

# AN ACCOUNT ON THE STOMATOPOD CRUSTACEANS OF MADEIRA

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With 10 figures and 1 table

**RESUMO.** No presente trabalho o autor referencia as espécies de Estomatópodes colhidas até à data nos mares da Madeira e existentes na colecção do Museu Municipal do Funchal. Assim, das seis espécies encontradas, quatro são novas para a área, *Platysquilla eusebia* (Risso, 1816), *Rissoides desmaresti* (Risso, 1816), *Rissoides pallidus* (Giesbrecht, 1910) e *Parasquilla ferussaci* (Roux, 1830). Sempre que possível são dadas indicações sobre o seu habitat e distribuição vertical e é apresentada uma chave para identificação das espécies aqui assinaladas.

## INTRODUCTION

In January 1984 a stomatopod was collected by the Museum's boat «*IANTHINA*» when line fishing in the Bay of Funchal. On examination this crustacean turned out to be *Rissoides desmaresti* (Risso, 1816), which according to Manning (1977 & 1981) was only known from the Mediterranean, the western coast of Portugal and further north. This fact made us look for other stomatopods in the MMF collection, and it was not without surprise that rather a large amount of specimens of these crustaceans were found to be stored there, among them no less than six different species four of which had never been recorded from Madeira. Many of them had already been identified during the 50's by Armando Figueira, assistant curator at the Museum at that time and mainly in charge of the carcinological collection. Judging by an extensive correspondence he entertained with Dr. Raymond B. Manning and Prof. L. B. Holthuis he had been working on this group of crustaceans for some time and intended to publish a paper on the results of this study which, however, never came to a conclusion as he left the Museum to take up a post at the National Museum of Natural Sciences in Ottawa, Canada.

A careful re-examination of the whole material in the light of recent studies of these crustaceans and a comparison with material from the Mediterranean confirmed Figueira's identifications and in view of the fact that the present material represents a considerable extension of their distributional area the author decided to publish the present paper.

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The taxa are presented in alphabetical order of the families they belong to. Detailed descriptions of the species we consider sufficiently characterized in previous literature are not given.

Drawings of parts considered relevant in the case of the species recorded for the first time from Madeira are given and differences considered significant between our specimens and those of the Mediterranean used for comparison are discussed.

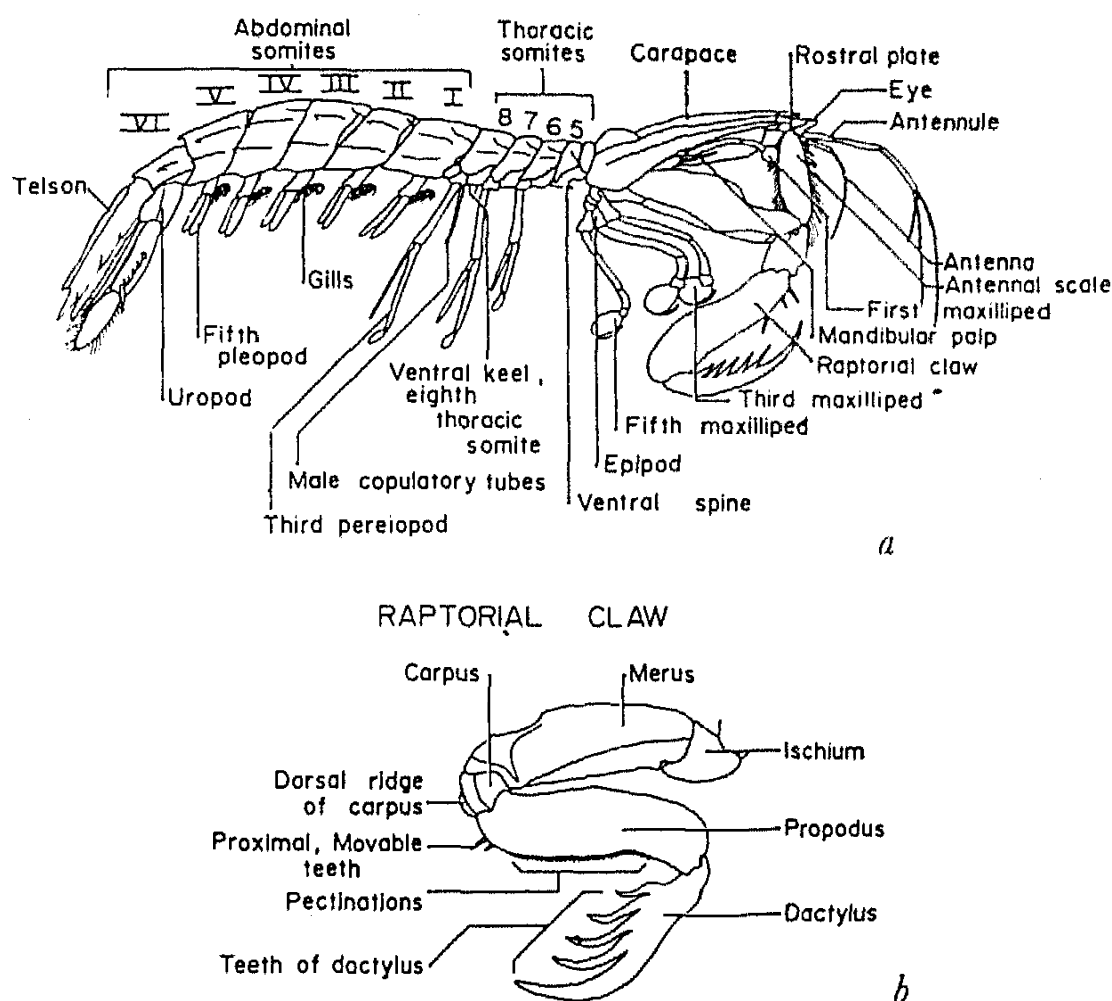


Fig. 1. Diagrammatic sketches of: a, a squillid and b, a raptorial claw, illustrating terms used in the text and key (from Manning, 1969).

Wherever possible we have tried to give indications on the habitat of the mentioned species based on data on the capture at our disposal.

Finally a key to the Madeiran stomatopods is given which may be useful to other Madeiran researchers interested in this field.

Measurements and indices as well as terminology used in the key (Figs. 1-3) are in accordance with the ones used by Manning (1969).

The abbreviations TL and CL stand for total length and carapace length respectively and are always in millimetres.

