

ORATOSQUILLINA MANNINGI, A NEW SPECIES OF STOMATOPOD FROM TAIWAN AND AUSTRALIA

Shane T. Ah Yong, Tin-Yam Chan, and Y. J. Liao

(STA) Dept. of Marine Invertebrates, Australian Museum, 6 College St., Sydney, NSW 2010, and School of Biological Sciences, University of New South Wales, Sydney, NSW 2052, Australia (e-mail: shaneahyong@crustacea.net); (T-YC and YJL) Institute of Marine Biology, National Taiwan Ocean University, Keelung, Taiwan, Republic of China

ABSTRACT

Oratosquillina manningi sp. nov. is described from Taiwan and Australia and closely resembles *O. microps* (Garcia and Manning) from the Philippines. This new species is unique in *Oratosquillina* for lacking a mandibular palp, bearing a median carina on the sixth abdominal somite, and numerous ventral carinae on the telson.

Manning (1995) subdivided *Oratosquilla* Manning, 1968, and proposed *Oratosquillina* for the *perpensa* and *gonypetes* groups (Manning, 1978). Twenty-two species were recognized in *Oratosquillina*, and an additional species from Taiwan and Australia is herein described. Three species of *Oratosquillina* bear numerous supplementary carinae on the dorsal surface of the telson: *O. striata* (Manning, 1978), *O. fossulata* (Moosa, 1986), and *O. microps* (Garcia and Manning, 1982). Two of these, *O. striata* and *O. fossulata*, belong to the *gonypetes* group, which lack an inferodistal spine on the outer margin of the merus of the raptorial claw. *Oratosquillina microps* belongs to the *perpensa* group, bearing an inferodistal spine on the outer margin of the merus of the raptorial claw. The new species described below most closely resembles *O. microps*.

MATERIALS AND METHODS

Descriptive terminology generally follows Manning (1969, 1978), with modifications used by Ah Yong (1998). All measurements are in millimeters (mm). Total length (TL) is measured along the midline from the tip of the rostrum to the apices of the submedian teeth. Carapace length (CL) is measured along the midline and excludes the rostral plate. Corneal index (CI) is given as 100 CL divided by cornea width. Abbreviations used in this account include: antennule (A1); antenna (A2); abdominal somite (AS); thoracic somite (TS); maxilliped (MXP); median (MD); submedian (SM); intermediate (IM); lateral (LT); marginal (MG); pleopod (PLP). Type material is deposited in the collections of Australian Museum (AM), Museum and Art Gallery of the Northern Territory, Darwin (NTM), and National Taiwan Ocean University, Keelung (NTOU).

SYSTEMATICS

Squillidae Latreille, 1803

Oratosquillina Manning, 1995

Oratosquillina manningi, new species

Figs. 1, 2

Material Examined.—Holotype: NTOU H 1996–8–4, male (TL 87 mm), Tai-Shi, I-Lan County, NE Taiwan, commercial trawl, 4 Aug 1996. Paratypes: NTOU P 1997–12–1, 1 female (TL 79 mm), Tai-Shi, I-Lan County, NE Taiwan, sand/mud, commercial trawl, coll. Y. J. Liao, 1 Dec 1997. AM P53856, 1 female (TL 90 mm), Tai-Shi, I-Lan County, NE Taiwan, sand/mud, commercial trawl, coll. Y. J. Liao, 1 Dec 1997. Other material: NTM Cr012402, 1 male (TL 59 mm), 19°07′–08′S, 119°05′–06′E, 78 m, trawled, FRV *Soela*, S0682 stn 128, 9 Dec 1982; NTM Cr012381, 1 male (TL 39 mm), 19°41′–42′S, 117°56′–57′E, 53 m, trawled, FRV *Soela*, S0283 stn 126, 21 Feb 1983.

Diagnosis.—Rostral plate trapezoid, with indistinct median carina. Carapace lacking branches of anterior bifurcation of median carina. Raptorial claw dactylus with 5 teeth; carpus dorsal carina undivided; merus outer inferodistal angle produced into acute spine. Mandibular palp absent. AS6 with short, low, median carina. Telson dorsolateral surface with bicarinate accessory median and numerous supplementary longitudinal carinae; ventral surface with long, smooth postanal carina flanked by sinuous carina and numerous curved carinae.

Description.—TL of adults to 90 mm. Dorsal integument lightly pitted.

