



Recent samples of mainly rare decapod Crustacea taken from the deep-sea floor of the southern West Europe Basin

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Abstract

During cruise 198 of F.R.V. 'Walther Herwig III' in August/September 1998, eight successful hauls were made in the southern part of the West Europe Basin from the bottom in a depth of about 4700 m. Seven samples were taken around 46° N, 17° W and one at 46° N, 13° W. In the same region, two decapod crustaceans were dredged during cruise 175 in 1996 and one in 1993. The following species of typical deep-sea decapods, most of them rarely recorded, were collected: *Willemoesia leptodactyla* (Willemoes-Suhm, 1873); *Parapagurus abyssorum* (Filhol, 1885); *Munidopsis crassa* Smith, 1885; *Munidopsis parfaiti* (A. Milne-Edwards & Bouvier, 1894); *Heterogenys microphthalma* (Smith, 1885); *Glyphocrangon atlantica* Chace, 1939; *Benthesicymus brasiliensis* Bate, 1881; *Benthesicymus iridescens* Bate, 1881; *Plesiopenaeus armatus* (Bate, 1881). For most of these species of Reptantia and Natantia, our knowledge on vertical and/or geographic range is extended considerably by the new records and some new records enable us to enlarge our knowledge on morphological variations within these species.

Abbreviations: Cpb – breadth of carapace; Cpl – length of carapace; Sl – shield length; Tl – total length

Introduction

The present investigation deals with deep-sea decapods of the southern West Europe Basin collected during a cruise in 1993, cruise 175 in 1996, and cruise 198 in 1998 by F.R.V. 'Walther Herwig III' (Table 1). In August/September 1998, eight successful hauls with an opening/closing Agassiz-trawl near the position 46° N/17° W and 46° N/13° W were taken

from a depth around 4700 m (Fig. 1). Deep-sea decapods have not been recorded for this region before. As few species and individuals seem to occur in the West Europe Basin as in other deep-sea regions. Turkey (1975) mentioned this phenomenon for the northern Iberian Basin too.

All specimens are deposited in the collection of the Zoologische Staatssammlung, Munich, Germany.

The following species were collected:

Reptantia:	Polychelidae:	<i>Willemoesia leptodactyla</i> (Willemoes-Suhm, 1873)
	Parapaguridae:	<i>Parapagurus abyssorum</i> (Filhol, 1885)
	Galatheidae:	<i>Munidopsis crassa</i> Smith, 1885
		<i>Munidopsis parfaiti</i> (A. Milne-Edwards & Bouvier, 1894)
Natantia:	Oplophoridae:	<i>Heterogenys microphthalma</i> (Smith, 1885)
	Glyphocrangonidae:	<i>Glyphocrangon atlantica</i> Chace, 1939
	Aristeidae:	<i>Benthesicymus brasiliensis</i> Bate, 1881
		<i>Benthesicymus iridescens</i> Bate, 1881
		<i>Plesiopenaeus armatus</i> (Bate, 1881)

Table 1. Station-list of successful samples in the southern part of the West Europe Basin. UTC=time when samples were taken; coordinates when gear was on the bottom

Station	Haul	Date	UTC	Coordinates	Depth (m)
198/07	1	30/08/1998	00:45:27	46° 03.34' N/16° 43.15' W	4719.50
			04:42:56	45° 57.43' N/16° 43.45' W	4684.50
198/13	2	31/08/1998	00:01:27	46° 03.23' N/16° 42.65' W	4723.50
			02:48:09	45° 58.04' N/16° 41.24' W	4701.25
198/18	3	01/09/1998	00:02:16	46° 02.60' N/17° 06.63' W	4714.25
			03:50:37	46° 05.71' N/17° 14.67' W	4702.75
198/24	4	02/09/1998	00:18:47	46° 03.93' N/17° 10.12' W	4725.75
			04:00:28	45° 57.26' N/17° 09.95' W	4699.00
198/29	5	03/09/1998	00:06:11	46° 03.18' N/16° 43.40' W	4718.50
			03:45:02	45° 57.02' N/16° 43.81' W	4684.75
198/40	7	04/09/1998	23:50:38	46° 00.63' N/17° 05.53' W	4707.25
			05/09/1998	03:45:08	45° 58.50' N/17° 14.85' W
198/50	8	08/09/1998	00:10:34	46° 02.69' N/16° 44.95' W	4635.75
			04:00:02	45° 55.75' N/16° 41.40' W	4704.25
198/59	9	09/09/1998	23:56:31	46° 01.24' N/13° 06.93' W	4785.50
			10/09/1998	03:45:06	46° 02.61' N/13° 15.75' W
175/77		04/09/1996	–	46° 02.81' N/16° 42.98' W 45° 55.05' N/16° 41.66' W	4650.00
–		06/04/1993	–	46° 12.0' N/17° 08.0' W	4900.00

RESULTS

Reptantia

Polychelidae

Willemoesia leptodactyla (Willemoes-Suhm, 1873)

(Figs 1 and 2)

Material examined: station 198/13, haul 2: 1 male (Cpl 33.7 mm, Cpb 23.1 mm, Tl 70.0 mm); 1 female (Cpl 40.8 mm, Cpb 30.0 mm, Tl not measurable); station 198/18, haul 3: 1 female (Cpl 43.1 mm, Cpb 31.0 mm, Tl 94.8 mm); station 198/24, haul 4: 2 females (Cpl 47.2 mm, Cpb 24.9 mm, Tl 104.8 mm; Cpl 33.8 mm, Cpb 23.7 mm, Tl 73.0 mm); station 198/50, haul 8: 1

carapace (sex cannot be identified) (Cpl 41.0 mm); station 198/59, haul 9: 1 female (seriously damaged) (Cpl 46.0 mm, Cpb 31.0 mm); station 175/77: 1 female (telson broken off) (Cpl 50.4 mm, Cpb 35.2 mm).

