ON SOME SPECIES OF THE GENUS NEPHROPS (CRUSTACEA DECAPODA)

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The present note is based in the first place on the Nephropsid material collected by the Australian Fisheries Steamer "Endeavour" in the waters of South and East Australia, while also the West Indian *Nephrops* specimens in the collections of the U.S. National Museum, Washington, D.C., and the Rijksmuseum van Natuurlijke Historie, Leiden, are dealt with.

I wish to express my sincere thanks to Dr. Fenner A. Chace, Jr., Curator of the Division of Marine Invertebrates of the U.S. National Museum for entrusting me with the study of the larger part of this material. I am furthermore much indebted to Dr. L. R. Tommasi, Instituto Oceanografico, São Paulo, Brazil, for specimens of *Nephrops rubellus*.

The new species described in this paper, *Nephrops boschmai,* is named in honour of Dr. Hilbrand Boschma, to whom the present volume is dedicated at the occasion of his 70th birthday. It is a great pleasure to express in this way my profound gratitude to Dr. Boschma not only for guiding my first steps in the field of systematic zoology, but also for the innumerable times that he gave me his sound advice and invaluable help both in scientific and personal matters.

Nephrops andamanicus Wood-Mason

Nephrops andamanicus Wood-Mason, 1892, pl. 4.

Endeavour Expedition

Great Australian Bight, 126.5° E, S. by W. of Eucla, Western Australia; depth 130-190 fathoms; No. E. 6248-6252. — 4 ♂♂, 2 ♀♀ (1 ovigerous).

The carapace length of the males varies between 78 and 85 mm, the females have the carapace length 75 and 85 mm; the largest female is ovigerous. The specimens agree in practically all respects with the published descriptions and figures of *Nephrops andamanicus,* and could be directly compared with a female specimen of that species (carapace length 57 mm) from the Andaman Sea taken at a depth of 188 to 220 fathoms, which was donated to the U.S. National Museum by the Indian Museum in Calcutta.

The only difference between the Australian and the Indian specimens that I could find is that in the Andaman Sea specimen a spine is present behind the hepatic groove, being placed in a line with the two upper of the three spines behind the orbit. This spine, which is also shown in the published figures of *Nephrops andamanicus*, is altogether absent in all my Australian specimens. The rostrum in the Australian material is somewhat more and the chelipeds slightly less slender than in the typical Andaman form, but these differences may be due to age since my Andaman specimen is much smaller than the Australian animals.

The spine at the end of the middle of the three longitudinal ridges on the branchial area of the carapace is present in a few specimens (and then usually on one side of the body only), but as a rule it is absent.

The examination of more material is necessary to decide whether these differences are sufficiently constant to be considered of subspecific importance.

Nephrops andamanicus is known from S.E. Africa, India and the Malay Archipelago. The present record thus greatly extends the known range of the species. The depth from which it has been reported varies between 237 and 840 m.

Nephrops boschmai new species (fig. 1)

Endeavour Expedition

Great Australian Bight, about 100 miles S. of Eucla, Western Australia; 120-160 fathoms; no. E. 3671, 3672. — 1 ♂, 2 ovigerous ♀♀.

Great Australian Bight, 126.5° E, S. by W. of Eucla; 130-190 fathoms; no. 3673. — 1 ♂ (holotype), 1 ovigerous ♀.

Great Australian Bight, 129° 6.5′ E, S. of Eucla; depth 200-300 fathoms; no. 3657. — 3 ♂♂.

Great Australian Bight, 129° 28′ E, S. of Eucla; depth 250-450 fathoms; no. 3682. — 1 ♀.

Great Australian Bight, 131° E, S. by E. of Eucla; depth 200-250 fathoms; no. 3693, 6254-6258. — 4 ♂♂, 8 ♀♀ (3 of which ovigerous).

The carapace lengths of the males vary between 51 and 68 mm, those of the non-ovigerous females between 45 and 55 mm, and those of the ovigerous females between 53 and 76 mm.

The present species belongs to the second of the groups in which Yaldwyn (1954) divided the Indo-West Pacific representatives of the genus *Nephrops*. This group is characterized by the abdominal somites, which are practically smooth to the naked eye, having no dorsal sculpturation. Furthermore there are no granulated or spinulated ridges on the chelipeds. So far only three species were known in this group, viz., *N. thomsoni* Bate (1888), *N. challengeri* Balss (1914), and *N. sibogae* De Man (1916).

