

TWO NEW THALASSINIDEA (CRUSTACEA: DECAPODA) FROM
JAPAN, WITH THE BIOGEOGRAPHICAL DISTRIBUTION
OF THE JAPANESE THALASSINIDEA

Katsushi Sakai

ABSTRACT

Two new species of the section Thalassinidea, *Axiopsis (Axiopsis) pilocheira* and *Callianidea lepta* from Japan are described. In addition, two species not previously recorded from Japanese waters, *Calocaris granulatus* from Sagami Bay and *Callianassa indica* from Okinawa, are reported. As a result, the species of Japanese Thalassinidea referable to 13 genera and 6 families now number 42. Nine seem to be elements from the Indo-southern West Pacific region, 31 are attributed to the central west Pacific, including 9 Japanese endemics, and 2 seem to be extended from the northern Pacific.

The species of Thalassinidea have been reviewed by Borradaile (1903), de Man (1928) and Sakai (1969, 1982). Until these studies 42 species were known, of which 29 were described as new species (de Haan, 1833-1849; 1849; Stimpson, 1860; Ortmann, 1891; Balss, 1913; Parisi, 1917; Kishinouye, 1926; Yokoya, 1933; Makarov, 1938; Miyake and Sakai, 1967; Sakai, 1967a; 1967b; 1970a; 1970b; 1971; 1982; 1986; Saint-Laurent and Loeuff, 1979), and eight reported from other localities than Japan were also added to the Japanese fauna (Balss, 1914; Nakazawa, 1927; Sakai, 1970a; Miyake, 1956; 1982). Of the 37 species cited above, some species subsequently recognized as junior-synonyms or junior-homonyms are included (Ortmann, 1891; Bouvier, 1901; Makarov, 1938; Yokoya, 1930; Sakai, 1966; 1968; 1969; 1982; 1984). Two new species, *Axiopsis (Axiopsis) pilocheira* and *Callianidea lepta*, and two species not previously recorded in Japan, *Calocaris granulatus* from Sagami Bay and *Callianassa indica* from Okinawa, are here added to the Japanese fauna. The description of the two new species and remarks on the other four are taken up below.

The following abbreviations are used in this paper, BLT = Biological Laboratory, Shikoku Women's University, Tokushima; cl = carapace length; E = epipod; tl = total length of body; USNM = U.S. National Museum, Washington, D.C.; ZLKU = Zoological Laboratory, Kyushu University, Fukuoka.

Family Axiidae Huxley, 1879

Genus *Axiopsis* Borradaile, 1903

Axiopsis (Axiopsis) pilocheira new species

Figures 1-2

Material Examined.—Holotype, 1 ♀, tl 96 mm, cl 34 mm, USNM Cat. No. 231418 (dedicated from I. Kubo's collection, Tokyo University of Fisheries, Japan), Kumano-nada, off east coast of the Kii Peninsula, Japan, about 360 m deep, 5 April 1937, coll. unknown.

Description.—Rostrum (Fig. 1a, b) narrow, with 2-3 marginal spines; supraorbital spine present. Outer carina of gastric region scarcely developed but with 2 elongate spines; submedian carina absent but position marked by 4 stout spines; median carina conspicuous with 3 anterior spines, a median tubercle, and 2 posterior spines. Cardiac region smooth.

Eyestalks extend to middle of rostrum. Antennular peduncle overreaches rostrum by distal segment; flagella long, outer dorsal flagellum 90 mm, and inner

