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Interstitial cumaceans from sandy bottoms and *Cymodocea* meadows of the Canary Islands

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Abstract: During the study of the interstitial fauna from *Cymodocea nodosa* meadows and nearby sandy bottoms of the Canary Islands (Eastern Central Atlantic Ocean), six cumacean species were collected. *Iphinoe inermis* was recorded for the first time in the Atlantic Ocean and a new species, *Iphinoe canariensis* sp. nov., is described. During the monthly monitoring survey, cumaceans showed a low frequency of occurrence (25%) in the whole community. The two-year seasonal samplings showed higher cumacean densities in winter, when 77% of specimens were collected. Cumaceans were more abundant in the nearby sandy bottoms (62%) than in *Cymodocea* meadows, and in the upper layer of sediment than in the lower layers.

Résumé: *Cumacés interstitiels des fonds sableux et des herbiers à* Cymodoce *des Iles Canaries.* Six espèces de cumacés ont été récoltées aux îles Canaries dans le cadre d'une étude sur la faune interstitielle provenant des herbiers à *Cymodocea nodosa* et des fonds sableux limitrophes. *Iphinoe inermis* est signalée pour la première fois dans l'océan Atlantique et une nouvelle espèce, *Iphinoe canariensis* sp. nov. est décrite. Les échantillonnages mensuels réalisés durant deux années montrent que les cumacés sont relativement peu fréquents au sein de la communauté (25 %) et plus abondants en hiver. De plus, ils sont plus fréquents sur les fonds de sable que dans les herbiers de *Cymodocea nodosa*. Leur abondance est maximale dans la couche superficielle du substrat.

Keywords: meiofauna, Cumacea, *Cymodocea*, Canary Islands, Macaronesian region.

Introduction

Cumaceans are benthic crustaceans normally found in soft bottom environments. Although they can burrow into the sediment, they also have a swimming activity mainly in the near bottom water layer (Wang & Dauvin, 1994; Dauvin & Zouhiri, 1996; Cartes & Sorbe, 1997; Corbera, 2000). Moreover, most of the littoral species show a nycthemeral migratory behaviour (Macquart-Moulin, 1991). As for benthic organisms, the distribution of cumaceans is related to sediment characteristics and several species display a marked preference for a defined sediment grain size (Dixon, 1944; Wieser, 1956; Pike & Le Sueur, 1958).

Although knowledge at a world level has grown in recent years, little is still known of the cumacean fauna of certain geographical areas. This is the case for the Canary Islands where only a few records have been published, most

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of them included in wider studies. The first contribution was by Zimmer (1921), which mentioned *Iphinoe trispinosa* (Goodsir, 1843) from Santa Cruz de Tenerife. Within a global study of the Tunel de la Atlántida, a volcanic submarine cave from Jameos del Agua (Lanzarote), García-Valdecasas (1985) collected some specimens of Leuconidae.

The greatest contribution to the knowledge of cumaceans from the Canary Islands was provided by the RRS Discovery II cruise carried out in deep water in 1968. In a preliminary study, Jones & Sanders (1972) suggested the presence of 46 species sampled from 1,564 to 3,301 m in the Canarian waters. The results were published by different authors and jointly with other deep-water Atlantic studies (Jones, 1973, 1974, 1984; Reyss, 1974, 1978; Bishop, 1981). In all, 29 species were recorded from the Canarian waters among which five were considered as endemic species.

Within the framework of a global study of the interstitial fauna from *Cymodocea* meadows and nearby sandy bottoms of the Canary Islands, the present paper deals with the taxonomy and ecology of cumaceans sampled in such environments.

Material and methods

During this study, six stations were sampled: Lanzarote, Playa de las Coloradas L1 (28°53.15'N, 13°47.57'W); Fuerteventura, Las Playitas F1 (28°13.29'N, 13°59.2'W); Gran Canaria, Playa del Cabrón C1 (27°52.7'N, 15°22.51'W); Tenerife, Ensenada de los Abades T1 (28°7.53'N, 16°26.38'W), Granadilla T3 (28°4.0'N, 16°30.15'W; 28°6.18'N, 16°28.12'W) and El Médano T2 (28°3.0'N, 16°32.4'W) (Fig. 1). Sediment samples were collected by scuba diving on sandy bottoms and *Cymodocea nodosa* (Ucria) Ascherson meadows from 5 to 25 m depth with a corer of 45 mm in diameter driven into the sediment to a depth of 30 cm. At each station, five cores were collected, one of them used for the study of physical and chemical parameters and the others for faunistic analysis.

For the study of vertical distribution of organisms, each core was divided into four layers: 0-5 cm, 5-10 cm, 10-20 cm and 20-30 cm. Granulometric analysis was carried out from 100 g of sediment using a series of screens that follow the Wentwort scale (Buchanan, 1984). The organic matter content of the sediment was estimated from a sample of 1 g using the Walkey (1947) method, adapted and modified by Jackson (1960). The carbonate content was analysed with a Bernard calcimetre from a sample of 0.5 g of sediment. Finally, the nitrogen content was estimated from a sample of 4 g of sediment using the Kjeldahl method (Marr et al., 1990).

The material sampled was deposited in the collection of benthic organisms of the Department of Animal Biology of the University of La Laguna (DZUL) and in the cumacean collection of the *Institut de Ciències del Mar* of Barcelona (ICM).

