

5/11

A FIRST INVENTORY OF THE MYSID FAUNA (CRUSTACEA: MYSIDACEA) IN COASTAL WATERS OF THE MADEIRA AND CANARY ARCHIPELAGOS

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ABSTRACT. In the Madeira Archipelago, 19 coastal mysid species, five of them new to science, were collected by handnet and by boat operated plankton and bottom nets. These belong to nine different genera, *Lophogaster*, *Siriella*, *Anchialina*, *Haplostylus*, *Erythrops*, *Leptomysis*, *Hemimysis*, *Mesopodopsis*, and *Heteromysis*. So far, 17 coastal mysid species, five of them new to science, were recorded for the Canary Archipelago. These species belong to twelve different genera, *Siriella*, *Anchialina*, *Gastrosaccus*, *Haplostylus*, *Erythrops*, *Leptomysis*, *Paraleptomysis*, *Mysidopsis*, *Hemimysis*, *Schistomysis*, *Paramysis*, and *Heteromysoides*.

Two species are known only from the Madeira and Canary islands, four other species appear to be endemic to Madeira, and three more species appear to be endemic to the Canary Islands. 47 % of the Madeiran species were also encountered at the Canary Islands, 53 % of the Canarian species were also recorded for Madeira. Three species were previously regarded as Mediterranean endemics. There is a marked northern influence, in so far as 10 of the 16 'Mediterranean' species are also distributed in boreal to subtropical zones of the NE-Atlantic, extending as far north as the Norwegian coasts.

The (sub)tropical Westafrican fauna is represented by two species only, *Lophogaster challengerii* and *Schistomysis* sp. A. A new *Heteromysis* species inhabits gastropod shells occupied by the hermit crab *Dardanus callidus*; such associations have been recorded from the Red Sea and the Indopacific; for the Atlantic, this is the first record of a mysid shrimp commensal with a hermit crab. A second new *Heteromysis* species was found only in association with the sea anemone *Telmatactis cricoides*; similar associations had so far been reported only from the Western Atlantic.

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INTRODUCTION

Our knowledge of the mysidacean fauna of the Macaronesian Islands largely dates back to the great oceanographic expeditions during the first half of this century. These expeditions passed the islands, from a mysidological point of view, almost casually. Methods applied and sampling stations chosen by these expeditions resulted in records of a number of oceanic mysid species, belonging to the Atlantic or even world wide, epi- to bathypelagic fauna. The following species were sampled a few km to several 100 km offshore and, therefore, cannot be regarded as part of island faunas in the strict sense. Records are from ILLIG (1930), FAGE (1941, 1942), NOUVEL (1943), TATTERSALL & TATTERSALL (1951), and O.S. TATTERSALL (1955):

Offshore species related to the Madeira Archipelago:

- Gnathophausia zoea* WILL.-SUHM, 1875
- Neognathophausia gigas* (WILL.-SUHM, 1875)
- Neognathophausia ingens* (DOHRN, 1870)
- Eucopia grimaldii* NOUVEL, 1942
- Eucopia major* HANSEN, 1910
- Eucopia sculpticauda* FAXON, 1893
- Eucopia unguiculata* (WILL.-SUHM, 1875) (syn. *E. hanseni* NOUVEL, 1942); also occurring nearshore
- Boreomysis incisa* NOUVEL, 1942
- Siriella thompsonii* (MILNE-EDW., 1837)
- Euchaetomera tenuis* G.O. SARS, 1883

Offshore species related to the Canary Archipelago:

- Gnathophausia gracilis* WILL.-SUHM, 1875
- Neognathophausia gigas* (WILL.-SUHM, 1875)
- Eucopia australis* DANA, 1852
- Eucopia grimaldii* NOUVEL, 1942
- Eucopia major* HANSEN, 1910
- Eucopia sculpticauda* FAXON, 1893
- Eucopia unguiculata* (WILL.-SUHM, 1875); also occurring nearshore
- Boreomysis arctica* (KRÖYER, 1861)
- Boreomysis illigi* O.S. TATTERSALL, 1955
- Boreomysis microps* G.O. SARS, 1883
- Siriella thompsonii* (MILNE-EDW., 1837)
- Euchaetomera glyphidophthalmica* ILLIG, 1906
- Euchaetomera intermedia* NOUVEL, 1942

Euchaetomera tenuis G.O. SARS, 1883

Euchaetomera typica G.O. SARS, 1883

Katerythrops oceanae HOLT & TATTERSALL, 1905

Longithorax alicei NOUVEL, 1942; described and only known from Canary region.

In contrast to pelagic species, inhabiting open Atlantic waters, the coastal mysid fauna of the Madeira and Canary archipelagos is almost unknown. NOUVEL (1943, 1951a), LEDOYER (1967, 1989) and CANCELA DA FONSECA et al. (1995) reported only a total of six species for shallow waters in the Madeira Archipelago (Madeira, Porto Santo, Desert Islands):

Siriella gracilipes (NOUVEL, 1942) (as *S. jaltensis* ssp.)

Anchialina agilis (G.O. SARS, 1877)

Haplostylus bacescui HATZAKIS, 1977 (as *Gastrosaccus normani*)

Erythrops elegans (G.O. SARS, 1863)

Leptomysis lingvura (G.O. SARS, 1866)

Hemimysis maderensis LEDOYER, 1989 (in part as *H. lamornae mediterranea*)

For the Canaries, the following coastal species are reported by CALMAN (1932), TATTERSALL & TATTERSALL (1951), and O.S. TATTERSALL (1957), respectively:

Gastrosaccus sanctus (van BENEDEN, 1861)

Heteromysoides cotti (CALMAN, 1932)

MATERIALS AND METHODS

In 1994 we started a systematic survey of the Madeiran and Canarian coastal mysid fauna. If not stated explicitly in material lists, sampling was done by the use of diver operated nets (mesh size 0.5 mm) during daytime. Boat operated trawls and bottom nets were also used during daytime, or surface plankton hauls during night. Gastropod shells, in part with pagurids, and sponges were collected, as these objects may be inhabited by mysids.

Most samples were taken by P. WIRTZ, those from Sept. 1995 and Feb. 1996 by both authors. Representative samples of reference materials and types of future descriptions will be deposited at the natural history museums of Funchal and Vienna.

