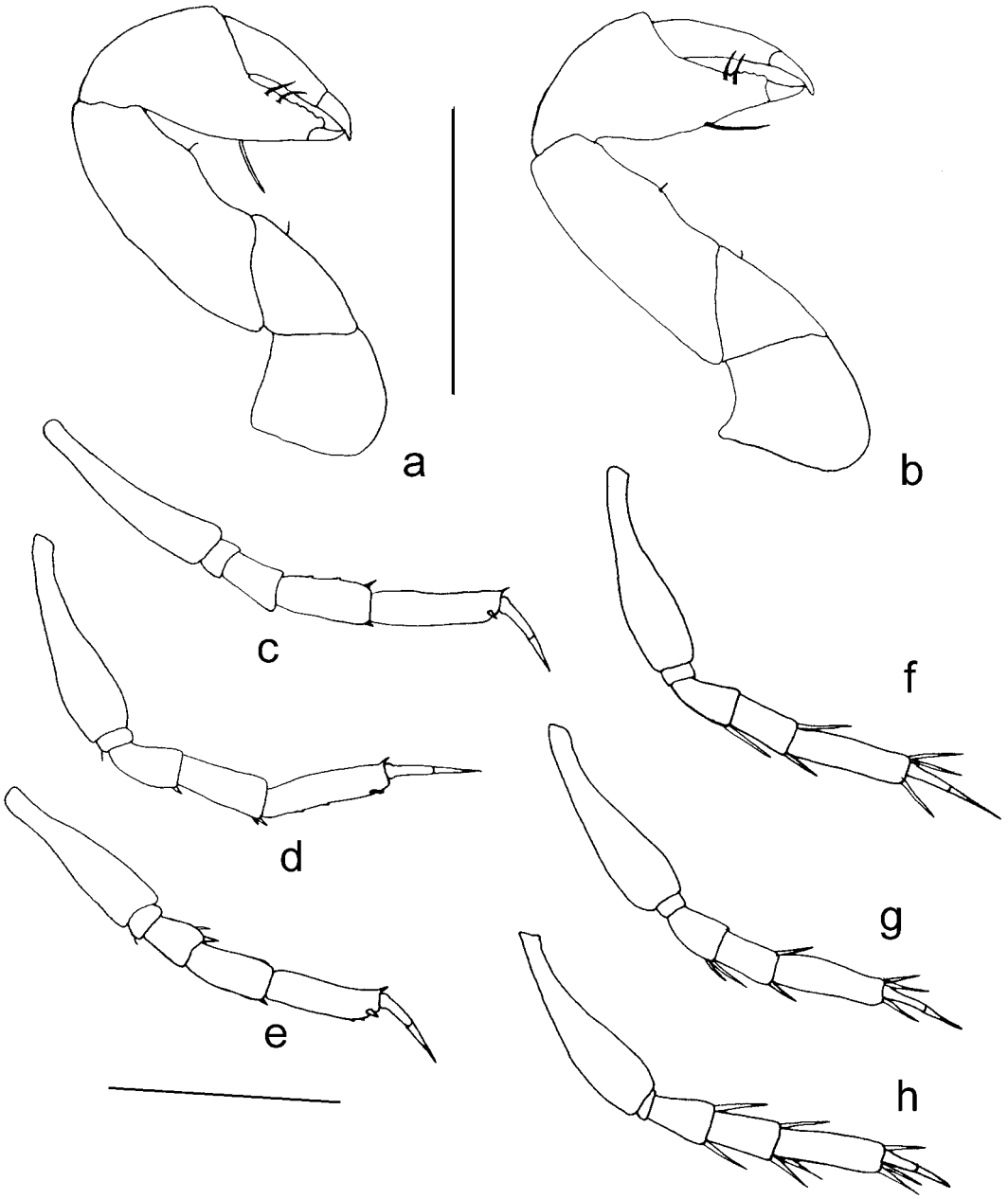

FIGURE 2. *Paragathotanais insolitus* n. sp. Paratype ZMH K-40346, a. left cheliped, internal face; b. right cheliped, external face; c. pereopod 1; d. pereopod 2; e. pereopod 3; f. pereopod 4; g. pereopod 5; h. pereopod 6. Scale bar 0.1 mm.

one simple ventral seta, and one aesthetasc. Article 4 very short with four terminal seta, one as long as the antenna.

Labrum: (Fig. 1f) hood-shaped with long lateral and short central setules.

Mandible: (Fig. 1g) well developed and well calcified, pars molaris reduced, left mandible with a spiniform lacinia mobilis.

Maxillule: (Fig. 1h) endite with one short and seven long terminal spines.

Maxilla: not recovered.

Labium: (Fig. 1i) composed of two fused lobes rounded distally, naked.

Maxilliped: (Fig. 1j) basis oval, endites naked with two distal tubercles. Palp composed of four articles. Article 1 as long as broad without setae. Article 2 with one strong distal seta. Article 3 with three stout inner setae. Article 4 with two terminal and two stout internal setae.

Epignath: not recovered.

Cheliped: (Fig. 2a, b) basis ventrally attached to cephalothorax, as long as wide, naked. Merus triangular with one short ventral seta. Carpus as long as chela with soft ventral protuberance, with seta. Propodus twice as long as broad with one ventral and two short dorsal setae near cutting edge. Cutting edge with four attenuated teeth. Dactylus curved, naked.

Pereopod 1: (Fig. 2c) basis four times longer than broad, without setae. Ischium short, naked. Merus of triangular shape, naked. Carpus with two dorsal spinules and two short terminal setae. Propodus long, with one terminal and one ventral spiniform setae. Dactylus about as long as unguis. Unguis slender, pointed.

Pereopod 2: (Fig. 2d) similar to pereopod 1 except ischium with seta, carpus smooth without spinules, merus with one short stout seta and propodus with two ventral spinules.

Pereopod 3: (Fig. 2e) similar to pereopod 2, exept merus with two short seta and carpus with only one short seta.

Pereopod 4: (Fig. 2f) basis four times as long as broad, naked. Ischium short, naked. Merus with one long, strong distal seta. Carpus as long as merus with two strong distal setae. Propodus as long as lengths of merus and carpus combined, with three strong terminal setae. Dactylus about as long as unguis. Unguis slender and sharp.

Pereopod 5: (Fig. 2g) similar to pereopod 4 except merus with two strong setae.

Pereopod 6: (Fig. 2h): as pereopod 5.

Pleopods: absent.

Uropods: (Fig. 1 k) uniramous. Basal article with one distal tubercle. Endopod as long as basal article with two terminal setae.

Ovigerous female: unknown.

Male: unknown.

Type locality: Angola Basin, RV Meteor 48, DIVA, Station 325, 19°58.1´S 002°59.8´E, 5450 m.

Etymology: The epithet, *insolitus* (Latin) for 'uncommon' or 'strange'; alludes to these animals having only four antennal segments and a reduced pars molaris, both uncommon character states for the genus.

*Remarks***:** Paragathotanais insolitus can be readily distinguished from all other *Paragathotanais* species by having only four antennal articles. This species also shows similarities to *Agathotanais* in the reduction of the pars molaris.

Genus *Metagathotanais* Bird and Holdich, 1988

Diagnosis: (modified after Bird and Holdich, 1988) cephalothorax shorter than pereonites 1 and 2 together. Pleonites and pleotelson apparently fused in female, with normal segmentation in preparatory and adult males. Antennule composed of four articles. Antenna composed of six articles, articles 2 and 3 each with one short superior seta. Pars molaris reduced. Lacinia mobilis of left mandible small and spiniform or reduced. Maxillule endite with eight or nine terminal spines. Maxilliped basis and endites together oval or heart-shaped. Epignath without terminal spine. Pereopods relatively small in relation to body size. Pereopod 1 to 3 usually with one short spine and a short seta on propodus. Ischium of pereopods 4 to 6 usually with seta. Uropod basis and endopod fused and without exopod.

Type species: *Metagathotanais insulcatus* Bird and Holdich, 1988.

***Metagathotanais loerzae* n. sp. (Figs. 3-4)**

Material: 10 specimens, Holotype ZMH K-40348, one female, 3.44 mm, RV Meteor 48, DIVA-1, station 340, 5394 m, EBS. Paratypes: ZMH K-40349, three females, 2.52, 2.48 and 1.99 mm, RV Meteor 48, DIVA-1, station 340, 5394 m, EBS. ZMH K-40350, three females, 3.19, 3.05 and 2.40 mm, RV Meteor 48, DIVA-1, station 344, 5415 m, EBS, ZMH K-40351, two females, 3.06 and 2.42 mm, RV Meteor 48, DIVA-1, station 345, 5347 m, BC, ZMH K-40352, one female, 3.31 mm, RV Meteor 48, DIVA-1, station 336, 5442 m, BC.

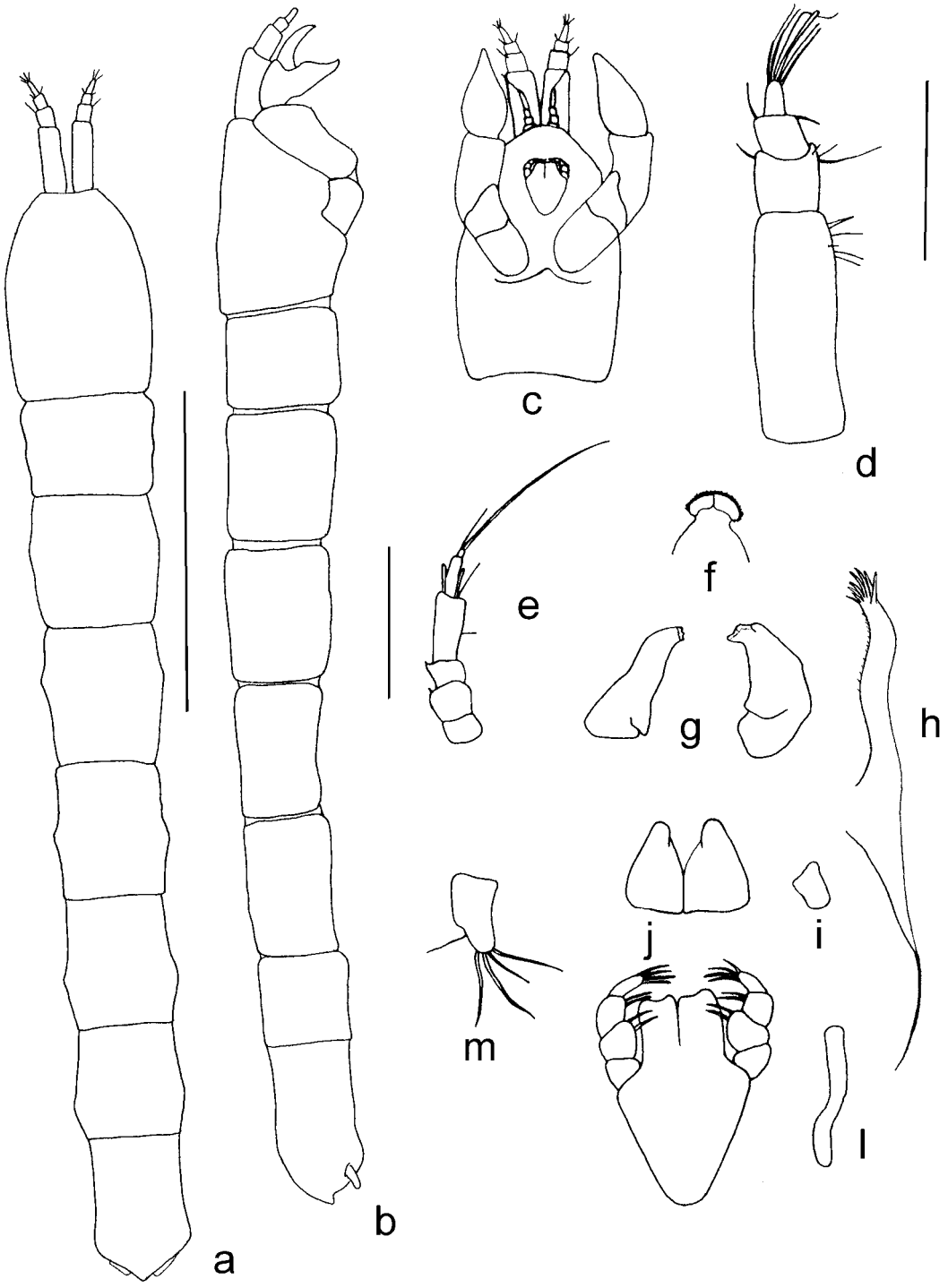

FIGURE 3. *Metagathotanais loerzae* n. sp. Holotype ZMH K-40348, a. body, dorsal view; b. body, lateral view; c. cephalothorax, ventral view. Paratype ZMH K-40350, d. antennule; e. antenna; f. labrum; g. mandibles; h. maxilulle; i. maxilla; j. labium; k. maxilliped; l. epignath; m. uropod. Scale bars: a., b., c. 1 mm, all others 0.2 mm.

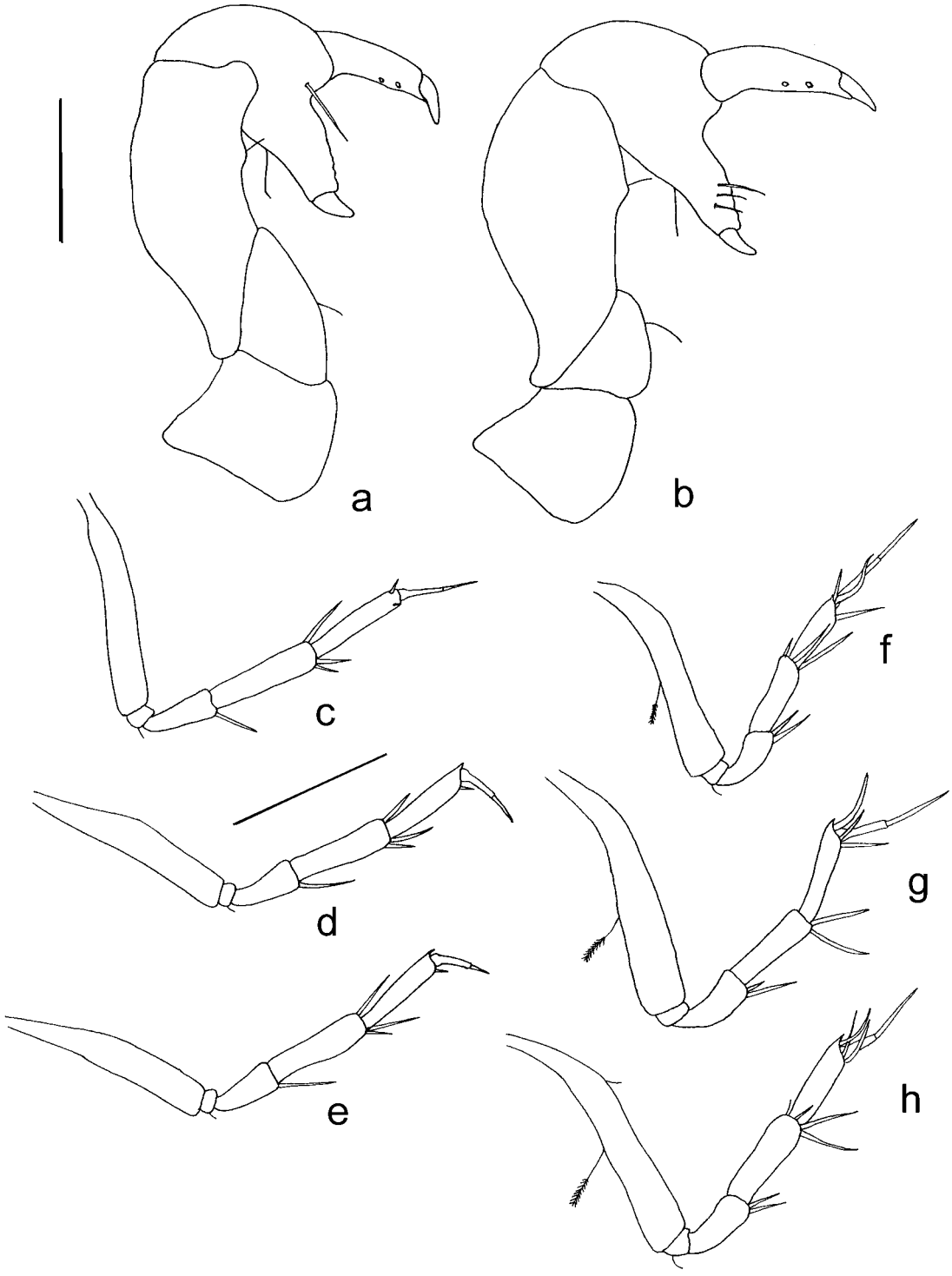

FIGURE 4. *Metagathotanais loerzae* n. sp. Paratype ZMH K-40350, a. left cheliped, internal face; b. right cheliped, external face; c. pereopod 1; d. pereopod 2; e. pereopod 3; f. pereopod 4; g. pereopod 5; h. pereopod 6. Scale bar 0.2 mm.

Description: Non-ovigerous female. Body: (Fig. 3a, b) 1.99 to 3.44 mm in length, long and slender, about eight times longer than wide, cylindrical. Cephalothorax: (Fig. 3c) longer than pleon, shorter than pereonites 1 and 2 together, ventrally with shallow transverse groove posterior of cheliped insertion. Pereon: (Fig. 3a, b) pereonite 1 shortest. Pereonites 2, 4 and 5 of equal length. Pereonite 3 longest. Pereonite 6 longer than first and shorter than second. Pleon: (Fig. 3a, b) pleonites and pleotelson indistinct, apparently fused.

Antennule: (Fig. 3d) composed of four articles. Article 1 longer than rest of antennule, with four long ventral setae and one setule near distal margin. Article 2 with one long and three short distal setae. Article 3 with two terminal setae. Article 4 with five simple terminal setae and one aesthetasc.

Antenna: (Fig. 3e) composed of six articles. Article 1 wider than long, naked. Article 2 as long as wide with one small terminal spine. Article 3 as long as wide with one distal spine. Article 4 with one ventral seta, one terminal and two ventral aesthetascs. Article 5 without setae. Article 6 very short with two terminal setae, one as long as rest of antenna.

Labrum: (Fig. 3f) hood-shaped, with distal setules.

Mandible: (Fig. 3g): well calcified. Lacinia mobilis reduced, pars molaris reduced to only blunt lobes.

Maxillule: (Fig. 3h) palp with one long terminal filament. Endite covered with ventral setules. Eight terminal spines.

Maxilla: (Fig. 3i) rectangular, naked.

Labium: (Fig. 3j) composed of two triangular lobes with one distal tubercle. Naked.

Maxilliped: (Fig. 3k) basis heart-shaped, endites naked. Palps composed of four articles. Article 1 naked. Article 2 with two inner strong setae. Article 3 with two inner strong setae. Article 4 with four strong terminal setae.

Epignath: (Fig. 3l) ribbon-like without spines or setae.

Cheliped: (Fig. 4a, b) basis wider than long, naked. Merus triangular with one ventral seta. Carpus slender, 2.5 times as long as broad with a smooth ventral tubercle at midlength, with one seta. Propodus twice as long as broad, one ventral seta, three short dorsal setae near cutting edge. One long seta near insertion of dactylus on the inner margin. Cutting edge undulated not forming teeth. Dactylus as long as fixed finger with two short blunt setae at midlength. Unguis not terminal, mounted dorsally on the dactylus.

Pereopod 1: (Fig. 4c) basis six times longer than broad. Ischium short with one ventral seta. Merus with one strong ventral seta. Carpus longer than merus and as long as propodus,

with three strong terminal setae. Propodus with two short distal setae. Dactylus about as long as unguis. Unguis slender and pointed.

Pereopod 2: (Fig. 4d) as pereopod 1 except propodus with short terminal spine and only one seta.

Pereopod 3: (Fig. 4e) as pereopod 2.

Pereopod 4: (Fig. 4f) basis 5.5 times as long as broad, with one plumose seta at midlength. Ischium short with one seta. Merus with two strong distal setae. Carpus as long as propodus with three strong distal setae. Propodus with one small terminal spine and two strong straight and one curved setae. Dactylus about as long as unguis. Unguis slender and sharp.

Pereopod 5: (Fig. 4g) as pereopod 4 except ischium without seta, carpus with two strong distal setae.

Pereopod 6: (Fig. 4h) as pereopod 4 except, carpus with one thin dorsal terminal seta, propodus with two curved and one straight strong terminal seta.

Pleopods: absent.

Uropods: (Fig. 3m) uropod basis and endopod fused without exopod. Four terminal and one lateral simple setae.

Ovigerous female: unknown.

Male: unknown.

Type locality: Angola Basin, RV Meteor 48, DIVA-1, Station 340, 18°17.3´S 004°41.2´E - 18°19.4´S 004°41.9´E, 5394 m.

Etymology: named after Anne-Nina Lörz, a colleague and friend.

Remarks: This species resembles *M. insulcatus*. The most distinct differences are in the mouthparts. In *M. loerzae,* the labrum is hood-like, and in *M. insulcatus* is rounded. The labium lobes are triangular and naked in *M. loerzae*, while in *M. insulcatus* the distal ends are wide and setose. The ischium of pereopod 1 to 3 have one seta and pereopods 4 to 6 have a setulose seta on the basis in *M. loerzae. M. insulcatus* does not have these setae. The merus of pereopods 1 to 6 of *M. loerzae* are longer that of *M. insulcatus*. *Metagathotanais* is only found at depths greater than 4500 m.

Genus *Agathotanais* Hansen, 1913

***Agathotanais* sp AB 1 (Fig. 5)**

Material: MCZ 16766, one non-ovigerous female, 3.25 mm, Atlantis II cruise 42 Station 193 Walfis Bay, 2094 – 2191 m, AD.

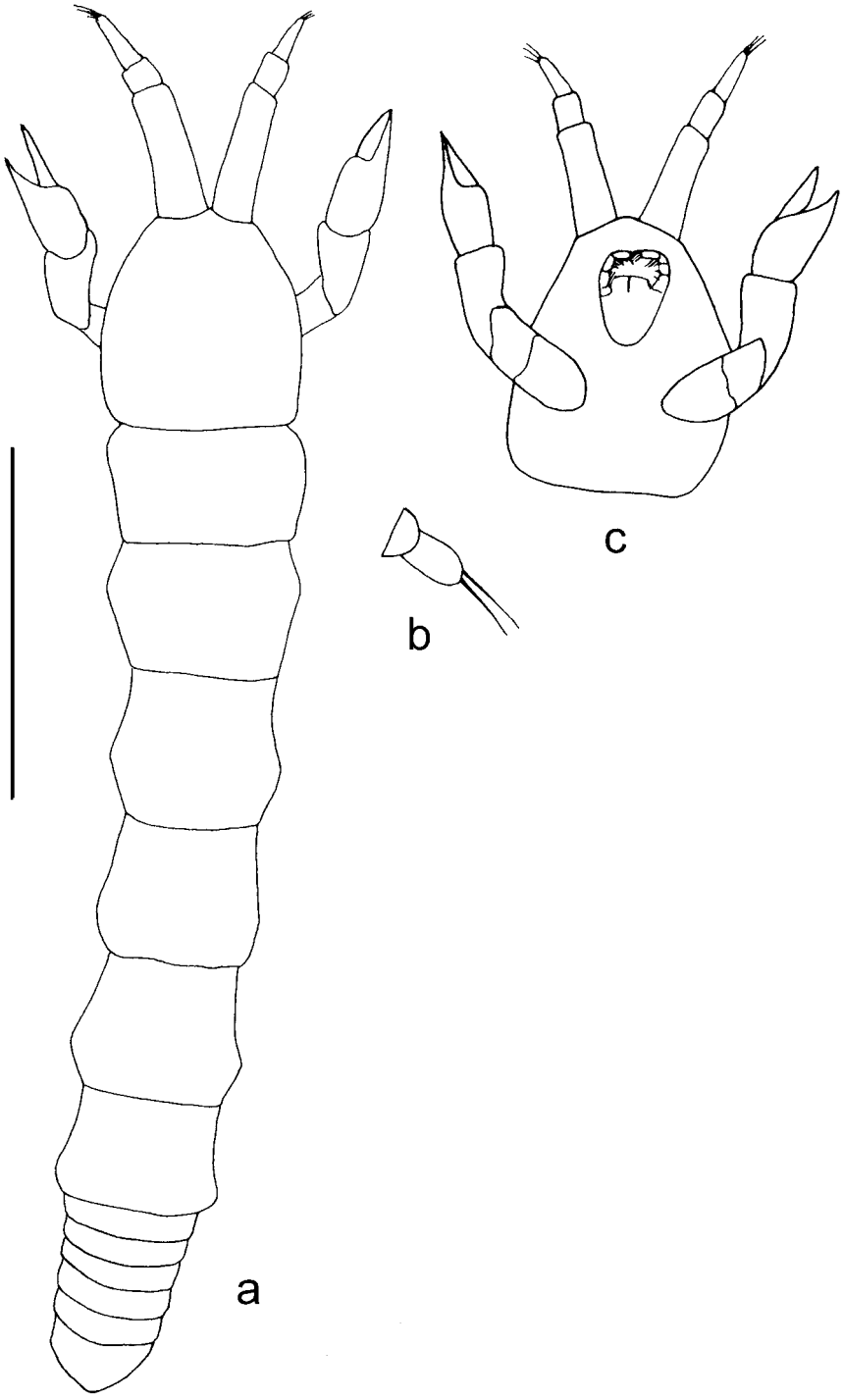

FIGURE 5. *Agathotanais* sp AB 1. MCZ 16766, a. body, dorsal view; b. uropod; c. cephalothorax, ventral view. Scale bar 1 mm

Description: Non-ovigerous female. Body: (Fig. 5a) 3.25 mm in length, cylindrical and slender, six times as long as broad. Cephalothorax: (Fig. 5c) longer than pleon. Pereon: (Fig. 5a) pereonite 1 as long as 6. Pereonite 2 longer than Pereonite 4 and shorter than Pereonite 3. Pereonite 3 longest pereonite. Pereonite 4 as long as 5 and longer than 6. Pleon: (Fig. 5a) cylindrical. Pleonites of subequal length narrowing towards the pleotelson. Pleotelson as long as two pleonites together and as wide as last pleonite. Apex pointed.

Antennule: Composed of three articles. Article 1 longest, longer than the following articles together, naked. Article 2 as long as broad, naked. Article 3 with three terminal simple setae.

Antenna: absent.

Pleopods: absent.

Uropods: (Fig. 5b) uniramous and uniarticled with two long simple terminal setae.

Remarks: Only one specimen was available for this study, therefore it was not possible to present a more detailed description of this species. Due to the absence of the antenna and form of the antennula, this species resembles *Agathotanais ahyongi* Larsen, 1999. *Agathotanais ahyongi* is more slender and the proportions of the cephalothorax are different. It is unlikely that *A. ahyongi*, known only from the tropical Pacific would be found to also occur in the Angola Basin.

Genus Paranarthrura Hansen, 1913

***Paranarthrura angolensis* Guerrero-Kommritz, Schmidt & Brandt, 2002**

Material: 33 specimens ZMH K-40493, three neuters, 1.12 – 1.13 mm, RV Meteor 48, DIVA1, station 330, 5423 m, BC; ZMH K-40494, one female, 2.55 mm, RV Meteor 48, DIVA-1, station 341, 5394 m, BC; ZMH K-40495, one neuter, 1.26 mm, RV Meteor 48, station 325, 5450 m, Muc; ZMH K-40496 , one neuter, 1.24 mm, RV Meteor 48, station 325, 5448 m, Muc; ZMH K-40497, one neuter, 1.17 mm, RV Meteor 48, DIVA-1, station 331, 5424 m, Muc; ZMH K-40498, one female, 1.88 mm, RV Meteor 48, DIVA-1, station 342, 5447 m, Muc; ZMH K-40499, one neuter, 0.88 mm, RV Meteor 48, DIVA-1, station 346, 5388, Muc; ZMH K-40500, one female, 1.71 mm, RV Meteor 48, DIVA-1, station 346, 5388 m, Muc; ZMH K-40501, two females, 2.21 – 2.92 mm, three males, 1.90, 1.31, 2.55 mm, one neuter, 1.61 mm, RV meteor 48, DIVA-1, station 340, 5394 m, EBS; ZMH K-40502, three males, 1.21, 1.53 mm, three neuter, 1.18, 1.21 mm, RV Meteor 48, station 345, 5347 m, BC; ZMH K-40503, one female, 1.69 mm, three neuters, 1.28, 1.33, 1.42 mm, RV Meteor 48, station 341, 5394 m, BC; ZMH K-40504, three females, 1.33, 1.60, 1.98 mm, one nueter, 0.97

mm, RV Meteor 48, station 336, 5442 m, BC, ZMH K-40505, one male, 1.96 mm, one neuter, 1.38 mm, RV Meteor 48, station 318, 5144 m, EBS, ZMH K-40506, one female, 2.38 mm, RV Meteor 48, station 344, 5415 m, EBS; ZMH K-40516, two neuters, 1.00, 1.50 mm, RV Meteor 48, station 345, 5347 m, BC.

Remarks: *Paranarthrura insignis* and *P. angolensis* are very similar in their general appearances. The shape of the chela in *P. insignis* is very characteristic and differs from that of *P. angolensis* in that the finger is more curved and the propodus is wider than in *P. angolensis*. Both species have a very wide bathymetric distribution with range of around 4000 m (Bird and Holdich 1989; Guerrero-Kommritz, Schmidt & Brandt 2002).

Discussion

The Agathotanaididae in the Angola Basin comprises six species belonging to four genera. This taxon represents 19 % of the Tanaidacea individuals found during the DIVA-1 expedition.

Paranarthrura is the most abundant North Atlantic genus with seven species, followed by *Paragathotanais* with three species, *Agathotanais* with two species, and *Metagathotanais* with only one species (Bird and Holdich, 1988). In the Angola Basin, *Paranarthrura* is also the most abundant and species rich genus; *Agathotanais*, *Paragathotanais,* and *Metagathotanais* are only represented by one species each. *Paranarthrura* and *Metagathotanais* are the most abundant genera in the Angola Basin comprising 12 % of all tanaids individuals from the DIVA-1 expedition.

Table 3. Species of Agathotanaididae from the Angola Basin

Species	Depth (m)
Agathotanais sp AB 1	2094–2191
Metagathotanais loerzae n. sp.	5394-5442
Paragathotanais insolitus n. sp.	5347-5450
Paranarthrura angolensis Guerrero-Kommritz *et al.*, 2002	631-5464
Paranarthrura insignis Hansen, 1913	1038-1300
Paranarthrura intermedia Kudinova-Pasternak, 1982	1300

Of the Angolan tanaidaceans *Paranarthrura insignis* is the species with the widest known distribution (Bird and Holdich 1989). All other species of Agathotanaididae reported have a local distribution.

The absence of *Paranarthura insignis* and *P. intermedia* in the present study cannot be explained. It is possible that these species were simply not sampled, very scarce, or that they are only present in depths around 1300 m in the study area.

Acknowledgments

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Veröffentlichung IV

Review of the genus *Chauliopleona* Dojiri and Sieg 1997 (Crustacea, Peracarida, Tanaidacea) and description of three new species.

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Abstract

The tanaidacean genus *Chauliopleona* Dojiri and Sieg, 1997 is reviewed. A generic diagnosis is given and the type species *Chauliopleona dentata* Dojiri and Sieg, 1997 is redescribed. Three species, *Leptognathia armata* Hansen, 1913, *L. amdrupii* Hansen, 1913, and *L. hastata* Hansen, 1913 are placed into this genus. Three new species, one from the Angola Basin, one from the deep sea of the tropical east Pacific, and one from Antarctica are described. A key for the genus is provided.

Keywords: Tanaidacea**,** *Chauliopleona*, taxonomy, new species

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Introduction

The tanaidacean genus *Chauliopleona* was erected in 1997 by Dojiri and Sieg to accomodate the species *Chauliopleona dentata* Dojiri and Sieg, 1997. A formal description of the genus was not given because the systematic position of this genus to other similar taxa was not clear (Dojiri and Sieg 1997). The species *C. dentata* was described partially and many useful features were missing from the account.

The most outstanding character of this genus is the posteriorly directed ventral spiniform process on pleonite 5. This character is also present in the species complex of *Leptognathia armata* Hansen, 1913*, L. hastata* Hansen, 1913 and *L. amdrupii* Hansen, 1913 of the North Atlantic Ocean. Another species was described by Vanhöffen (1914) from Antarctic waters as *Leptognathia sp.* The relationship of these species to each other and to the genus *Chauliopleona* had not previously been analyzed.

The species of the complex *L. armata*, *L. hastata* and *L. amdrupii* are very similar, and Hansen (1913) stated that the differences between them were minimal, the most important features to separate the species being the form of the carpus of the cheliped and the geographical distribution of the species. Kudinova-Pasternak (1965) stated that there are no differences between *L. armata* and *L. hastata* and synonymized the two.

According to the literature the distribution of *L. armata* is very wide. It has been reported from Greenland and the North Atlantic Ocean (Hansen 1913), from the South Atlantic Ocean (Kudinova-Pasternak 1975), from Antarctica (Kudinova-Pasternak 1986) from the Pacific Ocean (Kudinova-Pasternak 1965, 1970, 1973, Menzies and Mohr 1962) and for the Beagle Channel (Schmidt 1999). The discovery of tanaids with a pleonal spur from the deep Angola Basin, from the deep sea of the east Pacific Ocean, and from Antarctica has led to their comparison with other known tanaids with this feature. The results are given in the present work.

Material and Methods

The material examined came from different expeditions; station data are given in Table 1. The dissections were made in glycerine under a Großfeld dissecting microscope TS from Leitz. All drawings were made using a Leitz Dialux microscope with camera lucida.

The holotype and the type series of the new species are deposited in the Zoological Museum Hamburg (ZMH). The types of *L.armata*, *L. hastata,* and *L. amdrupii* are deposited in the Zoological Museum Copenhagen (ZMC) and the paratype of *C. dentata* is deposited at the moment in the reference collection of Jürgen Sieg in the Naturkundemuseum Berlin and will be sent to the Santa Barbara Museum of Natural History (SBMNH).

The terminology used in this work follows Larsen (2003). The classification follows Gutu and Sieg (1999); the more recent classification of Larsen and Wilson (2002) considered the genus *Chauliopleona* as *incertae sedis* because of its incomplete description.
Length is measured from the tip of the cephalothorax to the tip of the pleotelson.
Abbreviations used: epibenthic sledge (EBS), box corer (BC).

No males were found in the examined material. All descriptions are of non-ovigerous females.

Table 1. Station list

Expedition	Date	Ship	Station	Longitude	Latitude	Depth (m)	Gear
ARK XI/2	30.9.1995	RV Polarstern	37-016	78° 58.25´N	07° 39.42´W	188	EBS
				78° 58.33´N	07° 40.05´W	191	
ANT XV	04.02.1998	RV Polarstern	48-089	73° 27.5´S	22° 43.10´W	1583	EBS
				73° 27.90´S	22° 47.8´W	1573	
ANT XV	26.02.1998	RV Polarstern	48-272	71° 27.5´S	15° 06.5´W	2007	EBS
				71° 30.40´S	15° 13.30´W	2061	
Joint Magellan,	21.11.1994	RV Victor Hensen	1270	54° 55.17´S	70° 45.15´W	135	EBS
				54° 55.23´S	70° 44.81´W		
Joint Magellan	21.11.1994	RV Victor Hensen	1279	54° 46.48´S	71° 08.48´W	580	EBS
Diva	25.07.2000	RV Meteor	345	16° 17.0´S	05° 27.0´E	5390	BC
Diva	28.07.2000	RV Meteor	348	16° 18.1´S	05° 27.2´E	5390	EBS
				16° 19.3´S	05° 27.2´E	5387	
Discol	10.01.1996	RV Sonne	515	7° 7.48´S	88° 27.00´W	4169	BC 1495
Discol	11.01.1996	RV Sonne	517	7° 7.49´S	88° 26.98´W	4172	BC 1496
Discol	12.01.1996	RV Sonne	527	7° 4.35´S	88° 27.63´W	4150	BC 1499
Discol	13.01.1996	RV Sonne	529	7° 4.37´S	88° 27.58´W	4166	BC 1501
Discol	14.01.1996	RV Sonne	534	7° 7.49´S	88° 27.00´W	4170	BC 1504
Discol	16.01.1996	RV Sonne	537	7° 4.33´S	88° 27.91´W	4154	BC 1506
Discol	16.01.1996	RV Sonne	539	7° 4.37´S	88° 27.76´W	4160	BC 1508
Discol	16.01.1996	RV Sonne	540	7° 4.38´S	88° 27.66´W	4162	BC 1509
Discol	17.01.1996	RV Sonne	544	7° 4.20´S	88° 27.90´W	4168	BC 1513
Discol	20.01.1996	RV Sonne	555	7° 4.20´S	88° 27.94´W	4166	BC 1515
Discol	20.01.1996	RV Sonne	556	7° 4.27´S	88° 27.94´W	4140	BC 1516
Discol	20.01.1996	RV Sonne	559	7° 7.50´S	88° 27.01´W	4171	BC 1519
Discol	22.01.1996	RV Sonne	565	7° 4.24´S	88° 27.92´W	4155	BC 1523
Discol	24.01.1996	RV Sonne	574	7° 4.16´S	88° 27.79´W	4179	BC 1524
Discol	26.01.1996	RV Sonne	579	7° 4.10´S	88° 27.07´W	4147	BC 1527
Discol	13.02. 1996	RV Sonne	585	5° 30.06´S	85° 22.36´W	4080	BC 1529
Discol	19.02. 1996	RV Sonne	597	5° 6.48´S	90° 14.86´W	3939	BC 1537

Systematics

Suborder Tanaidomorpha Sieg, 1980
Family Anarthruridae Lang, 1971
Subfamily Akanthophoreinae Sieg, 1986
Genus *Chauliopleona* Dojiri and Sieg, 1997

Diagnosis: pleonite 5 with prominent, posteriorly directed, ventral apophysis. Cheliped insertion via sclerite.

Description. Body cylindrical, long and slender, about seven times as long as broad. Cephalothorax oval or triangular. Eyes and eyelobes absent. Pereon composed of six free pereonites, pereonite 2 longest. Pleon composed of five free pleonites and a pleotelson. Pleonite 5 with a backward-directed ventral apophysis. Antennule composed of four articles. Antenna composed of six articles. Labrum hoodlike with marginal setules. Mandible well calcified, molar process not pointed, turned down ward, bearing about ten pointed spinules. Maxilla rectangular. Maxillule endite with seven or eight terminal spines. Maxilliped basis fused, endites not fused. Cheliped attached laterally by a sidepiece, carpus common with a carpal shield. Pereopods 1 to 3 with coxa, pereopods 4 to 6 lacking coxa. Pereopod 1, merus with one spiniform seta and a row of ventral spines or spinules on propodus. Dactylus of pereopods 4 to 6 with a ventral groove bordered by spinules, unguis short and pointed. Pleopods biramous. Uropods biramous, exopod shorter than endopod, both composed of two articles each.

Type species: *Chauliopleona dentata* Dojiri and Sieg, 1997, original designation.

Number of known species: seven.
Chauliopleona amdrupii (Hansen, 1913)
Chauliopleona amftae n. sp.
Chauliopleona armata (Hansen, 1913)
Chauliopleona dentata Dojiri and Sieg, 1997
Chauliopleona hastata (Hansen, 1913)
Chauliopleona nickeli n. sp.
Chauliopleona paradoxa n. sp.

Remarks. *Chauliopleona* is very easy to distinguish from other genera because of its posteriorly directed ventral apophysis on pleonite 5. The genus *Portaratrum* Guerrero-Kommritz, 2003 and the species *Leptognathia tuberculata* Hansen, 1913 do posses a ventral spiniform process on pleonite 5, but this is directed downwards and is not as long as in thespecies of *Chauliopleona*. The insertion of the cheliped in *L. tuberculata* is a typical *Leptognathia* insertion and that of *Portaratrum* resembles that of *Metagathotanais* Bird and Holdich, 1988. The genus *Scoloura* Sieg and Dojiri, 1991 has a posteriorly directed lateral spiniform process on each side of the pleotelson.

Akanthophoreus Sieg, 1986 is a very similar genus in many characters but has no ventral posteriorly-directed spiniform process on any pleonite or pleotelson.

Chauliopleona dentata Dojiri and Sieg, 1997
(figures 1-2)

Leptognathia armata Schmidt, 1999:40.

Material examined: paratype, SBMNH 144123, non-ovigerous female, 2.0 mm, station 4C, 33° 50´40´´N 118° 26´22´´W, 76 m, Santa Monica Bay, California, 8 January 1987. Other material: ZMH K-40226, one non-ovigerous female, 3.17 mm, RV Victor Hensen, station 1270, 54°55´S 70°45´W, 135 m, 21 November 1994; ZMH K-40227, one non-ovigerous female, 2.53 mm, RV Victor Hensen, station 1279, 54° 46´S 71° 08´W, 580 m, 21 November 1994.

Diagnosis. Cheliped dactylus with dorsal crenulation, carpal shield poorly developed. Basal article of Uropod with three distal setae.

Redescription. Body (figures 1 a - c): long, about seven times as long as broad, cylindrical, 2 – 4 mm in length. Cuticle strong. Cephalothorax about 1.3 times as long as broad, with nearly parallel lateral margins, and abruptly tapering anteriorly. Ventral groove around cheliped insertion. Pereonites 1 to 4 of similar width, pereonite 5 narrowest, pereonite 6 shortest. Pleon longer than cephalothorax, pleonites subequal, wider than long. Pleotelson pentagonal, apex rounded.

Antennule (figure 1 d): article 1 longest with one simple and three feathered setae. Article 2 with one long and two simple setae. Article 3 shortest with one simple and two feathered setae. Article 4 with six terminal simple setae.

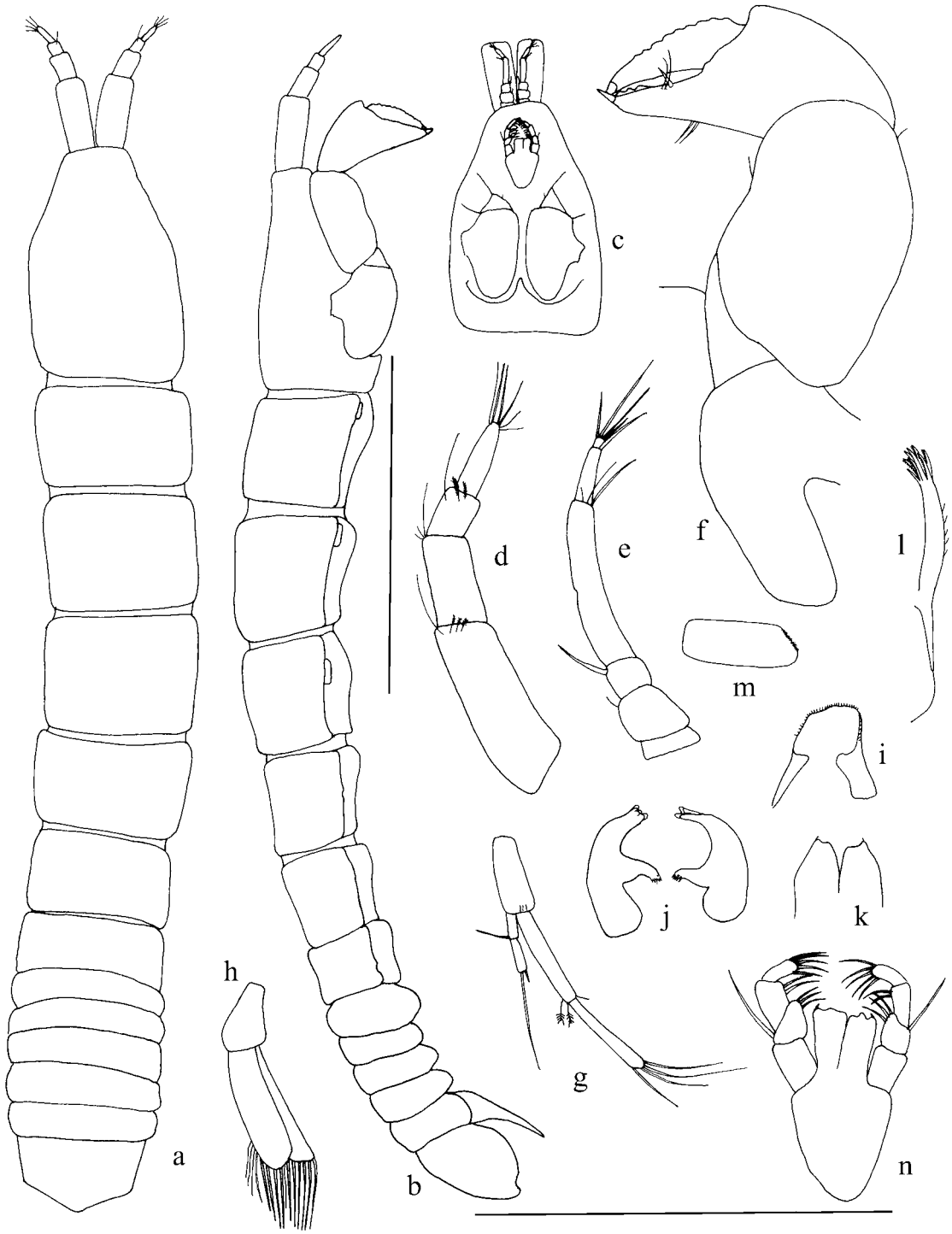

Fig 1. *Chauliopleona dentata* ZMH K-40226 a. Dorsal view b. lateral view. c. Ventral view of cephalothorax. (Scale bar 1 mm) d. antennule. e. antenna. f. cheliped. g. uropod. h. pleopod. i. labrum. j. mandibles. k. labium. l. maxillule. m. maxilla. n. maxilliped. (Scale bar 0.5 mm).

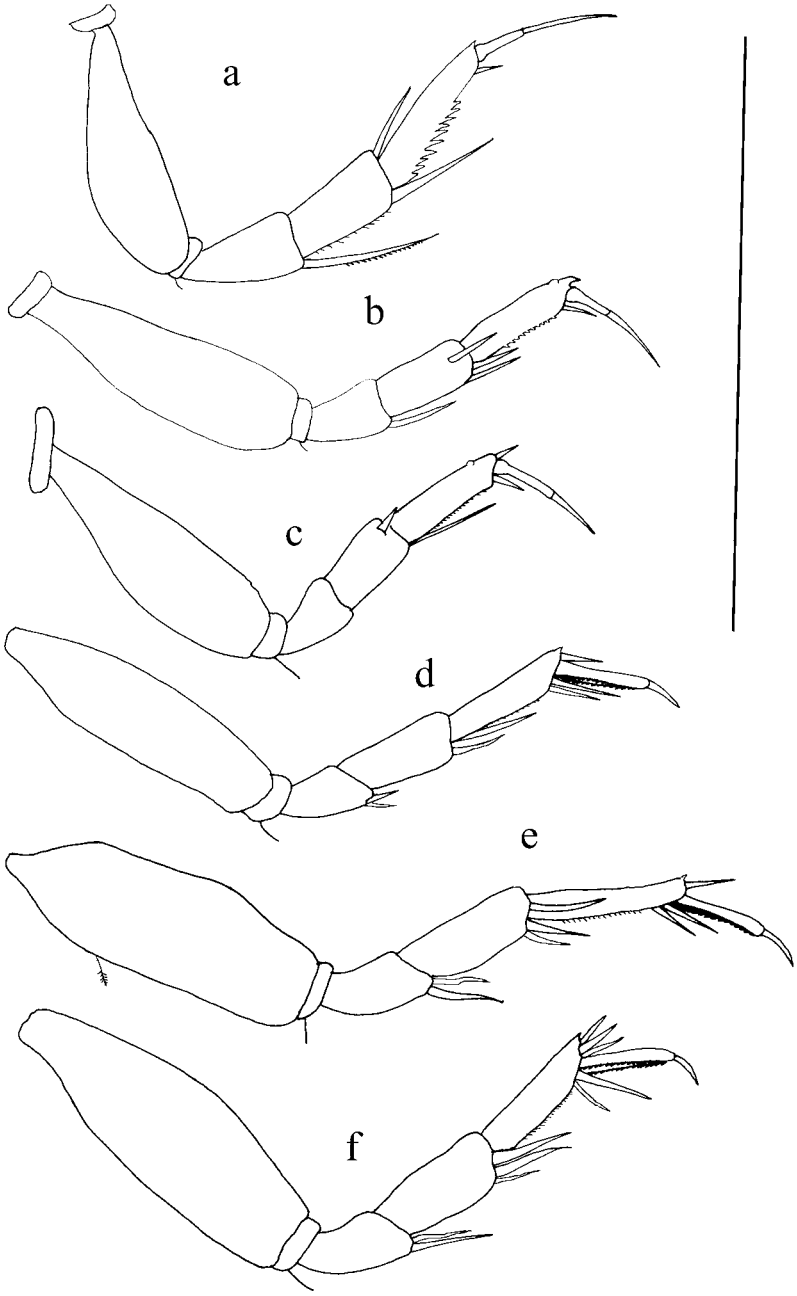

Fig 2. *Chauliopleona dentata* ZMH K-40226 a. pereopod 1. b. pereopod . c. pereopod 3. d. pereopod 4. e. pereopod 5. f. pereopod 6. (Scale bar 0.5 mm).

Antenna (figure 1 e): article 1 very short. Article 2 as long as broad with one simple thin seta. Article 3 short with one simple seta. Article 4 longest with one short and two long setae as long as article 5. Article 5 with one long terminal seta. Article 6 with four terminal simple setae.

Labrum (figure 1 i): hoodlike with fine marginal setules.

Mandible (figure 1 j): well calcified and sclerotized on incisive margins, molar process developed, slender, bearing about ten distal spinules.

Maxillule (figure 1 l): endite naked with two large setulated, five large simple and one small terminal spines. Palp with one long terminal seta.

Maxilla (figure 1 m): rectangular, with one row of setules distally.

Labium (figure 1 k): composed of two triangular lobes, with one small terminal seta.

Maxilliped (figure 1 n): endites with a blunt spine and a simple seta. Palp article 1 naked. Article 2 with one long outer and three curved inner setae. Article 3 with two inner setae. Article 4 with two long and two short inner setae and one short outer seta.

Epignath (not drawn): falciform.

Cheliped (figure 1 f, 15g): basis shorter than carpus, divided unequally by sclerite. Merus with one simple ventral seta. Carpus about 1.7 times as long as broad, with one simple ventral and one small dorsal seta. Carpal shield developed. Propodus with two ventral setae. Fixed finger with three small teeth, cutting edge with one short and two long setae near articulation of finger. Dactylus with crenulations along dorsal margin.

Pereopod 1 (figure 2 a): coxa with seta. Basis longer than three following articles together. Ischium with one small simple seta. Merus bearing one pinnate spiniform seta. Carpus with one row of ventral spinules and two spiniform setae. Propodus with one ventral row of spinules and curved rows of minute setules, one short dorsal spine and one short spiniform seta. Dactylus short, about half unguis length. Unguis pointed.

Pereopod 2 (figure 2 b): coxa with seta. Basis longer than three succeeding articles together. Ischium with one small simple seta. Merus with one spiniform seta. Carpus with three spiniform setae. Propodus with one ventral row of spinules and one short spiniform terminal seta. Dactylus and unguis as in pereopod 1.

Pereopod 3 (figure 2 c): as pereopod 2 except merus naked, carpus with two spiniform setae, one long one short; propodus with two short spiniform terminal setae.

Pereopod 4 (figure 2 d): basis longer than three succeeding articles together. Ischium with simple seta. Merus with two short strong simple setae. Carpus smooth with two strong simple setae. Propodus with one ventral row of small spinules, with three distal long simple

strong setae. Dactylus with ventral groove bordered by proximally directed spinules. Unguis short and pointed.

Pereopod 5 (figure 2 e): as pereopod 4, except basis with setulose seta, and carpus with three distal spiniform setae.

Pereopod 6 (figure 2 f): as pereopod 5, except basis naked, and propodus with five terminal spinulose setae.

Pleopods (figure 1 h): basis sub-triangular. Endopod and exopod similar in shape, with two long terminal plumose setae and about 20 plumose setae each.

Uropods (figure 1 g): basal article with three small setae near insertion of endopod. Exopod shorter than article 1 of endopod, composed of two articles: article 1 with one simple thin seta, article 2 with one short and one long terminal setae. Endopod composed of two articles: article 1 with one simple and two feathered setae, article 2 with two short feathered and four long simple setae.

Type locality: station 4C, 33° 50´40´´N 118° 26´22´´W, 76 m, Santa Monica Bay, California, 8 January 1987

Remarks. As *C. dentata* is currently defined, the distribution is disjunct. It can be found in the Magellan Strait, Beagle Channel, and on the coasts of California.
The material examined from the Beagle Channel shows no significant difference from the type material from California. More material from the west coast of South America is needed to clarify whether this species has a such a wide geographical distribution or if there are two different populations, one in California and one in the Beagle Channel. Some features that were described in the original paper could not be seen in the type material. The armature of the antennule and the uropod varies from individual to individual. The feathered setae are not always present.

Chauliopleona amdrupii (Hansen, 1913) new combination
(figures 3-4)

Leptognathia amdrupii Hansen, 1913: 81
Material examined: holotype ZMUC CRU-5284, Forsbald Fjörd, Greenland.
Other material: one non-ovigerous female ZMH K-40228, Ark XI-2, RV Polarstern, station 37-16, 78° 58.25´N 07° 39.42´W, 188m, 78° 58.33´N 07° 40.05´W, 191m, EBS, 30 September 1995.

Diagnosis. Cheliped lacks carpal shield. Pereopod 1 with two serrated setae on carpus.

Description. Body (figures 3 a, b, c): cylindrical, about 7.7 times as long as broad, 2.7 - 3.2 mm in length. Cuticle strongly sclerotized. Cephalothorax 1.5 times as long as broad with straight margins, tapering anteriorly. Ventral groove around cheliped insertion. Pereonite 2 longest, pereonite 6 shortest, pereonites 3, 4 and 5 subequal. Pleon longer than cephalothorax, pleonites of similar width and length. Pleonite 5 longest. Pleotelson pentagonal.

Antennule (figure 3 d): article 1 longest, with two long thin and three small simple setae. Article 2 with one long seta and two small simple setae. Article 3 shortest, with two simple terminal setae. Article 4 with three long and two short simple terminal setae.

Antenna (figure 3 e): article 1 short. Article 2 as long as 3, unarmed. Article 3 as long as broad, with one small ventrodistal seta. Article 4 longest with two short and three long simple setae. Article 5 with one long terminal simple seta. Article 6 shortest with five long simple setae.

Labrum (figure 4 a): hoodlike with fine marginal setules.

Mandible (figure 4 b): well calcified and sclerotized on incisive margins. Molar process developed, slender, with about ten distal spinules.

Maxillule (figure 4 d): endite with three large setulated, four large, and two small simple terminal spines. Palp with two terminal setae.

Maxilla (figure 4 e): rectangular without setae.

Labium (figure 4 c): composed of two triangular lobes, with a row of small terminal setae.

Maxilliped (figure 4 f): endites with one lateral seta. Palp of four articles. Article 1 naked. Article 2 with three inner and one outer long setae. Article 3 with three inner setae. Article 4 with four curved setae.

Epignath: not recovered

Cheliped (figure 3 f, 15e): basis as long as carpus, divided unequally by sclerite. Merus triangular in shape with one ventral simple seta. Carpus 2.2 times as long as wide. One ventral and one dorsal simple seta. Carpal shield very weak or absent. Fixed finger with four small teeth, three dorsal and two ventral setae. Dactylus smooth.

Pereopod 1 (figure 4 g): coxa without seta. Basis longer than the three following articles together, with two simple setae. Ischium short, naked. Merus with one spiniform seta. Carpus with two serrated strong setae and a row of spines ventrally. Propodus with

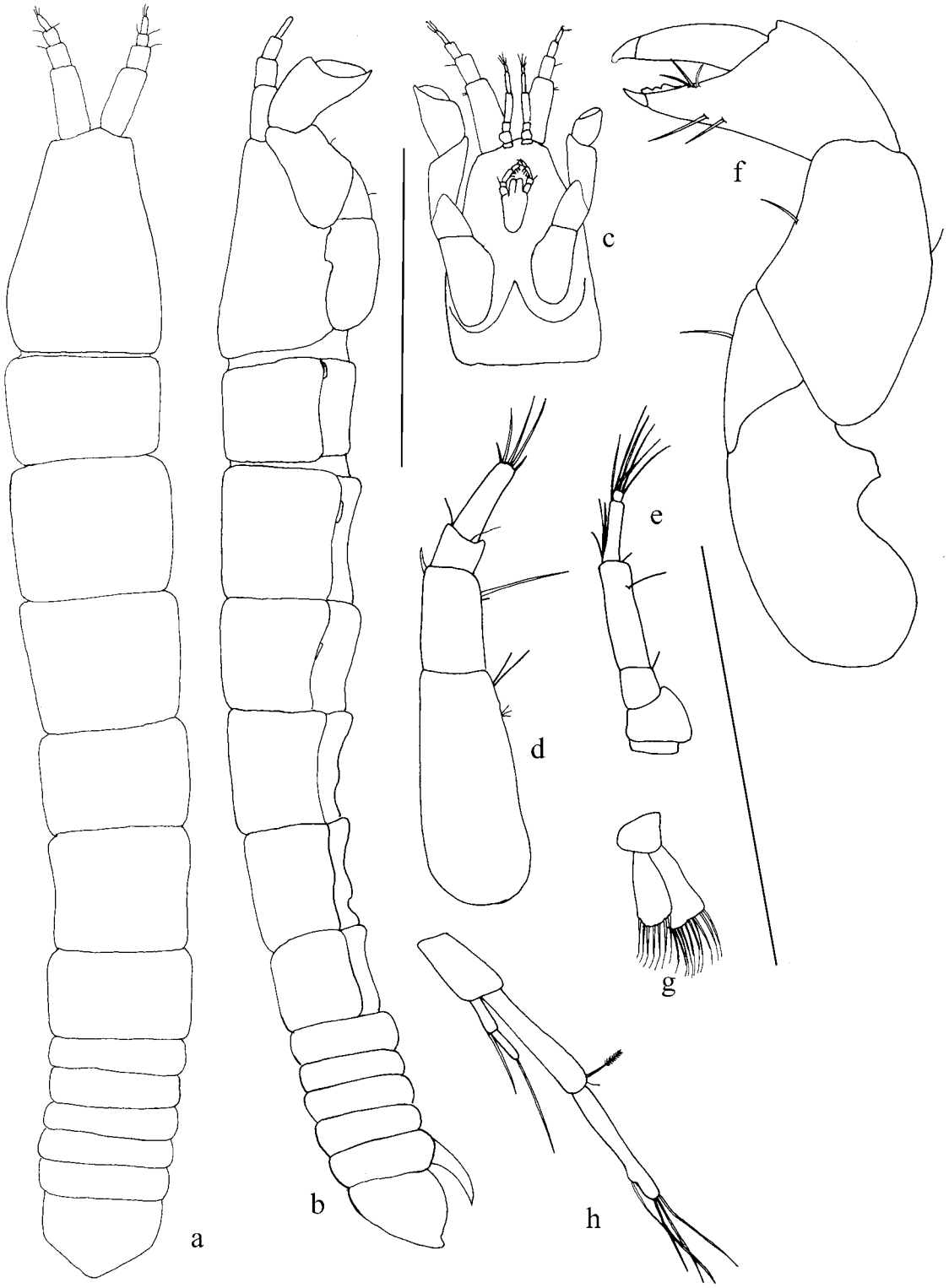

Fig 3. *Chauliopleona amdrupii* new combination ZMH K-40228 a. dorsal view. b. lateral view c. schematic view of ventral cephalothorax. (Scale bar 1 mm). d. Antennule. e. Antenna. f. cheliped. g. pleopod. h. uropod. (Scale bar 0.5 mm)

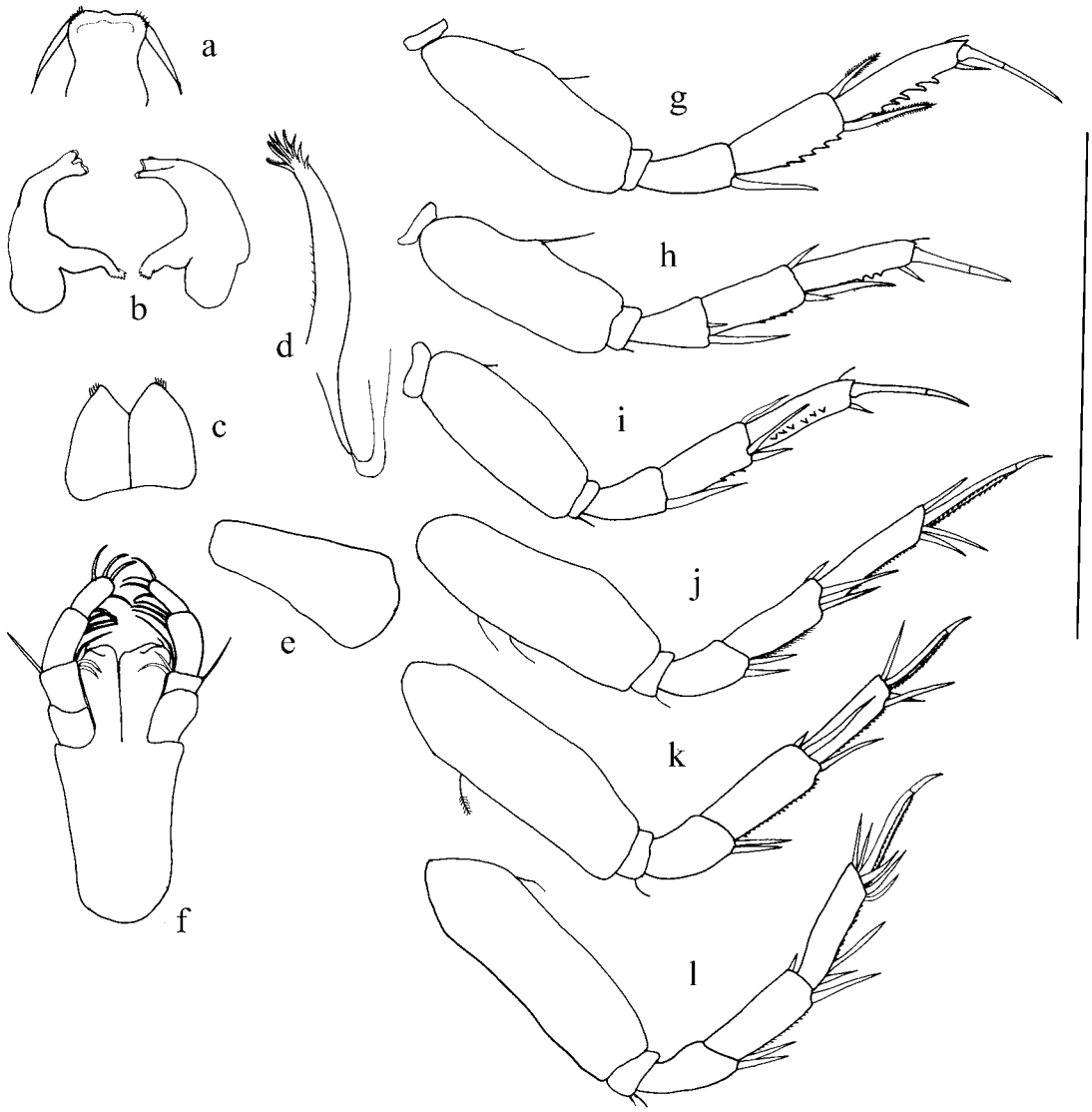

Fig 4. *Chauliopleona amdrupii* new combination ZMH K-40228 a. labrum. b. mandibles. c. labium. d. maxillule e. maxilla f. maxilliped. g. pereopod 1. h. pereopod 2. i. pereopod 3. j. pereopod 4. k. pereopod 5. l. pereopod 6. (Scale bar 0.5 mm)

about seven short spines ventrally and one short terminal spine, one spiniform terminal and one simple setae. Dactylus about as long as unguis. Unguis pointed.

Pereopod 2 (figure 4 h): as pereopod 1, basis with one simple seta, ischium with one seta, merus with one short and one long spiniform pinnate seta. Carpus with about four small spines, one long spiniform pinnate and two short spiniform setae.

Pereopod 3 (figure 4 i): as pereopod 1, except ischium with seta, carpus with only three small spines and three spiniform setae.

Pereopod 4 (figure 4 j): basis longer than three following articles, with two simple setae. Ischium with one simple seta. Merus with two spiniform pinnate setae. Carpus with two long spiniform pinnate and one short spiniform setae and a midventral row of spinules. Propodus with a midventral row of spinules and three very sharp spiniform setae. Dactylus long with a midventral groove bordered by proximally directed spinules. Unguis short and pointed.

Pereopod 5 (figure 4 k): as pereopod 4, except basis with only one setulose seta.