The specimens cited in this paper are the property of the following institutions :

MMF — Museu Municipal do Funchal — Madeira

USNM — National Museum of Natural History, Smithsonian Institution — Washington

RMNH — Rijksmuseum van Natuurlijke Historie — Leiden

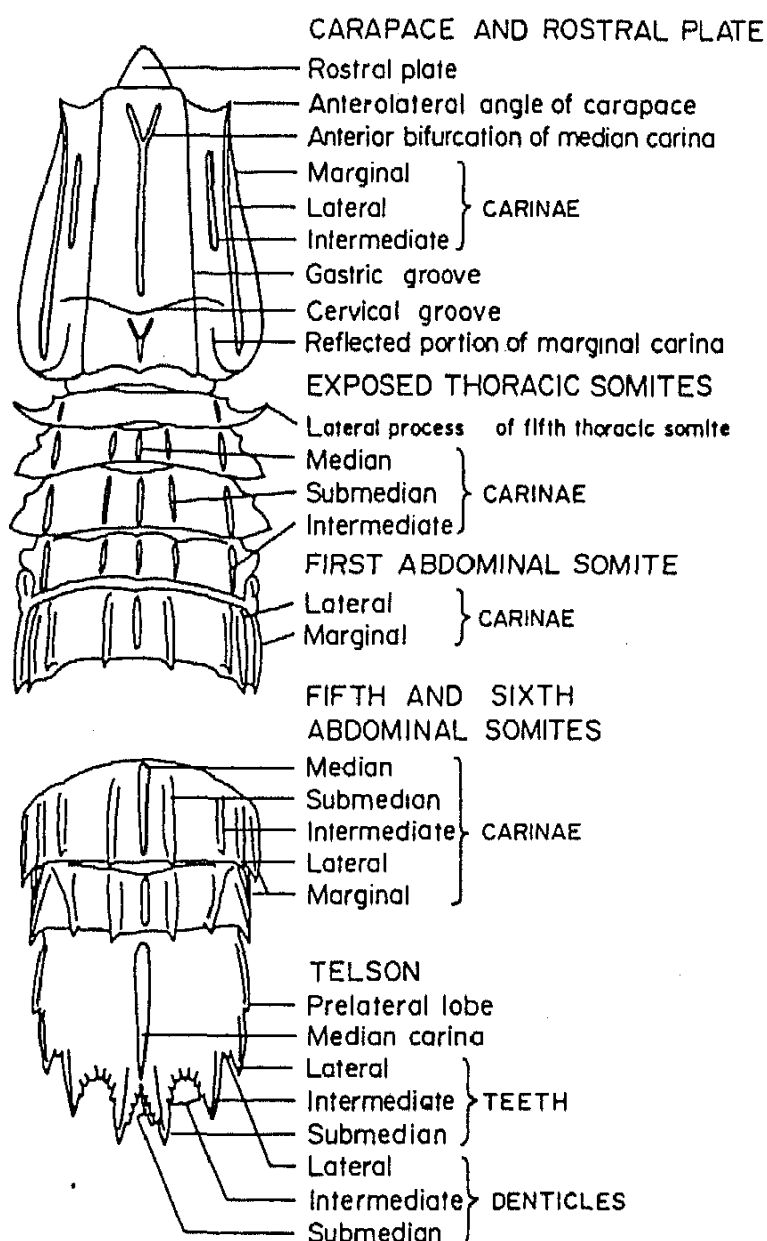


Fig. 2. Terms used in the text and key (from Manning, 1969).

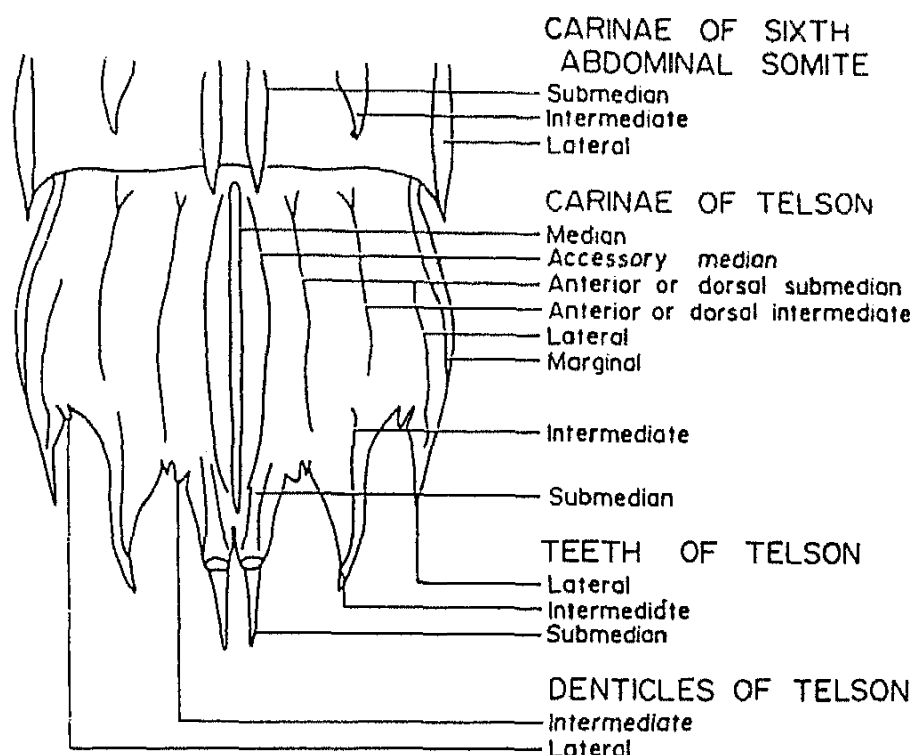


Fig. 3. Terms used in the text and key in respect to gonodactylids and pseudosquillids (from Manning, 1969).

#### ACKNOWLEDGEMENTS

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Family NANNOSQUILLIDAE Manning, 1980.

*Platysquilla eusebia* (Risso, 1816) (Fig. 4)

**Material:** MMF 13621, ♂ 45 mm, Funchal Bay, sandy bottom, 10-15 m, 31.3.1958. 13690, ♀ 48 mm, idem, 1.4.1958. 23734, 5 ♂♂, 36-47 mm, Funchal Bay, 26.8.1959. USNM 76356, ♂ 51 mm, Bay of Naples.

**R e m a r k s:** This species has already been recorded from the Mediterranean, Atlantic Coast of Portugal, France and west coast of Ireland (Fig. 8).

Our specimens agree perfectly with the descriptions given by Manning (1977) and direct comparison with a specimen from the Mediterranean (Bay of Naples) showed no significant differences.