Body size was measured from tip of rostrum to end of telson, without spines. Geographic coordinates are indicated to the next 0.01° as 32.64N/16.82W, for example.

RESULTS

The survey was still in progress, when this paper was presented. Nevertheless, knowledge of the coastal mysid faunas already had increased tremendously to the following preliminary inventories:

Coastal mysid species of the Madeira Archipelago:

Fam. Lophogastridae:

1. *Lophogaster challenger* FAGE, 1940

Fam. Mysidae:

Subfam. Siriellinae

2. *Siriella armata* MILNE-EDWARDS, 1837
3. *Siriella clausii* G.O. SARS, 1877
4. *Siriella gracilipes* (NOUVEL, 1942)
5. *Siriella jaltensis crassipes* (G.O. SARS, 1877)
6. *Siriella norvegica* G.O. SARS, 1869

Subfam. Gastrosaccinae

7. *Anchialina agilis* (G.O. SARS, 1877)
8. *Anchialina* sp. A
9. *Haplostylus bacescui* HATZAKIS, 1977

Subfam. Mysinae, tribe Erythropini

10. *Erythrope elegans* (G.O. SARS, 1863)

Subfam. Mysinae, tribe Leptomysini

11. *Leptomysis* sp. A
12. *Leptomysis lingvura* ssp. B
13. *Leptomysis* sp. C
14. *Leptomysis megalops* ZIMMER, 1915

Subfam. Mysinae, tribe Mysini

15. *Hemimysis maderensis* LEDOYER, 1989
16. *Mesopodopsis aegyptia* WITTMANN, 1992

Subfam. Mysinae, tribe Heteromysini

17. *Heteromysis norvegica* G.O. SARS, 1882
18. *Heteromysis* sp. A
19. *Heteromysis* sp. B

Coastal mysid species of the Canary Archipelago:

Fam. Mysidae:

Subfam. Siriellinae

1. *Siriella armata* MILNE-EDWARDS, 1837
2. *Siriella clausii* G.O. SARS, 1877
3. *Siriella gracilipes* (NOUVEL, 1942)

Subfam. Gastrosaccinae

4. *Anchialina agilis* (G.O. SARS, 1877)
5. *Gastrosaccus sanctus* (VAN BENEDEN, 1861)
6. *Haplostylus bacescui* HATZAKIS, 1977

7. *Haplostylus lobatus* (NOUVEL, 1951)
Subfam. Mysinae, tribe Erythropini
8. *Erythropus elegans* (G.O. SARS, 1863)
Subfam. Mysinae, tribe Leptomysini
9. *Leptomysis* sp. A
10. *Leptomysis lingvura* ssp. B
11. *Leptomysis* sp. C
12. *Paraleptomysis banyulensis* (BACESCU, 1966)
13. *Mysidopsis* sp. A
Subfam. Mysinae, tribe Mysini
14. *Hemimysis* sp. A
15. *Schistomysis* sp. A
16. *Paramysis arenosa* (G.O. SARS, 1877)
Subfam. Mysinae, tribe Heteromysini
17. *Heteromysoides cotti* (CALMAN, 1932)

Account of the species

1. *Lophogaster challenger* FAGE, 1940

Lophogaster typicus, G.O. SARS, 1885 p. 14.

Lophogaster challenger FAGE, 1940, 1942; NOUVEL, 1943; O.S. TATTERSALL, 1955.

Material. 1 ind., 6 mm, Madeira, off Funchal, 32.62N/16.92W, 90-110 m, epibenthic sledge, 23 Jan. 1995.

Unlike most *Lophogaster* species, this is essentially a coastal benthopelagic form, occurring mainly in depths of 50-150 m. Most reports are from SW-Africa, 1°S-40°S. There is only one previous record from the northern hemisphere, 4 ind. from the Azores in 200-450 m depth, identified by NOUVEL (1943). Our finding from Madeira confirms this considerable range extension.

2. *Siriella armata* MILNE-EDWARDS, 1837

Siriella armata MILNE-EDWARDS, 1837; W.M. TATTERSALL, 1927; TATTERSALL & TATTERSALL, 1951; NOUVEL, 1951b; FURNESTIN, 1959; ARIANI, 1967; KATAGAN, 1985.

Material. 37 ind., Madeira, bay of Machico, 32.71N/16.76W, 3-5 m, sand, 14 Sept. 1995. 50 ind., Madeira, Calheta, 32.72N/17.17W, 5 m, 21 May 1995. 31 ad., Madeira Arch.,

Porto Santo, Vila Baleira, 33.05N/16.33W, 2-4 m, sand, concrete blocks, swarm, 24 Sept. 1995. 24 ind., Canaries, Tenerife, Baja de Adeje, 28.10N/16.76W, 8 m, over *Cystoseira* debris, July 1994. 50 ad., Gran Canaria, Muelle de Arinaga, 27.85N/15.40W, *Cymodocea* meadow, 7 m, Apr. 1995, night.

This shallow water species may be found solitary or in large schools over sand or between macrophytes. It is rarely found in surface plankton. It is widely distributed in the Mediterranean and in the NE-Atlantic from the North Sea to the coasts of Morocco. Our findings for the faunas of the Madeira and Canary archipelagos well complement the known distribution range.

3. *Siriella clausii* G.O. SARS, 1877

Siriella clausii G.O. SARS, 1877; NOUVEL, 1943, 1951b; TATTERSALL & TATTERSALL, 1951; FURNESTIN, 1959; ARIANI, 1967; KATAGAN, 1985.

Material. 22 ind., Madeira, Caniço de Baixo, 32.64N/16.82W, hard substrate with algae and sand, 5-23 m, 19 Sept. 1995, night. Same location, 9 ind., from algae (*Stypopodium zonale*), 20 m, 25 Sept. 1994. 7 ind., Madeira Arch., Porto Santo, bay at Vila Baleira, 33.04N/16.34W, surface plankton tow, 5-6 m above ground, 23 Sept. 1995, night. 3 ind., Canaries, El Hierro, harbour of La Restinga, 27.64N/17.98W, 8-17 m, sand, algae, 25-27 Dez. 1994. Same island, 1 male, Punta Lajial, 27.65N/18.01W, 10 m, algae, 24 Dez. 1994. 18 ind., Canaries, Tenerife, Baja de Adeje, 28.10N/16.76W, 14 m, among macrophytes, 15 Feb. 1995.