Pereopod 6 (figure 4 l): as pereopod 5, except basis with one simple seta, carpus with four spiniform setae, and propodus with five spiniform terminal setae.

Pleopods (figure 3 g): basal article cuadrangular. Endopod and exopod rectangular, with ten simple setae.

Uropods (figure 3 h): basal article naked. Exopod very short, less than 50 % of article 1 of endopod. Article 1 as long as 2, each with one long terminal simple seta. Endopod article 1 with one long feathered and one short simple seta. Article 2 with four long simple setae.

Type locality: Forsbald Fjörd, Greenland.

Remarks. The redescription is based on the type specimen of Hansen (1913) and one specimen from south Greenland. Most of the drawings are from the specimen from south Greenland (ZMH K-40228).

Chauliopleona armata (Hansen, 1913) new combination
(figures 5-6)

Leptognathia armata Hansen, 1913

Leptognathia armata Niestrasz, 1913: 30; Stephensen, 1933: 347

Non *Leptognathia armata* Kudinova-Pasternak 1965: 82; 1970: 353; 1973: 154; 1975: 219; 1986: 67; Menzies and Mohr 1962: 196-197.

Material examined: type, non-ovigerous female ZMUC CRU-5612, Ingolf expedition, station 22, 48° 25´N, 58° 10´W, 3474 m.

Diagnosis. Cephalothorax long, abour 1.6 times as long as broad. Cheliped propodus and dactylus smooth and slender, carpal shield well developed and rounded.

Redescription. Body (figures 5 a, b, c): long and slender, about eight times as long as broad, cylindrical, 3.6 mm in length, cuticle strong. Cephalothorax 1.6 times as long as broad, conical, ventral groove around cheliped insertion. Pereonite 6 shortest, 4 and 5 of equal length, pereonites 2 and 3 longest. Pleon longer than cephalothorax. Pleonites of equal length, pleonite 5 with posteriorly directed ventral spiniform process. Pleotelson pentagonal.

Antennule (figure 5 d): articles 1 to 3 naked, article 1 longest. Article 4 with five terminal simple long setae.

Antenna (figure 5 e): article 1 very short. Article 2 short, as long as third, naked. Article 3 naked. Article 4 longest, with two terminal simple long setae. Article 5 long and naked. Article 6 with two long and two short terminal setae.

Mouthparts were not dissected.

Cheliped (figure 5 f, 15 a): basis unequal, two thirds of it proximal to insertion. Merus triangular and naked. Carpus broad, about 1.4 times as long as wide. Carpal shield well developed. Propodus 2.5 times as long as broad. Fixed finger with four teeth, one ventral and two dorsal simple setae. Dactylus smooth and slender.

Pereopod 1 (figure 6 a): coxa without setae. Basis longer than three following articles together, naked. Ischium with one seta. Merus with one long spiniform seta. Carpus with three long spiniform setae. Propodus with ventral row of eight short strong spinules and one short spiniform seta. Dactylus about as long as unguis. Unguis pointed.

Pereopod 2 (figure 6 b): as pereopod 1, except carpus with only two long spiniform terminal setae. Propodus with a row of about 14 short strong spinules.

Pereopod 3 (figure 6 c): as pereopod 1, except propodus without short spinules.

Pereopod 4 (figure 6 d): basis longer than following three articles together, naked. Ischium short, naked. Merus with two spiniform setae. Carpus with two spiniform setae. Propodus with two short terminal spiniform setae. Dactylus long, with midventral groove bordered by backwardly directed spinules. Unguis short and pointed.

Insert figure 5 and 6 about here

Pereopod 5 (figure 6 e): as pereopod 4, except carpus with three long spiniform setae. Propodus with three long spiniform setae.

Pereopod 6 (figure 6 f): as pereopod 5.

Pleopods (figure 5 g): basal article square. Exopod and endopod only with five terminal simple setae.

Uropods (figure 5 h): basal article rhomboid. Exopod shorter than half of article 1 of endopod. Exopod of two subequal articles: article 1 with a simple terminal seta, article 2 with

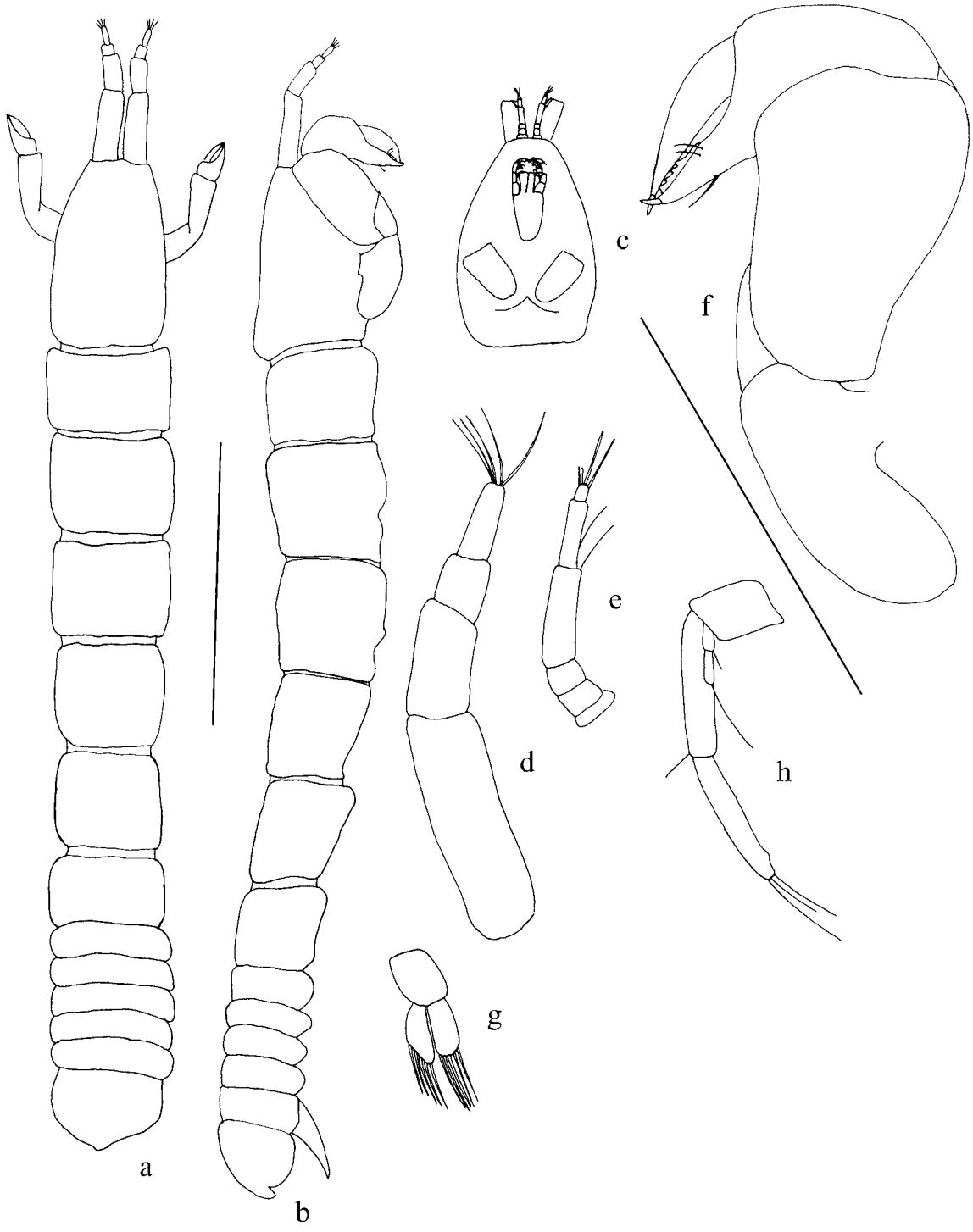

Fig 5. *Chauliopleona armata* new combination ZMUC CRU-5612 a. dorsal view. b. lateral view. c. ventral view of cephalothorax. (Scale bar 1 mm) d. Antennule. e. antenna. f. cheliped g. pleopod h. uropod. (Scale bar 0.5 mm).

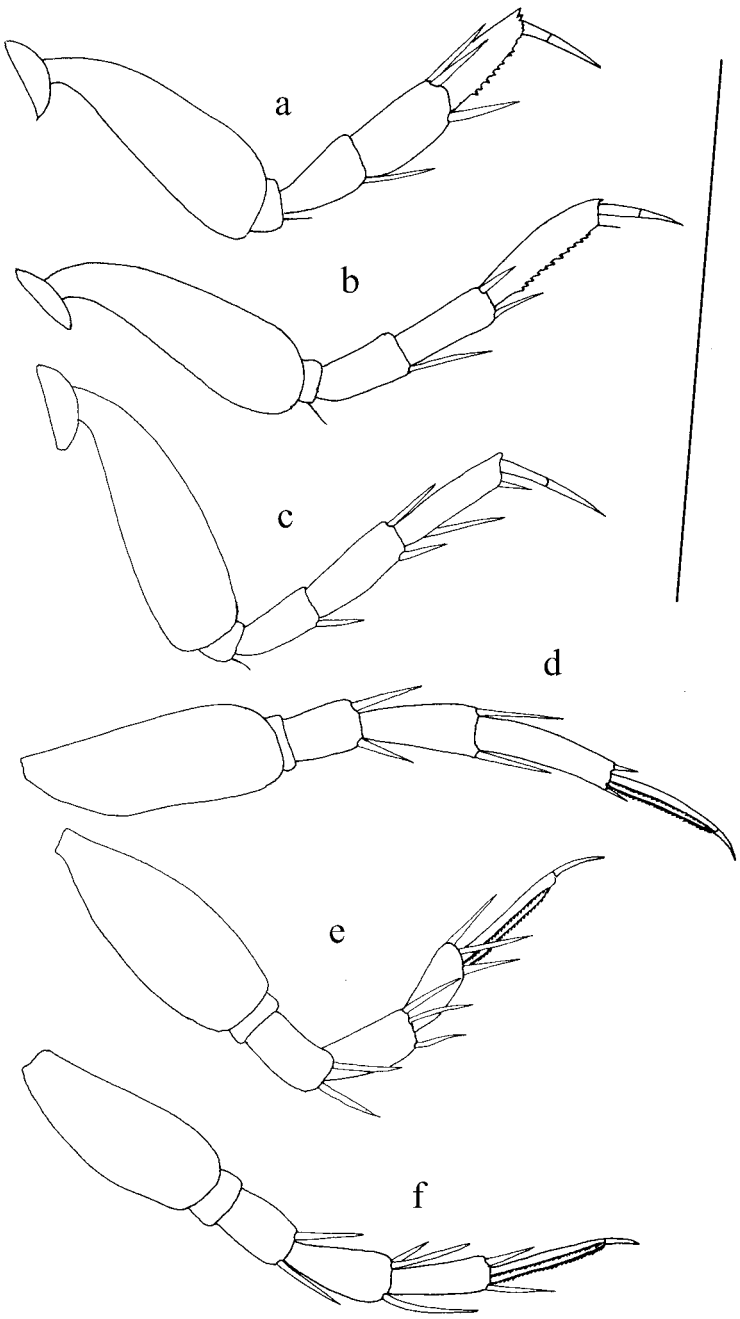

Fig 6. *Chauliopleona armata* new combination ZMUC CRU-5612 a. pereopod 1. b. pereopod 2. c. pereopod 3. d. pereopod 4. e. pereopod 5. f. pereopod 6. (Scale bar 0.5 mm)

a simple long terminal seta. Endopod composed of two equally long articles: article 1 with one short simple terminal seta, article 2 with three long terminal simple setae.

Type locality: 48° 25´N 58° 10´W, 3474 m, station 22 Ingolf Expedition.

Remarks. For this species only the type material was available so that no dissection was possible to study mouth parts. This species is only present in the north Atlantic Ocean.

Chauliopleona hastata (Hansen, 1913) new combination

(figures 7-8)

Leptognathia hastata Hansen, 1913

Leptognathia hastata Stephensen, 1932:348

Material examined: syntype, ZMUC CRU-6682, Ingolf Expedition, station 125, 68° 08´N 16° 02´W, 1373 m. Other material: 19 non-ovigerous females ZMH K- 40229, Ark XI-2, RV Polarstern, Stat 37-16, 78° 58.25´N 07° 39.42´W, 188 m, 78° 58.33´N 07°40.05´W, 191 m, 30 September 1995, EBS.

Diagnosis. Cheliped well developed, strong, carpal shield well developed with proximal ventral lobes, chela strong.

Redescription. Body (figures 7 a, b, c): about seven times as long as broad, cylindrical, 1.88 – 5.06 mm in length, cuticle strong. Cephalothorax about 1.4 times as long as broad, ventral groove surrounding cheliped insertion. Pereonite 2 longest, 6 and 1 equal and shortest, 4 and 5 of equal length. Pleon as long as cephalothorax. Pleotelson pentagonal.

Antennule (figure 7 d): article 1 longest, with one distal simple seta. Article 2 as long as 4 with simple terminal seta. Article 3 shortest with simple seta. Article 4 with three long simple setae, one short simple seta, and one aesthetasc.

Antenna (figure 7 e): article 1 very short. Article 2 square, with one simple seta. Article 3 with small terminal simple seta. Article 4 with three small simple setae. Article 5 with simple long terminal seta. Article 6 with three long simple setae, one short simple seta, and one aesthetasc.

Labrum (figure 8 a): hoodlike, with fine marginal setules.

Mandible (figure 8 b): well calcified and sclerotized on incisive margins, molar process developed, bearing about ten distal spinules.

Maxillule (figure 8 c): endite setulated, with four setulated, three simple and one short terminal spines. Palp with two long terminal setae.

Maxilla (figure 8 d): rectangular, with one row of setules distally.

Labium (figure 8 f): composed of two pentagonal lobes.

Maxilliped (figure 8 e): endites with one blunt spine and two simple setae. First palp article naked. Second article with one outer and three or four curved long inner setae. Third article with three inner setae. Fourth article with four terminal setae.

Epignath (figure 8 g): falciform.

Cheliped (figure 7 f, 15 b): basis as long as carpus, 50 % of basis proximal to

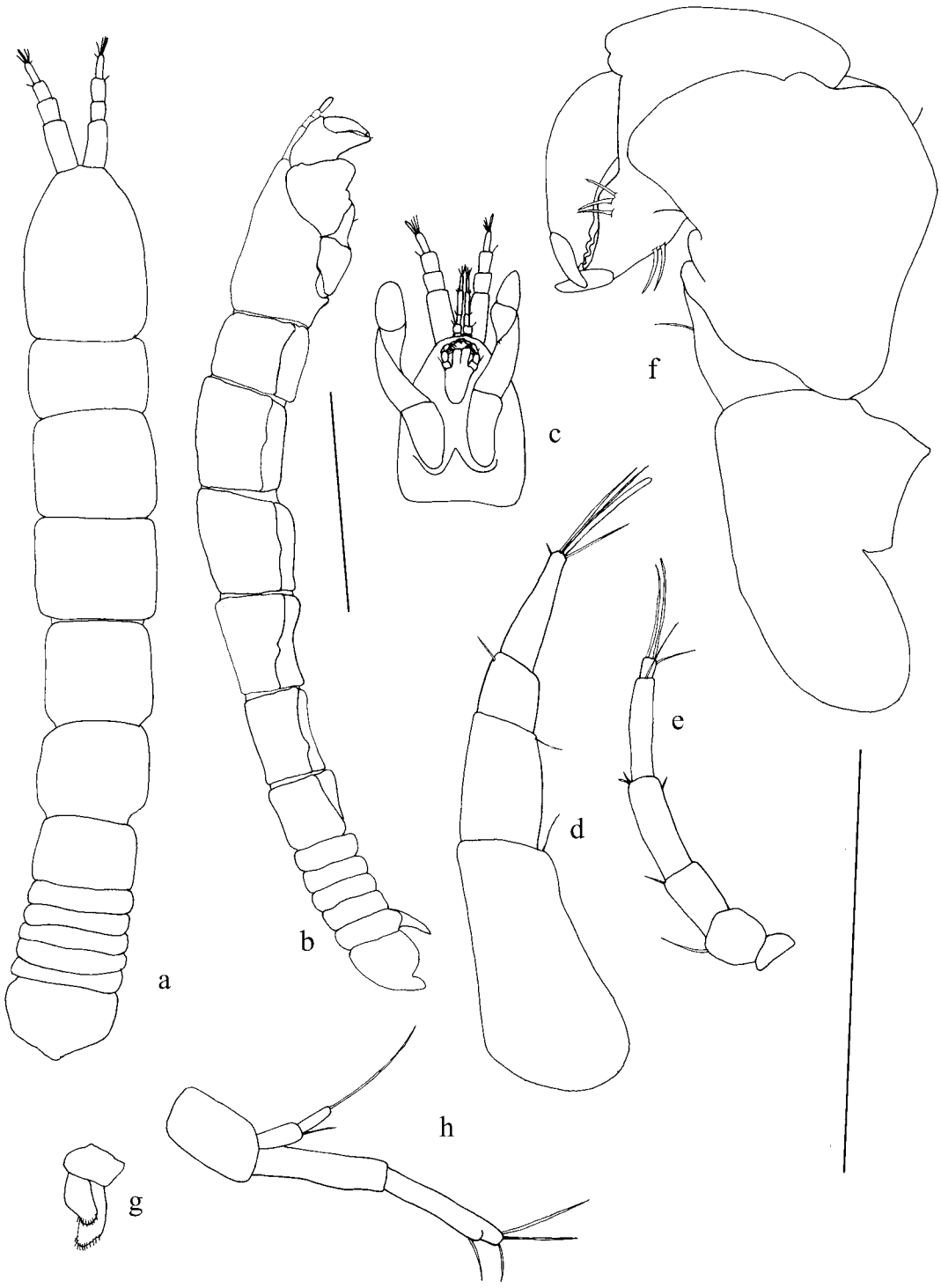

Fig 7. *Chauliopleona hastata* new combination ZMH K-40229. a. dorsal view. b. lateral view. c. ventral view of cephalothorax. (Scale bar 1 mm). d. antennule. e. antenna. f. cheliped. g. pleopod. h. uropod. (Scale bar 0.5 mm).

Fig 8. *Chauliopleona hastata* new combination ZMH K-40229 a. labrum. b. mandible. c. maxillule. e. maxilliped. f. labium. g. epignath. h. pereopod 1. i. pereopod 2. j. pereopod 3. k. pereopod 4. l. pereopod 6. m. pereopod 6. (Scale bar 0.5 mm)

attachment. Merus triangular, with one simple seta. Carpus about 1.1 times as long as broad. Carpal shield very well developed. One rounded protuberance near insertion of propodus, two lobes under carpal shield, and one ventral and one dorsal simple seta. Propodus twice as long as broad, with four teeth on fixed finger and two ventral and three dorsal setae. Two dorsal blunt lobes on top of finger insertion. Dactylus curved with three small ventral teeth, smooth.

Pereopod 1 (figure 8 h): coxa without seta. Basis with one simple seta. Ischium with one simple seta. Merus with one long spiniform pinnate seta. Carpus with one long spiniform seta and about six ventral spinules. Propodus with about 24 small ventral spinules and one short spiniform seta. Dactylus short, about as long as unguis. Unguis pointed.

Pereopod 2 (figure 8 i): as pereopod 1 except basis naked, merus with one spiniform seta. Carpus with three fine ventral spines and one long spiniform pinnate and two short simple setae. Propodus with about 15 small ventral spinules and one short spiniform seta.

Pereopod 3 (figure 8 j): as pereopod 2.

Pereopod 4 (figure 8 k): basis with one feathered and two small simple setae. Ischium with two simple setae. Merus triangular with two long spiniform seta. Carpus with three long spiniform setae. Propodus with three long spiniform terminal setae. Dactylus with ventral groove bordered by very fine proximally directed spinules. Unguis short and pointed.

Pereopod 5 (figure 8 m): as pereopod 4, except ischium with one seta.

Pereopod 6 (figure 8 l): as pereopod 5, except ischium with one seta and propodus with four terminal spiniform setae.

Pleopods (figure 7 g): basal article rhomboidal. Endopod and exopod shaped like a thongue with fine terminal setules.

Uropods (figure 7 h): basal article rectangular. Exopod shorter than article 1 of endopod, composed of two articles: article 1 with one short terminal simple seta, article 2 with one long simple terminal seta. Endopod of two articles equal in length: article 1 naked, article 2 with four terminal simple setae.

Type locality: 68° 08´N 16° 02´W, 1373 m, station 125, Ingolf Expedition.

Remarks. This description is based on the type material and on animals from north Greenland. This species can be easily differentiated from *C. armata* by the form of the carpal shield which is very pronounced, as well as the chela, which is stronger and heavier in *C. hastata*. This is a valid species, and no synonym of *C. armata* or *C. amdrupii*. *Chauliopleona hastata* can be found in very cold waters from north Greenland, *C. armata* only in waters from south Greenland or Iceland in depths between 188 and 1373 m.

Chauliopleona amftae n. sp.

(figures 9-10)

Material examined: holotype; non-ovigerous female ZMH K- 40230, Diva, RV Meteor, station 345, 16° 17.0´S 05° 27.0´E, 5390 m, KG, 25 July 2000. Paratype: non-ovigerous female ZMH K-40231, Diva, RV Meteor, station 348, 16° 18.1´S 05° 27.0´E, 5390 m, 16° 19.3´S 05° 27.2´E, 5387 m, EBS, 28 July 2000 (dissected).

Diagnosis. Cheliped merus with one ventral rounded protuberance with one simple seta on it.

Description. Body (figures 9 a, b, c): slender, about 6.7 times as long as broad, cylindrical, 2.48 – 4.18 mm in length, cuticle strong. Cephalothorax about 1.4 times as long as broad, rounded tapering towards antennules. Pereonite 2 longest, pereonites 3 and 4 of equal length, pereonite 6 shortest. Pleon as long as cephalothorax, pleonites of equal length. Pleotelson apex rounded.

Antennule (figure 9 d): article 1 with three small short and one long simple setae. Article 2 with one terminal long seta. Article 3 with three small lateral and two terminal setae. Article 4 with one short and four long terminal setae.

Antenna (figure 9 e): article 1 short. Article 2 as long as wide, with one distal small seta. Article 3 with long simple seta. Article 4 longest, with one small lateral and one short and two long terminal setae. Article 5 about half length of 4, with one terminal simple seta. Article 6 very short, with four terminal setae, two long and two short.

Labrum (figure 10 b): hoodlike with fine marginal setules.

Mandible (figure 10 c): well calcified and sclerotized on incisive margins, molar process developed, bearing about ten terminal spinules.

Maxillule (figure 10 e): endite setulose, with one large setulose, six large simple spines and one short terminal one. Palp with two terminal setae.

Maxilla (figure 10 f): rectangular, naked.

Labium (figure 10 d): composed of two pentagonal lobes with row of setules distally.

Maxilliped (figure 10 h): endites with one short spiniform seta. Palp article 1 naked. Article 2 with one outer spiniform seta. Article 3 with four inner setae. Article 4 with three inner and three terminal setae.

Epignath (figure 10 g): falciform.

Cheliped (figure 9 f, 15 d): basis as long as carpus. Merus triangular with one ventral rounded protuberance at midlength, with one simple seta on top of it. Carpus about 1.5 times

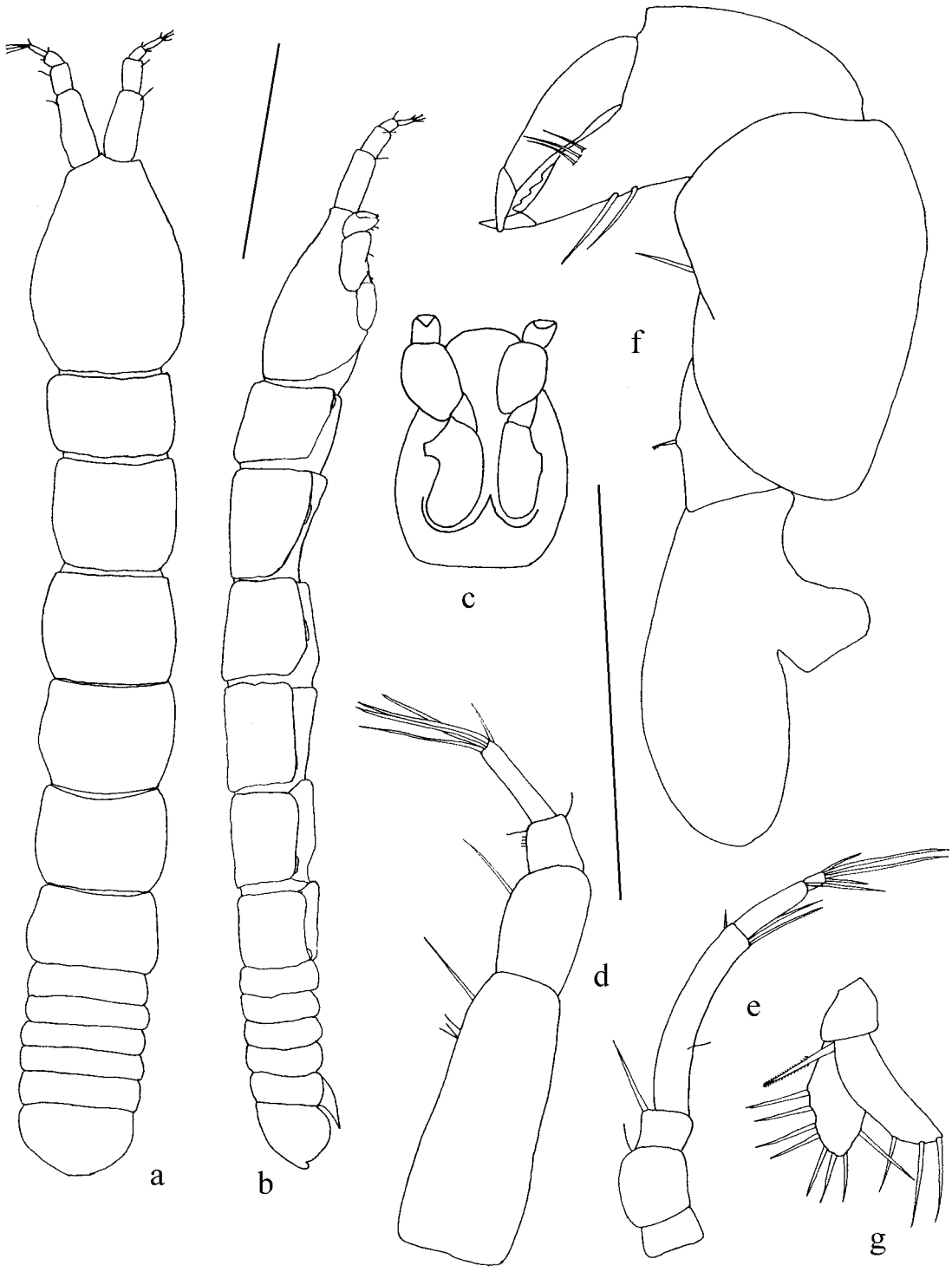

Fig 9. *Chauliopleona amftae* n. sp. ZMH K-40231 a. dorsal view. b. lateral view. c. schematic ventral view of cephalothorax. (Scale bar 1 mm) d. antennule. e. antenna. f. cheliped. g. pleopod. (Scale bar 0.5 mm).

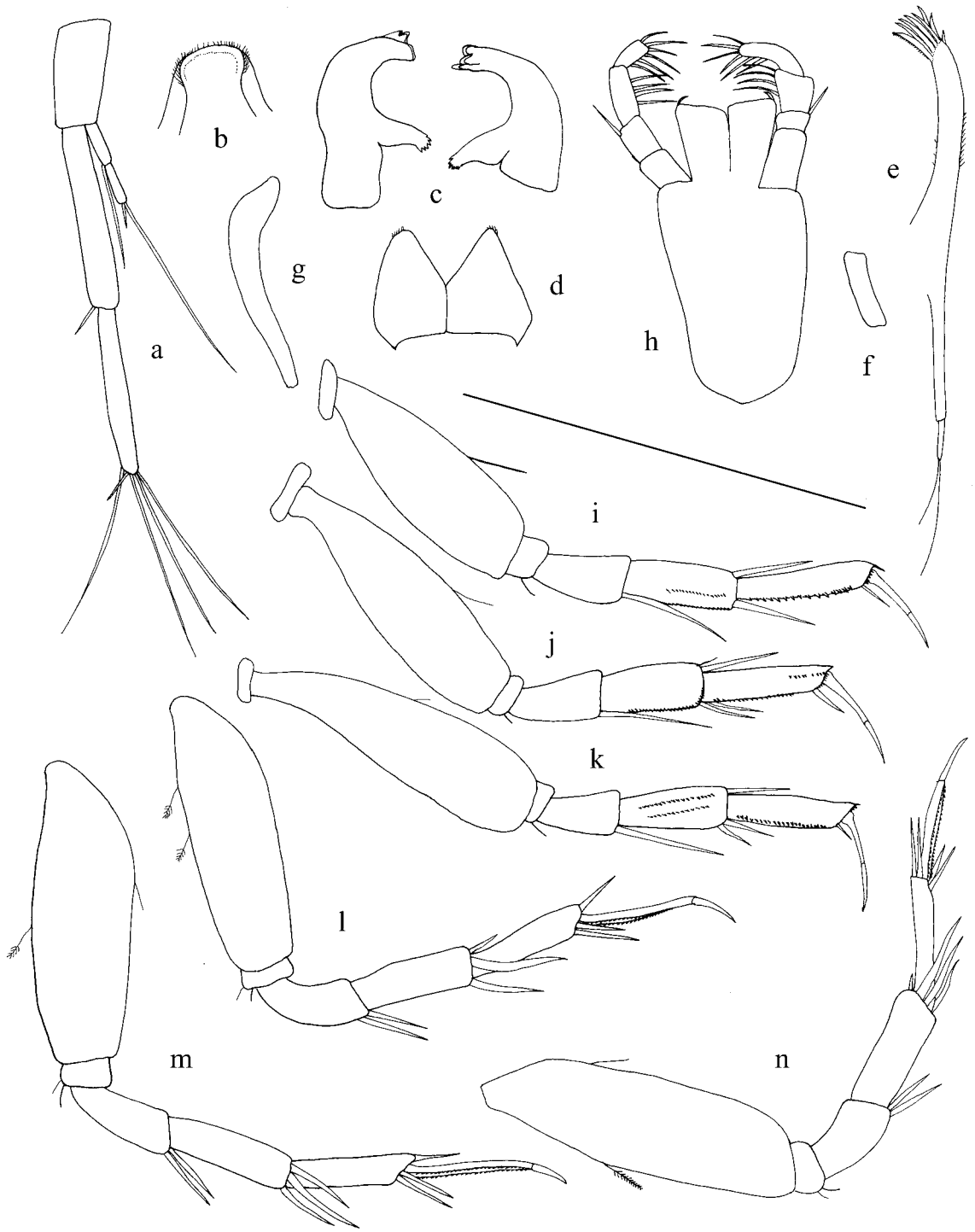

Fig 10. *Chauliopleona amftae* n. sp. ZMH K-40231 a. uropod. b. labrum. c. mandibles. d. labium. e. maxillule. f. maxilla. g. epignath h. maxilliped. i. pereopod 1 j. pereopod 2. k. pereopod 3. l. pereopod 4. m. pereopod 5. n. pereopod 6. (Scale bar 0.5 mm).

as long as broad with one ventral seta at midlength. Carpal shield developed. Fixed finger with four teeth on inner margin, two ventral and three laterodorsal simple setae. Dactylus smooth with no special features.

Pereopod 1 (figure 10 i): coxa without seta. Basis longer than three following articles together, with one simple seta at midlength. Ischium with one small simple seta. Merus with one spiniform seta as long as carpus. Carpus with two rows of small setules and two terminal spiniform setae. Propodus with row of about 15 spinules, two small terminal spiniform seta. Unguis as long as dactylus.

Pereopod 2 (figure 10 j): coxa without seta. Basis longer than the three following articles together, with one simple seta. Ischium with a small simple seta. Merus with one long terminal spiniform seta. Carpus with row of setules ventrally and three terminal spiniform and one simple setae. Propodus with one terminal spiniform seta and row of setules ventrally and around insertion of dactylus. Unguis pointed, about half as long as dactylus.

Pereopod 3 (figure 10 k): as pereopod 2, except carpus lacks simple seta and setulation on propodus less prominent.

Pereopod 4 (figure 10 l): basis with two setulose seta. Ischium with two simple setae. Merus with two spiniform setae. Carpus with two long and one short spiniform setae. Propodus with three terminal spiniform setae. Dactylus with ventral groove bordered by proximally directed spinules. Unguis short and pointed.

Pereopod 5 (figure 10 m): as pereopod 4, except basis with one setulose seta, carpus with three long spiniform setae.

Pereopod 6 (figure 10 n): as pereopod 4, except basis with one simple and one setulose setae, carpus with three long and one short spiniform setae, propodus with four spiniform setae.

Pleopods (figure 9 g): basis subtriangular. Exopod with about eight simple setae, endopod with bipinnate seta at base.

Uropods (figure 10 a): basis rectangular naked. Exopod as long as basis, composed of two articles: article 1 with one long seta, article 2 with two terminal setae, one very long. Endopod article 1 with small terminal seta, article 2 with one short and four terminal long setae.

Type locality: Angola Basin, Diva, RV Meteor, station 345, 16° 17.0´S 05° 27.0´E, 5390 m, KG, 25 July 2000.

Etymology: The species is named after Diana Amft.

Remarks. This species resembles *C. armata*. It differs from the latter in the shape of the cephalothorax and the cheliped (see fig 15 a, d).

Chauliopleona paradoxa n.sp.

(figures 11-12)

Material examined: holotype, non-ovigerous female ZMH K- 40232, RV Sonne, Discol station 559, 7° 7.50´S 88° 27.01´W, 4171m, KG 1519, 20 January 1996. Paratypes: 26 non-ovigerous females; ZMH K-20233 RV Sonne, Discol station 515 (1), ZMH K-40234 RV Sonne, Discol station 517 (1), ZMH K-40235 RV Sonne, Discol station 527 (1), ZMH K-40236 RV Sonne, Discol station 529 (2), ZMH K-40237 RV Sonne, Discol station 534 (1), ZMH K-40238 RV Sonne, Discol station 534 (2), ZMH K-40239 RV Sonne, Discol station 539 (2), ZMH K-40240 RV Sonne, Discol station 540 (3), ZMK K-40241 RV Sonne, Discol station 544 (4), ZMH K-40242 RV Sonne, Discol station 555 (1), ZMH K-40243 RV Sonne, Discol station 556 (1), ZMH K- 40244 RV Sonne, Discol station 565 (1), ZMH K-40245 RV Sonne, Discol station 574 (3), ZMH K-40246 RV Sonne, Discol station 579 (1), ZMH K-40247 RV Sonne, Discol station 585 (1), ZMH K-40248 RV Sonne, Discol station 597 (1).

Diagnosis. Cheliped dactylus with dorsal crenulation, carpal shield well developed. Dactylus of pereopod 4 to 6 with prominent spines.

Description. Body (figure 11 a, b, c): about seven times as long as broad, cylindrical, about 1 – 4.06 mm in length. Cephalothorax about 1.3 times as long as broad. Ventral groove around cheliped insertion. Pereonites 2 and 3 longest and equal in length, 4 and 5 equal in length, 6 shortest. Pereonite 1 widest. Pleon longer or as long as cephalothorax, pleonites subequal in length. Pleotelson pentagonal.

Antennule (figure 11 d): article 1 longest with two small and one long simple seta. Article 2 with one long and one short simple seta. Article 3 with a simple seta. Article 4 with four long and one short simple terminal setae.

Antenna (figure 11 e): article 1 short, naked. Article 2 with one simple dorsodistal seta. Article 3 with one long simple dorsodistal seta. Article 4 longest with two long simple setae distally. Article 5 with one terminal seta. Article 6 shortest with two short and three long simple setae.

Labrum (figure 11 i): hoodlike, with a row of long setules laterally and short setules distally.

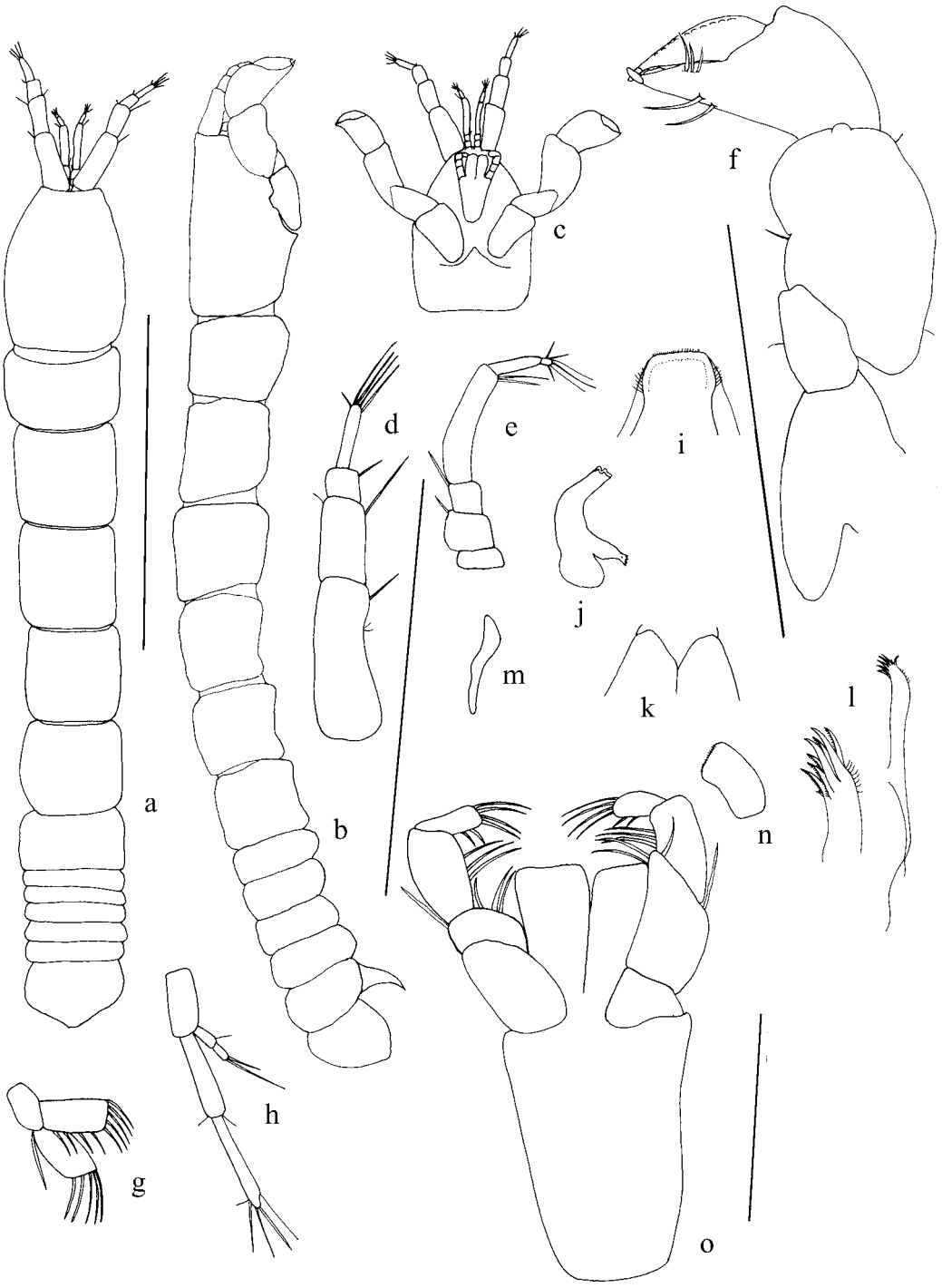

Fig 11. *Chauliopleona paradoxa* n. sp. ZMH K-40236 a. dorsal view b. lateral view c ventral view of cephalothorax. (Scale bar 1 mm). d. antennule e. antenna. f. cheliped g. pleopod. h. uropod. i. labrum. ZMH K- 40235 j. mandible. k. labium. l. maxillule. n. maxilla. m. epignath. (Scale bar 0.5 mm). ZMH K-40236 o. maxilliped. (Scale bar 0.1 mm).

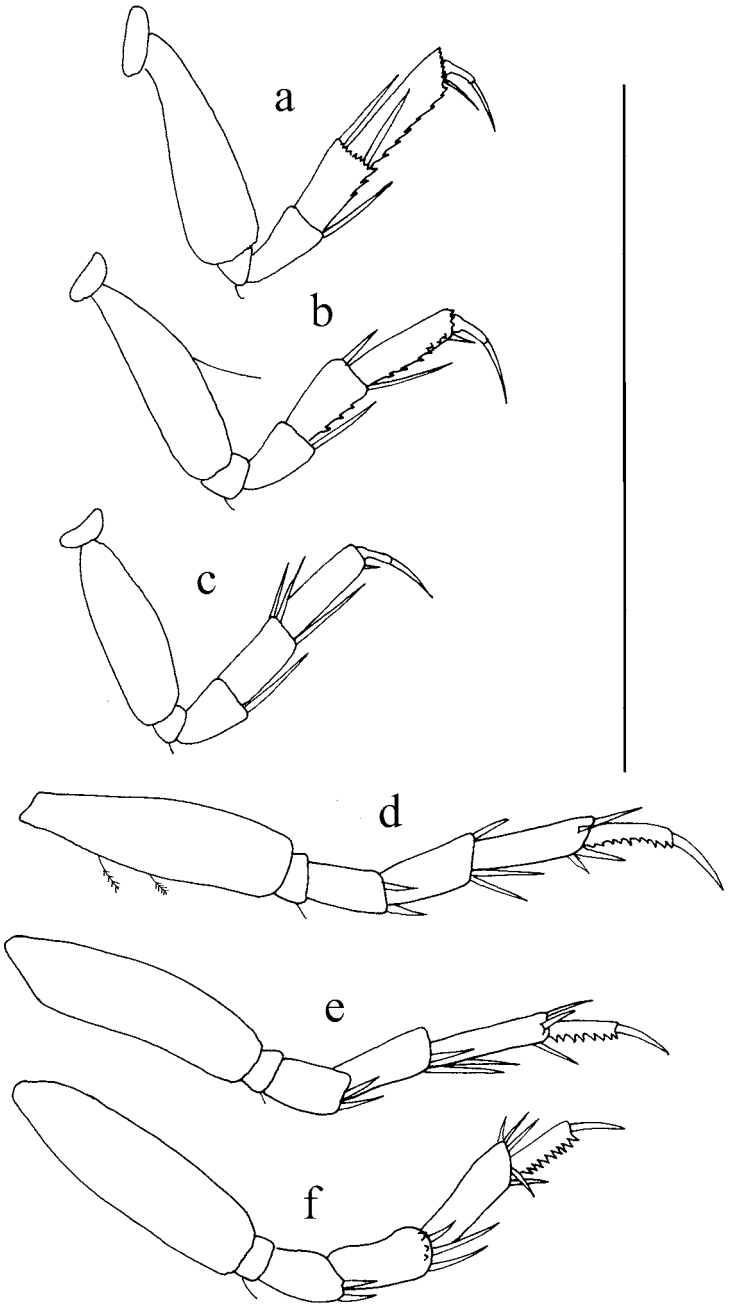

Fig 12. *Chauliopleona paradoxa* n. sp. ZMH K-40236 a. pereopod 1. b. pereopod 2. c. pereopod 3. d. pereopod 4. e. pereopod 5. f. pereopod 6. (Scale bar 0.5 mm).

Mandible (figure 11 j): well calcified and sclerotized on incisive margins, molar process developed bearing about ten terminal spinules.

Maxillule (figure 11 l): endite with setules, with five long setulose and two long simple spines and one short terminal one. Palp with two distal setae.

Maxilla (figure 11 m): rectangular with one row of setules distally.

Labium (figure 11 k): composed of two triangular lobes with one distal seta.

Maxilliped (figure 11 o): endites naked. Palp article 1 naked. Article 2 with one outer and three curved spiniform setae. Article 3 with three inner curved spiniform setae. Article 4 with two short inner spiniform setae and four terminal spiniform setae.

Epignath (figure 11 m): falciform.

Cheliped (figure 11 f, 15 f): posterior part of basis tapering distally. Merus with one simple seta. Carpus 1.6 times as long as broad, with one ventral simple seta and two dorsal simple setae, one rounded protuberance near attachment of propodus. Carpal shield well developed. Propodus twice as long as broad with two or three teeth on fixed finger, three dorsal and two ventral simple setae. Dactylus with a fine crenulated dorsal border.

Pereopod 1 (figure 12 a): coxa without setae. Basis naked. Ischium with one simple seta. Merus with one long spiniform seta. Carpus with two long spiniform setae and ventral row of spinules. Propodus with one short terminal spiniform seta and many small spinules ventrally. Dactylus short about the half length of unguis. Unguis pointed.

Pereopod 2 (figure 12 b): as pereopod 1, except one long simple seta on basis.

Pereopod 3 (figure 12 c): as pereopod 2, except with three long spiniform setae on carpus; carpus and propodus with few spinules ventrally or smooth.

Pereopod 4 (figure 12 d): basis with two setulose setae. Ischium with one simple seta. Merus with two short spiniform setae. Carpus with three spiniform setae. Propodus with three long and one short spiniform setae. Dactylus long with ventral groove bordered by proximally directed spines. Unguis pointed.

Pereopod 5 (figure 12 e): as pereopod 4, except basis naked, dactylus with more prominent and longer spines. Unguis sharp.

Pereopod 6 (figure 12 f): as pereopod 5, except carpus with small lateral spines, propodus with five short terminal spiniform setae.

Pleopods (figure 11 g): endopod with one long simple seta at attachment to basis and seven simple setae distally. Exopod with six distal simple setae.

Uropods (figure 11 h): basal article long, naked. Exopod shorter than article 1 of endopod, of two articles: article 1 longest, with a lateral simple seta, article 2 with one short

and one long simple terminal seta. Endopod article 1 with two small simple terminal setae, article 2 with four long and one short simple terminal setae.

Type locality: Peru abyssal plains, Discol, RV Sonne, station 559, 7° 7.50´S 88° 27.01´W, 4171m, KG 1519, 20 January 1996

Etymology: the name refers to the fact that this species is a "strange" *C. hastata* with some highly variable characters making it difficult to identify.

Remarks. This species has a very wide morphological variability. The posteriorly-directed ventral apophysis is very variable and may be very small to very large. The same can be recognized in other characters, such as dentition of the fixed finger of the chela, that varies from one to three teeth. The crenulation on the finger is in some individuals very weak and in others very prominent.

Chauliopleona nickeli n. sp

(figures 13-14)

Material examined: holotype, non-ovigerous female ZMH K-40249, ANT XV/3, RV Polarstern, station 48-89, 73° 27.5´S 22° 43.10´W, 1583 m 73° 27.90´S 22° 47.8´W, 1573 m, EBS, 4 february 1998. Paratypes: three non-ovigerous females ZMH K-40250, ANT XV/3, RV Polarstern, station 48-89, 73° 27.5´S 22° 43.10´W, 1583 m, 73° 27.90´S 22° 47.8´W, 1573 m, EBS, 4 February 1998; 11 non-ovigerous females ZMH K-40251, ANT XV/3, RV Polarstern, station 48-272, 71°27.5´S 15°06.5´W, 2007 m, 71° 30.4´S 15° 13.3´W, 2061 m, EBS, 26 February 1998 (one dissected).

Diagnosis. Cheliped propodus crenulated dorsally at dactylus insertion.

Description. Body (figures 13 a, b, c): about 6.4 times as long as broad, cylindrical, 2.38 – 3.5 mm in length. Cuticle strong. Cephalothorax about 1.5 times as long as broad. Ventral groove around cheliped insertion. Pereonite 2 longest. Pereonite 6 shortest, pereonites 4 and 5 of equal length. Pleon longer than cephalothorax. Pleonite 1 to 4 of similar length, pleonite 5 longest. Pleotelson rounded.

Antennule (figure 13 d): article 1 as long as all other articles together, with one terminal seta and two small lateral setae. Article 2 with one long distal simple seta. Article 3 with two terminal setae, one long and one short. Article 4 with four terminal setae and one aesthetasc.

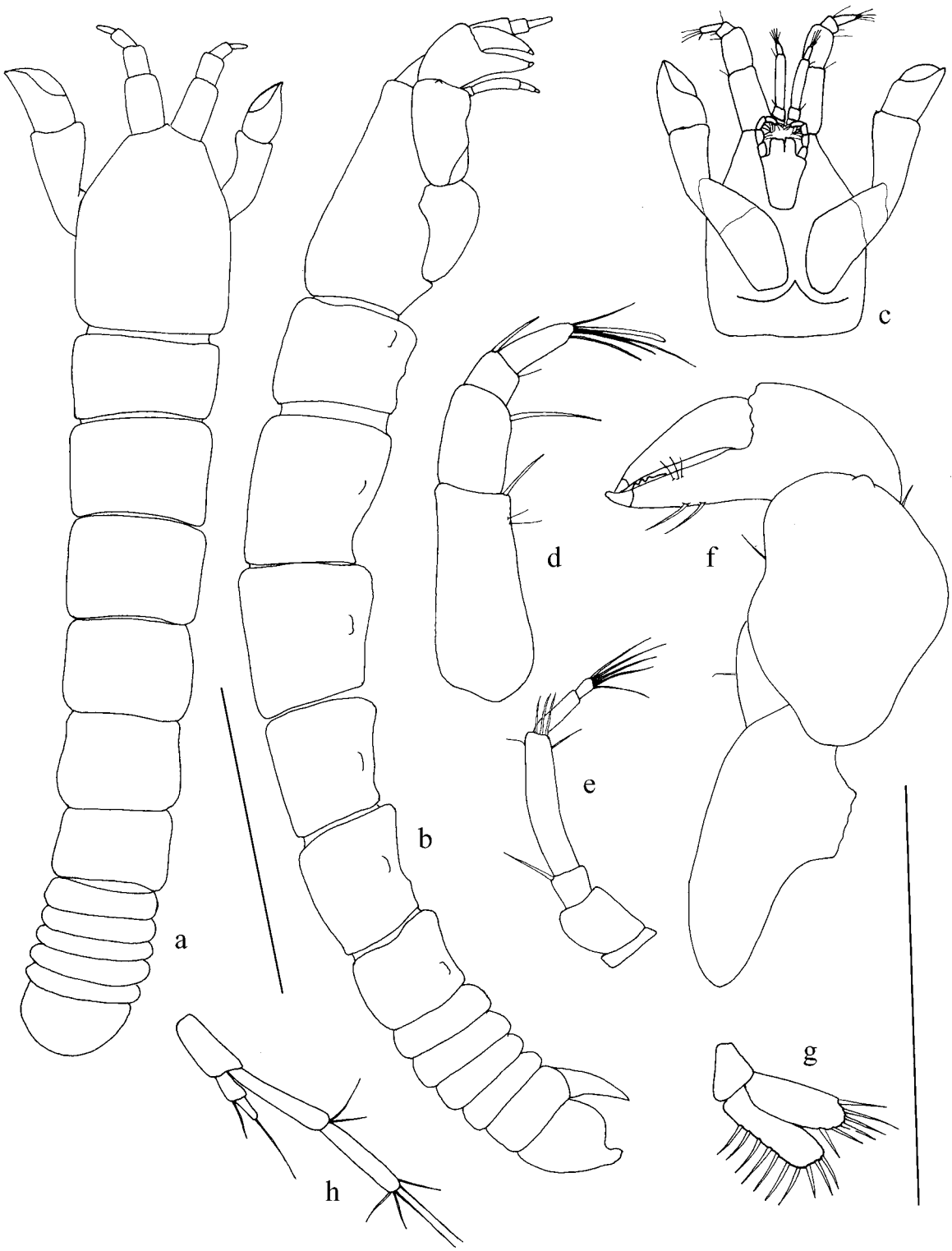

Fig 13. *Chauliopleona nickeli* n. sp. ZMH K-40251 a. dorsal view. b. lateral view. c. ventral view of cephalothorax. (Scale bar 1 mm). d. antennule. e. antenna. f. cheliped. g. pleopod. h. uropod. (Scale bar 0.5 mm).

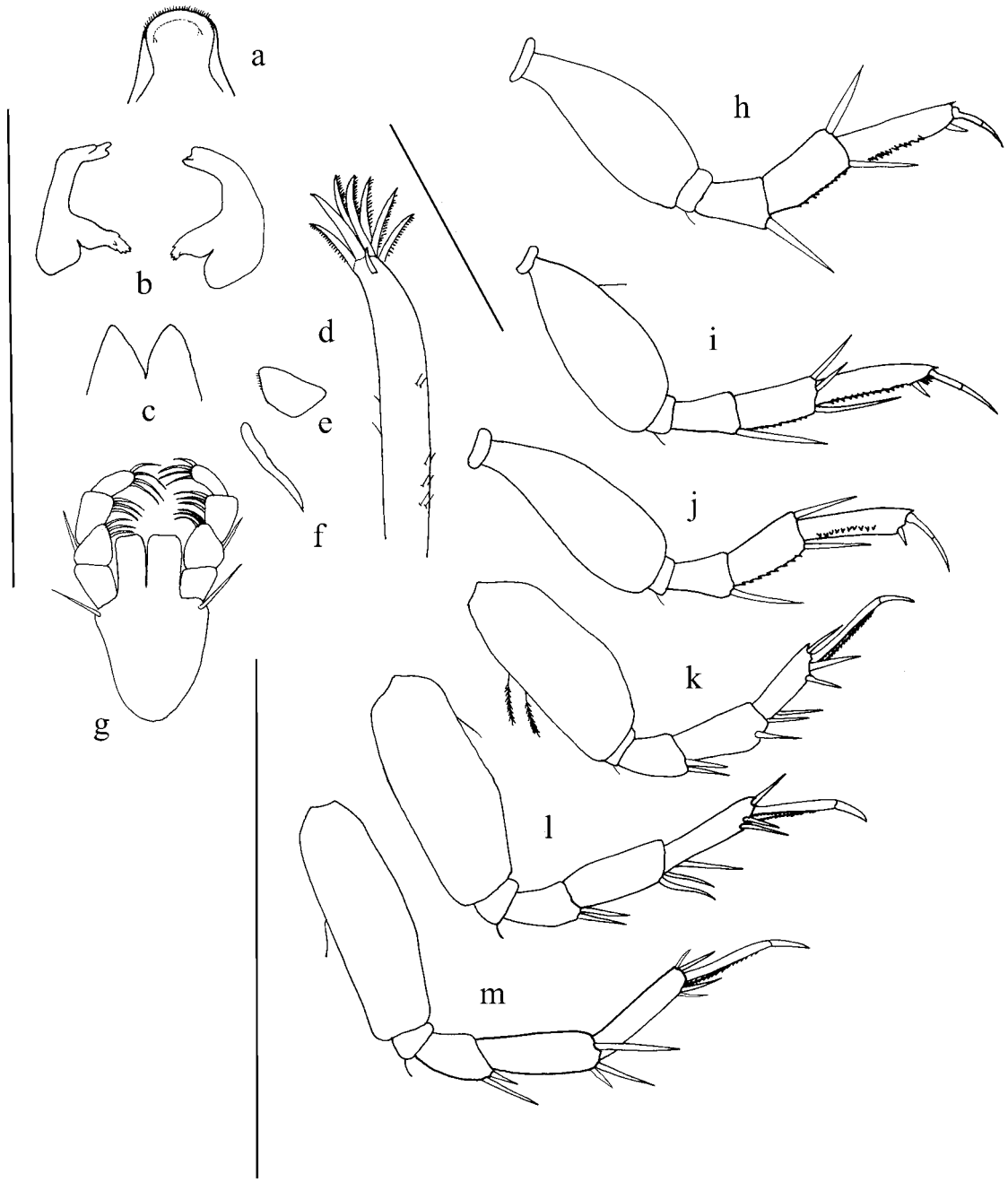

Fig 14. *Chauliopleona nickeli* n. sp. ZMH K-40251 a. labrum. b. mandibles. c. labium. (Scale bar 0.5 mm). d. maxillule. (Scale bar 0.1 mm). e. maxilla. f. epignath. g. maxilliped. h. pereopod 1. i. pereopod 2. j. pereopod 3. k. pereopod 4. l. pereopod 5. m. pereopod 6. (Scale bar 0.5 mm).

Antenna (figure 13 e): article 1very short. Article 2 square. Article 3 short with one seta distally. Article 4 longest with one short and three long distal simple setae. Article 5 as long as 1. Article 6 shortest with five terminal setae.

Labrum (figure 14 a): hoodlike with fine marginal setules.

Mandible (figure 14 b): well calcified and sclerotized on incisive margins, molar process developed, broad, bearing about ten distal spinules.

Maxillule (figure 14 d): endite setulated, with seven setulated setae and one small simple terminal spine. Palp with two terminal setae.

Maxilla (figure 14 e): rectangular, with one row of setules distally.

Labium (figure 14 c): composed of two triangular lobes, naked.

Maxilliped (figure 14 g): one long simple seta on each side of basis at attachment of palp, endites naked. Palp article 1 naked. Article 2 with one outer and three inner curved setae. Article 3 with three inner setae. Article 4 with four terminal setae.

Epignath (figure 14 f): falciform.

Cheliped (figure 13 f, 15 c): basis naked, as long as carpus. Merus triangular, with one seta. Carpus about 1.2 times as long as broad, with one midventral simple seta and one dorsodistal simple seta, and rounded protuberance at end of shield. Carpal shield developed. Fixed finger with two simple ventral setae and three dorsal setae at level of propodus and three dorsal teeth. Insertion margin of propodus crenulated. Dactylus smooth.

Pereopod 1 (figure 14 h): coxa without seta. Basis smooth. Ischium short, with one seta. Merus triangular in shape with one spiniform ventral seta as long as carpus. Carpus with two spiniform setae and a row of spinules ventrally. Propodus with about 14 fine spines ventrally, one strong seta distally, half length of dactylus. Dactylus about as long as unguis. Unguis short and pointed.

Pereopod 2 (figure 14 i): as pereopod 1 except basis with one seta, carpus with three terminal spiniform setae.

Pereopod 3 (figure 14 j): as pereopod 1.

Pereopod 4 (figure 14 k): basis with two setulose setae. Ischium with one seta. Merus of triangular shape with two spiniform setae. Carpus with three spiniform setae. Propodus with three terminal spiniform setae. Dactylus longer than propodus, with ventral groove bordered with proximally directed spinules. Unguis short and pointed.

Pereopod 5 (figure 14 l): as pereopod 4, except basis with one simple seta and propodus longer than dactylus.

Pereopod 6 (figure 14 m): as pereopod 5, except propodus with four terminal spiniform setae.

Pleopods (figure 13 g): basal article triangular, exopod and endopod with simple strong setae.

Uropods (figure 13 h): basal article longer than wide. Exopod shorter than basis, composed of two articles: article 1 with one terminal seta, article 2 with one terminal seta as long as exopod. Endopod composed of two long articles: article 1 with two and article 2 with five simple terminal setae.

Type locality: Weddel Sea, ANT XV/3, RV Polarstern, station 48-89, 73° 27.5´S 22° 43.10´W - 73° 27.90´S 22° 47.8´W, 1583 - 1573 m, EBS, 4 February 1998.

Etymology: this species is named after Jörg Nickel, a colleague and friend.

Remarks. The *C. armata* reported from the south Pacific, Indian Ocean and antarctic waters by Kudinova-Pasternak (1986) are probably *C. nickeli* n. sp.or a closely similar species. Material from the reference collection of Jürgen Sieg from Kerguelen Island are close to *C. nickeli* n. sp unfortunately they are not in good conditions to make a description. The material of Vanhöffen (1914) refered to *Leptognathia sp*., could not be found for comparision but it is very probable that it belongs to *C. nickeli* n. sp.

Discussion

Chauliopleona is very easy to distinguish from other taxa because of its posteriorly directed ventral apophysis on pleonite five. This apophysis is very variable among all the studied material. In some individuals it reaches to the junction of pleonite 5 to the pleotelson, in some to the midlength of the pleotelson, and in others it can be very large, surpassing the length of the pleotelson. In some individuals it is not very well developed, and in two specimens of *C. nickeli* it was directed downwards.

The distribution of the genus is very wide in the Atlantic Ocean, from Greenland to the Antarctic, and in the East Pacific Ocean from California to the Magellan Strait.
The species of *Chauliopleona* are similar in their morphology, leading many authors in the past to doubt the validity of some species. Hansen (1913), in is his original description of *Leptognatia armata, L. hastata,* and *L. amdrupii* refers to this problem. Kudinova Pasternak (1965, 1986) synonymized *L. hastata* with *L. armata* and did not recognize the Antactic form as a new species. Unfortunatelly the material examined by Kudinova-Pasternak could not be obtained for comparison.

It is not clear to which *Chauliopleona* species belong the specimens mentioned by Menzies and Mohr (1962). Their drawings are not good enougth to identify the animal, although it may be a preparatory male because five articles are shown on the antennule. *C. armata* was until now only known from south Greenland and the north Atlantic Ocean. The presence of this species in the north Pacific is doubtful and it is posible that the animals reported belongs to *C. dentata* or to a new, undescribed species.

The absence of males, and mancas in the material studied cannot be satisfactorily explained. Preparatory males of these species were described by Dojiri and Sieg (1997) and are characterized by having five articles in the antennule. The most probable explanation is that male: female ratio is very low. Future studies may resolve this problem .

Key to species of *Chauliopleona*, comparison of cheliped on figure 15.

1. Cheliped with carpus slender, about twice as long as broad (see figure15).....*C. amdrupii* (Hansen, 1913).
   Cheliped with carpus very broad forming a carpal shield, carpus less than twice as long as broad.....2
2 Dorsal margin of dactylus of chela smooth.....3
   Dorsal margin of dactylus of chela crenulated 6
3 Carpus of cheliped more than 1.5 times as long as broad 4
   Carpus of cheliped shorter 5
4 Merus of cheliped with midventral rounded protuberance bearing seta, pleon as long as cephalothorax.....*C. amftae* n. sp.
   Merus of cheliped witout midventral rounded protuberancebearing seta, pleon longer than cephalothorax .....*C. armata* (Hansen, 1913).
5 Carpus of cheliped with two ventral rounded lobes on carpal shield, fixed finger with four teeth.....*C. hastata* (Hansen, 1913).
   Carpus smooth, fixed finger with three teeth.....*C. nickeli* n. sp.
6 Pleon as long as cephalothorax, dactylus of pereopods 4 to 6 with large spines.....*C. paradoxa* n. sp.
   Pleon longer than cephalothorax, dactylus of pereopod 4 to 6 with fine small spinules.....*C. dentata* Dojiri and Sieg, 1997.

Fig 15. *Chauliopleona* chelipeds: a. *C. armata*. b. *C. hastata*. c. *C. nickeli*. d. *C. amftae*. e. *C. amdrupii*. f. *C. paradoxa*. g. *C. dentata*. The chelipeds are not drawn in the same scale.

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Veröffentlichung V

A revision of the genus *Paraleptognathia* Kudinova-Pasternak, 1981 (Crustacea: Tanaidacea) and description of four new species

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Abstract

The genus *Paraleptognathia*, a common representative of the deep-sea and polar faunas, has been revised. The genus *Akanthophoreus* Sieg, 1986 has been synonymized with *Paraleptognathia.* A new definition and description of the genus *Paraleptognathia*, redescriptions of nine species *P. alba* (Hansen, 1913), *P. antarctica* (Vanhöffen, 1914), *P. australis* (Beddard, 1886), *P. brachiata* (Hansen, 1913), *P. gracilis* (Krøyer, 1842), *P. inermis* (Hansen, 1913), *P. longiremis* (Lilljeborg, 1864), *P. multiserrata* (Hansen, 1913), *P. weddellensis* (Sieg, 1986), and descriptions of four new species *P. multiserratoides* n. sp., *P. benguela* n. sp., *P. fastuosa* n. sp., *P. tenuichela* n. sp.are presented. The 16 species of *Paraleptognathia* are discussed.

Key words: *Paraleptognathia, Akanthophoreus*, *P. multiserratoides* n. sp., *P. benguela* n. sp., *P. fastuosa* n. sp., *P. tenuichela* n. sp., taxonomy, Polar Oceans, deep-sea.

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Introduction

The Tanaidacea is a common marine taxon, that occurs in all oceans from the upper sublittoral to the abyssal depth (Gutu & Sieg 1999). Members of the *Paraleptognathia* genus are abundant and common in the polar regions and at the abyssal depth. Until recently only four species were recognized as belonging to this genus. Some confusion about characters such as the number of articles on the antennule and similarity with other genera made the revision of the genus necessary.