Eye small, cornea bilobed; CI 503–605; extending beyond midlength but not apex of A1 peduncle segment 1. Ophthalmic somite an-

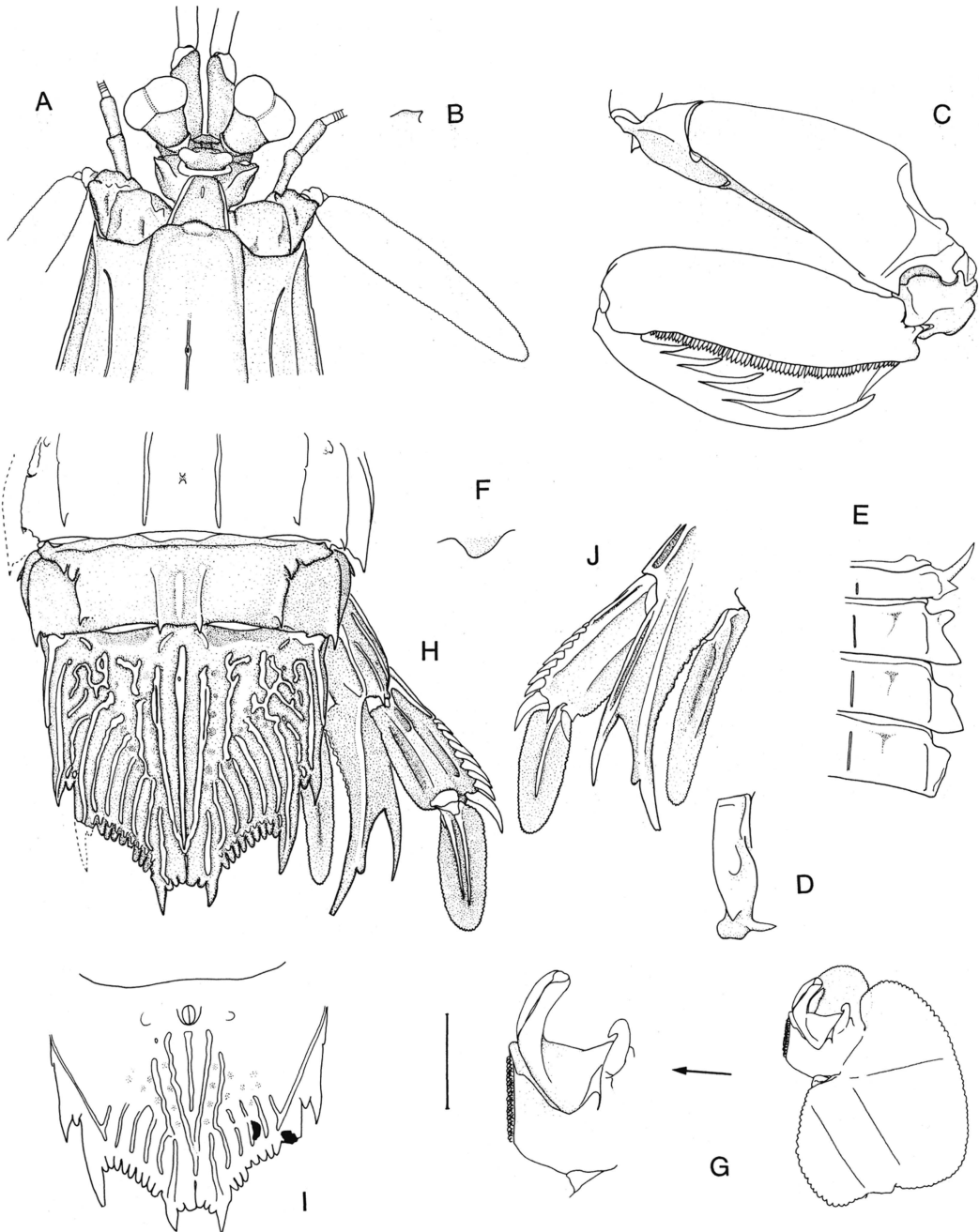


Fig. 1. *Oratosquillina manningi* sp. nov., holotype: A, anterior cephalon, dorsal; B, dorsal process of antennular somite, right lateral; C, raptorial claw, right lateral; D, TS5, right lateral; E, TS5–8 lateral processes, right dorsal; F, TS8 sternal keel, right lateral; G, PLP 1 endopod, right anterior; H, AS5–6, uropod and telson, dorsal; I, telson, ventral; J, uropod, right ventral. Scale: A–E, H–J = 5 mm; F, G = 2.5 mm.

terior margin medially emarginate. Ocular scales rounded, separate.