This shallow water species is usually found solitary or in small aggregations between vegetation. It is regularly found in the surface plankton at night. Like *S. armata*, it is widely distributed in the Mediterranean and in the NE-Atlantic from the North Sea to the coasts of Morocco. Our findings for the faunas of the Madeira and Canary archipelagos well complement the known distribution range.

4. *Siriella gracilipes* (NOUVEL, 1942), new rank.

Siriella jaltensis gracilipes NOUVEL, 1942, 1943; MACQUART-MOULIN, 1965; ARIANI, 1967; ARIANI & SPAGNUOLO, 1976; WITTMANN, 1992a, b.

Siriella adriatica HOENIGMAN, 1960.

Siriella jaltensis, LEDOYER, 1967, 1989; WITTMANN, 1977; nec CZERNIAVSKY, 1868; nec TATTERSALL & TATTERSALL, 1951.

Material. 10 ind., Madeira, Funchal, 32.64N/16.91W, surface plankton tow in front of harbour, 20 m above ground, 19 Sept. 1995, night. 2 fem., 1 male, Madeira, Caniço de Baixo,

32.64N/16.82W, hard substrate with algae and sand, 5-23 m, 19 Sept. 1995, night. 9 ind. (subad. + juv.), Madeira, Reis Magos, 32.64N/16.82W, 12 m, in empty shell of *Charonia lampas*, 30 Oct. 1995. 1 male, Canaries, El Hierro, Punta Lajial, 27.65N/18.01W, 8 m, 21 Dez. 1994.

The systematics of *S. jaltensis* (CZERNIAVSKY, 1868) and related forms is a rather complicate chapter of mysid taxonomy and biogeography. Samplings of K.J. WITTMANN in various parts of the Mediterranean showed that populations in brackish to euhaline lagoons normally belong to the nominal form of *S. jaltensis*. Most populations in marine phytal areas, also found in littoral to submarine caves, however, fit with the description of NOUVEL (1942) for *S. jaltensis gracilipes*. As both forms are sympatric over a vast distribution range, they need to be separated at specific rather than subspecific level. *S. adriatica* HOENIGMAN, 1960 was recognized by WITTMANN (1992a, b) as overwintering generation of *S. jaltensis gracilipes* and now becomes a synonym of the species *gracilipes*.

S. gracilipes differs from the diverse subspecies of *S. jaltensis* (CZERNIAVSKY, 1868) by a more slender carpopropodus at thoracic endopods and by eyes with a larger and more globular cornea. The size of the cornea shows a stronger positive correlation with body size than do the eyestalks. This results in very globular eyes for large individuals (> 9 mm; c.f. Fig. 3 in ARIANI & SPAGNUOLO, 1976). *S. gracilipes* is widely distributed in the Mediterranean, from Gibraltar to the Aegean Sea (leg. K.J. WITTMANN). Outside the Mediterranean it was reported only from Madeira, and now also from the Canaries.

S. gracilipes lives in variety of coastal habitats, such as seagrass meadows, stands of *Cystoseira*, or in the mega-mesolithion. As pointed out by WITTMANN (1977), it tends to cling to its substrate (seagrass leaves) during daytime, except when it finds microcaves or even large caves where it may show continous swimming activity and may aggregate in schools. The occurence in a shell of *Charonia lampas* shows that large empty gastropod shells may fit the quality of microcaves. At night it is swimming actively, widely distributed near the bottom. A small number of individuals, mainly juveniles, may migrate upwards and may even reach the surface.

5. *Siriella jaltensis crassipes* (G.O. SARS, 1877)

Siriella crassipes G.O. SARS, 1877.

Siriella jaltensis, ? W.M. TATTERSALL, 1927.

Siriella jaltensis crassipes, BACESCO, 1941; NOUVEL, 1943.

Siriella jaltensis var. *crassipes*, NOUVEL, 1951b; FURNESTIN, 1959.

Material. 1 male, 11 mm, Madeira, Porto da Cruz, 32.77N/16.82W, 6 m, 28 May 1994.

S. jaltensis crassipes differs from the remaining subspecies of *S. jaltensis* (CZERNIAVSKY, 1868) by a stout carpopropodus at thoracic endopods. It was reported from

the Western Mediterranean, from France and Tunisia. Outside the Mediterranean it was reported by NOUVEL (1943, 1951b) and FURNESTIN (1959) for the Atlantic coast of Morocco. Our finding is the first for Madeira and well complements the known distribution range.

6. *Siriella norvegica* G.O. SARS, 1869

Siriella norvegica G.O. SARS, 1869; NOUVEL, 1943, 1951b; FURNESTIN, 1959; MACQUART-MOULIN, 1975; LAGARDÈRE & NOUVEL, 1980a.

Material. 4 ind., Madeira, Funchal, 32.64N/16.91W, surface plankton tow in front of harbour, 20 m above ground, 19 Sept. 1995, night. 18 ind., Madeira, off Funchal, 32.62N/16.92W, 55-70 m, epibenthic sledge, 23 Jan. 1995. Same data, 11 ind., 90-110 m. Same data, 4 ind., 120-180 m, 25 Jan. 1995. 1 fem. subad., Madeira Arch., Porto Santo, bay at Vila Baleira, 33.04N/16.34W, surface plankton tow, 5-6 m above ground, 23 Sept. 1995, night. Same data, 1 male subad., 33.03N/16.34W, 80-90 m above ground.

This species shows a large vertical distribution from a few to 400 m (LAGARDÈRE & NOUVEL, 1980a). The animals show an epibenthic mode of live during daytime and a planktonic migratory movement up to the sea surface during night. *S. norvegica* is a normal and regular component of the surface plankton at night. It shows almost the same geographic distribution as *S. armata* and *S. clausii*, widely distributed in the Mediterranean and in the NE-Atlantic from the North Sea to the coasts of Morocco. Also in this case, our findings for the faunas of the Madeira and Canary archipelagos well complement the known distribution range.

7. *Anchialina agilis* (G.O. SARS, 1877)

Anchialus agilis G.O. SARS, 1877.

Anchialina agilis, NOUVEL, 1943 (Madeira pop.), 1951b; FURNESTIN, 1959; CANCELA DA FONSECA et al. (1995).

