

Four new genera of leucosiid crabs (Crustacea: Brachyura: Leucosiidae) for three new species and nine species previously in the genus *Randallia* Stimpson, 1857, with a redescription of the type species, *R. ornata* (Randall, 1939)

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Abstract.—A study of the leucosiid genus *Randallia* Stimpson, 1857, led to the description of four new genera: *Tanaoa*, for *R. distincta* Rathbun, 1893, *R. pustulosa* Wood-Mason, in Wood-Mason & Alcock, 1891, and a new species, *T. nanus*; *Tokoyo* for *R. eburnea* Alcock, 1896, and a new species, *T. cirrata*; *Toru* for *R. granuloides* Sakai, 1961, *R. trituberculata* Sakai, 1961, *R. pila* Tan, 1996, *R. mesjatzevi* Zarenkov, 1990, and a new species, *T. septimus*; and *Urashima*, for *R. lamellidentata* Wood-Mason, 1892, and *R. pustuloides* Sakai, 1961. *Randallia* is restricted to its type species, *R. ornata* (Randall, 1839), and provisionally 12 other species currently placed in this genus pending further revision. All new genera are diagnosed and species assigned to them described or redescribed and illustrated; extended synonymies are given, and a key for species identification is provided. The type species, *R. ornata*, is redescribed.

The genus *Randallia* Stimpson 1857a was established for *Ilia ornata* Randall, 1839, a leucosiid crab known from the Pacific and Gulf coasts of California (Stimpson, 1857a). The chaotic leucosiid systematics and the fact that Stimpson (1857a:85; 1857b:471) gave but a cursory description, allowed for a miscellaneous assortment of leucosiid crabs to be relegated to that genus. Several authors (Doflein 1904, Serène & Soh 1976, Tan 1996) regarded *Randallia* as a heterogenous genus in need of revision. Yaldwyn & Dawson (1976) sorted *Randallia* species into four ill-fitting “species groups” according to rugosity of the carapace and length of chelipeds, while disregarding the variation in the segmentation of the male abdomen, structure of the first male pleopod, and other morphological features. Though 30 species have been hitherto assigned to *Randallia*, doubts remained as to their systematic position (Ovaere 1989).

A study of the extensive collections of

the National Museum of Natural History, Smithsonian Institution, Washington, D.C., together with other major collections has enabled re-examination of many type specimens and much of the published material, and led to a reevaluation of *Randallia*. As result, the genus is herein restricted to its type species, *R. ornata* (Randall 1839), known from the eastern Pacific, and 12 other species provisionally retained in *Randallia* s. s. pending further revision (Table 1). Of the other 17 species hitherto assigned to *Randallia* s. l., *R. angelica* Garth, 1940 was synonymized with *R. ornata* (Randall, 1839), by Hendrickx (1997). *Randallia japonica* Yokoya, 1933 was declared a junior synonym of *R. eburnea* Alcock, 1896, by Sakai (1934). Four species were transferred to other genera: *R. coronata* Alcock & Anderson, 1894 to *Pariphicululus* Alcock, 1896, by Alcock (1896); *R. lanata* Alcock, 1896 and *R. villosa* Chen, 1989 to *Ihleus* Ovaere, 1989, by Ovaere (1989); and *R. mirabilis*

Table 1.—Generic assignment of species hitherto attributed to *Randallia* Stimpson, 1857a (* species herein provisionally retained in *Randallia* s. s., pending further revision).

* <i>R. agaricias</i> Rathbun, 1898.
* <i>R. americana</i> (Rathbun, 1893)
<i>R. angelica</i> Garth, 1940: synonymized with <i>R. ornata</i> (Randall, 1839) (see Hendrickx 1997).
* <i>R. bulligera</i> Rathbun, 1898
<i>R. coronata</i> Alcock & Anderson, 1894: reassigned to <i>Pariphiculus</i> Alcock, 1896 (see Alcock 1896)
* <i>R. curacaoensis</i> Rathbun, 1922
<i>R. distincta</i> Rathbun, 1893: placed in <i>Tanaoa</i> , new genus
* <i>R. eburnea</i> Alcock, 1896: placed in <i>Tokoyo</i> , new genus
* <i>R. glans</i> Alcock, 1896
* <i>R. gilberti</i> Rathbun, 1906
* <i>R. granulata</i> Miers, 1886
<i>R. granuloides</i> Sakai, 1961: placed in <i>Toru</i> , new genus
<i>R. japonica</i> Yokoya, 1933: synonymized with <i>R. eburnea</i> Alcock, 1896 (see Sakai 1934)
* <i>R. laevis</i> (Borradaile, 1916)
<i>R. lamellidentata</i> Wood-Mason, 1892: placed in <i>Urashima</i> , new genus
<i>R. lanata</i> Alcock, 1896: reassigned to <i>Ihleus</i> Ovaere, 1989 (see Ovaere 1989)
<i>R. mesjatzevi</i> Zarenkov, 1990: placed in <i>Toru</i> , new genus
* <i>R. minuta</i> Rathbun, 1935
<i>R. mirabilis</i> Zarenkov, 1969: reassigned to <i>Raylilia</i> Galil, 2001 (see Galil 2001)
* <i>R. nana</i> Zarenkov, 1990
<i>R. ornata</i> (Randall, 1839): type species of <i>Randallia</i> Stimpson, 1857a
<i>R. pila</i> Tan, 1996: placed in <i>Toru</i> , new genus
* <i>R. pustulilabris</i> Alcock, 1896
<i>R. pustuloides</i> Sakai, 1961: placed in <i>Urashima</i> , new genus
<i>R. pustulosa</i> Wood-Mason, in Wood-Mason & Alcock, 1891: placed in <i>Tanaoa</i> , new genus
<i>R. serenei</i> Richer de Forges, 1983: is placed in synonymy with <i>Tanaoa distinctus</i> (Rathbun, 1893)
* <i>R. speciosa</i> Chen, 1989
<i>R. trituberculata</i> Sakai, 1961: placed in <i>Toru</i> , new genus
<i>R. villosa</i> Chen, 1989: reassigned to <i>Ihleus</i> Ovaere, 1989 (see Ovaere 1989)
<i>R. vitjazi</i> Zarenkov, 1994: placed in synonymy with <i>Tanaoa pustulosus</i> (Wood-Mason, in Wood-Mason & Alcock, 1891)

Zarenkov, 1969 to *Raylilia* Galil, 2001, by Galil (2001). Four new genera are herein established for three new species, and nine species previously in *Randallia* s. l. *Randallia serenei* Richer de Forges, 1983, and *Randallia vitjazi* Zarenkov, 1994, were recognized as junior synonyms of previously described species. *Randallia* s. s. differs from the newly established genera in having the antennular operculum entirely sealing the antennular aperture, the anterior margin of efferent branchial channel trilobate, and the male abdominal segments 3–5 fused. All species in the new genera are described or redescribed and illustrated, extended synonymies given, and a key for their identification is provided. The type species, *R. ornata*, is also redescribed.

Abbreviations used are: btw, between; coll., collector; CP, chalut à perche (beam trawl); CH, chalut (trawl); DW, Waren dredge; I., Island; Is., Islands; Lt., Light; Pt., Point; Stn, station. The French expedition BATHUS was named after the Greek word for deep, *bathys*. The other French expeditions are identified by acronyms: BORDAU, a contraction of “bordure d’Australo-indienne plateau”; CHALCAL, “chalutage New Caledonia”; HALIPRO, “halieutique profonde”; KARUBAR, a contraction of the names of Kai, Aru and Tanimber Islands; MUSORSTOM was organized jointly by the Muséum national d’Histoire naturelle and the Office de la Recherche Scientifique et Technique Outre-Mer (ORSTOM).

The length of each specimen was mea-

sured along the vertical median line of the carapace, excluding intestinal spine.

The material used remains deposited in the following museums: National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM); The National Natuurhistorische Museum, Leiden (formerly Rijksmuseum van Natuurlijke History) (NNM); Museum national d'Histoire naturelle, Paris (MNHN); The Natural History Museum, London (NHM); Australian Museum, Sydney (AMS); National Institute of Water & Atmospheric Research, New Zealand (NIWA); National Taiwan Ocean University, Keelung (NTOU); Queensland Museum, Brisbane (QM); South African Museum, Cape Town (SAM); Senckenberg Museum, Frankfurt (SMF); Western Australian Museum, Perth (WAM); Zoological Museum, Amsterdam (ZMA); and Zoological Museum, Moscow University (ZMMU).

Randallia ornata (Randall, 1839)

Figs. 1A, 3A, B

Ilia ornata Randall, 1839:129.

Guaia ornata Gibbes, 1850:186.

Randallia ornata Stimpson, 1857a:85; 1857b:471, pl. 20 fig. 3; 1860:69.—Rathbun, 1898:613; 1904:170; 1937:172, pl. 49, figs 1–2.—Holmes, 1900:100.—Weymouth, 1910:18, pl. 1, fig. 3.—Baker, 1912:102.—Schmitt, 1921:188, fig. 116.—Serène, 1954:491.—Garth, 1960:111; 1966:10.—Richer de Forges, 1983:634 (tab.).—Austin, 1985:646.—Bonfil & Carvacho, 1989:83, fig. 4a.—Hendrickx, 1990:45; 1992:7; 1995:129; 1997:163, fig. 114.

Randallia angelica Garth, 1940:54; pl. 11, figs 1–2.—Serène, 1954:492.—Richer de Forges, 1983:634 (tab.).—Rodríguez de la Cruz, 1987:120.

Not *Randallia ornata* Boone, 1930:59, pl. 12 [= *R. bulligera* Rathbun *fide* Garth 1966:10].

Type material.—Paratypes of *Randallia angelica* Garth, 1940: Puerto Refugio, Angel de la Guardia I., R/V *Velero*, Stn 541-

36, 110 m, 4 Mar 1936, ♂ 19.5 mm, ♀ 18.5 mm (USNM 139772).