Results

During the study of infaunal communities from *Cymodocea nodosa* meadows and nearby sandy bottoms, 25 taxonomical groups were identified (Brito, 1999). Cumaceans were not a dominant taxa and their frequency of occurrence was low (25%). In all, 58 specimens of cumaceans belonging to six species were collected. Four species were recorded for the first time in the Canarian waters. *Iphinoe* cf. *inermis* Sars, 1879 was recorded for first

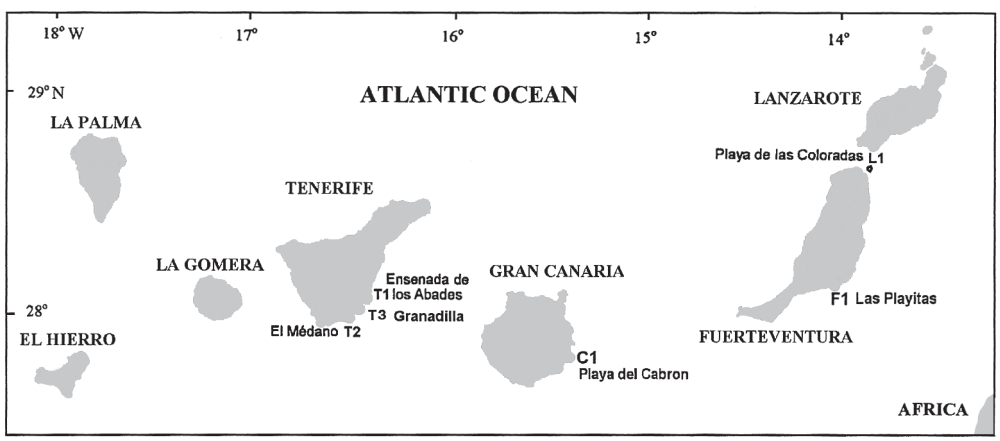

Figure 1. Map of the Canary Islands showing the sampling stations.
Figure 1. Carte des Iles Canaries avec les stations d'échantillonnage.

time in the Atlantic Ocean and a new species, *Iphinoe canariensis* sp. nov. was described. The seasonal monitoring of the community over two years showed higher cumacean abundance during wintertime when 77% of specimens were collected.

ORDER CUMACEA
Family Bodotriidae Scott, 1901
Genus *Eocuma* Marcusen, 1894
Eocuma sp.

Material examined: Fuerteventura, Las Playitas, 20-9-94, sandy bottoms with rhizomes of *Cymodocea*, 5 m depth, one manca.

Remarks
Structure of uropod and morphology of the basis of first pereopod place this specimen within the genus *Eocuma*. However, its developmental stage, where some morphological characters are not well developed, and the poor condition of preservation did not allow a determination at a species level.

Ecology
This is a rare species only collected in sandy bottoms with rhizomes of *Cymodocea*. The sediment was composed of fine sand (Q_{50}= 0.190) moderately or well moderately sorted with a low silt-clay content. The specimen was found in the upper layer of sediment where the organic matter content was 0.50%. The carbonate content was high (20.4%) and constant in all sediment layers. On the contrary, the nitrogen content was very low, 0.02% in the upper layer and slightly decreasing with depth.

Genus *Iphinoe* Bate, 1856
Iphinoe cf. *inermis* Sars, 1879
(Fig. 2)

Material examined: Gran Canaria, Playa del Cabrón, 29-3-94, sandy bottoms with rhizomes of *Cymodocea*, 7 m depth, one adult female with some embryos in the marsupium and ten mancas that were almost certainly released during sampling collection or fixation.

Description
Adult female 7 mm total length. Carapace (Fig. 2a) shorter than a fourth of total length, nearly twice as long as deep. Anterolateral angle acute with a small auxiliary tooth on upper margin. Pseudorostrum short and rounded in dorsal view. Five thoracic segments free. Peduncle of first antenna 3-segmented, third segment being the longest, main flagellum with a distal aesthetasc. Last abdominal somite with a pair of perianal setae. Uropod peduncle longer than exopod (Fig. 2b), with eight spines on inner edge; endopod with four spines of increasing length on inner edge of proximal joint and 11 on the distal one. Exopod of uropod with eight plumose setae on inner edge and three distal spines.
Pigmentation: the female specimen shows several small spots that persist after fixation, distributed on the whole body except on the first and second thoracic somites.

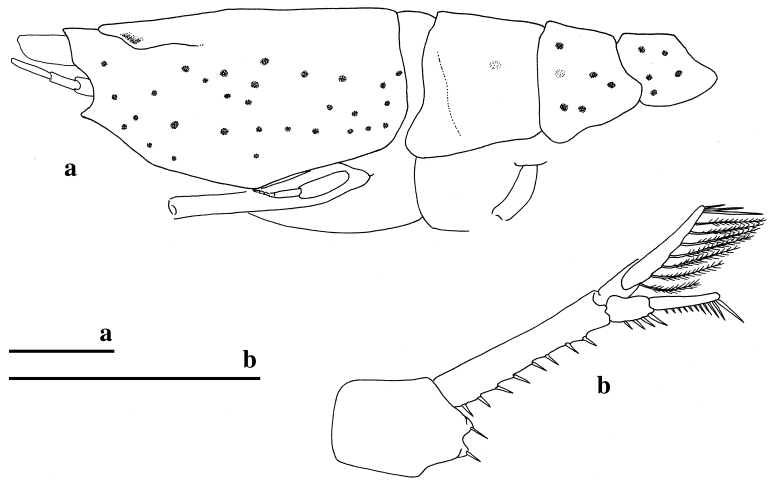

Figure 2. *Iphinoe inermis* Sars 1878, adult female; **a.** carapace in lateral view; **b.** uropod and last abdominal somite. Scale bars: 0.5 mm.
Figure 2. *Iphinoe inermis* Sars 1878, femelle adulte : **a.** vue latérale gauche de la carapace ; **b.** uropode et dernier somite abdominal. Echelles : 0,5 mm.