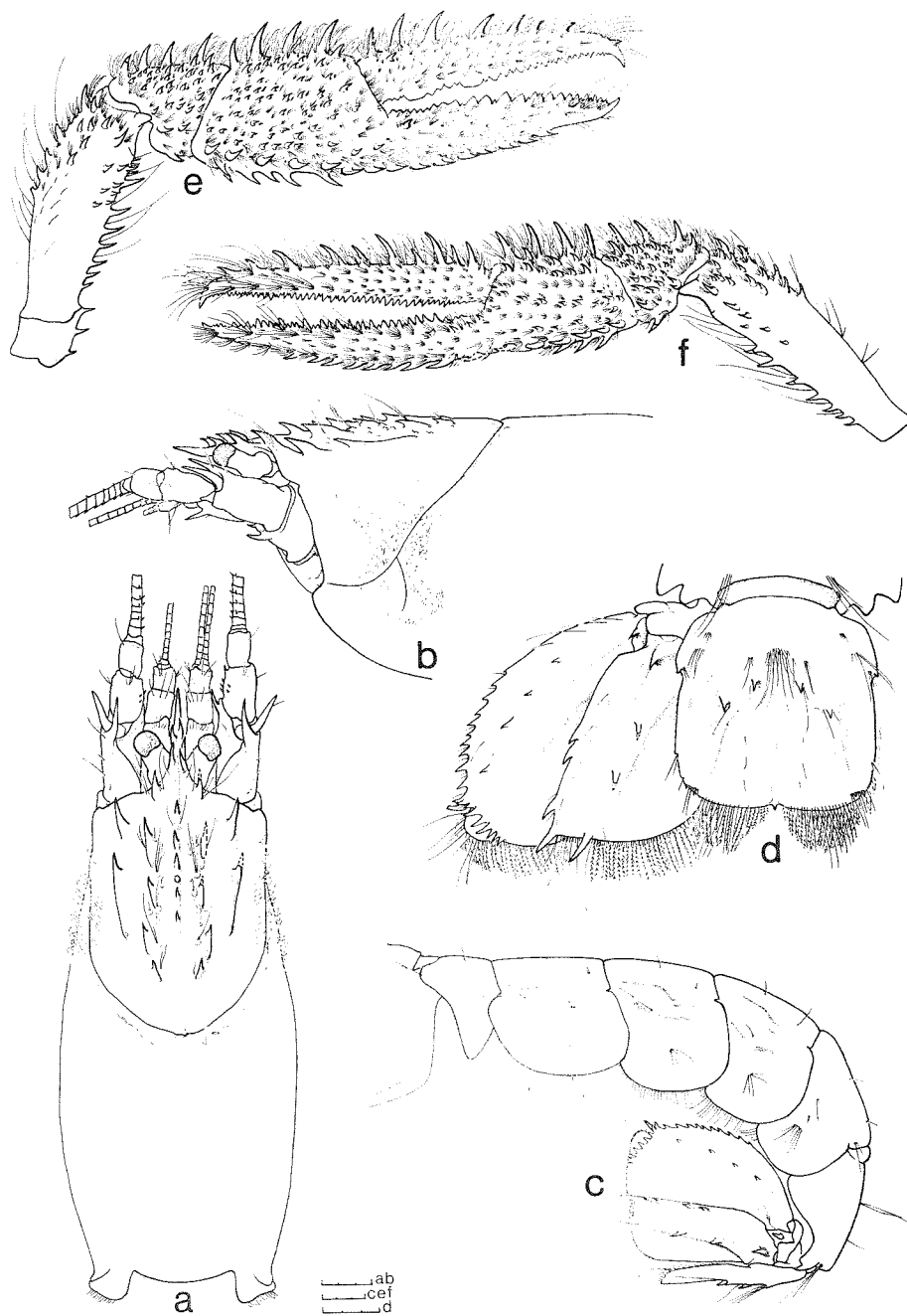


Figure 1. *Axiopsis (Axiopsis) pilocheira* new species, holotype, female from Kumano-nada, Japan. a. carapace, dorsal; b. anterior carapace, lateral; c. abdomen and tail-fan, lateral; d. telson and left uropod; e. 1st right pereiopod, excluding f. 1st left pereiopod, excluding coxa and basis; coxa, basis and ischium. Scale in mm.



Figure 2. *Axiposis (Axiopsis) pilocheira* new species, holotype. a. maxillule, outer; b. maxilla, outer; c. 1st maxilliped, mesial; d. 2nd maxilliped, outer; e. 3rd maxilliped, outer; f. proximal parts of 3rd maxilliped, mesial. Scale in mm.

ventral 98 mm long. Antennal peduncle exceeds antennular peduncle by distal segment; segment 1 with 2 anteroventral spines; spine of segment 2 outward directed, scaphocerite extends slightly behind; segment 3 with sharp distoventral spine; segment 4 with small distoventral spine, flagellum 160 mm long.