Remarks: *Willemoesia leptodactyla* was described by Willemoes-Suhm (1873) as *Deidamia leptodactyla*. Grote, G.-R., 1873 set up the genus *Willemoesia* (according to Bouvier, 1917) and attributed to it the type-specimen (according to Sund (1920a), the female of the 'Challenger'-station 13). Eight species of this genus are known "occurring in widely separated geographical areas" (Gore, 1984). Gore (1984) gives in his Table 2a "Comparison of morphological characters in the deep-sea polychelid lobsters, genus *Willemoesia*" for *Willemoesia leptodactyla* the following characters based on former authors: "Carapace Ornamentation: minute spinules, stiff hair; lateral spines

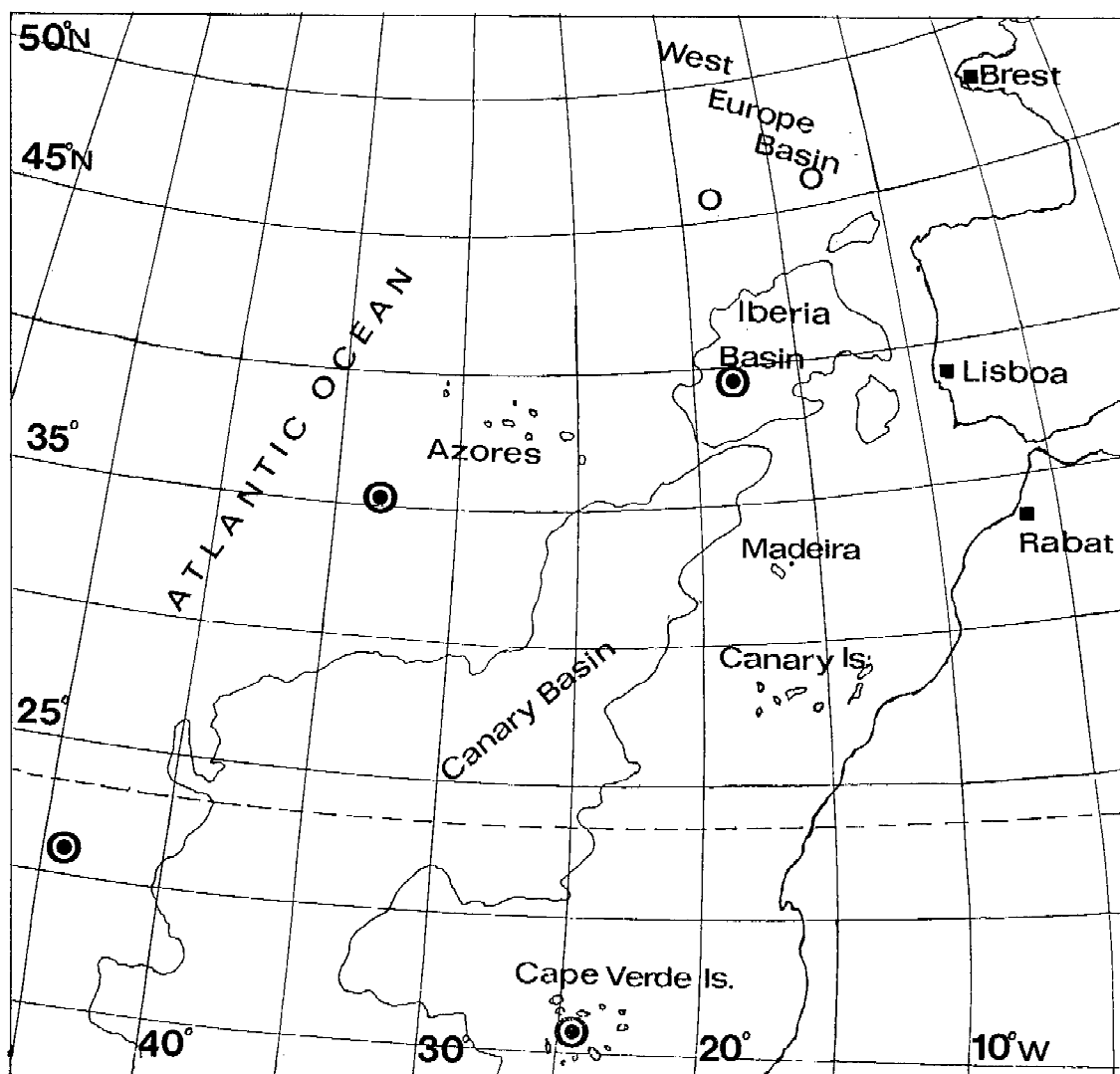


Figure 1. Map of the NE-Atlantic showing the known distribution of *Willemoesia leptodactyla* (Willemoes-Suhm, 1873) (circles with middle point) and the areas of the present records (open circles).

6-9/3-5/15-20; frontal margin nearly transverse; orbital sinus present; postero-medial carinae spined; abdomen somite 6 smooth, or slight keel". Firth & Pequegnat (1971) described the lateral margins of the carapace as subparallel, but this does not correspond with the present specimens in which the margins of the carapace are anteriorly moderately rounded.

The spine-formula of the lateral margin was adopted by Firth & Pequegnat (1971) from the former authors as 6-9/ 4-6/ 15-22, probably not taking into account the spine-formula found by Sivertsen & Holthuis (1956): 6-9/4-7/15-22. The present material shows a spine-formula of 6-10/3-8/14-23.