Material. 100 ind., Madeira, Funchal, 32.64N/16.91W, surface plankton tow in front of harbour, 20 m above ground, 19 Sept. 1995, night. 25 ind., Madeira, off Funchal, 32.62N/16.92W, 90-110 m, epibenthic sledge, 23 Jan. 1995. Same data, 25 ind., 120-180 m, 25 Jan. 1995. 100 ind., Madeira, Caniço de Baixo, 32.64N/16.82W, 40-70 m, algae, bottom net, 22 Sept. 1995. 9 ind., Madeira Arch., Porto Santo, bay at Vila Baleira, 33.04N/16.34W, surface plankton tow, 5-6 m above ground, 23 Sept. 1995, night. Same data, 45 ind., 33.03N/16.34W, 80-90 m above ground. 3 ind., Canaries, Tenerife, Las Galletas, 28.00N/16.65W, 18 m, *Cymodocea*, 15 Feb. 1995.

This species also shows a large vertical distribution from a few to 420 m (LAGARDÈRE & NOUVEL, 1980). The animals are epibenthic during daytime and show a strong migratory activity up to the sea surface during night. The species is widely distributed in the Mediterranean and in the NE-Atlantic, from Norway to Morocco; reported by NOUVEL (1943) from night surface plankton at Funchal harbour (Madeira) and also from the Moroccan coast at Casablanca. Our record is new for the Canaries. For populations from Cape Verde Islands, NOUVEL (1943) noted the absence of ocular papillae and, therefore, this material may not belong to *A. agilis*.

8. *Anchialina* sp. A (aff. *oculata*)

Material. 10 ind., Madeira, off Funchal, 32.62N/16.92W, 120-180 m, epibenthic sledge, 25 Jan. 1995. Same data, 1 male, 90-110 m, 23 Jan. 1995. 18 ind., Madeira, Caniço de Baixo, 32.64N/16.82W, 40-70 m, algae, bottom net, 22 Sept. 1995.

This new species differs from *A. agilis* by eyes with large cornea and the absence of ocular papillae. The inner distal corner of the median segment of the antennular trunc forms a large spiniform protrusion. This marks a clear difference to *A. oculata* HOENIGMAN 1960, which is known from the Tyrrhenian, Adriatic and Aegean seas (ARIANI & SPAGNUOLO, 1976; HATZAKIS, 1982; unpublished samples from the Gulf of Naples).

9. *Gastrosaccus sanctus* (van BENEDEN, 1861)

Mysis sancta van BENEDEN, 1861.

Gastrosaccus sanctus, W.M. TATTERSALL, 1927; NOUVEL, 1951b; BACESCU, 1954; O.S. TATTERSALL, 1955, 1957; FURNESTIN, 1959.

Material. 88 ind., Gran Canaria, Puerto de Pasitos Blancos, 26.74N/15.62W, 10-20 m, sand, *Cymodocea*, *Caulerpa*, bottom net, 14 Feb. 1996.

This species was reported by O.S. TATTERSALL (1957) as "off the shores of the Canaries". It normally lives in shallow to littoral habitats. It is strictly benthic during daytime and may show nocturnal vertical migrations. It is known from the Mediterranean, and in the Atlantic from the North Sea as far south as Cameroon. It was not found at Madeira.

10. *Haplostylus bacescui* HATZAKIS, 1977

Gastrosaccus normani, NOUVEL, 1943, 1951a (Madeira pop.); LEDOYER, 1967; CANCELA DA FONSECA et al. (1995).

Haplostylus bacescui HATZAKIS, 1977.

Material. 50 ind., Madeira, Funchal, 32.64N/16.91W, surface plankton tow in front of harbour, 20 m above ground, 19 Sept. 1995, night. 10 ind., Madeira, off Funchal, 32.62N/16.92W, 55-70 m, epibenthic sledge, 23 Jan. 1995. 7 ind., Madeira, Lido do Funchal, 32.63N/16.93W, 10 m, sand, 10 Jan. 1995. >500 ind., Madeira Arch., Porto Santo, bay at Vila Baleira, 33.04N/16.34W, plankton tow at surface, 5-6 m above ground, 23 Sept. 1995, night. Same data, 36 ind., 33.03N/16.34W, 80-90 m above ground. 1 fem., Gran Canaria, El Cabron, 27.87N/15.38W, rocks and sand, 17-22 m, July 1994.

Our night plankton samples from Madeira and Porto Santo contained hundreds of *Haplostylus*, all belonging to the species *bacescui*. Our findings from Madeira and the Canaries imply a considerable range extension because the species was previously known only from the Mediterranean. NOUVEL (1951a) reported *Gastrosaccus normani* G.O. SARS, 1877 (now *Haplostylus normani*) from Funchal harbour (Madeira) and stated "Toutefois, l'exopodite du troisième pléopode des mâles porte aussi souvent 3 que 2 épines au niveau des fausses articulations". This is a typical character of *H. bacescui* which was split from *H. normani* by HATZAKIS (1977). Therefore, NOUVEL'S (1951a) material is transferred to *H. bacescui*.

11. *Haplostylus lobatus* (NOUVEL, 1951)

Gastrosaccus normani, W.M. TATTERSALL, 1927.

Gastrosaccus lobatus NOUVEL, 1951a, b; FURNESTIN, 1959; ? O.S. TATTERSALL, 1961; ARIANI, 1967.

Haplostylus lobatus, HATZAKIS, 1977; LAGARDÈRE & NOUVEL, 1980a.

Material. 2 subad., 5 mm, Canaries, El Hierro, harbour of La Restinga, 27.64N/17.98W, 8-10 m, sand, 25 Dez. 1994. 1 subad., 4 mm, Canaries, Tenerife, Baja de Adeje, 28.10N/16.76W, 20 m, sand, 15 Feb. 1995.

This species lives in shallow to deep waters down to 420 m (LAGARDÈRE & NOUVEL, 1980a) and lives close to the substrate during daytime. It may show nocturnal vertical migrations. It is known from the Mediterranean and the NE-Atlantic from the North Sea as far south as Morocco. Material from the coast of Morocco, reported by W.M. TATTERSALL (1927) as the species *normani*, was identified by NOUVEL (1951b) as sp. *lobatus*. Our record is new for the Canaries. The record for Ghana by O.S. TATTERSALL (1961) appears questionable, based only on two very young specimens and a fragment of an adult one.