The genus *Paraleptognathia* was created in 1981 by Kudinova-Pasternak to cover an unusual tanaidomorph female bearing five articles in the antennule, *Paraleptognathia typica.* She considered this character as unique among all known tanaidomorphs. In 1985 Kudinova-Pasternak described one more species *P. bacescui,* which had only four articles on antennule but with the other generic characters. She discusses the possibility that the five articles on antennule of *P. typica* are only a deviation of the normal state of the antennule or that the studied specimen has a congenital malformation. She also considered *P. typica* only a rare species with five articles in the antennule and that this genus is atypical in the Tanaidomorpha where the number of articles on the antennule in females and neuters is very constant, three or four, sometimes five like in *Collettea* (Larsen 2000), in contrast to the Apseudomorpha where it can fluctuate. In 1986, Sieg described one more species from the Antarctic, *P. antarctica*, and discussed the pleopod character of *P. typica* which had consist of two articled exopod of pleopod. He believed this to be a misinterpretation by Kudinova-Pasternak (1981) and the normal state is only one segment, as in *P. bacescui* and *P. antarctica*.

Sieg (1991) mentioned that *Akanthophoreus* is a synonym of *Paraleptognathia* but did not explain the arguments, and refers to a work that has been never published. This led to a lot of confusion about this genus, which seems have not constant number of articles in the antennule. Moreover Dojiri & Sieg (1997) described *Paraleptognathia bisetulosa* and gave some notes on *Paraleptognathia gracilis* (Krøyer, 1842) without explaining the synonymy of this species.

The genus *Akanthophoreus* was erected by Sieg (1986). The main character of the genus was the spiniform seta on the carpus of the first walking leg. The antennule is composed of four articles and the chela is attached via sclerite. The basis of the chela was typically triangular. Sieg recognized six species that belong to this genus: *A. antarcticus* (Vanhöffen, 1914), *A. australis* (Beddard, 1886), *A. gracilis* (Krøyer, 1842), *A. longiremis* (Lilljeborg, 1864), *A. multiserratus* (Hansen, 1913) and *A. weddellensis* Sieg, 1986.

In the same work Sieg (1986) created the subfamily Akanthophoreinae to cover genera with a spiniform seta on carpus of pereopod one. The type genus of this subfamily was *Akanthophoreus*.

In the phylogenetic analysis of the Paratanaoidea Larsen & Wilson (2002) stated that *Akanthophoreus* cannot be placed in any known family and it is considered as *incertae sedis.* In the same work it was mentioned that the genus *Leptognathia* may have a close relationship to *Paraleptognathia*. On the species list of the Tanaidacea homepage (Anderson et al. 2004) the genus *Akanthophoreus* and *Paraleptognathia* are *incertae sedis*.

Material and methods

The material used for this study came from the reference collection of Jürgen Sieg, the Zoological Museum Berlin, the Zoological Museum Hamburg, and the Zoological Museum of the University of Copenhagen.

The material was collected during several expeditions on board of different ships, RV ”Diana” 1900 (Greenland), RV ”Ingolf” 1898, (Greenland), RV ”Walther Herwig” 1984/85 (the Antarctic), RV ”Meteor” 1989/90 (the Antarctic), 2000 (Angola Basin), RV ”Polarstern, Polarfuchs” 1984, RV ”Polarstern” 1983, 1986 (the Antarctic), 1993, 1994 (Iceland and Greenland), RV ”Porsild” 1998, 1999 (Greenland). Different capture gears were used: dredge (Dg), Agassiz trawl (AT), epibenthic sledge (EBS), box corer (BC), multicorer (Muc). For station data see Table 1.

Dissections were made in glycerine using a Leitz Großfeld TS dissecting microscope; drawings were made using a Leitz Dialux microscope equipped with a camera lucida.
The terminology for the descriptions was adopted from Larsen (2003).

Only females, neuters and juvenile males were used in this study. Mature males are very scarce and because sufficient males were not available, they have not been described in the present study. At the moment it is not possible to distinguish the males of this genus clearly from each other and to be sure that the males belong to a specific species (female) on morphological basis.

The type series of the new species are deposited at the Zoological Museum Hamburg (ZMH), the Zoological Museum Berlin (ZMB), and the Zoological Museum of the University of Copenhagen (ZMUC).

The type material of *Paraleptognathia typica* Kudinova-Pasternak, 1981, *P. bacescui* Kudinova-Pasternak, 1985 and *P. bisetulosa* Dojiri & Sieg, 1997 was not available for this study.

Table 1 List of ships and stations

Place	Ship	Station	Position 1	Position 2	Depth	Date	Gear
Antarctic Peninsula	Meteor	21	61° 00.5´S 55° 59.9´W		429	30.12.89	BC
Antarctic Peninsula	Meteor	27	61° 45.0´S 57° 54.2´W		329	01.01.90	BC
Antarctic Peninsula	Meteor	30	62° 40.6´S 59° 12.9´W		510	02.01.90	BC
Antarctic Peninsula	Meteor	50	62° 15.3´S 60° 34.3´W		168	05.01.90	BC
Antarctic Peninsula	Meteor	66	64° 28.5´S 64° 45.0´W		320	08.01.90	Dg
Antarctic Peninsula	Meteor	87	66° 32.7´S 68° 29.2´W		435	12.01.90	BC
Antarctic Peninsula	Meteor	96	62° 46.6´S 60° 54.1´W		145	16.01.90	BC
Admiralty Bay	Polarstern, Polarfuchs	15			200	20.11.84	BC
South Orkney Islands	Walther Herwig	89	60° 34.9´S 44° 17.0´W		240	12.02.85	BC
South Orkney Islands	Walther Herwig	96	60° 46.6´S 45° 21.6´W		127	14.02.85	BC
South Orkney Islands	Walther Herwig	97	60° 46.6´S 45° 21.6´W		127	14.02.85	BC
South Orkney Islands	Walther Herwig	106	61° 07.5´S 46° 31.5´W		289	16.02.85	BC
South Orkney Islands	Walther Herwig	120	60° 23.1´S 46° 44.0´W		280	19.02.85	BC
Off Elephant Island	Walther Herwig	138	61° 21.8´S 56.00.6´W		368	22.02.85	BC
Off Elephant Island	Walther Herwig	149	61° 09.0´S 56° 07.2´W		208	24.02.85	BC
Off Elephant Island	Walther Herwig	161	60° 51.3´S 55° 45.6´W		290	26.02.85	BC
Off Elephant Island	Walther Herwig	166	61° 00.3´S 55° 13.6´W		195	27.02.85	BC
Antarctic Peninsula	Walther Herwig	266	63° 11.3´S 58° 47.3´W		100	21.03.85	BC
Off Elephant Island	Polarstern	6	61° 10.0´S 55° 16.0´W		202	10.05.86	AT
Off Elephant Island	Polarstern	10	60° 5.36´S 55°39.98´W		112	10.05.86	BC
Off Elephant Island	Polarstern	20	61°13.34´S 55°52.83´W		96	12.05.86	BC
Off King George Island	Polarstern	21	75° 38.9´S 27°20.86´W		289	23.02.83	AT
Off Elephant Island	Polarstern	91	62° 49.51´S 60° 57.50´W		247	24.05.86	BC
Off Elephant Island	Polarstern	139	65° 51.03´S 55° 39.76´W		231	09.06.86	BC
Off Elephant Island	Polarstern	140	60° 53.71´S 55° 46.74´W		320	09.06.86	BC
Off Elephant Island	Polarstern	143	60° 55.51´S 55° 09.33´W		358	10.06.86	BC
Off Elephant Island	Polarstern	145	61° 04.64´S 55° 54.78´W		142	11.06.86	BC
Off Elephant Island	Polarstern	147	61° 03.34´S 55° 51.63´W		139	11.06.86	BC
Off Elephant Island	Polarstern	148	60° 50.62´S 55° 32.53´W		342	12.06.86	BC
Off Elephant Island	Polarstern	152	61° 04.80´S 56° 03.04´W		403	13.06.86	BC
Off Elephant Island	Polarstern	153	61° 02.97´S 55° 51.76´W		143	13.06.86	BC
Off Elephant	Polarstern	154	61° 01.34´S		339	13.06.86	BC

Island			56° 00.42´W				
Off Elephant Island	Polarstern	155	60° 59.38´S 55° 58.71´W		331	13.06.86	BC
Greenland	Polarstern Ark IX-3	155	80° 06.89´N 10° 41.71´W	80° 06.86´N 10° 42.62´W	186	11.07.93	EBS
Grönland	Polarstern Ark IX-3	179	80° 36.56´N 11° 17.20´W	80° 36.38´N 11° 17.98´W	260	14.07.93	EBS
Greenland	Polarstern	31-6	74° 56.86´N 11°07.00´W		2681	13.07.94	EBS
Greenland	Polarstern	31-9	74° 53.52´N 12° 25.39´W	74° 53.63´N 12° 25.95´W	1525	17.07.94	EBS
Iceland	Polarstern	31-39	80° 39.93´N 12° 34.82´W	80° 39.79´N 12° 34.91´W	50	29.07.94	EBS
Mellemfjord Grönland	Porsild		69°.46.6´N 54° 45.7´W	69° 42.2´N 54° 32.5´W	145 -75	07.1998	Dg
Mellemfjord Grönland	Porsild		69°.46.6´N 54° 45.7´W	69° 42.2´N 54° 32.5´W	145 -75	07.1999	Dg
Angola Basin	Meteor 48	318	22° 18.7‘ S 03° 17.7‘ E	22° 20.2‘ S 03° 18.4‘ E	5144	9.7.2000	EBS
Angola Basin	Meteor 48	325	19° 58.2‘ S 02° 59.7‘ E		5493	14.7.2000	Muc
Angola Basin	Meteor 48	338	18° 18.1‘ S 04° 39.9‘ E	18° 20.8‘ S 04° 38.6‘ E	5398	22.7.2000	EBS
Angola Basin	Meteor 48	340	18° 17.3‘ S 04° 41.2‘ E	18° 19.4‘ S 04° 41.9‘ E	5395	23.7.2000	EBS
Angola Basin	Meteor 48	341	17° 08´S 04° 42´E		5479	23.7.2000	BC
Angola Basin	Meteor 48	344	17° 04.9‘ S 04° 40.8‘ E	17° 07.5‘ S 04° 42.3‘ E	5415	25.7.2000	EBS
Angola Basin	Meteor 48	345	16° 17.0‘ S 05° 27.0‘ E		5390	26.7.2000	BC
Angola Basin	Meteor 48	346	16° 17.0‘ S 05° 27.0‘ E		5434	27.7.2000	Muc
Angola Basin	Meteor 48	348	16° 17.1‘ S 05° 27.3‘ E	16° 19.3‘ S 05° 27.2‘ E	5387	28.7.2000	EBS
Angola Basin	Meteor 48	350	16° 13.3‘ S 05° 26.8‘ E	16° 14.9‘ S 05° 26.7‘ E	5389	28.7.2000	EBS

Taxonomy

Tanaidomorpha Sieg, 1986

Incertae sedis

Genus *Paraleptognathia* Kudinova-Pasternak, 1981

Synonymy : *Akanthophoreus* Sieg, 1986

Diagnosis: antennule with four articles, antenna with six articles, cheliped insertion via sclerite. Exopod of uropod composed of two articles. Merus of pereopod 1 with one spiniform seta and carpus with two spiniform setae. Ventral surface of cephalothorax with a groove around cheliped insertion.

Description: body long and slender, six to ten times as long as wide. Cephalothorax oval; no ocular processes; eyes absent. Pereon composed of six free pereonites. Pleon composed of five free pleonites and pleotelson; as wide as pereon and cephalothorax. Antennule of four articles in females and neuters, of five in juvenile males and seven in adult

males. Antenna composed of six articles; article 1 short, semifused to cephalothorax; article 2 and 3 with a seta; article 4 longest with one or two distal setae. Labium hood-shaped with distal setules. Mandibles well calcified; molar process not pointed**,** with about ten end spinules. Lacinia mobilis thornlike (cylindrical or flat with distal denticules). Maxillula endite with eight to ten terminal spiniform setae, some of them pinnate; palp with two terminal filaments. Epignath cudgel-shaped with one thin spine distally. Maxilla rectangular. Labium composed of two triangular lobes with some distal setae. Maxilliped basis fused, with two setae near insertion of palpus. Palpus composed of four articles, article 1 naked; article 2 with three inner and one outer setae; article 3 with three inner setae; article 4 with five terminal setae. Ventral surface of cephalothorax with a groove around cheliped insertion. Cheliped attached via sclerite. Cheliped merus with ventral simple setae; carpus with one dorsal seta near insertion of chela and sometimes near insertion to merus; one or two ventral simple setae at midlength; propodus with three dorsal simple short setae near cutting edge. Cutting edge with none to four teeth; fixed finger with two ventral long simple setae. Merus of pereopod 1 with one spiniform seta and carpus with two spiniform setae. Dactylus of pereopod 1 -3 smooth and pointed. Dactylus of pereopod 4–6 bear a ventral groove bordered by spinules. Merus of pereopod 5 and 6 with two spiniform setae. Pleopod biramous; exopod with one long feathered seta. Uropod biarticled; exopod and endopod composed of two articles; exopod shorter then first article of endopod.

Ovigerous females: as non-ovigerous females, body flattened dorsoventrally with marsupium, composed of four oostegites originated at pereopod 1 to 4.

Neuter: as non-ovigerous female.

Juvenile males: as non-ovigerous females except antennule with five articles and cheliped ornamentation (crenulation, tubercles) more prominent.

Males: antennule with seven articles. Inner margin of chela with a row of simple setae near insertion of dactylus. Pleopods well developed, pleon almost as long as pereon.

Type species**:** *Paraleptognathia typica* Kudinova-Pasternak, 1981, original designation.

Included species**:** in addition to the type species are: *Paraleptognathia alba* (Hansen, 1913), *P. antarctica* (Vanhöffen, 1914), *P. australis* (Beddard, 1886), *P. bacescui* Kudinova-Pasternak, 1985, *P. benguela* n. sp., *P. bisetulosa* Dojiri & Sieg, 1997*, P. brachiata* (Hansen, 1913), *P. fastuosa* n. sp., *P. gracilis* (Krøyer, 1842), *P. inermis* (Hansen, 1913), *P. longiremis* (Lilljeborg, 1864), *P. multiserrata* (Hansen, 1913), *P. multiserratoides* n. sp., *P. tenuichela* n. sp., *P. weddellensis* (Sieg, 1986).

Remarks: the revision of the genus *Paraleptognathia* became necessary due to an observation made during the analysis of more than two thousand Tanaidacea from Greenland in 2003. Up to now *Akanthophoreus* and *Paraleptognathia* were recognized as valid genera. It was suspicious that in the studied materials an undescribed species of *Paraleptognathia* was always found together with "*Akanthophoreus gracilis"*. Both species were very similar, sharing the same identification characters; the only difference was the five articles in antennule, and better expressed crenulation of cheliped and bigger tubercles in *Paraleptognathia* than in *Akanthophoreus*. Previous studies were bringing suspicious results: ovigerous females and mancas of *Paraleptognathia* were always absent in samples, although this species was sometimes very abundant, these findings were never explained. Further observation displayed that one non-ovigerous female of the new "*Paraleptognathia*" species from Greenland had a small genital cone. Hansen (1913) mentioned that the preparatory males of *Leptognathia hanseni* Vanhöffen, 1907 had five segments on the antennule. This facts led to a more detailed comparison of the two genera. After examining a male of "*Akanthophoreus gracilis*" and comparing it with the new *Paraleptognathia* species it was clear that this "*Paraleptognathia*" is a preparatory male of *Akanthophoreus gracilis*. This assumption led to the comparison of the rest of "*Akanthophoreus*" and "*Paraleptognathia*" species, *Paraleptognathia antarctica* and *Akanthophoreus antarcticus*, were sympatric and shared the same diagnostic characters. In samples with *A. weddellensis* or *A. australis* were always *Paraleptognathia* specimens that differs only in the number of articles in the antennule. After all these observations it has become clear that the genera *Paraleptognathia* and *Akanthophoreus* were synonyms. The discovery of unpublished notes of Jürgen Sieg deposited in the Zoological Museum Berlin (collection of Dr. O. Coleman) confirmed this observation.

Paraleptognathia was described by Kudinova-Pasternak in 1981 and has priority over *Akanthophoreus* Sieg, 1986. Therefore *Akanthophoreus* is a junior synonym of *Paraleptognathia.*

***Paraleptognathia alba* (Hansen, 1913) new combination (Figs 1, 2)**

Synonymy: *Leptognathia alba* Hansen, 1913

Material examined: two individuals. Holotype ZMUC CRU 5247 non ovigerous female, 3.7 mm, south west of Cape Farewell, RV ”Ingolf” St. 22, 58° 10´N 48° 25´W 1845 fm (3376 m). Other material ZMUC CRU 3944 non ovigerous female, 2.6 mm, East Iceland, Bakkefjord (Bakkafloi), RV ”Diana” St 8., 24-30 m.

Diagnosis: Chela smooth, carpal shield developed and rounded, carpus twice as long as wide.

Description: non-ovigerous female. Body (Fig. 1a, b): long, about seven and a half times as long as wide. Pleon shorter than cephalothorax. Body length 2.6 to 3.7 mm. Cephalothorax (Fig.1a, b): one and a half times longer than wide. Pereon (Fig.1a, b): pereonite 6 shortest, pereonite 1 as long as 5, pereonites 2, 3 and 4 of equal length. Pleon (Fig.1a, b): pleonites of equal length; pleotelson rounded, apex with a tubercle.

Antennule (Fig. 2b): article 1 longer than all the others together, with one distal simple seta; article 2, one third of length of first, with two distal simple setae; article 3 shortest with one distal simple seta; article 4 with four terminal setae.

Antenna (Fig. 2c): article 1 short, semifused to the cephalothorax; article 2 as long as wide; article 3 half as long as second; article 4 longest with two distal setae; article 5 with one terminal seta; article 6 shortest with three terminal setae.

Cheliped (Fig. 2a): basis as long as chela; merus triangular with one ventral simple seta; carpus longer than wide with one ventral seta at midlength, carpal shield developed and rounded; propodus smooth, twice as long as dactylus, cutting edge with four teeth; dactylus smooth, naked.

Pereopod 1 (Fig. 2e): coxa naked; basis three times longer than wide, naked; ischium short with one simple, thin seta; merus smooth with one spiniform seta; carpus smooth with two spiniform setae; propodus smooth with one distal short spiniform seta and a dorsal spine; dactylus smooth, unguis half as long as dactylus, sharp.

Pereopod 2 (Fig. 2f): as pereopod 1, except carpus with three spiniform setae; propodus with one simple thin seta dorsally, near spine.

Pereopod 3 (Fig. 2g): as pereopod 2, except basis four times longer than wide.

Pereopod 4 (Fig. 2h): basis about three times as long as wide, naked; ishium short, naked; merus smooth, with two spiniform setae; carpus smooth with three spiniform setae; propodus smooth with four terminal spiniform setae; ungius sharp, about half length of dactylus.

Pereopod 5 (Fig. 2i): as pereopod 4, except ischium with simple seta; propodus with three spiniform setae.

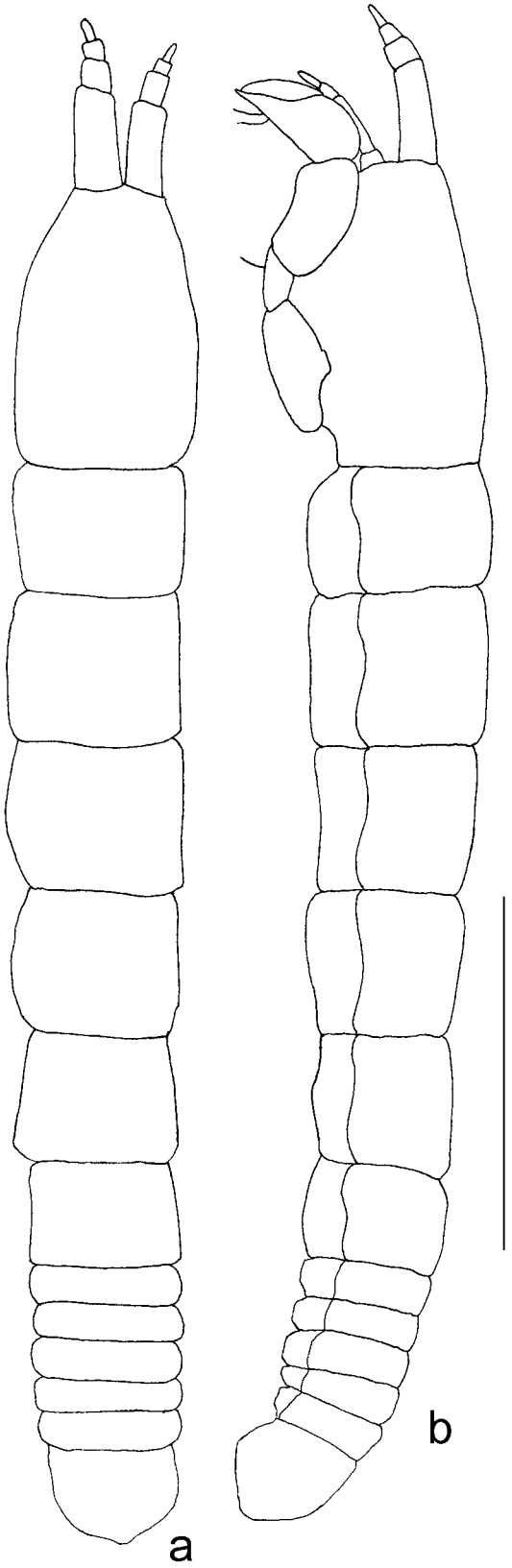

Figure 1. *Paraleptognathia alba*, holotype, ZMUC CRU 5247 a. Body, dorsal view, b. Body, lateral view. Scale bar 1mm.

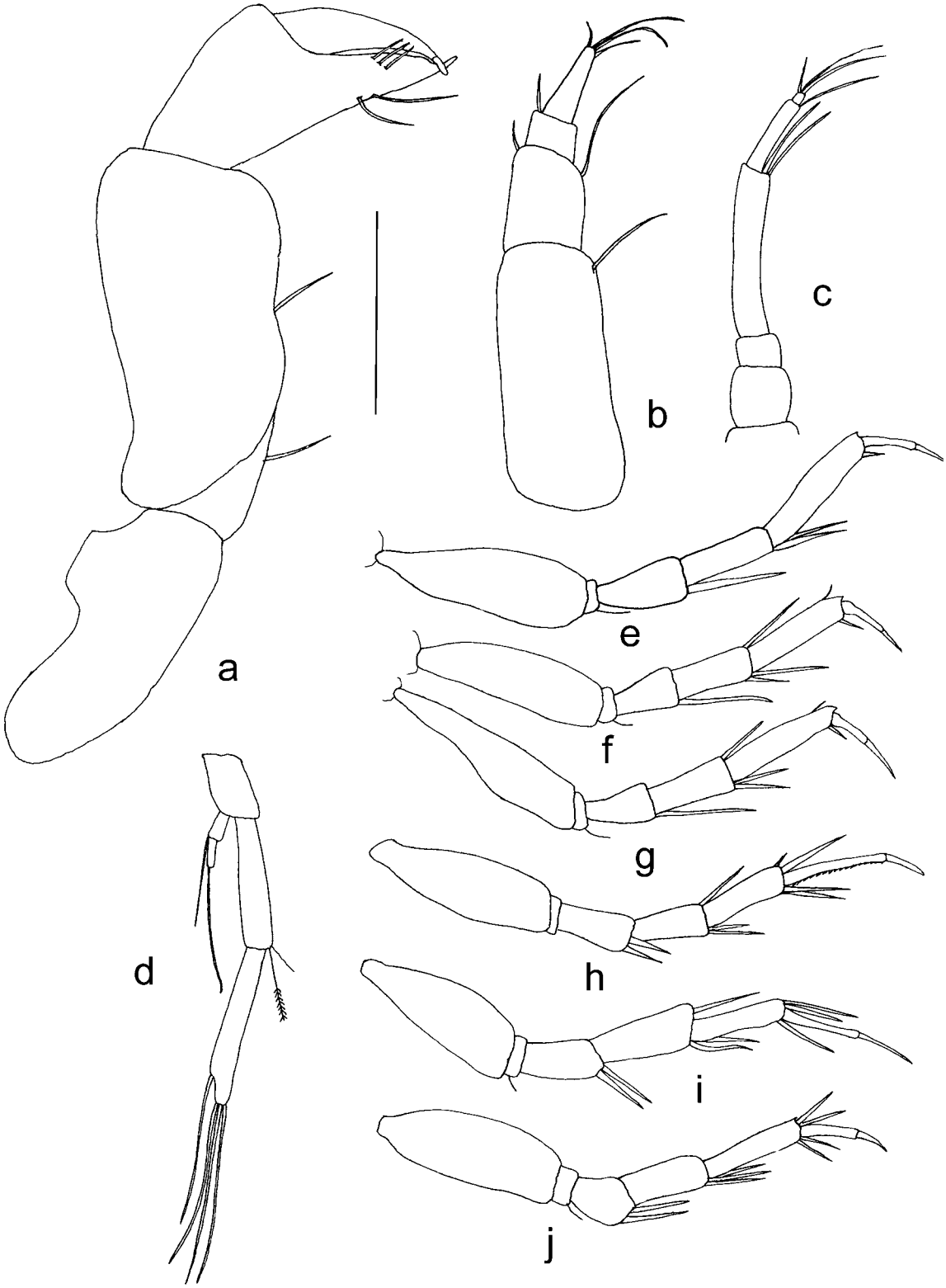

Figure 2. *Paraleptognathia alba*, holotype, ZMUC CRU 5247 a. Cheliped, b. Antennule, c. Antenna, d. Uropod, e. Pereopod 1, f. Pereopod 2, g. Pereopod 3, h. Pereopod 4, i. Pereopod 5, j. Pereopod 6. Scale bar 0.25 mm.

Pereopod 6 (Fig. 2j): as pereopod 4, except ischium with seta.

Pleopods: present, not illustrated.

Uropods (Fig. 2d): basal article rectangular, naked; exopod half as long as article 1 of endopod. Exopod article 1 with one simple terminal seta; article 2 with one terminal long seta. Endopod article 1 shorter than article 2, with one setulose and one simple seta distally; article 2 with four long distal setae.

Type locality: south west of Cape Farewell RS "Ingolf" St. 22, 58° 10´N 48° 25´W, 1845 fm (3376 m).

Distribution: this species is only known from Iceland and south Greenland.

Remarks: because this species is represented by two individuals, the holotype and one animal misidentified as *Leptognathia sarsii* Hansen, 1909, dissection was not possible and mouthparts were not investigated. The antenna and the pleopods could not be studied properly. This species can clearly be distinguished from other *Paraleptognathia* species in the shape of the cheliped carpus which is twice as long as wide. The ventral flat tubercles mentioned by Hansen (1913) on the pleon are not characteristic for this species, they can be observed on other *Paraleptognathia*.

***Paraleptognathia antarctica* (Vanhöffen, 1914) new combination (Figs 3, 4)**

Synonymy**:** *Paraleptognathia antarctica* Sieg, 1986
Akanthophoreus antarcticus Sieg, 1986
Leptognathia antarctica Vanhöffen, 1914
Leptognathia diversa Sieg, 1983

Material examined**:** 18 individuals. ZMH K-40562 RV "Meteor" St. 50, one neuter, ZMH K-40563 RV "Meteor" St. 87, one juvenile male, ZMH K-40564 RV "Meteor" St. 96, one juvenile male, ZMH K-40565 RV "Polarstern, Polarfuchs" St. 15, one female, ZMH K-40566 RV "Walther Herwig" St. 89, one female, ZMH K-40567 RV "Walther Herwig" St. 96, one female, one juvenile male, ZMH K-40568 RV "Walther Herwig" St. 120, one neuter, ZMH K-40569 RV "Walther Herwig" St. 161, one female, ZMH K-40570, RV "Polarstern" St. 21, two females (one dissected), ZMH K-40571 RV "Polarstern" St. 140, two juvenile males, one neuter, ZMH K-40572 RV "Polarstern" St. 145, two females, ZMH K-40573 RV "Polarstern" St. 147, two females.

Diagnosis: Cheliped carpal shield well developed, dactylus with crenulation.

Description: non-ovigerous female. Body (Fig. 3a, b): long, about 6.5 times as long as wide. Body length 1.22 to 3.0 mm. Cephalothorax (Fig. 3a, b): about 1.3 times longer than wide, as long as pleon, tapering to antennule insertion. Pereon (Fig. 3a, b): pereonite 1 as long as pereonite 6, pereonite 5 longer than 6, pereonite 2 longer than 5 and subequal to 3 and 4. Pleon (Fig. 3a, b): pleonite 1 longest, pleonites 2 to 5 subequal.

Antennule (Fig. 3c): article 1 longest, with five short and one long simple lateral setae, article 2 as long as article 4, with one distal long simple seta; article 3 shortest with two short simple setae; article 4 with five terminal simple setae.

Antenna (Fig. 3e): article 1 short, semifused to cephalothorax, naked; article 2 as long as wide, with one short spiniform seta dorsally; article 3 with one dorsal simple seta; article 4 longest with two long simple terminal setae and three distal short setae; article 5 with one terminal simple seta; article 6 with three simple terminal setae.

Labrum (Fig. 4d): hood-like, with a row of setules at the lateral margins.

Mandible (Fig. 4c): well calcified, lacinia mobilis spiniform; pars molaris ventrally directed.

Maxillula (Fig. 4a): endite with four rows of setules ventrally, with three short, one pinnate and five simple terminal spiniform setae.

Maxilla (Fig. 4f): rectangular, naked.

Labium (Fig. 4e): composed of two triangular lobes with one short simple seta distally.

Maxilliped (Fig. 4g): endites have no special features.

Epignath (Fig. 4b): as long as Maxillula, naked.

Cheliped (Fig. 3f): basis shorter than carpus; merus with one ventral simple seta; carpus with two ventral simple setae, one dorsal seta, one tubercle near insertion of chela, carpal shield developed, not prominent; propodus twice as long as dactylus smooth, with two ventral and three dorsal setae, three teeth on cutting edge; dactylus with a row of tubercles dorsally, not well developed in all specimens.

Pereopod 1 (Fig. 3i): coxa naked; basis three times longer than wide, naked; ischium short with simple short seta; merus triangular, smooth, with one spiniform seta; carpus smooth, as long as merus, with two spiniform setae; propodus smooth with one terminal spine and a short spiniform seta; dactylus smooth; unguis sharp, as long as dactylus.

Pereopod 2 (Fig. 3j): as pereopod 1 except basis with one short simple and one setulose setae. Carpus longer than merus; propodus with one simple seta distally.

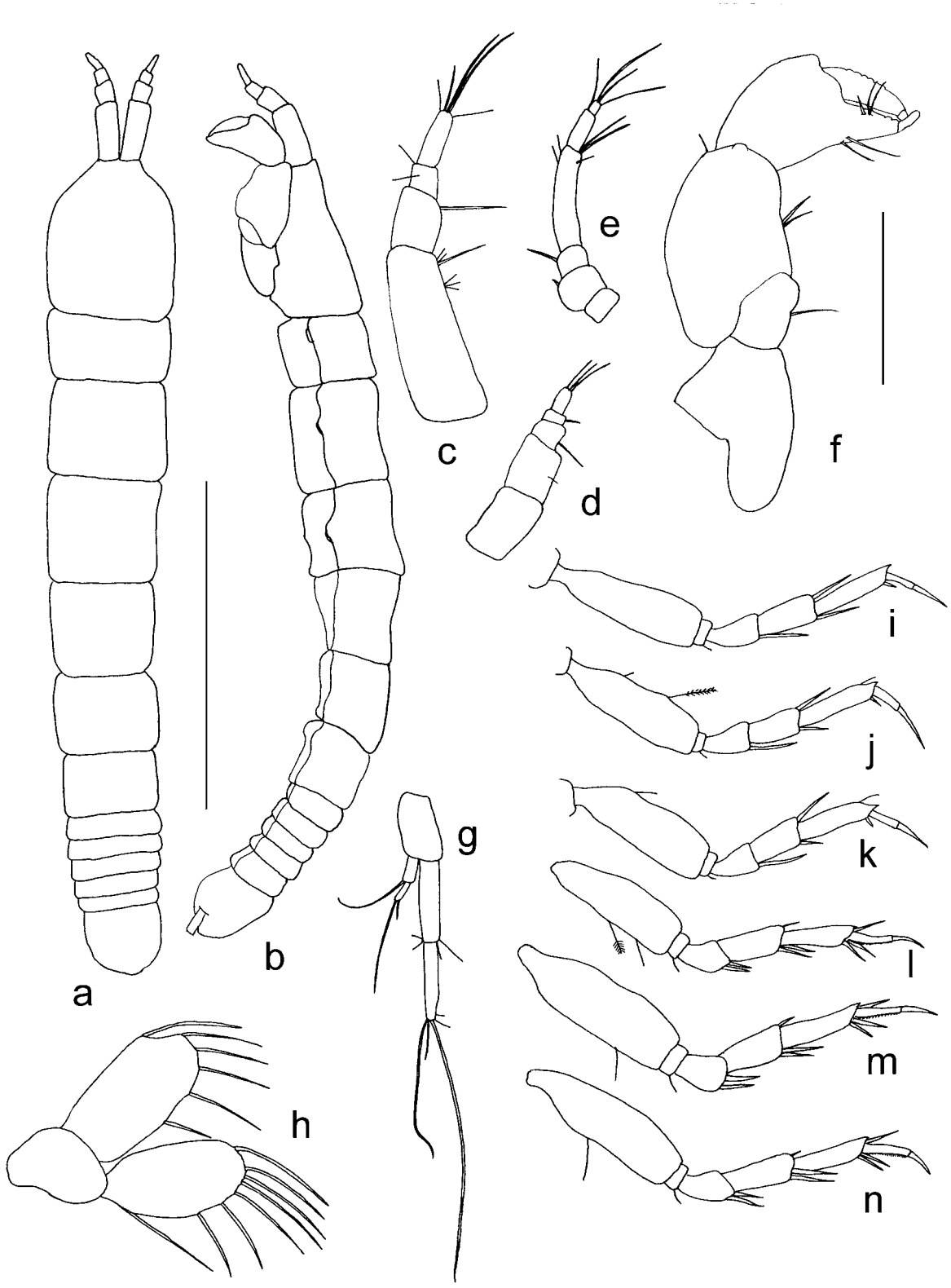

Figure 3. *Paraleptognathia antarctica* ZMH K-40570 a. Body dorsal view, b. Body, lateral view. Scale bar 1mm. c. Antennule, d. Antennule juvenile male, e. Antenna, f. Cheliped, g. Uropod, h. Pleopod, i. Pereopod 1, j. Pereopod 2, k. Pereopod 3, l. Pereopod 4, m. Pereopod 5, n. Pereopod 6. Scale bar 0.25 mm.

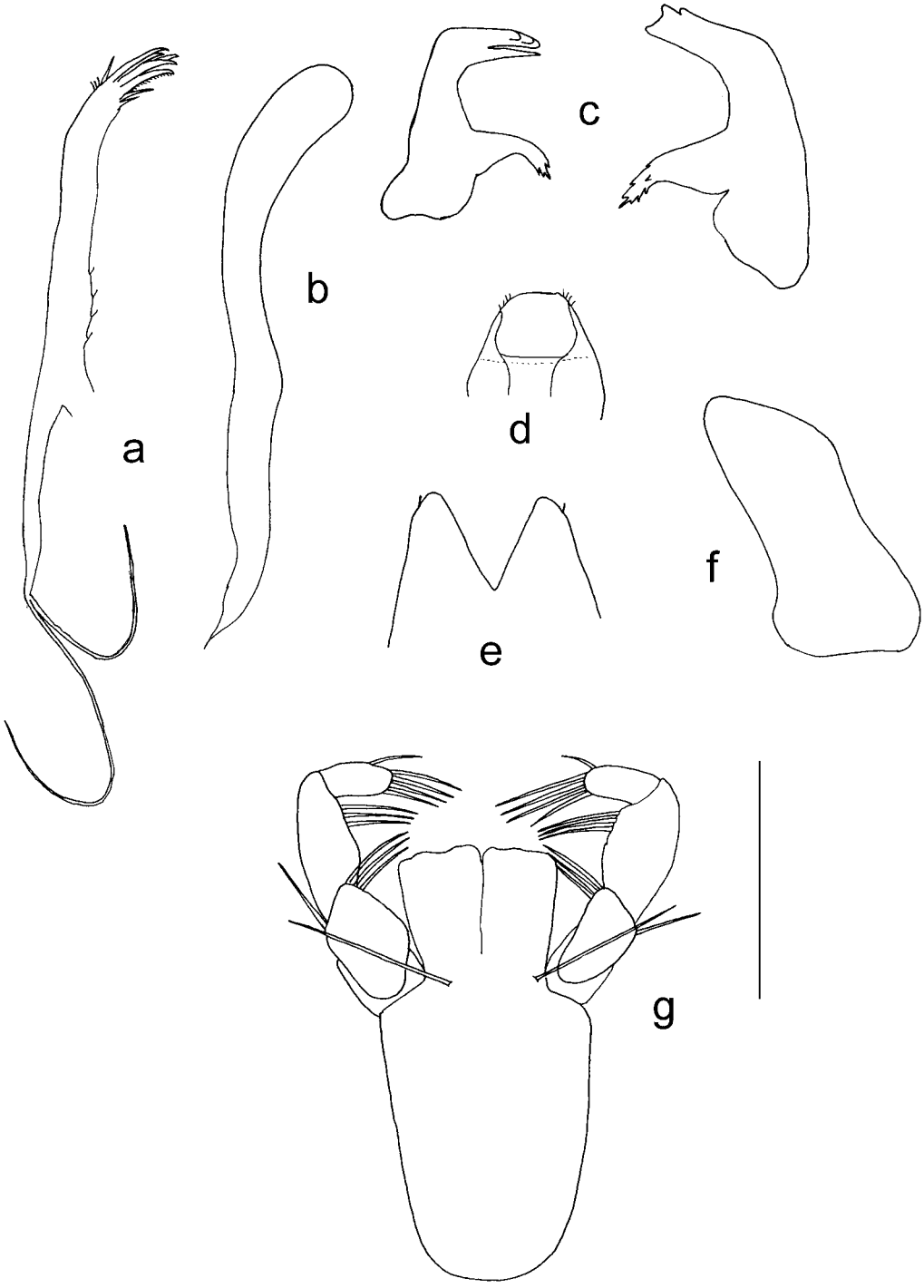

Figure 4. *Paraleptognathia antarctica* ZMH K-40570 a. Maxillula, b. Epignath, c. Mandibles, d. Labrum, e. Labium, f. Maxilla, g. Maxilliped. Scale bar 0.1 mm.

Pereopod 3 (Fig. 3k): as pereopod 2, except basis with only one short simple seta.

Pereopod 4 (Fig. 3l): basis three times as long as wide, with one setulose and one simple setae ventrally; ischium short, with one simple short seta; merus with two spiniform setae; carpus with two long and one short spiniform setae; propodus with three terminal spiniform setae; dactylus curved; unguis sharp, about as long as dactylus.

Pereopod 5 (Fig. 3m): as pereopod 4, except basis with only one simple seta.

Pereopod 6 (Fig. 3n): as pereopod 5.

Pleopods (Fig. 3h): basal article triangular, exopod with seven long simple setae; endopod with six long simple setae.

Uropods (Fig. 3g): exopod about 0,6 of length of first article of endopod, article 1 with one long simple seta; article 2 with two terminal setae; endopod article 1 with four distal short simple setae; article 2 with five terminal setae.

Ovigerous females body length 2.3 to 3.0 mm.

Juvenile male body length 1.5 to 1.8 mm. Antennule (Fig. 3d): article 1 as long as article 2, naked; article 2 with one short simple seta; article 3 with a long simple seta; article 4 shortest with one simple seta; article 5 with three terminal setae.

Mancas body length 0.9 to 1.1 mm.

Distribution: this species is found in East Antarctic waters from the Weddell Sea to the Ross Sea, around Elephant Island, South Orkney Islands, Antarctic Peninsula.

Remarks: the species *Paraleptognathia antarctica* Sieg, 1986 is the synonym of *P. antarctica* (Vanhöffen, 1914). No significant differences were found during the analysis of the material. The row of tubercles on the dorsal edge of the chelipeds dactylus is not well developed in all specimens. *P. antarctica* species is very similar to *P. gracilis* but the carpal shield of the cheliped of *P. gracilis* is not as well developed as in *P. antarctica*. Moreover *P. gracilis* occurs in the Arctic and *P. antarcica* in the Southern Ocean.

***Paraleptognathia australis* (Beddard, 1886) new combination (Figs 5, 6)**

Synonymy: *Akanthoporeus australis* Sieg, 1986

Leptognathia australis Beddard, 1886

Leptognathia gracilis Shiino, 1970

Leptognathia gracilis Kudinova-Pasternak & Pasternak, 1981

Material examined**:** 29 individuals. ZMH K-40574 RV ”Walther Herwig” St. 96, three juvenile males, ZMH K-40575 RV ”Walther Herwig” St. 120, one female, ZMH K-40576 RV ”Walther Herwig” St. 138, one female, one juvenile male, ZMH K-40577 RV ”Walther Herwig” St. 149, one female, ZMH K-40578 RV ”Walther Herwig” St. 166, one female, one male, ZMH K-40579 RV ”Walther Herwig” St. 266, one female, ZMH K-40579 RV ”Polarstern” St. 6, one female, ZMH K-40580 RV ”Polarstern” St. 20, two females (one dissected), nine neuters, ZMH K-40581 RV ”Polarstern” St. 147, one female, ZMH K-40582 RV ”Polarstern” St. 153, four females, ZMH K-40583 RV ”Polarstern” St. 155, two females**.**

Diagnosis: Cheliped carpal shield well developed, propodus with lateral crenulation, dactylus with dorsal crenulation.

Description: non-ovigerous female. Body (Fig. 5a, b): long, about eight times longer than wide. Body length 1.2 to 3.0 mm. Cephalothorax (Fig. 5a, b): about 1.5 times longer than wide, narrowing to antennule insertion. Pereon (Fig. 5a, b): pereonite 1 shortest, pereonites 5 and 6 of equal length, pereonite 2 longer than pereonite 5 and of equal length to pereonites 3 and 4. Pleon (Fig. 5a, b): pleonites of equal length and each with one simple short lateral seta; pleotelson rounded.

Antennule (Fig. 5c): article 1 longest, with one long and three short setae; article 2 as long as article 4, with one long simple seta; article 3 shortest, with two terminal simple setae; article 4 with six terminal setae.

Antenna (Fig. 5d): article 1 short, semifused to cephalothorax; article 2 as long as wide with one short spiniform seta dorsally; article 3 with one simple seta distally; article 4 longest, with two long simple and one short simple setae distally; article 5 with one long simple seta distally; article 6 shortest, with five terminal simple setae.

Labrum (Fig. 6d): hood-shaped, with a row of setules on the distal margin.

Mandible (Fig. 6c): well calcified, pars molaris bent ventrally; lacinia mobilis broad with small denticles on distal edge.

Maxillula (Fig. 6b): with three pinnated, two short and three simple terminal spiniform setae.

Maxilla (Fig. 6f): triangular, naked.

Labium (Fig. 6e): composed of two triangular lobes, with one short simple seta at distal outer margin.

Maxilliped (Fig. 6g): endites not fused, with no special features.

Epignath (Fig. 6a): as long as Maxillula, with no special features.

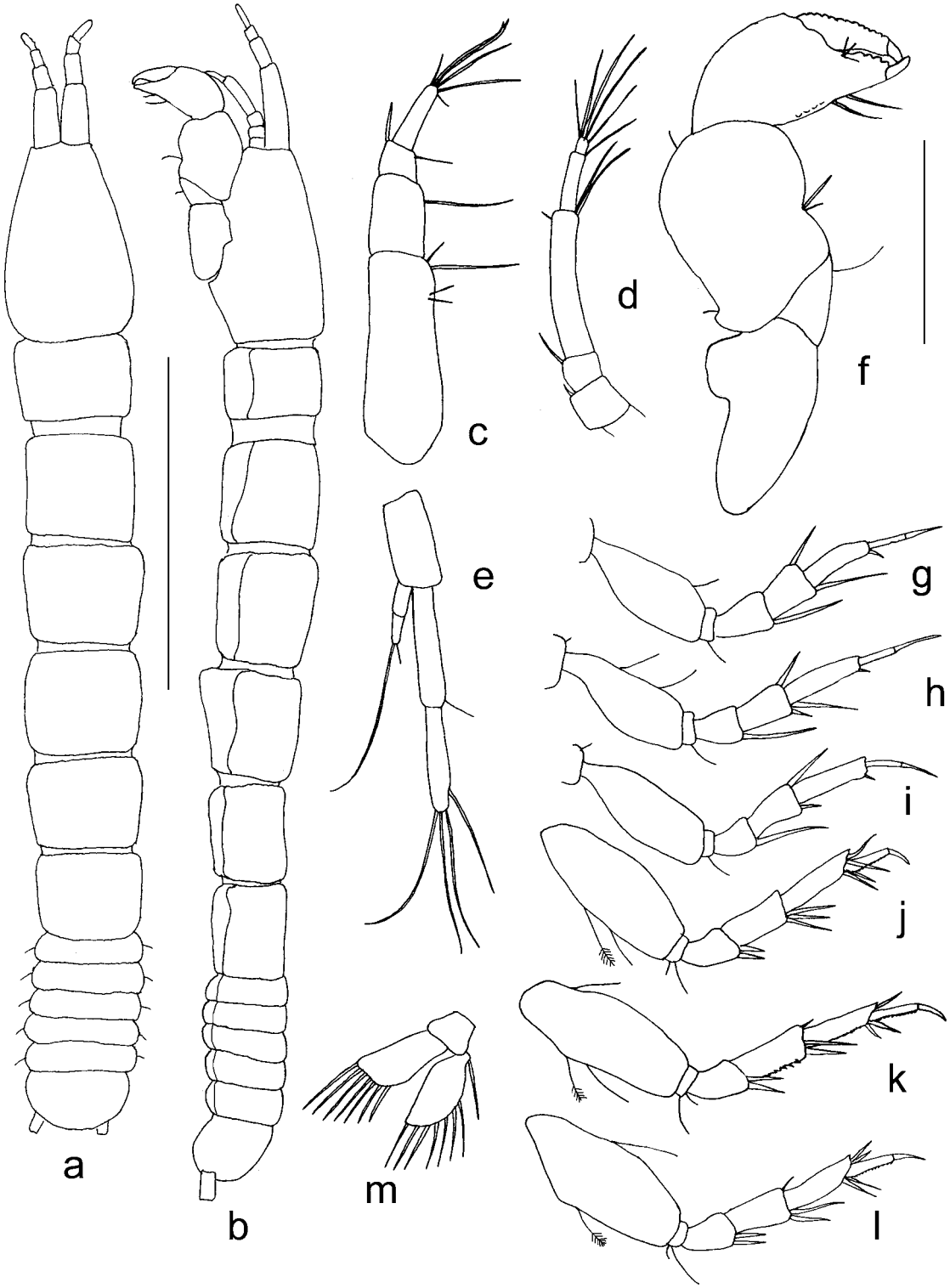

Figure 5. *Paraleptognathia australis* ZMH K-40580 a. Body dorsal view, b. Body lateral view. Scale bar 1mm. c. Antennule, d. Antenna, e. Uropod, f. Cheliped, g. Pereopod 1, h. Pereopod 2, i. Pereopod 3, j. Pereopod 4, k. Pereopod 5, l. Pereopod 6, m. Pleopod. Scale bar 0.25 mm.

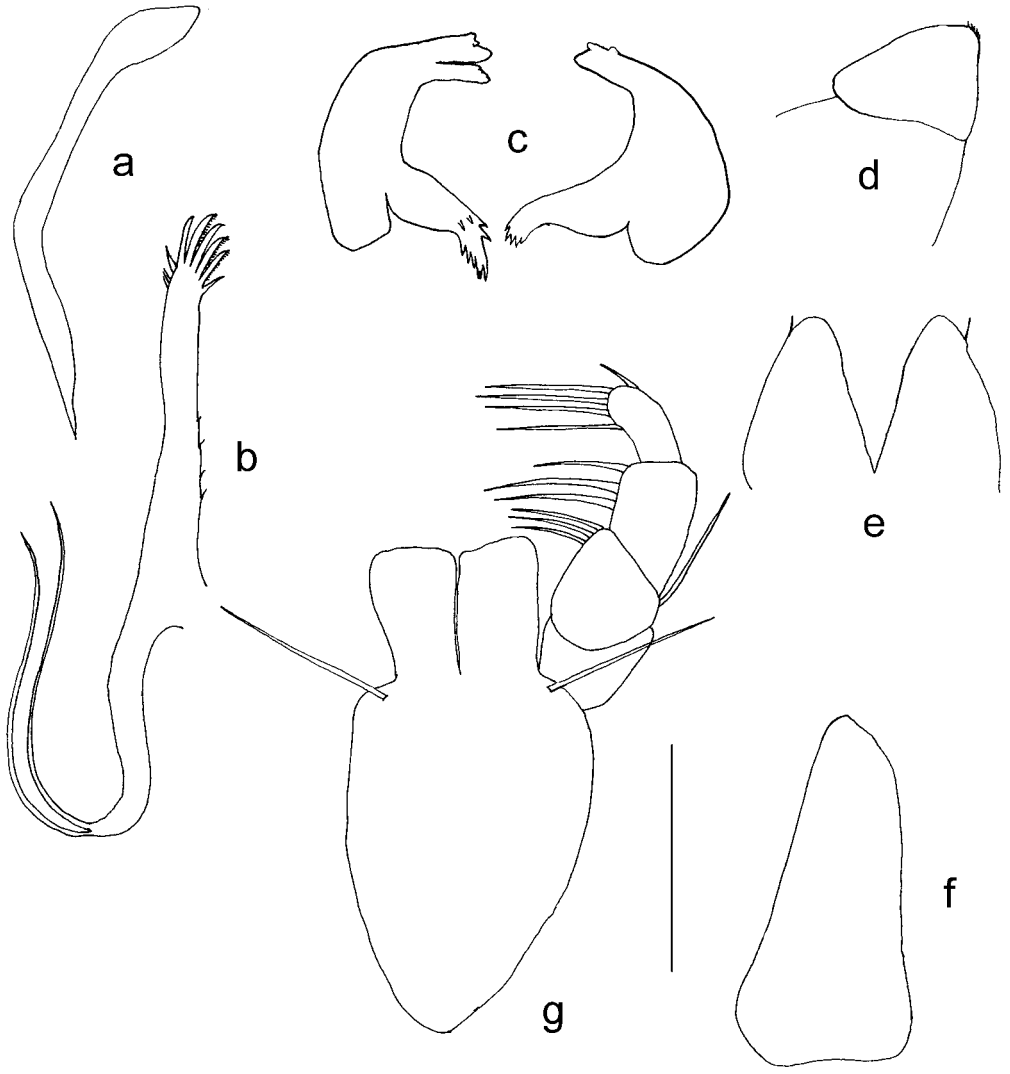

Figure 6. *Paraleptognathia australis* ZMH K-40580 a. Epignath, b. Maxillula, c. Mandibles, d. Labrum, e. Labium, f. Maxilla, g. Maxilliped. Scale bar 0.1 mm.

Cheliped (Fig. 5f): basis as long as carpus; merus with one thin ventral simple seta; carpus with two ventral and two dorsal setae, one near the basis and one near insertion of propodus, carpal shield well-developed, smooth; propodus twice as long as dactylus, with a fine crenulation on the inferior outer margin and four teeth on cutting edge; dactylus with prominent crenulation on the dorsal margin.

Pereopod 1 (Fig. 5g): coxa naked; basis short about 2.5 times longer than wide, with one simple dorsal seta; ischium short with one simple seta; merus as long as carpus, with one spiniform seta; carpus with two spiniform setae; propodus with one terminal short spiniform seta; dactylus smooth; unguis as long as dactylus.

Pereopod 2 (Fig. 5h): as pereopod 1, except coxa with seta; basis with two simple dorsal setae; merus shorter than carpus; carpus with three spiniform setae.

Pereopod 3 (Fig. 5i): as pereopod 1, except coxa with seta; merus shorter than carpus; propodus with terminal spine.

Pereopod 4 (Fig. 5j): basis about 2.5 times longer than broad, with one setulose and one simple setae; ischium short with two simple setae; merus shorter than carpus, with two spiniform setae; carpus with three spiniform setae; propodus with terminal spine and four spiniform setae; unguis about two thirds of dactylus length.

Pereopod 5 (Fig. 5k): as pereopod 4, except basis with an extra simple seta; carpus and propodus with a row of spinules ventrally.

Pereopod 6 (Fig. 5l): as pereopod 4, except basis with only one ventral setulose and one dorsal simple setae.

Pleopods (Fig. 5m): basal article triangular, exopod with seven long simple setae; endopod with seven long simple setae.

Uropods (Fig. 5e): exopod half as long as article 1 of endopod. Exopod article 1 naked; article 2 with two terminal simple setae. Endopod article 1 with one terminal seta; article 2 with four simple terminal setae.

Juvenile males body length 1.4 to 2.0 mm.

Mancas up to 1.2 mm.

Distribution: this species is found in the Weddell Sea, around Elephant Island, South Orkney Islands, South Shetland Islands, Kerguelen Island, Antarctic Peninsula.

Remarks: this species resembles *P. gracilis* and *P. antarctica* very closely. The differences are at the cheliped level, the carpal shield in *P. australis* is bigger than in *P. gracilis* and *P. antarctica*. *Paraleptognathia antarctica* lacks the fine crenulation on the lateral external edge of the propodus.

Paraleptognathia bisetulosa Dojiri & Sieg, 1997

Material examined: none.

Distribution: East Pacific Ocean, California, Santa Maria Basin, off Purisima Point, 34° 41.40´N 120° 57.90´W, 410 m.

Remarks: due to mailing problems (new U.S. regulations) no material was available for this study. This species was poorly described by Dojiri & Sieg (1997) and can be easily distinguished from other *Paraleptognathia* by the presence of two spiniform setae on merus of pereopod 1; this is a unique character state for *Paraleptognathia*.

***Paraleptognathia bacescui* Kudinova-Pasternak, 1985**

Material examined: none.

Distribution: this species is only known from the type locality RV "Vitjaz" 1982, St. 163, 29° 51.0´N 28° 07´W, 3340-3440 m depth.

Remarks: the type material could not be found in the Zoological Museum of Moscow (Blazewicz-Paszkowycz, personal communication). From the original illustration (Kudinova-Pasternak 1985:56) and description can be concluded that the specimens are 1.2 -3.6 mm long. Mancas are between 1.2 and 1.6 mm long. The antenna is composed of seven articles; article 4 is divided in two. In the investigated material from other *Paraleptognathia* species it cannot be seen. Some individuals show a constriction at this level but it is not clear if the article is only damaged. Kudinova-Pasternak (1985) mentions that the palp of the maxillula has only one terminal filament. The cheliped is covered by very fine setules. This could not be observed in any other *Paraleptognathia.* The illustration of the cheliped is difficult to compare to other species because it displays the inner side while most of the other illustrations show the outer side of the cheliped. The carpal shield is well developed, making the carpus almost as long as wide. The row of setae on the propodus of the cheliped is present in many adult females as well in many adult males of *Paraleptognathia* and *Leptognathia* species (Dojiri & Sieg 1997).

This species is closely related to *P. benguela* n. sp.. A better separation of these two species will not be possible before more material of *P. bacescui* is available.

***Paraleptognathia brachiata* (Hansen, 1913) new combination (Figs 7, 8)**

Synonymy: *Leptognathia brachiata* Hansen, 1913

Material examined: syntypes ZMUC CRU 3738 RV ”Ingolf” St. 25, 63° 30´N 54° 25´W, 582 fm (1065 m), six females (one dissected), one juvenile male, one neuter, ZMUC CRU 5877 RV ”Ingolf” St. 24, 63° 06´N 56° 00´W, 1199 fm (2194 m), four females, one neuter.

Diagnosis: Cheliped carpal shield triangular, pointed. Maxilliped basis long. Uropod basal article about three times as long as wide.

Description: non-ovigerous female. Body (Fig. 7a, b): long, about 7.5 times longer than wide. Body length 1.6 to 3.6 mm. Cephalothorax (Fig. 7a, b): egg-shaped, about 1.3 times longer than broad, shorter than pleon. Pereon (Fig. 7a, b): pereonite 1 as long as pereonite 6; pereonite 5 longer than pereonite 6 and shorter than pereonite 4; pereonites 2, 3, 4 equal long. Pleon (Fig. 7a, b): pleonites 1 and 3 equal in length and longer than the others; pleonites 2, 4 and 5 subequal; each pleonite with lateral simple seta.

Antennule (Fig. 7c): article 1 longest with one simple distal seta; article 2 with one long and one short distal setae; article 3 shortest with one distal simple short seta; article 4 with five terminal setae.

Antenna (Fig. 7e): article 1 short, semifused to cephalothorax (not illustrated); article 2 as long as broad, with one short spiniform seta; article 3 with one dorsal simple seta; article 4 with a constriction at midlength, two long terminal simple setae; article 5 with one simple terminal seta; article 6 shortest, with four terminal simple setae.

Labrum (Fig. 8b): hood-shaped, with a row of setules at the lateral margins.

Mandible (Fig. 8c): lacinia mobilis broad and pointed; right mandible broken during dissection.

Maxillula (Fig. 8a): endite with five rows of setules dorsally and two pinnate, two short and five smooth terminal spiniform setae.

Maxilla (Fig. 8f): rectangular, with no special features.

Labium (Fig. 8d): composed of two triangular lobes, with one seta distally on each lobe.

Maxilliped (Fig. 8g): basis long, tongue-shaped; basal setae were not observed.

Epignath (Fig. 8e): with no special features.

Cheliped (Fig. 7h): basis shorter than carpus; merus with one simple ventral seta; carpus with one ventral and one dorsal setae, carpal shield well-developed, pointed, triangular; propodus smooth with three teeth on cutting edge; dactylus smooth, about 0.6 length of propodus.

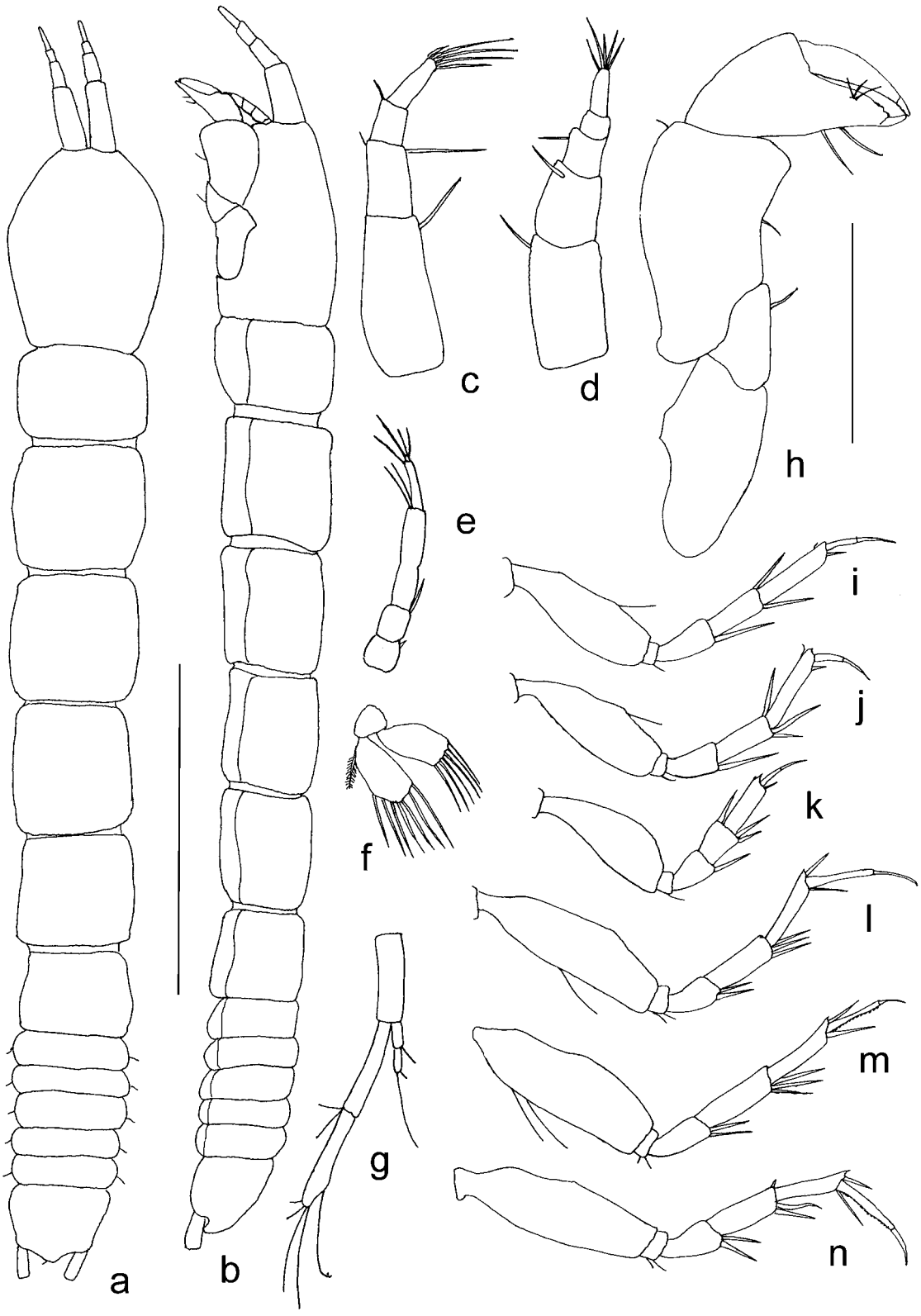

Figure 7. *Paraleptognathia brachiata* ZMUC CRU 3738 a. Body dorsal view b. Body lateral view. Scale bar 1mm c. Antennule, d. Antennule juvenile male, e. Antenna, f. Pleopod, g. Uropod, h. cheliped, i. Pereopod 1, j. Pereopod 2, k. Pereopod 3, l. Pereopod 4, m. Pereopod 5, n. Pereopod 6. Scale bar 0.25 mm.

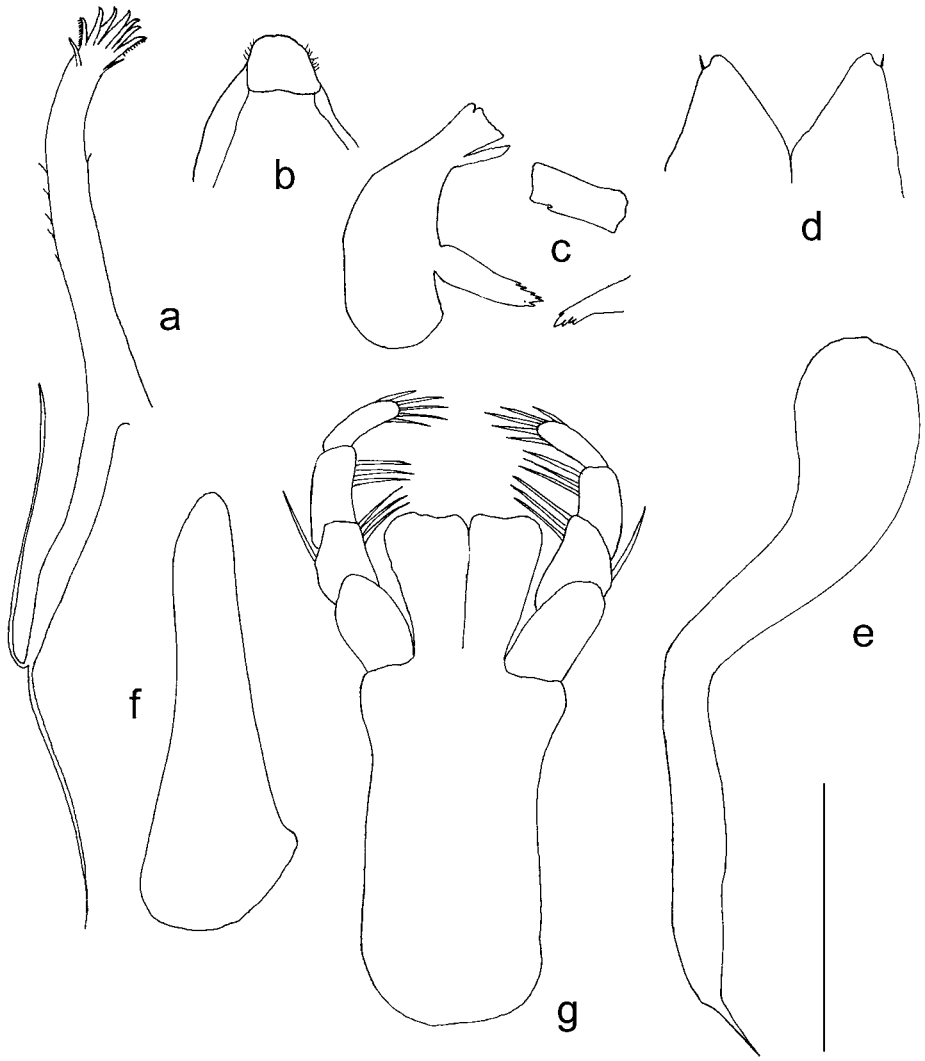

Figure 8. *Paraleptognathia brachiata* ZMUC CRU 3738 a Maxillula, b. Labrum, c. Mandibles, d. Labium, e. Epignath, f. Maxilla, g. Maxilliped. Scale bar 0.1 mm.