Mandibular palp 3-segmented. Maxillular endopod (Fig. 2a) 2-segmented, distal segment deflected proximally with 2 terminal setae. Maxillary scaphognathite (Fig. 2b) with long posterior flagellum; endopod distally tapering and incurved with distal hairs. Maxilliped 1 endopod (Fig. 2c) 2-segmented; exopod with 2-segmented process, proximal segment small. Maxilliped 2 exopod (Fig. 2d) consisting of proximal segment and multiarticulate flagellum. Maxilliped 3 coxa (Fig. 2e, f) with sharp distal spine on posteromesial margin; basis also with sharp distal, bifid spine on posteromesial margin; ischium with serrated ridge on inner mesial margin, and with 2 spines on outer mesial margin; merus about one-fourth longer than ischium in midline, with 4–5 sharp spines on outer mesial margin; carpus about $\frac{3}{4}$ length of merus, and with distoventral spine; propodus slightly shorter than carpus; dactylus about $\frac{2}{3}$ length of propodus.

Pereiopods 1 (Fig. 1e, f) unequal; carpus and chela flat, with scattered plumose hairs and spines, obliquely positioned to merus.

Right cheliped larger; coxa bears distal and middle spines on posteromesial margin; basis unarmed; ischium with 3 equidistant ventral spines. Merus with row of 7 outer ventral spines, with 3 ventromesial spines on distal part, with 5 dorsal spines on distal half; outer surface with 15 spines on distal half, and hairy on dorsodistal part. Carpus with paired ventral spines and a row of 4 strong dorsal spines; outer surface with more than 30 spines. Chela about 4 times as long as carpus in midline, with row of 16 distinct outer ventral spines, a row of 8 strong ventromesial spines on proximal half, and 4 sharp dorsal spines; outer surface spinous, thickly covered with plumose hairs; mesial surface covered with tufts of short hairs, and with 2 sharp spines below dorsal margin; fixed finger longer than palm, incurved distally with acute tip; cutting edges with row of triangular and quadrate teeth. Dactylus 1.6 times as long as palm in midline, with 8 sharp dorsal spines.

Left cheliped smaller; coxa and basis as in larger cheliped; ischium with 6 slender ventral spines. Merus about 3.5 times as long as broad, with 7 slender ventral spines, with 4 dorsal spines on distal third; outer surface with more than 16 spines on distal part. Carpus $\frac{1}{3}$ length of merus in midline, with 3 slender dorsal spines, and a ventral spine; outer surface with more than 30 spines, and mesial surface with strong dorsomedial spine. Chela about 4 times as long as carpus in midline, with 17 sharp outward directed spines on outer ventral margin, and 4 sharp dorsal spines; outer surface scattered with numerous small sharp spines; inner surface dorsally with sharp spine; fixed finger 2.5 times as long as palm, slender, incurved distally, armed with row of acute anteriorly directed spines on cutting edge. Dactylus with 10 sharp dorsal spines.

Pereiopod 2 coxa with 2 small posteromesial spines; ischium with a distoventral spine; merus with 3 sharp anteriorly directed ventral spines; chela slightly longer than carpus.

Pereiopod 3 coxa, basis and ischium unarmed; merus with 3 ventral spines. Pereiopod 5 unarmed.

Branchial-formula as follow:

	Maxillipeds			Pereiopods				
	1	2	3	1	2	3	4	5
Epipods and podobranchs	E	E+1	E+1	E+1	E+1	E+1	E	—
Arthrobranchs	—	—	2	2	2	2	2	—
Pleurobranchs	—	—	—	—	—	—	—	—

Abdominal segments (Fig. 1c) smooth. Pleuron 1 narrow, triangular ventrally;

pleuron 2 broad, truncate on ventral margin; pleura 3–5 also truncate ventrally; and pleuron 6 broadly-rounded on ventral margin.

Pleopod 1 in female simple, elongate, leaflike, bearing marginal hairs in distal half. Pleopods 2–5 biramous and narrowly leaflike, each bearing appendix interna.

Telson (Fig. 1d) 1.3 times as long as abdominal segment 6, almost parallel sided, with 2 marginal spines, and with pair of 2 movable spinules at each posterolateral angle; posterior margin slightly concave medially with median spinule; surface with 2 pairs of spines. Uropodal exopod broad; outer margin broadly rounded with 8–10 spines on distal half, outer rib on surface with 3–4 spines, while inner rib smooth; distal suture with 9–10 spinules plus distinct outer movable spine; distal lobe small. Uropodal endopod with proximal spine, outer margin almost straight, with 4 spines including distal one; midrib with 3 spines including distal marginal one.