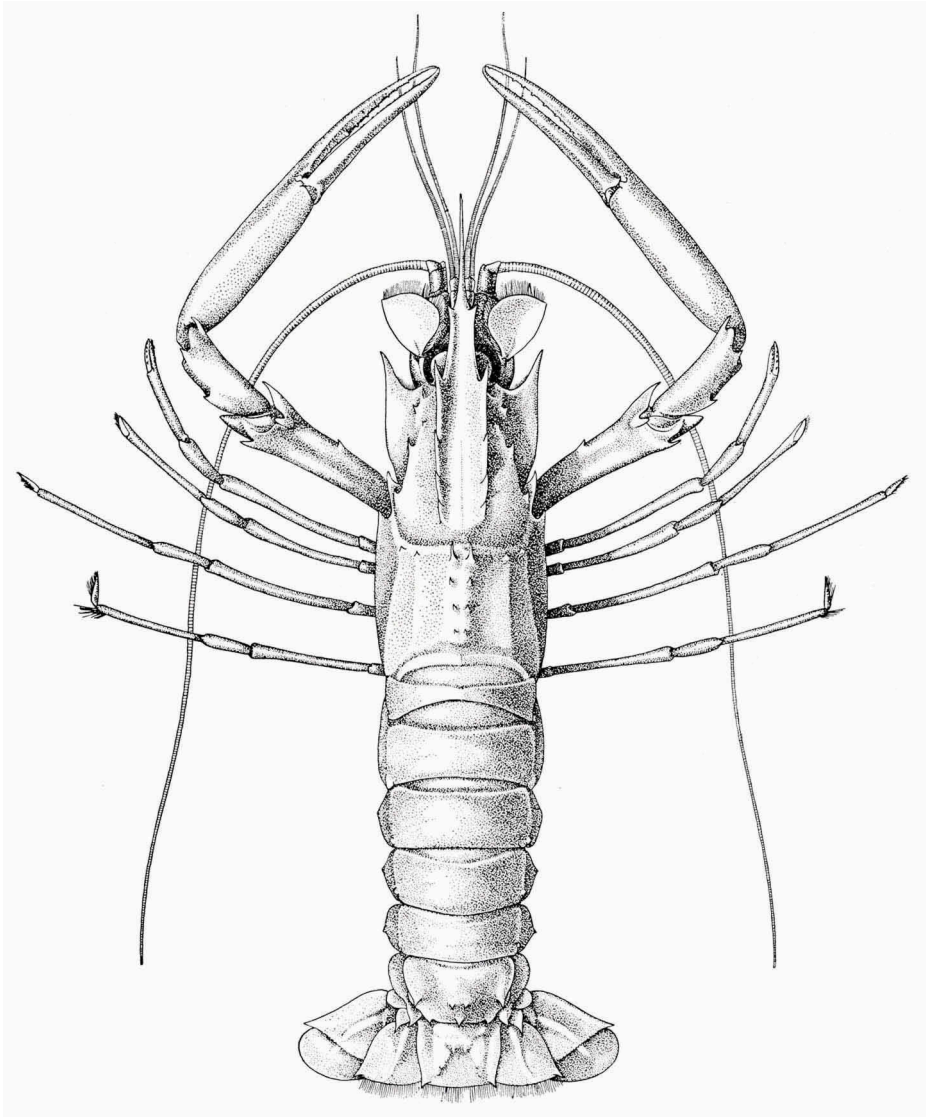

Fig. 1. *Nephrops boschmai* new species. Ovigerous paratype female in dorsal view ("Endeavour" no. 3673; Rijksmuseum van Natuurlijke Historie, Reg. No. Crust. D. 15462). × 0.8. W. C. G. Gertenaar del.

Nephrops boschmai resembles *N. sibogae* and differs from the other two species in that the rostrum bears two rows of five teeth, there being three instead of two teeth behind the large tooth at the base of the rostrum proper. Between these two rows of teeth there are no spinules, and neither are

such spinules visible between their posterior end and the cervical groove. Behind the cervical groove two distinct submedian spines are placed which are followed by a double row of about three to five denticles. In this respect the new species agrees with *N. sibogae* and *N. thomsoni*, but differs from *N. challengeri*.