Remarks
The adult specimen is similar to the description of *Iphinoe inermis* by Sars (1879), characterized by the lack of spines on middorsal line of the carapace, the possession of a pair of perianal setae, the relative length of uropod segments and the number of spines on the uropod peduncle. However, the length-depth ratio of the carapace is nearly 2 in the specimen examined by us, while Ledoyer (1965) mentioned lower values for *I. inermis* from the northwestern Mediterranean. The length-depth ratio of the carapace is an anatomical character used to differentiate species of this genus (Ledoyer, 1965; Day, 1978; Corbera & García-Rubies, 1998). As differences in length-depth ratio have been found and no adult male has been studied, the determination of this specimen may need confirmation.

Ecology and distribution within the sediment
The specimens were collected in *Cymodocea* meadows. The sediment was composed of fine sand in all layers (Q_{50}= 0.221-0.178) and was moderately sorted. The muddy content was lower than 1% and the mean organic matter content was 0.33% with increasing values in deeper layers. The mean carbonate content was 32.9% increasing slightly in deeper layers (35.4%) and the nitrogen content (0.02%) was constant in all layers.

The specimens were found in the 0-5 cm upper layer where the sediment was moderately sorted (S_0= 1.49) and the organic matter content was 0.2%.

Geographic distribution: Mediterranean Sea (Fage, 1951), the Canary Islands (Gran Canaria).

Iphinoe canariensis sp. nov.
(Figs 3, 4, 5)

Type locality: Canary Islands, Tenerife, Tanque del Vidrio (Granadilla), sta. T3E2, 28º.3'N, 16º30.7'W, Feb. 1998, in *Cymodocea* meadows, 12 m depth.
Other localities: Central Térmica of Granadilla, sta. T3C1, 28º4.57'N, 16º29.17'W, sandy bottoms, 13 m depth. Ensenada de Los Abades, sta. T121C10, Feb. 1994 sandy bottoms with rhizomes of *Cymodocea*, 13-16 m depth. El Médano, sta. T21C10, June1994, sandy bottoms with rhizomes of *Cymodocea*, 7 m depth

Type specimens. Holotype: one adult ♂ partially dissected and mounted on slide Tanque del Vidrio (Granadilla), sta. T3E2, CUM-0022 (ICM). Allotype: one ovigerous ♀ partially dissected and mounted on one slide, Central Térmica of Granadilla, sta. T3C1, CUM-0023 (ICM). Paratypes: two preadult ♀♀, three juveniles and one manca, same locality than allotype, CUM-0024 (ICM); one adult ♂, one preadult ♀, sta. T3B1, CUM-0025 (ICM).
Etymology: the species name is derived from the Canary Islands, Macaronesian archipelago.

Description

Adult male, 7.56 mm total length. Integument finely scaly, poorly calcified and slightly translucent. Carapace 1/4 of total length, 2.28 times as long as deep, without spines on middorsal line (Fig. 3a). Anterolateral angle rounded. Eyelobe well developed with 5 lenses. Pseudorostrum short, less than 1/7 of carapace, tip rounded in dorsal view. Five thoracic somites free, the first visible dorsally and laterally. A sternal process with eight teeth on the sternite of second thoracic somite (Fig. 4b). Peduncle of first antenna 3-jointed (Fig. 3e), third joint the longest, main flagellum with one aesthetasc and two terminal setae. Flagellum of second antenna reaching beyond last abdominal somite. Basis of third maxilliped (Fig. 3b) longer than the rest of leg, distal process reaching beyond articulation between merus and carpus; merus expanded distally but not reaching articulation between carpus and propodus. Basis of first pereopod (Fig. 3c) slightly shorter than the remaining joints together, inner edge with hairs and a distal plumose seta; ischium short with a small plumose seta on inner edge; merus slightly longer than ischium but shorter than carpus; carpus, propodus and dactylus of similar length, the latter with three long distal spines. Second pereopod (Fig. 3d) shorter than basis of first pereopod. Basis shorter than rest of leg, with several plumose setae on both edges; merus and carpus with a hard distal spine but without plumose setae; dactylus as long as carpus and propodus combined, with spines on both edges and some of them located distally. Last abdominal somite