12. *Erythrops elegans* (G.O. SARS, 1863)

Nematopus elegans G.O. SARS, 1863.

Erythrops elegans, COLOSI, 1922; BACESCO, 1941; TATTERSALL & TATTERSALL, 1951; FURNESTIN, 1959; HATZAKIS, 1982; CANCELA DA FONSECA *et al.* (1995).

Material. 50 ind., Madeira, off Funchal, 32.62N/16.92W, 55-70 m, epibenthic sledge, 23-25 Jan. 1995. Same data, 9 ad., 35-50 m. Same data, 1 male, 90-110 m. Same data, 1 male, 120-180 m. 28 ind., Madeira, Caniço de Baixo, 32.64N/16.82W, 22-27 m, sand, Sept., Oct. 1994. 1 male, Madeira, rocky reef, about 1.5 km SE of Caniço de Baixo, 32.64N/16.82W, 28 m, coarse sand, 19 Oct. 1994. 10 ind. (subad. + juv.), Madeira, Cais do Porto da Cruz, 32.77N/16.82W, 6 m, 2 Oct. 1994. 20 ind. (subad. + juv.), Madeira, Cais do Porto Novo, 32.66N/16.80W, 35 m, coarse sand with *Veretillum*, 24 Sept. 1994. 4 subad., Madeira, bay at Garajau, 32.63N/16.85W, 30 m, sand, 30 July 1994. 2 fem., Canaries, El Hierro, in front of harbour of La Restinga, 27.64N/17.98W, 26 m, coarse sand, 26 Dez. 1994.

This is essentially an epibenthic, sand dwelling form, with striking red eyes. It is known as a coastal shallow water species. Our findings considerably extend the lower depth limit of distribution. It is widely distributed in the Mediterranean and in the NE-Atlantic from the North Sea as far south as Morocco. Our findings are new for the Canaries and fit well to the known distribution range.

13. *Leptomysis* sp. A (aff. *heterophila*)

Leptomysis heterophila, WIRTZ 1995b.

Material. 30 ind., Madeira, Caniço de Baixo, 32.64N/16.82W, hard substrate with algae and sand, 5-23 m, 19 Sept. 1995, night. Same location, 62 ind., rocks and sand, 24 m, 25 Jan. 1994, day. 250 ind., Madeira, bay at Machico, 32.71N/16.75W, soft bottom, beneath wreck, 16 m, 23 Apr. 1994, day. 17 ind., Madeira, Reis Magos, 32.64N/16.82W, rocks and sand, 10 m, 27 Jan. 1994, day. 21 ind., Madeira, Calheta, 32.72N/17.17W, 5 m, 21 May 1995. 24 ind., Canaries, Tenerife, Baja de Adeje, 28.10N/16.76W, 8 m, *Cystoseira* debris, July 1994. 30 ind., Canaries, El Hierro, Punta Lajial, 27.65N/18.01W, 17 m, 22 Dez. 1994. Same island, 25 ind., harbour of La Restinga, 27.64N/17.98W, 8-10 m, sand, 25 Dez. 1994. 25 ind., Gran Canaria, Muelle de Arinaga, 27.85N/15.40W, *Cymodocea* meadow, 7 m, Apr. 1995, night.

This new species is very similar to *L. heterophila* WITTMANN, 1986, which is known from the Adriatic, Western Mediterranean, and from the coasts of Ireland and England

(WITTMANN, 1986). Populations from Portugal (coast at Sesimbra, 38.26N/9.06W, 15-20 m, 15 Oct. 1994, leg. P. WIRTZ) also fit well to the concept of *L. heterophila*.

Populations from Madeira and the Canaries, however, differ considerably from *L. heterophila* by the constant absence of the seta at the epipod of the first thoracomere and by the penultimate segment of the exopod of the fourth male pleopod being shorter than combined neighbouring segments. The animals gather in small to very large swarms over many types of substrate, frequently around aggregations of the long-spined sea urchin *Diadema antillarum*, as shown in a photo by WIRTZ (1995b, p. 95 top). At night they remain near the bottom. At Madeira this species is by far the most frequent swarming mysid in depths of 5-30 m.

14. *Leptomysis lingvura* ssp. B

Leptomysis linguura, ? FURNESTIN, 1959.

Leptomysis lingvura, LEDOYER, 1967.

Material. 27 ind., Madeira, off Funchal, 32.62N/16.92W, 90-110 m, epibenthic sledge, 23 Jan. 1995. Same data, 60 ind., 55-70 m, 23-25 Jan. 1995. 22 subad., Madeira, Caniço de Baixo, 32.64N/16.82W, rocks and sand, 25 m, 23 Oct. 1994. 39 ind., Madeira, rocky reef, about 1.5 km SE of Caniço de Baixo, 32.64N/16.82W, 28 m, coarse sand, 19 Oct. 1994. 3 ad., 25 subad., Madeira, bay of Machico, Três Marias, 32.71N/16.75W, 16 m, sand, 1 Nov. 1994. 30 ind., Canaries, El Hierro, Punta Lajial, 27.65N/18.01W, 15 m, swarm, 21 Dez. 1994. Same island, 15 ind., in front of harbour of La Restinga, 27.64N/17.98W, 21 m, sand, swarm, 26 Dez. 1994.

L. lingvura is widely distributed in the Mediterranean and in the NE-Atlantic from Norway to Morocco. For Madeira it was already reported by LEDOYER (1967). The known distribution is now extended southwards to the Canaries. Three subspecies are currently distinguished (WITTMANN, 1986a). The nominal form, *L. lingvura lingvura* (G.O. SARS, 1866), is restricted to the European coasts of the Atlantic up to 63°N. The local populations of Madeira and the Canaries correspond to this subspecies in most aspects, but are clearly different by showing an 8-segmented [as in the Mediterranean subspecies *L. lingvura marioni* (GOURRET, 1888) and *L. lingvura adriatica* WITTMANN, 1986] exopod of fourth male pleopod, in contrast to a 10- to 11-segmented one in other Atlantic populations.