The spine-formula of the median dorsal carina of the carapace varies in the present material 1.(5-8).2.1./2.2.(3-5). Bate's (1888) specimen from 'Challenger', station 13, shows the median carina spine-formula 1.(4).2.1.1./2.1.(3), Bouvier (1917) specified 1.(5).2.1./2.(3). and Sivertsen & Holthuis (1956) report 1.(6).2.1./2.2.(4). The specimens recorded here closely agree with the spine-formula of the specimens recorded by Sivertsen & Holthuis (1956). I believe that the differences with the specimens referred to by the other authors are caused by the two often indistinct spines situated on the ridge just behind the cervical groove. The spines of the gastro-orbital carina

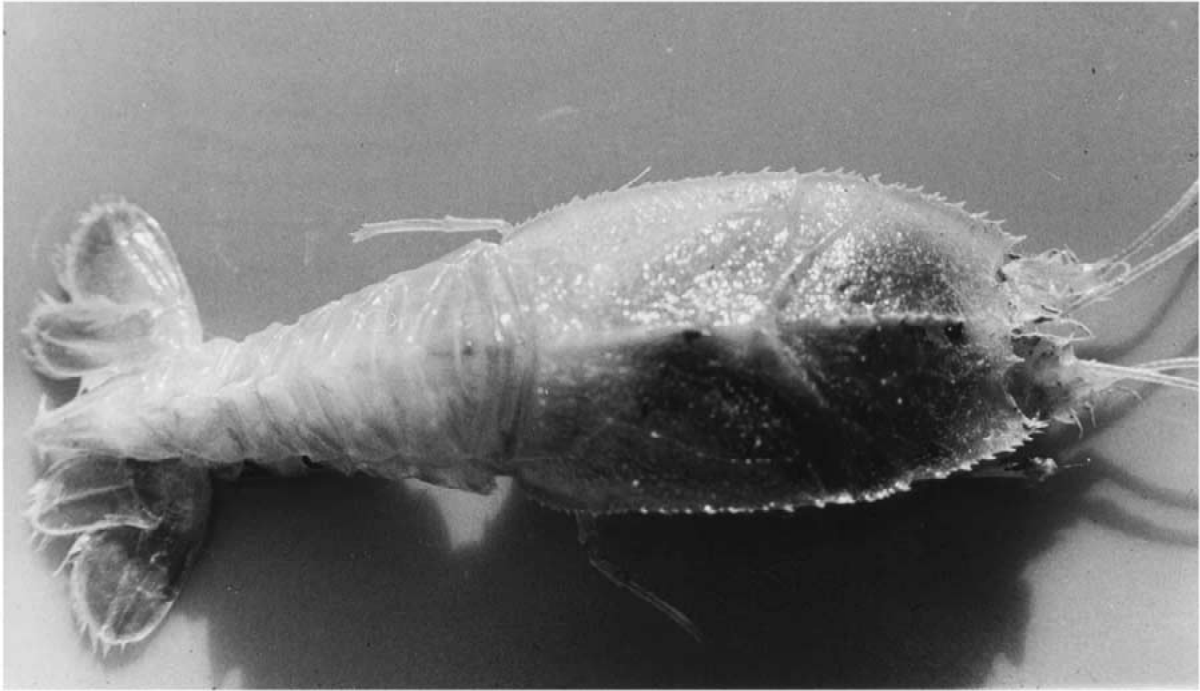


Figure 2. *Willemoesia leptodactyla* (Willemoes-Suhm, 1873). Male of station 198/13, haul 2, photographed on board of F.R.V. 'Walther Herwig' immediately after the haul.

and superior branchial carina in the present specimens are often inconspicuous. I am not sure if they are important diagnostic characteristics of the species.

Only the female of haul 2 possesses a cheliped at the left side. The dactylus does not bear any denticles on its outside, the palm shows a double row of spinules on the upper and lower surface. The double row on the upper side is not as distinct as the lower one. Beyond the base of the fixed finger this row becomes single and ends at about $2/3$ of the length of the finger. The fixed finger shows the strong subdistal spine which is characteristic for the genus *Willemoesia*. The two spines at the merus near the articulation to the carpus as figured by Bate (1888) are distinctly present here. Bouvier (1917) does not draw these spines. Measurements of the cheliped: dactylus 20.4 mm; propodus 35.0 mm; carpus 34.9 mm; merus 41.3 mm; ischium 17.6 mm.

Figure 2 shows the male of station 198/12, haul 2, immediately after the haul. The gastrical region of the carapace is red coloured below the surface. In the adjacent regions, the darker viscera can be seen through the integument. The antennae and antennulae, including their peduncles, the border of the carapace, the pereopods and the complete dorsal surface of the abdominal summits including the uropods

are tinged pale rosy. The eyes are reduced. Only six specimens of this species are known till now. The type-specimen (according to Sund's (1920a) separation of Bate's (1888) '*Willemoesia leptodactyla*' (see above)) was collected in 1873 by H.M.S. Challenger in the Central-Atlantic from a depth of 3475 m (the depth was measured as 1900 fathoms. 1 fathom=1.829 m. Some authors multiplied with only 1.8 and therefore calculated 3420 m). Bouvier (1917) described two males, one of which was collected by the yachts 'Hirondelle' and 'Princesse Alice' in 1896 (station 753; depth 4360 m) in the central part of the Iberian Deep-Sea between Portugal and the Azores, the other specimen was collected in 1901 (station 1150, depth 3890 m) near the isle Sta. Luzia of the Cape Verde Islands. Unfortunately Bouvier notes down in the text for both localities 'Açores', which is cited by later authors without considering the list of stations with their coordinates (see Bouvier, 1917: 124–127). In 1910, during the "Michael Sars North Atlantic Deep-Sea Expedition" three further females of *Willemoesia leptodactyla* were captured from a depth of 2615 m, SW of the Azores (Sivertsen & Holthuis, 1956). The new records from the West Europe Basin are therefore the most northern and eastern localities for this species

(Fig. 1), and the maximal depth is extended to 4785 m, illustrating that the adult specimens of *Willemoesia leptodactyla* are typical abyssobenthic animals.

Parapaguridae

Parapagurus abyssorum (Filhol, 1885)

Material examined: station 198/24, haul 4: 2 males (SI 7.3 mm, 12.9 mm), 1 female (SI 10.2 mm); station 198/40, haul 7: 1 male (SI 11.9 mm), 2 ovigerous females (SI 9.8 mm, 11.0 mm); station 198/50, haul 8: 1 male (SI 11.9 mm).