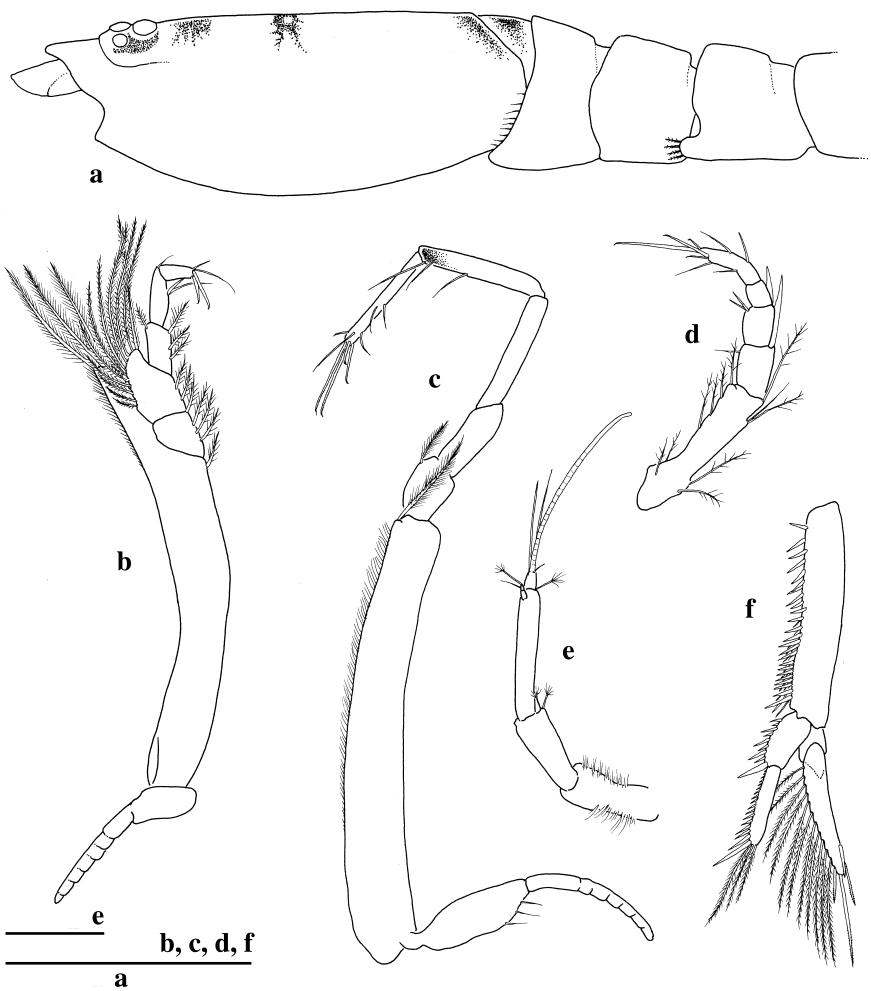

Figure 3. *Iphinoe canariensis* sp. nov. adult male, holotype; **a.** carapace in lateral view; **b.** third maxilliped; **c.** first pereopod; **d.** second pereopod; **e.** first antenna; **f.** uropod. Scale bars: a-d, f: 0.5 mm; e: 0.1 mm.

Figure 3. *Iphinoe canariensis* sp. nov., mâle adulte, holotype; **a.** vue latérale gauche de la carapace ; **b.** troisième maxillipède ; **c.** premier péréiopode ; **d.** deuxième péréiopode ; **e.** première antenne ; **f.** uropode. Echelles : a-d, f : 0,5 mm ; e : 0,1 mm.

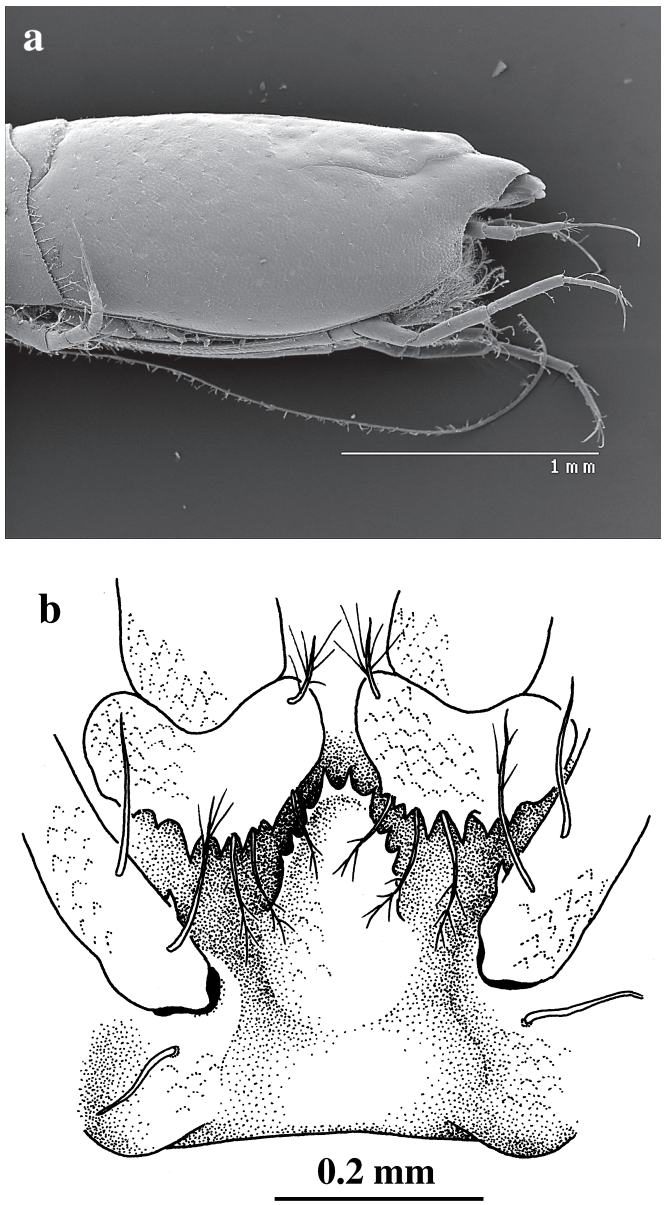

Figure 4. *Iphinoe canariensis* sp. nov. adult male; **a.** SEM photograph of the carapace in lateral view; **b.** sternal process on the second sternite.

Figure 4. *Iphinoe canariensis* sp. nov., mâle adulte ; **a.** photographie au microscope électronique à balayage (MEB) du côté droit de la carapace ; **b.** processus médian sur le deuxième sternite.

with a pair of perianal setae. Uropod peduncle 1.5 times as long as endopod (Fig. 3f), with about 28 spines on inner edge, arranged in two rows on its distal half. Endopod slightly shorter than exopod, two-segmented, with nine spines on the inner edge of first joint and 17 on second one.

Adult female, 5.75 mm total length. Carapace 2.1 as long as deep and shorter than 1/4 of total length; with nine teeth on the anterior half of middorsal line (Fig. 5a). Anterolateral angle acute and finely serrated on lower edge. Uropod peduncle 1.5 times as long as the endopod (Fig. 5e), with eight spines on inner edge; endopod slightly shorter than exopod, two-jointed, with four spines on the inner edge of first joint and seven on second one. Exopod two-jointed with six plumose setae followed by two spiniform setae on inner edge and four distal spiniform setae.

Morphological variability

The study of all specimens showed a stability of the morphological characters that have a taxonomic relevance (Table 1), which only varied between different developmental stages. The number of middorsal spines of the carapace varied from six to nine in females and increased in successive female developmental stages. This trend was also observed for the number of spines on their uropod peduncle and their endopod. Although preadult males followed the same pattern as females, males change markedly their morphology after the first adult moult, just like in other species of the genus (Ledoyer, 1965). Adult males showed an increase of the relative length of carapace, a loss of the middorsal spines and an increase of the number of uropod spines.