Etymology.—The name of *pilocheira* is derived from the Greek, *pilos* meaning hairy, and *cheiros* meaning hand.

Remarks.—*A. pilocheira* is superficially similar to *A. amakusana* (Miyake and Sakai, 1967) in spination of 5 dorsal carinae on the gastric region, and in the carpus and chela of the 1st pereopod; flat, hairy, obliquely positioned. It is readily distinguished from *A. amakusana* by the elongate rostrum, the eyestalks being distinctly shorter than the rostrum, the broad uropod, the carpus and chela of the 1st pereopod much ornamented with spines; and the presence of podobranchs. *A. amakusana*, however, is a small species measuring only 32 mm in total body length, the eyestalks are stout, and the cardiac region bears a middorsal carina on the whole of its length.

Calocaris granulosis Grebenyuk, 1975

Calocaris (Calastacus) granulosis Grebenyuk, 1975, p. 299, 2 text-figs.

Material Examined.—1 ♀, tl 78 mm, damaged, USNM Cat. No. 231420, off south of Oiso, Sagami Bay, Japan, 250–280 m deep, 3 April 1984, trap for crabs, coll. by H. Ikeda.

Remarks.—This species reported only from Alaska is collected for the first time from Sagami Bay, Japan, at a depth of 250–280 m.

Family Callianideidae Kossmann, 1880

Genus *Callianidea* H. Milne-Edwards, 1837

Callianidea lepta new species

Figure 3

Material Examined.—Holotype, 1 ♂, tl 20 mm, cl 45 mm, USNM Cat. No. 231419, Chatan, Okinawa Is., low tidal zone, 29 July 1984, coll. by S. Shokita.

Description.—Cervical groove (Fig. 3a) weakly developed, dorsal transverse part, situated about in middle, running forward to anterolateral margin of carapace. Dorsal surface of carapace declining anteriorly to rostrum; rostrum broadly triangular, about $\frac{1}{3}$ as long as eyestalk; front deeply excavate at both sides of eyestalks, with a short longitudinal row of setae behind; dorsolateral anterior margin of carapace broadly rounded.

Eyestalk (Fig. 3a, b) reaching to distal margin of antennal segment 2, rounded on surface, cornea subdistal. Antennular peduncle slightly longer than antennal peduncle; segment 1 extremely elongate, about twice as long as last 2 segments together, flagella of about equal length, about 0.5 times as long as peduncle.