This is a first record of this species from Madeira and constitutes the southern limit of the distributional area of the species in the NE Atlantic.

Though there are only a few specimens in our collection, the data on their capture seem to indicate a preference for sandy and muddy bottoms in shallow water.

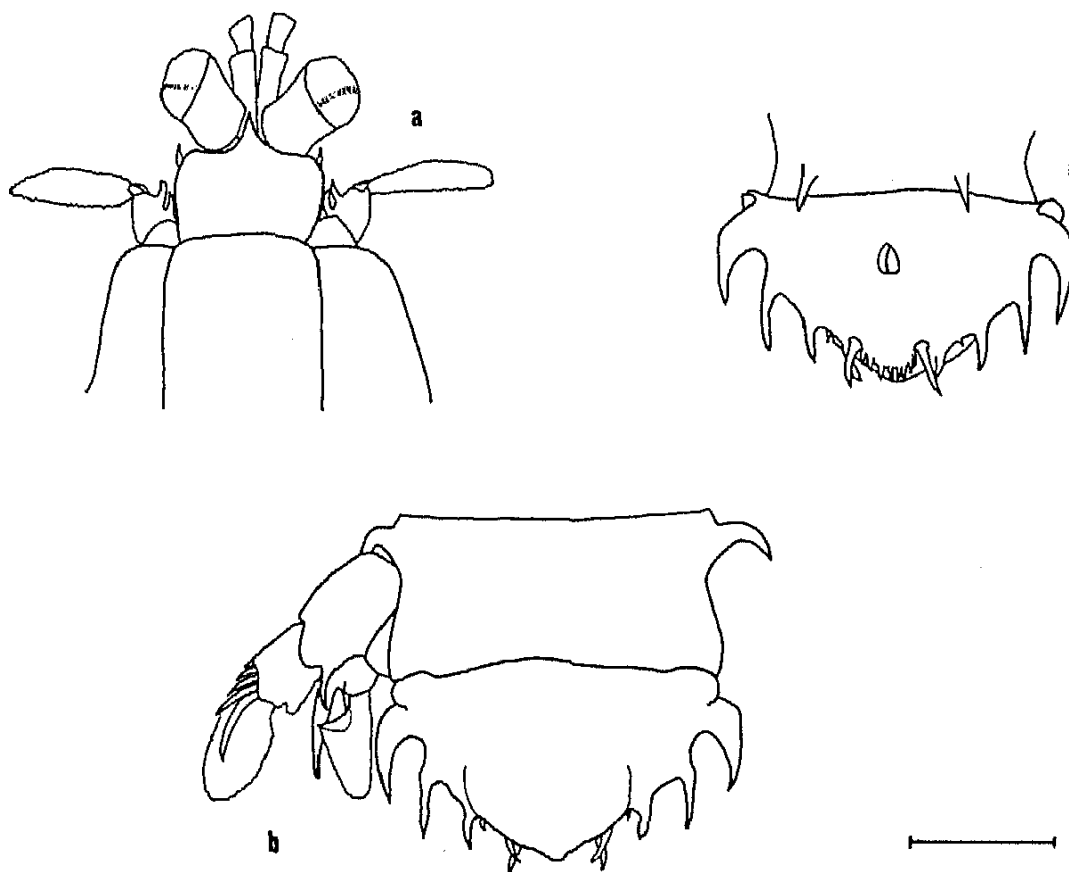


Fig. 4. *Platysquilla eusebia* (Risso), male, TL 46 mm, Madeira (MMF 23734): a, anterior portion of body; b, sixth abdominal somite, telson and uropod; c, telson, ventral view. (Setae omitted).

#### Family PSEUDOSQUILLIDAE Manning, 1977

##### *Parasquilla ferussaci* (Roux, 1830) (Fig. 5)

**M a t e r i a l:** MMF 7901, fragment, Funchal Fish Market, from stomach of *Serranus atricauda* Günther, 2.2.1956. 9925, 2 ♀♀, 74-78mm,

Funchal Fish Market, from stomach of «Abrotea» (Gadid fish), 24.10.1956. 23733, ♀ 96 mm, Madeira, 3.5.1963.

**R e m a r k s:** This rare species is here recorded for the first time for Madeira. Before this it was only known from the Mediterranean (Manning, 1962), Sesimbra, Portugal (Figueiredo, 1962), Senegal (Monod, 1951) and Gulf of Guinea (Manning, 1974, 1977) (Fig. 9).

The specimens observed are in good agreement with the description presented by Manning (1962) with the exception of the denticles of the telson, 11-14, 2,1 in our material, 8-9, 2,1 (Manning, 1962) and 10-12, 2,1 (Manning, 1977).