Material examined.—United States. California, San Francisco, 1880, coll. D. S. Jordan, 2 ♀ 30.2, 38.3 mm (USNM 3115). San Francisco Bay, R/V *Albatross*, Apr 1914, ♂ 44.0 mm (USNM 55532). Golden Gate, 21 Jun 1915, ♀ ovig. 39.8 mm (USNM 66506). Monterey Bay, Santa Cruz Light-house, R/V *Albatross*, Stn 4560, 18 m, 11 Jun 1904, ♂ 30.2 mm (USNM 66505). Santa Barbara, 1880, coll. D. S. Jordan, 4 ♂ 48.8–54.4 mm, 4 ♀ ovig. 30.2–33.4 mm (USNM 3101). Mugu Bay, Ventura Co., Aug 1923, coll. E. P. Chace, ♂ 25.2 mm, ♀ ovig. 27.4 mm (USNM 57284). Santa Cruz I., R/V *Albatross*, 7 Feb 1889, ♀ 40.0 mm (USNM 17394). San Pedro I., Mar 1931, ♂ 26.3 mm (USNM 21791). Long Beach, coll. H. N. Lowe, 2 ♂ 28.9, 41.9 mm, 2 ♀ 33.5, 35.5 mm (USNM 46684). Newport Bay, 16 Jan 1939, coll. S. A. Glassell, 4 ♂ 19.8–33.5 mm, ♀ 18.7 mm (USNM 207834). Santa Catalina I., R/V *Anton Dohrn*, 30 Dec 1912, 2 ♂ 16.4, 26.2 mm, ♀ 18.2 mm (USNM 50115). Catalina harbour, 23 Jun 1916, ♂ 15.6 mm, ♀ ovig. 17.6 mm (USNM 66488). SW Catalina harbour, 23 Jun 1916, ♀ 19.4 mm (USNM 66496). San Nicolas I., R/V *Albatross*, Stn 4422, 57 m, 13 Apr 1904, ♀ 21.4 mm (USNM 66504). San Diego Bay, R/V *Albatross*, 1 Mar 1904, ♀ 33.4 mm (USNM 66507).

Mexico. Lower California, Playa Maria Bay, 24–26 Aug 1896, coll. A.W. Anthony, 8 ♂ 31.3–53.3 mm, 5 ♀ ovig. 25.7–37.7 mm (USNM 19521). Corona del Mar, 13 m, Jul 1935, coll. G. E. MacGinitie, ♂ 48.8 mm (USNM 89739). Mar 1948, coll. G. E. MacGinitie, ♀ ovig. 30.8 mm (USNM 89742). Balboa, 0–27.5 m, coll. S. H. Glassell, 4 ♂ 11.9–27.3 mm, 4 ♀ 18.1–35.3 mm (USNM 207834).

Redescription.—Dorsal surface of carapace smooth, minutely shagreened anteriorly. Frontal lobes triangulate, anteriorly granulate. Anterolateral margin with subhepatic granulate tubercle, 3 or more pear-

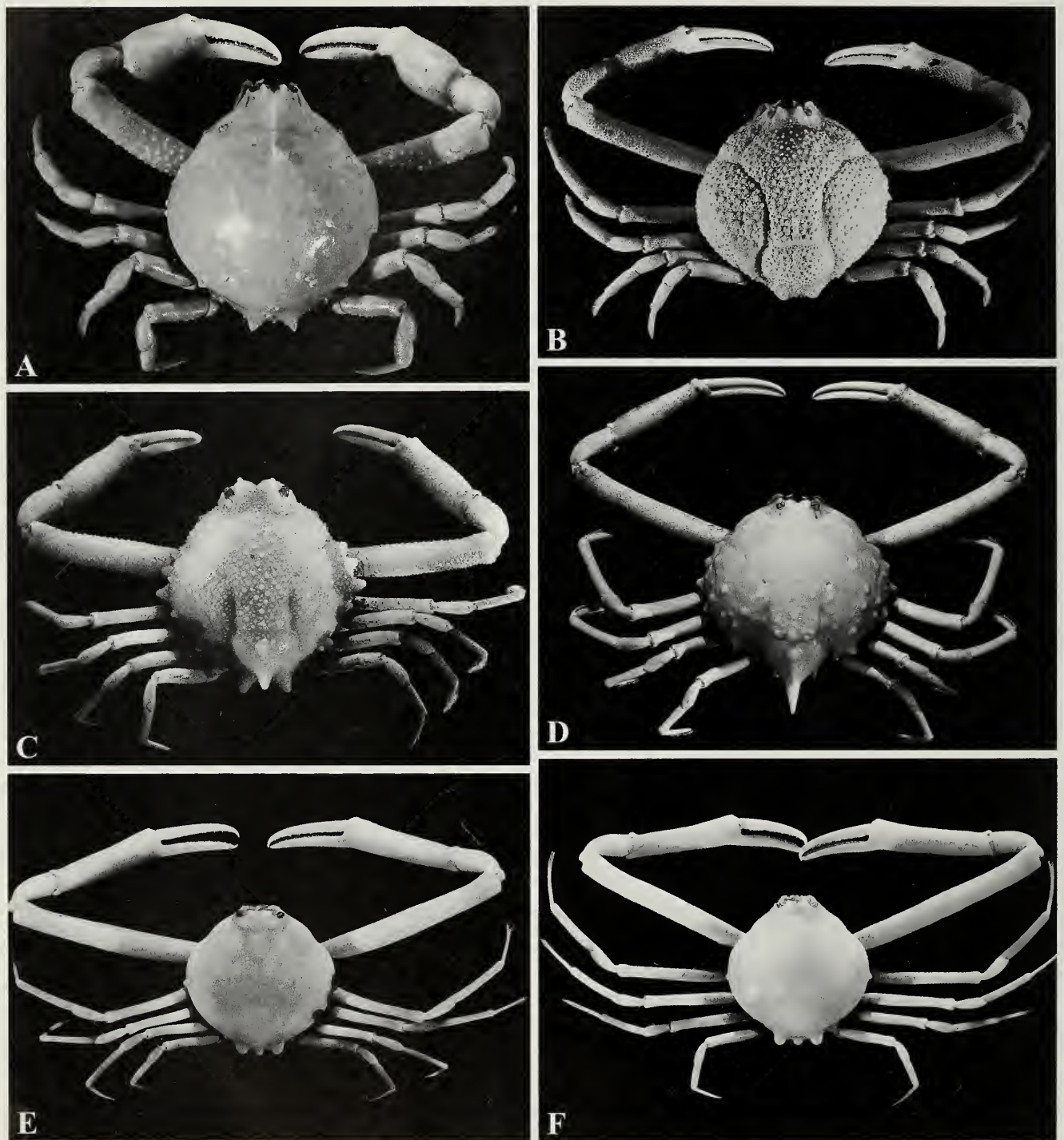


Fig. 1. A, *Randallia ornata* (Randall, 1839): ♂ cl 30.2 mm, dorsal view, California, Monterey Bay, R/V *Albatross*, Stn 4560, USNM 66505; B, *Tanaoa distinctus* (Rathbun, 1893): ♂ cl 40.5 mm, dorsal view, Banc Tuscarora, MUSORSTOM 7, Stn DW 556, MNHN; C, *Tanaoa nanus*, new species: holotype, ♂ cl 12.7 mm, dorsal view, Vanuatu, MUSORSTOM 8, Stn CP 1053, MNHN; D, *Tanaoa pustulosus* (Wood-Mason, in Wood-Mason & Alcock, 1891): ♂ cl 35.8 mm, dorsal view, Btw Negros, Siquijor, R/V *Albatross* Stn 5538, USNM; E, *Tokoyo cirrata*, new species: holotype, ♂ cl 13.0 mm, dorsal view, Vanuatu, MUSORSTOM 8, Stn CP 1086, MNHN; F, *Tokoyo eburnea* (Alcock, 1896): ♂ cl 14.8 mm, dorsal view, Japan, Tosa Bay, SMF 22577.

liform granules on epibranchial margin. Posterolateral margin with small, triangular denticle. Posterior margin bearing 2 dorsoventrally flattened triangular denticles laterally, pearliform granules medially. Hepat-

ic region tumid, topped by 1 or more pearliform granules. Intestinal region slightly inflated, bearing a granule (Fig. 1A).

Anterior margin of efferent branchial channel granulate, with 3 subequal lobes.



Fig. 2. A, *Toru granuloides* (Sakai, 1961): ♂ cl 23.0 mm, dorsal view, Loyalty Is, MUSORSTOM 6, Stn DW 456 (MNHN); B, *Toru pilus* (Tan, 1996): ♂ cl 10.8 mm, dorsal view, Vanuatu, MUSORSTOM 8, Stn CP 1047 (MNHN); C, *Toru septimus*, new species: holotype. ♂ cl 13.1 mm, dorsal view, Loyalty Is., Stn DW 421 (MNHN); D, *Toru trituberculatus* (Sakai, 1961): ♂ cl 13.0 mm, dorsal view, Japan, Mimase (SMF); E, *Urashima lamellidentatus* (Wood-Mason, 1892): holotype. ♂ cl 11.9 mm, dorsal view, Andaman Is. (NHM 1896.9.8.7); F, *Urashima pustuloides* (Sakai, 1961): ♂ cl 32.8 mm, dorsal view, Taiwan, I-Lan county (MNHN B26326).

Third maxilliped anteriorly setose, granu-
lose.

Cheliped merus 0.75 as long as carapace,
set with pearliform granules; carpus with
few granules distally on upper margin; pro-

podus swollen, smooth but for minutely
granulate upper margin; fingers, longer than
palm, set with longitudinal granulate ridges.
Pereiopodal carpi 1–4 with upper margin
distally granulate; upper margin of propodi