A1 peduncle 0.91–0.99 CL. A1 somite dorsal processes with acute apices, directed anterolaterally. A2 scale 0.69–0.74 CL.

Rostral plate broader than long, trapezoid; lateral margins carinate; apex truncate; dorsally with short median carinule.

Carapace anterior width 0.54–0.56 CL; anterolateral spines not extending to base of ros-

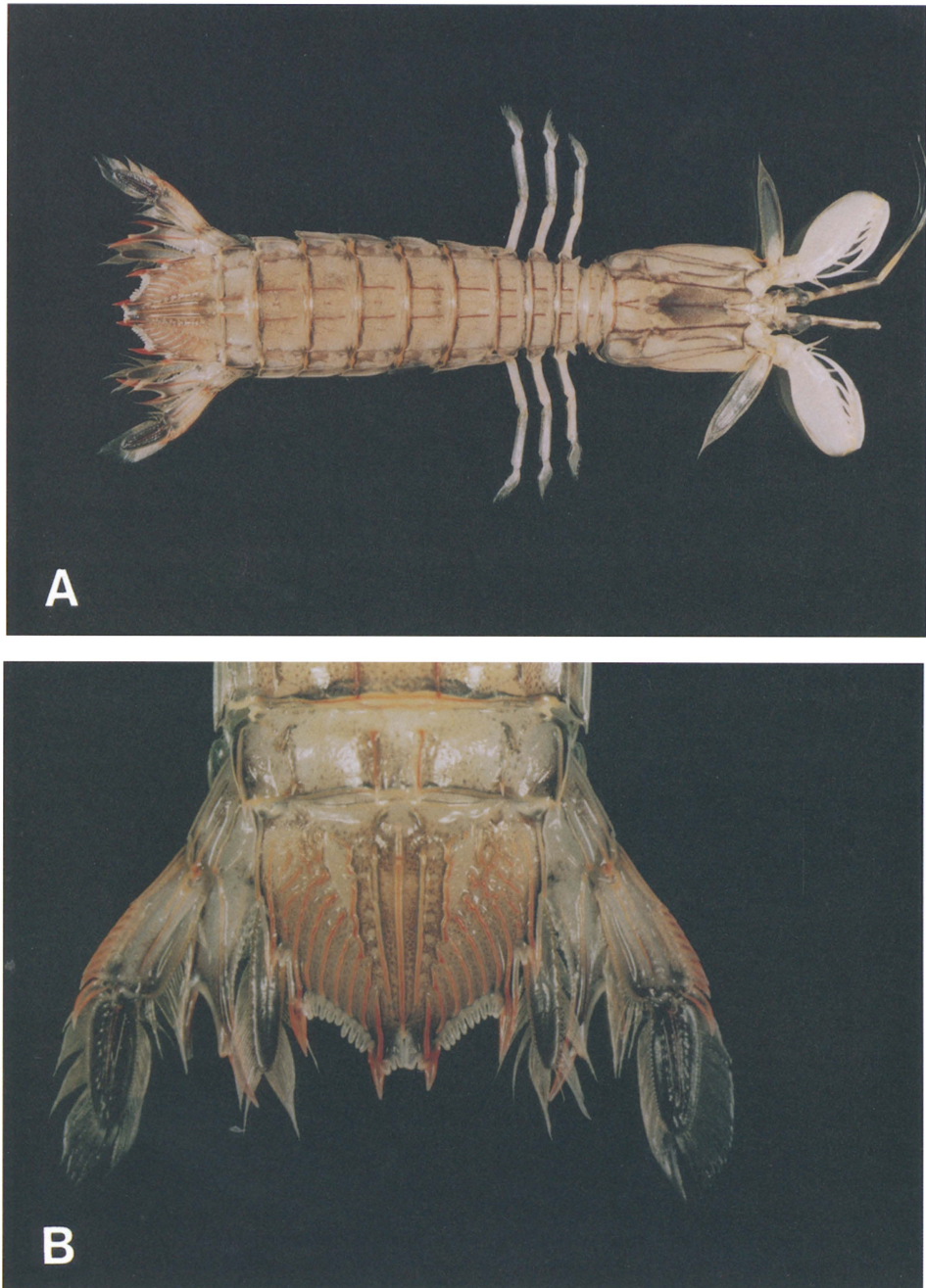


Fig. 2. *Oratosquillina manningi* sp. nov., holotype: A, dorsal view. B, AS6, uropods and telson.

tral plate; with median, intermediate, lateral, marginal, and reflected marginal carinae; median carina lacking branches of anterior bifurcation, with shallow longitudinal depression in position of anterior bifurcation; posterior median projection obtuse, low.