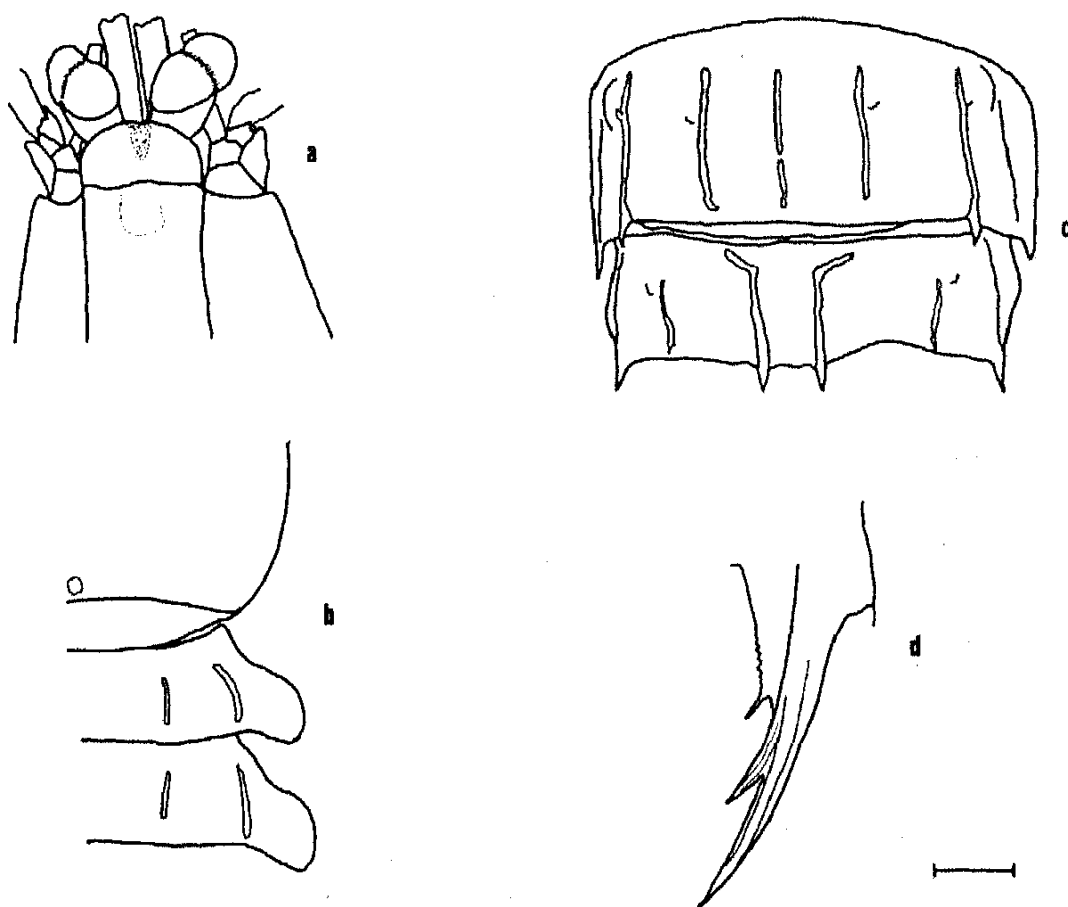


Fig. 5. *Parasquilla ferussaci* (Roux), female, TL 74 mm, Madeira (MMF 9925): a, anterior portion of body; b, lateral processes of sixth and seventh thoracic somites; c, fifth and sixth abdominal somites, dorsal view; d, basal prolongation of uropod, ventral view. (setae omitted).

In our specimens the last movable spine of the outer margin of the proximal segment of the uropodal exopod always exceeds half the distal segment, which is in accordance with Manning (1962) but the same author (1977) contradicts this: «...distalmost short not extending the midlength of distal segment:».

The dorsal oblique carinae of the telson are very visible in our specimens which distinguish them at first sight from *P. meridionalis* Manning, 1961 as well as the fact that the intermediate carinae of the sixth abdominal somite (Fig. 5, c) are posteriorly armed which is not the case in *P. meridionalis* nor in *P. coccinea* Manning, 1962. Also, the latter species has the antero-lateral angle of the rostral plate armed with one or two teeth which is not the case in *P. ferussaci* (Fig. 5, a).

The colouration of the specimens is light on the central dorsal part of the body and rather dark on the lateral parts as well on the posterior margin of the telson, the uropods, pleopods and pereopods on the specimens preserved in alcohol.

Due to the fact that only very few specimens of the material are at hand as well as the manner in which they were collected nothing concrete can be said about the habitat and vertical distribution of this species in our area.

*Pseudosquilla oculata* (Brullé, 1837)

**Material:** Post larvae (Monodactyla stage): MMF 3280, ♂ 27 mm, from stomach of *Alepisaurus ferox* Lowe, Madeira, 10.1.1952. 3914, ♀ 30 mm; 3915, ♂ 32 mm; 3916, ♂ 28.5 mm; 3917, ♂ 29 mm; 3918, ♂ 27 mm, from stomach of *Thunnus alalunga* Bonnaterre, Madeira, 3.11.1953. 4473, 3 ♀♀ 28.5-31 mm, 4 ♂♂ 26-30 mm, from stomach of *A. ferox*, Madeira, 10.11.1953. 4474, 3 ♀♀ 29-30 mm, 3 ♂♂ 27-29 mm, idem.

**Adults:** MMF 242, ♂ 66 mm, Selvagens, May, 1922. 282, very damaged specimen, Selvagens, 4.5.1922. 261, ♂ 48 mm, from stomach of *Serranus atricauda* Günther, Madeira, 12.10.1940. 3501, ♂ 52 mm, Madeira, 17.7.1952. 3679, ♂ 70 mm, no data. 4486, ♂ 61 mm, from stomach of *S. atricauda*, Desertas, 6.6.1954. 4721, ♂ 58 mm, Madeira, 12.11.1954. 5602, ♂ 67 mm, origin doubtful, (according to fish-monger from stomach of *Aphanopus carbo* Lowe) Madeira, 5.5.1955. 5603, ♀ very damaged, idem. 6309, ♀ 44 mm, from stomach of *S. atricauda*, Madeira, 14.9.1955. 6341, ♀ 40 mm, Madeira, 22.9.1955. 8187, ♀ 25 mm, from stomach of an unknown fish, Madeira, 12.4.1956. 11105, ♂, very damaged, Funchal Bay, 18.2.1957. 15342, ♂ 29 mm, from stomach of an unknown fish, Madeira, 30.1.1959. 15344, ♂ 66.1 mm, from stomach of *Phycis phycis* (L.), Madeira, 13.1.1959. 15986, ♂ 82 mm, Madeira, June, 1959. 23723, ♀ 42 mm, from stomach of *S. atricauda*, Selvagem Grande, 28.7.1984. 23729, ♀ 55 mm, Madeira, 15.12.1962. 23730, ♂ 50 mm, Madeira, 3.10.1962. 23731, ♀ 45 mm, Madeira, 15.11.1958. 23732, ♀ 30 mm, from stomach of *S. atricauda*, Madeira, 17.4.1959. 23739, ♂ 81 mm, Madeira, 8.12.1959 (lived some time in aquarium).

**Remarks:** This species which is easily identified seems to be

the most common in this area and is therefore the most copiously represented in the MMF collection.

Almost all specimens observed were collected in the Funchal fish market and come from stomach contents of various species of fishes. It must be noted that the post-larvae observed all come from stomachs of pelagic fish, such as *Thunnus alalunga* Bonnaterre and *Alepisaurus ferox* Lowe which indicates that the post-larvae must also be pelagic. *A. ferox* in our waters is normally taken between 100 to 200 m depth (Maul, 1946) for which reason it is possible that *P. oculata* exceeds, at least at this stage, the depth of 69 m (Manning, 1977).

Almost all the adult specimens seen come from stomachs of fishes, most commonly from *Serranus atricauda* Günther, a species inhabiting rocky bottoms of the coastal zones though also taken in deeper waters down to 100 m. In the western Atlantic *P. oculata* is also said to prefer rocky bottoms (Manning, 1969). In the eastern Atlantic it has been recorded from the Azores, Madeira, Canary Is., Cape Verde Is., Annobón, S. Tomé and St. Helena. It is here recorded for the first time from the Salvage Islands (30° 08' N, 15° 52' W) (Fig. 9).