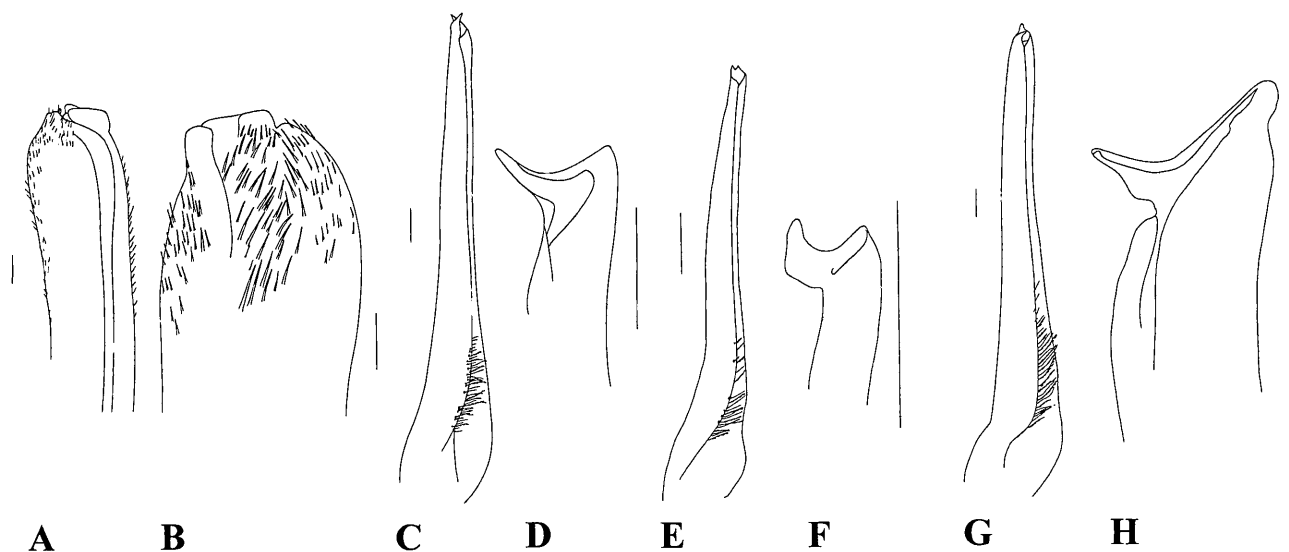


Fig. 3. A, B, *Randallia ornata* (Randall, 1839), ♂ cl 30.2 mm, California, Monterey Bay, R/V *Albatross*, Stn 4560 (USNM 66505): A, first pleopod; B, apex of first pleopod. C, D, *Tanaoa distinctus* (Rathbun, 1893), ♂ cl 40.5 mm, Banc Tuscarora, MUSORSTOM 7, Stn DW 556, (MNHN): C, first pleopod; D, apex of first pleopod. E, F, *Tanaoa nanus*, new species, ♂ cl 13.7 mm, Indonesia, Tanimbar I., KARUBAR, Stn CP 39 (MNHN): E, first pleopod; F, apex of male first pleopod. G, H, *Tanaoa pustulosus* (Wood-Mason, in Wood-Mason & Alcock, 1891), ♂ cl 34.0 mm, Japan, Tosa Bay (NHM 1961.6.5.38/39): G, first pleopod; H, apex of first pleopod. Scales = 1 mm.

1–4 bearing medially granulate ridge; lower margin of fifth pereopodal merus, propodus granulate.

Thoracic sternites, abdomen minutely pitted. Male first pleopod slightly sinuous, dorso-ventrally flattened, tip thickened, with dense tuft of setae subapically on internal margin (Figs. 3A, B).

Color.—“Carapace variegated with sanguineous spots, confluent anteriorly; chelipeds variegated with red” (Rathbun 1937: 172). “Ground color of carapace olive buff almost covered anteriorly with dots of chrome yellow. Large, regular designs vinaceous russet, smaller patches paler and more orange. Posterior spines white. Cheliped yellow to pale buff, merus covered with carrot red, carpus and manus with a coarse netting of the same color. Merus of ambulatory legs pale yellowish white at base blending into intense scarlet on distal portion. Remaining segments yellowish white; dactyl yellow tipped.” (Garth 1940: 55).

Distribution.—Eastern Pacific: Pacific and Gulf coasts of California, 10–185 m.

Remarks.—Randall’s (1839) specimens

are no longer extant (Rathbun 1937:172). According to Garth (1940) *R. angelica* differs from *R. ornata* in degree of granulation, more prominent frontal teeth and more pronounced angle of front with hepatic margin. Two decades later Garth (1960) considered it a synonym of *R. ornata*, and yet six years later (Garth 1966) reversed himself again and considered *R. angelica* a “Gulf of California cognate” of *R. ornata*. Hendrickx (1997:163), who examined specimens collected off the Pacific and Gulf of California coasts, maintained that *R. angelica* is but a synonym of *R. ornata*.

Examination of large series of specimens, including Garth’s paratypes, revealed intraspecific variability in granulation. Smaller specimens (cl < 25 mm) tend to bear coarser, denser granules on the carapace and legs. The differences in granulation enumerated by Garth (1940:56) as characteristic of *R. angelica* fall within the range of variation observed for *R. ornata*.

The 12 species provisionally assigned to *Randallia* s. s. differ from *R. ornata* in a number of characters. *Randallia americana* (Rathbun, 1893), *R. glans* Alcock, 1896, *R.*

agaricias Rathbun, 1898 and *R. speciosa* Chen, 1989 differ from *R. ornata* in having a bilobate margin to the efferent branchial channel. *Randallia granulata* Miers, 1886, *R. gilberti* Rathbun, 1906, and *R. nana* Zarenkov, 1990 differs from *R. ornata* in having segments 3–6 of male abdomen fused in addition to the bilobate margin to efferent branchial channel. *Randallia pustulibris* Alcock, 1896, *R. laevis* (Borradaile, 1916) and *R. minuta* Rathbun, 1935 differ from *R. ornata* in having the antennular operculum sealing only the bottom half of antennular aperture. *Randallia bulligera* Rathbun, 1898 differs from *R. ornata* in its male first pleopod having a petaloid tip. *Randallia curacaoensis* Rathbun, 1922 differs from *R. ornata* in having the sixth abdominal segment in the male bearing proximally a triangular denticle. As previously mentioned, these species are herein retained in *Randallia* s. s. pending further revision, rather than leave them as *incertae sedis*.

Tanaoa, new genus

Diagnosis.—Carapace subcircular, globose. Front narrow, uptilted, bilobed. Eyes small, retractible. Outer orbital margin trisutured, V-shaped gap proximally on ventral margin. Antennules obliquely folded, basal antennular segment squat, operculiform, sealing lower antennular aperture. Antennae small, slender, basal antennal segment inserted in orbital hiatus. Postorbital region concave. Branchial, intestinal regions swollen, demarcated by grooves, 2 pairs of pits along cardiobranchial grooves. Posterior margin of carapace narrow, bidentate.

Third maxilliped exopod not quite sealing efferent branchial channel. Third maxilliped exopod slightly shorter than endopod; merus of endopod subtriangular, shorter than subrectangular ischium. Anterior margin of efferent branchial channel produced, bilobed, separated by narrow groove from lower orbital margin.

Chelipeds long, slender, equal. Cheliped

with merus and palm subcylindrical; fingers nearly as long as upper margin of palm, inner margins denticulate. Pereiopods 1–5 slender, short; all but last dactyl shorter than propodi; upper surface of pereiopodal dactyls setose, tips corneous.

Fourth thoracic sternite swollen laterally. Male abdominal sulcus deep, nearly reaching buccal cavity, anterior margin raised, prominently granulate. Male abdomen triangular, abdominal segments 3–6 fused, basio-lateral regions of fused segments inflated, anterior margin bearing denticle. Telson slender, one-third as long as fused segments, not reaching tip of abdominal sulcus. Walls of abdominal sulcus carinate along sternal sutures 2–4. Female abdominal segments 4–6 fused, swollen, shield-like. Telson ogival, fitting between third maxillipeds, posteriorly sinuous.

Male first pleopod elongate, slightly sinuous, attenuate; bearing minute preapical process perpendicular to tip (Fig. 4a, b); second pleopod short, distally scoop-like.

Type species.—*Randallia pustulosa* Wood-Mason, in Wood-Mason & Alcock, 1891. Gender: feminine.

Species.—*Tanaoa distinctus* (Rathbun, 1893), *Tanaoa nanus*, new species, *Tanaoa pustulosus* (Wood-Mason, in Wood-Mason & Alcock, 1891).

Etymology.—In the myths of the Marquesas islanders, Tanaoa is the god of darkness, confined to the depths of the ocean. The name *Tanaoa* is to be considered as an arbitrary combination of letters and heretofore takes the gender masculine.

Remarks.—*Tanaoa*, new genus, differs from *Randallia* s. s. as follows: antennular operculum seals only the lower antennular aperture; the third maxilliped exopod and efferent branchial channel gape anteriorly; the anterior margin of the efferent branchial channel is bilobate; male abdominal segments 3–6 are fused; and the male first pleopod is distally attenuate, bearing a preapical process. In contrast, in *Randallia* s. s. the antennular operculum seals entirely the antennular aperture; the third maxilliped ex-

opod seals the efferent branchial channel; the anterior margin of the efferent branchial channel is trilobate; the sixth segment of the male abdomen is free; and the male first pleopod is distally club-shaped.

Tanaoa distinctus (Rathbun, 1893), new combination

Figs. 1B, 3C, D

Randallia distincta Rathbun, 1893:257; 1906:890, pl. 16, fig. 2, 3, text-fig. 44.—Ihle, 1918:312.—Serène, 1954:492; 1968:45.—Yaldwyn & Dawson, 1976:97.—Richer de Forges, 1983:634(tab), 636, 638.

Randallia serenei Richer de Forges, 1983:634, figs 1–4.—Poupin & Richer de Forges, 1991:211.

Type material.—Holotype of *Randallia distincta* Rathbun, 1893: Hawaiian Is., Oahu I., R/V *Albatross* Stn 3472, 21°12'N, 157°49'W, 4 Dec 1891, 540 m, ♀ 20.4 mm (USNM 17516). Holotype of *Randallia serenei* Richer de Forges, 1983: Tahiti. Port Phaeton, 400–500 m, 1978, coll. B. Richer de Forges, 2 ♂ 40.3, 41.8 mm (MNHN B8735).

Material examined.—Marquesas Is., Ta-huata I., 430 m, 13 Sep 1987, ♂ 32.5 mm, ♀ 31.0 mm (MNHN); 9°54.5'S, 139°08.2'W, 350 m, 1 Sep 1990, coll. J. Poupin, 2 ♂ 31.0, 40.0 mm, 2 ♀ 31.8, 43.7 mm (MNHN). Eiao I., 7°58.5'S, 140°44.5'W, 415 m, 19 Jan 1991, coll. J. Poupin, 6 ♂ 39.7–44.3 mm, 10 ♀ 22.6–42.9 mm (MNHN). MUSORSTOM 9, Stn CP 1169, 8°59'S, 140°05'W, 391–408 m, 24 Aug 1997, ♂ 32.2 mm (MNHN). Stn CP 1191, 8°46'S, 140°07'W, 390–400 m, 26 Aug 1997, ♂ 41.7 mm (MNHN). Stn CP 1251, 9°47'S 139°38'W, 500–650 m, 2 Sep 1997, ♂ 40.0 mm (MNHN). Stn CP 1268, 7°56'S 140°43'W, 285–320 m, 4 Sep 1997, ♂ 43.6 mm, ♀ ovig. 39.1 mm (MNHN). Stn CP 1270, 7°56'S 140°43'W, 497–508 m, 4 Sep 1997, ♂ 30.3 mm, ♀ 31.5 mm, 1 juv. (MNHN). Stn CP 1276, 7°52'S 140°37'W, 800–805 m, 5 Sep 1997, ♂ 21.3 mm

(MNHN). Stn CP 1281, 7°48'S 140°21'W, 450–455 m, 7 Sep 1997, ♀ 31.5 mm (MNHN). Stn DW 1287, 7°54'S, 140°40'W, 163–245 m, 7 Sep 1997, ♂ 42.6 mm (MNHN).