Raptorial claw dactylus with 5 teeth, outer margin faintly sinuous, proximal margin angular; carpus dorsal carina undivided; propodus opposable margin pectinate, with 3 movable spines proximally, distal margin lacking stout tooth; merus outer inferodistal angle

produced into acute spine; basis with ventrally directed spine mesially.

Mandibular palp absent. MXP1–4 each with epipod. MXP5 basal segment with posterior carina, terminating abruptly, but lacking distal spine.

TS5 lateral process anterior lobe a slender spine directed anterolaterally; posterior lobe a short spine directed laterally.

TS6 lateral process anterior lobe slender, rectangular, apex blunt; posterior lobe broad, triangular, anterior margin straight, apex acute.

TS7 lateral process anterior lobe much smaller than posterior lobe, low, angular, apex blunt; posterior lobe broad, triangular, anterior margin straight, apex acute.

TS8 anterolateral margin angular, apex blunt; sternal keel low, angular, apex blunt.

AS1–5 each with distinct, subparallel SM carinae. AS2–5 each with median tubercle and pit; proximally with irregular tubercle between intermediate and lateral carinae. AS6 with short, low MD carina posteriorly and ventrolateral spine anterior to uropodal articulation. Abdominal carinae spined as follows: SM (5)–6, IM 4–6, LT 2–6, MG 1–5.

Male PLP1 endopod with elongate hook process, apex blunt; apex of tube process considerably exceeding apex of hook process.

Telson as long as or slightly longer than broad; prelateral lobe longer than margin of LT tooth; denticles rounded, intermediates and lateral with low dorsal tubercle, SM 2–4, IM 9–11, LT 1. MD carina with proximal dorsal pit and short posterior spine overhanging sharp tubercle. Telson dorsolateral surface with bicarinate accessory MD and numerous curved supplementary longitudinal carinae; proximally with short, irregular, reticulated carinae and tubercles; carina of SM tooth irregular, extending almost to proximal margin of telson, but discontinuous adjacent to distal portion of MD carina; carina of LT tooth extending anteriorly almost to proximal margin; ventral surface with long, smooth postanal carina flanked by 1 or 2 sinuous, entire, or subdivided carinae converging posteriorly, and 6 shorter curved carinae posteriorly; ventrolateral carina extending to inner base of intermediate tooth.

Uropodal protopod terminal spines with lobe on outer margin of inner spine rounded, narrower than or as broad as adjacent spine,

proximal margin concave; with minute spine anterior to endopod articulation; protopod inner margin crenulate. Uropodal exopod proximal segment outer margin with 7–9 slender, graded movable spines, distalmost not reaching midlength of distal segment; distal margin with 2 ventral spines, outer slender, inner short, triangular. Exopod distal segment slightly longer than proximal segment; with 1 ventral and 2 dorsal carinae; entirely dark.

Color in Life.—Dorsal surface light brown with scattered dark chromatophores, ventral surface clear/white. Carapace with gastric grooves red; anterior and lateral margins, and carinae dark green; posterior margin between gastric grooves orange; with dark median patch, diffuse anteriorly. Antennule peduncle with 4 dark bands on outer margin. Antennal protopod dark on outer margin; antennal scale clear with dark outline, most pronounced anteriorly. Raptorial claw dactylus white; propodus with dark distal and extensor margin; carpus dark at articulation with propodus and merus; merus with inferodistal margin yellow, dark on superior and inferior margin. TS5–8 and AS1–6 with posterior margin black and yellow-orange; with dark, diffuse, irregular patches between intermediate and lateral carinae; submedian carinae red. Telson light brown dorsally, darkening posteriorly; supplementary carinae and carinae of primary teeth red; denticles white. Uropod protopod with diffuse dark chromatophores distally, apices of terminal spines red. Uropodal exopod proximal segment dark distally and proximally with outer margin yellow; distal segment black. Uropodal endopod distal half black.

Measurements.—Table. 1.