#### Family SQUILLIDAE Latreille, 1803

##### *Rissoides desmaresti* (Risso, 1816) (Fig. 6 & Table 1)

**M a t e r i a l :** MMF 7204, ♂ 48 mm, Funchal fish market, from stomach of *Scorpaena scrofa* L., 12.11.1955. 8084, ♂ 40 mm, from stomach of *Sparus pagrus* L., Funchal fish market, 21.3.1956. 10477, ♂ 67 mm, from stomach of *Phycis phycis* (L.), idem, 22.12.1956. 13604, ♀ 61 mm, Funchal fish market, 11.3.1958. 15592, ♂ 56 mm, idem, 12.3.1959. 15899, ♂ 43 mm, idem, 13.6.1959. 23735, ♂ 55 mm, idem, 26.10.1960. 23737, ♂ 40 mm, from stomach of *Serranus atricauda* Günther, Funchal Bay, 25.1.1984. RMNH No. 15, 3 ♂ 39-43 mm, Bay of Naples, 1876. USNM 76357, ♂ 62 mm, Bay of Naples.

**R e m a r k s :** This species is recorded here for the first time from Madeira, which constitutes the southernmost limit of its distributional area in the NE Atlantic (Fig. 10).

The specimens in our collection are of great interest in so far as five of them possess an antennular peduncle which is longer than carapace, shorter in two and equal in one (Table 1). Also the specimens from the Gulf of Naples, which were used for comparison, have their antennular peduncles longer than the carapace (Table 1).

Manning (1977) when describing this species says that the antennular peduncle is shorter than the carapace. However, Lewinsohn & Manning (1980), when describing the specimens captured in Israel and Cyprus say that the antennular peduncle is as long as or longer than the combined length of carapace and rostral plate, which is characteristic

of *R. pallidus* (Giesbrecht, 1910). Our specimens differ clearly from *R. pallidus* in having the lateral process of the fifth thoracic somite rounded (Fig. 6, b, c) and not showing a post-anal keel.

The claw is relatively slender, the propodus being broader at mid-length (Fig. 6, d) which agrees with Manning (1977) and Lewinsohn & Manning (1980). However, with increase in size of the specimens the claw becomes broader (Fig. 6, f).

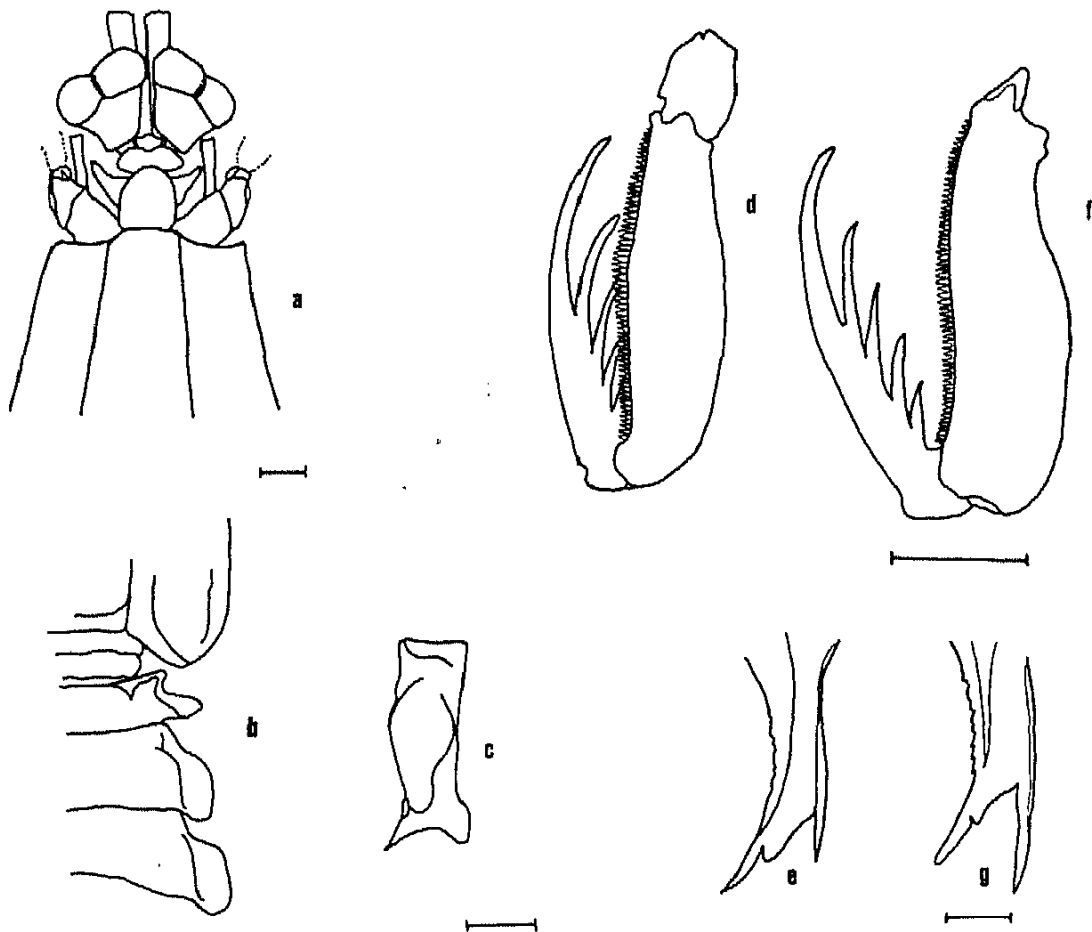


Fig. 6. *Rissoides desmaresti* (Risso), male, TL 40 mm, Madeira (MMF 23737): a, anterior portion of body; b, lateral processes of fifth, sixth and seventh thoracic somites; c, lateral process of fifth thoracic somite, lateral view; d, carpus, propodus and dactylus of claw; e, basal prolongation of uropod, dorsal view. Male, TL 67 mm, Madeira (MMF 10477): f, propodus and dactylus of claw; g, basal prolongation of uropod, dorsal view.

Our specimens present 5-6 movable spines along the outer margin of the proximal segment of the uropodal exopod (table 1). Six of the 8 specimens from Madeira have the inner margin of the basal prolongation of the uropod crenulate or even almost smooth (Fig. 3, e). However, in two specimens this margin of the basal prolongation is almost serrate mesially (Fig. 3, g) thus being nearer *R. pallidus*.