Pigmentation: Males and immature females showed a constant pigmentation pattern that persisted after fixation. There are three pigmented areas on the carapace, one behind the eyelobe, another on its middle edge and the last on its distal edge. The distal part of the propodus of the first pereopod was also pigmented. Apart from the carapace pigmentation the ovigerous female also showed an abundant pigmentation on thoracic and abdominal somites.

Remarks

Iphinoe canariensis sp. nov. belongs to the *Iphinoe trispinosa*'s group. The males are very closely related to *I. douniae* Ledoyer, 1965 by the lack of middorsal teeth and the length-depth ratio of the carapace (Table 2). However, *I. canariensis* has the basis of first pereopod comparatively shorter, lacks plumose setae on carpus of second pereopod and shows a clearly different sternal process. Females of *I. canariensis* have a higher number of teeth on carapace than *I. trispinosa* but similar to *I. douniae* and *I. dayi* Jones, 1960; however, the number of spines on uropod peduncle and endopod is always lower than in the two aforementioned species.

Ecology and distribution within the sediment

Iphinoe canariensis was the most abundant cumacean species collected during this study, but it was only found in sandy bottoms and *Cymodocea* meadows from Tenerife. Most of the specimens were collected in the upper layer of

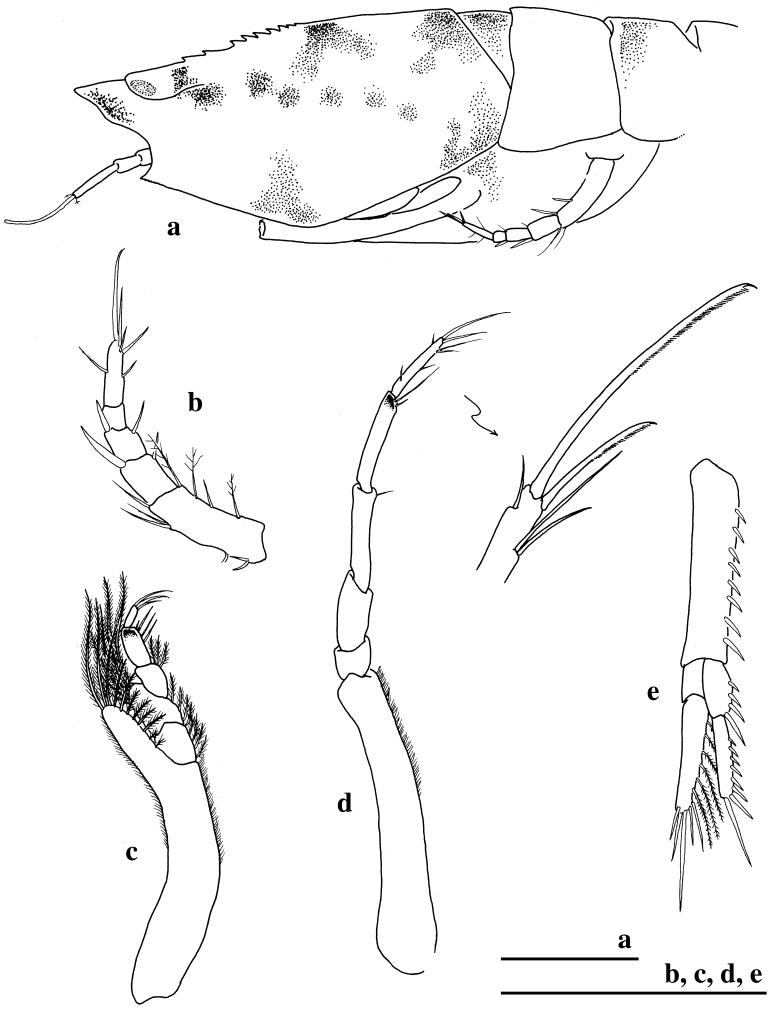

Figure 5. *Iphinoe canariensis* sp. nov. adult female, allotype; **a.** carapace in lateral view; **b.** second pereopod; **c.** third maxilliped; **d.** first pereopod; **e.** uropod. Scale bars: 0.5 mm.

Figure 5. *Iphinoe canariensis* sp. nov., femelle adulte, allotype ; **a.** vue latérale gauche de la carapace ; **b.** deuxième péréiopode ; **c.** troisième maxillipède ; **d.** premier péréiopode ; **e.** uropode. Echelles : 0,5 mm.

sediment, but few of them burrowed down to the 5-10 cm layer. The seasonal sampling showed a higher abundance of this species during winter and a preference for sandy bottoms (62%) in comparison with *Cymodocea* meadows (38%). In Los Abades, the sediment in the upper layer (0-20 cm) was fine sand (Q_{50}= 0.23) and poorly sorted. In El Médano, the sediment was medium sand (Q_{50}= 0.29) and well sorted in the 0-10 cm layer. The carbonate content was 18% and 2.8% and the nitrogen content 0.03% and 0.02% respectively. The organic matter content was low and fluctuated between 0.45% and 0.35%.

Geographic distribution: southeastern coast of Tenerife, the Canary Islands.

Genus *Bodotria* Goodsir, 1843
Bodotria arenosa Goodsir, 1843

Material examined: Tenerife, Central Térmica of Granadilla, sta. T3C3I98, Feb. 1998, sandy bottoms, 17-25 m depth, one ovigerous ♀, one adult ♂.

Remarks
Bodotria arenosa was described from the Scotland coast; it is very closely related to *B. scorpioides* (Montagu, 1804). The two species have been confused until the revision of Le Loeuff & Intes (1977). *B. arenosa* may be distinguished because it has a one-jointed uropod endopod, while in *B. scorpioides* it is two-jointed.