Etymology.—Named in honor of Dr. Raymond B. Manning, Smithsonian Institution, for his longstanding contribution to carcinology and his generous assistance with our stomatopod studies.

Remarks.—*Oratosquillina manningi* sp. nov. closely resembles *O. microps* from the Philippines in the small eyes, bilobed lateral processes of the thoracic somites, and dorsal carination of the telson. The new species differs from *O. microps* in lacking a mandibular palp; the rostral plate is apically truncate with a short median carina, rather than

Table 1. Selected measurements of specimens examined. Measurements in millimeters (mm). Abbreviations: male (m), female (f), total length (TL), carapace length (CL), anterior carapace width (AC), cornea width (CW), corneal index (CI), antennal scale (A2S), antennal peduncle (A1P).

Specimen	sex	TL	CL	AC	CW	CI	A2S	A1P
AM P53856	f	90	19.65	10.60	3.25	605	14.45	18.25
Holotype	m	87	19.20	10.50	3.70	519	13.90	17.55
NTOU P 1997-12-1	f	79	17.20	9.30	3.05	564	12.40	16.30
NTM Cr012402	m	59	14.15	7.90	2.75	515	10.30	13.75
NTM Cr012381	m	39	9.05	4.85	1.80	503	6.25	9.00

smooth and apically rounded; there are five instead of six teeth on the dactylus of raptorial claw; a short median carina is present on AS6 (though it may not be obvious unless the surface is dried); and the mid-ventral surface of the telson bears numerous carinae in addition to the postanal carina, rather than a postanal carina only.

Oratosquillina manningi is unique in the genus in lacking a mandibular palp, bearing a median carina on AS6, and bearing numerous carinae on the ventral surface of the telson. The presence or absence of the mandibular palp, in combination with other characters, has been considered an important generic character among stomatopods (e.g., Manning, 1968, 1995). However, the close resemblance of *O. manningi* sp. nov. to *O. microps*, which bears a mandibular palp, suggests that the absence of the mandibular palp in *O. manningi* may be an independent loss and not a reliable indicator of phylogenetic relationships in this case. Similarly, *Oratosquillina imperialis* (Manning, 1965), which otherwise closely resembles its congeners, such as *O. fossulata* (Moosa, 1991) and *O. striata* (Manning, 1978), is the only species of the genus in which the number of epipods varies (two or three instead of always four). Nevertheless, both *O. manningi* and *O. microps* differ from all other species in the *perpensa* group in bearing the bicarinate accessory median carina and other supplementary carinae on the dorsal surface of the telson.

Owing to the absence of the mandibular palp, *O. manningi* will key out nearest to *Areosquilla* Manning, 1976, or the monotypic *Paralimopsis* Moosa, 1991, using the key to genera of the Squillidae in Manning (1995). Species of *Areosquilla* differ from *O. manningi* in being smaller (TL < 50mm), in bearing only two epipods, bearing more than five teeth on the dactylus on the raptorial claw, and the absence of numerous supplementary

carinae on the telson. Unfortunately, variation in some species of *Oratosquillina* in several commonly used key characters (i.e., the presence or absence of the mandibular palp and the number of epipods), may present difficulties in reliably distinguishing *Oratosquillina* from *Areosquilla*. Differences in adult size and general appearance are difficult to incorporate into diagnostic keys, but adults of species of *Areosquilla* differ from all species of the *Oratosquillina perpensa* group in lacking the outer, inferodistal spine on the merus of the raptorial claw. *Areosquilla* differs from all species of the *Oratosquillina gonypetes* group in lacking a mandibular palp.

Comparison of *Oratosquillina manningi* with the holotype of the type species of *Paralimopsis*, *P. carinata*, shows the following differences: in *O. manningi*, the eyes are relatively smaller; the dorsal processes of the antennular somite are directed anterolaterally, not laterally; the branches of the anterior bifurcation of the median carina of the carapace are absent rather than present; the lateral process of TS6 is strongly bilobed rather than being at most indistinctly bilobed; TS7 is bilobed rather than unilobed; AS1–5 each lack the median carina present in *Paralimopsis*; AS3–5 each lack a longitudinal carina between the submedian and intermediate carinae, present in *Paralimopsis*; the dorsal ornamentation of the telson is more complex; the postanal carina is flanked by numerous supplementary carinae which are absent in *Paralimopsis*; and the inner margin of the uropodal protopod is crenulate, not spinose.