Remarks: The identification of these specimens, belonging to the most successful genus of deep-sea hermit crabs, is very easy, using the key “for the western Atlantic species of *Parapagurus* Smith” by Lemaitre (1989). The meri, carpi and propodi of the pereopods are distinctly armed with small spines, which is characteristic for this species. Their dactyli are nearly twice as long as the propodi. The left legs are slimmer than the right ones. In all other respects, the specimens are in agreement with the detailed description of Lemaitre.

The small male from station 198/24, haul 4, inhabited a snail-shell of *Gymnobela frielei* (Verrill, 1885), a typical lower bathyal and abyssal gastropod of the Northern Atlantic. [The new record for this snail is one of the deepest known till now (comp. Bouchet, Ph. & A. Waren, 1980)]. The female caught in the same haul was associated with a colony of six individuals of *Epizoanthus* spec. (order Zoantharia). The other specimens mentioned above were living in a shelter formed by actinians producing a soft chitinous pseudo-shell covering the inner wall of the home of the hermit crab. In the larger males and females the carpus and chela of the chelipeds are covered with a fur of simple and plumose setae. In younger specimens, the fur is more dense than mentioned by Lemaitre (1989).

With these new records, the known distribution of the species is extended towards the European continent. Lemaitre (1989) provides a distributional map and reports the locality nearest to the present record to be about 200 sm to the SW, about halfway between the Azores (“Talisman; 24.8.1883; 42° 19' N/23° 36' W; depth 4100 m”) and the locality of the present record. The vertical range as given by Lemaitre (1989) from 2500 to 4360 m (see also A. Milne-Edwards & E.-L. Bouvier, 1899, as *P. pilosimanus* Smith; var. *abyssorum* A. Milne-Edwards) is extended by more than 350 to 4725.25 m. *Parapagurus abyssorum* ap-

pears to be a very rare deep-sea species. However, this can be due to the fact that we possess comparatively few deep-sea hauls.

Galatheidae

Munidopsis crassa Smith, 1885

Material examined: station 198/13, haul 2: 1 ovigerous female (Cpl 65.9 mm, Cpb 41.8 mm, TI 125.8 mm, egg 2.8×3.0 mm (more than 100)); station 198/18, haul 3: 1 male (Cpl 30.2 mm, Cpb 19.1 mm, TI 54.1 mm); 1 female (Cpl 37.0 mm, Cpb 23.0 mm, TI 67.0 mm); station 198/29, haul 5: 1 male (with parasite) (Cpl 47.0 mm, Cpb 29.8 mm, TI 84.8 mm); 4 females (Cpl 51.0 mm, Cpb 30.0 mm, TI 92.1 mm; Cpl 34.0 mm, Cpb 20.2 mm, TI 61.9 mm; Cpl 22.0 mm, Cpb 13.1 mm, TI 41.0 mm; small specimen, carapace missing); station 198/40, haul 7: 2 males (Cpl 50.9 mm, Cpb 30.5 mm, TI 93.0 mm; Cpl 29.4 mm, Cpb 19.1 mm, TI 53.0 mm); station 198/50, haul 8: 1 male (Cpl 23.9 mm, Cpb 14.8 mm, TI 44.2 mm); 2 females (Cpl 40.0 mm, Cpb 26.0 mm, TI 74.0 mm; Cpl 16.0 mm, Cpb 9.8 mm, TI 28.5 mm).

Remarks: This species of deep-sea squat lobsters was identified with the use of the key provided by Zariquiey Alvarez (1968). The present specimens of *Munidopsis crassa* are ‘chalk-coloured’ as described by Murray & Hjort (1912, cited in Sivertsen & Holthuis, 1956). The fingers of the chelae are characteristically spoonlike shaped. The tips of the dactyli of the pereopods are really rusty to black coloured as mentioned by Bouvier (1922) which, however, is not visible in his coloured figure. The short blond hairs on the distal third of the propodus of the pereopods are distinct in the present specimens. The lateral outer spines at the eyes vary from conspicuous to extremely reduced. The rostrum is slightly curved up. All other characteristics agree very well with the drawing in Bouvier (1922).

The ovigerous female of station 198/13, haul 2, measures 125.8 mm from the tip of the rostrum to the tip of the telson. It seems to be the largest known specimen of *Munidopsis crassa*. There are more than 100 eggs measuring 2.8×3.0 mm. Their colour of the living animal was deep red.

The male (TI 84.8 mm) of station 198/29, haul 5, is parasitized by a bopyrid (Isopoda, Bopyridae). The left branchial region of the carapace is voluminously swollen. Gore (1983) mentioned 7 specimens of *Munidopsis crassa* which had either rhizocephalan or bopyrid parasites.



Figure 3. *Munidopsis parfaii* (A. Milne Edwards & Bouvier, 1894). Ovigerous female of station 198/50, haul 8.

Munidopsis crassa Smith, 1885 ranges from the western North Atlantic from SE Georges Bank (SE off Boston) down to the Venezuela Basin in depths of 3000–5012 m (Williams & Turner, 1986). Gore (1983) mentioned a depth-record of 2514 m in the western Atlantic by Mayo (Mayo, B.S., 1974 unpublished, fide Gore, 1983). From the eastern North Atlantic, *Munidopsis crassa* is known from the Bay of Biscaya, the Iberian Basin between Portugal and the Azores, and from the Canary Islands (A. Milne-Edwards & E.-L. Bouvier, 1899; Sivertsen & Holthuis, 1956; Türkay, 1975; Gore, 1983; Williams & Turner, 1986). The record by Bouvier (1922) of the Bay of Biscaya (“station 2964: 46° 17' 30" N/5° 42' W, depth 4380 m”) is situated in the eastern part of the West Europe Basin and is together with Türkay’s record from the Iberian Basin the closest to the present one. The male mentioned by Türkay (preserved at the Zoologische Staatssammlung, Munich) was captured in a depth of 5315 m (position 42° 44.5' N/13° 34.3' W) and is the deepest record for the species. The depth in which the present specimens were found ranges from 4635.75 to 4723.50 m.