Pereopod 1 (Fig. 7i): coxa naked; basis about three times as long as broad, with one simple dorsal seta; ischium short, with one simple seta; merus as long as carpus, smooth, with one spiniform seta; carpus smooth, with two spiniform setae; propodus with small terminal spine, and a thin short seta dorsally and a short spiniform seta ventrally; dactylus smooth, about as long as unguis.

Pereopod 2 (Fig. 7j): as pereopod 1, except carpus longer than merus, with three spiniform setae.

Pereopod 3 (Fig. 7k): as pereopod 1, except basis naked and carpus with three spiniform setae.

Pereopod 4 (Fig. 7l): basis about 3.5 times longer than broad, with one ventral simple seta; ischium short with two simple setae; merus smooth, shorter than carpus, with two spiniform setae; carpus smooth, with three spiniform setae; propodus with terminal spine and two terminal spiniform setae; dactylus longer than unguis.

Pereopod 5 (Fig. 7m): as pereopod 4, except basis with two ventral simple setae.

Pereopod 6 (Fig. 7n): as pereopod 5, except basis naked and one short and two long spiniform setae on carpus.

Pleopods (Fig. 7f): basal article triangular, exopod with seven simple long setae, endopod with six simple setae.

Uropods (Fig. 7g): basal article of the uropod is about three times as long as wide. Exopod half as long as article 1 of endopod; exopod article 1 with one short distal seta; article 2 with one short and one long terminal setae. Endopod article 1 with two distal short simple setae, article 2 with five terminal setae.

Ovigerous female body length 2.7 to 3.0 mm.

Juvenile male body length 2.8 mm. Antennule (Fig. 7d): article 1 longest with one distal simple seta; article 2 as long as articles 4 and 5 together, with one distal seta; article 3 with one distal simple seta; article 4 shortest, naked; article 5 with five terminal setae.

Manca up to 1.5 mm.

Distribution: North Atlantic Ocean, Davis Strait off southwest Greenland.

Type locality: Davis Strait, RV ”Ingolf” St. 25, 63° 30´N 54° 25´W, 582 fm (1065 m).

Remarks: this species has a very prominent oval carpal shield on the cheliped, which is an outstanding character. The length of the basal article of the uropod is about three times as long as wide, which also makes it very easy to distinguish from other species, in which the basal article is less than two times as long as wide.

***Paraleptognathia gracilis* (Krøyer, 1842) new combination (Figs 9, 10)**

Synonymy**:** *Akanthophoreus gracilis* Sieg, 1986

Tanais gracilis Krøyer, 1842

Tanais islandicus G. O. Sars,1877

Leptognathia Sarsii Hansen, 1913

Leptognathia Sarsii Hansen, 1909

For complete synonymy see Lang (1957) and Sieg (1983)

Material examined**:** 1964 individuals. ZMH K-40584-ZMH K-40587 RV ”Porsild” Mellemfjord 1998, 499 individuals, ZMH K-40588-ZMH K-40599 RV ”Porsild” Mellemfjord 1999, 1033 females, 279 juvenile males, two adult males. ZMUC CRU 3945 East Iceland, Breidals Vig, 6 fm (11 m) 8.06. 1900, 24 females, four juvenile males, ZMUC CRU 3946 North Iceland, RV ”Ingolf” St. 126, 67° 19´N 15° 52´W, 293 fm (536 m), three females, one juvenile male, two neuters, ZMUC CRU 3947 Norway, 1898 of Sars, nine females, four juvenile males, ZMUC CRU 3948 Faroe, Bordoy Island, Klaksvig, 15 fm (27 m), 5.1.1899, 54 males, eight females, ZMUC CRU 3949 North Iceland, RV ”Ingolf” St. 128, 66° 30´N 20° 02´W, 194 fm (106 m), one female, ZMUC CRU 3950 North Iceland, RV ”Ingolf” St. 124, 67° 40´N 15° 40´W, 495 fm (905 m), three females, one juvenile male, ZMUC CRU 3951 East Iceland, Bakkefjord (Bakkafloi), RV ”Diana”, 6 fm (11 m), eight females, ZMUC CRU 3952 East Greenland, Steward Land, 70° 0´N, 158 fm (289 m), two females, ZMUC CRU 3653 East Iceland, Seydis Fjord, 6 fm (11 m), five females, ZMUC CRU 3954 Greenland, Angmagsalik, 65° 51´N, 19.6.1902, two females, one juvenile male, one neuter, ZMUC CRU 3955 Greenland, Cap Dalton, 69° 24.6´N 23° 30´W, 9-11 fm (16–20 m), two females, two juvenile males, ZMUC CRU 3956 Greenland, Turner Sound, 69° 44´N, 3 fm (5 m), II Amdrup Exp., one female, ZMUC CRU 3957 Greenland, Glasfor, one juvenile male, ZMUC CRU 3958 East Greenland, Sabine Island, 74°3´N 19° 45´W, 3-5 fm (5–9 m), Daffliste Exp., 12.9.1900, eleven females, one juvenile male. (ZMUC CRU 3946 to 3958 were indentified previously as *L. Sarsii*).

Diagnosis: cheliped carpal shield medium to small or absent, dactylus with crenulation.

Description: non-ovigerous female from Mellemfjord, west Greenland. Body (Fig. 9a, b): long, about eight times longer than broad. Body length 1.4 to 4.0 mm. Cephalothorax (Fig. 9a, b): shorter than pleon, about 1.3 times longer than broad. Pereon (Fig. 9a, b): pereonite 6 shortest, pereonite 1 longer than 6 and shorter than 5. Pereonite 2 and 3 equal in length and longer than pereonite 4. Pleon (Fig. 9a, b): pleonite equal in length, pleonite 5 shortest; pleotelson rounded with one small lateral apophysis on each side in some individuals pointed, in others rounded; apex with a terminal tubercule.

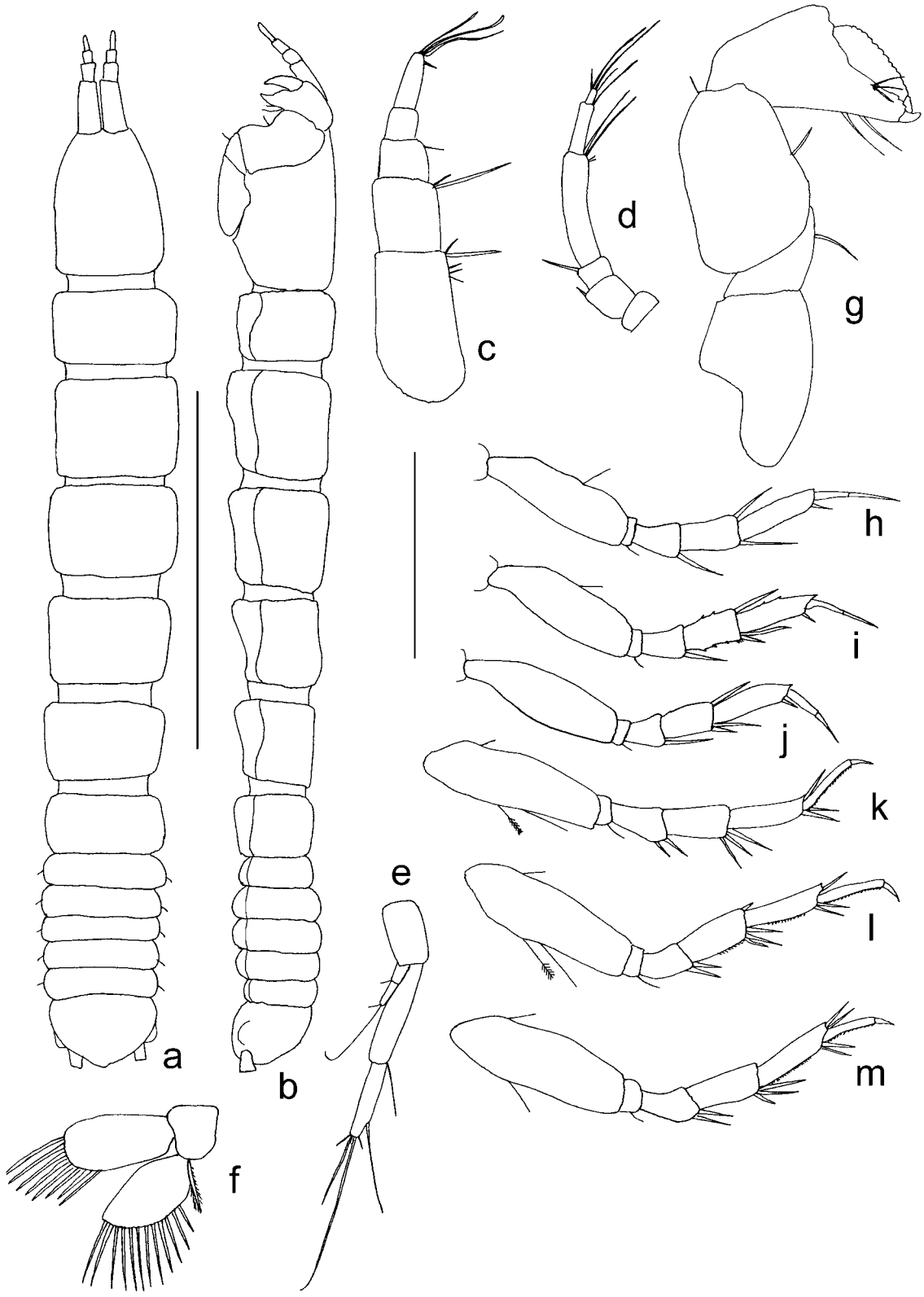

Figure 9. *Paraleptognathia gracilis* ZMH K-40589 a. Body dorsal view, b. Body lateral view. Scale bar 1mm. c. Antennule, d. Antenna, e. Uropod, f. Pleopod, g. Cheliped, h. Pereopod 1, i. Pereopod 2, j. Pereopod 3, k. Pereopod 4, l. Pereopod 5, m. Pereopod 6. Scale bar 0.25 mm.

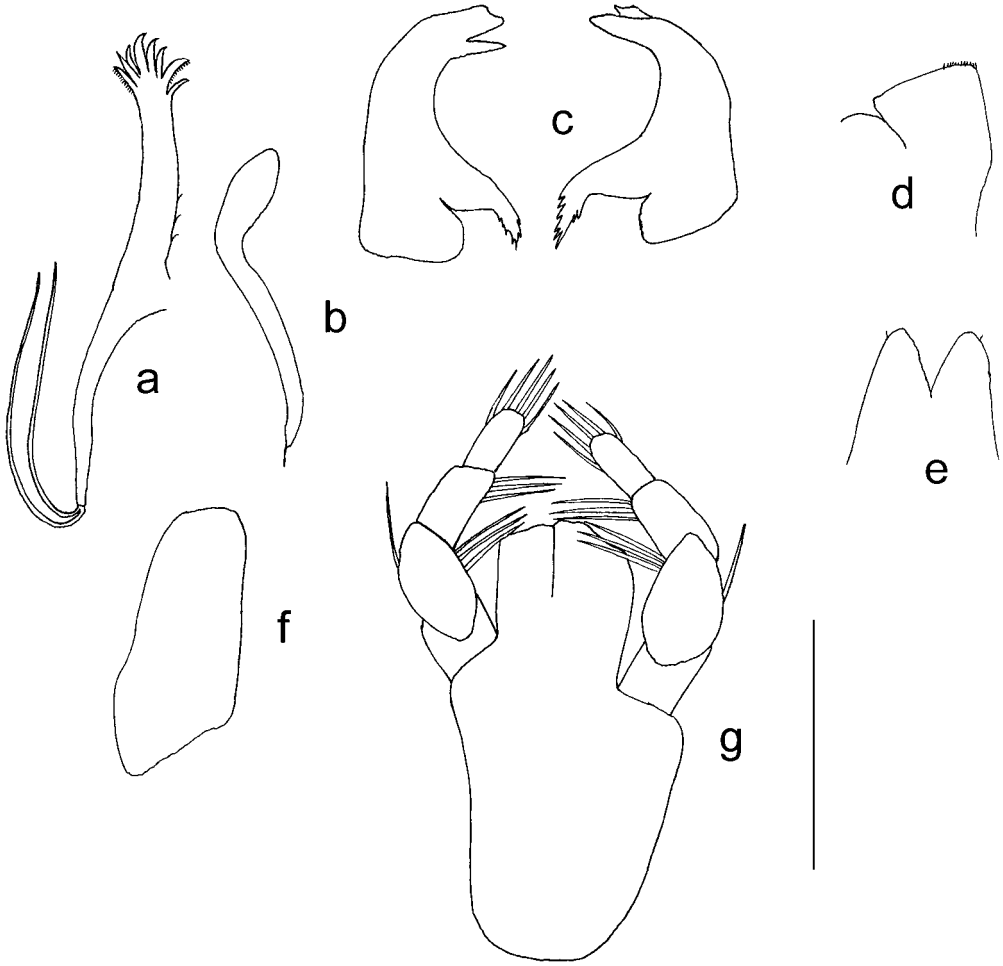

Figure 10. *Paraleptognathia gracilis* ZMH K-40589 a. Maxillula, b. Epignath, c. Mandibles, d. Labrum, e. Labium, f. Maxilla, g. Maxilliped. Scale bar 0.25 mm for b and e for the rest scale bar 0.1 mm.

Antennule (not illustrated): article 1 longest with one long simple and four short simple distal setae; article 2 with one long and one short distal setae; article 3 shortest with one distal simple short seta; article 4 with five terminal setae.

Antenna (Fig. 9d): article 1 short semifused to cephalothorax; article 2 as long as

broad, with one short spiniform seta; article 3 with one dorsal simple seta; article 4 longest,with two long simple terminal and two short simple setae; article 5 with one terminal simple seta; article 6 shortest, with four terminal simple setae.

Labrum (Fig. 10d): hood-shaped, with a row of setules on the distal margin.

Mandible (Fig. 10c): well calcified, pars molaris bent downwards; lacinia mobilis spiniform.

Maxillula (Fig. 10a): endite with three ventral rows of setules, two pinnate, and seven simple terminal spiniform setae.

Maxilla (Fig. 10f): rectangular, smooth.

Labium (Fig. 10e): composed of two triangular lobes, with simple seta distally.

Maxilliped (Fig. 10g): endites not fused, no setae were observed on the basis.

Epignath (Fig. 10b): smooth with no special features.

Cheliped (Fig. 9g): basis as long as carpus; merus with one simple ventral seta; carpus with one ventral and one dorsal setae, one tubercle near insertion of chela, carpal shield medium to small or absent; propodus twice as long as broad, with three teeth at the cutting edge; dactylus with a row of tubercles dorsally.

Pereopod 1 (Fig. 9h): coxa naked; basis three times longer than broad, with one simple seta; ischium short with one simple seta; merus smooth with one spiniform seta; carpus longer than merus, smooth with two spiniform seta; propodus smooth, with one terminal short spiniform seta; dactylus smooth; unguis as long as dactylus.

Pereopod 2 (Fig. 9i): as pereopod 1, except carpus with a dorsal and a ventral row of spinules and three spiniform setae; propodus with a dorsal row of spinules and a terminal spine.

Pereopod 3 (Fig.9j): as pereopod 1, except basis naked, carpus with three spiniform setae; propodus with a terminal spine.

Pereopod 4 (Fig. 9k): basis 3.5 times longer than broad, with a dorsal simple, one setulose and one simple ventral setae; ischium short, with one simple seta; merus with two spiniform setae; carpus longer then merus, with three spiniform setae; propodus smooth with three terminal spiniform setae and one terminal spine; dactylus as long as carpus, unguis sharp.

Pereopod 5 (Fig. 9l): as pereopod 4, except carpus and propodus have a ventral row of spinules.

Pereopod 6 (Fig. 9m): as pereopod 4, except basis with only one ventral simple seta and propodus with row of ventral spinules, two ventral and two dorsal spiniform setae on propodus.

Pleopods (Fig. 9f): exopod with twelve long simple setae, endopod with eight simple setae.

Uropods (Fig. 9e): exopod half as long as first article of endopod; article 1with one simple distal seta, article 2 with one long and one short simple terminal setae. Endopod article 1 with one distal simple seta; article 2 with five terminal setae.

Juvenile male body length 2.0 to 2.8 mm. Antennule (Fig. 9c): first article longest, with one long and four short simple setae; article 2 with one long and one short simple setae; article 3 with one simple seta; article 4 shortest, naked; article 5 with four terminal setae.

Manca body length up to 1.4 mm.

Distribution: this species is widely distributed in the Arctic, Greenland, Spitzbergen, Iceland, North Pacific, Alaska.

Remarks: *Paraleptognathia gracilis* has a very wide distribution in the Arctic. There are numerous population that show a wide range of variation in the size of the lateral pleotelson apophyses, in the size of cheliped carpal shield, and chela crenulation. Some specimens from Iceland, Greenland and Spitzbergen possess large lateral apophyses on the pleotelson. Preparatory males from west and south Greenland posses small lateral apophyses on the pleotelson and a moderated developed carpal shield and some individuals show a weak lateral crenulation on the fixed finger as in *P. australis.* In the Mellemfjord (west Greenland) individuals stages with short, middle and large apophysis, as well as with lateral crenulation on the fixed finger, and moderated developed carpal shield of the cheliped were found. Some large non-ovigerous females possess also crenulation on the fixed finger but no pleonal apophysis. The observed variability of these characters support the assumption of Lang (1957) making *Leptognathia Sarsii* Hansen, 1909 a synomym of *P. gracilis*.

The carpal shield in *P. gracilis* is moderated to weak developed which makes it easy to distinguish from other *Paraleptognathia* species of the Arctic. Adult males are very scarce, from 1314 individuals of the Mellemfjord examined only 2 were adult (”swimming”) males. Reports of *P. gracilis* from the Southern Ocean must be attributed to other species like *P. australis* or *P. antarctica*.

***Paraleptognathia inermis* (Hansen, 1913) new combination (Figs 11, 12)**

Synonymy**:** *Leptognathia inermis* Hansen, 1913

Material examined**:** 14 individuals. Holotype ZMUC CRU 6821, North Iceland, RV ”Ingolf” St. 126, 67° 19´N 15° 52´W, 293 fm (536 m), one female, two neuters, *other material*: ZMH K -40536 RV ”Polarstern” St. 39, two females, ZMH K-39759 RV ”Polarstern” St. 179, six females, ZMH K-40532 RV ”Polarstern” St. 31-9, one female, ZMH K-40552 RV ”Polarstern” ARK IX-3 St. 155, two females.

Diagnosis: Cheliped carpal shield very prominent, carpus less then twice as long as wide.

Description: non-ovigerous female. Body (Fig. 11a, b): long, about 6.5 times longer than broad. Body length 2.2 to 3.9 mm. Cephalothorax (Fig. 11a, b): about 1.3 times longer than broad. Pereon (Fig. 11a, b): pereonite 6 shortest, pereonite 1 and 5 of equal length, pereonite 4 longer than 5 and equal to 3; pereonite 2 longest. Pleon (Fig. 11a, b): pleonites equal in length, with one lateral simple seta.

Antennule (Fig. 11c): article 1 longest (longer than the rest articles combined length) with one long simple and four short simple distal setae; article 2 with one long and one short distal setae; article 3 shortest, with three distal simple short setae; article 4 with four terminal setae and one aesthetasc.

Antenna (Fig. 11d): article 1 short semifused to cephalothorax; article 2 as long as broad, with one short spiniform seta; article 3 with one dorsal simple seta; article 4 with a constriction at midlength, two terminal long simple and at constriction one short simple setae; article 5 with one terminal simple seta and one at midlength; article 6 shortest, with four terminal simple setae.

Labrum (Fig. 12d): hood-shaped, with a row of setules on the distal margin.

Mandible (Fig. 12c): well calcified, pars molaris bent ventrally (one broken during dissection), lacinia mobilis broad and pointed.

Maxillula (Fig. 12a): endite with three dorsal and three ventral rows of setules; one thin, one pinnate and six simple terminal spiniform setae.

Maxilla (Fig. 12f): rectangular, smooth.

Labium (Fig. 12e): composed of two triangular lobes with three short distal setae.

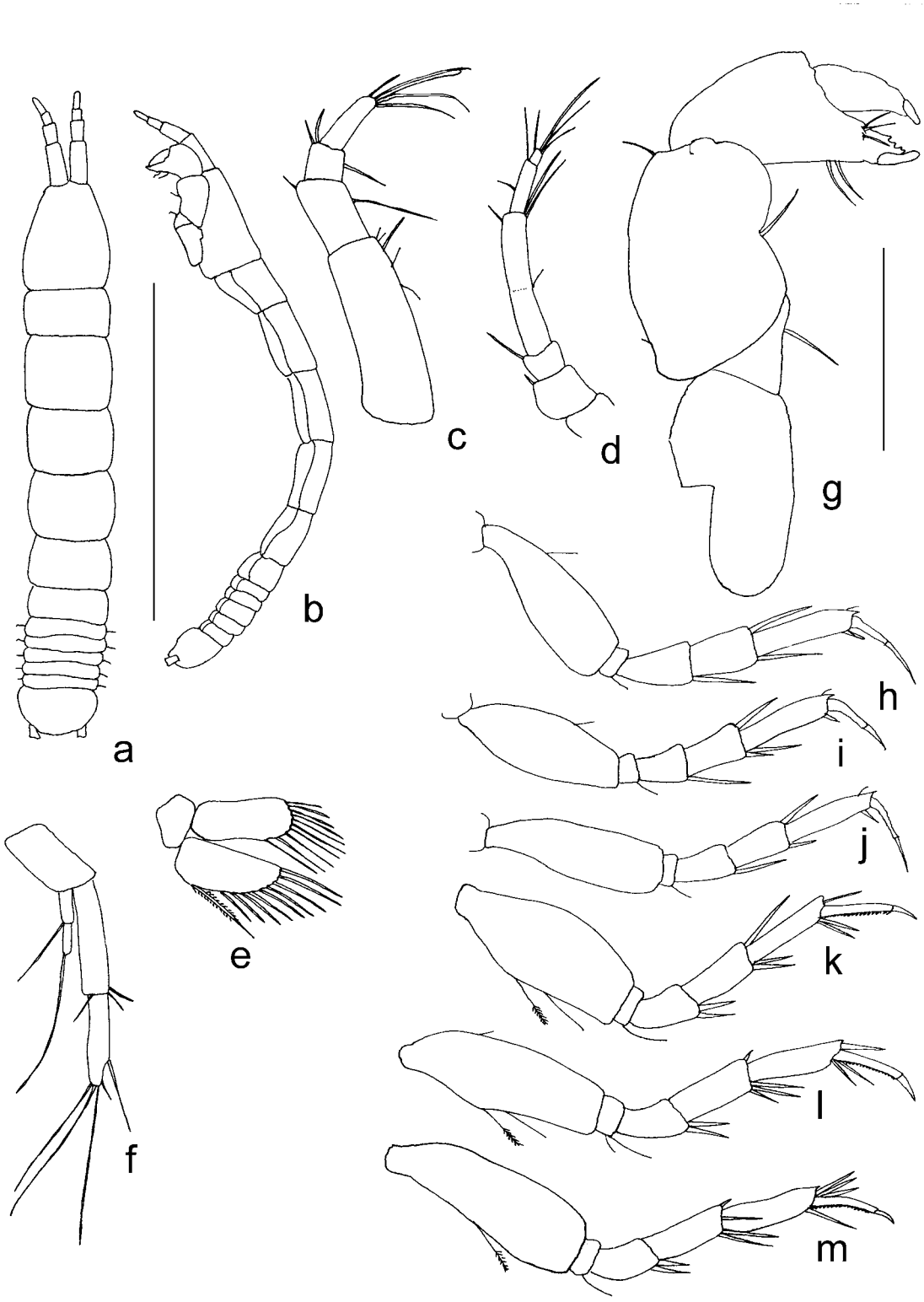

Figure 11. *Paraleptognathia inermis* ZMUC CRU 6821 a. Body dorsal view, b. Body lateral view. Scale bar 1mm. ZMH K-40536 c. Antennule, d. Antenna, e. Pleopod, f. Uropod, g. Cheliped, h. Pereopod 1, i. Pereopod 2, j. Pereopod 3, k. Pereopod 4, l. Pereopod 5, m. Pereopod 6. Scale bar 0.25 mm.

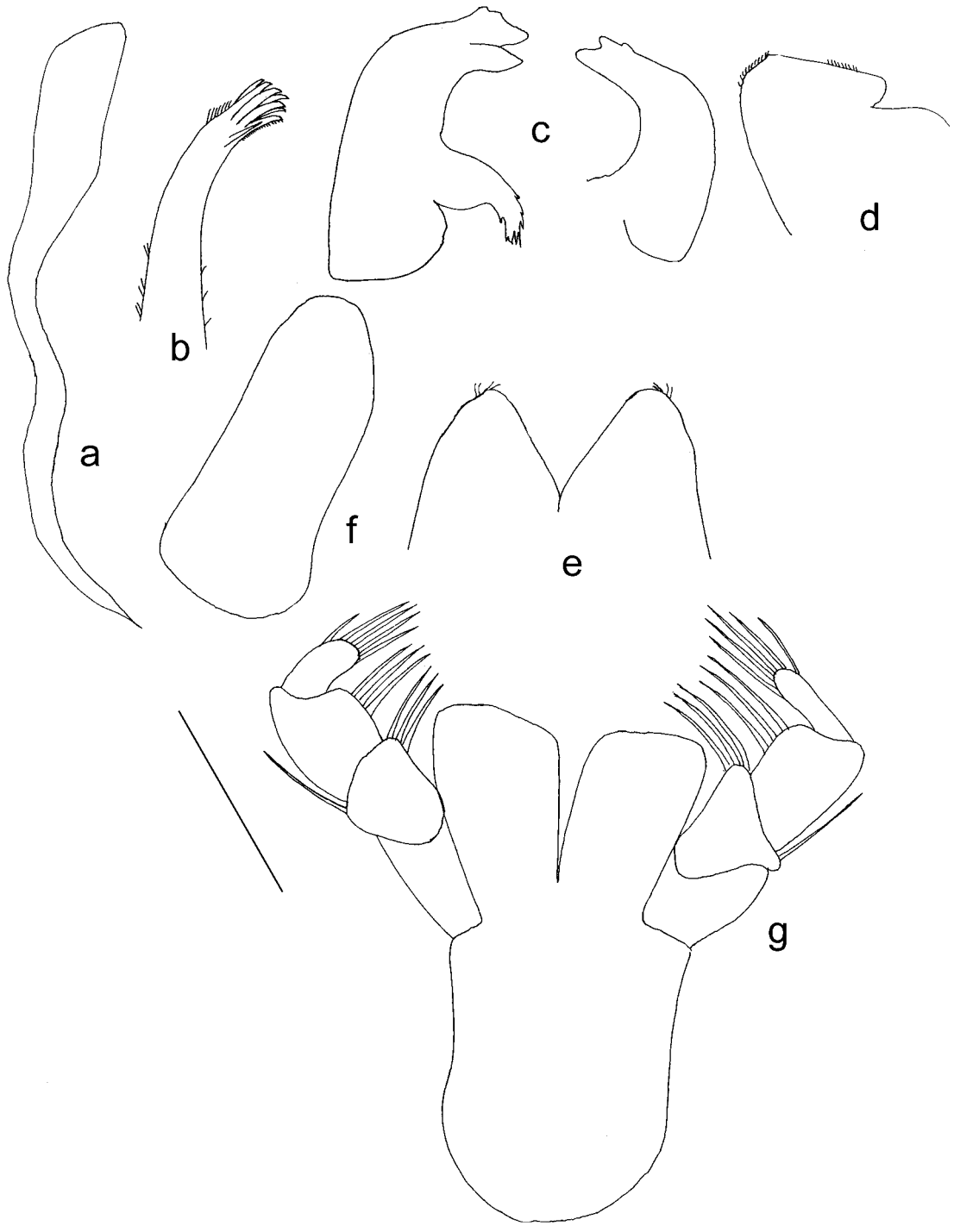

Figure 12. *Paraleptognathia inermis* ZMH K-40536 a. Epignath, b. Maxillula, c. Mandibles, d. Labrum, e. Labium, f. Maxilla, g. Maxilliped. Scale bar 0.1 mm.

Maxilliped (Fig. 12g): endites not fused, as broad as basis, no setae were observed on the basis.

Epignath (Fig. 12a): with no special features.

Cheliped (Fig. 11g): basis as long as carpus; merus with one ventral simple seta; carpus with one ventral and two short simple setae, with tubercle near insertion of chela, carpal shield developed, rounded; propodus about twice as long as dactylus, with four teeth at cutting edge; dactylus smooth.

Pereopod 1 (Fig. 11h): coxa naked; basis three times longer than wide, with a simple short seta; ischium short, with one simple seta; merus as long as carpus, with one spiniform seta; carpus with two spiniform setae; propodus with one terminal spine and a thin dorsal and a short spiniform ventral setae; dactylus smooth; unguis sharp.

Pereopod 2 (Fig. 11i): as pereopod 1, except carpus longer than merus, with three spiniform setae.

Pereopod 3 (Fig. 11j): as pereopod 1, except basis naked.

Pereopod 4 (Fig. 11k): basis about two and a half times longer than broad, with one setulose and one simple ventral seta; ischium short, with one long simple seta; merus with two spiniform setae; carpus longer than merus, with three spiniform setae; propodus longer than carpus, with three spiniform terminal setae; dactylus as long as propodus; unguis sharp.

Pereopod 5 (Fig. 11l): as pereopod 4, except basis with one extra dorsal simple seta; ischium with two simple setae; carpus with four spiniform setae.

Pereopod 6 (Fig. 11m): as pereopod 5, except basis with only one setulose seta; ischium with one simple seta; propodus with four spiniform setae.

Pleopods (Fig. 11e): exopod with nine simple long setae; endopod with ten simple long setae.

Uropods (Fig. 11f): exopod about half as long as first article of endopod. Exopod article 1 with a long simple seta; article 2 with one long simple terminal seta. Endopod article 1 with three distal simple setae; article 2 with five terminal setae.

Type locality: North Iceland, RV ”Ingolf” St. 126, 67° 19´N 15° 52´W, 293 fm (536 m).

Distribution: North Atlantic Ocean, Iceland, Greenland Sea.

Remarks: this species is very similar to *P. alba*. The carpal shield on the carpus is better developed in *P. inermis* and the carpus is shorter in *P. inermis* than in *P. alba*.

Sieg (1986b) gives in his figures and description some features that were not observed in the present material like the setules on the maxilla, on pereopod 1 and 2, the absence of

setules on the labium. Other differences are probably due to the style in which Sieg draw tanaids.

***Paraleptognathia longiremis* (Lilljeborg, 1864) new combination (Figs 13, 14, 15)**

Synonymy**:** *Akanthophoreus longiremis* Sieg, 1986
Leptognathia longiremis (Lilljeborg, 1864)
Tanais longiremis Lilljeborg, 1864

Material examined**:** 21 individuals. ZMH K-40542 RV "Polarstern" St. 31-6, 21 females.

Diagnosis: Propodus of pereopod 1 with a row of ventral spines.

Description: non-ovigerous female. Body (Fig. 13a, b): long, about eight times as long as broad. Body length 2.5 to 3.7 mm. Cephalothorax (Fig. 13a, b): about 1.4 times longer than broad. Pereon (Fig. 13a, b): pereonite 6 shortest, pereonite 1 longer than 6, shorter than 5, pereonite 5 as long as 4, pereonite 2 and 3 equal in length. Pleon (Fig. 13a, b): pleonites subequal; pleotelson rounded.

Antennule (Fig. 14a): article 1 longest with one long simple distal seta; article 2 with one distal simple seta; article 3 shortest, naked; article 4 with five terminal setae.

Antenna (Fig. 14b): article 1 short semifused to cephalothorax; article 2 as long as broad, with one short spiniform seta; article 3 with one dorsal simple seta, article 4 with two terminal long simple and one short simple setae, article 5 with one terminal simple seta; article 6 shortest, with four terminal simple setae.

Labrum (Fig. 15a): hood-shaped, with a row of setules on the distal margin.

Mandible (Fig. 15c): well calcified, pars molaris bent ventrally, lacinia mobilis spiniform.

Maxillula (Fig. 15a): endite with four rows of ventral setules, and one short, one pinnate and six simple terminal spiniform setae.

Maxilla (Fig. 15f): rectangular, smooth.

Labium (Fig. 15e): composed of two triangular lobes, with two distal simple setae on each lobe.

Maxilliped (Fig. 15g): endites not fused; no setae were observed on the basis.

Epignath (Fig. 15b): smooth, with no special features.

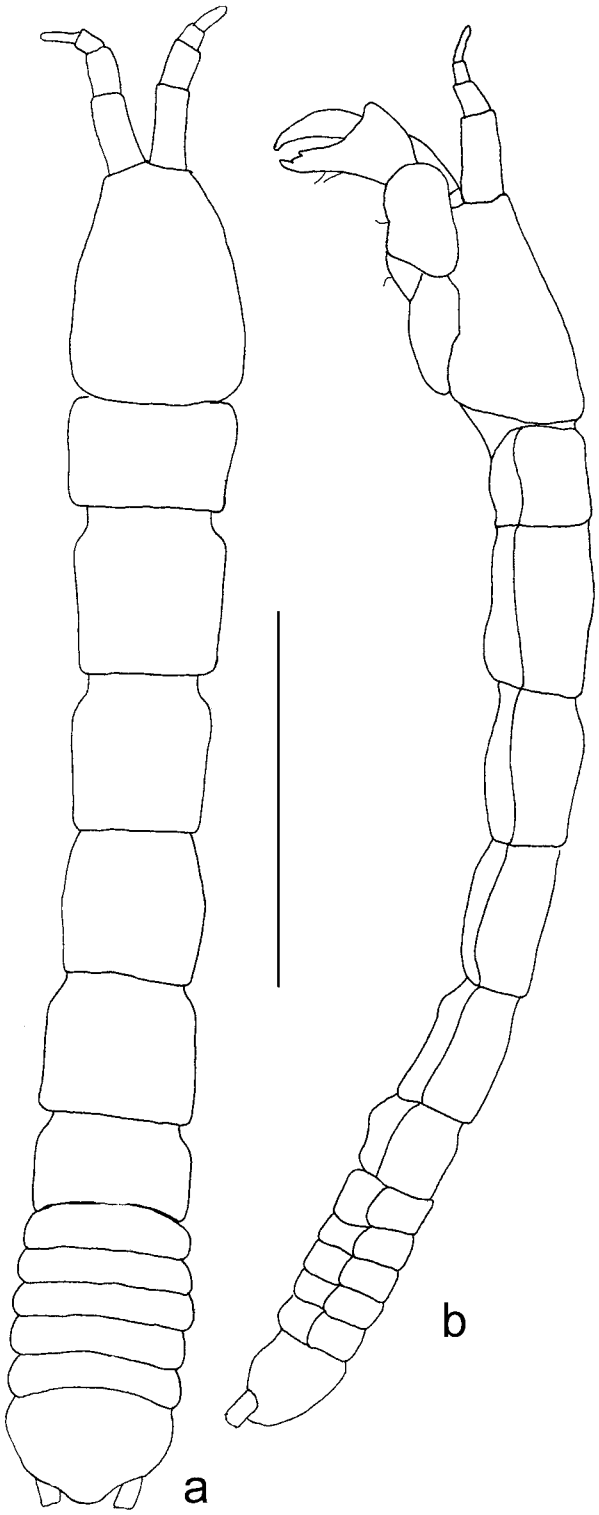

Figure 13. *Paraleptognathia longiremis* ZMH K-40542 a. Body dorsal view, b. Body lateral view. Scale bar 1mm.

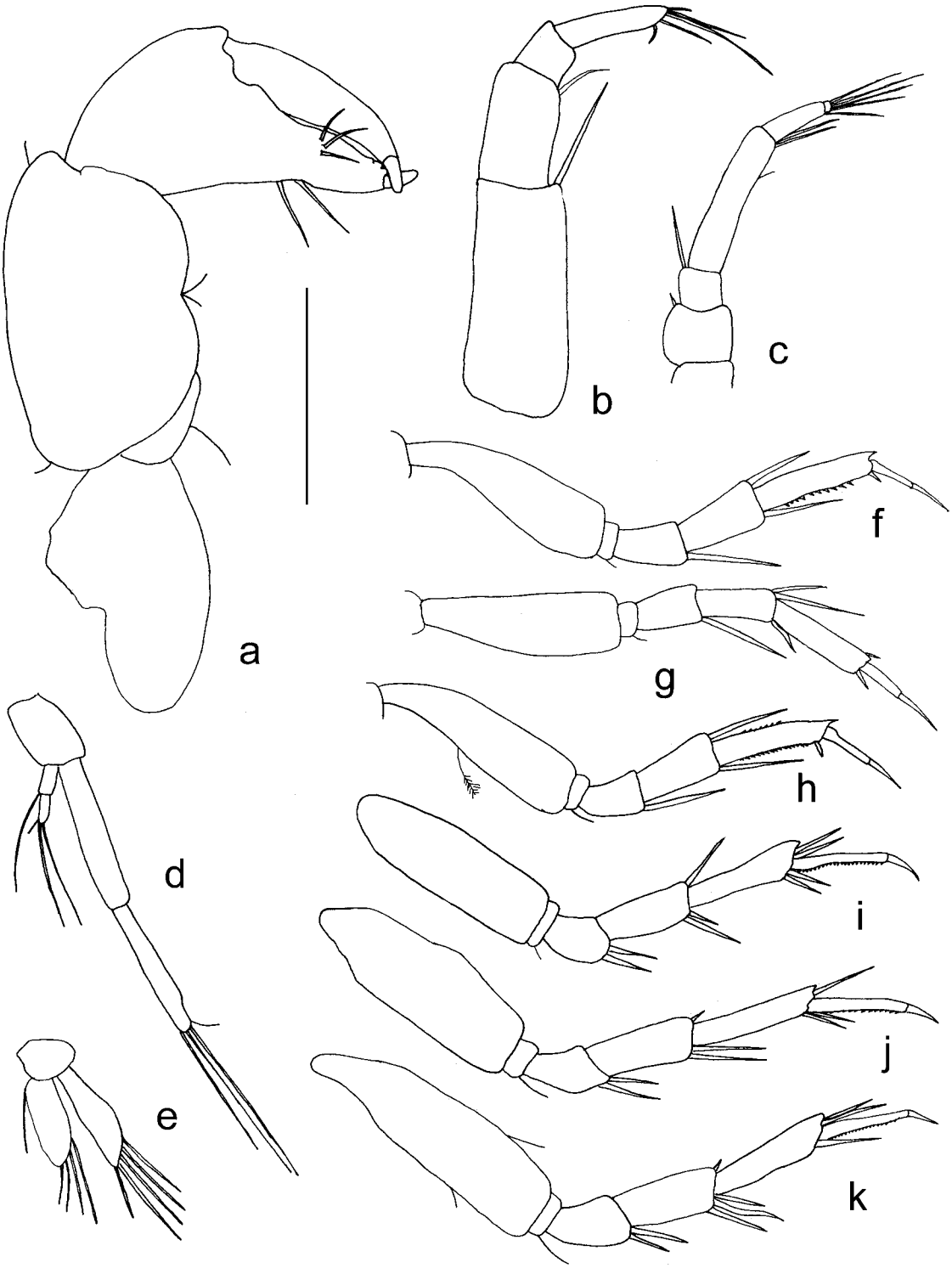

Figure 14. *Paraleptognathia longiremis* ZMH K-40542 a. Cheliped, b. Antennule, c. Antenna, d. Uropod, e. Pleopod, f. Pereopod 1, g. Pereopod 2, h. Pereopod 3, i. Pereopod 4, j. Pereopod 5, k. Pereopd 6. Scale bar 0.25 mm.

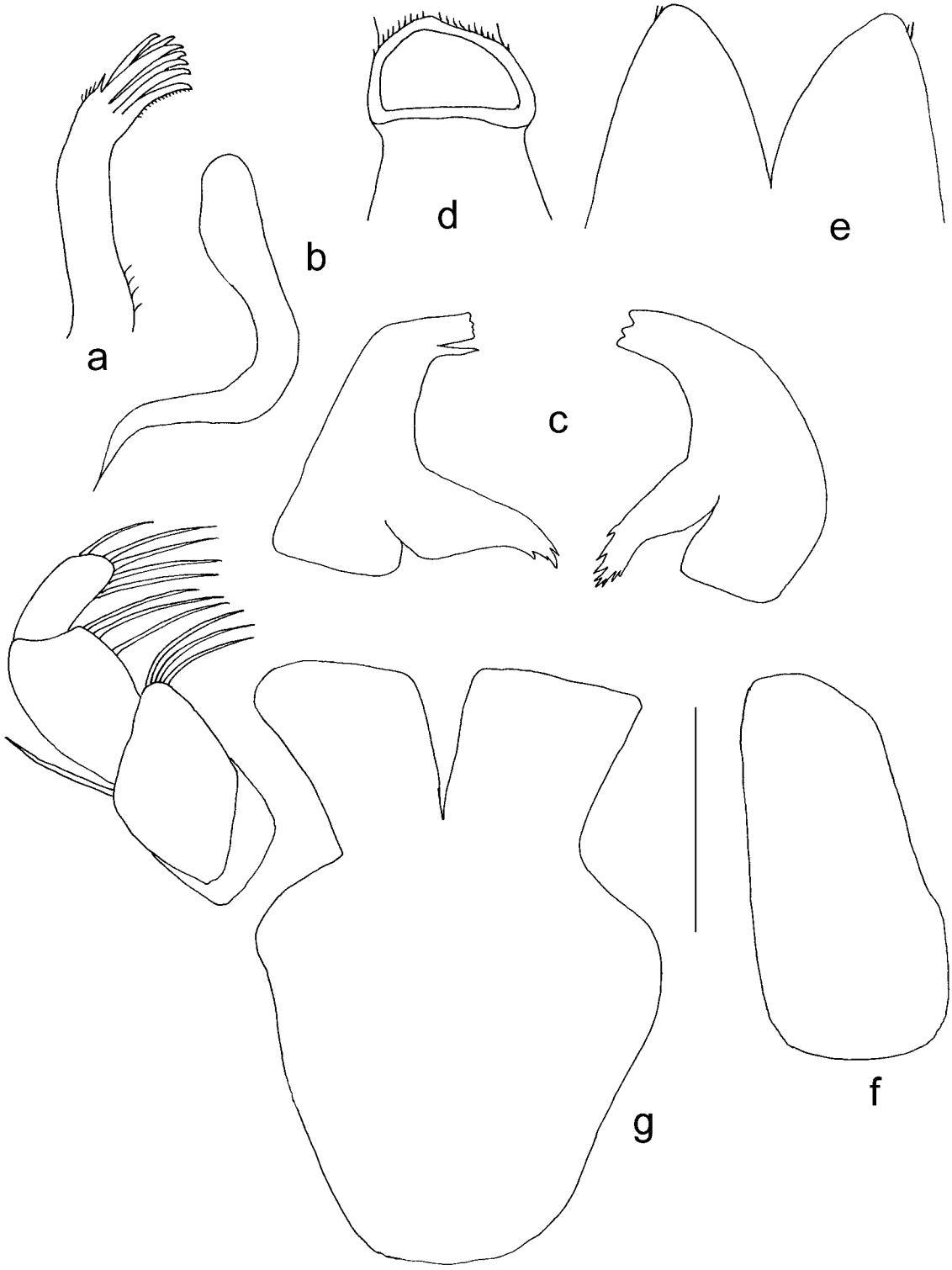

Figure 15. *Paraleptognathia longiremis* ZMH K-40542 a. Maxillula, b. Epignath (Scale bar 0.25 mm), c. Mandibles, d. Labrum, e. Labium, f. Maxilla, g. Maxilliped. Scale bar 0.1 mm for a, c, d, e,f, g.

Cheliped (Fig. 14a): basis naked; merus with one ventral seta; carpus with two ventral and two dorsal simple setae and one tubercle near insertion of chela, carpal shield well-developed, rounded; propodus with three teeth at cutting edge; dactylus smooth.

Pereopod 1 (Fig. 14f): coxa naked; basis about 3.5 times longer than broad, naked; ischium short, with short simple seta; merus with one spiniform seta; carpus longer than merus, with two spiniform setae; propodus with a ventral row of short spines, one terminal spine and one spiniform distal seta; dactylus smooth; unguis sharp.

Pereopod 2 (Fig. 14g): as pereopod 1, except carpus with three spiniform setae and propodus smooth.

Pereopod 3 (Fig. 14h): as pereopod 1, except basis with setulose seta and propodus with a ventral and a dorsal row of spinules.

Pereopod 4 (Fig. 14i): basis about 3.5 times longer than broad, naked; ischium short, with a short simple seta; merus with two spiniform setae; carpus with three spiniform setae; propodus smooth, with four terminal spiniform setae and one terminal spine; dactylus as long as propodus; unguis sharp.

Pereopod 5 (Fig. 14j): as pereopod 4, except propodus with three terminal spiniform setae.

Pereopod 6 (Fig. 14k): as pereopod 4, except basis with two simple setae; carpus with four spiniform setae.

Pleopods (Fig. 14e): exopod with four simple long setae; endopod with five simple long setae.

Uropods (Fig. 14d): exopod less than half the length of endopod article 1. Exopod article 1 with one distal simple seta; article 2 with three terminal setae. Endopod article 1 naked; article 2 with four terminal setae.

Distribution: this species occurs in south and east Greenland.

Remarks: *Paraleptognathia longiremis* is very similar to *P. gracilis* and primary it was synonymized by Lang (1957) with this species. *Paraleptognathia longiremis* has a clear row of spinules on propodus of the pereopod 1. The chelipeds are different, the chela has no crenulation in *P. longiremis*, and propodus of P 1 has a row of spinules that is missing in *P. gracilis*. The observation of Hansen (1913) of a very long uropod is not present in all individuals. Most of the individuals found had a typical short *Paraleptognathia* uropod.

***Paraleptognathia multiserrata* (Hansen, 1913) new combination (Figs 16, 17)**

Synonymy**:** *Akanthophoreus multiserratus* Sieg, 1986
Leptognathia multiserrata Hansen, 1913

Material examined: Five individuals. Holotype ZMUC CRU 7430 RV "Ingolf" St. 4, 64° 07´N 11° 12´W, 237 fm (450 m), one female, one manca. Other material: ZMB 27518 Faroe Bank Channel St. 11B1 61° 00´N 7° 30´W, 862 m, one female, ZMUC CRU 3959, Faroe, Bordoy Island, Kalksvig Indlobit Til, 20-25 m, 22. 9.1926, two females.

Diagnosis: Cheliped carpal shield with crenulation, propodus and dactylus with crenulation.

Description: non-ovigerous female. Body (Fig. 16a, b): long, about 8.3 times longer than broad. Body length 2.9 to 3.5 mm. Cephalothorax (Fig. 16a, b): long, about 1.7 times longer than broad. Pereon (Fig. 16a, b): pereonite 1 as long as pereonite 6 and shorter than pereonite 5; pereonite 2, 3, and 4 of equal length and longer than 5. Pleon (Fig. 16a, b): pleonite one longest, pleonites 2, 3, 4, 5 subequal.

Antennule (Fig. 16c): article 1 longest, with one simple distal and three short setae; article 2 with one long and one short distal setae; article 3 shortest, with one distal simple seta; article 4 with five terminal setae.

Antenna (Fig. 16d): article 1 short, semifused to cephalothorax; article 2 as long as broad; article 3 with one dorsal simple seta; article 4 with two terminal long simple and two short setae; article 5 with two terminal simple setae; article 6 shortest, with four terminal simple setae.

Labrum (Fig. 16g): hood-shaped, with a row of distal setules.

Mandible (Fig. 17b): well calcified, pars molaris turned inwards and downwards; lacinia mobilis broad and blunt on distal edge.

Maxillula (Fig. 17c): endite with four rows of setules ventrally and one short, two pinnate and five simple terminal spiniform setae.

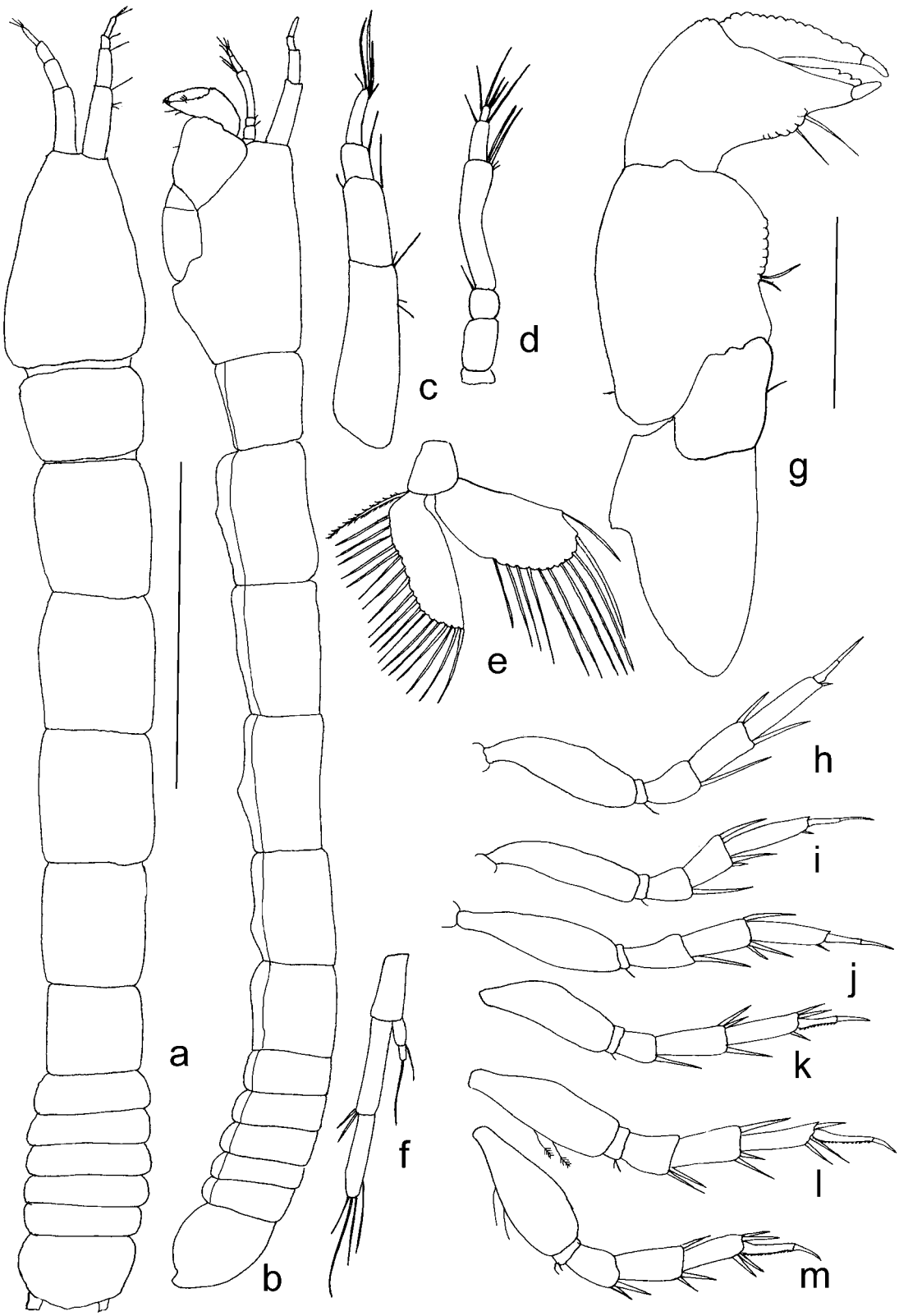

Figure 16. *Paraleptognathia multiserrata* ZMUC CRU 7430 a. Body dorsal view, b. Body lateral view. Scale bar 1mm. ZMB 27518 c. Antennule, d. Antenna, e. Pleopod, f. Uropod, g. Cheliped, h. Pereopod 1, i. Pereopod 2, j. Pereopod 3, k. Pereopod 4, l. Pereopod 5, m. Pereopod 6. Scale bar 0.25 mm.

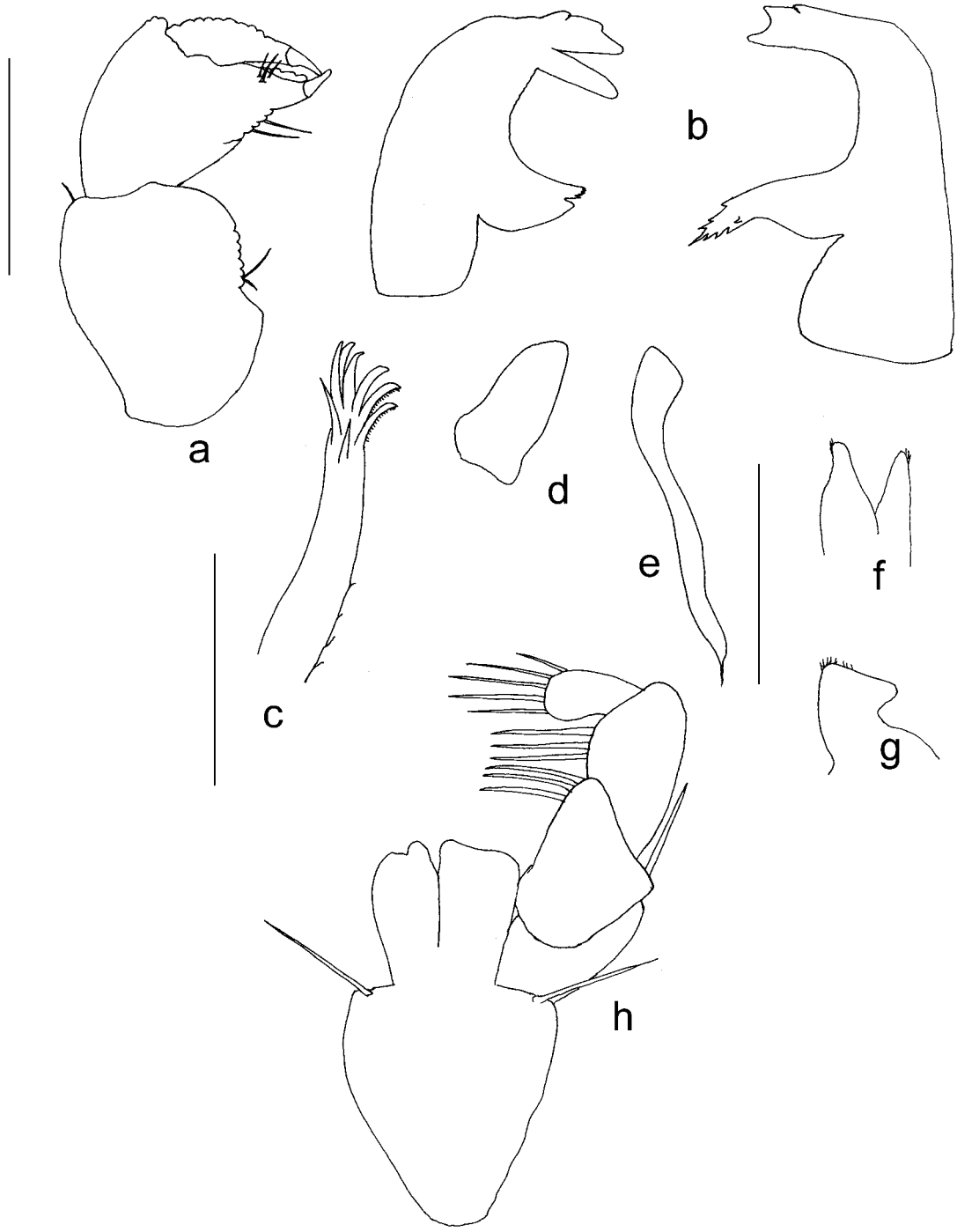

Figure 17. *Paraleptoganthia multiserrata* ZMUC CRU 7430 a. Cheliped. ZMB 27518 b. Mandibles, c. Maxillula, d. Maxilla, e. Epignath, f. Labium, g. Labrum, h. Maxilliped. Scale bar 0.25 mm for a,d,e,f,g. Scale bar 0.1 mm for b,c,h.

Maxilla (Fig. 17d): triangular, naked.

Labium (Fig. 17f): composed of two lobes with two short simple setae distally.

Maxilliped (Fig. 17h): endites not fused, basis heart-shaped, palpus relatively large.

Epignath (Fig. 17e): with no particular feature.

Cheliped (Fig. 16g, 17a): basis as long as carpus; merus with one ventral simple seta; carpus with two ventral and one dorsal setae, one tubercle near insertion of chela; carpal shield moderately developed, with row of tubercles in the lower margin; propodus with three dorsal tubercles near insertion of dactylus, and a row of lateral tubercles at ventral setae level, three teeth at cutting edge; dactylus with a row of tubercles on the dorsal margin.

Pereopod 1 (Fig. 16h): coxa naked; basis about three and a half times longer than broad; ischium short, with one simple seta; merus with one spiniform seta; carpus longer than merus, with two spiniform setae; propodus with one terminal short spiniform seta; dactylus smooth; unguis as long as dactylus.

Pereopod 2 (Fig. 16i): as pereopod 1, except carpus with three spiniform setae.

Pereopod 3 (Fig. 16j): as pereopod 2.

Pereopod 4 (Fig. 16k): basis about three and a half times longer than wide; ischium short, with a short simple seta; merus with one spiniform seta; carpus with three spiniform setae; propodus with three terminal spiniform setae; dactylus short; unguis as long as dactylus.

Pereopod 5 (Fig. 16l): as pereopod 4, except basis with two setulose setae, ischium with two simple setae, merus with two spiniform setae.

Pereopod 6 (Fig. 16m): as pereopod 4, except basis with two simple setae; merus with two spiniform setae and propodus with four spiniform setae.

Pleopods (Fig. 16e): exopod with 18 simple long setae, endopod with eleven simple long setae.

Uropods (Fig. 16f): Exopod less than half as long as article 1 of endopod. Exopod article 1 with one long distal seta; article 2 with one long terminal seta. Endopod article 1 with two distal short setae; article 2 with four terminal setae.

Manca body length 1.5 mm.

Type locality: East of Iceland, RV "Ingolf" St. 4, 64° 07´N 11° 12´W, 237 fm (450 m).

Distribution: this species occurs in the North Atlantic from the Faroe Islands to the east of Iceland.

Remarks: this species can be easily distinguish from all other *Paraleptognathia* species from the North Atlantic by a well developed carpal shield on the cheliped with a prominent crenulation as well as a strong crenulation on the propodus.

***Paraleptognathia typica* Kudinova-Pasternak, 1981**

Material examined: none.

Distribution: this species is only known from the type locality in the North Pacific Ocean, RV "Vitjaz", St. 6006, 22° 45´N 173°44´E, 5200 m.

Remarks: The type material could not be found in the Museum of Zoology of Moscow Lomonosow University. The present remarks refer to the original figures and description of (Kudinova-Pasternak 1981:107). This species is about 2.7 mm in length. Antenna with a constriction or fusion line at article 4. The pleopod exopod is composed of two arcticles. The uropod articles 1 of endopod and exopod are naked. Cheliped with a well developed carpal shield comprising about one third of the carpus, covered with fine setules, similar to *P. bacescui*. Merus, carpus and propodus of pereopod 1 have a row of ventral spinules. The illustrations as well as the text give no more information.

***Paraleptognathia weddellensis* (Sieg, 1986) new combination (Figs 18, 19)**

Synonymy**:** *Akanthoporeus weddellensis* Sieg, 1986

Material examined: Ten individuals. ZMH K-40600 RV "Walther Herwig" St. 106, one female, ZMH K-40601 RV "Polarstern" St. 91, one juvenile male, ZMH K-40602 RV "Polarstern" St. 145, one female, one neuter, ZMH K-40603 RV "Polarstern" St. 147, four females (one dissected), ZMH K-40604 RV "Polarstern" St. 153, one female, ZMH K-40605 RV "Polarstern" St. 147, one female.

Diagnosis: Cheliped carpal shield well developed, smooth. Propodus of pereopod 1 and 2 with spinules.

Description*:* non-ovigerous female. Body (Fig. 18a, b): long, about 7.5 times longer than broad. Body length 1.4 to 2.8 mm. Cephalothorax (Fig. 18a, b): about 1.3 times longer than broad. Pereon (Fig. 18a, b): pereonite 1 as long as pereonite 6; pereonite 5 as long as

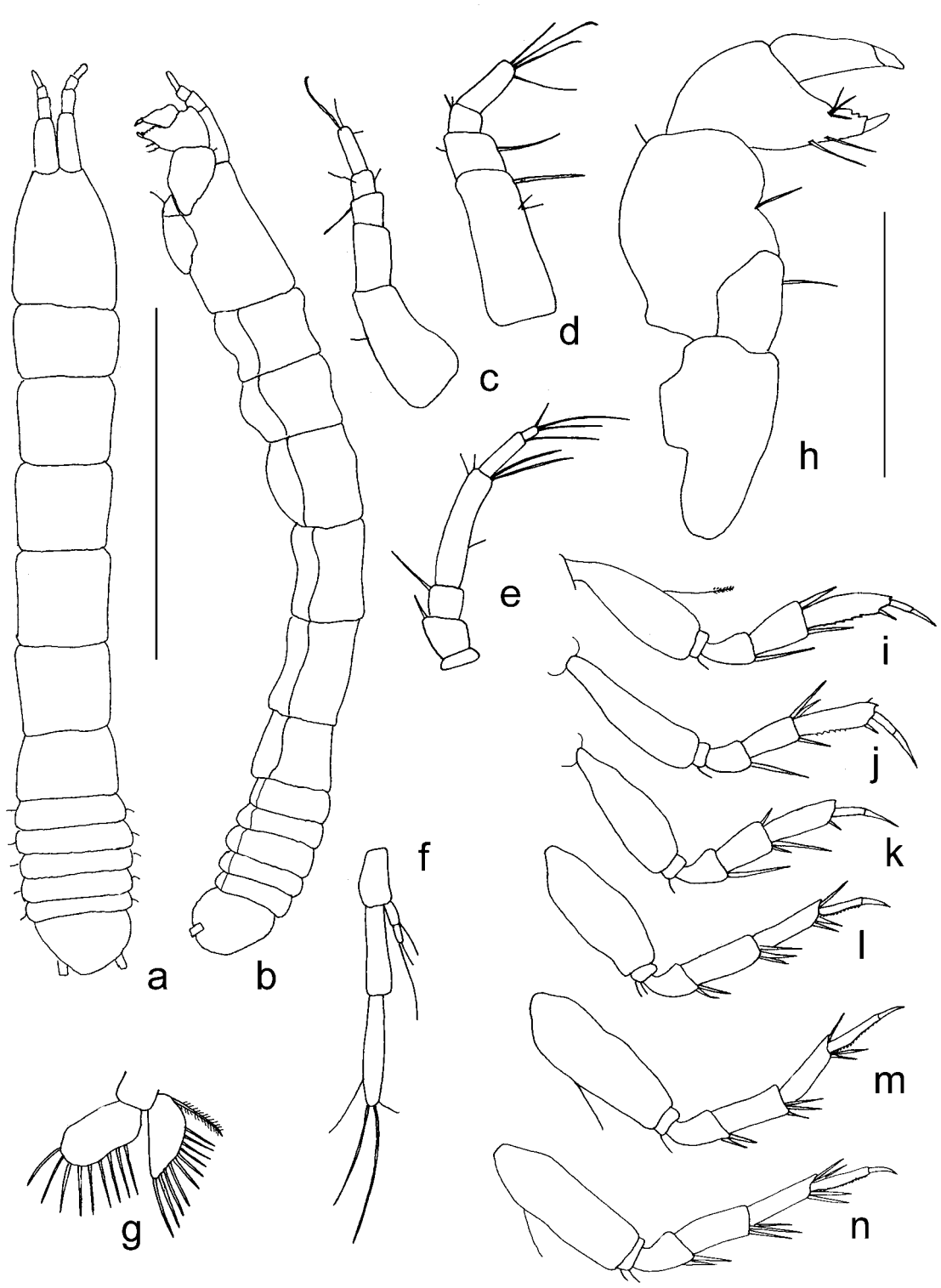

Figure 18. *Paraleptognathia weddellensis* ZMH K-40603 a. Body, dorsal view, b. Body lateral view. Scale bar 1mm. c. Antennule juvenile male, d. Antennule female, e. Antenna, f. Uropod, g. Pleopod, h. Cheliped, i. Pereopod 1, j. Pereopod 2, k. Pereopod 3, l. Pereopod 4, m. Pereopod 5, n. Pereopod 6. Scale bar 0.25 mm.