Tuamotu Archipelago. 18°04.2'S, 141°01.8'W, 500 m, 2 Jun 1990, coll. J. Poupin, ♂ 43.0 mm, ♀ ovig. 42.7 mm (MNHN). Makemo, 300–600 m, 4 Jun 1988, coll. J. Poupin, ♀ 32.5 mm (MNHN).

Society Is., 15°48'S, 154°32'W, 500–700 m, 21 Jul 1988, coll. J. Poupin, ♂ 40.6 mm (MNHN). Tahiti. Port Phaeton, 400–500 m, 6 Oct 1978, coll. B. Richer de Forges, ♂ 40.3 mm (MNHN B8734). Bora-Bora I., 400–700 m, 23 Jul 1988, coll. J. Poupin: ♂ 39.5 mm (MNHN). Taravao, 17°47'S, 149°21'W, 500–600 m, 11 Dec 1988, coll. J. Poupin, 3 ♂ 30.8–39.5 mm, ♀ 40.7 mm (MNHN).

Hawaiian Is. Maui I., W Puniawa Pt, R/V *Albatross* Stn 4079, 21°01.40'N, 156°22.50'W, 261–326 m, 21 Jul 1902 ♂ 42.5 mm, ♀ ovig. 39.7 mm (USNM 29883). R/V *Albatross* Stn 4082, 21°04.35 N, 156°21.10'W, 402–435 m, 21 Jul 1902 3 ♂ 20.9–30.8 mm, 2 ♀ 32.3, 43.6 mm (USNM 29884). Oahu I., SW Diamond Head Lt, R/V *Albatross* Stn 3813, 483–335 m, 28 March 1902, ♂ 30.4 mm (USNM 29872). SW Diamond Head Lt, R/V *Albatross* Stn 3818, 536–540 m, 31 Mar 1902, ♂ 20.5 mm (USNM 29873). Oahu, SW Kahuku Pt, R/V *Albatross* Stn 4115, 21°41.5'N, 158°08.5'W, 357–441 m, 25 Jul 1902, ♀ 29.8 mm (USNM 29885). Off Honolulu, 27–40 m, Feb–Mar 1962: ♀ ovig. 41.6 mm (WAM c24429). Hawaii I., Kawaihae Lt., R/V *Albatross* Stn 4044, 20°03.15'N, 155°55.20'W, 426–362 m, 11 Jul 1902, ♂ 43.0 mm, ♀ 32.7 mm (USNM 29882). Pailolo Channel, btw Maui, Molokai Is., R/V *Albatross* Stn 3883, 21°09.15'N, 155°34.15'W, 507–520 m, 16 Apr 1902, 2 ♂ 12.6, 18.6 mm, ♀ 19.8 mm (USNM 29878). Pailolo Channel, btw Maui, Molokai Is., R/V *Albatross* Stn 3865, 468–518 m, 10 Apr 1902, 4 ♂ 13.3–20.7 mm, ♀ 13.1 mm (USNM

29877). Molokai I., R/V *Albatross* Stn 3836, 21°00.05'N, 157°08.20'W, 435–467 m, 3 Apr 1902, 2 ♀ 20.2, 18.3 mm (USNM 29874).

Western Samoa. Upolu I., Apia, 250–846 m, 5–16 Sep 1980, coll. D. Popper, ♂ 43.5 mm, ♀ 30.8 mm (NNM 35234).

Wallis Is. MUSORSTOM 7, Stn DW 525, 13°11'S, 176°15'W, 500–600 m, 13 May 1992, ♀ 42.2 mm (MNHN).

Banc Tuscarora. MUSORSTOM 7, Stn DW 556, 11°49'S, 178°18'W, 440 m, 19 May 1992, ♂ 40.5 mm (MNHN).

New Zealand. 34°24.0'S, 173°10.3'E, 472 m, 21 Mar 1982, ♂ 35.9 mm (NIWA).

Guam. Agana Bay, 303 m, 28–9 Aug 1975, coll. L. Eldredge, ♀ 24.9 mm (MNHN B8737).

Redescription.—Dorsal surface of carapace covered with pearliform granules, interspaced with smaller granules, granules more pronounced posteriorly. Frontal lobes triangulate, minutely and closely granulate. Third maxilliped prominently granulose. Subhepatic margins of carapace somewhat inflated, 3 low granulate tubercles on epi-branchial margin, more pronounced in juveniles. Hepatic, branchial, and intestinal regions demarcated by shallow grooves. Intestinal region bearing small tubercle posteriorly, tubercle reduced in larger specimens; conical, upcurved in juveniles. Posterior margin bearing 2 stubby protrusions laterally (Fig. 3C, D).

Cheliped and pereopods 1–5 closely granulate throughout. Cheliped merus in adult male nearly as long as carapace; fingers nearly as long as upper margin of palm. Pereopodal dactyls tomentose anteriorly.

Thoracical sternites granulate. Fused abdominal segment in male triangular, bearing transverse ridge, with preapical median denticle. Telson slender, third as long as fused abdominal segments. Female abdomen granulate, granules larger, closer proximally, low denticle medially on distal margin. Male first pleopod with transverse digitate process preapically (Fig. 1B).

Distribution.—Pacific Ocean: Marquesas Is., Tuamotu Archipelago, Society Is., Hawaiian Is., Samoa, Banc Tuscarora, Wallis Is., New Zealand, Guam; 27–805 m.

Remarks.—Rathbun (1893:257) described *Randallia distincta* from a juvenile female specimen, but on examining additional material collected by the *Albatross*, observed that adult specimens differ from juveniles in lacking tubercles on the branchial margins, denticles on the posterior margin, and a spine on the intestinal region (Rathbun 1906:890). Richer de Forges (1983:634) based his description of *R. serenei* on adult specimens, but noted (1983:638) that a juvenile from Guam differs from the adults in possessing “les gros granules du bord latéral et le granule de l'aire intestinal”. Richer de Forges (1983:638), distinguished *R. serenei* from *R. distincta* in having more rounded tubercles on the posterior margin of the carapace and pronounced branchio-cardiac grooves, though admitting “Pour mieux décrire chacune de ces espèces, il serait nécessaire une gamme de taille de chaque espèce”. Examination of the type series of *R. distincta* and *R. serenei*, and numerous additional specimens, including the male first pleopod, has shown that the latter is a junior synonym of the former. The specimen collected off New Zealand has slimmer, longer chelipeds than the other specimens examined.

***Tanaoa nanus*, new species**

Figs. 1C, 3E, F

Randallia pustulosa: Ihle, 1918:246 (not *Randallia pustulosa* Wood-Mason, in Wood-Mason & Alcock, 1891).

Type material.—Holotype: Vanuatu. MUSORSTOM 8, Stn CP 1053, 16°29.23'S, 167°58.70'E, 536–519 m, 1 Oct 1994, coll. B. Richer de Forges, ♂ 12.7 mm (MNHN B.28510). Paratype: Indonesia: 1°17.5'N, 118°53'E, N of Kaniungan, *Siboga* Stn 90, 281 m, 21 Jun 1899, ♂ 14.7 mm (ZMA 242432).

Material examined.—Vanuatu. MUSOR-

STOM 8, Stn CP 1027, 17°53.05'S, 168°39.35'E, 550–571 m, 28 Sep 1994, coll. B. Richer de Forges, ♀ 13.5 mm (MNHN). Stn CP 1047, 16°53.62'S, 168°10.49'E, 486–494 m, 30 Sep 1994, coll. B. Richer de Forges, ♂ 9.5 mm (MNHN). Stn CP 1052, 16°32.37'S, 168°00.29'E, 561–564 m, 1 Oct 1994, coll. B. Richer de Forges, ♂ 12.3 mm (MNHN). Stn CP 1054, 16°27.95'S, 167°57.44'E, 522–527 m, 1 Oct 1994, coll. B. Richer de Forges, ♂ 13.1 mm, ♀ ovig. 12.4 mm (MNHN). Stn CP 1055, 16°30.11'S, 167°55.13'E, 572–580 m, 1 Oct 1994, coll. B. Richer de Forges, ♀ ovig. 15.3 mm (MNHN). Stn DW 1072, 15°39.89'S, 167°19.61'E, 622–625 m, 4 Oct 1994, coll. B. Richer de Forges, ♂ 10.9 mm (MNHN). Stn CP 1089, 15°08.82'S, 167°17.23'E, 494–516 m, 6 Oct 1994, coll. B. Richer de Forges, ♂ 10.9 mm, ♀ ovig. 12.4 mm (MNHN). Stn CP 1111, 14°51.09'S, 167°14.00'E, 1210–1250 m, 8 Oct 1994, coll. B. Richer de Forges, ♀ ovig. 14.1 mm (MNHN). Stn CP 1124, 15°01.72'S, 166°56.51'E, 532–599 m, 9 Oct 1994, coll. B. Richer de Forges, 2 ♀ ovig. 16.2, 17.1 mm (MNHN).

Wallis I. MUSORSTOM 7, Stn DW 523, 13°12'S, 176°16'W, 455–515 m, 13 May 1992, 1 juv. (MNHN).

New Caledonia. HALIPRO 1, Stn CP 867, 21°26'S, 166°18'E, 720–950 m, 22 Mar 1994, coll. B. Richer de Forges, ♂ 10.4 mm, ♀ 15.6 mm (MNHN). BATHUS 4, Stn DW 911, 18°57.80'S, 163°08.47'E, 566–558 m, 5 Aug 1994, coll. B. Richer de Forges, ♀ 12.5 mm (MNHN). Stn DW 915, 18°51.26'S, 163°16.72'E, 580–575 m, 5 Aug 1994, coll. B. Richer de Forges, 3 ♂ 9.9–10.4 mm (MNHN). Stn DW 920, 18°45.33'S, 163°17.16'E, 610–620 m, 6 Aug 1994, coll. B. Richer de Forges, ♂ 8.5 mm (MNHN).