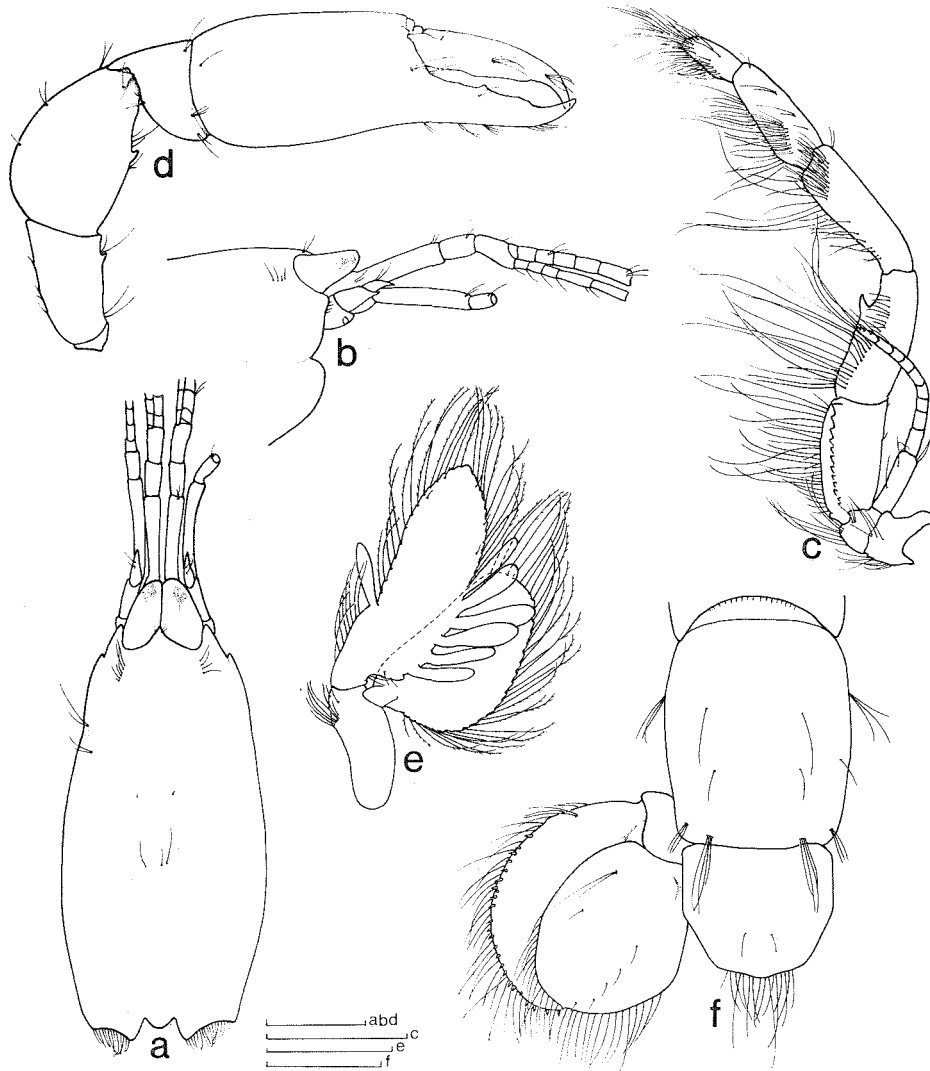


Figure 3. *Callianidea lepta* new species, holotype, male from Okinawa, Japan. a. carapace, dorsal; b. anterior carapace, lateral; c. 3rd maxilliped, mesial; d. 1st right pereopod, outer; e. 2nd pleopod, anterior face; f. 6th abdominal segment, telson, and left uropod. Scale in mm.

Antennal scaphocerite acute, peduncular segment 4 more than twice the length of segment 2, reaching to midpoint of antennular segment 2.

Maxilliped 3 (Fig. 3c) with exopod reaching almost to end of merus; ischium twice as long as broad, with inner mesial row of 12 spinules; merus slightly longer than ischium, with strong mesial spine subdistally; carpus and propodus together about as long as ischium and merus together; dactylus short.

Pereopods 1 (Fig. 3d) subequal; ischium 1.5 times as long as broad at distal part, with a small mesial tooth distally; merus about 1.5 times the length of ischium, largely curved dorsally, its ventral margin with a small tooth near mid-

point; carpus about $\frac{1}{3}$ length of merus and 1.8 times as long as broad in midline; chela about 6 times length of carpus in midline; fixed finger about $\frac{2}{3}$ as long as palm, tapering, cutting edge with 1 row tooth; dactylus equal to fixed finger, incurved distally.

Pleopod 1 in males wanting. Pleopod 2 (Fig. 3e) biramous, exopod oval and with marginal hairs; endopod slightly longer than exopod with marginal hairs except on proximal margin, characteristically bearing a few simple, narrowly ovate branchial filaments. Pleopods 3–5 similar to but larger than pleopod 2 in shape.

Telson (Fig. 3f) 0.8 times longer than width, proximal half parallel sided, tapering in distal half, and distal margin broadly convex with hairs. Uropodal endopod 1.3 times as long as telson, oval, 1.3 times longer than width; exopod broadly ovate, 1.3 times longer than width; exopod exceeds endopod, 1.3 times as long as endopod, 1.5 times as long as its width.

Etymology. — The name, *lepta*, is derived from the Greek, *leptos* meaning slender, hinting that the shape of the specimen is slender.

Remarks. — The present species is closely related to *C. leura* Poore and Griffin, 1979 from Queensland, Australia, in the form of the subequal chelipeds, the elongate antennular segment 1, the front of the carapace with a short longitudinal row of setae behind, the maxilliped 3 merus with a mesial spine, and the uropod distinctly longer than the telson. However, it is distinguished from Australian species by the rostrum being broadly triangular with a pointed tip, the eyestalks rounded, the cornea subdistal, the antennular segment 1 about twice as long as the last 2 segments together; the pleopods 2–5 hairy but proximally with a few simple, narrowly ovate branchial filaments; the uropodal endopod 1.3 times as long as the telson. In *C. leura*, the rostrum is bluntly rounded, the eyestalks are somewhat flattened with the cornea distal (Poore and Griffin, 1979, text-fig. 40a), the antennular segment 1 more than 3 times as long as the last 2 segments together, the uropodal endopod 1.5 times as long as the telson, and pleopods 2–5 bearing simple narrowly ovate branchial filaments on the whole margin.