Ecology
All the specimens were collected during winter in sandy bottoms, three of them in an area affected by the warm water emission of a power station.

Geographic distribution: Eastern Atlantic Ocean, from Norway (Sars, 1900) to the Canary Islands (Tenerife), Mediterranean Sea and Black Sea (Bacescu, 1951).

Family Nannastacidae Bate, 1865
Genus *Cumella* Sars, 1865
Cumella africana Bacescu, 1972

Material examined: Lanzarote, Playa de las Coloradas, 23-12-1993, in *Cymodocea* meadows, 11 m depth, one immature ♀ (Fig. 6)

Remarks
Cumella africana was described from the sandy bottoms of Mauritania coast (Bacescu, 1972). Although it is closely related to *C. limicola* Sars, 1879, from the Mediterranean Sea, especially the females, they may be differentiated by the lack of spines in the middorsal line of carapace, the relative length of joints of fifth pereopod and the smaller length of uropod peduncle.

Ecology and distribution within the sediment
The specimen was collected between rhizomes of *Cymodocea*. At the sampling station the sediment was a muddy sand, with a dominant fraction of fine sand (Q_{50}=0.130-0.178) moderately sorted (S_0= 1.47) and with a high mud content (8.4%).

The specimen was collected in the 0-5 cm layer where the organic matter content showed the highest values of the studied stations (0.6%). The carbonate content was very high, with a value of 61% in the upper layer of sediment and increasing values in deeper layers. The nitrogen content was 0.03% in all the layers.

Table 1. Morphological variability of *Iphinoe canariensis* sp. nov. collected near Granadilla, south coast of Tenerife. TL, total length; CL, carapace length including pseudorostrum; CD, carapace maximum depth; m, male; f, female.

Tableau 1. Variabilité morphologique des spécimens d'*Iphinoe canariensis* sp. nov. récoltés près de Granadilla, sur la côte sud de Tenerife.TL, longueur totale ; CL, longueur de la carapace incluant le pseudorostre ; CD, hauteur maximale de la carapace ; m, mâle ; f, femelle.

sex	stage	TL (mm)	CL (mm)	CD (mm)	CL/CD	number of spines on		
						Carapace	uropod peduncle	endopod of uropod 1st joint, 2nd joint
m	adult	7.65	1.82	0.80	2.28	0	>28	8, 17
m	adult	7.40	1.75	0.75	2.3	0	>27	9, 17
m	adult	7.25	1.75	0.75	2.3	0	>26	8, 13
m	preadult	6.25	1.55	0.75	2.1	8	8	4, 7
f	adult	5.75	1.55	0.75	2.1	9	8	4, 7
f	preadult	6.25	1.58	0.78	2	8	10	4, 7
f	preadult	5.55	1.48	0.75	1.98	7	8	4, 7
f	preadult	5.30	1.40	0.68	2.1	7	8	4, 7
f	preadult	5.30	1.33	0.75	1.8	7	8	4, 5
f	preadult	4.75	1.23	0.6	2	?	7	4, 6
	juvenile	4.75	1.25	0.65	1.9	6	7	4, 6
	juvenile	4.63	1.25	0.70	1.8	7	8	4, 5
	juvenile	4.50	1.28	0.65	1.96	6	7	4, 5
	juvenile	4.50	1.15	0.6	1.9	6	7	4, 5
	juvenile	4.13	1.10	0.6	1.8	6	7	4, 6
	juvenile	2.90	0.98	0.48	2	6	5	4, 4
	manca	2.60	0.73	0.43	1.7	6	3	3, 4

Table 2. Morphological features of four *Iphinoe* species. CL, carapace length including pseudorostrum; CD, carapace maximum depth.

Tableau 2. Morphologie externe de quatre espèces d'*Iphinoe.* CL, longueur de la carapace incluant le pseudorostre ; CD, hauteur maximale de la carapace.

	I. canariensis	*I. trispinosa*(1)	*I. douniae*(2)	*I. dayi*(3)
Adult male				
CL/CD	2.3	2.0	2.2-2.4	2.0
Number of middorsal spines	0	0	0	5-7
Length of basis of the first pereopod compared with the rest of leg	shorter	longer	similar	similar
Adult female				
CL/CD	1.9	2.0	2.4	2.0
Number of middorsal spines	6-9	2-6	6-12	8-10
Number of spines on uropod peduncle	8	10	11	15
Number of spines on uropod endopod (1st joint, 2nd joint)	4, 7	5, 14	5, 11	6, 6

(1) Data from Sars (1900); (2) data from Ledoyer (1965); (3) data from Day (1978)

Geographic distribution: Coast of Mauritania (Bacescu, 1972) and the Canary Islands (Lanzarote), from 11 to 94 m depth.

Family PSEUDOCUMATIDAE Sars, 1865

Genus *Pseudocuma* Sars, 1865

Pseudocuma longicorne (Bate, 1858)

Material examined: Tenerife, Los Abades, sta. T131A5, 15-05-1994, in sandy bottoms with rhizomes of *Cymodocea*, 13 m depth, one adult ♂, one juvenile.

Remarks

Pseudocuma longicorne, described by Bate (1858) from the south of Ireland, has a wider geographic distribution than the other species of the genus. In the Atlantic Ocean it coexists with two other species, *P. chevreuxi* Fage, 1928 and *P. simile* Sars, 1900. The presence of dorsolateral keels on the carapace and the lack of denticulation on the anterolateral angle allow to separate *P. longicorne* from the other two species.

Ecology and distribution within the sediment

The sediment was composed of fine sand (Q_{50}= 0.224-0.245) in the 0-20 cm layer and medium sand (Q_{50}= 0.331) in the 20-30 cm layer. The specimens were collected in the 0-5 cm layer, where the sediment was poorly sorted and the mud content lower than 1%. The organic matter content was 0.45% in the upper layer with decreasing values in the deeper ones. The carbonate content showed quite low values with a mean of 4.1%. The nitrogen content was higher in the upper layer (0.03%).