15. *Leptomysis* sp. C (aff. *mediterranea*)

Material. 113 ind., Madeira, Cais de Sta. Cruz, 32.69N/16.77W, 21 m, sand, swarm, 1 Oct. 1994. 50 ind., Madeira, bay at Machico, 32.71N/16.76W, *Cymodocea* meadow, 12 m,

23 Apr. 1994. 50 ad., Madeira, Calheta, 32.72N/17.17W, 5 m, 21 May 1995. 9 ind., Gran Canaria, El Cabron, 27.87N/15.38W, rocks and sand, 17-22 m, July 1994. 50 ad., Gran Canaria, Muelle de Arinaga, 27.85N/15.40W, *Cymodocea* meadow, 7 m, Apr. 1995, night. 1 male, Gran Canaria, Puerto de Pasitos Blancos, 26.75N/15.62W, *Cymodocea* meadow, 8 m, July 1994. Same data, 11 ind., 9 m, Apr. 1995. 3 males, Canaries, El Hierro, harbour of La Restinga, 27.64N/17.98W, 8-10 m, sand, 25 Dez. 1994.

This new species resembles *L. mediterranea* G.O. SARS, 1877 by the form of the antennal scale and the large rostrum. Despite of comparable body size, the terminal joint of the antennal scale, however, shows only 11-16 setae. The species differs from *L. buergii* BACESCU, 1966 by having the posterior pore group not integrated into the posterior margin of the carapace. It was sampled at Madeira and the Canaries where it gathers in swarms over sand or in *Cymodocea* meadows, where it was also found at night.

16. *Leptomysis megalops* ZIMMER, 1915

Leptomysis megalops ZIMMER, 1915; BACESCU, 1941; HOENIGMAN, 1955; O.S. TATTERSALL, 1955; LAGARDÈRE & NOUVEL, 1980b; SORBE, 1981.

Material. 15 ind. in 2 samples, Madeira, off Funchal, 32.62N/16.92W, 120-180 m, epibenthic sledge, 25 Jan. 1995.

This species is the deepest form of its genus, usually found in 100-200 m, with a range of 60-400 m. It is known from the western Mediterranean (including Adriatic and Tyrrhenian Sea) and the E-Atlantic, where it was recorded from the Gulf of Biscay to South Africa (44°N-38°S). Our record is new for Madeira and fits well to the known distribution range.

17. *Paraleptomysis banyulensis* (BACESCU, 1966)

Leptomysis apiops, WALKER, 1901; HOENIGMAN, 1958; WITTMANN, 1977; HATZAKIS, 1982.

Leptomysis apiops banyulensis BACESCU, 1966; WITTMANN, 1978; KATAGAN & LEDOYER, 1979.

Paraleptomysis apiops banyulensis, LIU & WANG, 1983.

Paraleptomysis banyulensis, WITTMANN, 1986.

Material. 1 male, 5 mm, Canaries, El Hierro, in front of harbour of La Restinga, 27.64N/17.98W, 26 m, coarse sand, 26 Dez. 1994. 5 ad., 1 subad., Canaries, Tenerife, Las

Galletas, 28.00N/16.65W, 18 m, *Cymodocea*, 15 Feb. 1995.

This is a strictly benthic species, occurring over mud, sand or sandy spots interspersed into *Cymodocea* meadows in coastal areas up to 50 m depth. It may be found solitary or in loose aggregations (WITTMANN, 1986b). It was known only from the Mediterranean Sea, in its entire extension from the coasts of Spain to Turkey. The finding at the Canaries thus represents a considerable range extension.

18. *Mysidopsis* sp. A (aff. *gibbosa*)

Material. 1 fem., 5 mm, Canaries, El Hierro, in front of harbour of La Restinga, 27.64N/17.98W, 26 m, coarse sand, 26 Dez. 1994. 1 fem. subad., Canaries, Tenerife, Baja de Adeje, 28.10N/16.76W, 14-18 m, sand, 15 Feb. 1995.

This new species differs from *M. gibbosa* G.O. SARS, 1864 by larger eyes, larger spines on endopods of uropods and by the almost complete absence of the characteristic dorsal humps on the carapace. *M. gibbosa* is widely distributed in the Mediterranean and in the NE-Atlantic where it was reported from the North Sea as far south as the coast of Morocco (FURNESTIN, 1959).

19. *Hemimysis maderensis* LEDOYER, 1989

Hemimysis lamornae mediterranea, LEDOYER, 1967.

Hemimysis maderensis LEDOYER, 1989.

Hemimysis lamornae, WIRTZ, 1995b.

Material. 250 ind., Madeira, Lido do Porto Moniz, 32.87N/17.16W, 14 m, small cave, 3 Oct. 1994. 16 subad., Madeira, Funchal harbour, 32.64N/16.91W, microcave, 8 m, 14 Apr. 1994. 6 subad., Madeira, Caniço de Baixo, 32.64N/16.82W, hard substrate with algae and sand, 5-23 m, 19 Sept. 1995, night. 14 ind., Madeira, Cais do Caniçal, 32.73N/16.73W, small cave, 8 m, 29 Jan. 1994.

The type material, collected by LEDOYER in 1966, is from a submarine cave in 5 m depth at Great Desert Island (Deserta Grande). So far, this endemic species has not been found outside the Madeira Archipelago. During daylight these sciaphilic animals gather in caves and microcaves where they swim close to the bottom. A colour photograph of this species is given in WIRTZ (1995b, p. 95, bottom right). At night the animals are widely distributed close to the rocky sea floor. This behaviour is similar to that observed by K.J. WITTMANN for *H. margalefi* ALCARAZ, RIERA & GILI, 1986 in the Gulf of Naples.

20. *Hemimysis* sp. A (aff. *maderensis*)

Material. 60 ind., Gran Canaria, El Cabron, 27.87N/15.38W, 14 m, swarm in crevice formed by rock, Apr. 1994. Same location, 6 ind., 17-22 m, rocks and sand, July 1994. 5 ind., Gran Canaria, Las Palmas, Playa de las Canteras, 28.14N/15.43W, microcave, 2 m, July 1994, night. 6 ad., Canaries, El Hierro, Punta Lajial, 27.65N/18.01W, 8 m, associated with swarm of *Leptomysis* sp.A, 21 Dec. 1994.

Hemimysis specimens sampled in the Canaries closely resemble *H. maderensis*, especially concerning the enlarged distal joint of the maxillary palp. However, they show certain distinct differences: the cornea is smaller and the smooth portion of the outer margin of the antennal scale amounts to only 30-40% its total length; adults measure only 4-5 mm. The animals were mainly found in large crevices of rocks where they were exposed to indirect daylight.