Family Callianassidae Dana, 1852

Genus *Callianassa* Dana, 1852

Callianassa indica de Man, 1905

Callianassa (Cheramus) indica de Man, 1905, p. 605; de Man, 1928, pp. 26, 100, 160, pl. 17.

Material Examined. — 1 ♂, tl 52 mm, 1 ovig. ♀, tl 64 mm, ZLKU 12409, east coast of Tonaki Is., Okinawa-group, Ryukyu Is., 9 July 1963, coll. by Y. Nakasone.

Type-locality. — Bay of Kankamaraän, south coast of Kangean (6°59'S, 115°24.7'E).

Remarks. — This species, known from Indonesian waters, is reported for the first time in Okinawa, Japan.

Family Upogebiidae Borradaile, 1903

Genus *Upogebia* Leach, 1814

Upogebia (Upogebia) pugnax de Man, 1905

Upogebia (Upogebia) pugnax de Man, 1905, p. 600; de Man 1928, pp. 66–69, pls. 5–6.

Material Examined. — 47 ♂, tl 18–43 mm, 36 ♀, tl 20–40, BLT 2877, tidal zone, inlet of Uranouchi, Usa, W. Kochi, 27 May 1979, coll. by K. Sakai.

Type-locality. — Sumba, Indonesia.

Remarks. — The species is abundant in the muddy sand of the tidal flat in the inlet of Uranouch, W. Kochi.

Upogebia (Upogebia) narutensis Sakai, 1986

Upogebia spinifrons, Sakai, 1984 pp. 209–214, 3 text-figs; Sakai, 1986, pp. 23–28, 1 pl.

Material Examined. — Many damaged specimens, BLT 4539, from west of Katsurahama, Kochi, 15 m, 7 October 1985, trawl, coll. by K. Sakai.

Remarks. — This species is already reported from Fukuyama and Naruto in the Inland Sea, and Tanabe-Egawa, west coast of Kii Peninsula, but the present record from Kochi proves that this species is rather abundant in the shallow waters of western Japan.

LIST OF THE SPECIES OF THE SECTION THALASSINIDEA IN JAPAN

Family Axiidae Huxley, 1879

Genus *Axius* Leach, 1815

Subgenus *Neaxius* Borradaile, 1903

Axius (Neaxius) acanthus A. Milne-Edwards, 1878

Axius (Neaxius) euryrhynchus de Man, 1905

Subgenus *Eiconaxius* Bate, 1888

Axius (Eiconaxius) farreae (Ortmann, 1891)

Genus *Oxyrynchaxius* Parisi, 1917

Oxyrynchaxius japonicus Parisi, 1917

Genus *Axiopsis* Borradaile, 1903

Subgenus *Paraxiopsis* de Man, 1905

Axiopsis (Paraxiopsis) brocki (de Man, 1888)

Subgenus *Axiopsis* Borradaile, 1903

Axiopsis (Axiopsis) aff. serratifrons Sakai, 1970

Axiopsis (Axiopsis) habereri (Balss, 1913)

Axiopsis (Axiopsis) princeps (Boas, 1880)

Axiopsis (Axiopsis) soyoi (Yokoya, 1933)

Axiopsis (Axiopsis) amakusana (Miyake and Sakai, 1967)

Axiopsis (Axiopsis) miyazakiensis (Yokoya, 1933)

Axiopsis (Axiopsis) polyacantha Miyake and Sakai, 1967

Axiopsis (Axiopsis) pilocheira new species

Genus *Calocaris* Bell, 1853

Calocaris mimasensis Sakai, 1967

Calocaris granulatus Grebenyuk, 1975

Family Callianideidae Kossmann, 1880

Genus *Callianidea* H. Milne-Edwards, 1837

Callianidea typa H. Milne-Edwards, 1837

Callianidea lepta new species

Family Callianassidae Dana, 1852

Genus *Callianassa* Dana, 1852

Callianassa longicauda Sakai, 1967

Callianassa bowieri Nobili, 1904

Callianassa japonica Ortmann, 1891

= *C. subterranea* (Montagu) var. *japonica* Ortmann, 1891; *C. harmandi* Bouvier, 1901; *C. californiensis* Dana var. *japonica* Bouvier, 1901; *C. californiensis* Dana var. *bowieri* Makarov, 1938