The CI (table 1) was determined both in specimens from Madeira as well as from the Mediterranean. The specimens with carapace length between 9 and 10 mm show a higher CI than the one found by Manning (1977), being comparable to the one found by the same author in *R. africanus* (Manning, 1974). On the other hand the CI of the larger specimens (CL=15-16 mm) is lower than the one presented by Manning (1977) and even lower than in the specimen with CL=9.5 mm (Table 1). Thus the corneal indices found do not permit to establish any relation to the carapace length, being an extremely variable character.

| Specimen    | Sex | TL | CL   | CI  | Lap  |
|-------------|-----|----|------|-----|------|
| MMF 7204    | ♂   | 48 | 11   | 440 | 11   |
| 8084        | ♂   | 40 | 9.5  | 475 | 8.5  |
| 10477       | ♂   | 67 | 16   | 457 | 17.5 |
| 13604       | ♀   | 61 | 15   | 428 | 17.5 |
| 15592       | ♂   | 56 | 13.5 | 450 | 14   |
| 15899       | ♂   | 43 | 10   | 400 | 7.5  |
| 23735       | ♂   | 55 | 13   | 430 | 14.5 |
| 23737       | ♂   | 40 | 9    | 450 | 10   |
| RMNH 15 - 1 | ♂   | 39 | 9    | 450 | 9.8  |
| - 2         | ♂   | 41 | 9.5  | 475 | 10   |
| - 3         | ♂   | 43 | 10.5 | 420 | 11   |
| USNM 76357  | ♂   | 62 | 14.5 | 414 | 16.5 |

Table 1. Corneal indices and lengths of antennular peduncles (Lap) in relation to carapace and total lengths of the specimens of *Rissoides desmaresti* (Risso) studied here.

As regards other morphological characters the Madeiran specimens are in agreement with the description presented by Manning (1977) and do not show significant differences in relation to the Mediterranean specimens at our disposal.

Regarding colouration only one male of 40 mm caught in 1984 still has its natural colouration which is in accordance with the one described by Manning (1977).

In view of the normal habitat of the species of fish in the stomach of which some of the Madeiran specimens were found it is likely that *R. demaresti* lives in our area on rocky bottoms, possibly reaching a depth of about 100 m. In the Mediterranean this species lives on softer bottoms and in a depth between 30 and 80 m. (Manning & Frogia, 1979 and Lewinsohn & Manning, 1980).

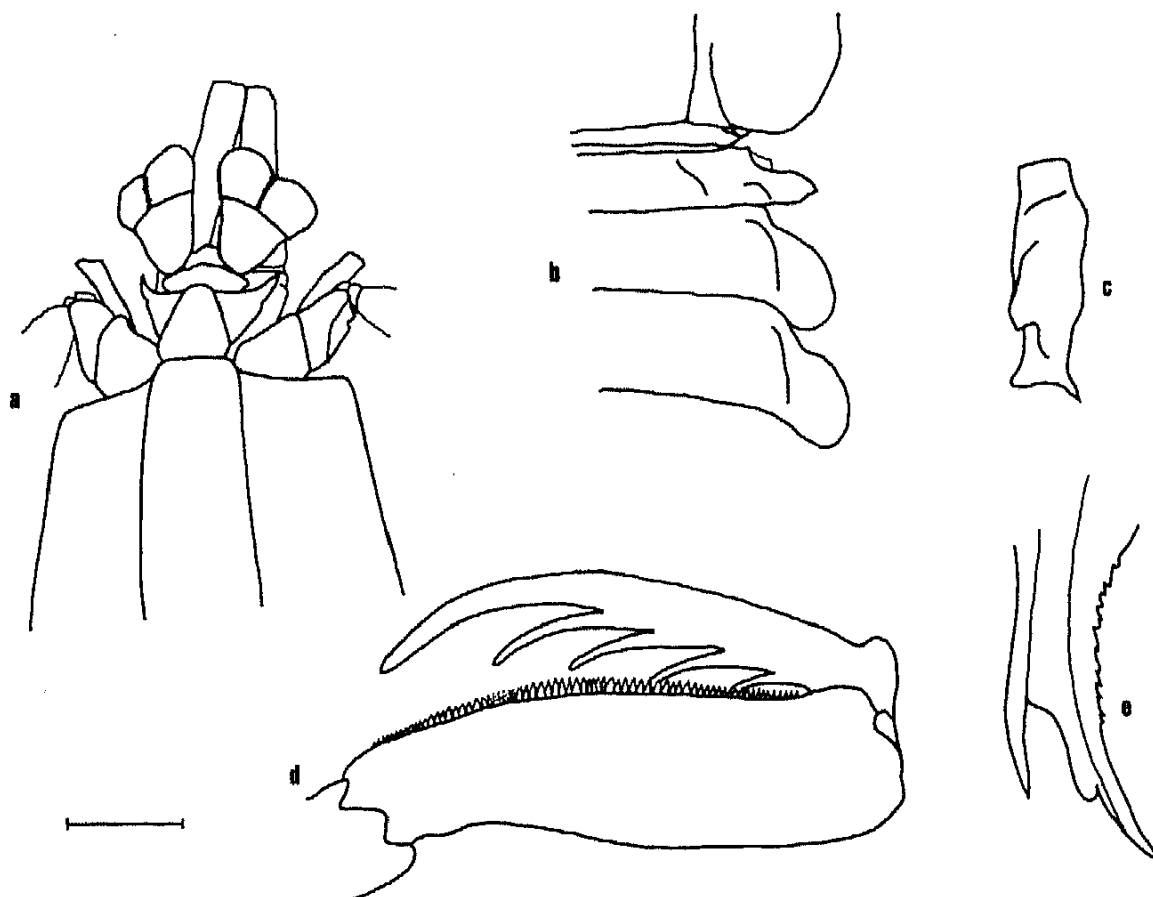


Fig. 7. *Rissoides pallidus* (Giesbrecht), male, TL 63 mm, Madeira (MMF 23746): a, anterior portion of body; b, exposed thoracic somites, dorsal view; c, fifth thoracic somite, lateral view; d, propodus and dactylus of claw; e, basal prolongation of uropod, ventral view. (Setae omitted).

*Rissoides pallidus* (Giesbrecht, 1910) (Fig. 7)

**M a t e r i a l:** MMF 5358, ♀ 59 mm, Funchal fish market, 13.4. 1955. 23736, ♀ Funchal fish market, 11.5.1963. 23746, 2 ♂♂ 63 mm, Madeira, no date. USNM 76358, ♀ 61 mm, Bay of Naples.