21. *Schistomysis* sp. A (aff. *spiritus*)

Synmysis spiritus, W.M. TATTERSALL, 1927.

Paramysis (Synmysis) spiritus, NOUVEL, 1951b; ? FURNESTIN, 1959.

Material. 70 ad., Canaries, Tenerife, Baja de Adeje, 28.10N/16.76W, 5 m, sand and rocks, large swarms, July 1994. Same data, 39 ad., 10 m, 15 Feb. 1995. 90 ind., Gran Canaria, El Cabron, 27.87N/15.38W, rocks and sand, 17 m, Apr. 1994. 55 ind., Gran Canaria, Puerto de Pasitos Blancos, 26.75N/15.62W, *Cymodocea* meadow, 9 m, Apr. 1995. 50 ad., Gran Canaria, Muelle de Arinaga, 27.85N/15.40W, *Cymodocea* meadow, 7 m, Apr. 1995, night.

This new Canarian *Schistomysis* species is found in large swarms over sand, and in *Cymodocea* meadows. It differs from *S. spiritus* (NORMAN, 1860) by a series of distinct features: eyestalks shorter; antennal scale less slender, with short apical lobus; endopods of uropods with a smaller number of subequal spines, not densely crowded; telson with basally more rounded cleft.

W.M. TATTERSALL (1927) studied one immature specimen from Casablanca Harbour (coast of Morocco) and stated "It is impossible to be sure of the identity of this specimen. In most of its characters it agrees with this species, but the spines on the inner uropod are not nearly so crowded as in mature specimens of *S. spiritus*". This coincidence lets it appear probable that TATTERSALL'S material (also cited by NOUVEL, 1951b) may belong to the new species. In this view, also the immature specimen of *S. spiritus* from Cape Ghir (Morocco), reported by FURNESTIN (1959), seems questionable. *S. spiritus* was recorded

from the Baltic and all NE-Atlantic coasts between Norway and Morocco. It was not found at Madeira, Canaries, and in the Mediterranean.

22. *Paramysis arenosa* (G.O. SARS, 1877)

Mysis arenosa G.O. SARS, 1877.

Paramysis arenosa, COLOSI, 1929; BACESCO, 1941; TATTERSALL & TATTERSALL, 1951; LABAT, 1953.

Material. 55 ind., Gran Canaria, Puerto de Pasitos Blancos, 26.75N/15.62W, *Cymodocea* meadow, 9 m, Apr. 1994. 15 ad., Gran Canaria, Muelle de Arinaga, 27.85N/15.40W, *Cymodocea* meadow, 7 m, Apr. 1995, night. 8 ad., Canaries, El Hierro, harbour of La Restinga, 27.64N/17.98W, 8-10 m, sand, 25 Dez. 1994. 7 ad., Canaries, Tenerife, Baja de Adeje, 28.10N/16.76W, 20 m, sand, 15 Feb. 1995. 150 ind., Canaries, Lanzarote, Puerto del Carmen, 28.92N/13.67W, 6 m, sand, Apr. 1995.

P. arenosa is essentially a sand dwelling form, often forming large aggregations on the substrate. In the Mediterranean it occurs also in the littoral zone. It is widely distributed in the Mediterranean and on European coasts of the Atlantic up to 57°N. So far, it was not found at Madeira. The findings at the Canaries considerably extend the known distribution range towards the south.

23. *Mesopodopsis aegyptia* WITTMANN, 1992

Material. 2 juv., 3 mm, Madeira, Caniço de Baixo, 32.64N/16.82W, 24 m, sand, 17 Sept. 1995.

This species was recently split off from *M. slabberi* (van BENEDEN, 1861) by WITTMANN (1992c). It is a more southern form, widely distributed in the Mediterranean. It is less eurythermic and less euryhaline than *M. slabberi* and occurs mainly in coastal marine waters. In the Aegean Sea it was observed in schools over sandy bottom in turbid waters near the surf zone (WITTMANN, 1992c). The finding at Madeira is the first outside the Mediterranean.

24. *Heteromysis norvegica* G.O. SARS, 1882

Heteromysis norvegica G.O. SARS, 1882; LAGARDÈRE & NOUVEL, 1980.

Heteromysis formosa, BACESCU, 1941; TATTERSALL & TATTERSALL, 1951; MAKINGS, 1977.

Material. 2 fem., 4-5 mm, Madeira, off Funchal, 32.62N/16.92W, 120-180 m, epibenthic sledge, 25 Jan. 1995.

This species mainly occurs in shallow waters, although the lower depth range is 400 m (LAGARDÈRE & NOUVEL, 1980b). During daylight it shelters in empty shells of large gastropods or in vegetation. At night it may be planktonic. The species is known from the Mediterranean (off Monaco) and the NE-Atlantic between Norway and the French coast. The finding at Madeira considerably extends the known distribution range southwards. Morphologically, *H. norvegica* belongs to the group of N-Atlantic and European *Heteromysis* species (subgenus *Heteromysis*, according to BACESCU, 1968). If the view of LAGARDÈRE & NOUVEL (1980b) is accepted, populations from the W-Atlantic (New England to Gulf of Mexico) may belong to a separate species, well known as *H. formosa* S.I. SMITH, 1873.

25. *Heteromysis* sp. A

Material. 3 fem. 4.2-4.6 mm, 3 males 2.9-3.2 mm, 6 ind. (subad. + juv.), Madeira, bay of Machico, 32.71N/16.76W, 10 m, rocks, shell of *Charonia tritonis variegata*, inhabited by the pagurid *Dardanus callidus*, 18 Sept. 1995. 7 ind. in 4 samples, Madeira, Caniço de Baixo, 32.64N/16.82W, 10-20 m, in shells among rocks: three shells of *Phalium undulatum* and one of *Charonia lampas*, all inhabited by *Dardanus callidus*, 19 Sept. - 2 Oct. 1995, 1 sample at night.