Indonesia: Tanimbar I., KARUBAR, Stn CP 39, 7°47'S, 132°26'E, 477–466 m, 28 Oct 1991, ♂ 13.7 mm, ♀ 14.4 mm (MNHN). Stn CP 59, 8°20'S, 132°11'E, 405–399 m, 31 Oct 1991, 2 ♂ 12.4, 12.5

mm, 2 ♀ ovig. 12.0, 14.6 mm (MNHN). Stn CP 70, 8°41'S, 131°47'E, 413–410 m, 2 Nov 1991, ♂ 10.6 mm (MNHN).

Description.—Dorsal surface of carapace covered with pearliform granules, interspaced with smaller granules. Frontal lobes rounded, closely granulate. Subhepatic margins of carapace somewhat swollen, median subhepatic tubercle followed, in young specimens, by smaller tubercle. Hepatic region bearing granulate tubercle. Anterolateral margin posteriorly set with 3 granulate tubercles, posteriormost tubercle largest. Posterolateral margin bituberculate, posterior tubercle larger. Posterior margin bearing 2 conical tubercles laterally. Branchial, intestinal regions demarcated by deep grooves. Intestinal region swollen, bearing granulate tubercle anteriorly, long, up-curved spur posteriorly (Fig. 1C).

Anterior margin of efferent branchial channel deeply sutured. Third maxilliped granulose.

Cheliped and pereopods 1–5 closely granulate throughout. Cheliped merus in adult male 0.75 as long as carapace, in female 0.66 carapace length; fingers as long as upper margin of palm.

Thoracical sternites in male boldly granulate. Telson slender, third as long as fused abdominal segments. Male first pleopod with lamellate process preapically (Figs. 3E, F).

Etymology.—From the Latin *nanus*, small, minute.

Distribution.—Indo-Pacific Ocean: Wallis I., Vanuatu, New Caledonia, Indonesia; 281–1250 m.

Remarks.—*Tanaoa nanus* differs from *T. pustulosus* in its much smaller size, its coarsely granulated carapace, and the lamellate preapical process of the first male pleopod.

Tanaoa pustulosus (Wood-Mason, in Wood-Mason & Alcock, 1891), new combination

Figs. 1D, 3G, H

Randallia pustulosa Wood-Mason, in Wood-Mason & Alcock, 1891:266; 1892:

pl. 5, fig. 4.—Alcock, 1896:196; 1899:27.—Doflein, 1904:42, pl. 14, fig. 1–6 (part).—Serène, 1954:491.—Sakai, 1976:99, pl. 30, fig. 2.—Yaldwyn & Dawson, 1976:95, figs 2–5.—Serène & Vadon, 1981:119, 124.—Richer de Forges, 1983:634 (tab.).—McLay, 1988:100, fig. 20.—Chen, 1989:217, fig. 15, pl. 4, fig. 1.—Tan, 1996:1054.—Ikeda, 1998:82, pl. 19, fig. 1a–d.—Ng et al., 2001:10.—Chen & Sun, 2002:342, fig. 151, pl. 3.1.

Randallia vitjazi Zarenkov, 1994:104, pl. 5, pl. 8B.

Not *Randallia pustulosa*: Ihle, 1918:246 [= *T. nanus*, new species].

Material examined.—Fiji. MUSORSTOM 10, Bligh Water, Stn CC 1331, 17°02.4'S, 178°01.8'E, 694–703 m, 8 Aug 1998, 7 ♂ 21.5–30.1 mm, 1 juv. (MNHN). Stn CC 1332, 16°56.2'S, 178°07.9'E, 640–687 m, 8 Aug 1998, 2 ♂ 28.5, 28.3 mm, 9 juvs. (MNHN). Stn CC 1337, 17°03.4'S, 177°47.2'E, 635–670 m, 9 Aug 1998, ♂ 27.8 mm, 1 juv. (MNHN). Stn CP 1342, 16°46.0'S, 177°39.7'E, 650–701 m, 10 Aug 1998, 2 ♂ 28.7, 21.4 mm (MNHN). Stn CP 1346, 17°19.6'S, 178°32.4'E, 673–683 m, 11 Aug 1998, ♂ 30.5 mm, ♀ 29.9 mm (MNHN).

New Caledonia. CHALCAL 2, Stn DW 75, 24°39.31'S, 168°39.67'E, 600 m, 29 Oct 1986, ♂ 19.6 mm, ♀ 30.5 mm (MNHN B21210). HALIPRO 1, Stn CP 867, 21°26'S, 166°18'E, 720–850 m, 22 Mar 1994, 1 juv. 15.8 mm (MNHN). BATHUS 4, Stn CP 911, 18°57.80'S, 163°08.47'E, 566–558 m, 5 Aug 1994, 1 juv. (MNHN).

Caroline Is. Palau I., Mutremdiv Pt., Jun 1981, coll. W.B. Saunders, ♂ 37.7 mm (USNM 354775).

Japan. Shikoku I., Mimase, Tosa Bay, 250 m, Apr 1968: ♂ 33.7 mm (SMF 15104, ex. coll. T. Sakai). Tosa Bay, 4 ♀ 33.9–34.3 mm (SMF 22555, ex. coll. T. Sakai). Tosa Bay, 34.2 mm (SMF, ex. coll. T. Sakai); Tosa Bay, ♂ 34.0 mm, ♀ 35.0 mm (NHM 1961.6.5.38/39, ex. coll. T. Sakai).

Taiwan. Tashi fishing port, 22 Mar 1986, coll. T.Y. Chan, ♀ ovig. 34.8 mm (NTOU).

Indonesia. Kai Is., KARUBAR, Stn DW 3, 5°48'S, 132°13'E, 301–278 m, 22 Oct 1991, ♂ 39.6 mm (MNHN).

Philippines. Mindanao, Iligan Bay, R/V *Albatross* Stn 5508, 8°17.24'N, 124°11.42'E, 494 m, 5 Aug 1909, ♂ 34.4 mm (USNM). Btw Negros, Siquijor, R/V *Albatross* Stn 5538, 9°08.15'N, 123°23.20'E, 468 m, 19 Aug 1909, ♂ 35.8 mm (USNM). MUSORSTOM, Stn 43, 13°50.5'N, 120°28.0'E, 484–448 m, 24 Mar 1976, 2 ♂ 23.8, 23.0 mm, ♀ 24.4 mm, 1 juv. (MNHN B18055). Stn 44, 13°46.9'N, 120°29.5'E, 610–592 m, 24 Mar 1976, ♂ broken, ♀ 15.1 mm (MNHN B18057). MUSORSTOM 3, Stn CP97, 14°00'N, 120°18'E, 189–194 m, 1 Jun 1985, 1 juv. (MNHN B17999). Stn CP122, 12°20'N, 121°42'E, 673–675 m, 4 Jun 1985, ♂ 18.1 mm (MNHN B18000). Stn CP128, 11°50'N, 121°42'E, 815–821 m, 5 Jun 1985, ♀ ovig. 35.3, ♀ parasitized 22.5 mm (MNHN B18001).

Laccadive Sea. 8°37'N, 75°37.30'E, ♀ parasitized 26.2 mm (NHM 1899.8.26.4, ex. Indian Museum). 9°34.57'N, 75°36.30'E, ♀ 12.6 mm, (NHM 1896.9.8.10, ex. Indian Museum).

Seychelles. 4°34.2'S, 56°26.6'E, 650–630 m, 22 Oct 1987, ♂ 31.3 mm (MNHN B19100). 9°34.57'N, 75°36.30'E: ♀ 12.6 mm (NHM 1896.9.8.10, ex. Indian Museum).

Réunion. 350–500 m, 2 Feb 1974, coll. P. Guézé, ♀ 31.8 mm (MNHN B19135). R/V *Marion Dufresne*, Stn CP 122, 20°57.9'S, 55°14.5'E, 450–580 m, 1 Sept 1982, ♀ 31.7 mm (MNHN B 19134).

Geyser Reef. Stn 114, 12°22.3'S, 46°28.2'E, 300–600 m, 11 Apr 1977, coll. M. Faubert, ♀ 24.1 mm (MNHN B19044).

Comoro Is., Stn 61, 12°46.0'S, 44°58'E, 475–510 m, 29 Mar 1977, coll. M. Faubert, 1 juv. (MNHN B19045).

Madagascar. 12°43.5'S, 48°14.5'E, 370 m, 14 Apr 1971, coll. A. Crosnier, ♀ ovig. 30.9 mm (MNHN B18583). Stn CH 24, 22°30.5'S, 43°07'E, 430–460 m, 13 Jan

1986, ♀ ovig. 34.7 mm (MNHN B18585). Stn CH 27, 22°21'S, 43°05.5'E, 450 m, 15 Jan 1986, coll. R. von Cosel, ♀ 32.6 mm dry (MNHN B18582). Stn CH 32, 22°25.8'S, 43°04.3'E, 450–475 m, 19 Jan 1986, coll. R. Cleva, ♀ ovig. 32.7 mm (MNHN B19726). Stn CH 37, 22°18.2'S, 43°04.8'E, 450–475 m, 21 Jan 1986, coll. R. von Cosel, ♀ ovig. 31.6 mm (MNHN B18587). Stn CH 38, 22°23.7'S, 43°05.5'E, 400–500 m, 21.01.1986, coll. R. von Cosel, ♀ ovig. 33.5 mm (MNHN B18581). Stn CH 58, 23°36.2'S, 43°30.5'E, 510 m, 27 Feb 1973, coll. R. von Cosel, ♀ ovig. 33.2 mm (MNHN B18588). Stn CH 59, 23°36.0'S, 43°29.6'E, 600–610 m, 27 Feb 1973, ♂ 30.3 mm, (MNHN B18586). Stn CH 60, 22°25.6'S, 43°06.2'E, 475 m, 18.10.1986, coll. R. von Cosel, ♀ ovig. 33.3 mm (MNHN B19038). Stn CH 61, 23°36.1'S, 43°31.0'E, 445–455 m, 27 Feb 1973, ♂ 31.3 mm, (MNHN B19736). Same data, ♀ 32.5 mm, ♀ ovig. 31.7 mm (MNHN B18584). Stn CH 81, 22°22.8'S, 43°03.3'E, 525, 25 Oct 1986, coll. R. von Cosel, ♀ 31.9 mm (MNHN B19039). Stn CH 122, 22°16.8'S, 43°02.7'E, 600 m, 30 Nov 1986, ♂ 33.0 mm, ♀ 22.7 mm (MNHN B19041). Stn CH 127, 22°S, 43°E, 610 m, 1 Dec 1986, coll. R. von Cosel, ♀ 22.3 mm (MNHN B19040).

