

berance at distal outer angle. Both first and second chelipeds quite similar in general aspects, carpus crescent-form, chela composed of two similar fingers which are provided with a tuft of long hairs on the distal border.

Atya moluccensis de HAAN

Atya moluccensis de HAAN, 1849, p. 186; MIERS, 1880, p. 382, Pl. 15, figs. 3 and 4; de MAN, 1892, p. 357, pl. 21, fig. 20; 1915, p. 407, Taf. 28, figs. 5 and 5a~d; BOUVIER, 1904, p. 137; BALSS, 1914, p. 26; BLANCO, 1935, p. 30.

Body large, entirely covered with fine spinules. Rostrum rather short, triangular in upper aspects, more or less deflexed, slightly shorter than 0.4 times the length of carapace, not reaching to the ter-

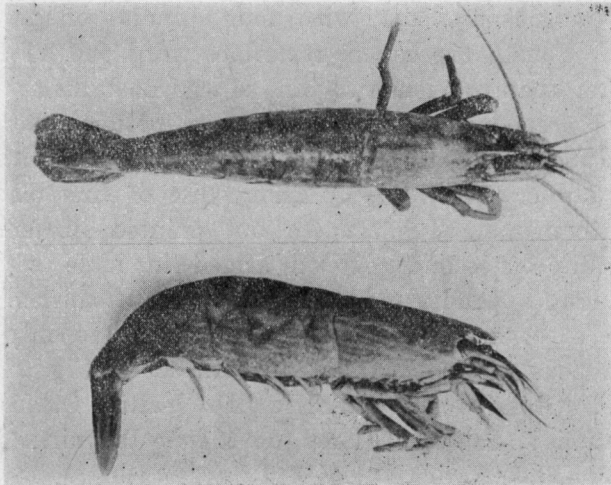


Fig. 22. *Atya moluccensis* de HAAN, ♀, × ca. 1.2.

minal margin of penultimate article of antennular peduncle, dorsal carina extending backwards to post-orbital region (Fig. 22), spineless dorsally, but with 8 spines ventrally (see below).

Number of lower rostral spines	3	4	5	6	7	8
Frequency	2	5	7	2	2	2

Infraorbital and pterygostomian angles each end in an acute spine (Fig. 23, A). Telson shorter than uropods, with two longitudinal series of 6~7 spinules on dorsal with a median and two marginal processes on distal convex border which bears several bristles (Fig. 23, B).

Mandible without palp (Fig. 23, *C* and *D*). Endopodite of first maxiliped with a lobular triangular process at distal angle. Chelipeds. quite similar in size and general aspects, carpus deeply excavated on anterior border, fingers similar (Fig. 23, *E* and *F*). Third to fifth pairs of legs much alike, densely covered with setae all over. Third leg stoutest of all walking legs, propodus in dactylus about 2.8, carpus 2, merus 6; carpus with a subterminal spine on the posterior border,