Behind the orbit the three post-orbital spines are arranged in a triangle; the posterior of these spines is strongest and is followed at some distance by a fourth spine which is placed behind the hepatic groove. Between this spine and the hepatic spine the posterior margin of the hepatic groove bears 4 to 7 spinules. Above the three post-orbital spines there may be 1 to 4 very small spinules. The branchiostegal spine is very large, like in *N. sibogae*, but its tip is more slender. The hepatic spine is large and ends in a narrow point; behind it and behind the cervical groove there is a much smaller spine. This small spine forms the end of the lowest branchial ridge, the two other branchial ridges end in anterior spinules which are still smaller. None of these three ridges bears any other spinules.

The abdominal tergites are smooth and, apart from some pitting, shiny and naked; there is only a faint indication of a groove laterally. The antero-lateral angle of the first somite is rounded or ends in a sharp point. A ridge extends over the base of the pleura. This ridge is formed by that the surface of the pleura lies on a lower level than that of the tergite, the two surfaces being separated by a sharp incline forming the ridge. The posterior region of the ridge shows an incision. The pleura furthermore possesses a depressed area and a deep pit. In these characters the species shows a close resemblance to *N. challengeri* and *N. sibogae*. The tips of the pleura, however, are more produced than in those species and end in slender sharp points. The sixth abdominal somite bears one or two, seldom three, pairs of submedian spinules in the center, and one median spinule on the posterior margin; of the anterior pair or anterior two pairs of submedian spinules, one or both of the spinules often are under-developed. The ridge over the pleural base ends here in a sharp spine but shows no spinules. The spinulation of the telson is similar to that of *N. sibogae*.

The scaphocerite differs from that of *N. sibogae* by that its greatest breadth lies in the proximal half. A spine is placed at the outer margin of the antennal peduncle near the base of the scaphocerite.

The third maxilliped has the last segment broad and oval, being different in this respect from that of *N. sibogae*.

The large chelipeds resemble those of *N. sibogae*, but differ in that the inner margin of the merus bears a distinct tooth in its middle; this tooth is sometimes followed by one or more much smaller teeth. Sometimes there

is also a tooth more distally. Like in *Nephrops sibogae* the anterior margin of the merus shows a large tooth in both the inner and upper parts; the upper tooth, however, is much shorter than the inner. The carpus bears a tooth in the proximal half of the outer margin; a small subterminal tooth is present on the inner lower angle. The chelae are very similar to those of *N. sibogae,* they are slender with the fingers about as long as the palm. The lower margin shows a regular curve, which is slightly interrupted in some specimens where the chela is widened at the base of the fingers. The palm and the fingers are rather evenly granulated. The cutting edges of the fingers are provided with small teeth of different size; generally one of the teeth in the proximal half of the cutting edge of the fixed finger is considerably larger than the rest. The following legs are slender and resemble those of *N. sibogae* very much.

Types. — The holotype is the male from S. by W. of Eucla ("Endeavour" no. 3673); it is preserved in the Australian Museum, Sydney. The other specimens are paratypes; they are deposited in the Australian Museum, Sydney, the U.S. National Museum, Washington, D.C., and the Rijksmuseum van Natuurlijke Historie, Leiden.

The new species is known only from the region off Eucla on the south coast of Western Australia (depth between 120 and 450 fathoms). Its closest ally is *Nephrops sibogae* De Man, which likewise is only known from the type material which came from near the Kei Islands, Moluccas, 5° 40′ S 132° 26′ E (depth 310 m).

Nephrops binghami Boone

Nephrops binghami Boone, 1927, p. 91, figs. 18-20.
Nephrops rubellus, Glassell, 1934, p. 454 (not *Nephrops rubellus* Moreira, 1903).
Nephrops rubellus binghami, Springer & Bullis, 1956, p. 14.

U.S. National Museum

N. of the Bahama Islands, 27° 22′ N 78° 07.5′ W; bottom gray sand; 338 fathoms; large beam trawl; 2 May 1886; "Albatross" Sta. 2655. — 3 ♂♂, 2 ♀♀.

Off the northcoast of Cuba, 22° 55′ N 79° 27′ W; 240 fathoms; trawl; July 1955; "Oregon" Sta. 1340. — 6 ♂♂, 15 ♀♀ (13 ovigerous).

Off the northcoast of Cuba, 22° 55′ N 79° 16′ W; 240 fathoms; trawl; July 1955; "Oregon" Sta. 1341. — 10 ♂♂, 11 ♀♀ (8 ovigerous).

The carapace length of the above specimens varies between 28 and 70 mm, that of the ovigerous females between 50 and 62 mm.