Redescription.—Dorsal surface of carapace unevenly granulate, obtuse granulate tubercles laterally on branchial region. Frontal lobes triangular, closely granulate. Third maxilliped minutely granulose. Subhepatic margins of carapace inflated, median subhepatic tubercle followed, in young specimens, by smaller tubercle. Anterolateral margin posteriorly set with 3 granulate tubercles, posteriormost largest. Posterolateral margin bituberculate, posterior tubercle larger. Posterior margin bearing 2 dorsoventrally flattened denticles laterally. Branchial, intestinal regions demarcated by deep grooves; intestinal region swollen, bearing prominent tubercle anteriorly, long, upcurved spur posteriorly (Fig. 1D).

Cheliped, pereopods granulate through-

out. Cheliped merus in adult male nearly as long as carapace, in female 0.85 carapace length; fingers as long as upper margin of palm.

Male thoracic sternites minutely granulate; margin of abdominal sulcus raised, granulate. Telson slender, third as long as fused abdominal segments. Male first pleopod with digitate process preapically (Figs. 3G, H).

Color.—“(after three weeks in alcohol) . . . dorsal surface of the carapace . . . pinkish-orange, with the tubercles . . . red; ventral surfaces . . . pale pinkish-white” (Yaldwyn & Dawson 1976:95). Color photo: Ikeda, 1998:82, pl. 19, fig. 1a–d.

Distribution.—Indo-Pacific Ocean: Fiji, New Caledonia, New Zealand, Caroline Is., Japan, Taiwan, Indonesia, Philippines, Andaman Sea, Laccadive Sea, Seychelles, Agalega Is., Comoro Is., Geysir Reef, Madagascar, Réunion, Mozambique channel, East Africa; 85–977 m.

Remarks.—The description and drawings of *Randallia vitjazi* (Zarenkov 1994:104, pl. 5, pl. 8B) are clearly that of *T. pustulosus*, including the filiform preapical process of the first male pleopod. Sakai (1976:99, pl. 14, fig. 6) believed that Doflein's specimen (*R. pustulosa*) from the Nicobars was “a different species, which seems to be related to *R. pustuloides* Sakai”, whereas Chen (1989:217) declared it simply “Non *Randallia pustulosa*” [Wood-Mason]; the specimen was not available to me at the time of writing.

Key to Species of *Tanaoa*, new genus

1. Anterolateral margins of carapace bearing low granulate tubercles; intestinal region bearing low tubercle posteriorly *T. distinctus*, new combination
- Anterolateral margins of carapace bearing prominent granulate tubercles; intestinal region bearing prominent tubercle anteriorly, upcurved spur posteriorly 2
2. Carapace length of adult >30 mm; preapical process of male first pleopod filiform . . . *T. pustulosus*, new combination

- Carapace length of adult >12 mm; preapical process of male first pleopod lamellate *T. nanus*, new species

Tokoyo, new genus

Diagnosis.—Carapace circular, globose, regions indistinct. Front narrow, bilobed. Eyes small, retractible. Outer orbital margin trisutured, V-shaped gap proximally on ventral margin. Antennules obliquely folded, basal antennular segment squat, operculiform, sealing lower antennular aperture. Antennae small, slender, basal antennal segment inserted in orbital hiatus. Postorbital region concave. Lateral margins rounded, bearing median tubercle. Posterior margin of carapace narrow, tridentate.

Third maxilliped exopod sealing efferent branchial channel, slightly shorter than endopod; merus of endopod subtriangular, shorter than subrectangular ischium; endopod of adult female with vertical line of setae medially. Anterior margin of efferent branchial channel produced, deeply cleft, separated by narrow groove from lower orbital margin.

Chelipeds long, slender, subequal. Cheliped merus and palm subcylindrical; fingers shorter than upper margin of palm, inner margins denticulate.

Pereiopods slender, short; dactyls nearly as long as propodi; upper surface of dactyls distally setose, tips corneous.

Male abdominal sulcus deep, nearly reaching buccal cavity; lateral walls of abdominal sulcus with elongate cavities anteriorly. Male abdomen narrow, twice as long as wide at base. Abdominal segments 3–6 fused, basio-lateral regions of fused segments slightly inflated, bearing denticle preapically; lateral margin carinate, carina fitting into groove between thoracic segments 4 and 5. Telson triangular, fifth as long as fused segments. Abdominal segments 4–6 of female fused, swollen, shield-like; telson lingulate, posterior margin arched. Margin of abdominal fossa in female prominent, anteriorly thickened.

Male first pleopod elongate, slightly sinuous, attenuate, distally sharply bent interiorly; second pleopod short, distally scoop-like.

Type species.—*Randallia eburnea* Alcock, 1896.

Species.—*Tokoyo cirrata*, new species, *Tokoyo eburnea* (Alcock, 1896).

Etymology.—Tokoyo, in Japanese mythology, was a girl who slew a sea-serpent that intimidated the fisherfolks. The name *Tokoyo* is to be considered as an arbitrary combination of letters, and heretofore takes the gender feminine.

Remarks.—*Tokoyo*, new genus, differs from *Randallia* s. s. in having the antennular operculum sealing only the bottom half of the antennular aperture, a bilobate anterior margin of efferent branchial channel, and fused segments 3–6 of the male abdomen. *Tokoyo* differs from the other three new genera described herein in its tridentate posterior margin of the carapace, the preapically positioned denticle on the fused segment of male abdomen, and the lingulate telson in the female.

Tokoyo cirrata, new species

Figs. 1E, 4A–C

Type material.—Holotype: Vanuatu. MUSORSTOM 8, Stn CP 1086, 15°36.58'S, 167°16.32'E, 182–215 m, 5 Oct 1994, coll. B. Richer de Forges, 1 ♂ 13.0 mm (MNHN B.28511). Paratypes: Same data, 12 ♂ 9.7–13.0 mm, 6 ♀ 11.7–12.2 mm, 4 ♀ ovig. 11.7–13.2 mm, 7 juv. (MNHN B.28512).

Material examined.—Vanuatu. MUSORSTOM 8, Stn CP 976, 19°25.22'S, 169°26.73'E, 160–182 m, 22 Sep 1994, coll. B. Richer de Forges, ♂ broken, ♀ ovig. 12.3 mm, 1 juv. (MNHN). Stn CP 1070, 15°36.59'S, 167°16.42'E, 184–190 m, 4 Oct 1994, coll. B. Richer de Forges, ♂ 9.1 mm, ♀ ovig. 13.7 mm, 1 juv. (MNHN).

Australia. Queensland, Moreton Bay, 36 m, Sep 1966, 2 ♂ 23.4, 24.3 mm (AMS P15383). East of Swains Reef, 22°26.75'S,

153°09.17'E, 139 m, 8 Sep 1995, ♂ 23.9 mm (AMS P56719).

Description.—Dorsal surface of carapace minutely and evenly granulate. Frontal lobes squat, minutely granulate. Subhepatic margin of carapace somewhat swollen, with row of granules, separated from anterolateral margin by shallow concavity. Lateral margin bearing medially small tubercle. Intestinal region weakly swollen, demarcated laterally by indistinct grooves. Posterior margin bearing 3 rounded, dorso-ventrally flattened denticles, median denticle smallest (Fig. 1E).

Third maxillipeds bearing conical granules, setae anteriorly, low granulation posteriorly. Thoracic sternites indistinctly granulate; anterior sternite with diagonal granulate ridge laterally.

Cheliped with well-spaced minute granules. Cheliped merus in adult male 1.60–1.80 as long as carapace; palm thicker distally; dactyl two-thirds as long as upper margin of palm, gap proximally between dactyl, pollex. Cheliped merus in female one-third longer than carapace, palm cylindrical. Pereiopods punctate.

Fused abdominal segments of male bearing flattened triangular denticle. Telson one-fifth as long as fused abdominal segments.

Tip of first male pleopod vermiculate, coiled, curled anteriorly (Figs. 4A–C).

Etymology.—From the Latin, *cirratus*, curly, and refers to the shape of first pleopod.

Color.—Dorsal surface of carapace orange, margins paler; posterior denticles white. Chelipeds pale orange, distal margins of merus, carpus, propodus stained with darker orange.

Distribution.—Southwestern Pacific: Vanuatu and Australia; 36–215 m.

Remarks.—*Tokoyo cirrata*, new species, differs from *T. eburnea* Alcock, 1896, in having an anteriorly coiled tip of the first male pleopod, and color pattern of the carapace.

Tokoyo eburnea (Alcock, 1896), new combination

Figs. 1F, 4D–F

Randallia eburnea Alcock, 1896:197.—Alcock & Anderson, 1897: pl. 30, fig. 4.—Ihle, 1918:246.—Sakai, 1934:289, pl. 18, fig. 4; 1935:54, pl. 9, fig. 3; 1937:132, fig. 22; 1965:42, pl. 17, fig. 1; 1976:98, pl. 29, fig. 1.—Uchida, 1949:720, fig. 2082.—Serène, 1954:491, 1968:45.—Utinomi, 1956:72, pl. 36, fig. 8.—Tyn-dale-Biscoe & George, 1962:87, fig. 7.7.—Chang, 1963:7, fig. 1.—Zarenkov, 1969:24, fig. 7.3.—Takeda & Miyake, 1970:225.—Campbell, 1971:41.—Takeda, 1973:32, fig. 3e, f; 1975:143; 1997:238; 2001:230.—Serène & Soh, 1976:12, pl. 3, fig. c.—Yaldwyn & Dawson, 1976:96.—Serène & Vadon, 1981:118, 124.—Richer de Forges, 1983:634.—Chen, 1989:212, figs 12, 13.—Huang, 1989:309, 1994:579.—Ng et al., 2001:10.—Chen & Sun, 2002:338, fig. 149.—Davie, 2002:275.

Randallia japonica Yokoya, 1933:130, text-fig. 46.

Material examined.—Japan: Shikoku I., Tosa Bay, Nov 1958, colls T. & K. Sakai, 2 ♀ ovig. 18.6, 17.3 mm (USNM 120708). Tosa Bay, 110 m, 10 May 1990, ♂ 14.8 mm (SMF 22577). Tosa Bay, ♀ 19.1 mm (SMF, ex. coll. Sakai). Off Ashizuri-Misaki, 366 m, 24 Nov 1958, ♀ 17.3 mm (SMF, ex. coll. Sakai). Honshu I., SW Seno Umi, R/V *Albatross* Stn 3703, 57 m, 7 May 1900, 1 juv. (USNM 134214).