Geographic distribution: Eastern Atlantic Ocean from North Sea to the Canary Islands (Tenerife), Mediterranean (Fage, 1951) and Black Sea (Bacescu, 1951). Also recorded from South Africa (Jones, 1960) and Vietnam (Zimmer, 1952).

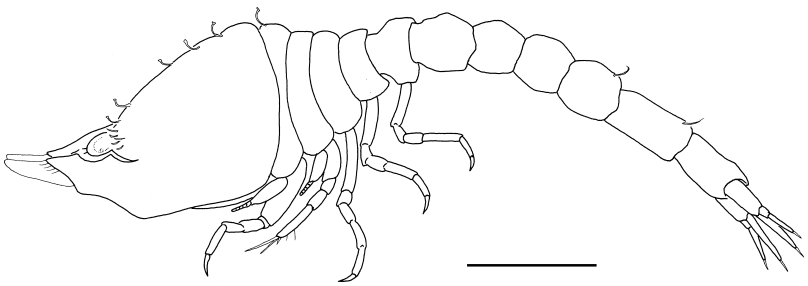

Figure 6. *Cumella africana* Bacescu, 1972. Immature female. Scale bar: 0.2 mm.
Figure 6. *Cumella africana* Bacescu, 1972. Femelle immature. Echelle : 0,2 mm.

Discussion

Dredges and corers probably do not sample efficiently cumaceans communities (Jones & Sanders, 1972) because these crustaceans have generally low densities, a swimming activity and may have a patchy distribution. Corbera et al. (2000) reported an increase of nocturnal densities for cumaceans in the nearest bottom water layer, which implies a nocturnal swimming activity and the use of sediment as refuge during day time, at least by a part of the population. Consequently, although corers do not provide data for the whole population, such samplings may inform on the presence of these crustaceans within the sediment.

Most of the cumacean populations showed higher densities during spring and summer (Roccatagliata, 1991; Corbera et al., 2000). However, mesohaline and oligohaline species like *Coricuma nicoyensis* Watling & Breedy, 1988 from gulf of Nicoya (Costa Rica) and *Spilocuma watlingi* Omholt & Heart, 1979 from Mobile Bay (Alabama, USA) showed higher densities in winter. In these populations, density changes have been associated with fluctuations of salinity (Vargas, 1989; Modlin, 1992). The higher winter abundance observed in the Canary Islands may be explained by a seasonal decrease of the swimming activity in the nearest bottom water layer, due to lower temperatures that might cause a higher presence of cumaceans within the sediment. This behaviour has also been observed during this study in amphipods, which were found in a deeper layer of sediment (20-30 cm depth) during winter (unpublished data).

Cumaceans were collected in the upper layer of sediment (0-5 cm). This pattern of distribution has been observed in all the sampling stations, and suggests that cumaceans are dependent of waters with a high oxygen content.

The cumacean fauna observed in the Canary Islands during this study comprised several boreo-Mediterranean species (*Bodotria arenosa, Pseudocuma longicorne* and *Iphinoe cf inermis*) and two other species, one with a reduced distribution, *Cumella africana*, the other one probably endemic, *Iphinoe canariensis* sp. nov. Instead, the species of central and south Atlantic coast of Africa were not found in our area. This distribution pattern must be related to the hydrography of the region where a predominant north-south current exists (Navarro-Pérez & Barton, 2001). However, the cumacean fauna of the Canary Islands is still poorly known and further studies are needed to complete this biogeographical panorama of the Macaronesian Region.

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References

Bacescu M. 1951. *Fauna Republicii Populare Române. Vol. IV Crustacea, Fasc. 1 Cumacea*. Editura Academiei Republicii Populare Române. 91 pp.

Bacescu M. 1972. *Cumella africana* n. sp. and *Makrokylindrus* (*Coalescuma*) *reyssi* n.sp. (Cumacea, Crustacea) from the Saharian bottom of the Atlantic. *Revue Roumaine de Biologie, série de Zoologie,* **17**: 143-151.

Bate S. 1858. On the genus *Scorpionura*. *Natural History Revue, Dublin*, **5**: 202-205.

Bishop J.D.D. 1981. A revised definition of the genus *Epileucon* Jones (Crustacea, Cumacea), with descriptions of species from the deep Atlantic. *Philosophical Transactions of the Royal Society of London*, **291**: 353-409.

Brito M.C. 1999. *Estudio de las comunidades intersticiales del sebadal (Cymodocea nodosa) en Canarias, con especial referencia a los Anélidos Poliquetos.* PhD Thesis, University of La Laguna. 618 pp.

Buchanan J.B. 1984. Sediment Analysis. In *Methods of the study of marine benthos* (Holme, N.A. & McIntyre A.D., eds), pp. 41-65. Blackwell: Oxford.

Cartes J.E. & Sorbe J.-C. 1997. Bathyal cumaceans of the Catalan Sea (north-western Mediterranean): faunistic composition, diversity and near-bottom distribution along the slope (between 389 and 1859 m). *Journal of Natural History,* **31**: 1041-1054.

Corbera J. 2000. Systematics and distribution of cumaceans collected during BENTART-95 cruise around South Shetland Islands (Antarctica). *Scientia Marina*, **64**(1): 9-28.

Corbera J. & García-Rubies A. 1998. Cumaceans (Crustacea) of the Medes Islands (Catalonia. Spain) with special attention to the genera *Bodotria* and *Iphinoe*. *Scientia Marina*, **62**: 101-112.

Corbera J., San Vicente C. & Sorbe J.-C. 2000. Small-scale distribution, life cycle and secondary production of *Cumopsis*

goodsir in Creixell Beach (western Mediterranean). *Journal of the Marine Biological Association of the United Kingdom*, **80**: 271-282.