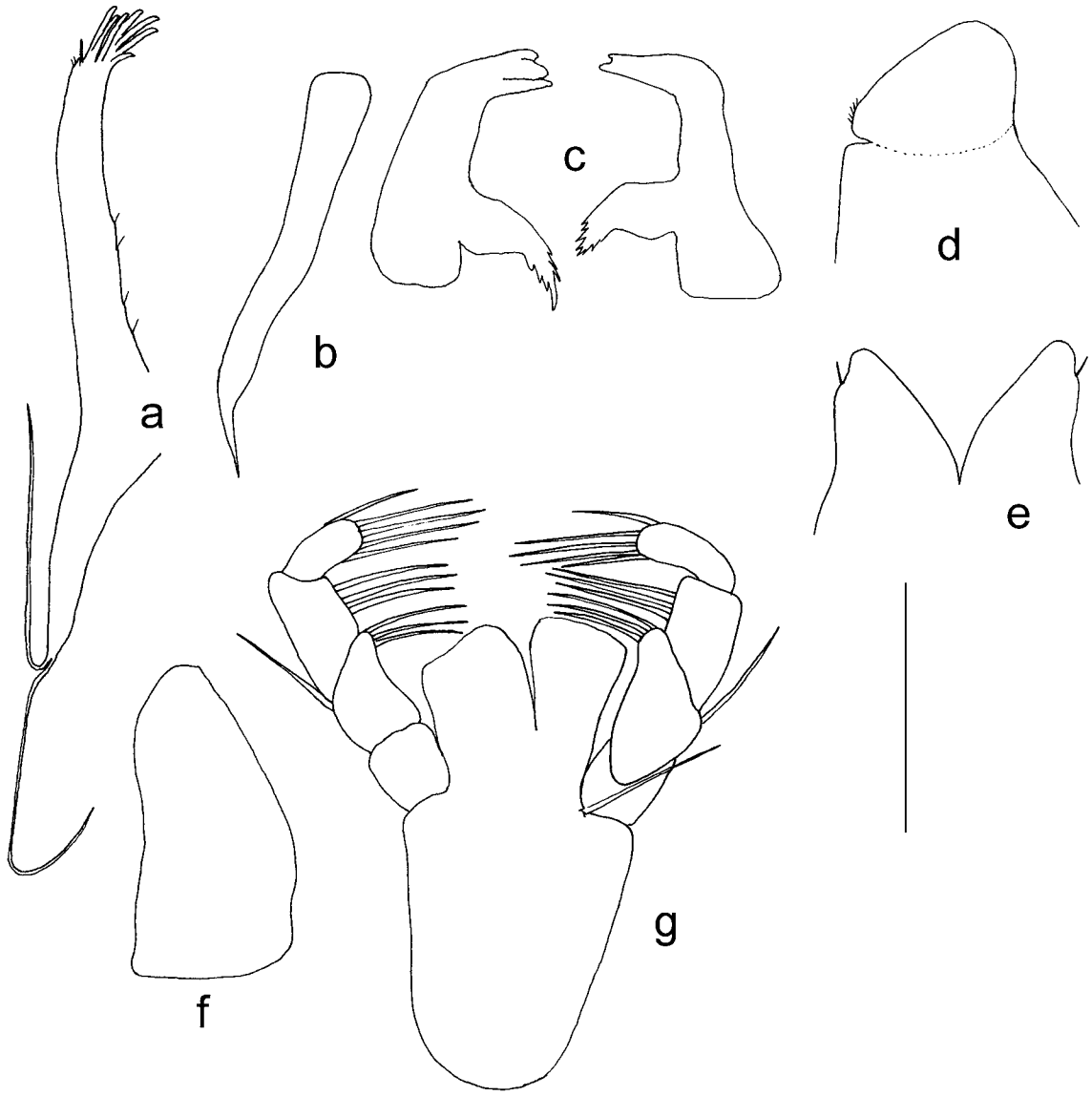

Figure 19. *Paraleptognathia weddellensis* ZMH K-40603 a. Maxillula, b. Epignath, c. Mandibles, d. Labrum, e. Labium, f. Maxilla, g. Maxilliped. Scale bar 0.1 mm.

pereonite 3 and longer than 6; pereonite 2 and 4 subequal. Pleon (Fig. 18a, b): pleonite 1 and 3 longest, pleonites 2, 4, 5 subequal.

Antennule (Fig. 18d): article 1 longest, with one long and two short simple setae; article 2 with one long simple and one short simple setae; article 3 shortest, with two terminal simple setae; article 4 with four terminal setae.

Antenna (Fig. 18e): article 1 short, semifused to cephalothorax; article 2 as long as wide, with one dorsal short spiniform seta; article 3 with one simple seta distally; article 4 longest, with two distal simple long, two distal short and one short simple setae at midlength; article 5 with one simple long seta distally; article 6 shortest, with three terminal simple setae.

Labrum (Fig. 19d): hood-shaped, with row of setules on the apical margin.

Mandible (Fig. 19c): Well calcified; pars molaris bent ventrally; lacinia mobilis spiniform.

Maxillula (Fig. 19a): endite with four rows of ventral setules, and two short and seven simple terminal spiniform setae.

Maxilla (Fig. 19f): rectangular, naked.

Labium (Fig. 19e): of two lobes with one short simple seta at distal outer margin.

Maxilliped (Fig. 19g): endites not fused, with no special feature.

Epignath (Fig. 19b): with no special feature.

Cheliped (Fig. 18h): basis as long as carpus; merus with ventral simple seta; carpus with one ventral and one dorsal simple setae, carpal shield well developed rounded; propodus smooth, with three teeth at cutting edge; dactylus smooth.

Pereopod 1 (Fig. 18i): coxa naked; basis about three times as long as broad, with one setulose seta; ischium short, with one simple seta; merus as long as carpus, with one spiniform seta; carpus with two spiniform setae; propodus with a row of ventral spines and a spiniform distal seta; dactylus smooth; unguis as long as dactylus.

Pereopod 2 (Fig. 18j): as pereopod 1, except basis without setae; carpus with three spiniform setae; propodus with a short simple seta.

Pereopod 3 (Fig. 18k): as pereopod 2, except propodus smooth.

Pereopod 4 (Fig. 18l): basis about three times as long as wide, naked; ischium short, with two simple setae; merus with two spiniform setae; carpus with three spiniform setae; propodus with three spiniform setae and a terminal spine; dactylus with no special features.

Pereopod 5 (Fig. 18m): as pereopod 4, except basis with one simple seta; ischium with one simple setae.

Pereopod 6 (Fig. 18n): as pereopod 4, except propodus with four spiniform setae.

Pleopods (Fig. 18g): exopod with ten long simple setae; endopod with nine long simple setae.

Uropods (Fig. 18f): exopod half the length of article one of endopod. Article 1 with one simple seta; article 2 with two terminal simple setae. Article 1 of endopod naked, article 2 with four terminal setae.

Juvenile males body length 2.1 mm. Antennule (Fig 18c): first article longest, with one simple seta; article 2 naked; article 3 with one long distal seta; article 4 shortest, with two distal setae; article 5 with three terminal setae.

Manca body length 1.0 mm.

Distribution: Weddell Sea, Elephant Island, South Orkney Island, King George Island.

Remarks: among the representatives of *Paraleptognathia* of the southern oceans this species has the biggest carpal shield on the cheliped of the region.

***Paraleptognathia multiserratoides* sp. n. (Fig. 20, 21)**

Material examined**:** 66 individuals. Holotype ZMH K-40606, RV ”Meteor” St. 66, one female. Paratypes ZMUC CRU 3960 RV ”Polarstern” St. 139, five females, ZMB 27519 RV ”Polarstern” St. 154, four females, ZMH K-40607 RV ”Meteor” St. 21, one female, ZMH K-40608 RV ”Meteor” St. 27, one female, ZMH K-40609 RV ”Meteor” St. 50, seven females (one dissected), ZMH K-40610 RV ”Meteor” St. 66, one female, ZMH K-40611 RV ”Meteor” St. 96, four females, one juvenile male, one neuter, ZMH K-40612 RV ”Walther Herwig” St. 138, one female, ZMH K-40613 RV ”Polarstern” St. 91, one female, ZMH K-40614 RV ”Polarstern” St. 143, one female, ZMH K-40615 RV ”Polarstern” St. 145, 16 females, four neuters, ZMH K-40616 RV ”Polarstern” St. 147, 13 females, two neuters, ZMH K-40617 RV ”Polarstern” St. 148, two females.

Diagnosis: Cheliped with crenulation on carpal shield, on dorsal and lateral propodus, and on dactylus. Pereopod 4 to 6 with spinules on propodus.

Description: non-ovigerous female. Body (Fig. 20a, b): long, about 10 times as long as wide. Body length 1.4 to 3.4 mm. Cephalothorax (Fig. 20a, b): about 1.5 times longer than broad, oval shaped. Pereon (Fig. 20a, b): pereonite 1 shortest; pereonite 6 longer than 1, shorter than 5; pereonite 2 longer than 5 and subequal to 4; pereonite 3 longest.
Pleon (Fig. 20a, b): pleonites of equal length; pleotelson rounded.

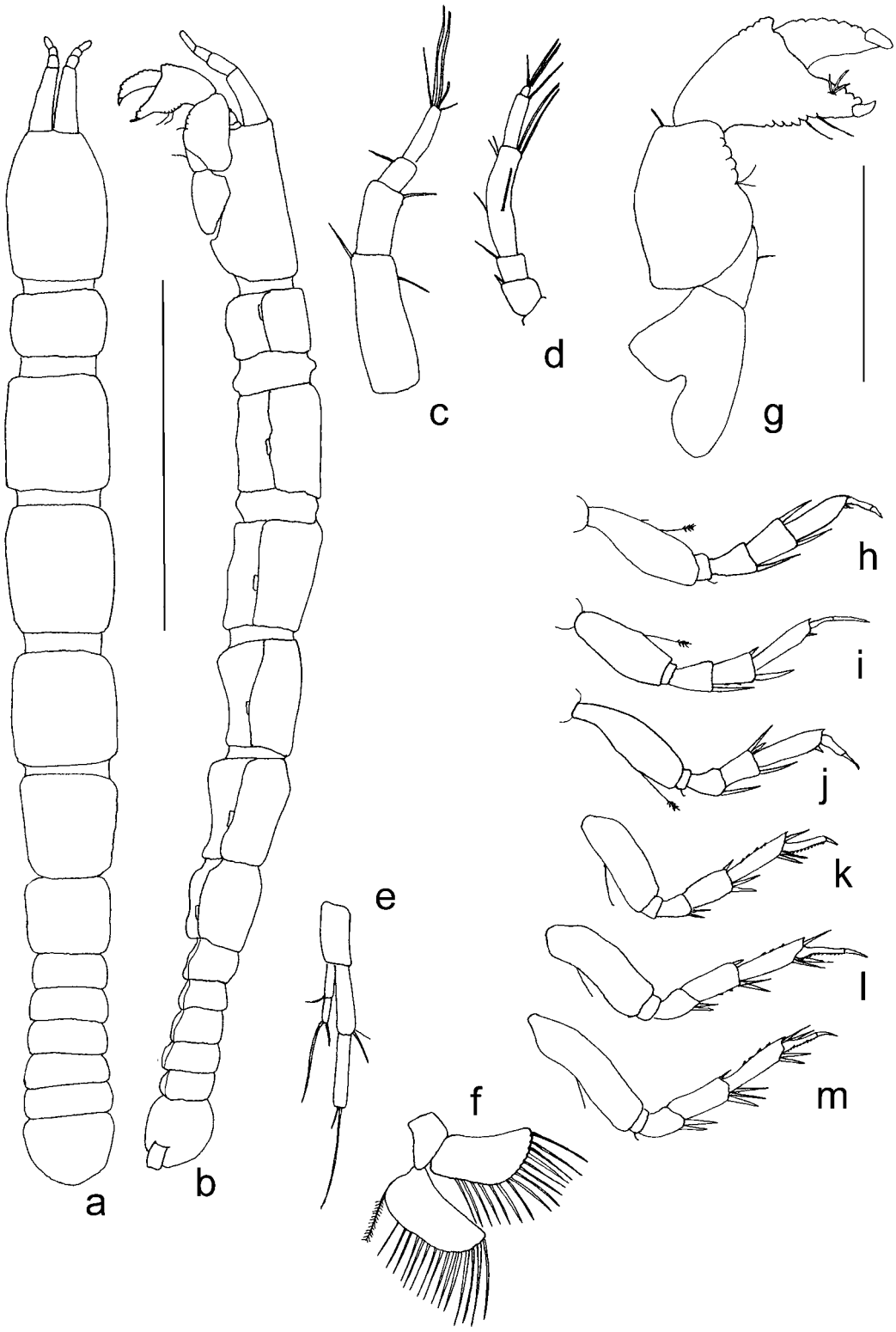

Figure 20. *Paraleptognathia multiserratoides* ZMH K-40606 a. Body, dorsal view, b. Body, lateral view. Scale bar 1mm. ZMH K 40609 c. Antennule, d. Antenna, e. Uropod, f. Pleopod, g. Cheliped, h. Pereopod 1, i. Pereopod 2, j. Pereopod 3, k. Pereopod 4, l. Pereopod 5, m. Pereopod 6. Scale bar 0.25 mm.

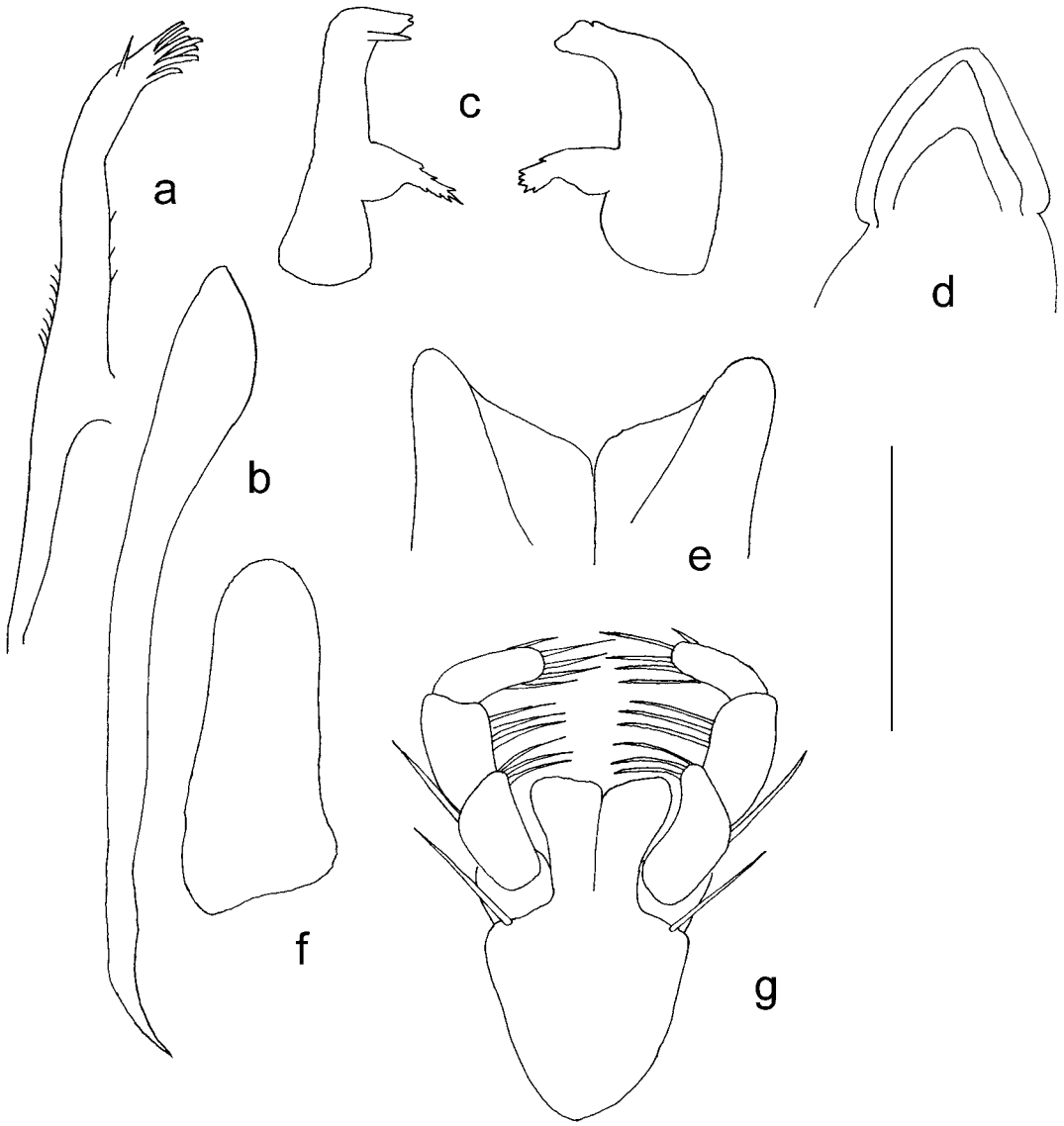

Figure 21. *Paraleptognathia multiserratoides* ZMH K-40609 a. Maxillula, b. Epignath, c. Mandibles, d. Labrum, e. Labium, f. Maxilla, g. Maxilliped. Scale bar 0.1 mm.

Antennule (Fig. 20c): article 1 longest, with two distal setae; article 2 with one long simple seta; article 3 shortest, with one distal simple seta; article 4 with five terminal setae.

Antenna (Fig.20d): article 1 short, semifused to cephalothorax; article 2 as long as wide, with one short spiniform seta dorsally; article 3 with one simple seta distally; article 4

longest, with two distal simple long, two distal short and two short simple setae at midlength; article 5 with one simple long seta distally; article 6 shortest, with three terminal simple setae.

Labrum (Fig. 21d): hood-shaped, smooth.

Mandible (Fig. 21c): well calcified; pars molaris bent ventrally; lacinia mobilis spiniform.

Maxillula (Fig. 21a): endite with three rows of ventral setules and seven rows of dorsal setules; nine simple terminal spiniform setae.

Maxilla (Fig. 21f): rectangular, with no special features.

Labium (Fig. 21e): composed of two triangular lobes, naked.

Maxilliped (Fig. 21g): with no special features.

Epignath (Fig. 21b): as long as Maxillula, with no special feature.

Cheliped (Fig. 20g): basis as long as carpus; merus with one ventral simple seta; carpus with one ventral and one dorsal simple setae; carpal shield weak, with a prominent row of tubercles on ventral margin; propodus with very prominent row of tubercles ventrally, row of tubercles dorsally near insertion of dactylus, with three teeth on cutting edge; dactylus with very prominent row of tubercles dorsally.

Pereopod 1 (Fig. 20h): coxa naked; basis 2.5 times as long as broad, with one simple short and one setulose setae; ischium short, with one simple seta; merus as long as carpus, with one spiniform seta; carpus with two spiniform setae; propodus with one terminal spine and one terminal short spiniform seta; dactylus smooth; unguis short and sharp.

Pereopod 2 (Fig. 20i): as pereopod 1, except basis with only one setulose seta, carpus with two spinules ventrally.

Pereopod 3 (Fig. 20j): as pereopod 1, except basis with only one setulose seta, carpus with three spiniform setae.

Pereopod 4 (Fig. 20k): basis three times as long as broad, with one simple seta; ischium short, naked; merus with two spiniform spetae; carpus longer than merus, with three spiniform setae; propodus with a row of dorsal spinules, terminal spine and three terminal spiniform setae; dactylus with no special features.

Pereopod 5 (Fig. 20l): as pereopod 4, except carpus with a row of spinules ventrally.

Pereopod 6 (Fig. 20m): as pereopod 4, except ischium with simple seta; carpus and propodus have four spiniform setae.

Pleopods (Fig. 20f): exopod with 14 simple long setae; endopod with 14 simple long setae.

Uropods (Fig. 20e): exopod almost as long as endopod article 1. Exopod article 1 with two distal simple setae; article 2 with two terminal simple setae. Endopod article 1 with one distal simple seta; article 2 with two terminal simple setae.

Type locality: Antarctic Peninsula, RV ”Meteor” St. 66, 64° 28.5´S 64° 45.0´W, 320 m, 8.01.1990, dredge.

Etymology: the latin termination *-oides* refers to the similarity to the species *P. multiserrata*.

Distribution: this species occurs in the Antarctic Peninsula, Elephant Island, and King George Island.

Remarks: this species resembles *P. multiserrata*. The differences are in the cheliped, the carpal shield in *P. multiserratoides* is less developed than in *P. multiserrata*, the propodus of P4-P6 in *P. multiserratoides* are armed in dorsal spinules while they are smooth in *P. multiserrata*. The crenulation on the cheliped is more prominent in *P. multiserratoides* than in *P. multiserrata*. Moreover *Paraleptognathia multiserrata* occurs in the North Atlantic Ocean while *P. multiserratoides* occurs in the South Atlantic Ocean.

***Paraleptognathia benguela* n. sp. (Figs 22, 23)**

Material examined**:** 18 individuals. Holotype ZMH K-40618 RV ”Meteor” 48 St. 340, two females. Paratypes ZMB 27520, RV ”Meteor” 48 St. 346, three females, ZMUC CRU 3961 RV ”Meteor” 48 St. 325, two females, ZMH K-40619 RV ”Meteor” 48 St. 340, two females, ZMH K-40620 RV ”Meteor” 48 St. 345, one female, ZMH K-40621 RV ”Meteor” 48 St. 344, three females, ZMH K-40622 RV ”Meteor” 48 St. 340, one juvenile male, ZMH K-40623 RV ”Meteor” 48 St. 348, one female, ZMH K-40624 RV ”Meteor” 48 St. 325, one female, ZMH K-40625 RV ”Meteor” 48 St. 338, one female, ZMH K-40626 RV ”Meteor” 48 St. 348, one female, ZMH K-40627 RV ”Meteor” 48 St. 345, one female.

Diagnosis: Carpal shield well developed. Pereopod 1, 2, 3 with spinules on merus, carpus and propodus.

Description: non-ovigerous female. Body (Fig. 22a, b): long, about 7.3 times longer than broad. Body length 1.5 to 4.0 mm. Cephalothorax (Fig. 22a, b): about 1.3 times longer than broad. Pereon (Fig. 22a, b): pereonite 1 as long as pereonite 6; pereonite 5 as long as pereonite 2 and longer than 6, pereonite 4 longer than 2 and shorter than 3; pereonite 3 longest. Pleon (Fig. 22a, b): pleonites of equal length, pleotelson with pointed apex.

Antennule (Fig. 22c): article 1 longest, with one long and three short setae; article 2 with one long simple and two short simple setae; article 3 shortest, with two terminal simple setae; article 4 with five terminal setae.

Antenna (Fig. 22d): article 1 short, semifused to cephalothorax; article 2 as long as wide, with one short spiniform seta dorsally; article 3 with one simple distal seta; article 4 longest, with two distal simple long, two distal short and one short simple setae at midlength; article 5 with one simple long distal seta; article 6 shortest, with five terminal simple setae.

Labrum (Fig. 23d): hood-shaped, with row of setules on lateral margins.

Mandible (Fig. 23c): well calcified; pars molaris bent ventrally; lacinia mobilis spiniform and blunt.

Maxillula (Fig. 23a): endite with three rows of ventral setules, four rows of dorsal setules, with one simple and eight pinnate terminal spiniform setae.

Maxilla (Fig. 23f): rectangular, with a row of setules on distal edge.

Labium (Fig. 23e): composed of two triangular lobes with row of setules at distal edge.

Maxilliped (Fig. 23g): endites not fused, with a distal tubercle, basis tong-shaped.

Epignath (Fig. 23b): with no special features.

Cheliped (Fig. 22g): basis as long as carpus; merus with ventral simple seta; carpus with a ventral and a dorsal simple setae; carpal shield well developed, about one third of carpus; propodus smooth, with two teeth at cutting edge; dactylus smooth.

Pereopod 1 (Fig. 22h): coxa naked; basis twice as long as broad, with two simple setae; ischium short, with one simple seta; merus with a ventral and a dorsal row of spinules and one spiniform seta; carpus as long as merus, with a ventral and a dorsal row of spinules, and two spiniform setae; propodus with ventral and dorsal row of spinules, one terminal spine and terminal short spiniform seta; dactylus as long as propodus.

Pereopod 2 (Fig. 22i): as pereopod 1, except basis naked, merus and propodus lack dorsal rows of spinules, carpus with three spiniform setae.

Pereopod 3 (Fig. 22j): as pereopod 2, except carpus lacks dorsal rows of spinules, and only two spiniform setae.

Pereopod 4 (Fig. 22k): basis three times as long as broad, naked; ischium short, with one simple seta; merus with two spiniform setae; carpus with three spiniform setae; propodus with two terminal spiniform setae; dactylus with no special features.

Pereopod 5 (Fig. 22l): as pereopod 4, except basis with three simple setae; merus with two spiniform setae, propodus with three terminal spiniform setae, dactylus with larger spinules as in pereopod 4 and 6.

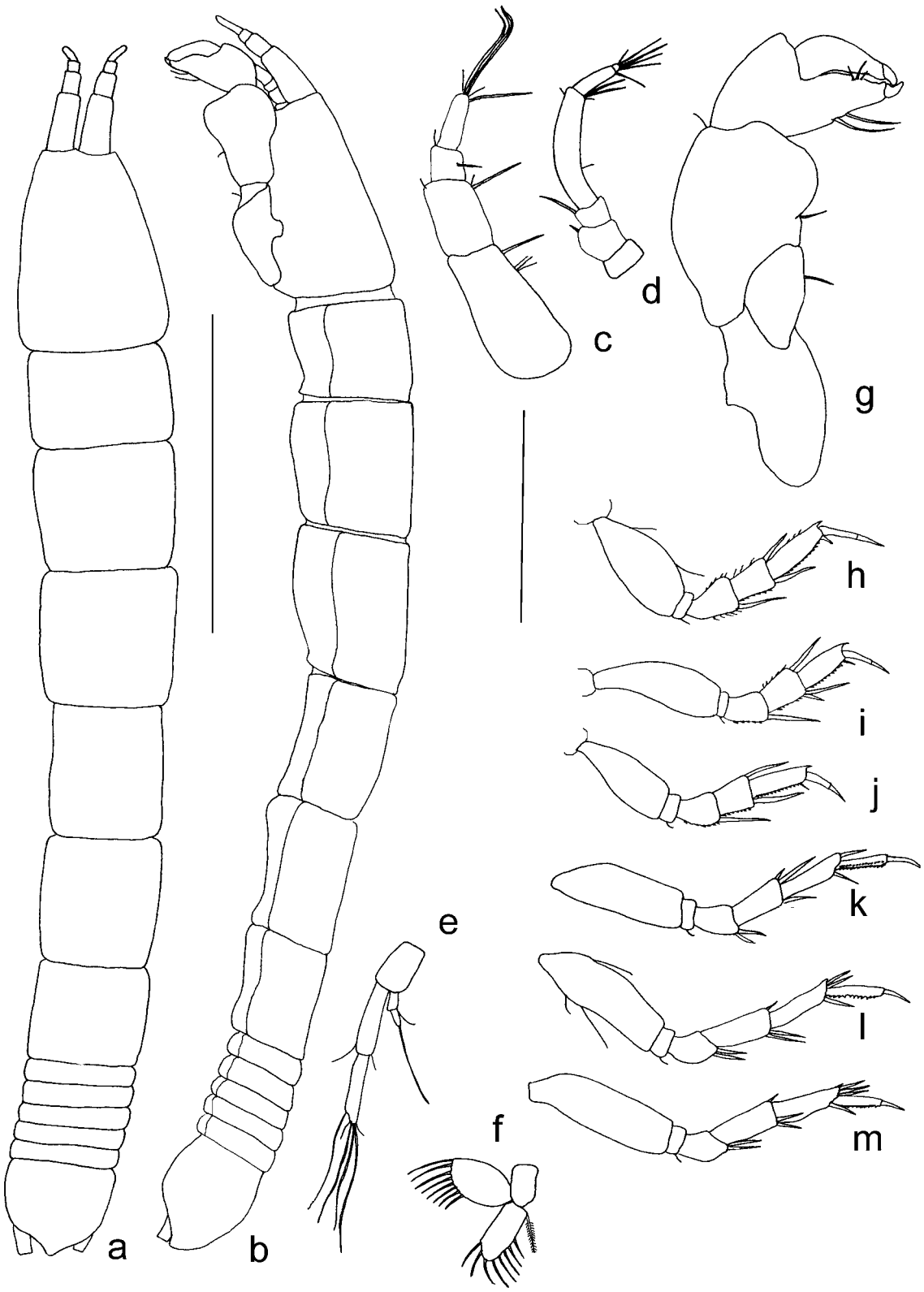

Figure 22. *Paraleptognathia benguela* ZMH K-40618 a. Body, dorsal view, b. Body, lateral view. Scale bar 1mm. ZMH K-40619 c. Antennule, d. Antenna, e. Uropod, f. Pleopod, g. Cheliped, h. Pereopod 1, i. Pereopod 2, j. Pereopod 3, k. Pereopod 4, l. Pereopod 5, m. Pereopod 6. Scale bar 0.25 mm.

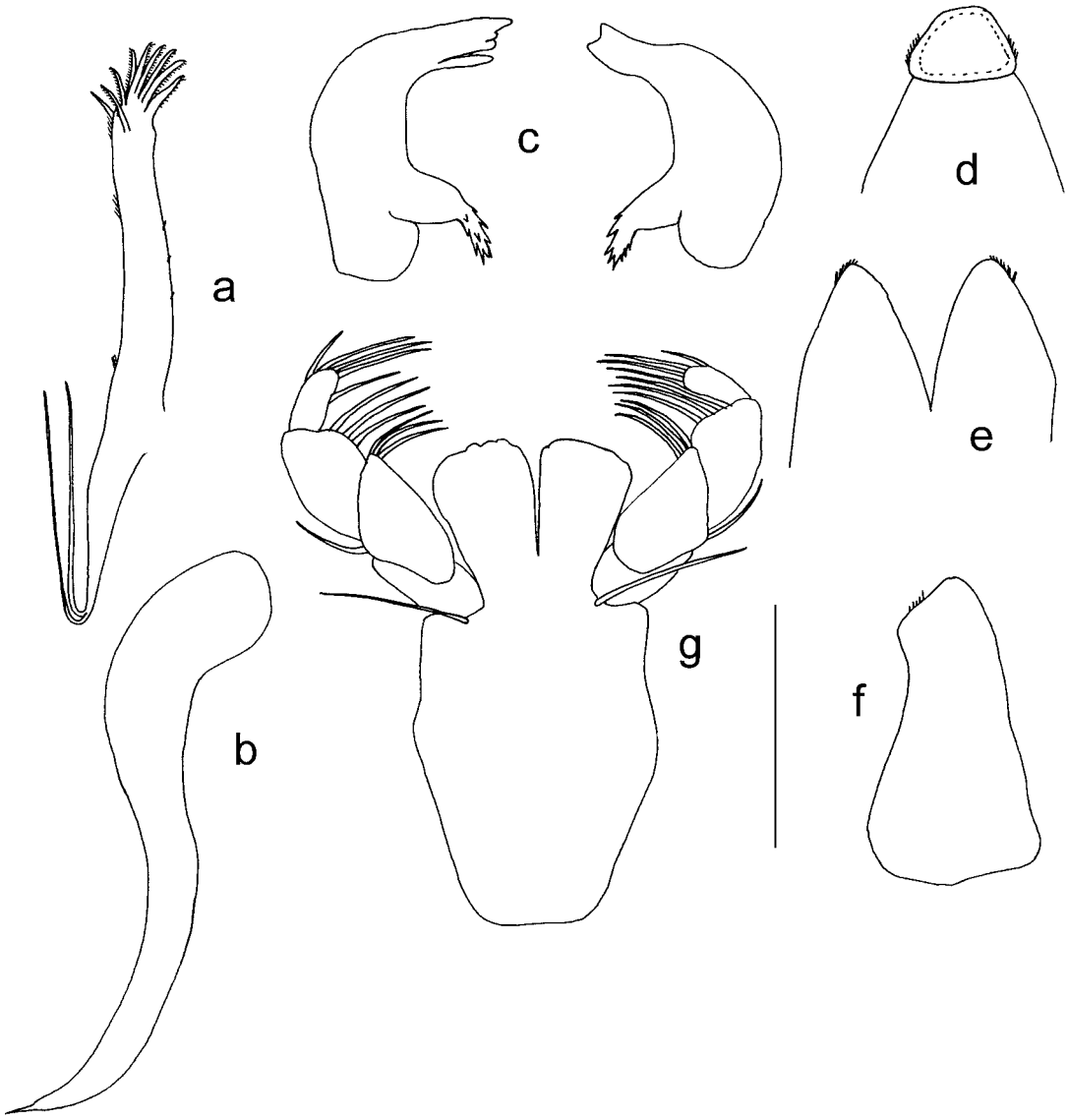

Figure 23. *Paraleptognathia benguela* ZMH K-40619 a. Maxillula, b. Epignath, c. Mandibles, d. Labrum, e. Labium, f. Maxilla, g. Maxilliped. Scale bar 0.1 mm.

Pereopod 6 (Fig. 22m): as pereopod 4, except propodus with four terminal spiniform setae.

Pleopods (Fig. 22f): exopod with eight simple long setae, endopod with seven simple long setae.

Uropods (Fig. 22e): exopod half the length of article 1 of endopod. Exopod article 1 with one simple seta; article 2 with one terminal simple seta. Article 1 of endopod with two simple setae; article 2 with six terminal setae.

Juvenile males body length 3.32 mm.

Mancas up to 1.5 mm.

Type locality: South Atlantic Ocean, Angola Basin, RV ”Meteor” 48 St. 340 18° 77.3´S 04° 41.2´E-18° 19.4´S 04° 41.9´E, 5395 m, 23.7.2000.

Etymology: the name refers to the Benguela Current that flows on top of the Angola Basin.

Distribution: South Atlantic Ocean, Angola Basin.

Remarks: this species resembles *P. bacescui* but the presence of spinules on the merus and carpus of P1 to P3 on *P. benguela* distinguish them. A detailed analysis of the type of *P. bacescui* is needed to define these two species more properly.

***Paraleptognathia fastuosa* n. sp. (Fig.24, 25)**

Material examined**:** Ten individuals. Holotype ZMH K- 40628 RV ”Meteor” 48 St. 344, one female. Paratypes ZMB 27521 RV ”Meteor” 48 St. 345, one female, ZMH K-40629 RV ”Meteor” 48 St. 340, four females (one dissected), two males, ZMH K-40630 RV ”Meteor” 48 St. 340, two females.

Diagnosis: Cheliped carpus long carpal shield small; propodus of pereopod 1 with spinules; pereon with prominent pereopod shoulders.

Description: non-ovigerous female. Body (Fig. 24a, b): about 6.5 times as long as broad. Body length 2.3 to 4.3 mm. Cephalothorax (Fig. 24a, b): oval shaped, about 1.2 times longer than broad. Pereon (Fig. 24a, b): pereonite 6 shortest, pereonite 1 as long as 5 and shorter than 2, pereonite 2, 3, 4 subequal. Pleon (Fig. 24a, b): pleonite 5 longest, pleonites 1, 2, 3, 4 subequal; pleonites 2, 3, 4, 5 with lateral simple setae; pleotelson pentameral.

Antennule (Fig. 24c): article 1 longest, with one long seta; article 2 with four short simple setae; article 3 shortest, with three terminal simple setae; article 4 with five terminal setae.

Antenna (Fig. 24e): article 1 short, semifused to cephalothorax; article 2 as long as wide, with one short spiniform dorsal seta; article 3 with one simple distal seta; article 4

longest, with two distal simple long, one distal short and one short simple setae at midlength; article 5 with one simple long distal seta; article 6 shortest, with four terminal simple setae.

Labrum (Fig. 25e): hood-shaped, with a row of setules on the distal lateral margins.

Mandible (Fig. 25d): well calcified; pars molaris bent ventrally; lacinia mobilis spiniform, blunt.

Maxillula (Fig. 25b): endite with 14 rows of setules dorsally and four ventral rows. One short, two pinnate and four simple terminal spiniform setae.

Maxilla (Fig. 25g): no special features.

Labium (Fig. 25f): composed of two triangular lobes with a row of setules at the distal edge.

Maxilliped (Fig. 25h): endites smooth, basis tongue-shaped.

Epignath (Fig. 25c): as long as Maxillula, with no special feature.

Cheliped (Fig. 25a): basis shorter than carpus; merus with one ventral simple seta; carpus with one ventral and two dorsal simple setae, carpal shield small, one tubercle near chela insertion, propodus slender, smooth, with three teeth at cutting edge, dactylus smooth.

Pereopod 1 (Fig. 24g): coxa naked, basis about four times as long as broad, with one setulose seta; ischium short, with one simple seta; merus with one spiniform seta; carpus with two spiniform setae; propodus with ventral row of spinules, terminal spine and a terminal short spiniform seta; dactylus smooth.

Pereopod 2 (Fig. 24h): as pereopod 1, except basis with one extra simple seta.

Pereopod 3 (Fig. 24i): as pereopod 1, except carpus with three spiniform setae and propodus lacks short spiniform seta.

Pereopod 4 (Fig. 24j): basis about four times as long as broad, with one setulose seta; ischium short, with two simple setae; merus with two spiniform setae; carpus with three spiniform setae; propodus with three terminal spiniform setae; dactylus with no special features.

Pereopod 5 (Fig. 24k): as pereopod 4, except basis with three setulose setae.

Pereopod 6 (Fig. 24l): as pereopod 4, except carpus and propodus have four spiniform setae.

Pleopods: absent.

Uropods (Fig. 24f):): exopod half the length of article 1 of endopod. Exopod article 1 with one simple seta; article 2 with two terminal simple setae. Article 1 of endopod with two simple distal setae; article 2 with seven terminal setae.

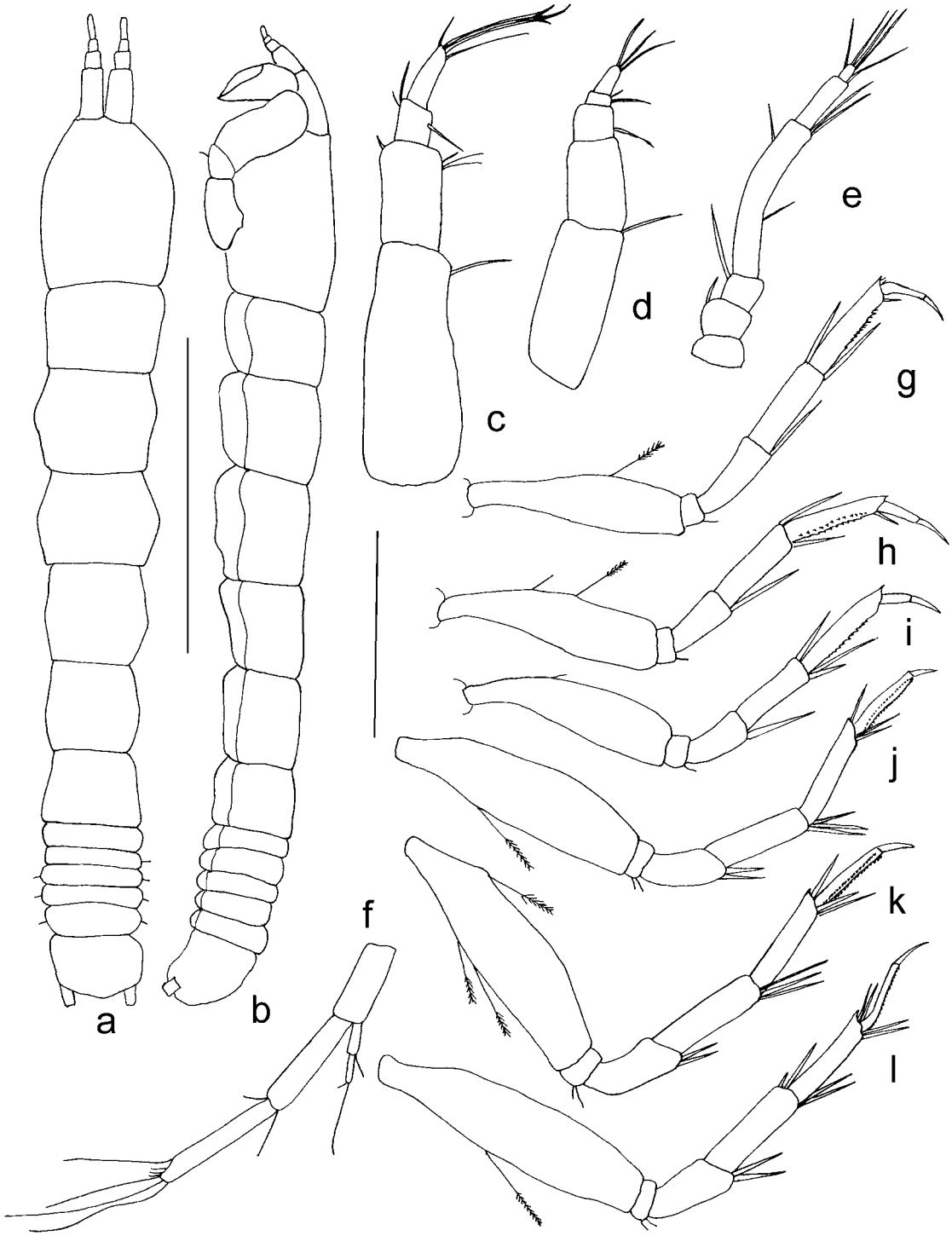

Figure 24. *Paraleptognathia fastuosa* ZMH K-40628 a. Body, dorsal view, b. Body, lateral view. Scale bar 1mm. ZMH K-40629 c. Antennule, d. Antennule juvenile male, e. Antenna, f. Uropod, g. Pereopod 1, h. Pereopod 2, i. Pereopod 3, j. Pereopod 4, k. Pereopod 5, l. Pereopod 6. Scale bar 0.25 mm.

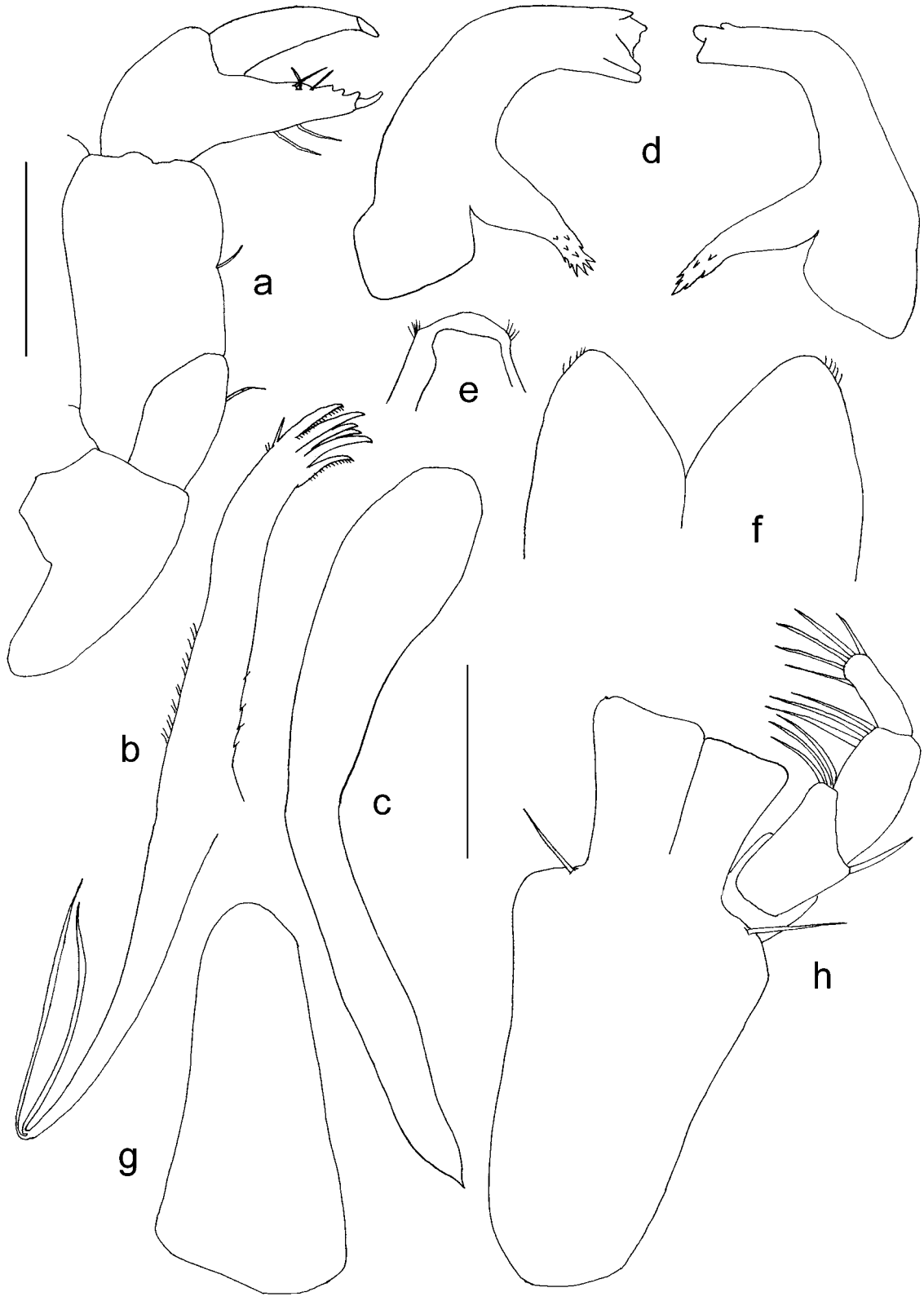

Figure 25. *Paraleptognathia fastuosa* ZMH K-40629 a. Cheliped. Scale bar 0.25 mm. b. Maxillula, c. Epignath, d. Mandibles, e. Labrum, f. Labium, g. Maxilla, h. Maxilliped. Scale bar 0.1 mm.

Juvenile male body length 2.6 to 3.0 mm. Antennule, article 1 longest, with one distal simple seta; article 2 naked; article 3 with one distal simple setae; article 4 shortest, with two distal setae; article 5 with three terminal setae.

Type locality: South Atlantic Ocean, Angola Basin, RV ”Meteor” 48 St. 344, 17° 04.9´S 04° 40.8´E – 17° 07.5´S 04° 42.3´E, 5415 m, 25. 7. 2000.

Etymology: in Latin *fastuosus* means proud, the proud *Paraleptognathia.*

Distribution: South Atlantic Ocean, Angola Basin.

Remarks: the cheliped with small carpal shield and long carpus is similar to that of *P. alba*. The cephalothorax is as long as the pleon in *P. alba,* in *P. fastuosa* the pleon is longer than the cephalothorax. The propodus of P 1 is smooth in *P. alba* and bears spinules in *P. fastuosa*.

***Paraleptognathia tenuichela* n. sp. (Figs 26, 27)**

Material examined**:** Six individuals. Holotype ZMH K-40631 RV ”Meteor” 48 St. 350, one female. Paratypes ZMH K-40632 RV ”Meteor” 48 St. 341, two females (1 dissected), ZMH K-40633 RV ”Meteor” 48 St. 346, one female, ZMH K-40364 RV ”Meteor” 48 St. 346, one female.

Diagnosis*:* Chela long and slender, rami of pleopods long and slender, no plumose seta.

Description: non-ovigerous female. Body (Fig. 26a, b): long, about 9.5 times longer than broad. Body length 1.4 to 3.3 mm. Cephalothorax (Fig. 26a, b): about 1.3 times longer than broad. Pereon (Fig. 26a, b): pereonite 1 as long as 6; pereonites 2, 3 and 5 subequal and longer than 1; pereonite 4 longest. Pleon (Fig. 26a, b): pleonites subequal, pleotelson pentameral.

Antennule (Fig. 26c): article 1 longest, with one long and four short setae; article 2 with one long simple and one short simple setae; article 3 shortest with two terminal simple setae; article 4 with four terminal setae.

Antenna (Fig. 26d): article 1 short, semifused to cephalothorax; article 2 as long as wide, with one short spiniform dorsal seta; article 3 with one simple distal seta; article 4 longest, with two distal simple long, two distal simple short setae; article 5 with one simple long seta distally; article 6 shortest, with two terminal simple setae.

Labrum (Fig. 27d): hood-shaped, with row of setules at lateral and apical margins.

Mandible (Fig. 27c): well calcified; pars molaris bent ventrally; lacinia mobilis tipped by two tubercles.

Maxillula (Fig. 27a): endite with three rows of ventral setules, with eight simple terminal spiniform setae.

Maxilla (Fig. 27b): triangular, elongated, smooth.

Labium (Fig. 27e): composed of two lobes with three short simple setae at distal outer margin.

Maxilliped (Fig. 27f): endites have distal tubercles.

Epignath: lost during dissection.

Cheliped (Fig. 26g): basis as long as carpus; merus naked; carpus with simple ventral seta; carpal shield weak, poorly developed; propodus long, slender, about three times as long as broad, three teeth at cutting edge, one long and one short ventral setae; dactylus slender and smooth.

Pereopod 1 (Fig. 26h): coxa naked; basis about four times as long as broad; ischium short, with one simple setae; merus with one spiniform seta; carpus with two spiniform setae; propodus with ventral row of spinules, a terminal spine, and one spiniform seta; dactylus smooth.

Pereopod 2 (Fig. 26i): as pereopod 1, except carpus with three spiniform setae, propodus with simple dorsal seta.

Pereopod 3 (Fig. 26j): as pereopod 1, except carpus with three spiniform setae.

Pereopod 4 (Fig. 26k): basis about four times as long as broad, with two simple setae; ischium short, with one simple seta; merus with two spiniform setae; carpus with three spiniform setae; propodus with distal spine, one dorsal simple and four terminal spiniform setae; dactylus with no special features.

Pereopod 5 (Fig. 26l): as pereopod 4, except basis five times as long as broad, with three simple setae, carpus with four spiniform setae.

Pereopod 6 (Fig. 26m): as pereopod 4, except basis five times as long as broad, with only one simple seta, merus with three spiniform setae, carpus with four spiniform setae, propodus lacks dorsal simple seta.

Pleopods (Fig. 26f): exopod lacks plumose seta. Exopod with five long simple setae; endopod with four simple long setae.

Uropods (Fig. 26e): exopod half the length of article 1 of endopod. Exopod article 1 with one simple seta, article 2 with one terminal simple seta. Article 1 of endopod with two distal simple setae, article 2 with four terminal setae.

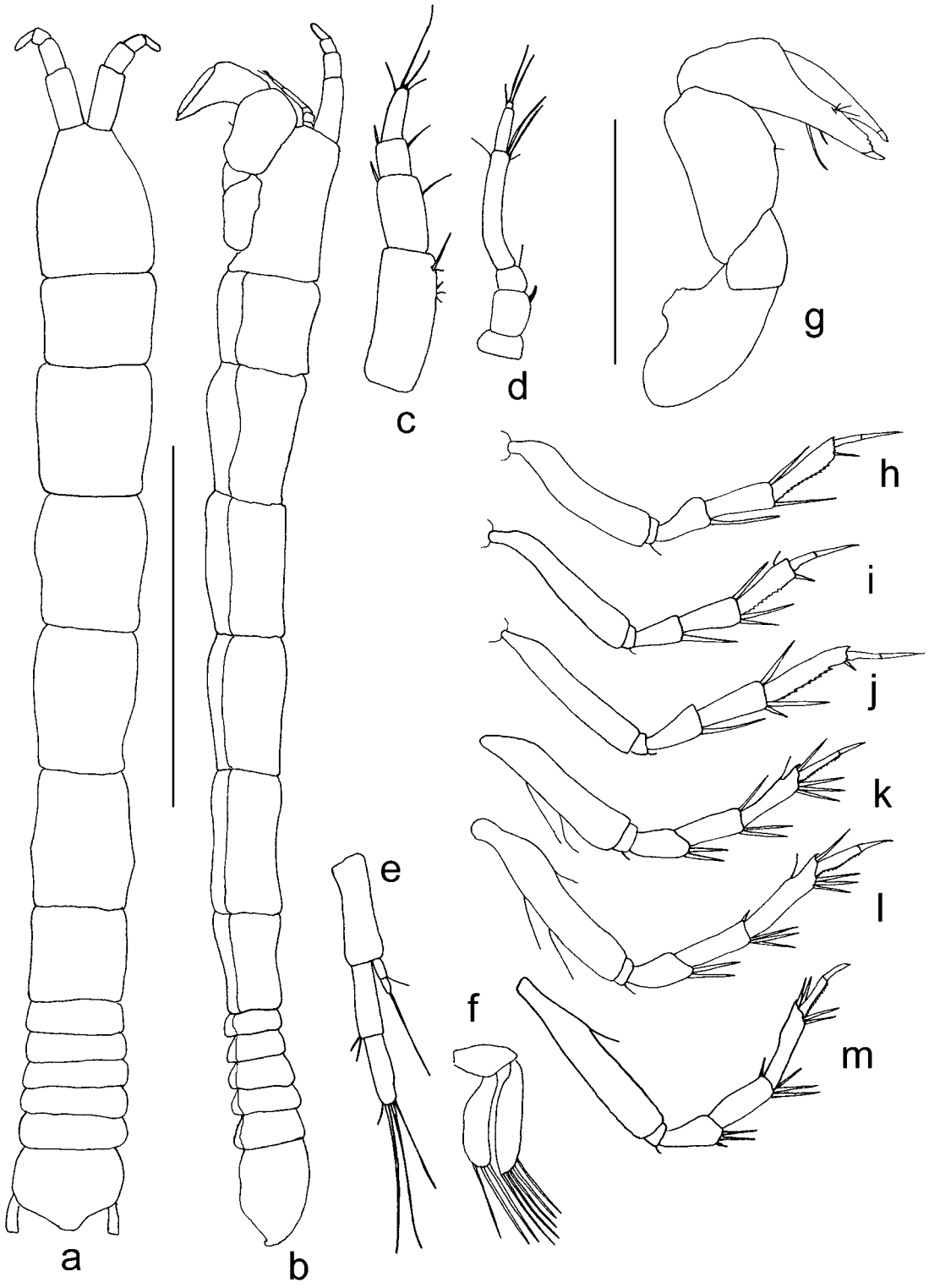

Figure 26. *Paraleptognathia tenuichela* ZMH K-40631 a. Body, dorsal view, b. Body, lateral view. Scale bar 1mm. ZMH K-40632 c. Antennule, d. Antenna, e. Uropod, f. Pleopod, g. Cheliped, h. Pereopod 1, i. Pereopod 2, j. Pereopod 3, k. Pereopod 4, l. Pereopod 5, m. Pereopod 6. Scale bar 0.25 mm.

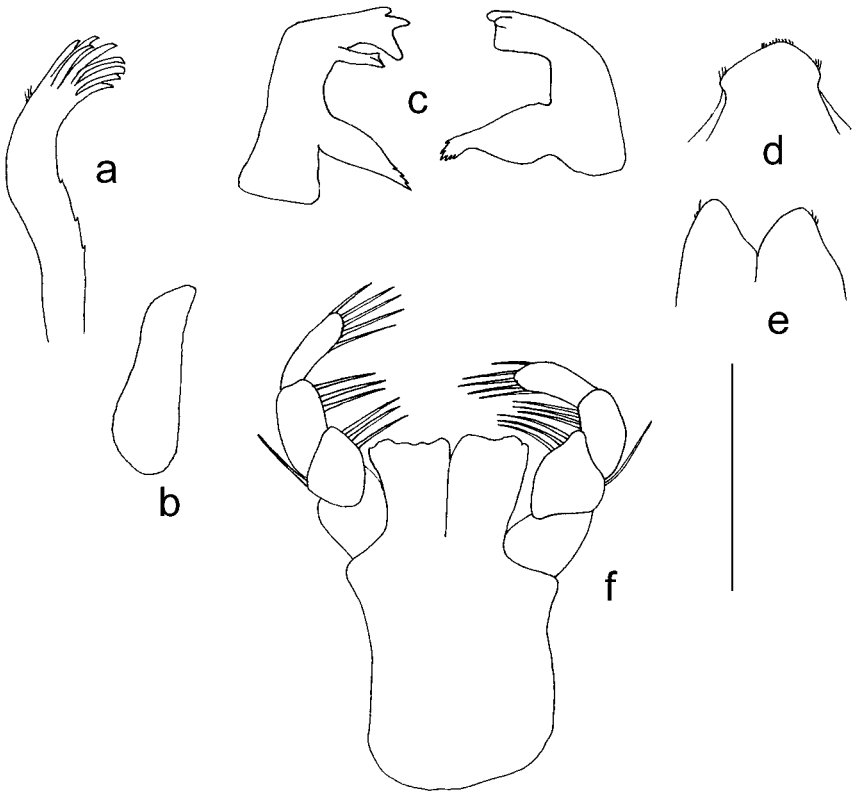

Figure 27. *Paraleptognathia tenuichela* ZMH K-40632 a. Maxillula, b. Maxilla, c. Mandibles, d. Labrum, e Labium, f. Maxilliped. Scale bar 0.1 mm.

Type locality: South Atlantic Ocean, Angola Basin, RV ”Meteor” 48 St. 350, 16° 13.3´S 05° 26.8´E–16° 14.9´S 05° 26.7´E.

Etymology: the name refers to the thin (Latin: *tenuis*) and slender chela.

Distribution: South Atlantic Ocean, Angola Basin.

Remarks: this species has chela and rami of pleopods very slender; also pleopods lacks the plumose seta on the exopod. These ”unusual” characters make it easy to distinguish from

other *Paraleptognathia*, but there is no doubt that this species belongs to the *Paraleptognathia* genus.

General remarks

Paraleptognathia is a widespread genus with a worldwide distribution. Its systematic position has not been established yet. Mouthparts show little variation between particular species. Most of the useful taxonomic characters were found at cheliped level and pereopod level. Sieg (1986) posted the genus *Paraleptognathia*/*Akanthoporeus* in the family Anarthruridae and in the subfamily Akanthophoreinae, because of the lack of heavy cuticula scleratization, well developed and pointed molar process, and the chela insertion via sclerite. The phylogentic analysis by Larsen & Wilson (2002) show clearly that the genus *Paraleptognathia/Akanthophoreus* does not belong to the Anarthruridae. The character pool suggest a closer relationship to the Leptognathiidae than to the Anarthruridae. It is possible that this genus and other related ones like *Chauliopleona*, which are considered to be *incertae sedis* constitute a new family.

The *Paraleptognathia bacescui* and *P. typica* described by Kudinova-Pasternak (1981, 1985) have chelipeds covered by setules, this character of the cuticula is not observed in other *Paraleptognathia* species, a detailed study of more specimens of *P. bacescui* and *P. typica* will clarify this point in future.

Paraleptognathia gracilis is a variable species so that in the past many different forms were described as separated species. At morphological basis there is a gradient of variation so that they all represent the same species. A genetic analysis will be welcome to show if all are cryptic species as in other tanaids species (Larsen 2001) or confirm whether the assumption of a single polymorphic species is true.

The relationship of *Paraleptognathia* to other Akanthophoreinae genera like *Scoloura* Sieg & Dojiri, 1991 is not clear. The resemblance of *Scoloura phillipsi* Sieg & Dojiri, 1991 to *P. gracilis* is very intriguing. A closer analysis of the East Pacific abyssal tanaids from the Discol experiment (research in progress) and the Pacific form of *P. gracilis* reported by Dojiri & Sieg (1997) and *Scoloura* will be the topic of a future paper.

Acknowledgments

Financial support was provided by the German Research Foundation Grant Br 1121/19-2. I am very grateful to my supervisor, Dr. Angelika Brandt from the Zoological Museum Hamburg for her support. I thank Dr. Oliver Coleman from the Naturkunde-Museum Berlin for lending material from the personal collection of Jürgen Sieg for this study, to Dr. Jørgen Olesen from the Zoological Museum University of Copenhagen for the loan of the type material of *Leptognathia,* to Dr. Magdalena Blazewicz-Paszkowycz from University of Łódź for information about the Kudinova-Pasternak material in the Zoological Museum Moscow, to Irina Eidus from the Zoological Museum Hamburg for the help with the Russian manuscripts, to Nicola Baird-Salcedo for correcting the manuscript, and to the reviewers for their comments.

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Taxonomic key for neuters and non-ovigerous females (four articles on antennule) of *Paraleptognathia*

1 Cheliped dactylus with crenulation.....2
- Cheliped dactylus smooth.....7
2 Cheliped propodus with lateral crenulation.....3
- Cheliped propodus smooth.....5
3 Carpal shield of cheliped with crenulation.....4
- Carpal shield of cheliped smooth.....*P. australis* (Beddard, 1886).
4 Carpus of P2 with spinules, propodus of P4 to P6 with dorsal row of spinules, labium and labrum naked.....*P. multiserratoides n. sp.*
- Carpus of P2 smooth, propodus of P4 to P6 smooth, labium and labrum with setules.....*P. multiserrata* (Hansen, 1913).
5 Merus of P1 with two spiniform setae.....*P. bisetulosa* Dojiri & Sieg, 1997.
- Merus of P1 with one spiniform seta.....6
6 Carpus of P2 with spinules and 3 spiniform setae, P5 and P6 with spinules on carpus and propodus.....*P. gracilis* (Krøyer, 1842).
- Carpus of P2 smooth with two spiniform setae, P5 and P6 carpus and propodus smooth.....*P. antarctica* (Vanhöffen, 1914).
7 Propodus of P1 smooth.....8
- Propodus of P1 with ventral row of spinules.....10
8 Carpal shield oval shaped and very prominent, propodus of P4 to P6 with two terminal spiniform setae.....*P. brachiata* (Hansen, 1913).
- Carpal shield rounded, propodus of P4 to P6 with four terminal spiniform setae.....9
9 Carpus of P5 and P6 with three spiniform setae.....*P. alba* (Hansen, 1913).
- Carpus of P5 and P6 with four spiniform setae.....*P. inermis* (Hansen, 1913).
10 Carpal shield small or absent, chela slender, three times as long as broad.....*P. tenuichela* n. sp.
- Carpal shield well developed; chela about two times as long as broad.....11
11 Merus of P1 to P3 with spinules.....12
- Merus of P1 to P3 smooth.....13
12 P5 carpus with three spiniform setae.....*P. benguela* n. sp.
- P5 carpus with four spiniform setae.....*P. typica* Kudinova-Pasternak, 1981.
13 Carpus of P1 and P2 with spinules.....*P. bacescui* Kudinova-Pasternak, 1985.

- Carpus of P1 and P2 smooth..……..……....14

14 Cheliped carpus long, twice as long as broad, carpal shield not very prominent...……...….....….*P. fastuosa* n. sp.

- Cheliped carpus about 1.5 times longer than broad, carpal shield prominent..….....15

15 Carpal shield rounded, very prominent; carpus of P3 with three spiniform setae.....…….....*P. weddellensis* (Sieg, 1986)

- Carpal shield not as above, carpus of P3 with two spiniform setae……..
……..……*P. longiremis* (Hansen, 1913).

Veröffentlichung VI

A new genus and species of deep-sea apseudomorph tanaidacean (Crustacea: Malacostraca: Peracarida) from the Angola Basin

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ABSTRACT.- A new apseudomorph tanaidacean *Glabroapseudes larseni* gen. nov. sp. nov. is described from a depth of over 5000 m from the Angola Basin (South Atlantic Ocean). A combination of characters including (1) the lack of a rostrum, (2) no epistomal, lateral or other spines or processes on the cephalothorax, (3) relatively small uropods with unequal rami makes *G. larseni* unique among other members of suborder Apseudomorpa. The new genus apparently represents an atypical member of the family Apseudidae and may have its closest affinities with the genera *Fageapseudes* BĂCESCU & GUTU 1971 and *Carpoapseudes* LANG 1968. The description of *G. larseni* is based on an adult male 12 mm long. *Glabroapseudes larseni* may have its closest affinities to *Apseudes unicus* KUDINOVA-PASTERNAK, 1981.

KEYWORDS: Tanaidacea, Apseudomorpha, Apseudidae, new genus and species, deep-sea, Angola basin, South Atlantic Ocean

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Introduction

Tanaidacea occur in all world oceans from the shallow shelf down to the deep-sea. The sytematics of the Tanaidacea however are not well understood for many taxa, especially those from the deep-sea. The suborder Apseudomorpha currently contains about 265 species, many of them more than 5 mm in body length, and includes the largest known tanaids. Deep-sea apseudomorphs are not abundant in many collections. During July 2000, members of the DIVA Expedition collected deep-water benthos, including Tanaidacea, from the Angola basin. Examination of the organisms collected during this sampling effort yielded an apparently undescribed genus and species of apseudomorphan Tanaidacea attributable to the family Apseudidae LEACH, 1814. The description of this new genus and species is the subject of the present paper.

Material and Methods

Sampling was conducted aboard the R/V Meteor, cruise 48-1, DIVA 1 expedition (**DIV**ersity of the deep **A**tlantic Ocean), using an epibenthic sled in depths between 3000-6000 m. The holotype has been deposited in the Zoological Museum Hamburg (ZMH). The total body length was measured from the anterior most part of the cephalothorax to the tip of the pleotelson. We follow the nomenclature proposed by SIEG 1977 in considering the appendage on the first free thoracomere as pereopod 1. For the armoring we follow the terminology proposed by SIEG 1980.

Results

Systematics

Suborder Apseudomorpha SIEG, 1980

Family Apseudidae LEACH, 1814

Genus *Glabroapseudes* gen. Nov

.