China. Off Dougliai, 28 Jun 1976, ♂ 12.3 mm, ♀ 13.2 mm (SMF13206).

Taiwan. Tashi, 24 Jan 1997, coll. T.Y. Chan, 2 ♀ ovig. 20.1, 19.1 mm (NTOU). Tashi, Dec 1997, coll. T.Y. Chan, 2 ♂ 17.8, 17.3 mm (NTOU).

Indonesia. Off Borneo, 5°57'N, 109°34'E, 150 m, 1963, ♀ ovig. 24.4 mm (NHM 1964.9.9.3). Btw Wowoni, Buton Is., 4°20'S, 122°58'E, 75–94 m, 'Siboga' Stn 204, 20 Sep 1899, ♀ 19.7 mm, 3 juvs. (ZMA 242361).

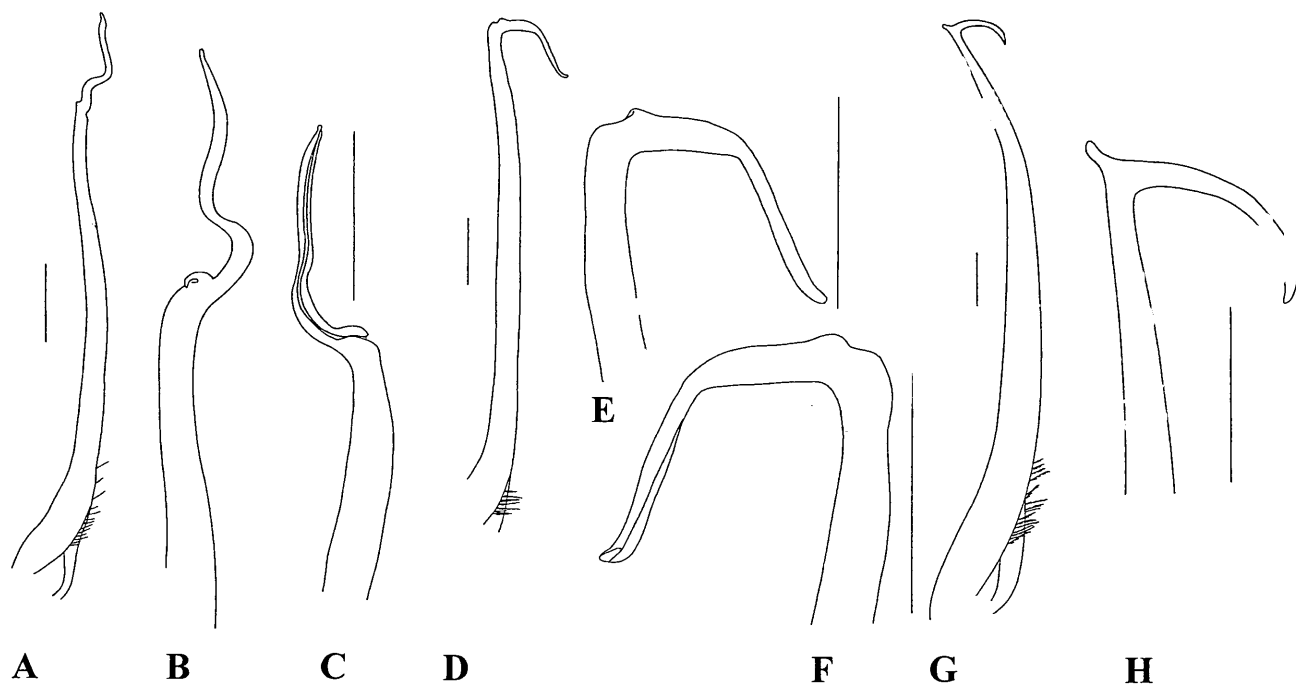


Fig. 4. A, B, C, *Tokoyo cirrata*, new species, holotype. ♂ cl 13.0 mm, Vanuatu, MUSORSTOM 8, Stn CP 1086 (MNHN): A, first pleopod; B, apex of first pleopod; C, apex of first pleopod, dorsal view. D, E, F, *Tokoyo eburnea* (Alcock, 1896), ♂ cl 14.8 mm, Japan, Tosa Bay (SMF 22577): D, first pleopod; E, apex of first pleopod; F, apex of first pleopod, dorsal view. G, H, *Toru granuloides* (Sakai, 1961), ♂ cl 25.8 mm, Loyalty Is., MUSORSTOM 6, Stn DW 487 (MNHN): G, first pleopod; H, apex of first pleopod. Scales = 1 mm.

Philippines. MUSORSTOM 1, Stn 16, 13°59'N, 120°12.3'E, 164–150 m, 20 Mar 1976, det. H. Chen, ♂ 27.4 mm, ♀ 26.9 mm (USNM 237656 ex. Paris Museum). Stn CP 34, 14°01'N, 120°15.8'E, 191–188 m, 23 Mar 1976, ♀ 32.1 mm (MNHN B 18975). Stn CP 58, 13°58.0'N, 120°13.7'E, 143–178 m, 26 Mar 1976, 9 ♂ 23.4–35.0 mm, 2 ♀ 19.4, 28.3 mm, 9 ♀ ovig. 26.1–29.0 mm, 4 juvs. (MNHN B 18058). MUSORSTOM 3, Stn CP 88, 14°01'N, 120°17'E, 183–187 m, 31 May 1985, 8 ♂ 12.0–23.5 mm, 12 ♀ 10.5–26.0 mm (MNHN B 17989). Stn CP 96, 14°00'N, 120°18'E, 190–194 m, 1 Jun 1985, 10 ♂ 11.1–23.8 mm, 5 ♀ 14.5–21.4 mm (MNHN B 17988).

Andaman Sea. Thailand. Similan I., R/V *Te Vega*, 08°46'N, 97°46'E, 75–81 m, 4 Nov 1963, 4 ♂ 11.4–15.5 mm, 3 ♀ 6.4–12.9 mm (USNM 273786).

Laccadive Sea. 11°05.45'N, 75°04.08'E: ♂ 9.6 mm (NHM 1896.9.8.20, ex. Indian Museum).

Redescription.—Dorsal surface of carapace minutely and evenly granulate. Frontal

lobes squat, minutely granulate. Subhepatic margin of carapace somewhat swollen, with row of granules, separated from anterolateral margin by shallow concavity. Lateral margin bearing medially small tubercle. Intestinal region slightly swollen, demarcated laterally by indistinct grooves. Posterior margin bearing 3 rounded, dorsoventrally flattened denticles, median denticle smallest (Fig. 1F).

Third maxillipeds bearing conical granules, setae anteriorly, low granulation posteriorly. Thoracic sternites indistinctly granulate; anterior sternite with diagonal granulate ridge laterally.

Cheliped with well-spaced minute granules. Cheliped merus in adult male almost twice as long as carapace; palm thicker distally; dactyl half as long as upper margin of palm, gap proximally between dactyl, pollex. Cheliped merus in female one-third longer than carapace, palm cylindrical, dactyl two thirds as long as upper margin of palm. Pereiopods punctate.

Fused abdominal segments of male bear-

ing flattened triangular denticle. Telson one-fifth as long as fused abdominal segments.

First male pleopod distally deflexed anteriorly (Figs. 4D–F).

Color.—“Yellowish-pink, with deeper pink on anterior margins of merus and hand of chelipeds; anterior portion of carapace and distal joint of merus of walking legs yellow. Fingers white” (Tyndale-Biscoe & George 1962:87). “[B]right brick red above and white below” (Chang 1963:7).

Distribution.—Indo-Pacific Ocean: Australia, Japan, China, Taiwan, Vietnam, Indonesia, Philippines, Andaman Sea, Laccadive Sea; 35–366 m.

Remarks.—Alcock (1896:198) erroneously described the male abdominal segments 3–5 as fused, when in fact segments 3–6 are fused, as remarked by Ihle (1918:246). Chen (1989, fig. 13b) erroneously depicted the sixth male abdominal segment as articulate. Examination of immature specimens showed that the pleopod drawn by Zarenkov (1969, fig. 7.3) is of a young male. The specimens from Borneo and the Philippines are much larger than the others examined, but no morphological differences were detected.

Key to Species of *Tokoyo*, new genus

1. First male pleopod with anteriorly coiled apical process *T. cirrata*, new species
- First male pleopod with interiorly deflexed apical process
 *T. eburnea*, new combination

Toru, new genus

Diagnosis.—Carapace subcircular, globose. Front narrow, uptilted, bilobed. Eyes small, retractible. Outer orbital margin trisutured, V-shaped gap proximally on ventral margin. Antennules obliquely folded, basal antennular segment squat, operculiform, sealing lower antennular aperture. Antennae small, slender, basal antennal segment inserted in orbital hiatus. Postorbital region concave. Intestinal region swollen, demarcated by grooves, 2 pairs of pits

along cardiobranchial grooves. Posterior margin of carapace narrow, bilobate.

Third maxilliped exopod slightly shorter than endopod, not quite sealing efferent branchial channel; endopod of adult female medially with vertical line of setae; merus of endopod subtriangular, shorter than subrectangular ischium. Anterior margin of efferent branchial channel produced, bilobed, separated by narrow groove from lower orbital margin.

Chelipeds long, slender, equal. Cheliped merus, palm subcylindrical; fingers as long as upper margin of palm, inner margins denticulate. Pereiopods slender, short; dactyls shorter than propodi; upper surface of pereopodal dactyls setose, tips corneous.

Fourth thoracic sternite not swollen laterally. Abdominal sulcus of male deep, elongate, nearly reaching buccal cavity, anterior margin raised; lateral walls of abdominal sulcus with elongate cavities anteriorly. Abdominal segments 3–6 of male fused, basio-lateral regions inflated, fused segment narrowing distally, bearing denticle at distal margin; lateral margin carinate, carina fitting into groove at suture between sternites 4 and 5. Telson lingulate, two-fifths as long as fused segment, not reaching tip of abdominal sulcus. Abdominal segments 4–6 of female fused, shield-like; margin of abdominal cavity prominent, rampart-like. Telson ogival, basal margin sinuous.

Male first pleopod elongate, attenuate, bearing long apical process; second pleopod short, distally scoop-like.

Type species.—*Randallia granuloides* Sakai, 1961.

Species.—*Toru granuloides* (Sakai, 1961), *T. mesjatzevi* (Zarenkov, 1990), *Toru pilus* (Tan, 1996), *Toru septimus*, new species.