Dauvin J.-C. & Zouhiri S. 1996. Suprabenthic crustacean fauna of a dense *Ampelisca* community from the English Channel. *Journal of the Marine Biological Association of the United Kingdom,* **76**: 909-929.

Day J. 1978. Southern African Cumacea. Part 2. Family Bodotriidae, subfamily Bodotriinae. *Annals of the South African Museum*, **75**(7): 159-290.

Dixon A.Y. 1944. Notes on certain aspects of the biology of *Cumopsis goodsiri* (van Beneden) and some other cumaceans in relation to their environment. *Journal of the Marine Biological Association of the United Kingdom,* **26**: 61-71.

Fage L. 1951. *Faune de France. 54 Cumacés.* Paul Lechevalier, Paris. 136 pp.

García-Valdecasas A. 1985. Estudio faunístico de la cueva submarina "Tunel de la Atlántida", Jameos del Agua, Lanzarote. *Naturalia Hispanica*, **27**: 1-56.

Jackson M.L. 1960. *Soil chemical analysis*. Prentice Hall, New York, 485 pp.

Jones N.S. 1960. Cumacea from South Africa. *Annals and Magazine of Natural History*, Ser **13**, 2: 171-180.

Jones N.S. 1973. Some Cumacea from the deep water of the Atlantic. *Crustaceana*, **25**: 297-319.

Jones N.S. 1974. *Campylaspis* species (Crustacea: Cumacea) from the deep Atlantic. *Bulletin of the British Museum (Natural History), Zoology series,* **27**: 247-300.

Jones N.S. 1984. The family Nannastacidae (Crustacea: Cumacea) from the deep Atlantic. *Bulletin of the British Museum (Natural History), Zoology series*, **46** (3): 207-289.

Jones N.S. & Sanders H.L. 1972. Distribution of Cumacea in the deep Atlantic. *Deep Sea Research,* **19**: 737-745.

Ledoyer M. 1965. Sur quelques espèces nouvelles d'*Iphinoe* (Crustacea Cumacea). Discussion et description comparative des espèces européennes déjà connues. *Recueil des Travaux de la Station Marine d'Endoume*, **39** (55): 253-294.

Le Loeuff P. & Intes A. 1977. Les *Bodotria* (Crustacea, Cumacea) des mers d'Europe et des côtes occidentales de l'Afrique tropicale. *Bulletin du Museum National d'Histoire Naturelle, Paris*, 3e série, **347**: 1138-1164.

Macquart-Moulin C. 1991. La phase pélagique nocturne des Cumacés. *Journal of Plankton Research*, **13**(2): 313-337.

Marr I.L., Cresser M.S. & Gómez-Ariza J.L. 1990. Química Analítica del Medio Ambiente. *Servicio de Publicaciones de la Universidad de Sevilla. Ser. Ciencias,* **29**: 1-327.

Modlin R.F. 1992. Population structure, distribution, life cycle and reproductive strategy of *Spilocuma watlingi* Omholt and Heard, 1979 and *S. salomani* Watling, 1977 (Cumacea: Bodotriidae) from coastal waters of the Gulf of Mexico. *Northeast Gulf Science,* **12**: 83-91.

Navarro-Pérez E. & Barton E.D. 2001. Seasonal and interannual variability of the Canary Current. In: *An Interdisciplinary View of the Ocean* (J.L. Pelegrí, I. Alonso, & J. Arístegui eds). *Scientia Marina*, **65** (Suppl. 1): 205-213.

Pike R.B. & Le Sueur R.F. 1958. The shore zonation of some Jersey cumacea. *Annals and Magazine on Natural History*, ser. **13**, **1**: 515-523.

Reyss D. 1974. Contribution à l'étude des cumacés de profondeur de l'Atlantique Nord : Le genre *Makrokylindrus* Stebbing. *Crustaceana*, **26**(1): 5-28.

Reyss D. 1978. Cumacés de profondeur de l'Atlantique Tropical. Famille des Lampropidae. *Crustaceana*, **35**: 71-84.

Roccatagliata D. 1991. *Claudicuma platense* Roccatagliata, 1981 (Cumacea) a new reproductive pattern. *Journal of Crustacean Biology*, **11**: 113-122.

Sars G.O. 1879. Nye Bidrag till kenskapen om Middelhavets invertefauna. 2. Middelhavets Cumaceer. *Archiv für Mathematik og Naturvidenskab,* **3-4**: 1-196.

Sars G.O. 1900. *An account of the Crustacea of Norway. Vol. III. Cumacea*. Bergen Museum, Christiania (Oslo). 115 pp. 72 pl.

Vargas J.A. 1989. Seasonal abundance of *Coricuma nicoyensis* Watling and Breedy, 1988 (Crustacea: Cumacea) on a tropical intertidal mud flat. *Revista de Biología Tropical*, 37: 207-211.

Walkey A. 1947. A critical examination of a rapid method for determining organic carbon in soil. *Soil Science*, **63**: 251-263.

Wang Z. & Dauvin J.-C. 1994. The suprabenthic crustacean fauna of the infralittoral fine sand community from the Bay of Seine (Eastern English Channel): composition, swimming activity and diurnal variation. *Cahiers de Biologie Marine,* **35**: 135-155.

Wieser W. 1956. Factors influencing the choice of substratum in *Cumella vulgaris* Hart (Crustacea, Cumacea). *Limnology and Oceanography,* **1**: 274-285.

Zimmer C. 1921. Mitteilung über Cumaceen des Berliner Zoologischen Museums *Mitteilunguen aus dem Zoologischen Museum in Berlin*, **10**: 117-149.

Zimmer C. 1952. Indochinesische Cumaceen. *Mitteilunguen aus dem Zoologischen Museum in Berlin*, **28**: 5-35