Etymology.— from *glaber (lat)* smooth, hairless; referring to the aspinose cephalothorax of the type species, gender masculine.

Diagnosis.—Apseudidae. Body attenuated, nine times longer than wide. Cephalothorax lacking rostral, epistomal, lateral spines or teeth. Pereopod 1 elongate, subcylindrical; carpus with numerous large setae. Carpus longer than merus on pereopods 2 to 6. Exopods present on both cheliped and pereopod 1. Pereonites without spines or lateral or dorsal processes. Dactyl of pereopod 4 not noticeably modified. Pleopods, five pairs, biramous. Uropods relatively short, approximately two thirds length of pleotelson.

Female unknown.

Type species: *Glabroapseudes larseni* sp. nov.

Remarks.— The absence of rostral, epistomal, and other spines or teeth on the cephalothorax distinguishes *Glabroapseudes*, gen. nov., from most known apseudomorph Tanaidacea. The new genus is assigned to the family Apseudidae because it has (1) a small forwardly directed coxal spine on pereopod 1, (2) an exopod on the cheliped and pereopod 1. *Glabroapseudes* may have its closest relationship with the genera *Fageapseudes* BĂCESCU & GUTU, 1971 and *Carpoapseudes* LANG, 1968. Although these two genera are superficially quite different, BĂCESCU (1981) and BĂCESCU & GUTU (1971) considered them related because of the form of the pleopods and the ratio of the carpus to merus of pereopod 1 in both is similar. Because the new genus lacks a "leaf-shaped" seta on the endite of the maxilliped as found in the Leviapseudinae, we place it in the subfamily Apseudinae LEACH, 1814.

The absence of a rostrum in *Glabroapseudes* may indicate an affinity with *Fageapsuedes* and the morphology of pereopod 1 and the exceptional length of the carpus on pereopods 2-6, may suggest a relationship to *Carpoapseudes*.

Although it also somewhat resembles *Fageapseudes bicornis* (KUDINOVA-PASTERNAK, 1973), *Glabroapseudes* is distinguished by (1) having a much less developed ocular process, (2) the absence of lateral spines or teeth on the body, (3) the poorly developed coxal spine of pereopod 1, (4) the lack of a specialized setae on the last article of the mandibular palp, and (5) having only two coupling hooks on the maxillipedal endite (not drawn).

The pereopod 1 of *Glabroapseudes* is long and subcylindrical with numerous strong simple and toothed spines and setae, especially on the carpus and propodus. These characters approach those of the genus *Carpoapseudes,* however, the absence of a "leaf-shaped" seta on distal inner margin of maxillipedal endite and lack of body spination immediately distinguishes *Glabroapseudes* from *Carpoapseudes* and its subfamily Leviapseudinae SIEG,

1980. *Glabroapseudes* further differs from *Carpoapseudes* by lacking a short comb-like "grooming seta" on the distal inner margin of the propodus of pereopod 1, however, a similar type of seta is present on pereopods 2, 3 and 4 of *Glabroapseudes.*

Glabroapseudes larseni, sp. nov.

(Figs 1-4)

Holotype.— Mature male, 12 mm; ZMH k-39941; 27 July 2000; A. BRANDT leg.
Type locality.— Atlantic ocean, Angola Basin,RV Meteor Cruise 48-1, DIVA, Sta. 348, 16° 18.1' S–05° 27.2' E; 16° 19.3' S–05° 27.2' E; depth 5390 – 5387 m, gear epibenthos sledge.
Etymology.— This species is named in honor of Dr. Kim Larsen, tanaidacean specialist and friend.

Diagnosis.— Body long and slender, nine times as long as broad, cephalothorax without rostral, epistomal, lateral, or other spines or processes, pereonites without lateral or dorsal processes, six free pereonites, five free pleonites. Inner flagellum of antennule with two articles, antenna with well-developed squama. Maxilulle with biarticulate palp. Cheliped and pereopod 1 with exopodite, carpus longer than merus in pereopods 2 to 6. Five pairs of pleopods. Pleotelson long about 15 % of body length. Uropods small, two thirds length of pleotelson.

Description (adult male).—Body (Fig. 1 a, b), cylindrical and elongate, nine times as long as wide. Integument strongly calcified. Length 12.0 mm (excluding antennae and uropods).

Cephalothorax (Fig. 1 a), relatively short, approximately 10 % of body length; 1.12 times longer than wide. Glabrous, surface smooth, except for weakly developed, subacute ocular process. Rostrum and epistomal spine absent. No visual elements, ocular lobes or spines present.

Pereon (Fig. 1 a), 46 % of body length. Pereonites 1-5 decreasing in width and increasing in length posteriorly. All pereonites with two two simple setae dorsally. No lateral or dorsal apophyse present. Pereonite 1 as wide as cephalothorax and twice as broad as long. Pereonite 2 narrower than pereonite 1 and nearly twice as long. Pereonite 3 twice as long as pereonite 1. Pereonite 4, 9/10 length of pereonite 5. Pereonite 5 as wide as pereonite 4 and 6 and as long as pereonite 1 and 2 combined. Pereonite 6 approximately 7/8 length of pereonite

5. Pereonites 1-5, each with ventral hyposphaenian. Shoulder (lobe to wich pereopod attached) of pereopods prominent. Each hyposphaenian located beneath or anterior to shoulder of pereopods. Genital cone well developed, smooth and rounded, directed downward.

Pleon (Fig. 1 a), 44 % of body length. Five free pleonites of almost equal length, hexagonal in dorsal view. All pleonites with pair of antero-dorsal setae. Surface smooth. No lateral or dorsal apophysis present. Pleotelson long and slender, five times longer than wide, 14 % of body length.

Antennule (Fig.1 c), peduncle with four articles, setation as illustrated. First article longest, 10 times longer than wide, longer than articles 2, 3, and 4 combined. Inner flagellum with two articles, both with distal simple setae. Outer flagellum with 10 articles, all articles with simple setae and/or aesthetascs, last article with two terminal aesthetascs and five simple setae.

Antenna (Fig. 1 d), about two thirds of antennule length. Peduncle with two apparent articles. First article very broad (not illustrated). Second about four times length of first. Squama slender, as long as second article of flagellum, with five distal pinnate setae. Flagellum composed of eight articles. First article as wide as long, with one pinnate setae. Article 3 as long as article 2 with one long distal pinnate setae. All subsequent articles with distal pinnate setae.

Labrum lost during dissection.

Mandible (Fig. 2 a, b, c, e), molar process strong with grinding surface closely set with setules. Fine setulation on top of the mandible. Right mandible; pars incisiva with six teeth, spine row with one short, stout, distally dentate spiniform seta and row of four long simple setae. Left mandible; pars incisiva with eight teeth, lacinia mobilis long with eight teeth; spine row with three bifurcated and three multicuspid setae. Mandibular palp with three articles; second article 2.5 times third, five long simple setae and seven minor pinnate setae on inner (flexor) edge; third bearing two long distal simple setae and 10 pinnate setae on inner (flexor) margin.

Maxillule (Fig. 3 a), outer endite with 11 conical setae and two subdistal, finely serrate setae. Inner endite with four short conical setulose setae. Palp composed of two articles, distal article with eight long setae armed distally with recurved setules.

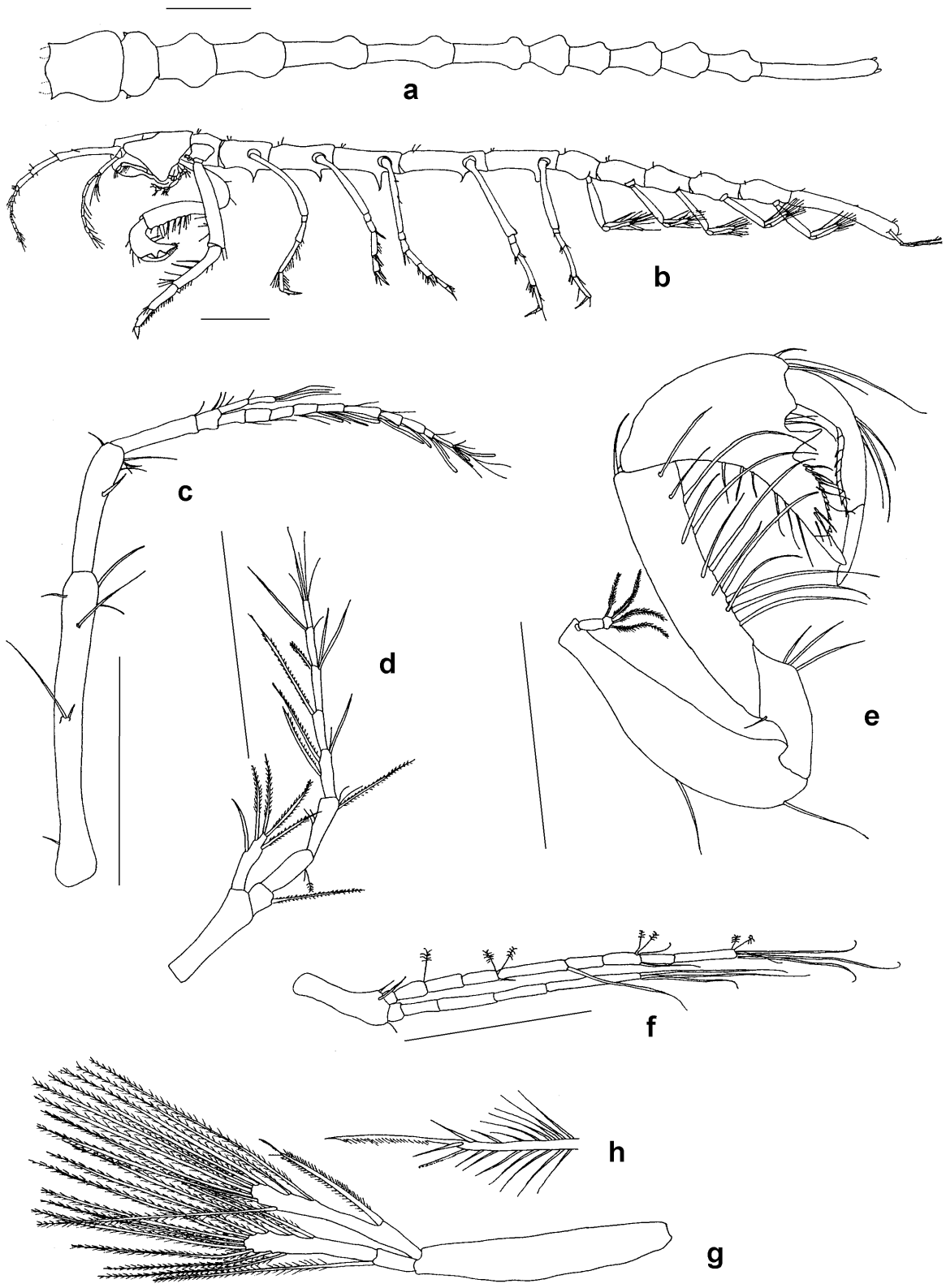

Fig 1. *Glabroapseudes larseni* n.sp. (Holotype) **a** Body, dorsal view (excluding antennae and uropods); **b** body, lateral view; **c** antennule; **d** antenna; **e** cheliped; **f** uropod, **g** pleopod, **h** enlargement of "specialized" seta. Scales for **a**, **b**, **c**, **d**, **e** = 1 mm, f, h = 0.5 mm.

Maxilla (Fig. 3 d, e), consisting of a palp and three endites; palp with one long pinnate and eight simple setae; distal endite with five curved blunt and five pinnate setae; middle endite with one multicuspid, four pectinate, three trilobed and one bifurcated setae. Proximal endite with numerous basally inflated, distally curved setae; medially, one very strong distally serrate seta; and two distolateral setae, serrate distally. Three to four minute teeth on disto-lateral margins of proximal endite.

Labium (Fig. 2 d), basal edge serrate; palp densely setulate with 1 simple, terminal seta.

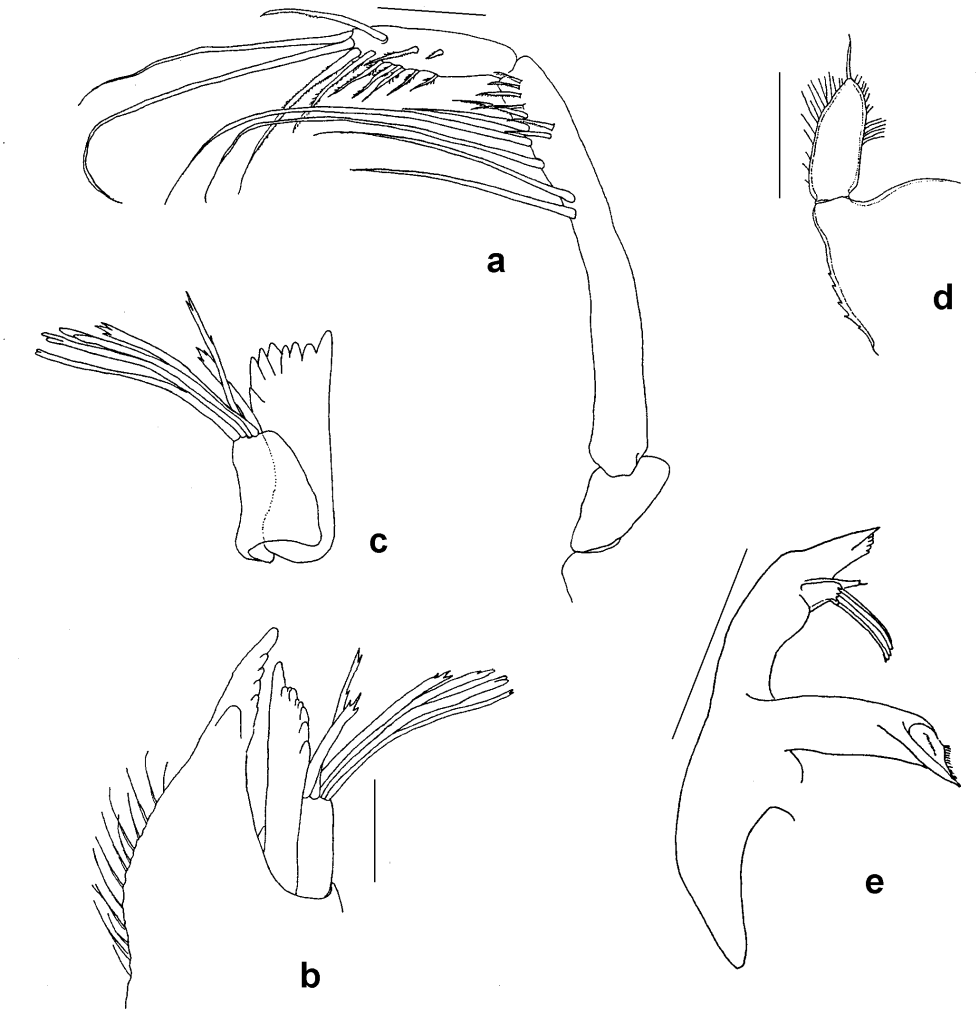

Fig 2. *Glabroapseudes larseni,* n.sp. (Holotype) **a**, palpus, scale = 0.1mm, **b** *lacinia mobilis*, **c** *pars incisiva* and *lacinia mobilis* (lateral aspect); scale = 0.01 mm, **d** labium, **e** mandible.

Maxilliped (Fig. 3 b, c), basis wider than endite. Endite with six conical setulose setae on inner edge and 11 bifurcate setae on distal margin, distal edge setulose with one long simple seta. Two coupling hooks observed. Palp composed of four articles; first with two long simple setae; second with seven long simple and many curved setae on inner (flexor) margin and one on outer (extender) edge; third with very long simple seta, as long as palp, and 8 simple setae; fourth with seven long terminal simple setae.

Epignath lost during dissection.

Cheliped (Fig. 1 e), exopodite with two articles, second with four plumose setae. Coxa small (not illustrated). Basis four times longer than wide, with two simple setae on ventral (extender) margin. Merus short, one third length of carpus, with one seta on inner (flexor) margin and one simple seta on outer (extender). Carpus with seven pairs of setae on flexor margin. Propodus wide, with blunt spine on finger; cutting edge of finger serrate distally, six simple setae on extender side, three simple setae in cavity between spinal process and insertion of dactylus. Dactylus long, curved, margin of cutting edge serrate; three simple setae medially on outer margin.

Pereopod 1 (Fig. 4 a, b), longest and largest pereopod, with carpus and propodus not inflated. Coxa well developed bearing small, anteriorly directed, spine. Endopodite, basis very long, seven times as long as board, with five simple setae on inner (flexor) margin and two simple setae distally; ischium reduced, asetose; merus longer than carpus, 16 short simple setae on outer (extender) margin and 11 strong simple setae on inner (flexor) margin; carpus with 10 simple setae and two strong distal spines. Propodus short, three times as long as claw, strong conical setae in two rows, one row with five and other with seven. Dactylus short, 58 % of total length of claw, with three small, acute denticles on inner edge. Exopodite with two articles, second bearing four pinnate setae.

Pereopod 2 (Fig. 4 c), coxa small (not illustrated). Basis very long 11 times longer than broad. Ischium with three simple setae on distal margin. Carpus twice as long as merus, with nine pairs of simple setae on outer (extender) margin. Propodus, with five lateral; three distal simple setae, and one small denticulate (grooming) seta. Dactylus with terminal spine as long as propodus.

Pereopod 3 (Fig. 4 d, e, f), coxa small (not illustrated). Basis relatively long, 10 times longer than board, one distal setulose setae on outer (extender) margin. Carpus longer than merus with seven pairs of simple setae on extender margin. Single distal setulose seta on

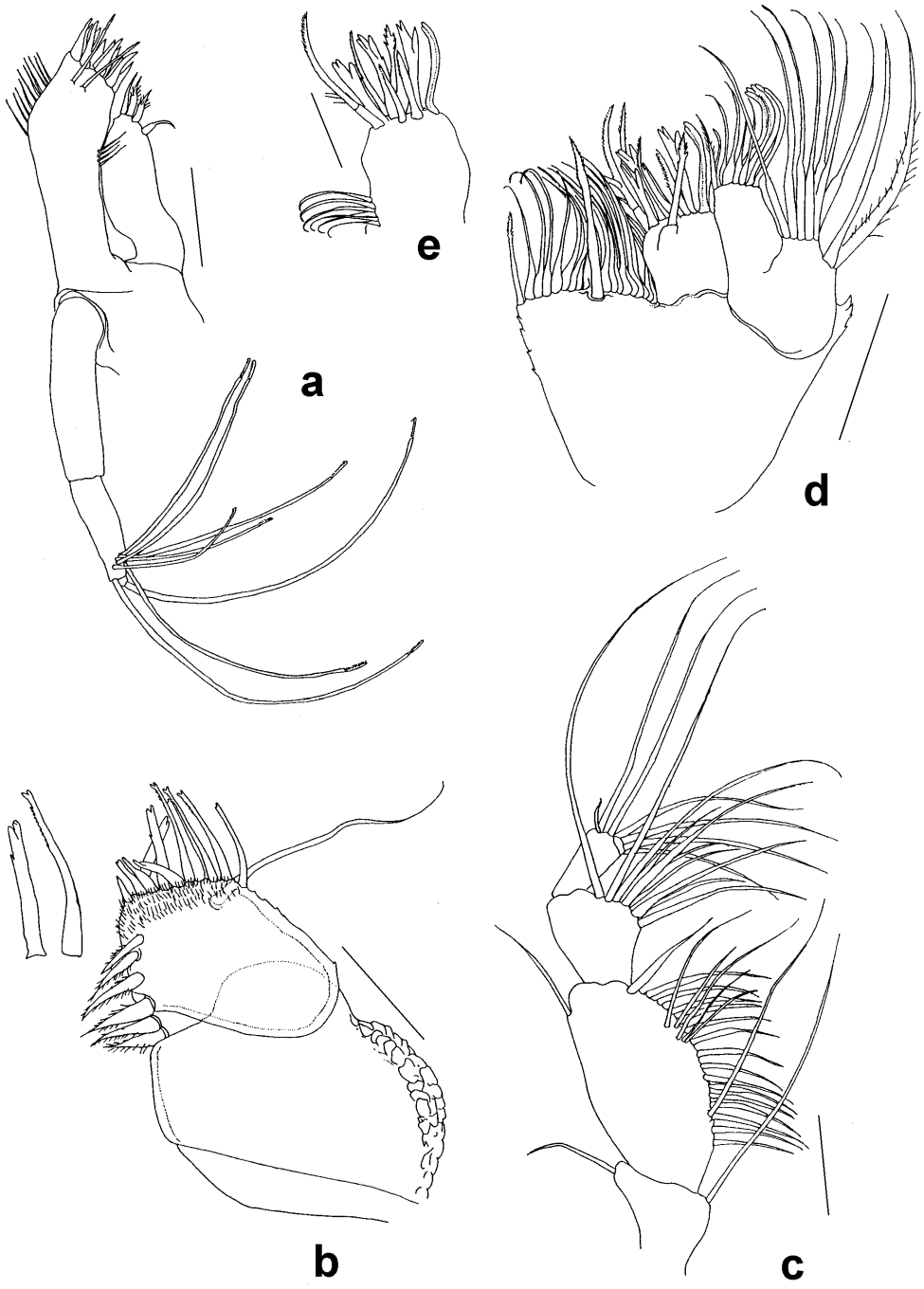

Fig 3. *Glabroapseudes larseni*, n.sp. (Holotype) **a** maxillule, **b** basis and inner plate of maxilliped, **c** maxilliped palp, **d** maxilla, scale = 0.1 mm, **e** endite of maxilla, inner aspect, scale = 0.05 mm.

outer (extender) margin and one denticulate setae distally on propodus. Dactylus with terminal spine as long as propodus.

Pereopod 4 (Fig. 4 g), basis long 10 times longer than wide. Carpus longer than merus. Propodus with only distal simple and one denticulate setae. Propodus 1.2 times longer than dactylus with terminal spine.

Pereopod 5 (Fig. 4 h), basis long 10 times longer than wide. Merus shorter than carpus. Carpus with only distal setae. Propodus with five strong short simple lateral setae and one long, distal, simple seta. Propodus 1.2 times longer than dactylus with terminal spine.

Pereopod 6 (Fig. 4 i), similar to pereopod 4. Carpus twice as long as merus. Eight setae on outer (extender) margin of carpus. Propodus with distal setulose setae on outer (extender) margin. Propodus 1.2 times longer than dactylus with terminal and terminal spine.

Pleopods (Fig. 1 g, h), all five pairs of pleopods biramous, similar in size and shape. Endopodite uniarticulate, inner distal margin with strong proximal plumose seta having tip with row of recurved setules. Exopodite biarticulate, first article with strong plumose seta.

Uropods (Fig. 1 f), relatively short, about two thirds length of pleotelson. Basis small, with three setae, two near basis of endopodite. Biramous, rami unequal. Exopodite relatively long, over two thirds length of endopodite; with five articles, last with three terminal distally curved setae. Endopodite having nine articles, distal most with four terminal, distally curved setae. Sensory "brush" setae on distal margins of articles 2, 4, 7 and 9; long simple seta on article 5.

Habitat.— Substratum composed of very fine, creamed colored sand and silt. The associated fauna included isopods, cumaceans, tardigrades, harpacticoid copepods, and other tanaidaceans (e.g., *Paranarthrura* sp., *Chauliopleona* sp. *Collettea* sp.).

Remarks.— *Glabroapseudes larseni* sp. nov. has a very close affinity to *Apseudes unicus* Kudinova-Pasternak, 1981. At first glance *G. larseni* appears to be the undescribed male of *A. unicus* which was described on the basis of three females. The type material of *A. unicus* was not avaible for study. However a comparision based on the description and illustrations suggest that *G. larseni* and *A. unicus* must belong to the same genus, but are not conspecific. Some differences such as the form of the cheliped and the general setulation of the body and especially of the antenna and antennule can be atributed to sexual dimorphism.

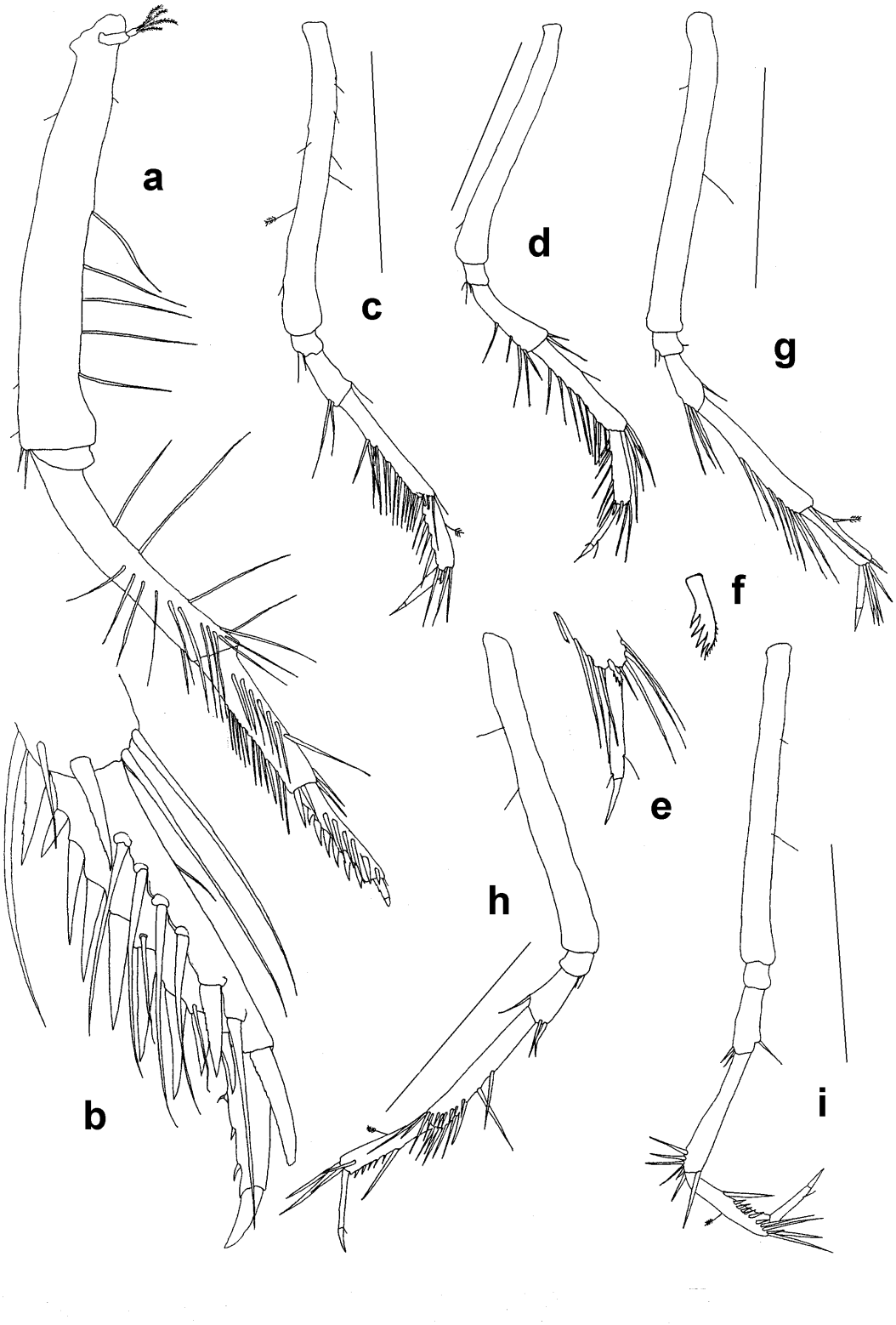

Fig 4. *Glabroapseudes larseni*, n.sp (Holotype) **a** pereopod 1, **b** detail of dactylus of pereopod 1, **c** pereopod 2, **d** Pereopod 3, **e** detail of dactylus of pereopod 3, **f** grooming setae, **g** pereopod 4, **h** pereopod 5; **i** pereopod 6. Scale = 1 mm.

Other differences can not be consideredas part of sexual dimorphism. The pereopodal shoulders are larger and the ocular process is better developed in *A. unicus*, whereas in *G. larseni* both characters are weak. In *G. larseni* the setules on the mandible especially beneath the lacinia mobilis are very long and scarce and only one row is visible, while on *A. unicus* this part is covered by numerous setules in many rows. G. larseni differs from A. unicus in having less setae on the maxilla.

The body ornamentation on all males tanaids is more prominent than in females. If *G. larseni* is indeed the male of *A. unicus* then that would mean the female has a more prominent body ornamentation than the male, wich is very improbable.

Apseudes unicus was found in antarctic waters while *G. larseni* was found in the South Atlantic Ocean. The composition of the tanaidacea fauna of the South Atlantic Ocean is different and have no speceis in common with the antarctic fauna (GUERRERO-KOMMRITZ unpublished data).

The large specialized plumose seta on the pleopodal endopodites of *Glabroapseudes* is similar to that reported by BĂCESCU (1981) for *Carpoapseudes kudinovae* BĂCESCU, 1981. This modified seta, which is located on the inner proximal margin of the endopodite and bears recurved setules at the tip, is probably involved in the grooming of the other pleopodal plumose setae.

It is unfortunate that more material of *G. larseni* and *A. unicus* was not available for study. We were hesitant to describe this new genus and species based on a single specimen; however, we believe its description is justified because the specimen is an adult male in excellent condition and because its distinctive morphological features make this taxon unique among the Apseudomorpha. To strengthen the systematic status of this genus, and clarify the relation to *Apseudes unicus* we hope that future expeditions in the southern oceans and the area of the type locality will yield additional specimens, including adult females, for study.

Zusammenfassung

Es wird eine neue Gattung und Art apseudomorpher Tanaidacea *Glabroapseudes larseni* sp. nov. aus über 5000 m Tiefe aus dem Angola Becken (Südatlantisches Ozean) beschrieben. Eine Kombination von Merkmalen machen *G. larseni* sp. nov. einzigartig unter der Unterordnug Apseudomorpha: (1) Fehlen eines Rostrums (2) Fehlen epistomischer, seitlicher

oder anderwertiger Stacheln auf dem Cephalothorax (3). kleine Uropoden mit gleich langen Ästen. Die Neue Gattung ist wahrscheinlich ein untypischer Vertreter der Apseudidae. Die Beschreibung von *G. larseni* n. sp. basiert auf einem 12 mm langem Männchen. Diese neue Art hat eine große morphologische Ähnlichkeit mit *Apseudes unicus* KUDINOVA-PASTERNAK, 1981. Die neue Gattung hat wahrscheinlich ihre engste Verwandschaft mit den Gattungen *Fageapseudes* BASCESCU & GUTU 1971 und *Carpoapseudes* LANG 1968.

ACKNOWLEDGEMENTS.— We thank Prof. Dr. ANGELIKA BRANDT for allowing us to studying the material from the Diva Expedition and Dr. KIM LARSEN for his constructive comments and help during the description of this new tanaidacean. We must thank specially to Dr MODEST GUTU for his unvaluable comments on the discuccion of this new taxon. We thank also the reviewers and Carol Schönig for comments. Travel for JÜRGEN GUERRERO-KOMMRITZ to conduct research at the College of Marine Sciences, The University of Southern Mississippi, USA, was funded by the German Research Foundation through grant Br1121/19-1.

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Veröffentlichung VII

New species of *Tanaella* Norman and Stebbing, 1886 (Crustacea: Tanaidacea: Tanaellidae) from the deepsea off the Antarctic and the Angola Basin, with a key to the genus

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Abstract

Three new deep-sea species in the genus *Tanaella* are described: two from the Antarctic (*T. eltaninae* sp. nov., *T. kimi* sp. nov.) and one from the Angola Basin (*T. profunda* sp. nov.). This is the first record of *Tanaella* in the deep-sea of the Antarctic and the southern Atlantic Ocean. A key to the 13 known species of the genus is provided.

Key words: Tanaidacea, *Tanaella,* Angola Basin, Antarctic, deep-sea

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Introduction

The taxonomy of the Tanaidacea is poorly understood, and with nearly every survey of the ocean floor, new species are frequently discovered.

The genus *Tanaella* was erected for the species *Tanaella uniguicillata* Norman & Stebbing, 1886. This genus has a world-wide distribution and its representatives are regularly found in deep-sea samples. Species of *Tanaella* can be easily distinguished from other tanaidaceans, by the four-articled antennula and the one-articled uropod.

Lang (1968) synonymized *Tanaella* with *Leptognathia* G. O. Sars, 1882. However Sieg (1986) resurrected the genus *Tanaella* providing convincing evidence that the morphology of the mandible separated these two genera; specifically the molar process of the mandible is flat and armed with several terminal spines in *Tanaella*, while it is acutely tipped in *Leptognathia*. Furthermore, the genus has recently been redefined by Larsen & Heard (2004).

Prior to this report there were ten species in the genus *Tanaella.* However only *Tanaella unisetosa* Sieg, 1986 and *Tanaella rotundicephala* Sieg, 1986 occur in the Antarctic; both are shallow-water species, with a depth range between 44 and 137 m.

The description of three new deep-sea species of the genus *Tanaella*, collected from several expeditions to the Antarctic and the Angola Basin is the topic of this paper.

Materials and methods

The specimens examined were collected during a series of research expeditions: DIVA (**Div**ersity of the Deep **A**tlantic Ocean) – expedition on board the RV "Meteor" (M48) to the Angola Basin, South Atlantic Ocean in July 2000, using a modified epibenthic sledge (Brandt & Barthel, 1995) and a multicorer (MUC) at depths between 5180 and 5447 m, ANT XV/3, a expedition to Antarctica on board the RV "Polarstern", cruise 48, station 272, using an epibenthic sledge (EBS) at the depth of 2077 m on 26 February 1998; and two American expeditions to the Antarctic on board the RV "Eltanin" cruise 8, station 573, (16 April 1963) and Cruise 21 station 267 (23 December 1965) using a Mensis trawl at depth ranges of 3978 – 4008 m and 4740 – 4742 m, respectively. Table I presents the station data.

Body length was measured from the anterior tip of the cephalothorax to the posterior tip of the pleotelson. All figures were drawn using a Zeiss Axiolab compound microscope

with camera lucida. Species descriptions and terminology followed Dojiri & Sieg's (1997) and were slightly modified according to Guerrero-Kommritz *et al*. (2002) and Larsen (2003).

Table 1. Station information from the South Atlantic and the Antarctic where examined material was obtained

Expedition	Ship & cruise	Station	Gear	Position 1	Position 2	Date	Depth (m)
	Eltanin 8	8/573	M.Tr	55°11'S 024°10'W	55°13'S 024°05'W	16.04.1963	3978 – 4008
	Eltanin 21	21/267	M.Tr	56°32'S 119°20'W	56°30'S 119° 27'W	23.12.1965	4740 – 4742
ANT XV/3	*Polarstern* 48	48-272	EBS	71°28.76'S 015°10.3'W		26.02.1998	2077
DIVA	*Meteor* 48	320	EBS	22°17,9'S 003°17.2'E	22°20.0'S 003°17.9'E	10.07.2000	5180
DIVA	*Meteor* 48	325	Muc	19°58.2'S 002°51.8'E		14.07.2000	5447
DIVA	*Meteor* 48	336	KG	18° 16.6'S 004°44.5'E		20.07.2000	5395
DIVA	*Meteor* 48	345	KG	16°17.0'S 005°27.1'E		26.07.2000	5390
DIVA	*Meteor* 48	348	EBS	16°17.1'S 005°27.3'E	16°19.3'S 005°27.2'E	28.07.2000	5390

ANT: Antarctic; DIVA: Diversity of the Deep Atlantic Ocean; EBS: epibenthic sledge; M.Tr.: Menzies trawl; Muc: multi corer; KG: box corer

Type specimens are deposited in the Zoological Museum of Hamburg (ZMH) and in the U.S. National Museum of Natural History (NMNM), Smithsonian Institution in Washington, D.C.

TAXONOMY

Suborder Tanaidomorpha Sieg, 1980

Family Tanaellidae Larsen & Wilson, 2002

Genus *Tanaella* Norman & Stebbing, 1886

***Tanaella eltaninae* sp. nov. (Figs 1-3)**

Material examined: holotype, USNM 1020439, female, 2.17 mm, *Eltanin* cruise 8, sta. 573, 55°11`S 024°10`W – 55°13`S 024°05`W, Menzies Trawl, depth 3978 – 4008 m; 16 April 1963. Paratype: USNM 1020440, female, 3.02 mm, *Eltanin*, cruise 21, sta. 267, 56°32`S

119°20`W– 56°30` S 119°27`W, Menzies Trawl, depth 4740 – 4742 m; 23 December 1965, (dissected).

Diagnosis: cheliped massive, without proximal tubercle in inner margin of dactylus. Maxilliped endites with tubercle. Labium narrow. The basis of pereopods 1-3 shorter than remainder of the articles combined. Pereopods 4-6 with ventral margin of propodus not serrated. Uropod as long as pleotelson, composed of uni-articled endopod.

Description: non-ovigerous female. Body (Figs. 1a, b) elongate, about six times longer than broad, slightly flattened dorsoventrally. Cephalothorax (Fig. 1a, c) triangular, shorter than pleon, posterior end twice as wide as anterior end. Pereon with first pereonite as long as sixth, second slightly longer than third and third to fifth subequal in length. Pleon as wide as pereon; first three pleonites subequal in length and shorter than fourth and fifth. Pleotelson as long as last four pleonites together, pentagonal, apex rounded.

Antennula (Fig. 2a) four-articled. First article longest, and equal in length to articles 2-4, with two short, subdistal setae. Second article with two distal setae. Third article shortest, with three setae (one minute). Fourth article narrowest, with six terminal setae and one aestethasc.

Antenna (Fig. 2b) six-articled. First article, small and partly fused with cephalothorax (not illustrated), second article triangular in shape with three comb setae and one distal long seta. Third article square with one long distal seta. Fourth article longest, equal in length to articles 1-3 combined, dorsal margin with four comb setae, three long and two minute distal setae. Fifth article with one distal seta. Sixth article shortest, with four long and one short setae.

Labrum (Fig. 2c) hoodlike with a finely setulose margin.

Mandible (Figs. 2d, e) well sclerotized; right mandible incisor pointed with three teeth; left mandible incisor with threee blunt teeth, lacinia mobilis flat and blunt ; seven terminal teeth on the molar process.

Maxillula (Fig. 2f) endite, inner margin with seven combs of setules, and nine distal spines (three bipinnate, five simple, and one very slim). Palp as long as endite with one long and one short terminal seta.

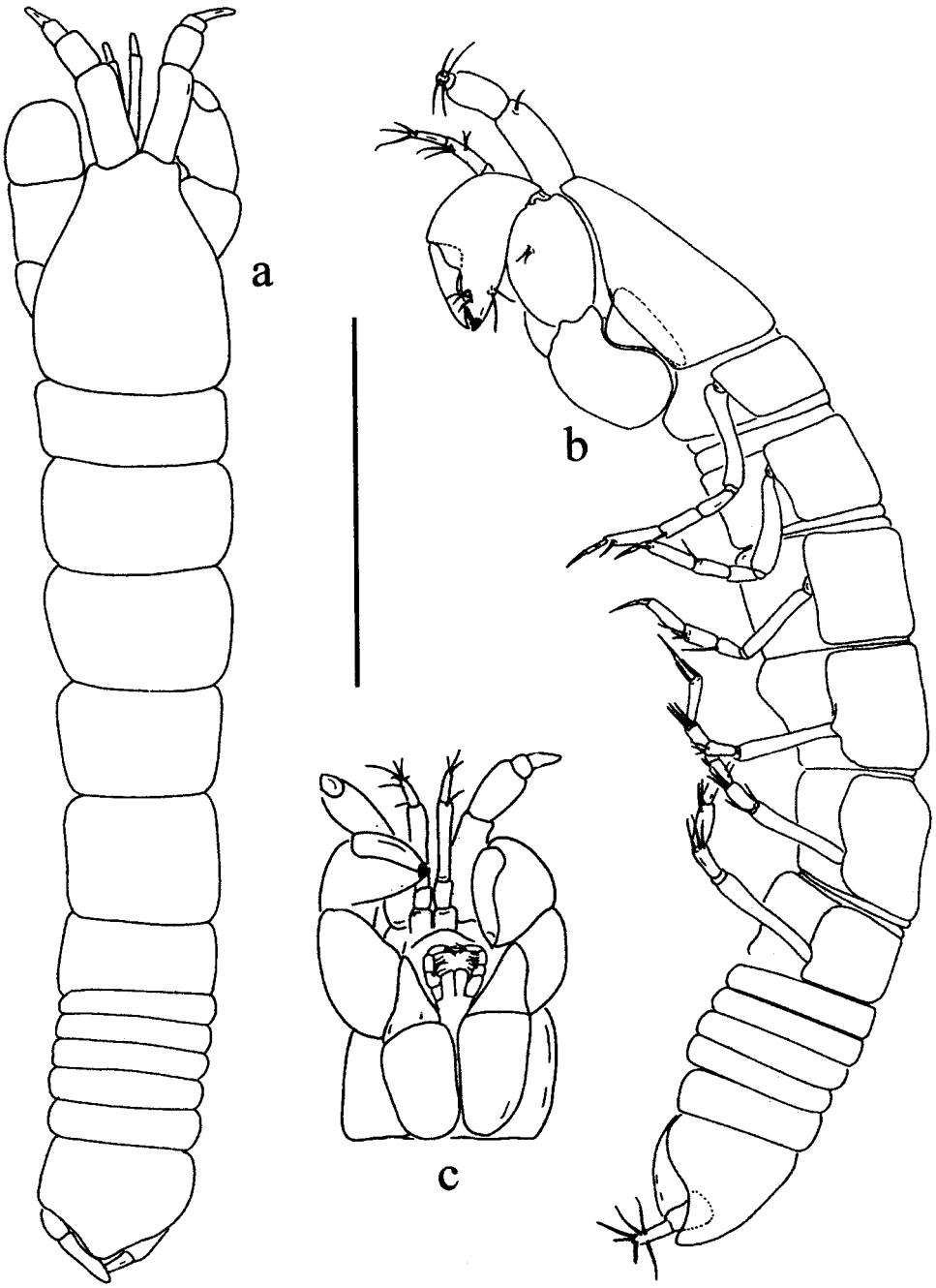

FIGURE 1. *Tanaella eltaninae* sp. nov., holotype (female): a, dorsal view; b, lateral view; c, cephalothorax ventral view. Scale bar = 1 mm.

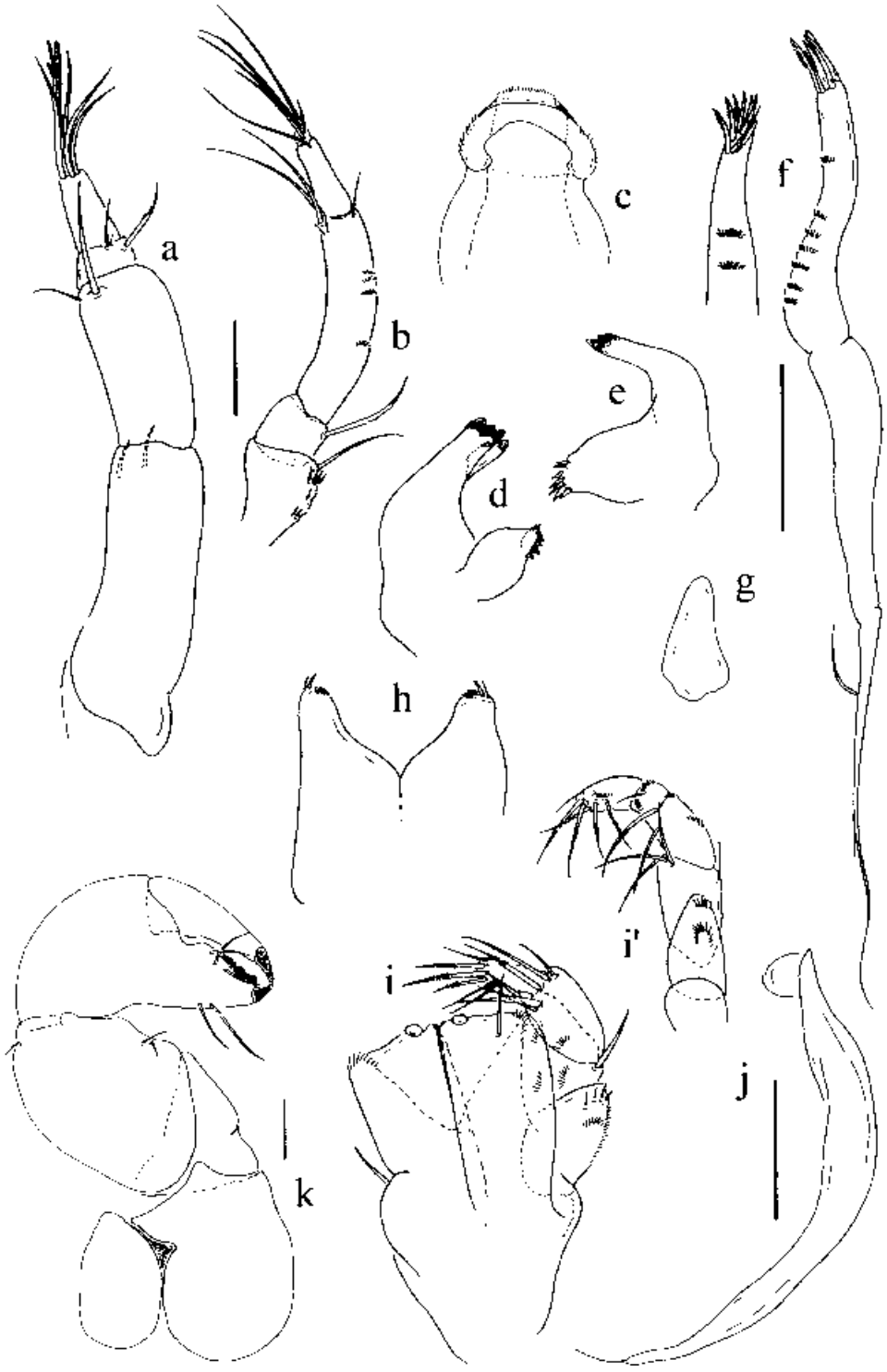

FIGURE 2. *Tanaella eltaninae* sp. nov., paratype (neuter): a, antennula; b, antenna; c, labrum; d, e, mandibles; f, maxillula; g, maxilla; h, labium; i, maxilliped (i' details of maxilliped); j, epignath; k, cheliped. Scale bar = 0.1 mm.

Maxilla (Fig. 2g) triangular, naked.

Labium (Fig. 2h) composed of two triangular lobes with one spiniform seta and many setules on apical margin.

Maxilliped (Figs. 2i, i`) basis fused, one seta near insertion of palp; endites rectangular, free. Distal part of each endite with one tubercle at inner margin and one medial seta; outer margin with a row of setules descending to the base. Palp four-articled. First article with combs of fine setules and one comb of relatively strong setulae on outer margin. Second with two combs of setulae and one simple, distal seta on outer margin. Third article with three inner setae and numerous combs of setules. Fourth article with four inner and two terminal setae (one very thin).

Epignath (Fig. 2j) falciform with a lobe on the proximal end and a seta on it distal end.

Cheliped (Fig. 2k) attached to cephalothorax by sidepiece. Basis strong. Merus wedge-shaped, naked. Carpus with two medial ventral setae and one dorsal terminal seta. One tubercle near insertion of propodus. Propodus twice as long as broad, fixed finger with two ventral setae (the distal seta extends over the tip of the fixed finger) and three dorsal setae near cutting edge. Cutting edge with five teeth. One depression on proximal margin. Dactylus with two small teeth at the mid-ventral part of the chela.

Pereopod 1 (Fig. 3a) coxa with a simple seta. Basis as long as carpus and propodus combined, with one fine seta on dorsal margin and a longitudinal row of setules ventrally. Ischium short, with a one ventral seta. Merus triangular with one strong and fine distal seta~~e~~. Carpus subequal in length to merus, with numerous combs of setules and three strong setae~~:~~ (two short and one long). Propodus nearly1.5 times as long as carpus, with two rows of spinules ventrally, a row of setules dorsally, and one strong distal seta. Dactylus slightly longer than unguis. Unguis sharp with one setula in the middle.

Pereopod 2 (Fig. 3b) as pereopod 1 except basis with two fine setae dorsally and no setule line ventrally, carpus with two long and one short strong terminal setae, unguis subequal to dactylus, without setula.

Pereopod 3 (Fig. 3c) as pereopod 2 except basis with one terminal setulose seta dorsally; and a minute distal seta on dactylus.

Pereopod 4 (Fig. 3d) without coxa. Basis long and naked. Ischium short, with one seta. Merus with two distal setae. Carpus slightly longer than merus, with one longitudinal ventral row of setules and five terminal setae: three strong and elongate, one short and one minute. Propodus slightly longer than carpus, with rows of thin setules ventrally, and three

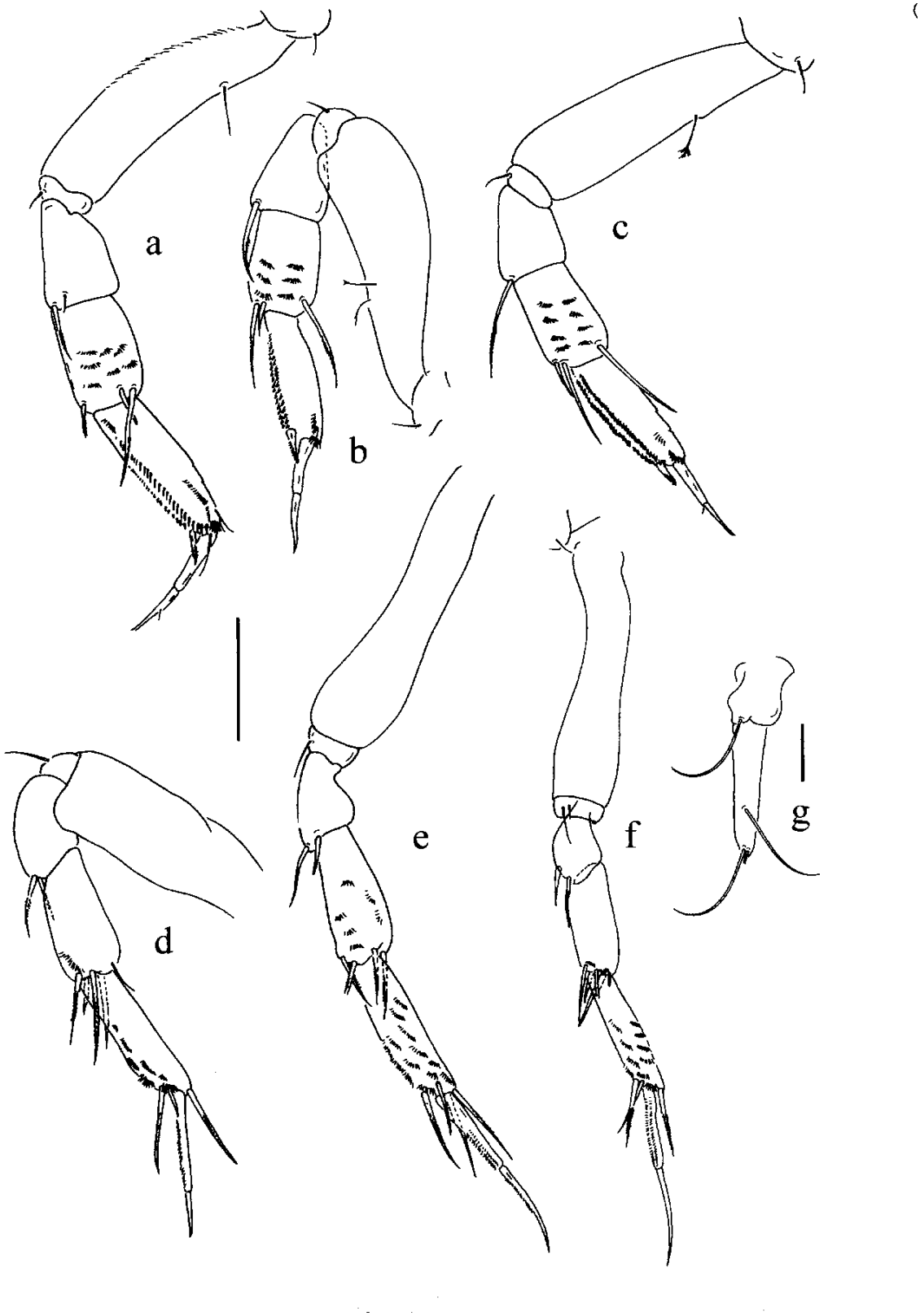

FIGURE 3. *Tanaella eltaninae* sp. nov., paratype (neuter): a, pereopod 1; b, pereopod 2; c, pereopod 3; d, pereopod 4; e, pereopod 5; f, pereopod; g, uropod. Scale bar = 0.1 mm.

strong distal setae, of one short and two long (slightly shorter than dactylus). Dactylus with ventral groove bordered by fine spinules. Unguis sharp, 2.5 times shorter than dactylus.

Pereopod 5 (Fig. 3e) without coxa. Proportions of basis, ischium, merus, carpus, and propodus as in pereopod 4. Basis naked. Ischium with two setae. Merus triangular, with two strong setae. Carpus with four strong distal setae and a fine short one. Propodus covered with many combs of fine setules, and three strong terminal setae. Dactylus with a ventral groove, and bordered by fine spinules. Unguis sharp, slightly longer than dactylus.

Pereopod 6 (Fig. 3f) without coxa. Proportions of basis, ischium, merus, carpus and propodus as in pereopod 4. Basis naked. Ischium with one seta. Merus triangular, with two distal setae. Carpus with four distal setae and many combs of setules. Propodus covered with many rows of setules. Four strong, and rather long terminal setae. Dactylus as in pereopod 5. Unguis sharp, slightly longer than dactylus.

Pleopods absent.

Uropods (Fig. 3g) uniramous. Basal article short, with one tubercle and a long seta. Endopodite one-articled with two long terminal setae and a lateral long one.

Ovigerous female, males and mancas unknown.

Etymology: named after the research vessel *Eltanin.*

Remarks: the species resembles *Tanaella paraforcifera*, but it differs in the relative length of the body: *T. paraforcifera* is about five times as long as wide, whereas *T. eltaninae* is about 6 times as long as wide. The basis of pereopods 1-3 of *T. paraforcifera* are longer than the remainder of the pereopod articles combined, while the basis of *T. eltaninae* is shorter than the remainder of the pereopod. The labium is elongate and narrow in *T. paraforcifera,* and short and wide in *T. eltaninae*. On the carpus of pereopod 1 there are two setae in *T. paraforcifera* and 3 setae in *T. eltaninae.*

***Tanaella kimi* sp. nov. (Figs. 4-6)**

Material examined: holotype: ZMH K- 40297, adult male, 2.83 mm, ANT XV/3, station 48-272, 71°28.76` S 015°10.3` W, EBS, depth 2077 m, 26 February 1998. Paratypes: ZMH K-40298, one male, 2.98 mm (dissected), one female, 2.62 mm, ANT XV/3, station 48-272, 71°28.76` S - 015°10.3` W, EBS, depth 2077 m, 26 February 1998.

Diagnosis: Cheliped narrow, without proximal tubercle on inner margin of dactylus. Maxilliped endites with tubercle. Labium narrow. Pereopods 4-6 with ventral margin of

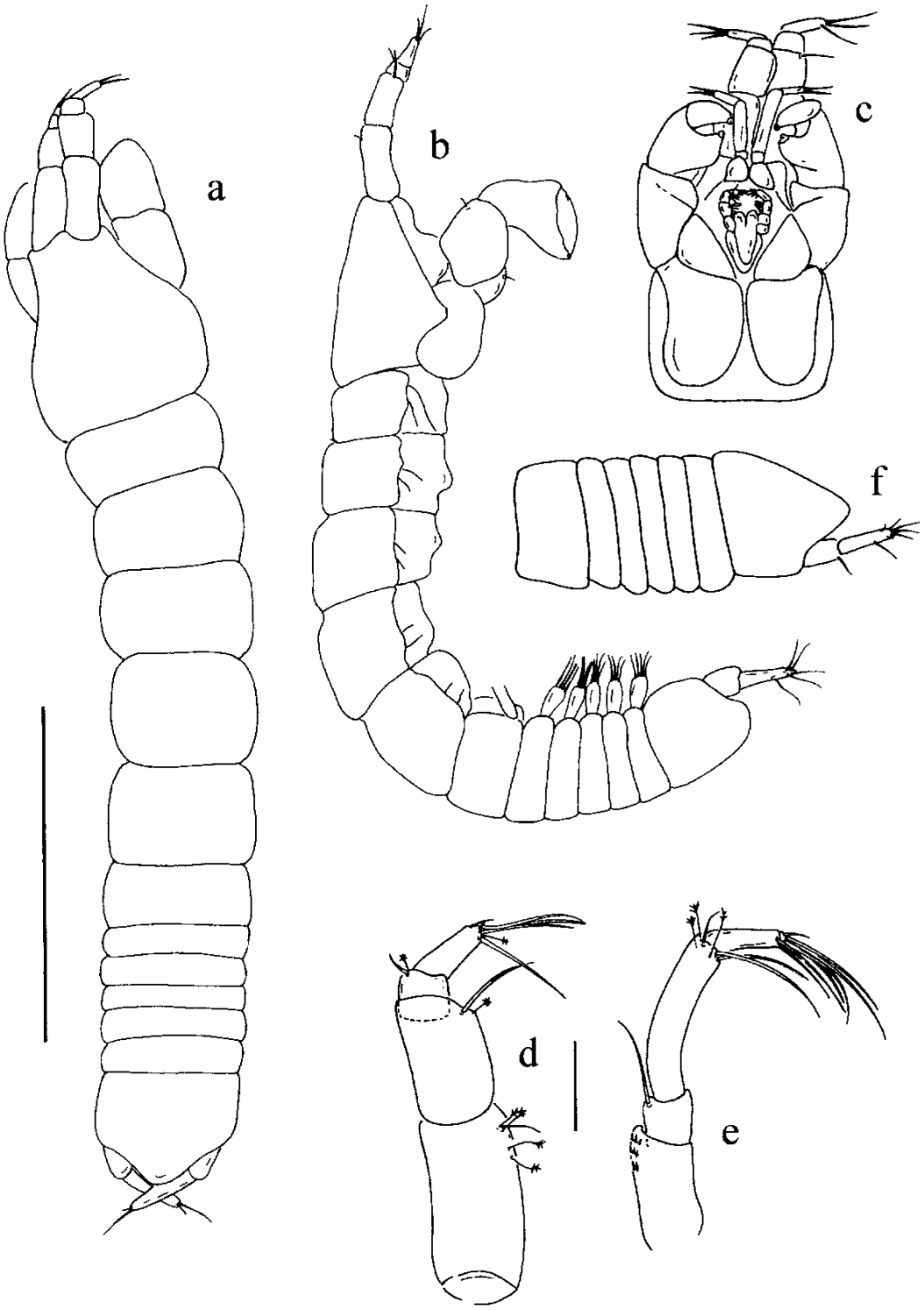

FIGURE 4. *Tanaella kimi* sp. nov., holotype (male): a, dorsal view; b, lateral view; c, ventral view of cephalothorax.; d antennula of female; e, antenna of female; f, pleon of female lateral view. Scale bar = 1mm

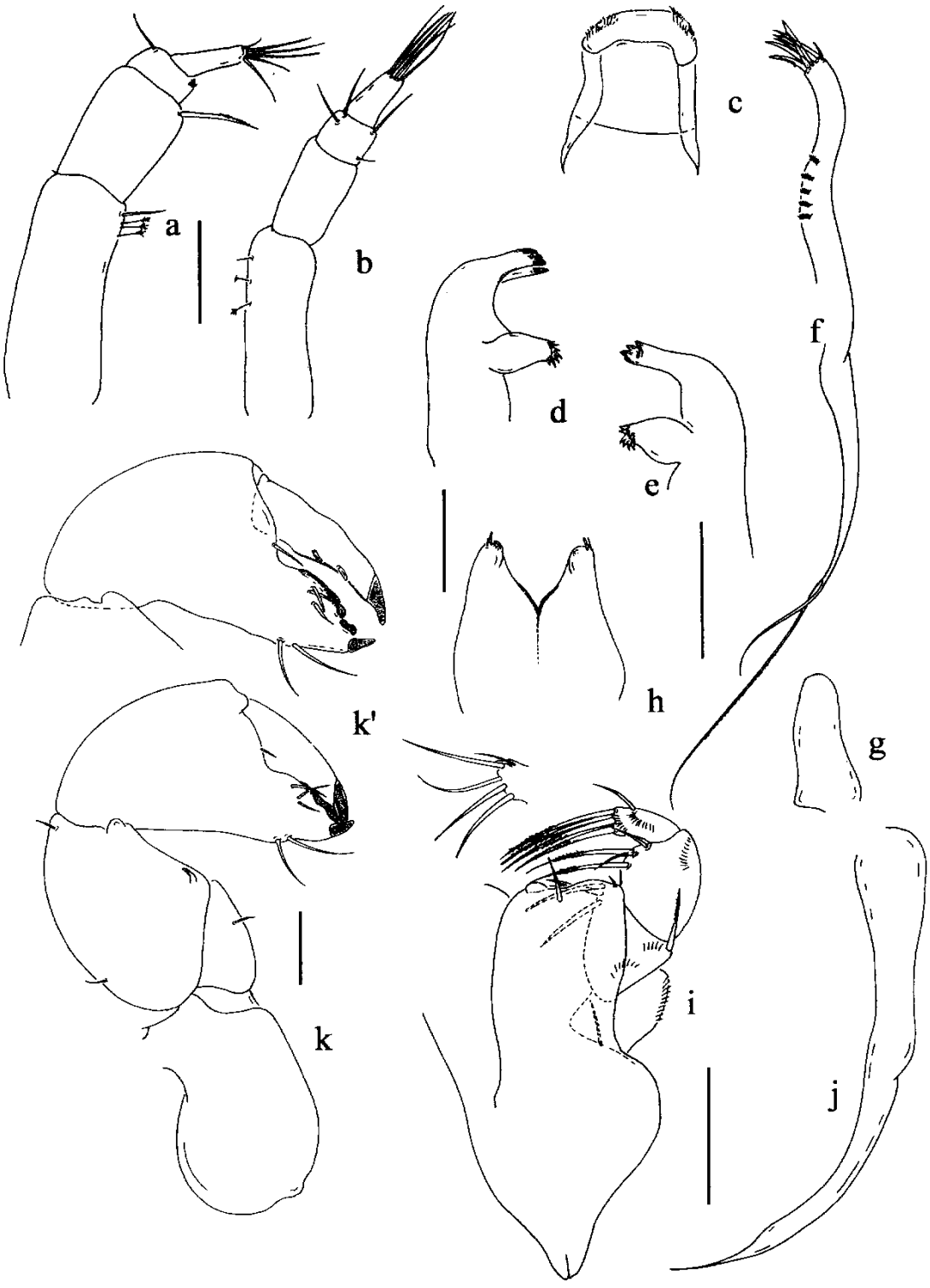

FIGURE 5. *Tanaella kimi* sp. nov., paratype (male): a, antennula; b, antenna; c, labrum; d, e mandibles; f, maxillula; g, maxilla; h. labium; i, maxilliped; I', tip of palpus of maxilliped; j, epignath; k, k′, cheliped. Scale bar = 0.1 mm

propodus not serrated. Male pereopods 4-6 without hook-shaped distal spiniform setae. Uropod as long as pleotelson, composed of two-articled endopod.

Description: male. Body (Fig. 4a, b) elongate, about five times longer than wide. Cephalothorax (Fig. 4a, c) shorter than pereon, triangular, posterior end twice as broad as anterior end. Pereon twice as long as pleon, pereonite one shorter in length than pereonite two, pereonites two and three equal in length, pereonite four longest, pereonite five slightly shorter than four, and pereonite sixth the shortest. Pleon as wide as pereon, pleonite three narrower than all others, pleonites one, two, four and five equal in length. Pleotelson as long as last four pleonites together, pentagonal, with apex rounded.

Antennula (Fig. 5a) four-articled. First longest (longer than second) with three plumose and one simple setae distally. Second article with one pinnate seta distally. Third article shortest with one simple seta distally. Fourth article 1.5 times longer than third, with six simple.

Antenna (Fig. 5b) four-articled. First article longest with three plumose setae distally Second article as long third and fourth combined. Third article shortest with four simple setae. Fourth article with six simple terminal setae.

Labrum (Fig. 5c) hoodlike, distal outer margins with setules.
Mandible (Figs. 5d, e) right mandible incisor pointed with three teeth; left mandible incisor with blunt teeth, lacinia mobilis pointed; seven terminal teeth on the molar process.

Maxillula (Fig. 5f) endite longer than palp, with five ventral comb setae at midlength; endite, distal end with four pinnate and five simple setae, and one short setae. Palp with two unequal long setae.

Maxilla (Fig. 5g) triangular, naked.

Labium (Fig. 5h) composed of two triangular lobes, apical margin with one spiniform seta and many setules.