***Munidopsis parfaii* (A. Milne-Edwards & Bouvier, 1894)**

(Figs 3 and 4)

Material examined: station 198/7, haul 1: 1 male (Cpl 41.0 mm, Cpb 30.1 mm, Tl 77.0 mm); station 198/13, haul 2: 1 male (Cpl 35.0 mm, Cpb 24.9 mm, Tl 64.0 mm), 1 female (Cpl 36.1 mm, Cpb 25.9 mm, Tl 68.0 mm), one carapace (not measurable); station 198/18, haul 3: 1 male (Cpl 40.4 mm, Cpb 28.1 mm, Tl 66.5 mm); station 198/24, haul 4: 8 males (Cpl 43.0 mm, Cpb 30.0 mm, Tl 78.1 mm; Cpl 41.0 mm, Cpb 28.0 mm, Tl 76.0 mm; Cpl 41.9 mm, Cpb 27.8 mm, Tl 75.9 mm; Cpl 41.0 mm, Cpb 28.0 mm, Tl 74.0 mm; Cpl 40.0 mm, Cpb 27.5 mm, Tl 73.8 mm; Cpl 39.8 mm, Cpb 27.1 mm, Tl 72.2 mm; Cpl 38.1 mm, Cpb 26.5 mm, Tl 71.0 mm; Cpl 37.5 mm, Cpb 25.1 mm, Tl 69.1 mm); station 198/29, haul 5; 1 male (Cpl 36.9 mm, Cpb 26.2 mm, Tl 69.0 mm); station 198/40, haul 7: 6 males (Cpl 43.5 mm, Cpb 30.0 mm, Tl 82.5 mm (with parasite); Cpl 42.3 mm, Cpb 27.0 mm, Tl 77.1 mm (with parasite); Cpl 42.1 mm, Cpb 28.4 mm, Tl 76.9 mm; Cpl

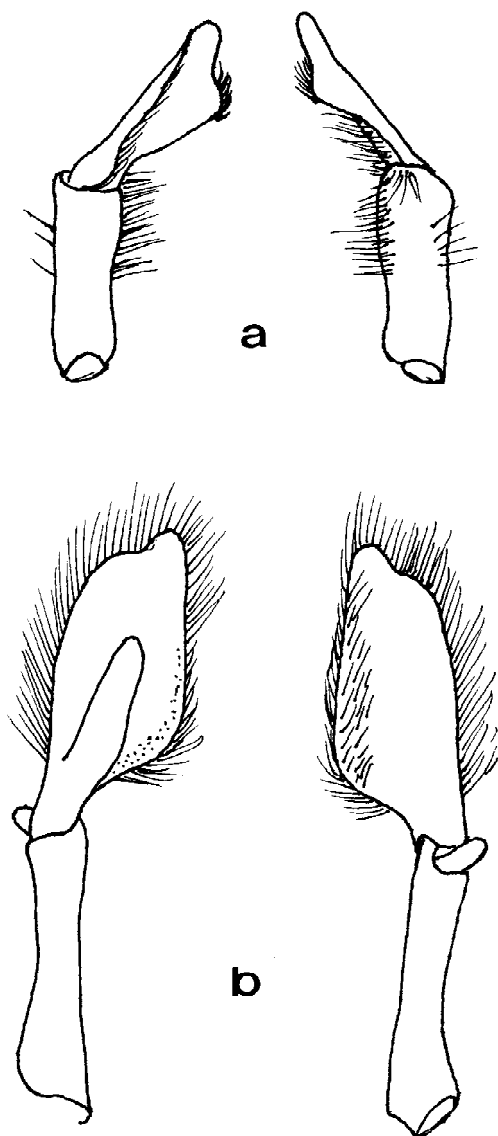


Figure 4. *Munidopsis parfai* (A. Milne Edwards & Bouvier, 1894) male of station 198/59, haul 9. Terminal joints of (a) gonopod 1; (b) gonopod 2.

40.8 mm, Cpb 28.0 mm, Tl 76.0 mm; Cpl 41.5 mm, Cpb 26.1 mm, Tl 75.5 mm; Cpl 38.0 mm, Cpb 26.7 mm, Tl 70.0 mm), 1 female (Cpl 40.0 mm, Cpb 28.2 mm, Tl 75.8 mm); station 198/50, haul 8: 1 ovigerous female (Cpl 40.0 mm, Cpb 28.8 mm, Tl 74.9 mm, egg-size 3.2×3.8 mm (about 50)); station 198/59, haul 9: 1 male (Cpl 50.0 mm, Cpb 35.0 mm, Tl 92.9 mm), 1 female (Cpl 40.5 mm, Cpb 27.0 mm, Tl 73.0 mm).

Remarks: A. Milne-Edwards & E.L. Bouvier (1894) described this species as *Orophorhynchus Parfai* on the basis of a single specimen captured by the 'Talisman' from a depth of 4255 m at 44° 20' N/19° 31' W (according to Nobre, 1936), which is close to the position on which the present specimen was collected. In 1899, the same authors described one male and one female from a depth of 4360 m at 39° 50' N/20° 18' W. Faxon (1895) noted: "*Orophorhynchus* has already been united with *Elasmonotus* by Henderson" and he "united *Elasmonotus* and *Munidopsis* as one genus". Both Doflein & Balss (1913) as well as Isabella Gordon (1955) cited the above-mentioned three specimens. Gordon (1955) stated for the genus *Munidopsis* "only four of this species occur below 4000 m, namely *Munidopsis abyssorum* A. Milne-Edwards & Bouvier, *M. antonii* A. Milne-Edwards, *M. crassa* Smith and *M. parfai* (A. Milne-Edwards)". Zariquiey Alvarez (1968) mentioned the same authorities. Here can be added Türkay's *Munidopsis thieli* Türkay, 1975 from the Iberian Deep-Sea Basin. In 1975, Türkay described two male specimens of *Munidopsis parfai* collected by an Agassiz-trawl during cruise 3 of the German R.V. 'Meteor' in 1966 from the Iberian Deep-Sea Basin (positions and depths: 42° 4.1' N/14° 55.6' W, depth 5275 m; 42° 55.4' N/14° 7.9' W, depth 5260 m). These specimens apparently represent the most recent and deepest records.