In the smaller Australian specimen of *O. manningi* (TL 39 mm), the well-developed penes and PLP1 endopod suggest that it is already sexually mature. Compared with the other specimens, however, the dorsal and ventral carinae of the telson are narrower, the median carina of AS6 is shorter and less distinct,

most marginal denticles of the telson bear a minute, soft, apical spinule, and the ventral supplementary carinae are relatively indistinct excepting the first carina flanking the postanal carina. In the largest male, the supplementary ventral carinae of the telson are best developed and the outer carina flanking the postanal keel is entire, instead of subdivided. All of these differences are likely to be age related. The present specimens agree well in other respects except that in the two largest specimens, the submedian carinae of AS5 are unarmed. The absence of posterior spines on AS5 in the two largest specimens and presence in the smaller specimens is unusual; among squilloids the number of spined abdominal carinae normally increases with size.

The known distribution of *O. manningi* is discontinuous, resembling that of *Erugosquilla grahami* Ah Yong and Manning, 1998, also recently discovered from Taiwan and Australia. The reality of this distributional discontinuity remains to be determined because the absence of records from intermediate localities likely reflects insufficient sampling effort, or misidentifications in the literature.

Distribution.—Known only from the Australian Northwest Shelf and northern Taiwan.

ACKNOWLEDGEMENTS

We thank Dr. George 'Buz' Wilson (AM) for constructive comments on the manuscript. Thanks also to Drs. Alain Crosnier and Nguyen Ngoc-Ho (Muséum national d'Histoire naturelle, Paris) for the loan of the holotype of *Paralimopsis carinata*. Ah Yong's stomatopod studies have been supported by an Australian Museum Postgraduate Grant, a Joyce Vickery Research Grant (Linnean Society of New South Wales), and Australian Postgraduate Award (to STA) from the Australian Research Council, administered by the University of New South Wales.

LITERATURE CITED

Ahyong, S. T. 1998. Review of *Neoanchisquilla* Moosa, 1991 and *Neclorida* Manning, 1995 (Crustacea: Stomatopoda: Squilloidea), with descriptions of two new species of *Neoanchisquilla* from the Indian Ocean.—Records of the Australian Museum 50: 217–229.

———, and R. B. Manning. 1998. Two new species of *Erugosquilla* from the Indo-West Pacific (Crustacea: Stomatopoda: Squillidae).—Proceedings of the Biological Society of Washington 111: 653–662.

Garcia, R., and R. B. Manning. 1982. Four new species of stomatopod crustaceans from the Philippines.—Proceedings of the Biological Society of Washington 95: 537–544.

Latreille, P. A. 1803. Histoire naturelle, générale et particulière, des Crustacés et des Insectes 3. F. Dufart, Paris. 467 pp..

Manning, R. B. 1965. Stomatopoda from the collections of His Majesty The Emperor of Japan.—Crustaceana 9: 249–262.

———. 1968. A revision of the family Squillidae (Crustacea, Stomatopoda), with the description of eight new genera.—Bulletin of Marine Science 18: 105–142.

———. 1969. Stomatopod Crustacea from the Western Atlantic.—Studies in Tropical Oceanography 8: viii + 380 pp.

———. 1976. Redescriptions of *Oratosquilla indica* (Hansen), and *Clorida verrucosa* (Hansen), with accounts of a new genus and two new species (Crustacea, Stomatopoda).—Beaufortia 25(318): 1–13.

———. 1978. Further observations on *Oratosquilla*, with accounts of two new genera and nine new species (Crustacea: Stomatopoda: Squillidae).—Smithsonian Contributions to Zoology 272: 1–44.

———. 1995. Stomatopod Crustacea of Vietnam: the legacy of Raoul Serène.—Crustacean Research Special No. 4: 1–339.

Moosa, M. K. 1986. [for 1985] Stomatopod Crustacea.—Résultats du Campagnes MUSORSTOM I and II Philippines, 2. Mémoires du Muséum National d'Histoire Naturelle, Paris, series A, Zoologie 133: 367–414.

———. 1991. The Stomatopoda of New Caledonia and Chesterfield Islands. Pp. 149–219 in Richer de Forges, ed. Le benthos de fonds meubles des lagons de Nouvelle-Calédonie 1. Editions de l'ORSTOM, Paris.

RECEIVED: 20 April 1999.

ACCEPTED: 8 November 1999.