Maxilliped (Fig. 5i) basis fused. Endites rectangular with one seta and one tubercle on the distal inner margin. Palp four-articled. First article square, with two comb setae. Second article, outer margin with two comb setae and one strong seta, inner margin with three setae. Third article, inner margin with four strong setae. Fourth article, inner margin with three setae, and three terminal strong setae.

Epignath (Fig. 5j) falciform rounded at proximal end, with one terminal seta.

Cheliped (Figs. 5 k, k`) attached to cephalothorax laterally by sidepiece. Basis strong and naked. Merus, ventrally with one minute simple seta. Carpus with two ventral simple

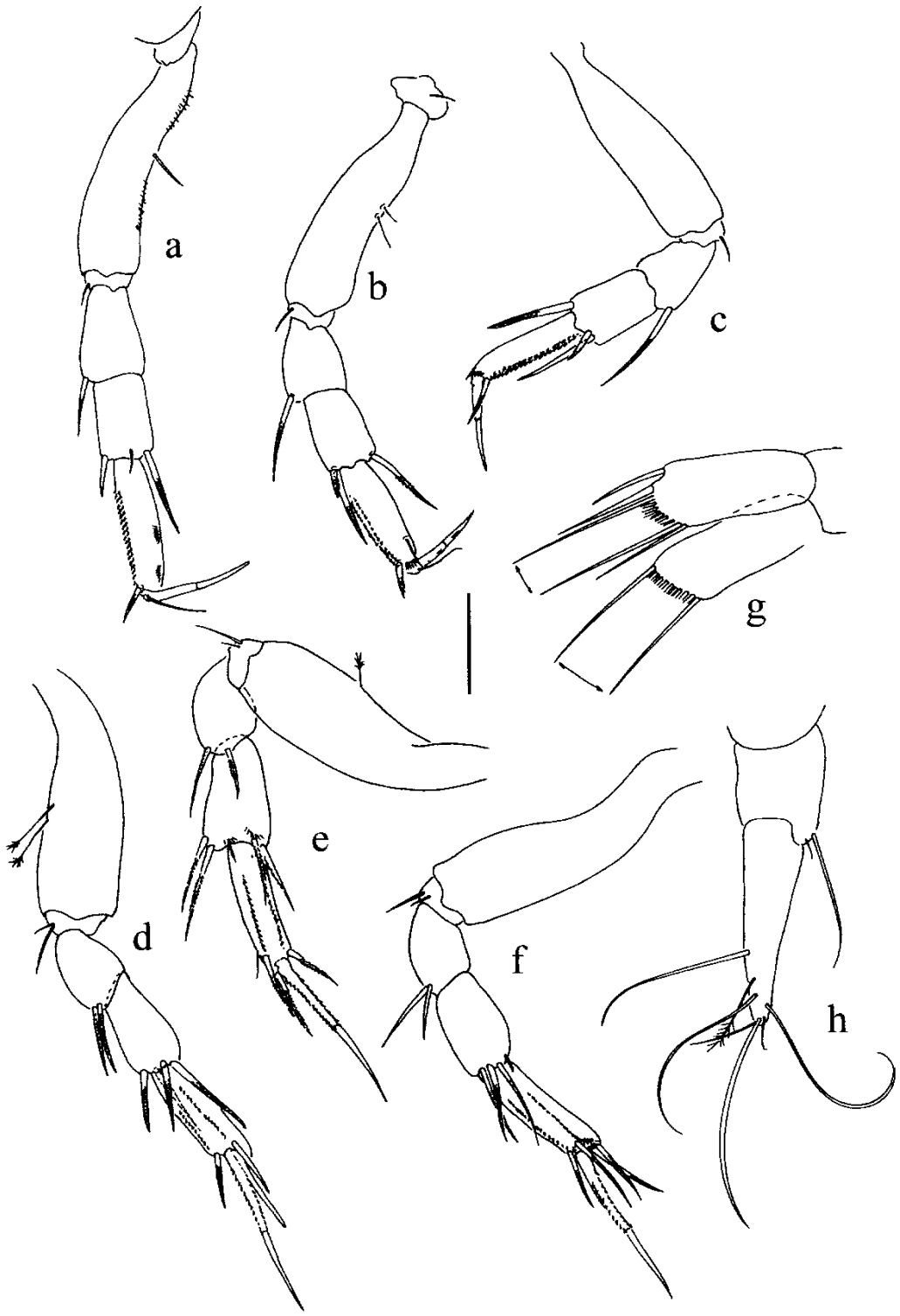

FIGURE 6. *Tanaella kimi* sp. nov., paratype (male): a, pereopod 1; b, pereopod 2; c, pereopod 3. d, pereopod 4; e, pereopod 5; f, pereopod 6. g, pleopods; h, uropod. Scale bar = 0.1 mm

setae and two dorsal setae (submiddle and one distal), one tubercle near insertion of propodus. Propodus twice as long as broad, with two ventral setae, three dorsal setae near cutting edge and one simple seta near insertion of dactylus. Cutting edge composed of four blunt teeth. Dactylus with two short ventral setae.

Pereopod 1 (Fig. 6a) coxa with seta. Basis as long as carpus and propodus combined length with a row of setules ventrally. Ischium short with one seta. Merus subequal in length to propodus, triangular with one strong distal seta. Carpus with two strong and one minute distal setae. Propodus slightly longer than dactylus and unguis combined length, with two comb setae, two rows of spinules, one strong short seta ventrally. Dactylus with one long slender seta. Unguis as long as dactylus.

Pereopod 2 (Fig. 6b) as pereopod 1 except basis with two ventral thin simple setae at midlength. Carpus with two long and one short strong setae. Propodus with one strong and one thin terminal setae and terminal margin with spinules.

Pereopod 3 (Fig. 6c) as pereopod 2 basis (not drawn).

Pereopod 4 (Fig. 6d) coxa absent. Basis slightly shorter than merus, carpus and propodus combined, with two plumose setae at midlength. Ischium with two setae one short and one long. Merus triangular with two strong distal setae. Carpus slightly longer than merus with four distal strong setae. Propodus slightly longer than carpus with two rows of spinules ventrally and three long strong distal setae. Dactylus subequal to unguis with a ventral groove bordered by spinules. Unguis sharp.

Pereopod 5 (Fig. 6e) as pereopod 4, except basis with only one plumose thin seta at midlength. Carpus with an additional short seta.

Pereopod 6 (Fig. 6f) as pereopod 5, except basis without setae, carpus with three terminal long strong setae, propodus with four strong distal setae, dactylus slightly longer than unguis.

Pleopods (Fig. 6g) biramous; basal article rectangular. Endopod rectangular with 12 long terminal setae. Exopod rectangular with 10 long terminal setae and one relatively short simple seta on dorsal margin.

Uropods (Fig. 6h) uniramous. Basal article uni-articulate with one tubercle with one long and one short seta. Endopodite with one plumose and two long simple setae laterally and four simple (two short and two long) distally.

Females: similar to males except third article longer and without a dense row of distal setules basally. Pleopods are missing. Pleonites broader than in males (Fig 4f). Antennula and antenna are different than those of male:

Antennula (Fig. 4d) four-articled. First longest (1.5 times longer than second ~~one~~) with four plumose and one simple setae. Second article with one long simple and one plumose setae distally. Third article shortest with one simple and one plumose seta distally. Fourth article 1.5 times longer than third, with one aestethasc, three long simple, one terminal plumose seta and one minute subdistal seta.

Antenna (Fig. 4e) six-articled. First article small (not illustrated), partially fused with cephalothorax. Second article twice as long as third, with three comb setae dorsally. Third article with one simple terminal seta. Fourth article longest (twice as long as fifth and sixth combined length) with two long simple, one short simple, and three plumose terminal setae. Fifth article with two long simple setae distally. Sixth article minute with four long simple and one short minute subterminal seta. Ovigerous female unknown. Mancas unknown.

Etymology: named in honor of the tanaid specialist and our friend and colleague Dr. Kim Larsen.

Remarks: The material consists of only three specimens: two with pleopods and one without. Thus only one male with pleopods was dissected.

This species resembles *Tanaella mclellandi* Larsen and Heard 2003 but can be differentiated from it by the length of the pereonites: in *T. mclellandi* the first pereonite is shortest while the fourth and fifth are subequal; in *T. kimi* pereonite sixth is shortest while the fourth is longest. The setation of the antennula of *T. mclellandi* and *T. kimi* are different, articles one and three of *T. mclellandi* are naked, but in *T. kimi* plumose and simple setae are present. In *T. mclellandi* the propodus of pereopod 1 is shorter than the combined length of the dactylus and unguis, while the propodus in *T. kimi* is longer than the combined dactylus and unguis.

***Tanaella profunda* sp. nov. (Figs. 7-9)**

Material examined: holotype: ZMH K-40299, DIVA station. 336, 18° 16.6’S; 004° 44.5’E, KG, 5395 m, July 2000, preparatory male, 2.35 mm. Paratypes: ZMH K-40300, DIVA station 345, 16° 17.0’S 005° 27.1’E, KG, 5390 m, 26 July 2000, prepartory male, 2.35mm, (dissected), ZMH K- 40301, DIVA station 320, 22° 17.9’S 003° 17.2’E – 22°20.0’S 003° 17.9` E, EBS, 5180 m, 10 July 2000, adult female, 2.75 mm, ZMH K- 40302, DIVA station 345, 16°17.0’S 005°27.1’E, KG, 5390 m, 26 July 2000, manca II, 1.86 mm, ZMH K- 40303, DIVA station 348, 16°17.1’S 005°27.3’E – 16° 19.3’S 005°

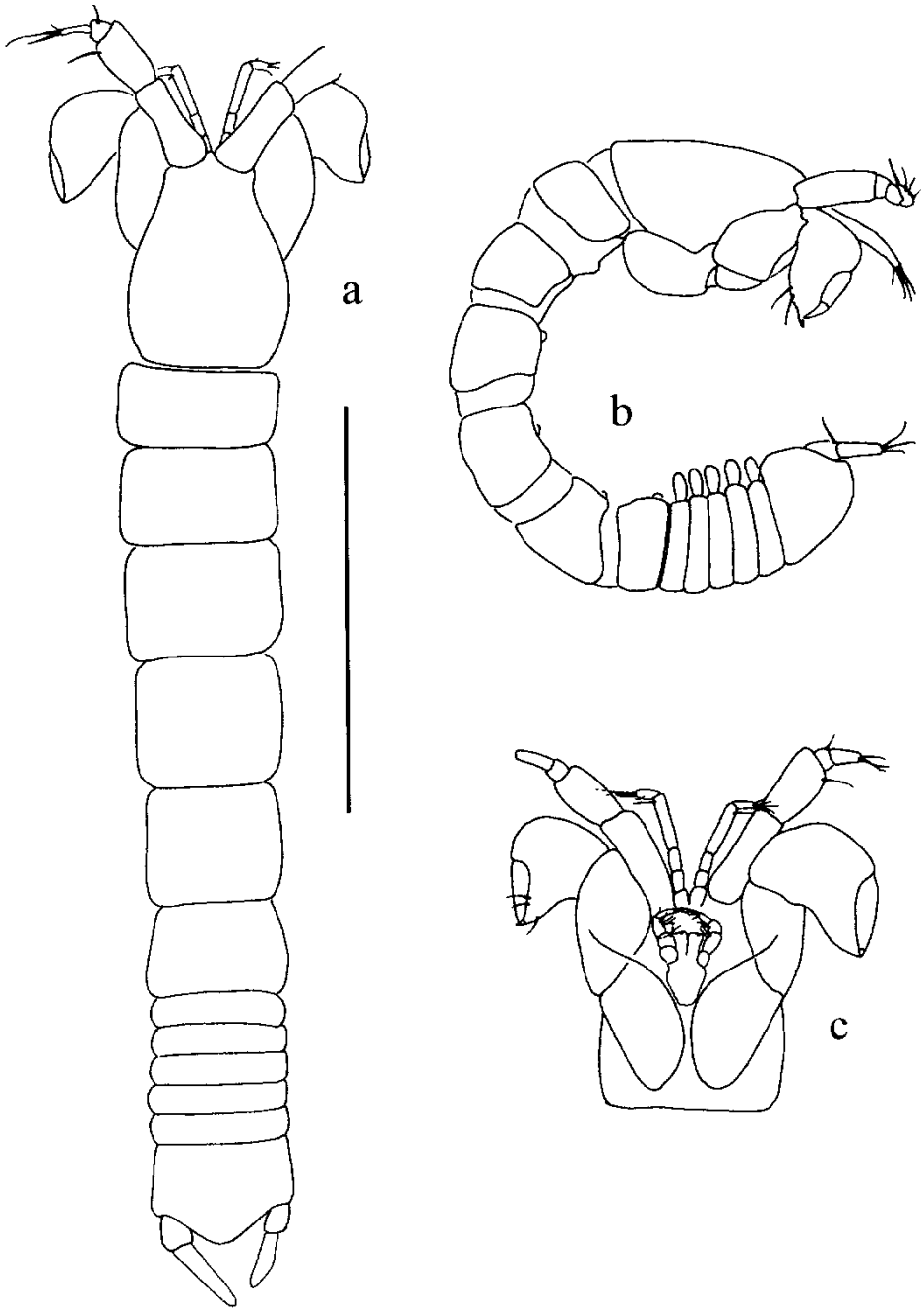

FIGURE 7. *Tanaella profunda* sp. nov., holotype (preparatory male): a, dorsal view. b, lateral view. c, ventral view of cephalothorax. Scale bar = 1mm

FIGURE 8. *Tanaella profunda* sp. nov., paratype (neuter): a, antennula. b, antenna. c, labrum. d, e, mandible; f, maxilla; g, maxillula; i, maxilliped; h, h', cheliped. Scale bar = 0.1 mm

27.2'E, EBS, 5390 m, 28 July 2000, manca II, 1.46 mm, ZMH K-40304, DIVA station 325, 19° 58.2'S 002° 51.8` E, Muc, 5447 m, 14 July 2000, manca I, 1.36 mm.

Diagnosis: cheliped massive, basis and dactylus with combs of setae and without proximal process in inner margin of dactylus. Maxilliped endites with tubercle. Pereopods 4-6 with ventral margin of propodus serrated. Uropod longer than pleotelson, composed of uni-articled endopod; basal article naked, shorter than half of endopod. Male pleopods without plumose setae.

Description: preparatory male. Body (Fig. 7a, b) about six and a half times longer than broad, dorsoventrally flattened. Cephalothorax (Fig. 7a, c) triangular, shorter than pleon, posterior end 1.8 times broader then anterior end. Pereon, first pereonite shortest, second and sixth equal in length, third and fifth pereonites equal in length, fourth pereonite longest. Pleon as wide as pereon, pleonites of equal length. Pleotelson pentagonal, as long as last three pleonites combined, apex rounded.

Antennula (Fig. 8a) four-articled. First article little longer than articles 2-4 combined, with many comb setae on proximal end, and one simple seta on subdistally. Second article with two plumose and one simple setae subdistally. Third article shortest with two simple setae and one comb seta. Fourth article twice as long as third, tipped with one aestethasc, six long and one short simple setae.

Antenna (Fig. 8b) six-articled. First article short nearly fused with the cephalothorax (not drawn). Second article as long as broad, with three long comb setae dorsally and one distal seta. Third article short with one distal simple seta. Fourth article twice as long as fifth, with five simple distal setae (two long, one short and two minute). Fifth article with two terminal simple setae. Sixth article shortest with three long and one subterminal setae.

Labrum (Fig. 8c) hoodlike, distal margin with two rows of setules.

Mandible (Fig. 8d, e) right mandible incisor pointed with three teeth; left mandible incisor blunt teeth, lacinia mobilis pointed; seven terminal teeth on the molar process.

Maxillula (Fig. 8f) endite with four ventral comb setae and nine distal setae (three bipinate, five simple and a small one).

Maxilla (Fig. 8g) triangular.

Labium (not drawn, destroyed during dissection) composed of two triangular lobes. One short spiniform seta and many setules on apical margin.

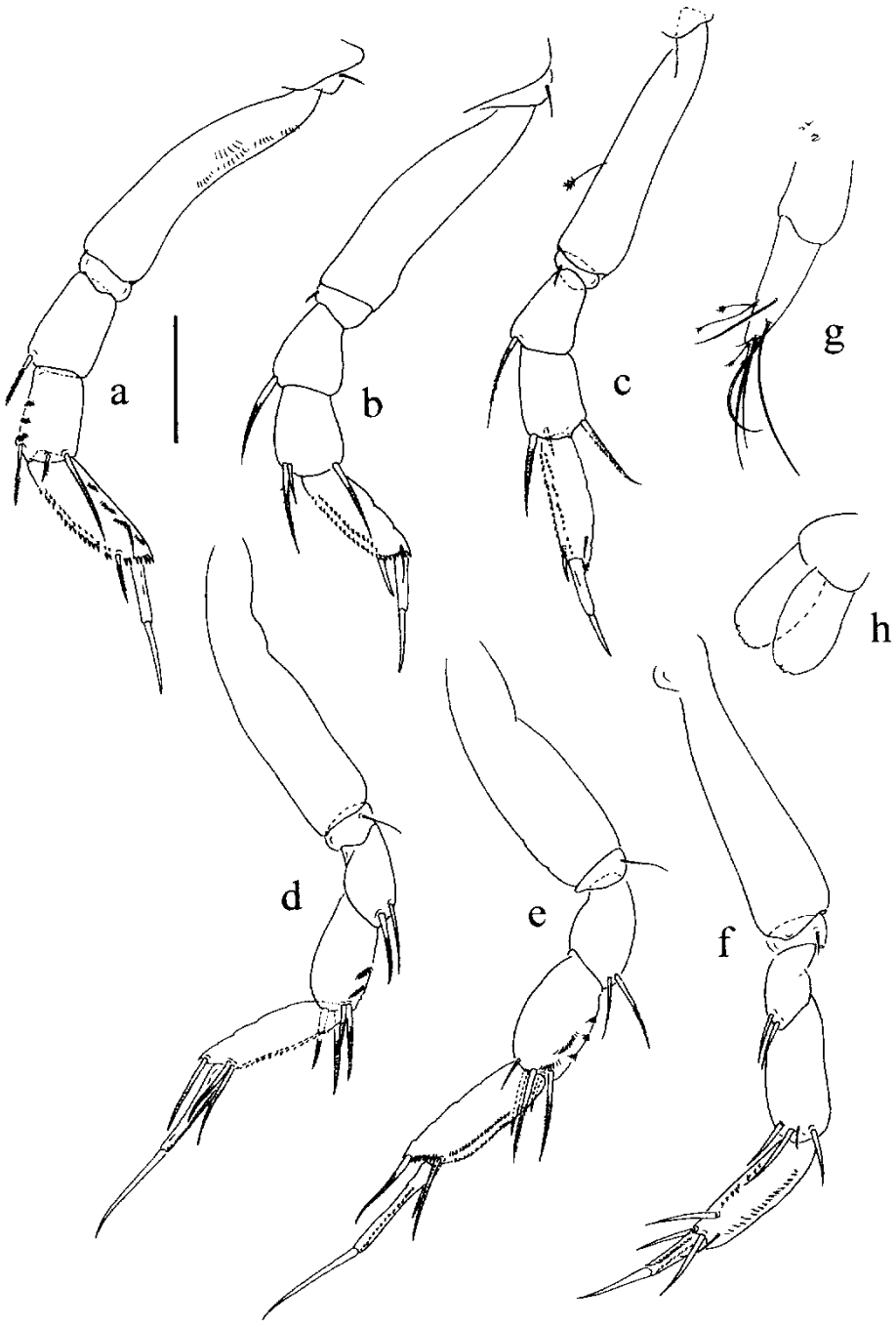

FIGURE 9. *Tanaella profunda* sp. nov., paratype (neuter): a, pereopod 1; b, pereopod 2; c, pereopod 3; d, pereopod 4; e, pereopod 5; f, pereopod 6; g, uropod; h, pleopods (male). Scale bar = 0.1 mm.

Maxilliped (Fig. 8i) basis fused. Endites with a tubercle on the distal margin. Palp four-articled. First article with a comb seta and one simple strong outer seta. Second article with three inner strong setae. Third article with a comb seta two strong and two thin inner setae. Fourth article with a comb seta and four strong and one thin terminal setae.

Epignath not recovered.

Cheliped (Fig. 8h, h') attached to cephalothorax by sidepiece, basis strong with eight comb setae on the posterior ventral margin. Merus with one simple ventral seta. Carpus with three comb setae on the posterior dorsal margin one dorsal seta near insertion of propodus and two simple setae ventrally and one tubercle at the insertion with propodus. Propodus twice as long as broad, fixed finger with two ventral setae and three setae near cutting edge. Cutting edge composed of five blunt teeth. Dactylus smooth with two short strong setae at cutting edge. Inner side of dactylus with many comb setae. Propodus with one long pinnate strong seta and two simple setae at insertion of dactylus.

Pereopod 1 (Fig. 9a) coxa with seta. Basis as long as ischium, merus carpus and half of propodus combined length, with a row of setules dorsally. Ischium short, with one simple seta. Merus subequal in length to carpus with one strong distal seta. Carpus with three comb seta ventrally and two long and one short strong distal setae. Propodus slightly longer than dactylus and unguis combined, with two rows of spinules and one strong seta ventrally, a row of setules and one dorsal thin seta dorsally. Dactylus as long as unguis.

Pereopod 2 (Fig. 9b) as pereopod 1, except basis lacks setules, and carpus is without comb setae and propodus without dorsal setules.

Pereopod 3 (Fig. 9c) as pereopod 2, except basis with one plumose seta at midlength.

Pereopod 4 (Fig. 9d) pseudocoxa absent. Proportion of articles as in pereopod 1except carpus slightly longer than merus; shorter than dactylus and unguis combined. Basis naked. Ischium short with relatively long simple seta. Merus with two distal setae. Carpus with two ventral comb setae and four strong distal setae. Propodus with two rows of spinules ventrally and three distal setae. Dactylus with a ventral groove bordered by fine spinules.

Pereopod 5 (Fig. 9e) as pereopod 4, except one extra simple short distal seta on carpus.

Pereopod 6 (Fig. 9f) as pereopod 5, except carpus with only three long strong setae.

Pleopods (Fig. 9h). Basal article rectangular shape. Endopod and exopod uni-articulate with some notches on distal margins.

Uropods (Fig. 9g) uniramous. Basal article longer than broad, naked. Endopod with uni-articulate; tipped by three long simple setae two plumose setae and one short simple seta and subdistally with two long simple and two plumose setae.

Females: similar to preparatory male but lack pleopods.

Mancas I: as neuter except pereonite six is not developed, and the size is smaller (1.36 mm).

Mancas II: as neuter except pereonite six is developed and pereopod 6 resembles a backwards projected spine (1.46 –1.86 mm).

Etymology: named in reference to the deep-sea habitat in which this species was found.

Remarks: Larsen and Heard (2004) mentioned that the males of *Tanaella* should have pleopods, and that the antennula should be thicker than those of females and neuter specimens. However, the pleopods on a specimen examined in this study lacked setae, and this specimen was assumed to be a preparatory male, because adult males have pleopods with setae and thicker antennula. Furthermore, the morphology of the antennula in this specimen provides no additional characters to help differentiate it from other specimens or taxa. No genital cones were observed.

Tanaella profunda resembles *Tanaella prolixcauda* Larsen & Heard 2004 but the species can be sapareted by the proportions of the pereonites: pereonite one is shortest followed by the second and sixth and pereonite four is longest in *T. profunda*. However in *T. prolixcauda* pereonite one is equal in length to pereonite six, and the second pereonite is shorter than third, while the third, fourth and fifth are equal in length and represent the longest pereonites. Pereopod 1 in *T. profunda* has one seta on the basis and one seta on the carpus while the basis of *T. prolixcauda* lacks setae and has 2 setae on the carpus.

According to Larsen and Heard (2004) the bathymetric distribution of *Tanaella* is from 44 to 4800 m. *Tanaella profunda* was found in very deep habitats (4950 – 5450 m) expanding the bathymetric distribution of the genus.

Key for the species of *Tanaella* (modified after Larsen & Heard 2004)"

1. Uropod composed of protopod and biarticulated endopod…… 2
- Uropod composed of protopod and uniarticulated endopod…..……..5
2. Cephalothorax as long as broad……..... *T. rotundicephala*
- Cephalothorax longer than broad…….3

3. Pleotelson apex pointed……*T. unisetosa*
- Pleotelson apex blunt……...……...4
4. Cheliped fixed finger with several acute denticles, cheliped dactylus with two spiniform setae on inner margin……..……..*T. forcifera*
- Cheliped fixed finger without acute denticles, cheliped dactylus with one spiniform setae on inner margin…….……*T. propinquus*
5. Uropods longer than pleotelson…..……6
- Uropods as long as, or shorter than, pleotelson……..…9
6. Pleotelson apex pointed. Male antennula with five articles....……....*T. tuberculata*
- Pleotelson apex smoothly rounded. Male antennula with four articles……...7
7. Uropodal protopod longer than half of endopod……*T. orchacea*
   Uropodal protopod shorter than half of endopod……8
8. Pleotelson as long as last two pleonites together, dactylus and unguis of pereopods 1-3 shorter than propodus, one seta on basal article of uropod. Male pleopods with plumose setae..……..…….……*T. prolixcauda*
- Pleotelson as long as last three pleonites together, dactylus and unguis of pereopods 1-3 as long as propodus, no seta on basal article of uropod. Male pleopods without plumose setae…….....*T. profunda* sp. nov.
9. Cheliped dactylus with proximal process on inner margin……....*T. ungucillata*
- Cheliped dactylus without proximal process on inner margin…….10
10. Uropod shorter than pleotelson. Pereopods 4-6 with ventral margin of propodus serrated and with setules……..……...…….……11
- Uropod as long as pleotelson. Pereopods 4-6 with ventral margin of propodus not serrated…….……...……12
11. Basis of pereopod 1, margin with minute setae. Male propodus of pereopod 6 without several hook-shaped serrated distal spiniform setae……...*T. kimi* sp. nov.
- Basis of pereopod 1 margin lacking setae, naked. Male propodus of pereopod 6 with several hook-shaped serrated distal spiniform setae……..…*T. mclellandi*
12. Cheliped carpus with a long seta. Chela with serration on proximal part of cutting edge……*T. paraforcifera*
- Cheliped carpus without a seta. Chela smooth on proximal part of cutting edge…….…..……*T. eltaninae* sp. nov.

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We are grateful to Prof. Dr. Angelika Brandt (Zoological Institute and Museum Hamburg) who loaned the material collected during the DIVA and ANT XV/3 Expeditions. Thanks are also due to Dr. T. Chad Walter and William E. Moser (National Museum of Natural History, Washington, D.C). Dr Adam Baldinger (Museum of Comparative Zoology Harvard University) kindly corrected English. Financial support was provided by the German Research Foundation (Grant DFG Br-1121/19-3) and the State Committee for Scientific Research, Poland (Grant 3 PO4F 037 23).

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Veröffentlichung VIII

Notes on the Tanaidacea (Crustacea: Peracarida) of the Angola Basin

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Abstract

In July 2000 the DIVA-1 Expedition collected deep-water benthos (5125-5449 m) in the Angola Basin, South Atlantic Ocean. The tanaidacean material is composed of 434 individuals with a body length between 1.2 and 12 mm. Sixty-eight species, belonging to 10 families were found. Tanaidomorpha with 63 species represent 96 % of the material, Neotanaidomorpha with one species 3 % and Apseudomorpha with 4 species 1 %. The most diverse genus is *Leptognathia* (22 species). The material is dominated by *Paranarthrura angolensis* with 58 individuals. The Tanaidacea of the Angola Basin share only one species (*Neotanais americanus*) with other deep-sea areas of the Atlantic Ocean, ninety-seven percent of the material is composed of new species. The different sampling gear results are discussed.

Keywords: Angola Basin, Tanaidacea, deep sea, South Atlantic.

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Introduction

The deep sea is a vast and poorly known environment in comparison to shallow waters. The fauna of this environment is very diverse and many new species are expected to be found in the near future. The Tanaidacea, a little known group of Crustacea, is considered to be one of the most successful invertebrates of the deep sea (Larsen pers. comm.). Tanaids are not very diverse in shallow waters, while in the deep sea they are well represented (Dojiri and Sieg 1997) and are one of the most abundant taxa in deep-sea samples. According to Wolff (1977), tanaids may comprise as much as 19% (by number) of the benthic macrofauna at 5000 m depth, and quite often the order is found to be the second or third most abundant peracarid taxon, next to amphipods and isopods, in ecological studies of the deep sea (Borowski 2001).

Determination of particular species is notoriously difficult. In the Tanaidomorpha and Neotanaidomorpha sexual dimorphism is very strongly displayed and males show an especially high degree of polymorphism. Moreover, the ontogenetic variation of most taxa makes the identification of many species very difficult (Larsen 2001; Wilson 1987).

The tanaid fauna from the North Atlantic Ocean is one of the best known worldwide due the works of Sars (1882), Hansen (1913), Norman and Stebbing (1886), and Bird and Holdich (1988, 1989). For other regions of the world our knowledge of Tanaidacea is even more incomplete. In the tropical regions the knowledge of deep-sea fauna, especially tanaids, is poor. For the South Atlantic Ocean there are only a few reports on tanaids. The most important works are by Kudinova-Pasternak (1990) and Bamber (2000). Until now only six families and 12 species of Tanaidacea were reported for the Angola Basin : *Glabroapseudes larseni*, Guerrero-Kommritz & Heard, 2003 (Apseudidae); *Sphyrapus malleolus* Norman & Stebbing, 1886 (Sphyrapidae); *Pseudotanais denticulatus* Bird & Holdich, 1989 (Pseudotanaidae); *Collettea pegmata* Bamber, 2000, *Portaratrum afer* Guerrero-Kommritz, 2003 (Colletteidae); *Tanaella profunda* Guerrero-Kommritz & Błażewicz-Paskowycz, 2004 (Tanaellidae); and six Agathotanaididae: *Agathotanais* sp AB1, *Metagathotanais loezae* Guerrero-Kommritz, 2003, *Paragathotanais insolitus* Guerrero-Kommritz, 2003, *Paranarthrura angolensis* Guerrero-Kommritz, Schmidt & Brandt, 2002, *Paranarthrura intermedia* Kudinova-Pasternak, 1982, and *Paranarthrura insignis* Hansen, 1913.

The DIVA-1 Expedition is the first effort to make a comprehensive survey of the benthic fauna in the Angola Basin. The Tanaidacea of the Angola Basin collected during the DIVA-1 Expedition is the subject of the present paper.

Materials and Methods

During July 2000 members of the DIVA-1 Expedition collected deep-water benthos, including Tanaidacea, from the Angola Basin. Sampling was conducted aboard the R/V *Meteor*, in depths between 5125 and 5449 m, along a transect of approximately 700 km, using four different gears: modified epibenthic sledge (EBS) (Brandt and Barthel 1995), box corer (BC), multicorer (Muc) and a large bottom trawl (BT). The samples were sieved gently with precooled seawater on board and transferred into 80% ethanol or 4% formalin in seawater. The main sorting work was done in the laboratory in Germany. Tanaidacea were found in 22 samples. For station data see Table 1. The tanaidaceans were identified to species level in the Zoological Museum Hamburg (ZMH), where the material is deposited.

Due to bad weather conditions during the recovery of the EBS little material is available from stations 320 and 338.

Results

The material of Tanaidacea found in the Angola Basin is composed of 434 individuals. Body lengths range between 1.2 mm and 12 mm. Sixty-eight species belonging to 10 families were found. The composition is as follows: the Tanaidomorpha are represented with 63 species (96% of all individuals), the Neotanaidomorpha with one species (*Neotanais americanus*) (3%), and the Apseudomorpha with four species (1%) (Fig. 1). Leptognathiidae is the most numerous in species and in individuals followed by Pseudotanaididae (Figs. 2, 3). The gear that captured most Tanaidacea is the EBS followed by the BC (Fig. 4).

The tanaidacean fauna of the Angola Basin has only one species in common with other deep-water areas of the Atlantic Ocean. Of the 68 species found, only seven are known to science, all 61 remaining species (90 % of the material) are new, and several of them were recently or are being described by the author (Guerrero-Kommritz 2003a, b; Guerrero-Kommritz and Heard 2003; Guerrero-Kommritz and Błażewicz-Paskowycz 2004). The species of the DIVA-1 Expedition are listed in the appendix I. Table 1 shows the numbers of individuals and species captured in total and per gear.

	Total catches		EBS		BC		Muc		BT	
Families	Ind.	Spec.	Ind	Spec	Ind	Spec.	Ind.	Spec.	Ind.	Spec.
Leptognathiidae	128	22	45	11	67	21	19	8	1	1
Anarthruridae	30	10	37	9	11	6	7	3	0	0
Agathotanaidiidae	77	3	31	2	38	3	8	2	0	0
Pseudotanaidae	72	12	48	11	20	8	4	4	0	0
Nototanaidae	25	10	16	8	6	4	2	2	1	1
Colletteidae	43	4	2	2	10	2	1	1	1	1
Neotanaidae	13	1	3	1	7	1	2	1	1	1
Tanaellidae	42	2	8	2	33	2	1	1	0	0
Apseudidae	3	3	3	3	0	0	0	0	0	0
Leviapseudidae	1	1	1	1	0	0	0	0	0	0
Total	434	68	194	50	192	47	44	22	4	4

Table 1 Total and per gear catches of individuals and species. Abbreviations: epibenthic sledge (EBS), Box corer (BC) Multicorer (Muc), Bottom Trawl (BT).

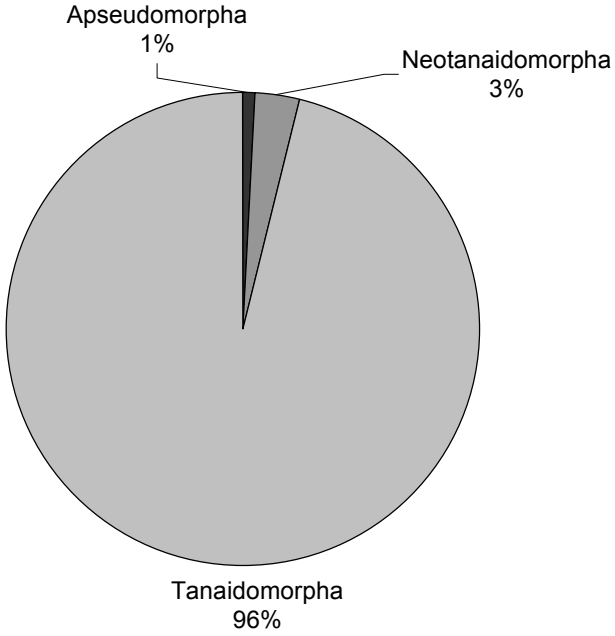

Figure 1. Tanaidacea individuals per suborders collected in the Angola Basin during the DIVA 1 Expedition.

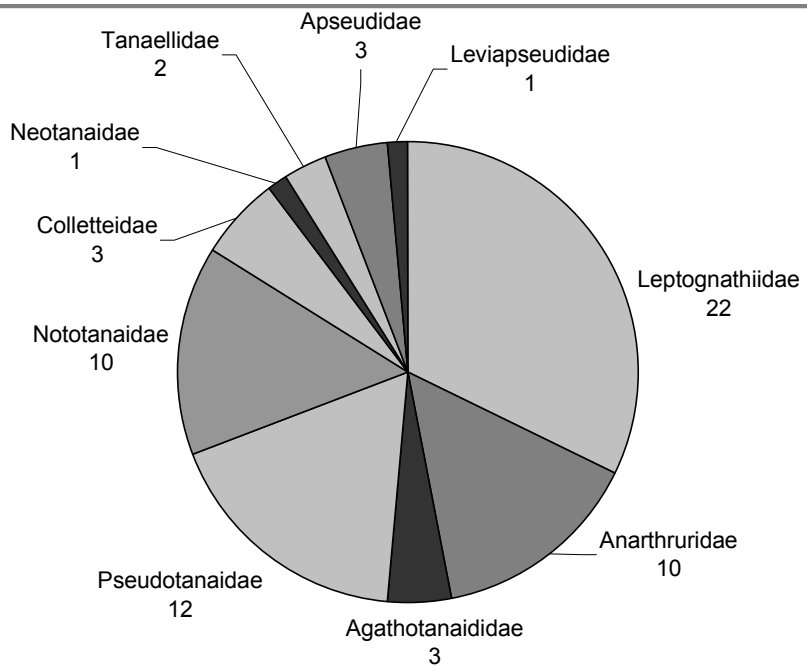

Figure 2. Tanaidacean species per families collected in the Angola Basin during the DIVA 1 Expedition (n=68).

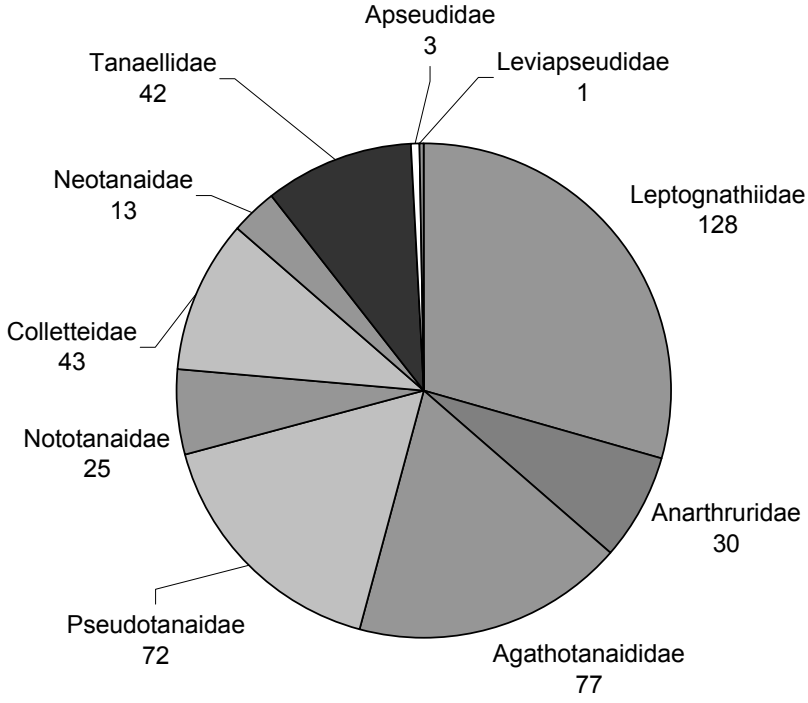

Figure 3. Tanaidacean individuals per families collected in the Angola Basin during the DIVA 1 Expedition (n=434).

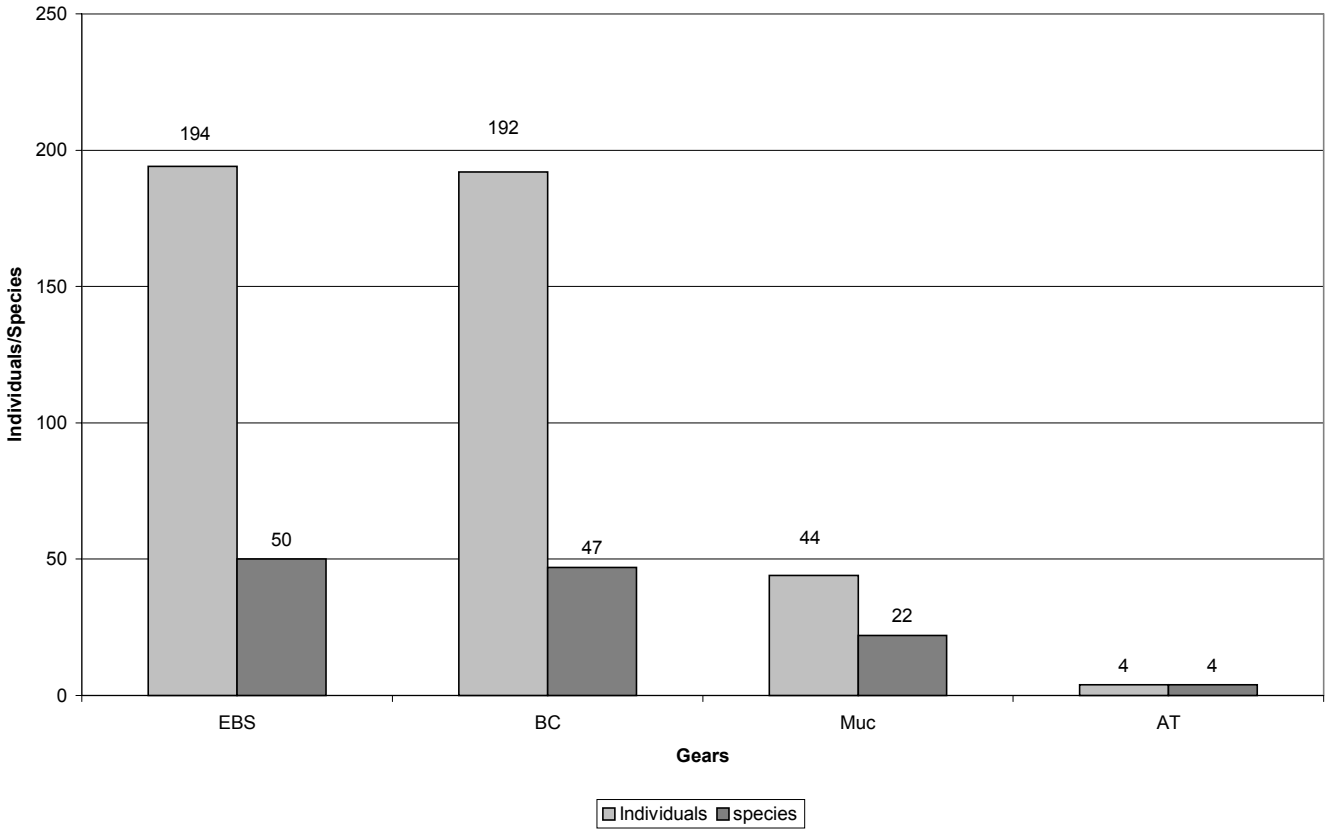

Figure 4. Tanaidacea collected by the different gear. (individuals n=434).

Discussion

Of the species reported by Bamber (2000) none was found in the material of the DIVA-1 Expedition. The total list of tanaid species from the Angola Basin now consists of 75 species: six reported by Bamber (2000), 68 in the present study, and one additional species found in material of the Sanders Expedition 1968 to the South Atlantic Ocean (Guerrero-Kommritz 2003b).

Neotanais americanus Beddard, 1886 is the only species that is in common with other deep-sea regions, it has a very wide distribution in the Atlantic Ocean and is reported for the deep sea of the North Atlantic Ocean, from Greenland to the Canary Islands, from the east coast of North America, and from the coast of Europe. In the South Atlantic this species is reported from the Argentine Basin, in the vicinity of Rio de la Plata, and in the Weddell Sea. (Gardiner 1975, Larsen 1999). *Neotanais americanus* is a problematic species and is

considered as a species complex. The full determination is only possible for adult males, which are usually rare in the samples, and show a high degree of polymorphism (Gardiner 1975). It is probable that in future this species will be split into several ones.

Tanaidomorpha females and neuters are morphologically similar. They live in tubes most of the time and are not very motile. In contrast, males are motile individuals, some of them polymorphic, and most of them non-feeding. They are searching for females by roaming the substrate most of the time (Larsen 2001). The highest number of males was sampled by means of the EBS (32 ind.).

Apseudomorphs were found only in the EBS samples. These large tanaids of more than 10 mm body length, live primarily epibenthically and it is not known how deep they dig into the sediment. Their absence from the BC and MUC samples can not be explained satisfactorily.

The presence of heavily cuticularized tanaidaceans, which are very bad swimmers (like members of Agathotanaidae, species of *Araphura* and some *Leptognathia*) and of typical burrowers, in the EBS can only be explained by the fact that the lower frame of the EBS dug itself into the substrate collecting everything that was in the upper sediment layer (Brenke pers. comm.)

The presence of Tanaidacea in the BT is difficult to explain. Although the tanaids captured are very big (approx. 7 mm in length), the net mesh of the BT is too wide to capture small animals of this size. The tanaids must have stuck on something including other fauna to be collected by this gear.

Apparently the catches increase while the latitude decrease in the BC samples, in which the northern most station shows the highest numbers of specimens. For the EBS the picture is different, the middle stations yielding the richest tanaid samples. The Muc samples show high numbers of tanaids in the south and in the north and only few at the middle stations of the sampling area. This surprising picture of the distribution of tanaids can not be explained. Due to the poor knowledge of the tanaid fauna of the deep sea a comparison with other deep-sea regions is not possible at the moment. The high percentage of new species sampled during the DIVA-1 Expedition illustrates that the amount of new species that can be discovered in the deep sea must be enormous. Because of the limited mobility of tanaidaceans the degree of endemism in the deep sea is probably very high (Larsen pers. comm.).

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Appendix I

Species of Tanaidacea of the Angola Basin sampled in the DIVA-1 expedition

Taxa / Gear	Station/Gear Station 318 EBS	320 EBS	324 KG	325 Muc	330 KG	331 Muc	334 AT	336 KG	337 AT	338 EBS	339 AT	340 EBS	340 KG	341 KG	342 Muc	344 EBS	344 KG	345 KG	346 Muc	348 EBS	349 AT	350 EBS	Σ
Apseudidae																							
Glabroapseudes larseni [1]																				1			1
Apseudes sp1																1							1
Apseudes sp2																				1			1
Leviapseudidae																							
Leviapseudes sp																				1			1
Neotanaidae																							
Neotanais americanus	1			1	1	1								2		1	4			1	1		13
Agathotanaididae																							
Paranarthrura angolensis[2]	2	1		1		1		7		1		9	1	7	1	2		14	2	7		2	58
Paragathotanais insolitus[2]				2														3	1				6
Metagathotanais loerzae[2]								1				4		1		3		4					13
Anarthruridae																							
Anarthruridae sp1																						1	1
Anarthrurid sp2												1											1
Anarthrurid sp3																1						1	2
Portaratrum afer[3]												2		1						5		2	10
Akanthophoreus sp1				3						1		7				2		2	1	2			18
Akanthophoreus sp2												7				1	1						9
Akanthophoreus sp3	1													2				1	2			1	7
Akanthophoreus sp4												1		3	1								5
Akanthophoreus sp5					1																		1
Akanthophoreus sp6																1							1
Colletteidae																							
Collettea sp1												1						1					2
Collettea sp2	1			1				2						1				6					11
Colletteidae sp											1												1
Tanaellidae																							
Tanaella profunda[4]		1		1	3			1										6		1			13
Araphura sp1														4		5		19				1	29
Leptognathiidae																							
Chauliopleona sp													1					2		1			4

Taxa / Gear	Station/Gear Station	318 EBS	320 EBS	324 KG	325 Muc	330 KG	331 Muc	334 AT	336 KG	337 AT	338 EBS	339 AT	340 EBS	340 KG	341 KG	342 Muc	344 EBS	344 KG	345 KG	346 Muc	348 EBS	349 AT	350 EBS	Σ
Leptognathia sp1															1						1			2
Leptognathia sp2													1		1			1						3
Leptognathia sp3													2		2		2		2		3		1	12
Leptognathia sp4													2		1	1								4
Leptognathia sp5						1									2				4	3			2	12
Leptognathia sp6				1	1				2				6		3		2		3					18
Leptognathia sp7				1		1							2		1									5
Leptognathia sp8				1	3										1				2	4				11
Leptognathia sp9															1									1
Leptognathia sp10											1			3										4
Leptognathia sp11															2									2
Leptognathia sp12					2															2				4
Leptognathia sp13						1									1	1			1		2			6
Leptognathia sp14						1													1					2
Leptognathia sp15																			1					1
Leptognathia sp16									1										1					2
Leptognathia sp17				1															4	1				6
Leptognathia sp18																			2					2
Leptognathia sp19																			1					1
Leptognathia sp20				2																				2
Leptognathia sp21										1														1
Leptognathia sp22		1			1	5							2		2		6		2		5		3	27
Nototanaididae																								
Meromonacantha sp																	1				1			2
Typhlotanais sp1		1											1											2
Typhlotanais sp2													1											1
Typhlotanais sp3					1										1									2
Paraespinosus sp1															2									2
Paraespinosus sp2													1			1								2
Paratyphlotanais sp1																	3							3
Paratyphlotanais sp2																					1			1
Paratyphlotanais sp3						1											1							2
Nototanaididae sp								1					1				2	2			1		1	8
Pseudotanaidae																								
Pseudotanaidae sp1						1					1		3				4						2	11
Pseudotanaidae sp2		1											5					1		1	2		1	11
Pseudotanaidae sp3		2											3		1		1	1	1		1		1	11
Pseudotanaidae sp4											1						1	1	1		1			5

Taxa / Gear	Station/Gear Station 318 EBS	320 EBS	324 KG	325 Muc	330 KG	331 Muc	334 AT	336 KG	337 AT	338 EBS	339 AT	340 EBS	340 KG	341 KG	342 Muc	344 EBS	344 KG	345 KG	346 Muc	348 EBS	349 AT	350 EBS	Σ
Pseudotanaidae sp5	1											1					2	3					7
Pseudotanaidae sp6										1		1											2
Pseudotanaidae sp7																			1	3			4
Pseudotanaidae sp8		1										1											2
Pseudotanaidae sp9												1											1
Pseudotanaidae sp10		1										1					2		1				5
Pseudotanaidae sp11			2											1		5		2	1			1	12
Pseudotanaidae sp12					1																		1
Total individuals	11	4	8	17	17	2	1	14	1	6	1	67	5	44	5	45	15	89	20	41	1	20	434
Total species	9	4	6	11	11	2	1	6	1	6	1	26	3	24	5	21	9	26	12	20	1	14	68

[1] Guerrero-Kommritz & Heard, 2003
[2] Guerrero Kommritz 2003
[3] Guerrero-Kommritz 2003
[4] Guerrero-Kommritz and Błażewicz-Paskowycz, 2004

Veröffentlichung IX

Phylogenetic analysis of genera of Akanthophoreinae (Tanaidacea: Crustacea)

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Abstract
This paper addresses the phylogeny of genera of Tanaidacea, using computer assisted parsimony methods within Akanthophoreinae, two of them *Chauliopleona* and *Paraleptognathia,* are considered *incertae sedis*. The morphology based analysis uses ten well-defined and described genera. One genus of Apseudomorpha *Glabroapseudes* was used as the out-group taxon, and nine genera of Tanaidomorpha: *Araphura*, *Chauliopleona*, *Collettea, Paragathotanais*, *Metagathotanais, Paraleptognathia*, *Paranarthrura*, *Portaratrum*, and *Tanaella* were used as in-group taxa for the present analysis. The genera *Chauliopleona* and *Paraleptognathia* build a monophylum. *Portaratrum* cannot be included in the known families and is considered *incertae sedis*. The analysis does not support the monophyly of the Akanthophoreinae and further questions the monophyly of Tanaellidae.

Key words: *Chauliopleona*, *Paraleptognathia*, *Portaratrum*, phylogeny, Tanaellidae, Akanthophoreinae

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Introduction

The systematics and the phylogeny of the order Tanaidacea are poorly understood, complex, confusing, and have changed often during the last years. Karl Lang tried to explain this situation and stated once: "the Tanaidacea are the most difficult among the difficult Crustacea" (Sieg, 1973), which reflects the systematic situation of the order and might be the reason why there are so few Tanaidacea students. The systematics of the Tanaidacea improved with the works of Karl Lang and Jürgen Sieg. Based on a phylogentic study, Sieg (1984) reconstructed the ground plan of the Tanaidacea, and postulated the possible ancestor of all Tanaidacea. This was the first detailed phylogentic study of the Tanaidacea and demonstrated the monophyly of the taxon. The recent systematics is based on this work. Gutu & Sieg (1999) summarized the presently accepted systematics the Tanaidacea, which contains four suborders and 25 families. The four suborders are: the fossil Anthracocaridomorpha Sieg, 1980 (with 2 families), and the recent, Apseudomorpha Sieg, 1980, comprise two superfamilies Jurapseudoidea (extinct) and Apseudoidea (12 families); Neotanaidomorpha Sieg, 1980 (one family) and Tanaidomorpha Sieg, 1980 with three superfamilies, Cretitanaoidea (extinct), Paratanaidoidea (seven families) and Tanaidoidea (one family). The Paratanaidoidea comprised the bulk of the known Tanaidacea. Between this suborder is the largest and most controversial family, the Anarthruridae Lang, 1971 with three subfamilies, Akanthophoreinae Sieg, 1986, Anarthrurinae Lang, 1971 and Leptognathinae Sieg, 1973. Based on his observation on deep-sea material, Sieg (1986) concluded that the Akanthophoreinae is one of the most important subfamilies in the deep sea, and he expected that most of the new deep-sea species would belong to this subfamily.

The Akanthophoreinae is defined by having four articles on the antennule, six articles on the antenna, pars molaris not acute with terminal spines, carpus of pereopod 1 with a strong seta, dactylus of pereopod 4 to 6 with groove bordered by spinules, pleopods present or not, uropods mono- or biramous. Marsupium with four oostegites and a strong sexual dimorphism. Males with reduced mouthparts (Sieg, 1986).

Larsen & Wilson (1998) found inconsistencies in the Akanthophoreinae and had doubts on the validity of the subfamily. Larsen & Wilson (2002) presented a phylogenetic analysis of the superfamily Paratanaidoidea using computer assisted parsimony methods and proposed a new systematics for the Paratanaidoidea. They studied 81 of the 88 superfamilies´ recognized

genera. The remaining seven genera were considered to be insufficiently described, thus not included in the analysis. In their work they rediagnosed the families, and split the Anarthruridae into four families: Anarthruridae, Agathotanaididae, Colletteidae and Tanaellidae. The monophyly of the families Paratanaidae, Pseudotanaididae, Nototanaididae and Agathotanaididae is corroborated, however, 21 genera have no familiar affiliation and were considered *incertae sedis*.

The subfamily Akanthophoreinae originally composed of 23 genera was split. 12 genera were assigned to other families and 11 were considered *incertae sedis* (Table 1). In order to study the systematic position of some of the *incertae sedis* genera, a revision of two of these genera: *Chauliopleona* Dojiri & Sieg, 1997 and *Paraleptognathia* Kudinova-Pasternak, 1981, were made (Guerrero-Kommritz 2004, Guerrero-Kommritz in press). The results show that *Akanthophoreus* Sieg, 1986, is synonymous with *Paraleptognathia* (Guerrero-Kommritz, 2004) and that *Chauliopleona* is not monotypic (Guerrero-Kommritz in Press). A phylogenetic analysis was done in order to analyse the phylogenetic relationship of the genera *Chauliopleona, Paraleptognathia,* and the genus *Portaratrum* Guerrero-Kommritz,

2003, with other well established Tanaidacea genera like *Metagathotanais* Bird & Holdich, 1988, *Paragathotanais* Bird & Holdich, 1988, *Paranarthrura* Hansen, 1913, *Collettea* Lang, 1973, and *Tanaella* Norman & Stebbing, 1886. Another aim of this study is to test the validity of Akanthophoreinae.

Material and Methods

Taxa chosen

Due to the inconsistencies found and the break up of the subfamily Akanthophoreinae by Larsen & Wilson (1998, 2002), and the synonymyzation of the type genus *Akanthophoreus* with *Paraleptognathia* (Guerrero-Kommritz, 2004) the monophyly of Akanthophoreinae is very doubtful. To test the monophyly of Akanthophoreinae, and clarify the relationship of some potentially related genera, ten well-defined and well-described deep-sea genera from the Atlantic Ocean were studied; some of them were *incertae sedis* (Fig. 1). The type species and as many species of the ten genera were studied if possible (Table 2). The genera *Chauliopleona*, *Glabroapseudes* Guerrero-Kommritz & Heard, 2003, and *Portaratrum* were never used in a phylogentic analysis before.

Table 1. Taxa of the Akanthophoreinae Sieg 1986 and their actual systematic position after Larsen & Wilson 2002.

Taxa Akanthophoreinae Sieg, 1986	Tanaellidae Larsen & Wilson, 2002	Colletteidae Larsen & Wilson, 2002	Pseudotanaidae Sieg, 1976	*Incertae sedis*
Akanthophoreus Sieg, 1986				X
Andrognathia Sieg, 1983				X
Araphura Bird & Holdich, 1984	X			
Araphuroides Sieg, 1986	X			
Arthrura Kudinova-Pasternak, 1966	X			
Chauliopleona Dojiri & Sieg 1997				X
Collettea Lang, 1973		X		
Filitanais Kudinova-Pasternak, 1973		X		
Haplocope G.O. Sars, 1882		X		
Latitanais Kudinova-Pasternak, 1987			X	
Leptognathiella Hansen, 1913		X		
Leptognathioides Bird & Holdich, 1984				X
Libanius Lang, 1971		X		
*Macrinella*Lang, 1971		X		
Mimicarhaphura Sieg, 1986				X
Nematotanais Bird & Holdich, 1985		X		
Paraleptognathia Kudinova-Pasternak, 1981				X
Robustochelia Kudinova-Pasternak, 1983				X
Safaritanais Kudinova-Pasternak, 1987				X
Scolora Sieg & Dojiri, 1991				X
Stenotanais Bird & Holdich, 1984				X
Tanabnormia Gutu, 1986				X
Tanaella Norman & Stebbing, 1886.	X			

In-group taxa

In-group taxa used are: *Araphura*, *Chauliopleona*, *Collettea*, *Metagathotanais*, *Paragathotanais*, *Paraleptognathia*, *Paranarthrura*, *Portaratrum* and *Tanaella*.

The genera *Araphura*, *Chauliopleona*, *Collettea*, *Paraleptognathia* and *Tanaella* were representatives of the Akanthophoreinae, and were used to test the monophyly of this subfamily.

The genera *Metagathotanais*, *Paragathotanais* and *Paranarthrura* belong to the well defined monophyletic family Agathotanaididae, and were chosen to analyse the phylogenetic relationship of these genera to the genera *incertae sedis* tested.

The genus *Chauliopleona* is used for the first time in a phylogentic analysis. It was not included in the phylogenetic analysis of Larsen & Wilson (2002) because it was poorly described.

The genus *Paraleptognathia* (= *Akanthophoreus*) is the type genus of the Akanthophoreinae and its systematic position is not clear.

The genus *Portaratrum* has an ambiguous position within the Tanaidomorpha, and was provisionally placed in the Colletteidae. This genus was never used before in phylogentic analysis.

The genus *Collettea* was revised by Larsen (2000). Larsen & Wilson (2002) designated this genus as the type genus for Colletteidae.

The genera *Tanaella* and *Araphura* belong to the family Tanaellidae. A revision of *Tanaella,* the type genus of the family Tanaellidae, was presented by Larsen & Heard (2004).

Out-group taxa

The deep-sea genus *Glabroapseudes,* a member of the Apseudomorpha from the Angola Basin, was chosen as the out-group. The Apseudomorpha display the most plesiomorphic characters of the Tanaidacea (Lang 1953, Gardiner 1975, Sieg 1980, Kudinova-Pasternak 1985, Larsen & Wilson 2002). Due to this, Apseudomorpha are used to root the tree.

Data acquisition

If possible the data were obtained from three or up to 20 individuals, if enough material was available, of all the known species of the genera, or at least from one representative species of each genus.

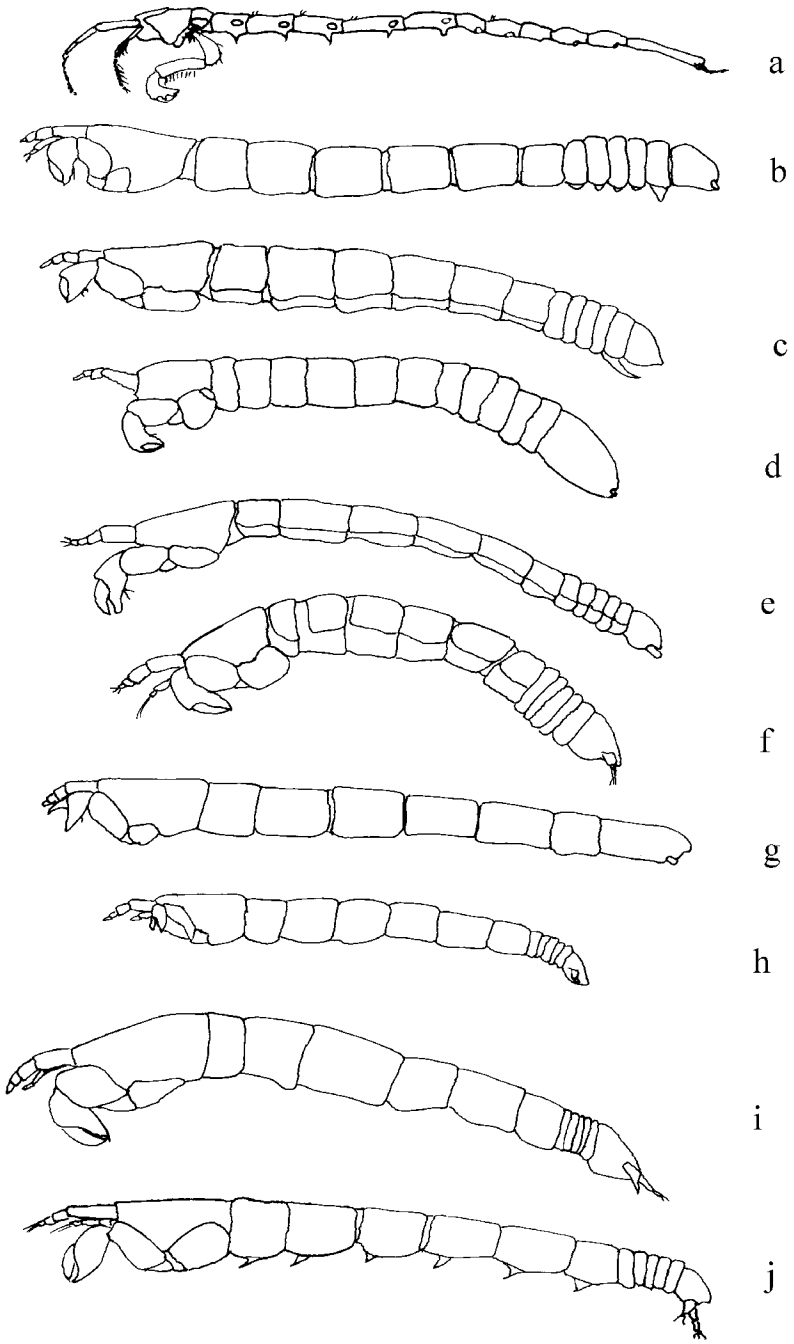

Figure 1 Shematic ilustrations of lateral view of genera used inthe present study: a. *Glabroapseudes larseni* Guerrero-Kommritz & Heard, 2003; b. *Portaratrum afer* Guerrero-Kommritz, 2003; c. *Chauliopleona* sp.; d. *Collettea pegmata* Bamber, 2000 (modified from Bamber 2000); e. *Paraleptognathia longiremis* (Lilljeborg, 1864); f. *Tanaella eltaninae* Guerrero-Kommritz & Blazewicz-Paszkowycz, 2004 (modified from Guerrero-Kommritz & Blazewicz-Paszkowycz, 2004); g. *Metagathotanais loerzae* Guerrero-Kommritz, 2003; h. *Paragathotanais insolitus* Guerrero-Kommritz, 2003; i. *Araphura* sp., j. *Paranarthrura angolensis* Guerrero-Kommritz, Schmidt & Brandt, 2002. Specimens not drawn at the same scale

Table 2. Species analysed

Taxa	Author	Source of data
Glabroapseudes larseni	Guerrero-Kommritz &Heard, 2003	Type material ZMH
Magotanais loerzae	Guerrero-Kommritz, 2003	Type material ZMH
Paragathotanais insolitus	Guerrero-Kommritz, 2003	Type material ZMH
Paranarthrura angolensis	Guerrero-Kommritz, Schmidt & Brandt, 2002	Type material ZMH
Portaratrum afer	Guerrero-Kommritz, 2003	Type material ZMH
Chauliopleona dentata	Dojiri & Sieg, 1997	Type material ZMB
Chauliopleona amdrupii	(Hansen 1913)	Type material ZMC
Chauliopleona armata	(Hansen, 1913)	Type material ZMC
Chauliopleona hastata	(Hansen, 1913)	Type material ZMC
Chauliopleona sp1		Type material ZMH
Chauliopleona sp2		Type material ZMH
Chauliopleona sp3		Type material ZMH
Paraleptognathia alba	(Hansen, 1913)	Type material ZMC
Paraleptognathia antarctica	(Vanhöffen, 1914)	Material ZMH
Paraleptognathia australis	(Beddard, 1886)	Material ZMH
Paraleptognathia benguela	Guerrero-Kommritz, 2004	Type material ZMH
Paraleptognathia brachiata	(Hansen, 1913)	Type material ZMC
Paraleptognathia fastuosa	Guerrero-Kommritz, 2004	Type material ZMH
Paraleptognathia gracilis	(Kroyer, 1842)	Material ZMH
Paraleptognathia inermis	(Hansen, 1913)	Type material ZMC
Paraleptognathia longiremis	(Liljeborg, 1864)	Material ZMH
Paraleptognathia multiserrata	(Hansen, 1913)	Type material ZMC, ZMB
Paraleptognathia multiserratoides	Guerrero-Kommritz, 2004	Type material ZMH
Paraleptognathia tenuichela	Guerrero-Kommritz, 2004	Type material ZMH
Paraleptognathia weddellensis	(Sieg, 1986)	Material ZMH
Tanella profunda	Guerrero-Kommritz & Blazewicz-Paszkowycz, 2004	Type material ZMH
Tanaella kimi	Guerrero-Kommritz & Blazewicz-Paszkowycz, 2004	Type material ZMH
Tanaella eltaninae	Guerrero-Kommritz & Blazewicz-Paszkowycz, 2004	Type material NMNH
Araphura higginsi	Sieg & Dojiri, 1989	Type material NMNH
Araphura sp		Material ZMH
Collettea sp.		Material ZMH

For the cladistic analysis, 420 morphological characters were originally investigated. Sexually dependent characters were not used because for most of the species one of the genders is unknown. Most males are not described, and therefore cannot be identified

properly, on the contrary from *Glabroapseudes* no female is known. For this reason we had to exclude sexual dependant, uninformative or problematic characters. After this character omission only 120 characters were left and further 40 ones of these proved not to be informative for the investigated species. Another 40 were found not to be diagnostic at generic level. For the remaining 40 morphological characters a database was established using the software DELTA (Description Language for Taxonomy) (Dallwitz et al. 1997). From these 40 characters, 24 were coded as binary, 11 characters had three states, and five characters have four or five states (Appendix 1).