The specimens could be easily identified using the key of Zariquiey Alvarez (1968) for the identification of eastern Atlantic *Munidopsis* species. The median dorsal anterior directed spines on the second, third and fourth abdominal tergites are characteristic for this eastern Atlantic species (Fig. 3).

The new records (compare list of stations and Fig. 1) of 19 males (Tl 64.0–92.9 mm) and 4 females (Tl 68.0–75.8 mm) give us the largest number of specimens of this species till now. The depth on which they were found ranges between 4635.75 and 4785.75 m. The male (Tl 92.9 mm) of station 198/59, haul 9, and the female (Tl 75.8 mm) of station 198/40, haul 7, are the largest specimens of the species known till now. The female (Tl 74.9 mm) of station 198/50, haul 8, is the first known to be ovigerous. Its about 50 dark orange coloured eggs show a diameter of 3.2–3.8 mm. The largest male (Tl 82.5 mm) of station 198/40, haul 7, is parasitized by *Peltogaster* sp. (Rhizocephala, Peltogasteridae).

In consideration of this new material, a more extended description of *Munidopsis parfai* is given. The specimens appear rather robust. The carapace, in-

cluding the rostrum, measures 35.5–50.0 mm × 24.4–35.0 mm corresponding to a ratio of about 3:2. The dorsal surface of the carapace is densely granulated. The regions can be well distinguished from each other. The rostrum is triangular, one-third of the width of the carapace at its base, with angles at two thirds, and its tip curved up. Dorsally it shows a distinct carina which is beset with one row of granules. This carina continues in the frontal region and in two thirds of the mesogastric region with a double row of granules. In the branchial, cardiac and intestinal regions as well as on the pleura of the abdominal segments 2–4, the granules are replaced by short, more closely set ridges. Spines are not present on the surface of the carapace. A supra-antennal spine, as a single strong spine, is not present. It is replaced by a small patch of granules. Gastric spines and hairs are not present on the carapace nor on the margins, but granules are. The linea anomurica is distinct.

The eye-stalks are strongly broadened, placed against the lower surface of the rostrum, without a spine at the basis, connected by a bridge as described for *Munidopsis thieli* by Türkay (1975), and apparently not movable. The corneae are small, lacking pigment and apical spines. The antennular peduncles are armed with two distinct spines. The basal segments of the antennae are provided with one spine on the outer side.

Basis and ischium of the third maxillipeds are provided with a row of denticles. Only the chelipeds possess epipods. Epipods are missing from the second to fifth pereopods. The chelipeds possess the characteristic spoonlike fingers. In pereopods 2–5, we find a remarkable, narrow, brushlike row of plumose hairs on the proximal side of the propodus. The dactyli bear a row of small spines on the ventral margin. The fifth pereopods are reduced in the characteristic manner for Galatheidae and show 2/3–3/4 of the distal part of the merus granulated. The terminal joints of the first gonopods of the males are folded. On the distal double-lobed margin, we find only a short row of short hairs (Fig. 4a). This is quite different from *Munidopsis crassa* and *M. bermudezi* as drawn by Türkay (1975). The terminal joints of the second gonopods are wide with a double-lobed distal border (Fig. 4b).

The whole animal is chalk coloured except for the blond to dark brown coloured tips of the dactyli of pereopods 2–5.

Natantia

Oplophoridae

Heterogenys microphthalmalma (Smith, 1885)

(=*Acanthephyra microphthalmalma* Smith, 1885)

Material examined: station 198/13, haul 2: 1 female (Cpl 25.4 mm); station 198/24, haul 4: 1 female (Cpl. 22.8 mm).

Remarks: Chace, Jr. (1986) considered the differences of this species in comparison with the other members of the genus *Acanthephyra* as so important that he set up the new genus *Heterogenys* with the only species *Heterogenys microphthalmalma*. The identification of the species is easy because of several characteristic features. The rostrum bears fewer teeth dorsally than ventrally; the eyes have the corneae smaller and narrower than the eyestalks; the abdominal segments 3–6 are dorsally carinate, the third segment bears a slender, very long median dorsal spine which reaches beyond the fourth abdominal segment. Unfortunately, this spine is broken off, just as the rostrum is, but the other features still allow a positive identification.

Chace (1986) noted: "... the number of published records of *H. microphthalmalma* is relatively low". Without regard to the few specimens reported "from Bay of Bengal, the Celebes Sea and from the southern Pacific Ocean" (Sivertsen & Holthuis, 1956), added by the records from the western North Pacific (Aizawa, 1974; fide Chace, 1986), I found in literature only 38 specimens reported for the Atlantic (from off the east coast of the U.S.A. (Smith, 1886), W of the Cape Verde Islands (Crosnier & Forest, 1973), SW of the Azores (Sivertsen & Holthuis, 1956), off Madeira (Fransen, 1991), from off Portugal (Coutière (1911a) fide Crosnier & Forest, 1973) and from two localities mentioned by Domanski (1986), which are situated around 31° 17' N/25° 24' W (Madeira Abyssal Plain) and 41° 30' N/20° 30' W (Kings Trough) (I believe that the position indicated by Domanski "30° W" is a mistake. The map "Fig. 1" in his publication justifies this correction). For a long time, the deepest record of the species was reported by Smith (1886) with '2.620 fathoms' (=4792 m). Domanski (1986) reports a new depth-record from the Madeira Abyssal Plain of 5440 m.