**R e m a r k s:** Of the specimens existing in the MMF collection only two males are well preserved permitting an easy identification. Specimen MMF 23736 is badly damaged; carapace, eyes, antennae and antennules missing. However, the lateral process of the fifth thoracic

somite flattened and sharp, the existence of a post-anal keel, the lateral carina of the fourth abdominal somite armed and the inner margin of the basal prolongation of the uropod denticulate permit us to identify this specimen as *R. pallidus*.

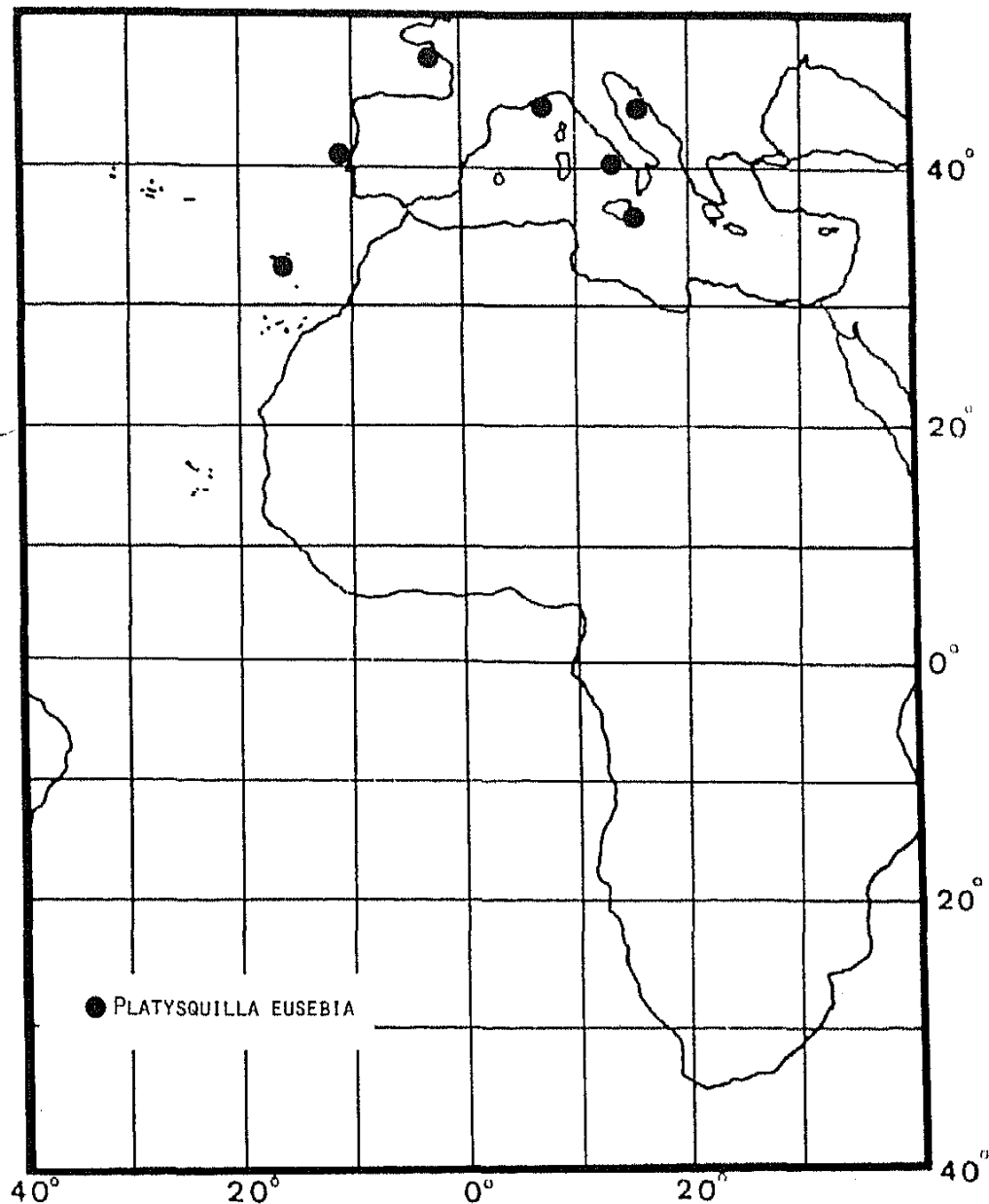


Fig. 8. Distribution of the Nannosquillid *Platysquilla eusebia* in the eastern Atlantic and Mediterranean.

Specimen MMF 23746 is in a state of advanced digestion. Apart from presenting the same characters observed for the above specimen it has the antennular peduncle longer than the combined length of the carapace and rostral plate, which is a character belonging to this species.

*Rissoides pallidus* has already been recorded from the Mediterranean, Eastern Atlantic, from Morocco to the Ivory Coast (Manning, 1977 and Lewinsohn & Manning, 1980) (Fig. 8). It is here recorded for the first time for Madeira.

Unfortunately the fishes in the stomachs, of which they were found are not known so that nothing can be said about habitat and vertical distribution in our area.