Character description:

In the following explanation of characters, numbers in brackets correspond to those in table 3.

Body

The cuticula of the Tanaidacea has different degrees of sclerotization. Most Tanaidacea have a modest or flexible body sclerotization, and some deep-sea genera have an inflexible rigid and strongly sclerotized cuticula like *Metagathotanais* or *Paragathotanais* (1). The body shape of the Tanaidacea is adapted to their benthic lifestyle. Many species have a dorsoventrally flattened body that is ovoid in cross section, and only a few genera are completely cylindrical in cross section (2). Although the body shape of many Tanaidacea is tube-like and smooth, some species possess prominent pereopod shoulders on the pereonites; this is present in the genus *Paranarthrura* and in many apseudomorphs (3). The width of the pleon differs in many taxa. In most genera of Tanaidomorpha, the pleon is as wide as the pereon, in others it is narrower than the pereon, and in a few genera like *Collettea* it is even wider than the pereon. In the Apseudomorpha, it is common to be as wide as or narrower than the pereon (4). The pleonites are commonly free, but they can be fused. This is present in the Apseudomorpha, and some Tanaidomorpha like *Metagathotanais, Agathotanais* and *Anarthrura* (5). The presence of ventral apophyses on the Tanaidacea is common on the pereon, however on the pleon it is uncommon, but is present in the genera *Chauliopleona* and *Portaratrum* (6). The pleotelson is in general shorter than the last three pleonites combined; in the genus *Collettea* the pleotelson is usually longer (7).

Antennule and Antenna

The antennule of the Tanaidomorpha is composed of four articles in females and up to seven in males; in the Apseudomorpha it is composed of 6 or more articles (8). The antenna in the Tanaidomorpha is composed of six articles or less; in the Apseudomorpha is composed of more than seven articles (9).

Mouthparts

Mouthparts are reduced in the Tanaidomorpha. The mandibular palp is present in the Apseudomorpha and absent in the Tanaidomorpha (10). The lacinia mobilis is present on both mandibles in the Apseudomorpha, and is composed of cuticular plates and setae; in the Tanaidomorpha it is present only on the left mandible, and composed of a plate with terminal denticles or a spine-like structure, in *Metagathotanais,* it is completely reduced (11). The pars molaris, is broad in some taxa and possesses a broad surface, in other taxa it is slender and ends in several spinules, in some it is acute or reduced (12). The maxillule endite of the Tanaidacea is covered by fine setules in most species, but the setules can also be missing (13). The maxillule is simplified with only one endite in the Tanaidomorpha, whereas in the Apseudomorpha two endites are present (14). The maxillule palp is present in the Apseudomorpha with numerous terminal setae; however, in the Tanaidomorpha only one or two setae are present (15). The labium is composed of two lobes in the Apseudomorpha, and fused in the Tanaidomorpha (16); a palp is present in the Apseudomorpha and missing in the Tanaidomorpha (17). The maxilla in the Apseudomorpha has both palp and endites; the Tanaidomorpha do not have these structures (18). The maxilliped basis is fused in the Tanaidomorpha; in the Apseudomorpha the basis is free, and in some genera the bases are held together by coupling hooks (19). The maxilliped basis has a number of setae, which can be present or absent, a character differing between species (20). The setation of the maxilliped endites is variable among the genera, and may have different kinds of setation or special structures like setae or tubercles (21). The setation of article 2 of the maxilliped is variable; it can have internal setae, external setae, or both (22).

Cheliped

The cheliped attachment provides information about the motility of the cheliped. There are different possibilities of insertions: via a simple sidepiece (called sclerite), or with a groove around the insertion, with sidepieces between the basis and cephalothorax, and in some genera like *Paranarthrura* the basis is fused to the cephalothorax (23). The Apseudomorpha possess

a cheliped exopod, which is missing in the Tanaidomorpha (24). The merus of the cheliped is fully developed in the Apseudomorpha and reduced in the Tanaidomorpha (32). The carpus of the cheliped is expanded ventrally in *Paraleptognathia* and C*haulíopleona* forming a kind of shield (25). The fixed finger of the chela bears a great amount of ventral seta in the Apseudomorpha, and only one or two in the Tanaidomorpha (26).

Pereopods

The first three pereopods often possess coxae; in some genera of Tanaidomorpha these are reduced (27). The reduction of coxae can also be observed on pereopods 4 to 6 (28). The pereopod 1 in the Apseudomorpha bear an exopod; the Tanaidomorpha lacks this structure (29). The number of spiniform setae of pereopod 1 on the merus (30), and on the carpus (31) can be varying from none to one or up to three or more, they can be short or long. The setation of the propodus is very prominent and abundant in Apseudomorpha, and scarce in the Tanaidomorpha (33). The shape of the dactylus on pereopod 1 can be smooth, long and slender, or bear spinules (34); on pereopod 4 it can be simple and sharp, have strong spines, or a ventral groove bordered by spinules (35).

Uropods

The uropod is composed of a basal article with an exopod and an endopod. It can be composed of many articles or be fused to only one article (36). The basal article is simple and smooth, or in some genera with a lateral projection (37). The exopod can be fused to the basal article, or be free (38), and if it is free, it can be polyarticled or monoarticled (39). The endopod can be polyarticled, monoarticled, or absent (49).

Table 3. Character and character states used in the cladistic analysis. Each character is terminated by a colon and the states 1,2, etc separated by semicolon. Consistency index (CI) follow in parenthesis.

	Character and state
(1)	Body cuticula sclerotization: (1) medium; (2) heavy (0.500)
(2)	Body form: (1) dorsoventrally flatened; (2) cylindrical (0.500)
(3)	Pereon: (1) smooth; (2) angular (0.500)
(4)	Pleon: (1) as wide as pereon; (2) narrower than pereon; (3) wider than pereon; (4) tapering to pleotelson (1.00)
(5)	Pleonites: (1) free; (2) fused (1.00)
(6)	Ventral apophysis on pleonite 5: (1) absent; (2) directed downwards; (3) directed backwards (1.00)
(7)	Pleotelson form: (1) shorter than last three pleonites; (2) longer than last three pleonites (1.00)

(8) Antennule composed of: (1) five articles or less; (2) composed of more than five articles (1.00)
(9) Antenna composed of: (1) six articles; (2) less than six articles; (3) more than six articles (1.00)
(10) Mandibular palp: (1) present; (2) absent (1.00)
(11) Lacinia mobilis: (1) complex; (2) simple; (3) absent (1.00)
(12) Pars molaris: (1) broad; (2) with terminal spinules; (3) reduced (1.00)
(13) Maxillula endite setulation: (1) present; (2) absent (0.500)
(14) Maxillula with: (1) one endite; (2) with two endites (1.00)
(15) Maxillula palp with: (1) one terminal filament; (2) two terminal filaments; (3) more than two terminal filaments (1.00)
(16) Labium lobes: (1) free; (2) fused (1.00)
(17) Labium: (1) with palp; (2) naked (1.00)
(18) Maxilla: (1) with palp and edites; (2) simple (1.00)
(19) Maxilliped basis: (1) fused; (2) divided (1.00)
(20) Maxilliped basis: (1) with seta; (2) naked (0.333)
(21) Maxilliped endites: (1) naked; (2) with setae; (3) with tubercles; (4) with setae and tubercles (0.600)
(22) Maxilliped article 2 with: (1) only internal setae; (2) internal and external setae; (3) only external setae (1.00)
(23) Cheliped attachment: (1) via sclerite; (2) via sclerite with groove; (3) ventral direct to cephalothorax; (4) via pseudocoxa (1.00)
(24) Cheliped exopod: (1) present; (2) absent (1.00)
(25) Cheliped carpus carpal shield: (1) absent; (2) present (1.00)
(26) Fixed finger with: (1) one ventral seta; (2) two ventral setae; (3) more than two ventral setae (0.667)
(27) Pereopod 1 to 3 with: (1) coxae; (2) no coxae (0.500)
(28) Pereopod 4 to 6: (1) with coxae; (2) without coxae (0.500)
(29) Pereopod 1 exopod: (1) present; (2) absent (1.00)
(30) Pereopod 1 merus setation with: (1) one long spiniform seta; (2) one short spiniform seta; (3) two spiniform setae; (4) many setae; (5) no setae (0.600)
(31) Pereopod 1 carpus setation with: (1) one spiniform setae; (2) two spiniform setae; (3) three or more spiniform setae (0.500)
(32) Cheliped merus: (1) fully developed; (2) reduced (1.00)
(33) Pereopod 1 propodus setation with: (1) one long spiniform seta; (2) one short spiniform seta; (3) three or more spiniform setae; (4) no setae (1.00)
(34) Pereopod 1 dactylus: (1) simple and sharp; (2) strong with ventral spinules (1.00)
(35) Pereopod 4 dactylus: (1) simple and sharp; (2) with ventral groove bordered by spinules; (3) with spines (0.667)
(36) Uropod: (1) composed of many articles; (2) fused to one article (1.00)
(37) Uropod basal article: (1) simple; (2) with lateral projection (1.00)
(38) Uropod exopod: (1) free; (2) fused to basal article (0.33)
(39) Uropod exopod: (1) polyarticled; (2) monoarticled; (3) absent (0.500)
(40) Free uropod endopod: (1) polyarticled; (2) monoarticled; (3) absent (0.667)

Analysis

A data matrix (nexus file) was generated from the DELTA database for input in PAUP (Phylogenetic Analysis Using Parsimony) 4.10. beta version (Swofford 1998). All characters were unordered and treated as having equal weight. A heuristic search (hsearch) was initiated, a treespace search using tree bisection and reconnection (TBR) with randomised addition of taxa (addseq = random), and 1000 replications were completed with setting branch options on a maximum of three trees (nchuck = 3, Chuckscore = 1 nreps = 1000 randomize = trees). Branches of resulting trees were then swapped in a second search retaining all minimum length trees (hsearch = current nchuck = 0 chuckscore =0). Character state optimisation: Accelerated transformation (ACCTRAN). Trees were drawn using TreeView 1.6.6. (Page 1996).

Abbreviations used: Zoological Museum Hamburg (ZMH), Zoological museum University of Copenhagen (ZMC), National Museum of Natural History (NMNH), Natural History Museum Berlin (ZMB).

Results

The analysis of the 40 characters studied in 31 species of 10 genera revealed that 18 characters were parsimony-uninformative (12 are out-group resolving characters), and 22 characters are informative. The total number of rearrangements tried was 286, and only one tree was retained with a tree length of 78. The relatively high consistency index (CI = 0.7436) and low homoplasy index (HI= 0.2564) shows that few homoplasies are present in the data.

The CI, excluding the uninformative characters, is 0.6296 and the HI, excluding the uninformative characters, is 0.3704. The retention index (RI) is 0.6364. The rescaled consistency index (RC) is 0.4732. The bootstrap values with 100 replicates are low, 59 for clade four, 48 for clade five, 77 for clade six, 84 for and clade seven.

The clades are defined by following apomorphies (Table 4):

The Out-group taxon *Glabroapseudes*, is defined by a dorsoventrally flattened body shape, pereon with shoulders, antennule composed of more than five articles, antenna composed of more than six articles, mandibular palp present, lacinia mobilis complex, maxillule with two endites, maxillule palp with more than two terminal filaments, labium with palp, maxilla with palp and endites, maxilliped basis divided, maxilliped endites with setae, cheliped exopod

present, fixed finger with more than three ventral setae, pereopods 4 to 6 with coxae, pereopod 1 exopod present, pereopod 1 merus setation with many setae, cheliped merus fully developed, pereopod 1 propodus setation with three or more spiniform setae, pereopod 1 dactylus strong with ventral spinules, pereopod 4 dactylus simple and sharp, free uropod exopod polyarticled.

Within the In group taxa, Clade 1 is defined by a cheliped attachment via sclerite with groove, pereopod 1 carpus setation with two spiniform setae.

Clade 2 is defined by a free uropod with a monoarticled endopod.

Araphura is defined by a setation on pereopod 1 merus with one short spiniform seta, the basal article of the uropod with a lateral projection, and a uropod exopod fused to the basal article.

Clade 3 is defined by a pars molaris with terminal spinules, a maxilliped with a naked basis, and naked maxilliped endites.

Clade 4 is defined by a cylindrical body shape, a reduced setulation on the maxillule endite, a maxilliped article 2 with only internal setae, a cheliped attachment ventral direct to cephalothorax, and pereopods 1 to 3 without coxae.

Clade 5 is defined by a cheliped carpus with a carpal shield, and a free uropod with a polyarticled exopod.

Portaratrum is defined by a ventral aphophysis on pleonite 5 directed downward, a setation on pereopod 1 on propodus with one long spiniform seta, and a free uropod with monoarticled exopod.

Clade 6 (Agathotanaididae) is defined by a heavy cuticular sclerotization, a pleon that is narrower than the pereon, a reduced pars molaris, and a fixed finger with one ventral setae. The dactylus of pereopod 4 is simple and sharp; the uropod exopod is fused to the basal article, and a free uropod with monoarticled endopod.

Metagathotanais is defined by fused pleonites, a reduced lacinia mobilis, setulation on the maxillule endite, and a maxillule palp with one terminal filament. The pereopod 1 carpus setation bears three or more spiniform setae, the uropod is fused to one article, and the uropod endopod is absent.

Clade 7 is defined by an angular pereon, maxilliped endites with setae, a pereopod 1 merus with one short spiniform seta, and a basal uropod article with a lateral projection.

Paragathotanais is defined by an antenna composed of less than six articles, fused labium lobes, maxilliped endites with tubercles, and a pereopod 1 merus without setae.

Paranarthrura is defined by a cheliped attachment via a pseudocoxa, a pereopod 1 to 3 with coxae, and pereopods 4 to 6 with coxae.
Chauliopleona is defined by a ventral aphopysis on pleonite 5 directed caudally, and maxilliped endite with setae and tubercles.
Paraleptognathia is defined by a maxilliped basis bearing setae.
Collettea is defined by a pleon which is wider than the pereon, a pleotelson being longer than the last three pleonites, a maxilliped basis with setae, second article of maxilliped with only external setae, a fixed finger with one ventral seta, merus of pereopod 1 with one short spiniform seta, dactylus of pereopod 4 with spines, and a monoarticled free uropod exopod.
Tanaella is defined by a uropod exopod fused to the basal article.

Discussion

Characters

The greatest problem in the present analysis was to obtain phylogenetically informative characters for the Tanaidacea used. For the present study 420 potential characters were originally investigated for 31 species. After careful examination of character information only 40 characters were left for the phylogentic analysis. In general, gender related characters cannot be used in most of the Tanaidacea. Some species are considered hermaphroditic (Lang 1953) or parthenogenetic (Sieg 1984), and others have sexually dimorphic males with reduced mouthparts like species of the Leptognathiidae and Anarthruridae (Sieg 1984; Larsen & Wilson 2002), while in other species males show only little sexual dimorphism (Larsen 2002, Larsen & Heard 2004). However for many of the studied species males are not known, or if known they show sexual dimorphism sometimes to a great extend (Lang 1973), in other genera males are very rare like in *Paraleptognathia* (Guerrero-Kommritz 2004). In other species only the males are known (Guerrero-Kommritz & Heard 2003).

Cuticular sclerotization is modest and flexible in most of the Tanaidacea. Some deep-sea genera, however, have a very heavily and strong body sclerotization, and it is assumed that it has developed independently in different taxa (Larsen & Wilson 2002). Until now, no correlation was found with regard to substrate and the sclerotization of the body, although the benthic lifestyle of most Tanaidacea has an influence on their body shape (Sieg 1984, Gutu & Sieg 1999), which is mostly “worm-like” and cylindrical or ovoid in cross section (Sieg 1984).

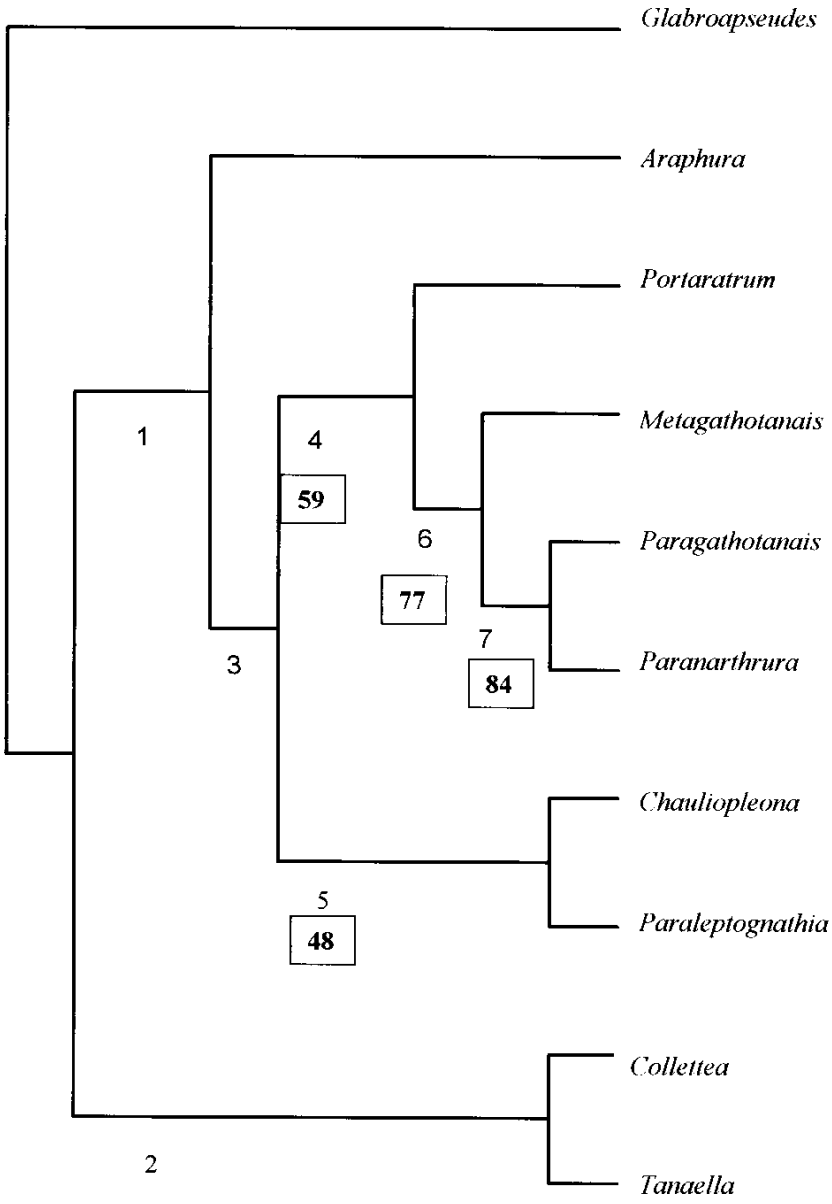

Figure 2. Phylogram resulting from a parsimony analysis of the data presented in Apendix I. Most parsimonious tree (tree length 78, CI = 0.7436). Numbers correspond to nodes referred to the text, numbers in boxes correspond to the bootstrap value for the clade.

Table 4. Clades and Taxa defined by character, character-state optimisation ACCTRAN.

Clade number or taxon	Character changing and states
Out-group Taxa *Glabroapsuedes*	$2^{1>2}$, $3^{1>2}$, $8^{1>2}$, $9^{1>3}$, $10^{2>1}$, $11^{2>1}$, $14^{1>2}$, $15^{2>3}$, $17^{2>1}$,$18^{2>1}$, $19^{1>2}$, $21^{4>2}$, $24^{2>1}$, $26^{2>3}$, $28^{2>3}$, $29^{2>1}$, $30^{1>4}$, $32^{2>1}$, $33^{2>3}$, $34^{1>2}$, $35^{2>1}$, $39^{3>1}$
Clade 1	$23^{1>2}$, $31^{3>2}$
Clade 2	$40^{1>2}$
Araphura	$30^{1>2}$,$37^{1>2}$, $38^{1>2}$
Clade 3	$12^{1>2}$, $20^{1>2}$, $21^{4>1}$
Clade 4	$2^{1>2}$,$13^{1>2}$, $22^{2>1}$, $23^{2>3}$, $27^{1>2}$
Clade 5	$25^{1>2}$, $39^{3>1}$
Portaratrum	$6^{1>2}$, $33^{2>1}$, $39^{3>2}$
Clade 6 Agathotanaididae	$1^{1>2}$, $4^{1>2}$, $12^{2>3}$, $26^{2>1}$, $35^{2>1}$, $38^{1>2}$, $40^{1>2}$
Metagathotanais	$5^{1>2}$, $11^{2>3}$, $13^{2>1}$, $15^{2>1}$, $31^{2>3}$, $36^{1>2}$, $40^{2>3}$
Clade 7	$3^{1>2}$, $21^{1>2}$, $30^{1>2}$, $37^{1>2}$
Paragathotanais	$9^{1>2}$, $16^{1>2}$, $21^{2>3}$, $30^{2>5}$
Paranarthura	$23^{3>4}$, $27^{2>1}$, $28^{2>1}$
Chauliopleona	$6^{1>3}$, $21^{1>4}$
Paraleptognatia	$20^{2>1}$
Collettea	$4^{1>3}$, $7^{1>2}$, $20^{1>2}$, $22^{2>3}$, $26^{2>1}$, $30^{1>2}$, $35^{1>3}$, $39^{3>2}$
Tanaella	$38^{1>2}$

The presence or absence of eyes is a character used in previous analyses (Sieg 1984, Larsen & Wilson 2002), but has turned out not to be a useful character because the deep-sea taxa studied all lack visual elements.

Body ornamentations, like spines, are common in the Apseudomorpha (Gutu & Sieg, 1999) but are almost absent in the Tanaidomorpha. No reductions of pereonites were observed in our taxa. Pereopod shoulders are common in the Apseudomorpha and are also present in tanaidomorph genera like *Paranarthrura* (Guerrero-Kommritz et al. 2002, Gutu & Sieg 1999). The width of the body is not constant in all taxa. In the Apseudomorpha and Tanaidomorpha the pleon is as wide as the pereon or sometimes it taper to the pleotelson. In a few cases, like in species of Collettea*,* the pleon is wider than the pereon (Larsen 2000), and this character is considered to be phylogenetically informative (Larsen & Wilson 2002).

Larsen & Wilson (2002) recognized five different fusion degrees of the pleonites. We only recognized two states, fused or free (Sieg, 1984), because we only have one taxon with fused pleonites *Metagathotanais.* This character is uninformative.

The presence of ventral apophyses on the pereon is common in the Tanaidacea and is considered to be a variable character (Lang 1953, Guerrero-Kommritz et al. 2002). The presence of apophyses on the pleon is not usual, it is present in *Portaratrum*, *Chauliopleona* and *Leptognathia tuberculata* Hansen, 1913. According to our analysis we consider it to have evolved independently in *Portaratrum* and *Chauliopleona,* and we assume the same for *Leptognathia tuberculata,* but this must be tested.

The pleotelson is in most tanaidaceans, shorter and smaller than the last three pleonites combined. The pleotelson of *Collettea* however is wider and longer than the last three pleonites combined (Larsen 2000), this character makes it easily distinguishes *Collettea* from other tanaids.

The antennule of the Tanaidomorpha is composed of three or four articles in females, up to seven in adult males, and five in preparatory males (Hansen, 1913; Guerrero-Kommritz, 2004); however some genera, like *Collettea,* have five articles, that can only be recognized under scanning electron microscope (Larsen 2000). In the Apseudomorpha the antennule is composed of six or more articles (Sieg 1984). This is an out-group resolving character.

The antenna in the Apseudomorpha is composed of a peduncle with five articles and a polyarticled flagellum. The antenna in the Tanaidomorpha is composed of six or fewer articles (Sieg 1984, Gutu & Sieg 1999). This is an out-group resolving character in our analysis.

Simplification and reduction of mouthparts are present in many genera of Tanaidomorpha. The mandible with its different structures is important for taxonomic work. The presence or absence of the mandibular palp is used to distinguish the Apseudomorpha (palp present) from the Tanaidomorpha (palp absent); therefore, it is considered a good out-group resolving character (Sieg 1984, Gutu & Sieg 1999, Larsen & Wilson 2002) also in our analysis.

The lacinia mobilis is present on both mandibles in the Apseudomorpha, and is composed of cuticular plates and setae; while in the Tanaidomorpha it is only present on the left mandible, and is composed of a plate with terminal denticles or of a thorn-like structure, and in genera like *Metagathotanais* it is completely reduced. Sieg (1984) and Larsen & Wilson (2002) coded only the presence of the lacinia mobilis in the right mandible. In our analysis is an important character to define *Metagathotanais* and the out-group.

The shape of the pars molaris is also considered one of the most important taxonomic characters, especially at family level and is used in many taxonomic keys (Hansen 1913, Lang 1949, 1968, Sieg 1986, Larsen & Wilson 2002). It can be broad and flat, with terminal spinules like in *Chauliopleona* and *Paraleptognathia*, acute, or reduced like in the Agathotanaididae.

The maxillule is composed of a palp and an endite, which can be double, like in the Apseudomorpha or single, like in the Tanaidomorpha. This character is considered as an out-group resolving character by Sieg (1984) and Larsen & Wilson (2002) and also in our analysis. The surface of the endite is covered by fine setules, but some species lack these setules. This character is analysed for the first time. The palp of the maxillule has terminal setae or filaments; the Tanaidomorpha have one or two terminal filaments while the Apseudomorpha possess more than two filaments.

The labium is composed of two lobes and a palp in the Apseudomorpha; these lobes are fused in the Tanaidomorpha and the palp is missing (Sieg 1984, Gutu & Sieg 1999).

The maxilla of the Tanaidomorpha is reduced to a smooth triangular or oval structure, while in the Apseudomorpha the maxilla has an endite and setae. This is an out-group resolving character (Sieg 1984, Larsen & Wilson 2002).

The maxilliped shows many useful characters. The basis is fused into one entity in the Tanaidomorpha, while in the Apseudomorpha the basis is free and in some genera is held together by coupling hooks. This is an out-group resolving character. The setation of the basis and endites is also important, and is variable within the genera (Larsen & Wilson 2002).

The presence of internal or external setae on the second article of the maxilliped was found to be informative for this analysis. For future analysis, the setation of the maxilliped should be considered as well as the setation of the pereopods.

The cheliped is considered to be one of the most informative characters in tanaidacean systematics. The cheliped of the Apseudomorpha has an exopod, which is absent in the Tanaidomorpha (Sieg, 1984). The attachment of the cheliped is an important taxonomic character and was used in every published phylogenetic analysis (Sieg 1984, Larsen & Wilson 2002). The kind of attachment provides information about the motility of the cheliped. The last two character states, direct attachment ventral of cephalothorax and basis fused to cephalothorax, are present in the Agathotanaididae and in *Portaratrum*. The merus is only fully developed in the Apseudomorpha and is missing in the Tanaidomorpha (Sieg 1984, Larsen & Wilson 2002). The carpus in the genera *Paraleptognathia* and *Chauliopleona* is enlarged and forms a carpal shield that covers part of the chela in some species (Guerrero-Kommritz *in press*). The fixed finger of the chela possesses many setae on its surface, but only the ventral setae were found informative for this study. The Apseudomorpha possess more than three ventral setae, and the Tanaidomorpha only one or two.

The pereopods have many characters, like the presence of coxae or the setation of each article. The absence of coxae is frequently observed in the Tanaidomorpha. The shape of the first three pereopods in the Tanaidomorpha is similar differing only in setation. Pereopods 4 to 6 are similar and lacks coxae in some Tanaidomorpha genera.

Pereopod 1 possesses many informative characters. The Apseudomorpha has a modified pereopod 1, which is enlarged and adapted to dig or filter, has a specialized dactylus with ventral spinules, and has an exopod (Lang 1968, Sieg 1984). The pereopod 1 in the Tanaidomorpha is smooth, slender, and sharp. The setation of the merus and carpus was used to define the Akanthophoreinae by Sieg (1986). The present results suggest that these characters are informative, but not enough to define a family. The propodus in the Apseudomorpha present a high number of setae, while the Tanaidomorpha possess only few setae.

The dactylus of pereopod 4 is considered important in the taxonomy of the Apseudomorpha, and is helpful to distinguish families like Gigantoapseudidae and Leviapseudidae (Gamo 1984, Kudinova-Pasternak 1978). In our case, we coded three different states: the most common the typical deep-sea tanaidomorphan dactylus with a ventral groove bordered by spinules, the simple and sharp dactylus and the dactylus with ventral spines.

The validity of the uropod as informative character has been doubted by Larsen & Wilson (1998). In some species, there is a great variation in the ontogeny of this character for Tanaidomorpha. Although this may happen, the species investigated were all of a similar stage: neuter or non-ovigerous female, and regarding these restrictions the character is informative. The uropod is composed of a basal article, an exopod and an endopod. The basal article can be simple or with a lateral projection like in *Araphura*. The exopod can be fused to the basal article, be absent, or be free and composed of one to many articles as well as the endopod.

The setation of pereopods 2 to 6 was found to be not informative at genus level. The lifestyle, ecology and behaviour or anatomy area almost completely unknown for the deep-sea species. Cryptic lifestyles and cryptic species are further difficulties when obtaining character information about tanaid species (Larsen 2001).

In the work of Larsen & Wilson (2002) 52 characters for 84 taxa were analysed. From these characters, 24 were used to separate the out-group taxa, and 28 are important for the in-group. Although their results demonstrated the monophyly of some families, 21 genera are *incertae sedis,* and the tree support values are low.

In our analysis 12 characters were used to separate the out-group, 6 characters are uninformative and 22 characters are important for the in-group.

Clades

Our tree shows clearly that the genera *Paragathotanais* and *Paranarthrura* build a monophylum closely related to *Metagathotanais*; this result coincides with the findings of Larsen & Wilson (2002). We therefore agree to the reintegration of the family Agathotanaididae Lang, 1971.

The present analysis however questions the monophyly of the family Tanaellidae. The analysis of Larsen & Wilson (2002) shows that the genera *Araphura* and *Tanaella* build a monophylum. The present study shows a closer relationship between *Collettea* and *Tanaella* than between *Araphura* and *Tanaella*. The important character of how the cheliped is attached via a sclerite including a groove around it was not used in any analysis before, and might be the reason for the different results from former publications. This character state separates *Araphura*, *Chauliopleona* and *Paraleptognathia* from *Tanaella* and *Collettea* and from *Portaratrum* and the Agathotanaididae.

The knowledge of the phylogenetic relationship of the Colletteidae and the Tanaellidae is still weak as referred to by Larsen & Wilson (2002), and more data are needed to define these two families more precisely.

The genus *Portaratrum* considered to be a member of the Colletteidae, is closer related to the Agathotanaididae than to *Collettea,* the type genus of Colletteidae. We believe that *Portaratrum* does not belong into the Agathotanaididae, but we cannot justify the creation of a new taxon for this genus at the present time, and we have to consider this genus as *incertae sedis*.

The genera *Chauliopleona* and *Paraleptognathia* form a monophylum. The close relationship of these genera is demonstrated, but the bootstrap values are too low to justify the establishment of a new family. In future with the inclusion of more genera and species we might find more characters to support this monophyly. At the moment, we still have to consider these two genera as *incertae sedis*.

The genera *Chauliopleona*, *Paraleptognathia*, *Araphura, Collettea*, *Tanaella* do not build a monophyletic taxon and build different clades. We must therefore, abandon Sieg's (1986) unsupported assumption that these genera form one monophyletic subfamily, the Akanthophoreinae.

The present attempt to better understand the phylogenetic relationship of the *incertae sedis* genera was not very successful. The results suggest the monophyly of *Chauliopleona* and *Paraleptognathia.* The support values for the branches of our tree are low. The low bootstrap values are probably due to the low number of informative characters in the data set. The inclusion of more genera and further characters (for example internal anatomy, transmisionelectron microscopic structures, genetic or behavioural characters) in the analysis may help in future to resolve better the phylogeny and systematic position of *Chauliopleona, Paraleptognathia* and *Portaratrum*.

Until more phylogenetic studies on tanaids can be done, the phylogeny and systematic proposed by Larsen & Wilson (2002) must be generally accepted, although some problems are outlined next. The monophyly of some genera is not clear, for example, the case of *Paraleptognathia* and *Akanthophoreus* in the presented tree by Larsen & Wilson (2002), where they belonged into different clades. However Guerrero-Kommritz (2004) has demonstrated that these genera are synonym. Ground phylogentic analyses at genus or may be even at species level are essential to clarify the monophyly of the genera and species of the Tanaidacea.

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Apendix 1 Data matrix

Taxa	Character 1234567891	1234567892	1234567893	1234567894
Glabroapseudes	1221111231	1112311121	2211131114	3132111111
Metagathotanais	2212211112	3311112212	1132112221	3221121233
Paragathotanais	2222111122	2321222212	3132112225	2221112232
Paranarthrura	2222111112	2321212212	2142111122	222111223½
Portaratrum	1211121112	2221212212	1132122221	2211211121
Collettea	1113112112	2111212212	4312111222	3221311122
Tanaella	1111111112	2111212211	4212121221	3221211232
Araphura	1111111112	2111212211	4222121222	2221212231
Chauliopleona	1111131112	2211212212	4222221221	2221211111
Paraleptognathia	1111111112	2211212211	1222221221	2221211111

Diskussion

Die Diskussion der vorliegenden Arbeit ist in die Abschnitte Taxonomie und Systematik, Phylogenie und Zoogeographie gegliedert. Diese Gliederung dient dazu, die Arbeit einfacher lesen zu können, und bedeutet nicht, dass es sich um getrennte Kapitel handelt. Jeder Teil der Arbeit steht mit den anderen in engem Zusammenhang.

Taxonomie und Systematik

Die Systematik der Tanaidacea befindet sich derzeit im Aufbruch. Die Entdeckung und Beschreibung neuer Arten von Tanaidaceen hat in den letzten Jahren zugenommen; zwischen Januar 2000 und März 2004 gab es eine Flut von 48 Publikationen über Tanaidaceen in denen drei neue Familien, 19 neue Gattungen und 75 neue Arten beschrieben wurden (Angsupanich 2001, Bamber 2000 a, b, 2003, Bird 2000, 2004, Drumm 2003, Gutu 2000, 2001 a, b, c, 2002 a, b, c, d, Gutu & Heard 2002, Hansknecht & Bamber 2002, Hansknecht et al. 2001, Larsen 2000, 2001, 2002 a, b, Larsen & Blazewicz-Paszkowycz 2002, Larsen & Heard 2002, 2004 a, b, Larsen & Rayment 2000). Allein im Rahmen der vorliegenden Arbeit wurden 16 neue Arten und zwei neue Gattungen beschrieben, 12 bekannte Arten mußten nachbeschrieben und zwei Gattungen revidiert werden.

Die neueren Untersuchungen in der Tiefsee haben sehr viele neue Arten hervorgebracht; im vorliegenden Material von der Diva-1 Expedition aus dem Angola Becken befinden sich 68 Arten, davon sind 67 neu, das entspricht 96 % der Individuen, 10 neue Arten wurden bereits beschrieben. Weiteres Material für die Beschreibung 40 weiterer neuer Arten ist vorhanden; von 17 zusätzlichen Arten gibt es nur einzelne Individuen oder Tiere in schlechtem Zustand, was eine formelle Beschreibung nicht ermöglicht. Die Beschreibung der neuen Arten wird in Laufe der nächsten Jahre erfolgen.

Die größte Schwierigkeit bei der taxonomischer Arbeit mit Tanaidacea ist die uneinheitliche morphologische Terminologie. Fast jeder Autor benutzt seine eigene Terminologie, um Körperteile zu benennen, was ein großes Hindernis für die taxonomische und systematische Bearbeitung der Tanaidacea ist. Um Tanaidacea bestimmen zu können, muß der Bearbeiter mit den Terminologien von Hansen (1913), Lang (1953), Wolf (1956) und Sieg (1977) vertraut sein, die meisten Beschreibungen benutzen eine dieser vier Terminologien. So ist z. B. der Thoracic leg 2 (Hansen 1913) gleich dem Thoracopod 3

(Wolf 1956) oder dem Peraeopod 2 (Lang 1953) oder dem Peraeopod 1 (Sieg 1977). Eine vereinfachte und einheitliche Terminologie für die Tanaidacea wurde von Larsen (2003) vorgeschlagen. Sie lehnt sich zum großen Teil an die Terminologie von Sieg (1977), fügt aber Änderungen in der Orientierung der Körperteile hinzu und basiert auf Homologien.

Die Kenntnis und der Bearbeitungsstand vieler Tanaidaceen-Gattungen sind unzureichend. Für die Gattung *Chauliopleona* Dojiri & Sieg 1997 gab es nur eine Diagnose und eine sehr unvollständige Beschreibung von der Typus-Art *Chauliopleona dentata* Dojiri & Sieg, 1997. Für die Revision der Gattung mußte eine neue Diagnose und eine Beschreibung der Gattung und der Typus-Art erstellt werden. Erst danach konnte die systematische Arbeit und der Vergleich mit anderen ähnlichen Arten beginnen. Die genaue Untersuchung von *Leptognathia armata*, *L. hastata* und *L. amdrupii* ergaben, dass *L. hastata* eine eigenständige Art ist und nicht synonym mit *L. armata,* wie Kudinova-Pasternak (1965, 1986) postulierte. Alle diese Arten gehören nicht zur Gattung *Leptognathia,* sondern zur Gattung *Chauliopleona*. Alle Vertreter der *Chauliopleona* sind morphologisch sehr ähnlich, dies wurde schon von Hansen (1913) in bezug auf *C. armata*, *C. hastata* und *C. amdrupii* festgestellt. Deswegen wurde auch von einigen Autoren angenommen (Kudinova-Pasternak 1965, 1970, 1973, 1975, 1986, Menzies & Mohr 1962), es handele sich um nur eine einzige Art mit einer kosmopolitischen Verbreitung.

Innerhalb der Gattung *Chauliopleona* bleibt *C. dentata* problematisch; es konnten keine deutliche Unterschiede gefunden werden zwischen den Individuen aus der Magellanstraße und denen aus Kalifornien. Es könnte sich um einer disjunkte Verbreitung handeln mit einer Population in Kalifornien und einer in der Magellanstraße. Es gibt bis heute keine Funde dieser Art aus Mittel- oder Südamerika. Die Vermutung liegt nahe, dass diese Art in allen Kaltwasserzonen des Ost-Pazifik vorkommt. Funde aus tiefem Wasser in Mittel- oder Südamerika könnten dies bestätigen. Es könnte sich aber auch um kryptische Arten handeln, die einen Artenkomplex bilden, die Beobachtungen an anderen Arten lassen dies vermuten (Larsen 2001).

Der ventrale Dorn in Pleonit fünf ist vorhanden bei *Leptognathia* (bei der Art *L. tuberculata* Hansen 1913), *Chauliopleona* und *Portaratrum*. Dieser Dorn kann spitz nach hinten gebogen oder nach unten gerichtet sein. Diese drei Gattungen können leicht durch die Form der Insertion des Chelipeden voneinander unterschieden werden. *Leptognathia* hat

einen Chelipeden mit Sklerit, *Portaratrum* hat einen Chelipeden, der direkt am Cephalothorax inseriert ist und *Chauliopleona* hat eine Grube rings um den Chelipeden.

Die intraspezifische Variabilität der Tanaidacea ist oft größer als die interspezifische Variabilität (Larsen 2001). *Paraleptognathia gracilis* (Krøyer, 1842) zeigt dieses sehr deutlich. *Paraleptognathia gracilis* ist eine Art mit einer sehr hohen Variabilität; besonders im Bereich des Chelipeden oder des Pleotelsons. Am Chelipeden bei juvenilen Männchen treten besondere Dornen am äußeren unteren Rand des Propodus auf und der Carpus verbreitert sich etwas und bildet einen Schild (carpal shield), wobei dieses juvenile Männchen sehr schwer von einem Weibchen von *P. australis* (Beddard, 1886) zu unterscheiden ist, wenn die Glieder der Antennula nicht gezählt werden.

Das Erkennen von Sexualdimorphismen ist ein Problem bei der Bestimmung und Beschreibung von Arten. Die Gattung *Paraleptognathia* wurde anhand eines außergewöhnlichen Exemplares beschrieben (Kudinova-Pasternak & Pasternak 1981). Erst nach genauer Untersuchung und durch Vergleich mit der Gattung *Akanthophoreus* Sieg, 1986 konnte gezeigt werden, dass es sich um juvenile Männchen handelte und nicht um eine andere Art. Diese juvenilen Männchen wurden schon von Hansen (1913) erwähnt. Auf dieser Grundlage wurde gezeigt, dass *Paraleptognathia* und *Akanthophoreus* synonym sind (Guerrero-Kommritz 2004). Die Arten, die für die Gattung *Akanthophoreus* beschrieben wurden, sind in Wirklichkeit Weibchen von *Paraleptognathia*.

Tanaidaceen Männchen schweben oft über dem Substrat und sind auf der Suche nach paarungsfähigen Weibchen (Larsen 2001). Es wird angenommen, dass sie aktive Schwimmer sind, ihre Lebenserwartung nicht sehr hoch ist, denn infolge der Rückbildung ihrer Mundteile können sie keine Nahrung mehr aufnehmen und aller Wahrscheinlichkeit nach sterben sie kurz nach vollendeter Paarung (Bird & Holdich 1989, Lang 1967).

Sexualdimorphismen sind weit verbreitet bei den Tanaidaceen. Bei den Neotanaidomorpha ist er am stärksten ausgeprägt. Männchen besitzen rudimentäre Mundwerkzeuge, und es können zwei Formen (Morphotypen) pro Art auftreten (Gardiner 1975). Bei den Tanaidomorpha ist der Sexualdimorphismus nicht so ausgeprägt. Bei Tiefsee-Tanaidomorpha wurden bis jetzt Taxa mit starkem Sexualdimorphismus, bei dem Männchen und Weibchen kaum gemeinsame Artmerkmale teilen, und Taxa mit limitiertem

Sexualdimorphismus, bei dem Männchen und Weibchen sich ähneln, beobachtet (Larsen 2002 a). Taxa mit starkem Sexualdimorphismus, wie die Leptognathiiden, haben sehr bewegliche Männchen mit einem stark entwickelten Pleon, sehr starken Pleopoden und reduzierten Mundwerkzeugen. Außerdem sind sie sehr selten (Larsen 2002 a, Wilson 1987), und es treten auch Unterschiede zwischen juvenilen und ausgewachsenen Männchen auf. Juvenile Männchen ähneln den Weibchen, besitzen aber fünf Glieder auf der Antennule, funktionsfähige Mundwerkzeuge und ausgeprägte Bezahnung oder Dornen auf den Chelipeden. In den Proben aus dem Mellemfjord, Disko Insel, Grönland, bestand ca. ein Drittel der Population von *Paraleptognatia gracilis* aus juvenilen Männchen. Adulte Männchen waren sehr selten, unter den 1341 untersuchten Individuen von *P. gracilis* befanden sich nur zwei adulte Männchen. Bei anderen Gattungen, wie zum Beispiel *Tanaella*, *Agathotanais*, *Paranarthrura* oder *Paragathotanais,* unterscheiden sich die Männchen wenig von den Weibchen und wurden oft als juvenile Männchen oder Weibchen mit Pleopoden beschrieben. Sie unterscheiden sich von den Weibchen, indem sie ein größeres Pleon, gut entwickelte Pleopoden und dickere Antennulae mit wenigen Aesthetasken besitzen. Die Männchen besitzen dieselbe Anzahl von Gliedern auf den Antennulae wie die Weibchen und haben funktionsfähige Mundwerkzeuge (Larsen 2002 a).

Männchen sind für viele Arten unbekannt, wie zum Beispiel für die Gattungen *Chauliopleona* und *Portaratrum* und für die Arten *Paragathotanais insolitus* und *Metagathotanais loerzae* sowie für die Tiefseeformen von *Paraleptognathia.* Weiterhin gibt es mindestens zwei Männchenformen (leptognathid swimming males), die bisher nicht einer Art zugeordnet werden konnten (Bird & Holdich 1989 b, Larsen 2002 a, Wilson 1987). Diese Männchen wurden auch im Angola Becken nachgewiesen. Es wird vermutet, es könnte sich um eine *Leptognathia*- oder eine *Paraleptognathia*-Art handeln. Leider konnten diese bisher jedoch nicht durch einen morphologischen Vergleich zugeordnet werden.

Die Seltenheit von Männchen ist bekannt und wurde bereits für das Flachwasser beschrieben (Blazewicz-Paszkowycz, 2001, Modlin & Harris 1989), wo vollständige Lebenszyklen studiert werden konnten. Männchen entwickeln sich direkt von einem Neuter (gonochore Männchen) und bei einigen Arten aus einem adultes Weibchen (progyne Männchen). Die Beobachtungen an *Paraleptognathia gracilis* lassen vermuten, dass die Gattung *Paraleptognathia* hochwahrscheinlich progyne Männchen besitzt, da die juvenilen Männchen dieselbe Größe wie ausgewachsene Weibchen haben und keine kleinen juvenilen Männchen oder kleine adulte Männchen beobachtet wurden, wie es bei *Paranarthrura angolensis* der Fall war. Es stand leider von keiner Tiefseeart genügend Material zur

Verfügung, um eine detaillierte Analyse der postmarsupialen Entwicklung durchzuführen. Nur durch Hälterung oder durch Beobachtungen von Populationen über längere Zeit liesse sich die Lebensdauer und der Lebenszyklus feststellen (Schmidt 1999), was im Moment für Tiefseearten unmöglich ist. Solange die Tiere nicht gehältert oder in freier Wildbahn beobachtet werden können, kann man nur hypothetische Lebenszyklen der Tanaidaceenarten vorschlagen.

Der Zugang zu Tanaidaceen-Material ist oft schwer, viele Arten sind nur durch das Typus-Exemplar belegt und in einigen Fällen ist dieses Material unauffindbar oder nicht verfügbar. So konnte z.B. das Material von *Apseudes unicus* Kudinova-Pasternak, 1981 nicht ausgeliehen werden und es konnte daher nicht geklärt werden, ob dieses Weibchen möglicherweise in der Gattung *Glabroapseudes* gehört oder nicht.

Die Entdeckung von einer Grube rings um den Chelipeden auf der ventralen Seite des Cephalothorax der Gattungen *Paraleptognathia*, *Chauliopleona* und *Araphura* ist ein Merkmal, das bis jetzt in der Tanaidaceen-Literatur ignoriert wurde.
Dieses Merkmal erleichtert die Bestimmung vieler Taxa sehr und ist für eine phylogenetischen Analyse sehr wertvoll.

Phylogenie

Phylogenetische Analysen der Tanaidacea wurden bisher selten durchgeführt. Bis heute existieren nur die Arbeiten von Sieg (1983, 1984) und Larsen & Wilson (2002). Sieg (1984) definierte die vier Unterordnungen und rekonstruierte den Urtanaidacea. Die manuelle Methode, die er damals benutzt hatte, wird heutzutage nicht mehr empfohlen, um Phylogenien zu erstellen, aber die Ergebnisse von Sieg sind immer noch gültig (Larsen & Wilson 2002).

Die Wahl der Merkmale, der Merkmalszustände sowie der Taxa ist die wichtigste Grundlage für die phylogenetische Analyse (Rieppel 1999, Schuh 2000, Wägele 2000, Wiesemüller 2003). Um phylogenetische Arbeiten auf höherer Ebene durchzuführen, muß zunächst die Monophylie der Gattungen geprüft werden. Bei der Arbeit von Larsen & Wilson 2002 wurde dies nicht für alle Gattungen durchgeprüft. Die Gattungen *Paraleptognathia* und *Akanthophoreus* sind synonym (Guerrero-Kommritz 2004), in der Analyse von Larsen &

Wilson (2002) gruppieren sie jedoch auf verschiedene Zweige des Kladogramms. Diese Beobachtung veranlasste den Autor, nur gut definierte Gattungen für die Analyse zu benutzen, von denen auch genügend Material für direkte Vergleiche zur Verfügung stand. Auf ungeprüfte Literaturdaten wurde nicht zurückgegriffen.

Für die Analyse der Akanthophoreinae wurden 31 Arten aus 10 gut definierten Gattungen der Tanaidacea untersucht und miteinander verglichen. 420 Merkmale wurden getestet, von denen schließlich nur 40 Merkmale für die phylogenetische Analyse übrig blieben. Davon waren 22 informativ für die Innengruppe und 15 wichtig für die Abspaltung der Außengruppe. In der Arbeit von Larsen & Wilson (2002) wurden 52 Merkmale für die Analyse von 84 Taxa der Paratanaidoidea benutzt, davon waren 26 informativ für die Innengruppe und weitere 24 Merkmale wurden benutzt, um die Außengruppen abzutrennen.

Die hier vorgelegte Analyse definiert fünf Monophyla; die Gattungen *Tanaella* und *Collettea* bilden ein Monophylum. Die Gattung *Araphura* ist ein Taxon, welches nicht eng mit *Tanaella* verwandt ist. *Portaratrum* bildet ein Monophylum und ist eng verwandt mit den Agathotanaididae (*Metagathotanais*, *Paragathotanais*, *Paranathrura*). Die Gattungen *Chauliopleona* und *Paraleptognathia* bilden ebenfalls ein Monophylum. Wegen der geringen Menge an informativen Merkmalen wurde es vorgezogen für dieses Monophylum noch nicht eine neue Familie zu beschreiben. Beide Gattungen galten in der Arbeit von Larsen & Wilson (2002) als *incertae sedis.*

Der Vergleich mit der phylogenetische Analyse von Larsen & Wilson (2002) zeigt Unterschiede in der Gruppierung der untersuchten Taxa. Nach Ansicht von Larsen & Wilson (2002) bilden *Tanaella* und *Collettea* separate Monophyla, und die Gattung *Tanaella* ist eng mit *Araphura* verwandt. In der hier vorgelegten Untersuchung ergeben sich andere Verwandtschaftsverhältnisse. Die Familie Tanaellidae wird nicht unterstützt, es zeigt sich eine engere Verwandtschaft von *Collettea* und *Tanaella* als zwischen *Tanaella* und *Araphura*. Diese Ergebnisse stellen sowohl die Monophylie der Tanaellidae als auch die der Colletteidae in Frage. Die Unterstützungswerte (Bremer Index) für die Zweige dieser beiden Familien waren auch nur schwach (Larsen & Wilson 2002).

Diese unterschiedlichen Ergebnisse beruhen wahrscheinlich auf der Wahl der Merkmale, der Gewichtung und Ausprägungsformen der Merkmale z.B. die Inserierung des Chelipedes. Die Inserierung in einer Grube wurde in den bisherigen Arbeiten (Larsen & Wilson 2002, Sieg 1983, 1984) nicht als Merkmal verwendet.

Die Monophylie der Akanthophoreinae Sieg, 1986 konnte nicht bestätigt werden und es wurden keine Apomorphien gefunden, die dieses Taxon begründen können. Die Akanthophoreinae werden als polyphyletische Gruppe betrachtet.
Die Phylogenie der Paratanaidoidea bleibt weiterhin sehr umstritten. Bis weitere Untersuchungen gemacht werden, muß die Phylogenie von Larsen & Wilson (2002) als Anhaltspunkt dienen.

Zoogeographie

Wie verteilen sich die Tanaidacea Taxa im Atlantischen Ozean?

Daten über Biogeographie von Tiefsee-Tanaidaceen sind selten, da es kaum Beschreibungen gibt. Außer den Arbeiten von Bamber (2000), Kudinova-Pasternak (1990), Larsen (1999) und der hier vorgelegten gibt es keine weiteren Informationen über Tiefsee-Tanaidaceen des tropischen und südlichen Atlantiks.

Der Nordatlantik ist das am besten erforschte Gebiet. Bird (2004) konnte anhand seiner Untersuchungen für den Nordost-Atlantik zwei Provinzen unterscheiden: die Norwegische Kaltwasser-Provinz, nördlich von den Faröe Inseln und Island und die Atlantische Tiefsee-Provinz in dem Hebriden-, Porcupine-, Biscaya-Tiefseebecken. Es fällt auf, dass in der Norwegischen Kaltwasser-Provinz bisher keine Agathotanaididae nachgewiesen wurden (Bird & Holdich 1988).

Für den Südatlantik kann noch keine Aufteilung in Provinzen gemacht werden. Die Untersuchung am Material des Angola Becken deutet darauf hin, dass es sich dort um eine eigenständige Fauna handelt. Es konnten keine gemeinsamen Arten mit den anderen bekannten Becken gefunden werden. Das Vorkommen der Agathotanaididae unterscheidet das Angola Becken jedoch von der Norwegischen Kaltwasser-Provinz. Die Agathotanaididae ist eine der wichtigsten Familien im Angola Becken, sie macht dort 19 % der Individuen der Tanaidaceenfauna aus, *Paranarthrura angolensis* ist die dominierende Art.

Für die benachbarten Becken (Argentinien-, Pernambuco-, Cap- und Guinea-Becken) liegen noch keine Daten vor, deshalb können keine zoogeographischen Vergleiche mit diesen Gebieten gemacht werden.

Die untersuchten Gattungen *Chauliopleona, Paranarthrura* und *Paraleptognathia* zeigen eine eurybathe Verbreitung mit Vertretern in der Tiefsee und auf dem Schelf, die Gattung *Portaratrum* kommt nur in der Tiefsee vor, alle diese Gattungen zeigen eine weltweite Verbreitung. Die Gattung *Metagathotanais* ist bis jetzt nur aus dem nördlichen und tropischen Atlantik aus Tiefen unterhalb 4500 m bekannt. Diese stark sklerotisierte Gattung scheint eine eng begrenzte Verbreitung im Vergleich zu den oben erwähnten Gattungen zu haben.

Die Gattungen *Paraleptognathia, Paranarthrura* und *Tanaella* zeigen polare Emergenz mit mehreren Vertretern auf dem Schelf. *Paranarthrura* zeigt ebenfalls eine sehr große bathymetrische Verbreitung mit Arten wie *P. insignis* oder *P. angolensis,* die in einer vertikalen Erstreckung von 5000 m Tiefe vorkommen. *P. fortispina* kommt im Südpolarmeer zwischen 140 bis 2000 m Tiefe vor. *P. meridonalis* ist nur vom Flachwasser der Antarktis bekannt (Sieg 1986). Sie ist die einzige bekannte Flachwasserart der Gattung *Paranarthrura*. *Tanaella* ist im Südpolarmeer mit *T. unisetosa* und *T. rotundicephala* vertreten, wo sie in 44 bis 137 m Tiefe vorkommt. Alle anderen Arten von *Tanaella* sind Tiefseearten, wobei *T. profunda* aus dem Angola Becken, mit 5450 m, das tiefste Vorkommen aufweist.

Von den untersuchten Gattungen besitzt nur *Chauliopleona* eine bekannte Flachwasserart, die nicht in polaren Gebieten vorkommt, C. *dentata* aus Kalifornien und der Magellan Region. Alle andere Arten sind Tiefsee-Vertreter.

Die vorliegenden Fundortdaten der untersuchten Arten geben Grund zur Annahme, dass die einzelnen Arten der Tiefsee eine lokale Verbreitung haben und jedes Tiefsee-Becken endemische Arten besitzt. Bei *Paranarthrura* kann dieses gut belegt werden. *P. angolensis* wurde bis jetzt nur im Angola Becken und angrenzenden Regionen gefunden und *P. tridens* im tiefsten Bereich des Porcupine Beckens (4426 – 4829 m). Arten, die nicht so tief nachgewiesen wurden, haben eine größere Verbreitung. *P. lusitanus* kommt z.B. im südlichen Nordatlantik und in der Biscaya Bucht (173 - 641 m), *P. borealis* in der Norwegischen Kaltwasser-Provinz südlich von Grönland und im Nordost-Atlantik, nördlich der Britischen Inseln (903 – 1600 m), *P. crassa* im Nordost-Atlantik vor der Küste Irlands und Frankreichs (Porcupine seabight, Celtic slope, Biscaya Bucht; 463-1739 m), *P. subtilis* im Nord-Atlantik (Davis Strait, Celtic Slope bis Biscaya Bucht; 582 – 1739 m), *P. intermedia* im Nordost-Atlantik und im Mittelmeer (1170 – 4190 m), *P. kurchatova* im tropischen Atlantik

(6340 – 6380 m), *P. fortispina* in der Antarktische Halbinsel und in der Weddellsee (423 - 1729) und *P. meridionalis* in der Weddellsee (289 – 423 m) vor.

P. insignis hat die weiteste Verbreitung (Nord-Atlantik, Karibik und tropischer Atlantik 463 – 5000 m) und ist auch eurybath. Die weite Verbreitung dieser Art ist rätselhaft, durch ihre Eurybathie allein kann dies nicht erklärt werden. *P. angolensis* ist auch eine eurybathe Art und deren Verbreitung beschränkt sich auf das Angola Becken. *P. insignis* könnte sich um einen Artenkomplex handeln, der bis jetzt nicht richtig aufgelöst wurde.

Eine Größenzunahme mit zunehmender Tiefe, wie es Wolf (1956) für die Tanaidacea postuliert, konnte nicht beobachtet werden. *Paranarthrura angolensis* ist eurybath, die Größe der Individuen ändert sich nicht mit zunehmender Tiefe. Sehr viele kleine Arten von Tanaidacea, wie zum Beispiel *Leptognathia* sp. 7 mit einer Größe von nur 1.2 mm, kommen im Angola Becken vor. Die Pseudotanaidae haben Durchschnittsgrößen von 1.5 mm (Sieg 1986), sie sind auch im Angola Becken mit Arten von 4 mm Gesamtlänge sowie mit Arten von nur 1.2 mm Länge vertreten. Ein genereller Trend zum Gigantismus konnte nicht bestätigt werden.

Gibt es kosmopolitische Arten?

Die bis jetzt untersuchten Arten zeigen keine kosmopolitische Verbreitung. Die Art mit der größten Verbreitung im Atlantischem Ozean ist *Neotanais americanus* (Beddard, 1886). Diese Art wurde südlich von Grönland, bei den Kanarischen Inseln, vor der Küste Nord-Amerikas, auf dem Kontinentalabhang Europas, im Argentinischen Becken, vor der Mündung Rio de la Plata, im Weddellmeer sowie im Angola Becken gefunden (Gardiner 1975, Larsen 1999, Guerrero-Kommritz 2004).
Für Arten wie z. B. *Chauliopleona* (=*Leptognathia*) *armata* (Hansen, 1913), für die angenommen wurde, dass es sich um eine kosmopolitische Art handelt, konnte bewiesen werden, dass es sich um mehrere, morphologisch sehr ähnliche lokale Arten handelt.

Gibt es Indizien für zoogeographische Ausbreitungswege in der Tiefsee?

Bis jetzt lassen sich anhand der verfügbaren Daten keine Tendenzen für Besiedlungswege ableiten. Die Tanaidaceen haben keine vagilen Verbreitungsformen und müssen aktiv neue Regionen erobern. Alle bekannten Tanaidaceen sind benthisch und es wird angenommen,

dass sie keine Langstreckenschwimmer sind und keine große Entfernungen bewältigen können. Nur Männchen besitzen gut ausgebildete Pleopoden. Eine Ausbreitung kann möglicherweise nur über mehrere Generationen erfolgen oder durch Verfrachtung des Sediments, z.B. Tiefseestürme.

Es wird vermutet, dass die meisten Arten nicht sehr mobil sind. Diese Vermutung wird erhärtet durch die Ergebnisse der vorliegenden Untersuchung, bei der keine kosmopolitischen Arten nachgewiesen wurden. Alle Arten, die als kosmopolitisch galten, sind Artenkomplexe, die morphologisch sehr ähnlich sind und eine beschränkte Verbreitung aufweisen.

Obwohl die Tanaidacea des Atlantischen Ozeans am besten untersucht sind, gibt es noch sehr viele Wissenslücken über ihre Zoogeographie.

Ausblick

Die Diversität der Tanaidacea wurde bisher falsch eingeschätzt. Die geschätzte Artenzahl von 2000 Arten (Sieg 1986) ist zu niedrig. Die große Zahl an neuen Arten, die jedes Jahr entdeckt werden sowie das Problem der kryptischen Arten (Larsen 2001) lassen vermuten, dass die Artenzahl der Tanaidacea deutlich über 2000 liegt.

Die systematische und taxonomische Bearbeitung der Tanaidaceen ist eine nicht zu unterschätzende und zeitaufwendige Aufgabe. Nur sehr wenige Wissenschaftler sind mit dieser Tiergruppe vertraut, die Systematik der Tanaidacea ist sehr umstritten.
Phylogenetische Untersuchungen mit 20 oder mehr Gattungen müssen unternommen werden. Dieses ist sehr schwierig, da die taxonomische Grundlage für solche Arbeiten meistens fehlt.
Phylogenetische Studien auf Artebene sind zunächst notwendig, um die Monophylie der Gattungen zu begründen. Gattungen wie *Leptognathia* sind vermutlich nicht monophyletisch (Sieg 1986).
Die Nutzung weiterer Merkmale, wie z. B. genetischer oder mikrostruktureller, ist notwendig, um Hypothesen über die Phylogenie und Verbreitungsmechanismen der Tiere erarbeiten zu können.
Viele weitere Arten müssen untersucht und beschrieben werden, um eine Vorstellung zu entwickeln, welches die Mechanismen sind, die die Verbreitung der Arten ermöglichen.

Die große Menge neuer Arten in der Tiefsee ist im Moment das größte Problem um verbindliche Aussagen über die Zoogeographie der Tiefsee-Tanaidaceen zu machen. Mehr als 90 % der gefundenen Arten sind neu für die Wissenschaft. Neue Lebensräume wie die „Cold Sweeps“ besitzen eine ausgeprägte eigenständige Fauna (Larsen 2003 b). Von anderen Lebensräumen wie z.B. den „Hot Vents“ ist die Tanaidaceen-Fauna noch unbekannt (Larsen pers. Mitteilung).

Die hohe Diversität der Tanaidacea in der Tiefsee ist noch nicht geklärt. Über die Biologie der Tiere ist wenig bekannt. Einige Arten wie z. B. *Pseudotanais colonus* Bird & Hodich, 1989 kommen nur in gestörten Gebiete vor. Es wird vermutet, dass sie Gruppen von Seegurken (Holothurioidea) der Tiefsee verfolgen, die sich durch das Sediment fressen und Mikrostörungen hervorrufen. Diese durch Bioturbation freigewordenen Gebiete werden sofort von *Pseudotanais colonus* erobert (Bird & Holdich 1989 b).

Viele Fragen bleiben offen:
Wozu dient die starke Cuticulatisierung der Agathotanaididae? Ein Zusammenhang mit dem Substrat ist nicht wahrscheinlich, da sie Tiefseeschlamm besiedeln wie viele andere Tanaidacea-Taxa, die nicht gepanzert sind.

Welche sind die Faktoren, die zu parallelen Entwicklungen in den Polargebieten führen? Arten wie *Chauliopleona hastata* und *Chauliopleona nickeli* sind fast identisch. Für die Arten *Paraleptognathia gracilis* und *P. australis* sowie für *P. multiserrata* und *P. multiserratoides* gilt, dass sie morphologisch ebenfalls nur sehr schwer zu unterscheiden sind.

Welche Faktoren machen es möglich, dass einige Gattungen wie z. B. *Paranarthrura* eurybath sind und eine Tiefenverteilung von fast 5000 m haben, andere Gattungen wie z.B. *Metagathotanais* jedoch nur unterhalb von 4000 m Tiefe vorkommen?

Begründet sich die hohe Diversität der Tanaidacea an Mikrostörungen, wie die durch Seegurken der Tiefsee, hervorgerufen werden?

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