Both present records of this species extend the known distribution in the Atlantic considerably to the north and confirm with 4699.00 and 4725.75 the

known depth range. *Heterogenys microphthalmus* apparently seems to be a bathypelagic to abyssopelagic species which often lives within the abyssobenthic zone. The female of station 198/13 (haul 2) apparently is the largest specimen of the species known till now. Unfortunately small pieces of the rostrum and the telson of both specimens are broken off, therefore it is not possible to report the exact total length.

Glyphocrangonidae

Glyphocrangon atlantica Chace, 1939

Material examined: station 198/29, haul 5: 1 male (Cpl 21.8 mm); station 198/40, haul 7: 1 male (Cpl 11.1 mm); 1 female (Cpl 11.6 mm); station 175/77: 1 male (Cpl 24.0 mm); 1993: 1 female (Cpl 21.8 mm).

Remarks: Of this typical heavily armoured deep-sea genus, only *Glyphocrangon atlantica* Chace, 1939, *G. longirostris* (Smith, 1882) and *G. sculpta* (S.I. Smith, 1882) are known from the eastern Atlantic. Holthuis (1971) gives very detailed descriptions and clear figures of these species. Using his key to the Atlantic species, the present specimens could easily be identified. However, the “two distinct teeth behind the branchiostegal spine” (Holthuis, 1971: key p. 277) of the anterior lateral carina of the carapace are not as “distinct” in the present species, but merely represented as two protuberances as illustrated by Holthuis (1971: Fig. 5). Holthuis (1971) describes this feature as follows: “The anterior lateral carina has two large, but not very high, teeth with blunt tops” and further on “In the French specimen, the sculpture of the carapace is far less distinct than in the PILLSBURY specimen, on which the above description is based . . .”. The two distinct teeth at the end of the pleura of the fifth abdominal segment separate *G. atlantica* without any doubt from *G. sculpta*, showing three teeth there. Holthuis’ description of *G. atlantica* is based on Chace’s type-specimen (a female) “from south of Santa Clara Province, Cuba” (20° 47’ 30” N/80° 24’ 30” W; depth 3885 m) from the ATLANTIS-Expedition in 1938, sta. 2966, on an ovigerous female from the PILLSBURY-Expedition in 1967, sta. 575, NW of Swan Island off Honduras (17°43’ N/84° 20’ W–17° 48’ N/84° 25’ W, depth 6373–6364 m) and a female from the Bay of Biscay, France, collected by the Centre Océanologique de Bretagne CHO4-sta. BO17 Put 115 in 1969 (45° 13’ N/05° 30’ W; depth 4665 m) (Holthuis, 1971). These three specimens were the only known of this species

for a long time, till Gore (1985a) described 48 specimens (males and females) collected from USNS ‘Bartlett’ Cruise 1301-82, in October–December 1981, at 11 stations in the Venezuela Basin. This material allowed him to make many additions to the known variability, reproductive biology, alimentation, parasitism and ecology of this species. Gore confirmed that the above-mentioned two teeth of the anterior lateral carina “were usually sufficiently developed to distinguish the species. In 2 instances even these teeth were reduced to sinuonities”, which agrees with the present specimens.

Apart from the record from the Bay of Biscay (Holthuis, 1971), *Glyphocrangon atlantica* was only known from the Caribbean Sea in the western Atlantic. Here it was found in a depth-range of 3885–6364 m. “The deepest ‘Bartlett’ specimens came from Stn. 97, 5055–5060 m” (Gore, 1985a). The one female from the Bay of Biscay from a depth of 4665 m was the only specimen known from the eastern Atlantic till now (Holthuis, 1971). The present specimens from 46° N, 17° W in the Western Europe Basin have a depth range of 4650–4900 m. *Glyphocrangon atlantica* therefore seems to be a typical abyssobenthic shrimp.

Aristeidae

Benthescycymus brasiliensis Bate, 1881

Material examined: station 198/7, haul 1: 1 male, 1 specimen (sex cannot be identified; both not measurable); station 198/18, haul 3: 1 male, 1 female (both not measurable).

Remarks: Although the specimens are partly damaged they could be positively identified as belonging to this rare species using the work of Crosnier & Forest (1973). The presence of the dorsomedian spines at the abdominal segments 3–6 is usually distinct. The new records are apparently the most northern ones. The closest records of the species found in literature are those of the Kings Trough and Madeira Abyssal Plain (Domanski, 1986), and off Morocco (Bouvier, 1908). Bouvier recorded the species as *Benthescycymus moratus* S.-I. Smith, 1886 from the cruise with the yacht ‘Princesse Alice’ in 1894, station 443, position 34° 04’ N/8° 58’ 45” W, depth 3745 m. Sund (1920b) recorded the species from the Canary Islands at a depth of 2603 m caught with the ‘Michael Sars’ in 1910, stating that the species “has formerly been taken in the Southern Pacific and the South Atlantic, in depth between 600 and 4300 m”. The present records

in a depth between 4684.50 and 4719.50 m confirm, that this dark red *Benthesicymus brasiliensis*, is an abyssopelagic animal living near the deep-sea bottom.

Benthesicymus iridescens Bate, 1881

Material examined: station 198/7, haul 1: 4 specimens (sex cannot be identified; size not measurable); station 198/13, haul 2: 4 females (size not measurable), 1 female (Cpl 45.2 mm); station 198/18, haul 3: 1 specimen (sex cannot be identified; size not measurable); station 198/24, haul 4: 1 female (size not measurable), 1 female (Cpl 41.2 mm); station 198/29, haul 5: 1 specimen (sex cannot be identified; size not measurable); station 198/40, haul 7: 1 specimen (sex cannot be identified; size not measurable); station 198/50, haul 8: 1 male, 2 specimens (all not measurable).