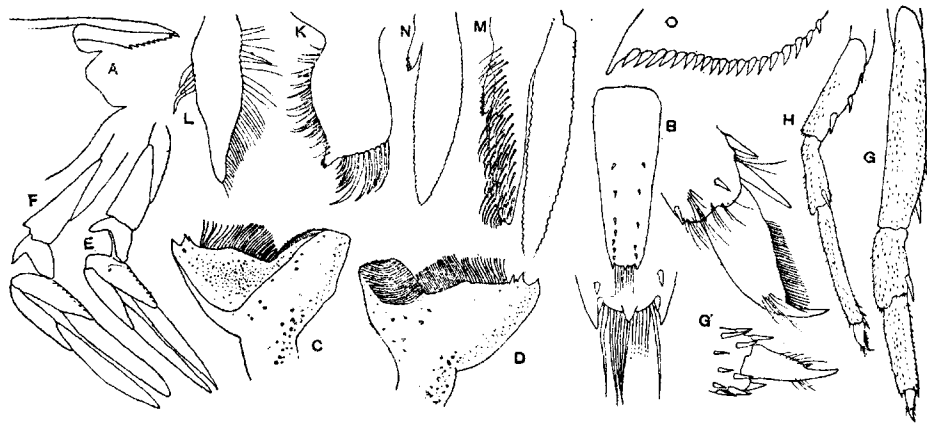


Fig. 23. *A*, Frontal region of carapace of *A. moluccensis*, ♀, ×4; *B*, telson, ×4; *C*, inner view of mandible, ×ca. 16; *D*, outer view of mandible, ×ca. 16; *E*, first leg, ×4; *F*, second leg, ×4; *G*, third leg, ×4; *G'*, dactylus of third leg, ×ca. 13; *H*, fifth leg, ×4; *H'*, dactylus of fifth leg, ×ca. 23; *K*, endopodite of first pleopod in male, ×ca. 13; *L*, same as in *K* in female, ×ca. 16; *M*, endopodite of second pleopod in male with stylamblys and appendix masculina, ×ca. 13; *N*, endopodite of second pleopod in female with stylamblys, ×7; *O*, uropodal spines, ×ca. 13.

merus with one small spinules and one large spine on the posterior border (Fig. 23, *G*). Fifth leg smaller and shorter (about 0.8 times) than third and fourth ones, propodus in dactylus 4, carpus 2, merus 3; dactylus armed with 32 setae in distal two-thirds of the posterior border except apical claw, carpus with a subterminal spinule on postero-lateral side, merus furnished with 3 spinules on posterior border (Fig. 23, *H*).

Definite branchiae two in number.

	<i>h</i>	<i>i</i>	<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>	<i>o</i>
Pleurobranchiae	—	r	1	1	1	1	1
Arthrobranchiae	—	1	1	—	—	—	—
Podobranchiae	—	—	—	—	—	—	—
Mastigobranchiae		r?	r	r	—	—	—
Exopodite	1	1	—	—	—	—	—

Endopodite of first pleopod resembles a sail of a boat in outline, with a short papilliform protuberance at inner distal corner, densely furnished with bristles on inner and terminal borders in male (Fig. 23, *K*), but in female, with long hairs on whole outer and central inner borders, both meeting acutely at tip (Fig. 23, *L*). Endopodite of second pleopod provided with a large appendix masculina as well as small stylamblys on its inner side, the former thickly set with setae (Fig. 23, *M*), but in female, with a stylamblys only (Fig. 23, *M*). Uropod with 19 spines (Fig. 23, *O*).

Above description is based on a male, 31 mm long, and an ovigerous female specimen, 51 mm in body length from posterior margin of orbital notch to the tip of telson.

Localities: Okinawa-zima, Miyako-zima, Isigaki-zima (Liu-kiu).

Distributions: Java; Sumatra; Celebes; Saleyer; Timor; Flores (de MAN); Philippine (BLANCO).

Note: According to MIER's⁽³⁷⁾ descriptions and illustrations which are based on an adult male from Java, "the third leg considerably dilated, and the merus armed below with a strong spine placed at some distance from the distal border of the segment". But my specimens have two unequal spinules instead of a strong spine in corresponding part of third leg which is not dilated.

III. General consideration

So far as my observations on the majority of the family Atyidae go, two modes of subdivisions may be recognized in this family, viz., geographical and morphological. The geographical distribution of the group warrants one to set five subgroups into which the group in question is divided, namely, (1) Korean, (2) All Japan, (3) Northern Japan, (4) Southern Japan, and (5) Subtropical and tropical Japan.

(1) Korean subgroup includes one which is endemic to Korea, *Neocaridina denticulata koreana*.

(2) All Japan subgroup covers the whole Japan in the extent of

distribution and is represented by *Caridina leucosticta*, *Paratya compressa* may also be said a member of this subgroup but it is not yet found more southern than Kyûsyû.

(3) Northern Japan subgroup extends from the latitude 35° northward to northern extremity of the Main Island of Japan in area and is inhabited by a subspecies of *P. compressa*, viz., *P. compressa improvisa*.