Callianassa petalura Stimpson, 1860

= *C. gigas* Dana var. *japonica* Makarov, 1938; *C. gigas* Dana var. *eo*a Makarov, 1938

Table 1. Geographical limits of distribution (by location and depth in meters) of major groups of Thalassinidae in Japanese water: Pac = Pacific side of Japan, Cont = Western Continental side of Japan

Region/Species	Geographic limit or location		
	Northernmost		Southernmost or Westernmost
	Pac	Cont	
Indo-West Pacific			
<i>Axius (Neaxius) acanthus</i>	Okinawa		
<i>Axiopsis (Paraxiopsis) brocki</i>	Okinawa		
<i>Callianidea tya</i>	Kagoshima	Fukuoka	
<i>Thalassinia anomala</i>	Okinawa		
<i>Upogebia pugnax</i>	Kochi		
Indian Ocean			
<i>Callianassa bouvieri</i>		Amakusa	
<i>Upogebia isodactyla</i>	?Inland-Sea		
Tropical W. Pacific			
<i>Axius (Neaxius) euryrhynchus</i>	Kii 20 m		
<i>Callianassa indica</i>	Okinawa		
Central W. Pacific			
<i>Axius farreae</i>	Uraga Str. 600 m	S. Goto 324 m	
<i>Axiopsis (A.) aff. serratifrons</i>		Tsushima 70 m	
<i>Axiopsis (A.) habereri</i>	Shioyazaki 102 m	Maizuru	Yellow Sea 99 m
<i>A. (A.) soyoi</i>	Shioyazaki 141 m to Kagoshima 133 m	Tsushima 120 m	
<i>A. (A.) polyacantha</i>			E. China Sea 96 m
<i>Callianidea lepta</i>	Hokkaido	Toyama	Okinawa
<i>Callianassa petalura</i>	Hokkaido	Amakusa	Kumamoto
<i>C. japonica</i>			Kumamoto
<i>C. longicauda</i>			E. China Sea
<i>C. nakasonei</i>			Okinawa
<i>C. spinophthalma</i>		Tsushima 210 m	
<i>C. sp. Sakai</i>		S. Tsushima 110 m	
<i>Laomedea astacina</i>	Tokyo Bay	Fukuoka	Iriomote
<i>Upogebia major</i>	Tokyo Bay to Kumamoto	Hokkaido	Vladivostok
<i>U. issaefi</i>	Mie to Hyogo		Vladivostok
<i>U. yokoyai</i>	Aomori	Nagasaki	Iriomote

Table 1. Continued

Region/Species	Geographic limit or location			Southernmost or Westernmost
	Northernmost			
	Pac	Cont		
<i>U. imperfecta</i>				Yellow Sea 50 m
<i>U. acanthochela</i>				Yellow Sea
<i>U. miyakei</i>				Ishigaki
<i>U. (Acutigebia) trypeta</i>				Amami-Oshima (inside coral)
<i>U. (Neogebicula) monochela</i>		Amakusa		
<i>Wolffoebia kyushuensis</i>	S. Miyazaki 137 m	N. Goto 106 m		
Endemic Japanese spp.				
<i>Oxyrynchaxius japonicus</i>	Sagami Bay to Kii 40–60 m			
<i>Axiopsis (A.) amakusana</i>		Amakusa 20–40 m		
<i>A. (A.) miyazakiensis</i>	Miyazaki 137 m			
<i>A. (A.) pilocheira</i>	Kumano-nada 360 m			
<i>Calocaris mimasensis</i>	Kochi deep			
<i>Calliax sakaii</i>		Amakusa		
<i>Ctenocheles balssi</i>	Sagami Bay 800 m	Niigata deep to Wakasa Bay 119 m		
<i>Upogebia narutensis</i>	Kii 20 m to Kochi 15 m			
<i>Tuerkayogebia kiiensis</i>	Kii 20 m			
N. Pacific region				
<i>Axiopsis (A.) princeps</i>	Hokkaido to Yamaguchi	Sagami Bay		Vladivostok
<i>Calocaris gramulosus</i>	Alaska	Sagami Bay		