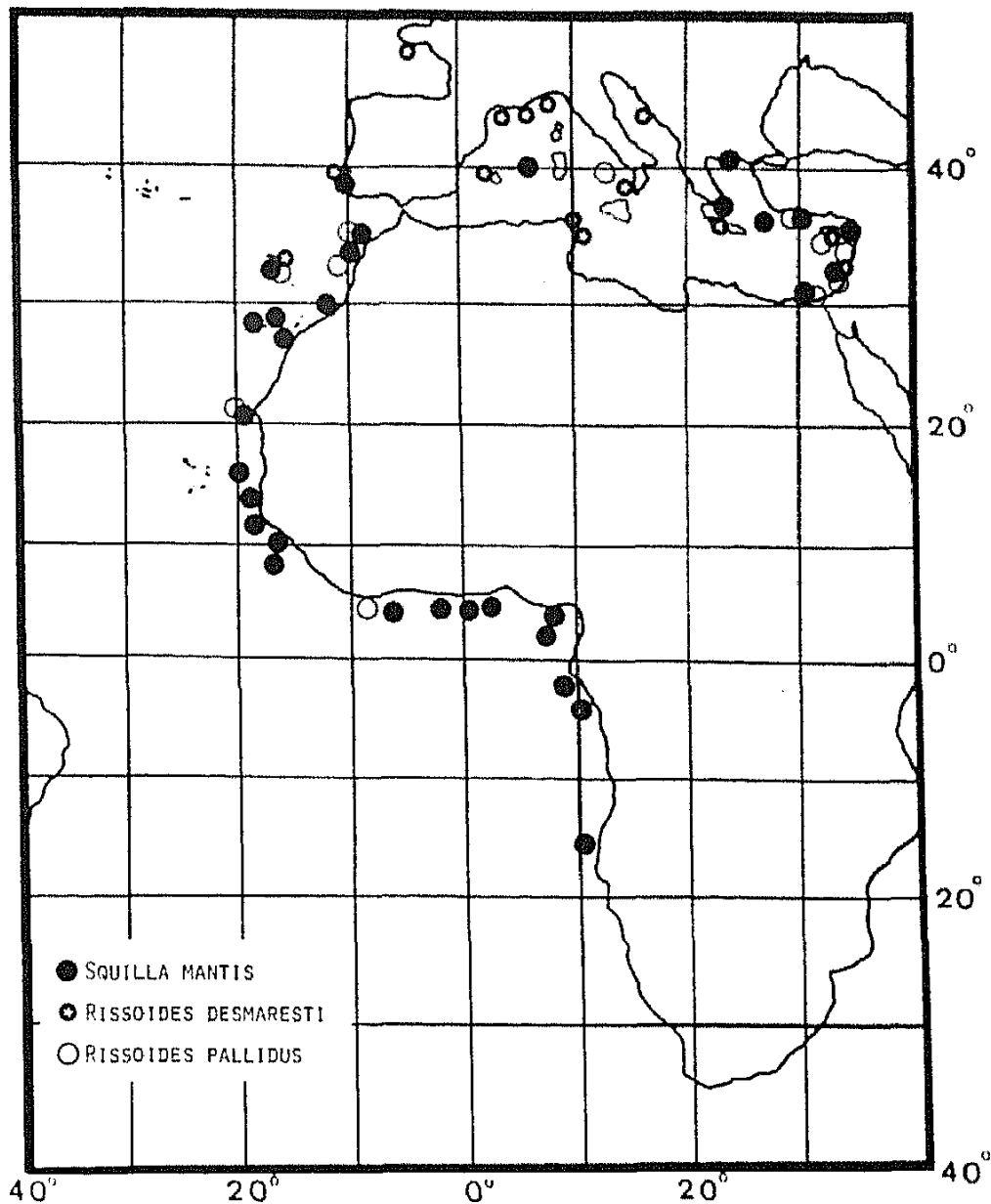


Fig. 10. Distribution of the squillids *Squilla mantis*, *Rissoides desmaresti* and *R. pallidus* in the eastern Atlantic and Mediterranean.

### *Squilla mantis* (Linnaeus, 1758)

**Material:** MMF 2702, ♀ 131 mm, Madeira, no date. 11388, ♂ 105 mm, Madeira, no date. 23726, ♂ 166 mm, in a fish pot, ca. 92 m depth, Madeira, 9.2.1958. 23727, 2 ♀♀ 140-147 mm, in a shrimp pot ca. 20 m depth, Madeira, 30.12.1983. 23728, ♀ 124 mm, Idem, 30.4.1984.

**R e m a r k s :** There is no difficulty or doubt in identifying the specimens, being in complete agreement with the descriptions in the current literature.

Four of the specimens of our collection were captured on sandy bottom between 20 and 92 m depth, which is in agreement with what is mentioned by other authors.

This species was already recorded from Madeira by Manning in 1981 (Fig. 8). Three of the specimens observed lived in our Aquarium for about 6 months.

#### KEY TO MADEIRAN SPECIES OF STOMATOPODA

(Adapted from Manning, 1977)

1. Propodi of posterior 3 maxillipeds broad, beaded or ribbed ventrally. Telson lacking sharp median carina (NANNOSQUILLIDAE). Dorsal surface of sixth abdominal somite and telson not completely covered with long spines. Outer margin of dactylus of claw not inflated basally. Mandibular palp absent. Four pairs of fixed spines on the margin of telson; one intermediate denticle present *Platysquilla eusebia* (Risso, 1816).

Propodi of posterior 3 maxillipeds slender, not beaded or ribbed ventrally. Telson with sharp median carina; at most submedian marginal teeth with movable spines ... 2

2. Four or more intermediate marginal denticles on telson (SQUILLIDAE). Lateral process of fifth thoracic somite not bilobed, a round lobe or a lateral spine, not produced into posteriorly-directed spines.

- a. Anterolateral angles of carapace spined. Dactylus of claw with 6 teeth. Apices of submedian teeth of telson fixed. (*Squilla*). Basis of claw unarmed. 5 epipods present. Intermediate carina of first abdominal somite and usually submedian carinae of fourth to sixth abdominal somites armed; lateral and marginal carinae of abdomen simple. Lateral process of fifth thoracic somite directed laterally. Telson with a pair of large dark circles anteriorly ... .. *Squilla mantis* (Linnaeus, 1758).

Anterolateral angles of carapace unarmed. Dactylus of claw with 5 teeth. Apices of submedian teeth of telson movable (*Rissoides*) ... .. aa

- aa. Basal prolongation of uropod with erect spines on inner margin. Lateral process of fifth thoracic somite flattened dorsoventrally, sharp laterally. Lateral carinae of fourth abdominal somite spined. Telson with a postanal keel ... .. *Rissoides pallidus* (Giesbrecht, 1910).

Basal prolongation of uropod unarmed on inner margin; Uropod with 5-7 movable spines on outer margin. Telson without a postanal keel. Lateral process of fifth thoracic somite a broadly rounded lobe, flattened antero posteriorly. ... .. *R. desmaresti* (Risso, 1816).

No more than 2 intermediate marginal denticles on telson. Ischiomerall articulation of claw terminal. Merus grooved inferiorly throughout its length. Dactylus of claw not inflated basally, with no more than 3 teeth. (PSEUDOSQUILLIDAE). Sixth abdominal somite with armed carinae or with posterior spines ... 3

3. Basal prolongation of uropod with two spines, inner margin unarmed. Carapace without carinae (*Pseudosquilla*) and ornamented with a pair of large dark circles surrounded by lighter-coloured ring. Rostral plate with apical spine. Telson with four pairs of dorsal carinae ... *Pseudosquilla oculata* (Brullé, 1837).

Basal prolongation of uropod with 3 spines, proximal smallest. Carapace with portion of marginal carinae on posterior portion of each lateral plate. Anterior 5 abdominal somites each with prominent longitudinal carinae. Rostral plate lacking apical spine ... *Parasquilla ferussaci* (Roux, 1830).

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