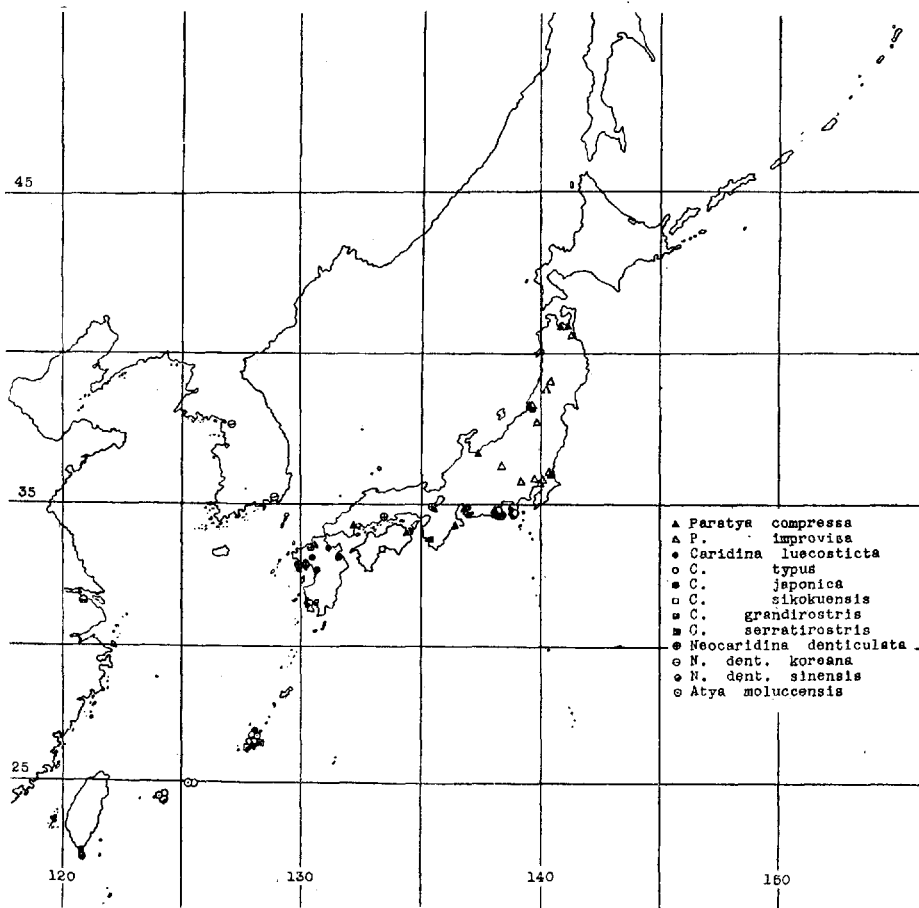


Fig. 24. Distribution of Japanese atyid shrimps.

(4) Southern Japan subgroup includes those which inhabit southern Japan, viz., *Caridina typus*, *C. japonica*, *C. japonica sikokuensis* and *Neocaridina denticulata*.

(5) Subtropical and tropical subgroup populates from Liu-kiu southward to Indian Ocean, including *Caridina grandirostris*, *C. serratirostris*, *Neocaridina denticulata sinensis*, and *Atya moluccensis*.

Of the morphological features which correspond to the geographical distribution of the specimens, mention should be made of the typical form of *Paratya compressa* and *P. comp. improvisa* on the one hand, and the typical form of *Neocaridina denticulata*, and its two subspecies *N. dent. koreana* and *N. dent. sinensis* on the other.

The two items do not go on all fours except the above mentioned examples. But I would like to call attention to the point that *Paratya compressa* stands far apart from all the rests in having exopodites on all pereopods. But *Atya* is rather near to *Caridina* with respect to the features of appendages. It may be mentioned that pleopods furnish conjectures as to the phylogeny of the group. I am inclined to set "leucosticta" form ancestral to two divergent stems "denticulata" and "typus" according to the features of pleopods. It is hoped, however, that careful examinations will throw some light on this problem.

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