- Callianassa indica* de Man, 1905
Callianassa spinophthalma Sakai, 1970
Callianassa nakasonei Sakai, 1967
Callianassa sp. Sakai, 1970
 Genus *Calliax* Saint-Laurent, 1973
Calliax sakaii Saint-Laurent, 1979
 =*C. (Callichirus) novaebritanniae*. -Sakai, 1966 (not Borradaile, 1899)
 Genus *Ctenocheles* Kishinouye, 1926
Ctenocheles balsi Kishinouye, 1926
- Family Laomediidae de Haan, 1849
 Genus *Laomedia* de Haan, 1849
Laomedia astacina de Haan, 1849
- Family Thalassinidae Herbst, 1804
 Genus *Thalassina* Herbst, 1804
Thalassina anomala Herbst, 1804
- Family Upogebiidae Borradaile, 1903
 Genus *Upogebia* Leach, 1814
 Subgenus *Upogebia* Leach, 1814
Upogebia (Upogebia) isodactyla (Ortmann, 1891)
Upogebia (Upogebia) major (de Haan, 1841)
Upogebia (Upogebia) issaeffi (Balss, 1913)
Upogebia (Upogebia) yokoyai Makarov, 1938
 =*Gebia affinis*. -Yokoya, 1930 (not Say, 1817)
Upogebia (Upogebia) pugnax de Man, 1905
Upogebia (Upogebia) narutensis Sakai, 1986
 =*U. spinifrons*. -Sakai, 1984 (not Haswell, 1882)
Upogebia (Upogebia) imperfecta Sakai, 1982
 =*U. issaeffi*. -Sakai, 1968 (not Balss, 1913)
Upogebia (Upogebia) acanthochela Sakai, 1967
Upogebia (Upogebia) miyakei Sakai, 1967
 Subgenus *Acutigebia* Sakai, 1982
Upogebia (Acutigebia) trypeta Sakai, 1970
 Subgenus *Neogebicula* Sakai, 1982
Upogebia (Neogebicula) monochela Sakai, 1967
 Genus *Wolffogebia* Sakai, 1982
Wolffogebia kyushuensis (Yokoya, 1933)
 Genus *Tuerkayogebia* Sakai, 1982
Tuerkayogebia kiiensis (Sakai, 1971)

BIOGEOGRAPHICAL DISTRIBUTION

The distribution of a species in the world's oceans is generally described in terms of latitude and longitude, and depth below sea level. However, it is well known that distribution corresponds to hydrographic climates and, in Japanese waters, the influence of the two great ocean currents, the Kuroshio or the warm current and the Oyashio or the cold current, are very important in the distribution of Thalassinidea. These major groups may be distinguished in the southern, central and northern regions (T. Sakai, 1940).

The southern region is occupied by species from the Indo-West Pacific region, which are further divided into three groups: (1) genuine Indo-West Pacific, (2) Indian Ocean, and (3) the tropical west Pacific species. The central west Pacific region includes Japanese endemic species.

The northern limits of the distribution of genuine Indo-West Pacific species in

Japanese waters are given in Table 1. Many Thalassinid species inhabit the Indo-West Pacific region bounded by the south and east coasts of Africa, the Red Sea, the north and east coasts of Australia, and Polynesia; however, only five species show their northern limit of distribution in Japanese waters.

For the distribution of species peculiar to the Indian Ocean in Japanese waters, see Table 1. The Indian Ocean bounded by the south and east coasts of Africa, the Red Sea, the Gulf of Aden, the South China Sea, north and west Australia includes only two species of Thalassinids.

Upogebia isodactyla from the Red Sea was reported from the Inland Sea of Japan (Nakazawa, 1927); however, this record is still questionable because since then no record of the species is presently in Japan.

The distribution of species inhabiting the tropical West Pacific Ocean in Japanese waters is considered to be the region bounded by Indonesia, Melanesia and Polynesia. It includes two species of Thalassinids.

Data for 22 species inhabiting the waters of the central west Pacific region, geographically bounded by the East-China Sea, the Yellow Sea, the Sea of Japan and the Pacific side of Japan are given in Table 1. In this area the nine Japanese endemic species are included, and Table 1 gives specific locations and depths.

The two species found in the northern Pacific Ocean bounded by Alaska, Bering Sea and the Sea of Okhotsk, are extended to Japanese waters in Table 1.

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ADDRESS: Laboratory of Crustacea, Shikoku Women's University, Tokushima 771-11, Japan.