Remarks: All specimens listed are damaged and their identification was sometimes difficult. The absence of medio-dorsal spines in the abdominal segments 3–6 was not always clear at first sight. As in some of the specimens of *B. brasiliensis*, the characteristic spines are broken off, they could easily have been mistaken for the present species. However, with the key of Crosnier & Forest (1973) the separation of these two species was clear. *Benthesicymus iridescens* seems to be a rare, but typical species for the zone near the deep-sea floor. Under the name *Benthesicymus longipes*, Bouvier (1908) described one male and one female of this species from station 1150 of the cruises by the yachts 'Hirondelle' and 'Princesse Alice' in 1901, southwest of the Cape Verde Islands (16° 12' N/24° 43' 45" W) from a depth of 3890 m. A large female (Bouvier, 1922) was recorded under the same name from station 2994 of the cruise in 1910 off Cape Finisterre (Spain) (44° 08' N/10° 44' W) from a depth of 5000 m. This last locality is very close to the present ones. Sund (1920b) reports two males from the 'Michael Sars'-Expedition in 1910 taken from a haul SW of the Azores and one damaged specimen from near the Canary Islands. Hanström (1933) noted the deepest record of the species till now with 6500 m from the Dana-Expedition in 1931 at station 4180 in the Canarian Basin west of Madeira (32° 56' N/23° 47' W). Domanski (1986) records 5 specimens of this species from Kings Trough and 233 specimens from the Madeira Abyssal Plain in a depth of 5440 m. This is the largest number of specimens known from these three localities.

Plesiopenaeus armatus (Bate, 1881)

Material examined: station 198/7, haul 1: 1 female (Cpl 58.3 mm); station 198/29, haul 5: 2 females (Cpl 62.1 mm; 81.3 mm); station 198/40, haul 7: 1 female (Cpl 68.8 mm); station 198/50, haul 8: 1 female (Cpl 65.0 mm); station 198/59, haul 9: 2 females (Cpl 41.2 mm; 54.8 mm).

Remarks: This large, completely deep scarlet coloured penaeid shrimp, could be easily identified with the figures by Crosnier & Forest (1973). Gore (1985b) reported about 50 specimens of this species from samples by USNS 'Bartlett' in the Venezuela Basin. His deepest record in this region was from 5060 m. Bouvier (1908) mentioned a young male from the cruise of the yacht 'Princesse Alice' in 1904 (station 1787: 31° 07' N/24° 03' W), which was captured NW of the Canaries at a depth of 5413 m. This record between the Azores and the Canaries is one of the deepest and one of the most northern in the eastern Atlantic till now. The present records from a depth between 4635.75 and 4785.75 m confirm that *Plesiopenaeus armatus* is a truly abyssopelagic shrimp living near the bottom of the deep-sea. Crosnier & Forest (1973) designated this species as "exclusivement benthic".

Discussion

The nine decapod species treated in this report were obtained by an opening/closing Agassiz-trawl together with holothurians, sea stars and mainly alepocephalid and macrourid fishes in the southern part of the West Europe Basin. All these species live truly abyssobenthic or abyssopelagic near the deep-sea floor. They seem to form an abyssobenthic association. Except for *Munidopsis crassa* and *Plesiopenaeus armatus*, all species mentioned here are considered quite rare till now. Both *Munidopsis crassa* and *Plesiopenaeus armatus* appear to be widely distributed in the Atlantic, seem to be comparatively common, and sometimes occur in larger populations (see Gore, 1983, 1985b).

The species of Reptantia, *Willemoesia leptodactyla*, *Parapagurus abyssorum* and *Munidopsis parfaii* on the contrary, are considered extremely rare. However, if we look at the 8 specimens of *Willemoesia leptodactyla*, and especially at the 24 specimens of *Munidopsis parfaii* which we found in the eight hauls in 1998 in this rather small area in the NE-Atlantic,

I believe that we are not allowed to speak of extremely rare species. The same holds for the *Natantia* recorded here. 'Rare' in respect to species from the abyssobenthal, respectively, abyssopelagial should be replaced by "seldom found till now". Before Gore (1985a), for instance, only three specimens of *Glyphocrangon atlantica* were known. 11 deep-sea trawls of USNS 'Bartlett' from the Caribbean Sea in October–December 1981 obtained 48 specimens of this species and gave Gore the possibility for "observations on variation in morphological features". The 5 specimens reported here extend our knowledge further. The same is expected for *Heterogenys microphthalma*, *Benthesicymus brasiliensis* and *Benthesicymus iridescens*, if new records become available. In conclusion, the species are not primarily rare, but the number of hauls are.

Nevertheless, this does not mean that the populations of these species are dense. Thiel (1972) points out that the "animal density does not decrease steadily from nearshore to offshore biocoenosis, i.e. generally with increasing depth" but . . . "the decrease is more pronounced for the macrofauna . . .". And further on: "The structure of the biocoenosis of the deep-sea floor is characterized by the meiofauna living on and in the sediment and by the dominance of sediment feeders in the macrofauna".

Polychelidae are sediment feeders and occasionally necrophagous as Tiefenbacher (1995) described for *Polycheles typhlops typhlops* (Heller, 1862) and *Stereomastis sculpta* (Smith, 1880) and which suggests that this holds for *Willemoesia leptodactyla*, too. For both species of *Munidopsis*, with their spoonlike shaped chelae, we may suppose the same. Gore (1983) stated for *Munidopsis crassa*: "This type of chelipeds seems well adapted for both scraping away the relatively soft sponge tissue, or spooning up the detrital material on the sea floor". Thompson (unpublished; fide Gore, 1985a) stated for the Glyphocrangonids that they "are omnivores, subsisting on gastropod molluscs, fish scales, annelid setae, and other detrital-like particles" and Gore (1985a) added: . . . "they may be rather agile epibenthic predators above the abyssobenthic substrata". According to Gore (1985b), we may state that the Aristeids *Benthesicymus brasiliensis*, *B. iridescens* and *Plesiopenaeus armatus* subsist in a similar way.

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