This new *Heteromysis* species is smaller than the others found at Madeira. The body shows a green complexion which is rare among mysids. This mysid was only found in large gastropod shells inhabited by *Dardanus callidus*. One individual was found in a shell sampled at night. Five empty shells examined were without mysids, or in one case inhabited by nine small *Siriella gracilipes*, respectively. In the Red Sea, and the Indian and Pacific oceans, there are not less than six *Heteromysis* species commensal with pagurids. On East African coasts, *H. harpax* HILGENDORF, 1878 forms family groups in shells inhabited by five different *Dardanus* species (VANNINI et al., 1993). For the Atlantic, this is the first record of a mysid shrimp in gastropod shells inhabited by hermit crabs. As mentioned above, *H. norvegica* may be found in empty gastropod shells. In the Caribbean, MODLIN (1987) collected two *Heteromysis* species from empty gastropod shells, but both species were also found in corals and sponges.

Heteromysis sp. A shows the typical leaf-like modified seta on the outer distal corner of the antennular trunc. Males have modified fourth pleopods. Both features are characteristic of the subgenus *Olivemysis* BACESCU, 1968 which is known from many species of tropical areas, especially in the W-Atlantic (BACESCU, 1968). They are not found in the subgenus *Heteromysis* (SMITH, 1873) which is typical of European and N-Atlantic waters.

26. *Heteromysis* sp. B

Heteromysis sp., WIRTZ 1996.

Material. 1 male ad., 4.6 mm, Madeira, Caniço de Baixo, 32.64N/16.82W, 28 m, from the sea-anemone *Telmatactis cricoides*, 29 Nov. 1994.

A number of individuals of this new species were observed and photographed (WIRTZ, 1996) on several occasions, always associated with the sea anemone *Telmatactis cricoides*. The animals were swimming around the stem of the anemone. However, so far only one individual was sampled, as it is very difficult to catch the mysids, which retreat into cracks in the rock when disturbed. This species shows a striking analogy to three Caribbean and Bermudan *Heteromysis* species, commensals of the sea-anemone *Bartholomea annulata*. This commensalism is apparently obligate in the Caribbean species, *H. actiniae* CLARKE, 1955.

Heteromysis sp. B shows the typical leaf-like modified seta on the outer distal corner of the antennular trunc, characteristic of the subgenus *Olivemysis* BACESCU, 1968. Thus, this species, like the previous, shows affinities to the tropical W-Atlantic.

27. *Heteromysoides cotti* (CALMAN, 1932)

Heteromysis cotti CALMAN, 1932; FAGE & MONOD, 1936.

Heteromysoides cotti, BACESCU, 1968; WILKENS et al., 1986.

No material sampled during this survey. This cave dwelling species with reduced eyes is only known from Lanzarote Island (Canaries), where it occurs in saltwater pools in the Jameos del Agua and Jameo de los Tres Lagos, and in several saline wells. BACESCU (1968) argued that "Il est certain que dans le cas de *H. cotti* il s'agit également d'une espèce marine (peut-être spongicole elle aussi) pénétrée et bien acclimatée dans un lac sousmarin qui continue à communiquer avec l'océan". Therefore, we have included this species in the list of coastal species. It is normally depigmented, but develops brownish pigment in illuminated parts of its habitat (WILKENS et al., 1986). A further cave dwelling species, *H. dennisi*, was recently described by BOWMAN (1985) from a marine cave at the Bahamas. The remaining *Heteromysoides* species known live at (sub)tropical coasts where they are found in cryptic habitats such as in corals or in sponges.

DISCUSSION

As indicated in the introduction, most offshore mysidacean species, found near the Madeira and Canary archipelagos, have a panatlantic or even world wide oceanic distribution. However, there is one questionable case, virtually indicating endemism of the Canary Islands.

The description of *Longithorax alicei* by NOUVEL (1942, 1943) is based on only a single subadult female. Type locality is mesopelagic waters southwest of Tenerife (Canaries). No further records of this species were ever made. Most *Longithorax* species show an ample oceanic distribution. Therefore, we are reluctant to recognize this species as an endemic faunal element of the Canaries, unless further material is found.

Sixteen of the 27 coastal mysid species reported here for the Madeira and Canary archipelagos occur also in the Mediterranean (59 %). This is in accordance with concepts that the shallow water marine fauna of the Macaronesian Islands is closely related to that of the Mediterranean Sea (WIRTZ & MARTINS, 1993; WIRTZ, 1994, 1995a). However, in Mysidacea these 'Mediterranean' faunal elements have a strong northern component, as the majority (10/16 = 63 %) has a vast distribution in the NE-Atlantic, from Norway to Morocco. Two more species occur on Mediterranean plus Westafrican coasts. Three species (*Haplostylus bacescui*, *Paraleptomysis banyulensis*, *Mesopodopsis aegyptia*) were previously reported exclusively for the Mediterranean. As noted by WIRTZ (1995a), the Madeiran marine fauna probably contains a considerable number of species that erroneously are considered Mediterranean endemics at the moment.

FURNESTIN (1959) noted that most of the species found on the coasts of Morocco are also known from Norwegian waters, and argued that this may be due to the eurythermic and euryhaline nature of the NE-Atlantic coastal mysid fauna. However, most sampling stations of FURNESTIN (1959) were in deeper waters, some km off the coastline, and therefore, cold-water faunal elements were overestimated while Mediterranean and tropical Westafrican elements were underestimated. We expect that the relative portion of northern species will decrease in favour of Mediterranean and (sub)tropical Westafrican species, with the detection of further species on the coasts of Morocco as well as Madeira and the Canaries.

The second largest category is represented by coastal species endemic to the Madeira and Canary archipelagos. Four species are now known only from Madeira, three other species only from the Canaries, and a further two species from both archipelagos, respectively. 47 % of the Madeiran species (n = 19) so far known were also encountered at the Canary Islands. 53 % of the Canarian species (n = 17) were also recorded for Madeira. At the moment, the Canary Islands are investigated less intensively for mysid shrimps than Madeira, and a greater number of additional species may be expected there.

So far, the (sub)tropical Westafrican fauna is represented by two species only, *Lophogaster challengerii* and *Schistomysis* sp. A. However, the mysid fauna of this area is very poorly known. Two further species, *Siriella jaltensis crassipes* and *Leptomysis megalops*, essentially have a Mediterranean plus Westafrican distribution, although the northern limit may extend up to the Gulf of Biscay.

In contrast to offshore pelagic mysid species, no amphiatlantic coastal species was recorded at the two archipelagos examined. The two new *Heteromysis* species, commensal with hermit crabs or sea anemones, respectively, show distinct morphological characteristics of the antennulae, previously only known from Caribbean and Indopacific species of this genus.

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