The present species differs from *Nephrops rubellus* Moreira, with which it has been confused, in the following points:

1. Behind the two rostral series of five teeth there are no denticles in *N. binghami,* while in *N. rubellus* two converging rows of two denticles each are present there.

2. In *N. binghami* no spinules are present between the two rows of rostral teeth; in *N. rubellus* 3 to 7 of such spinules may be observed there.

3. In *Nephrops binghami* there is a single or double longitudinal row of about 2 to 4 spinules between the rostral teeth and the two upper postorbital spines; no such spinules are seen in *N. rubellus.* Below the posterior postorbital spine a small spinule is usually visible in *N. binghami,* this spinule is absent in *N. rubellus.*

4. The upper of the three longitudinal carinae on the branchial region of the carapace in *N. rubellus* is smooth or bears 1 spinule in the posterior part; in *N. binghami* this carina bears 2 to 5 spinules which are regularly divided over the posterior two thirds.

5. In *Nephrops binghami* there are three or four pairs of submedian spinules behind the two larger spines that are placed on the posterior margin of the cervical groove. In *N. rubellus* these spinules are more numerous and less distinctly paired.

6. The ridge which runs over the base of the pleura of the third to fifth abdominal somites bears a spine in *N. rubellus,* while this ridge on the sixth somite of this species shows two spines. In *N. binghami* there is no spine at all on the ridge of the pleura of the third to fifth abdominal somites, while that of the sixth somite bears a single spine.

7. In *N. binghami* the first chelipeds are far more slender than in *N. rubellus* and the inner surface of the merus is smooth rather than with spinules distally; also in other parts of the chela *N. rubellus* has additional spinules which are not shown by *N. binghami.*

8. In *N. binghami* the unarmed distal part of the upper margin of the dactylus of the first chelipeds occupies more than half the length of the dactylus; in *N. rubellus* it is less than half as long as the dactylus.

Nephrops binghami was described by Boone (1927) after material from Glover Reef off British Honduras at a depth of 484 fathoms. Glassell (1934) placed the name *N. binghami* in the synonymy of *N. rubellus* Moreira, but Springer & Bullis (1956) on the authority of Dr. Fenner A. Chace, Jr., recognized Boone's species as a distinct subspecies of Moreira's species. In my opinion the differences between the two forms are sufficienlty constant to admit *N. binghami* as a good species. The present material was identified by Dr. Chace, the "Oregon" specimens are those listed by Springer & Bullis (1956).

Nephrops rubellus Moreira

Nephrops rubellus Moreira, 1903, p. 62; Moreira, 1903a, p. 7, fig.; Moreira, 1905, p. 128, pl. 3; Doello-Jurado, 1938, p. 291, pl. 2; Andrade Ramos, 1950, p. 83, 86, figs. 1-3; Popovici & Angelescu, 1954, p. 508.
not *Nephrops rubellus*, Glassell, 1934, p. 454.

U.S. National Museum

E.S.E. of Ilha Rasa near the entrance of Bahia de Rio de Janeiro, Brazil; depth 50 m; January 1903; C. Moreira. — 1 ♂, 1 ovigerous ♀ (syntypes).

Off Cabo Santa Maria, Rocha State, Uruguay, 34° 38′ S 52° 15′ W; 65-70 fathoms; July 1925; C. Alexanderson; S. S. "Undine". — 2 ♂ ♂.

Museum Leiden

Santos, São Paulo State, Brazil; May 1960; L. R. Tommasi. — 2 ♂ ♂.

The carapace length of the above specimens varies between 60 and 69 mm, that of the ovigerous female is 60 mm.

This species, the differences of which from *N. binghami* have been enumerated above, seems to be restricted to the S.E. coast of South America, roughly between 23° and 38° S. The records in the literature are: Off Rio de Janeiro, Brazil, 30 to 35 miles offshore, 43°—43° 30′ W, depth 60-100 m (Moreira, 1903, 1903a, 1905), Ilha Xavier, E. of Santa Catarina, S.E. Brazil, 66-132 m depth (Andrade Ramos, 1950), N.E. of the mouth of Rio de la Plata, Uruguay, 34° 38′ S 52° 15′ W, 34° 47′ S 52° 20′ W, 34° 50′ S 52° 20′ W, 34° 59′ S 52° 40′ W, 35° 08′ S 52° 35′ W, 35° 35′ S 52° 45′ W, depth 110-150 m (Doello-Jurado, 1938), off Quequén, Buenos Aires Province, Argentina, about 38° 32′ S (Popovici & Angelescu, 1954).

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