Etymology.—Toru is the Polynesian god of the chasms of the deep. The name *Toru* is to be considered as an arbitrary combination of letters and heretofore takes the gender masculine.

Remarks.—*Toru*, new genus, is differentiated from *Tanaoa*, new genus, in having

a lingulate telson in the male, the lateral walls of male abdominal sulcus are excavate anteriorly, the male first pleopod bearing a long apical process, the margins of the female abdominal cavity prominent, rampart-like, and the fourth thoracic sternite even; whereas in *Tanaoa* the male telson tapers narrowly, the lateral walls of the male abdominal sulcus are entire, the preapical margin of the male first pleopod bear a minute process perpendicular with tip, the margins of the female abdominal cavity do not form a rampart-like edge, and the fourth thoracic sternite is greatly swollen laterally.

Toru granuloides (Sakai, 1961), new combination

Figs. 2A, 4G, H

Randallia granuloides Sakai, 1961:136, pl. 3, fig. 3; 1976:96, text-fig. 52.—Serène, 1968:45.—Yaldwyn & Dawson, 1976:96.—Richer de Forges, 1983:634.

Material examined.—Wallis I. MUSORSTOM 7, Stn DW 583, 13°11'S, 176°14'W, 330–365 m, 22 May 1992, ♀ 18.5 mm (MNHN). Stn DW 584, 13°11'S, 176°14'W, 360–400 m, 22 May 1992, 1 juv. (MNHN). Stn DW 605, 13°21'S, 176°08'W, 335–340 m, 26 May 1992, ♂ 16.6 mm (MNHN).

Fiji. MUSORSTOM 10, Stn CP 1386, 18°18.5'S, 178°05.1'E, 230–344 m, 19 Aug 1998, ♀ ovig. 20.1 mm (MNHN). BORDAU 1, Stn CP 1434, 17°11'S, 178°41'W, 400–401 m, 2 Mar 1999, ♂ 17.8 mm (MNHN).

Loyalty Is. MUSORSTOM 6, Stn DW 416, 20°42.15'S, 166°59.60'E, 343 m, 16 Feb 1989, ♂ 27.3 mm (MNHN). Stn DW 428, 20°23.54'S, 166°12.57'E, 420 m, 17 Feb 1989, ♂ 18.9 mm, ♀ 9.5 mm (MNHN). Stn DW 456, 21°00.71'S, 167°26.35'E, 240 m, 20 Feb 1989, ♂ 23.0 mm (MNHN). Stn DW 487, 21°23.30S, 167°46.40'E, 500 m, 23 Feb 1989, ♂ 25.8 mm, ♀ 13.8 mm (MNHN). BATHUS 2, Stn CP 737, 23°03.42'S, 166°59.97'E, 350–400 m, 13 May 1993, ♂ 23.2 mm (MNHN).

New Caledonia. MUSORSTOM 4, Stn

194, 18°52.8'S, 163°21.7'E, 545 m, 19 Sep 1985, ♂ 25.8 mm (MNHN B18411). Stn 236, 22°11'S, 167°15'E, 495–550 m, 2 Oct 1985, 2 juv. (MNHN B21245).

Japan. ♂ 19.3 mm, ♀ ovig. 21.5 mm (SMF, ex. coll. Sakai). 2 ♂ 18.8, 19.0 mm (SMF, ex. coll. Sakai).

Redescription.—Dorsal surface of carapace granulate, granules closer set posteriorly. Frontal lobes rounded, minutely and closely granulate. Subhepatic margins of carapace very slightly swollen, Lateral margin medially set with small tubercle. Posterior margin bearing 2 lamellate, granulate, triangular tubercles laterally. Intestinal region swollen, topped by low tubercle, demarcated by deep grooves (Fig. 2A). Third maxilliped granulose.

Cheliped and pereopods closely granulate throughout. Cheliped merus in adult male as long as carapace; fingers as long as upper margin of palm. Pereopodal dactyls anteriorly tomentose.

Thoracic sternites and abdomen minutely granulate. Preapical denticle on fused abdominal segment in male triangular.

Shaft of first male pleopod slightly curved, with sickle-shaped apical process (Figs. 4G, H).

Distribution.—Western Pacific: Fiji, Wallis I., Vanuatu, Loyalty Is., New Caledonia, Japan; 50–550 m.

Remarks.—Sakai (1961:136) believed “The nearest relative of this new species [*Randallia granuloides*] is *R. granulata* Miers (1886)”. Yaldwyn & Dawson (1976:96), as well as Richer de Forges (1983:634), relegated *R. granuloides* and *R. granulata* to the same “species-group”. However, despite superficial similarity owing to the granulate carapace and elongate chelipeds they belong in different genera: *Toru granuloides*, new combination, differs from *R. granulata* in the form of the male telson, ogival rather than rounded as in *R. granulata*; and in the form of the first male pleopod, bent distad in *R. granulata*.

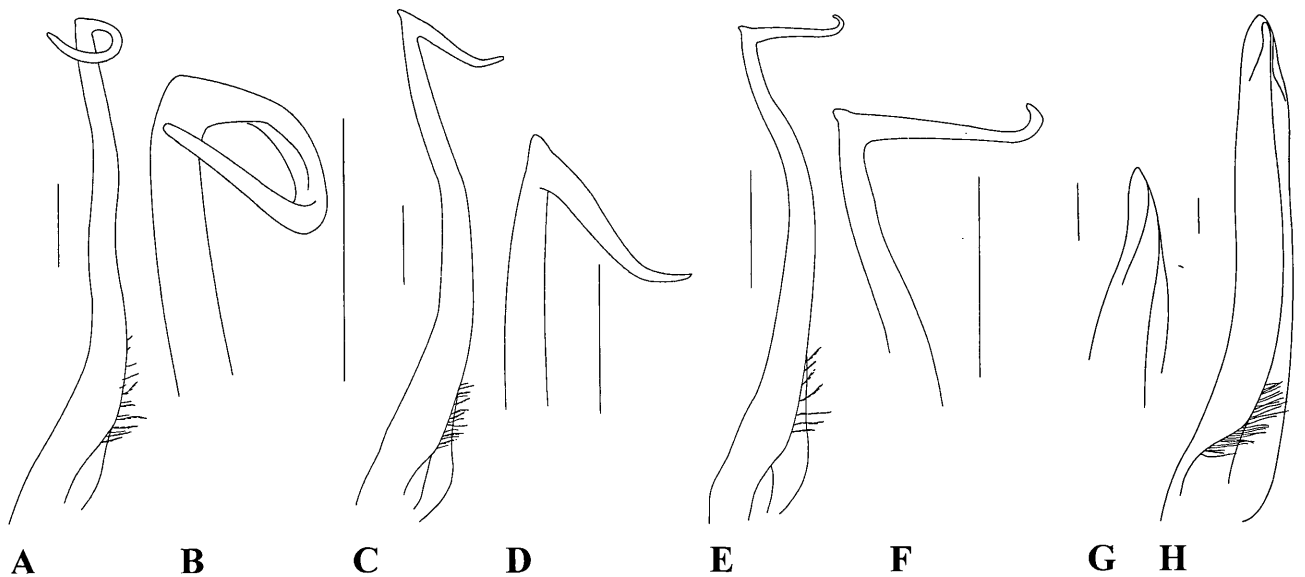


Fig. 5. A, B, *Toru pilus* (Tan, 1996), ♂ cl 11.5 mm, New Caledonia, BATHUS 4, Stn CP 946, (MNHN): A, first pleopod; B, apex of first pleopod. C, D, *Toru septimus*, new species, holotype. ♂ cl 13.1 mm, Loyalty Is., Stn DW 421 (MNHN): C, first pleopod; D, apex of first pleopod. E, F, *Toru trituberculatus* (Sakai, 1961), ♂ cl 8.6 mm, Indonesia, Tanimbar I., KARUBAR, Stn CP 67 (MNHN): E, first pleopod; F, apex of first pleopod. G, H, *Urashima pustuloides* (Sakai, 1961): paratype, ♂ cl 34.3 mm, Japan, Shikoku I., Mimase, Tosa Bay (NHM 1961.6.5.46–48): G, first pleopod; H, apex of first pleopod. Scales = 1 mm.

Toru mesjatzevi (Zarenkov, 1990),
new combination

Randallia mesjatzevi Zarenkov, 1990:67,
pl. 7.

Redescription.—Dorsal surface of carapace granulate, granules conical anteriorly. Frontal lobes rounded, minutely and closely granulate. Subhepatic margins of carapace very slightly swollen, Lateral margin uniformly rounded. Posterior margin bearing 2 lamellate, granulate, triangular tubercles laterally. Intestinal region somewhat swollen, demarcated by shallow grooves. Third maxilliped granulose, endopod medially with vertical ridge of conical granules.

Cheliped and pereopods closely granulate throughout. Cheliped merus in adult male as long as carapace; fingers as long as upper margin of palm. Anterior margin of pereopodal meri, carpi and propodi prominently spinose. Pereopodal dactyls anteriorly tomentose.

Thoracic sternites and abdomen minutely granulate. Preapical denticle on fused abdominal segment in male triangular.

Shaft of first male pleopod slightly sinuous, with sickle-shaped apical process.

Distribution.—Off Kenya; 130–150 m.

Remarks.—Zarenkov's (1990, pl. 7, fig. 13) illustration of the first male pleopod of *Toru mesjatzevi*, with its sickle-shaped apical process, clearly places the species within the genus *Toru*. The species is larger than its congeners (CL 36.0, 33.0 mm), and is notable for its prominently spinose pereopods. The specimens were not available to me at the time of writing.

Toru pilus (Tan, 1996), new combination
Figs. 2B, 5A, B

Randallia pila Tan, 1996:1051, fig 7l–n, 8a, c–f, 4G, H.

Type Material.—Holotype: Philippines. R/V *Albatross* Stn 5454, 13°12'N, 123°50.30'E, 300 m, 7 Jun 1909: ♂ 13.0 mm (USNM). Paratype: Luzon, San Bernardino Straits, R/V *Albatross* Stn 5453, 13°12'N, 123°48.18'E, 271 m, 7 Jun 1909, ♀ ovig. 10.0 mm (USNM).

Material examined.—Fiji. MUSOR-STOM 10, Stn CP 1325, 17°16.4'S, 177°49.8'E, 282–322 m, 7 Aug 1998, 12 ♂ 9.5–11.4 mm, ♀ 10.4 mm, 6 ♀ ovig. 9.1–11.0 mm (MNHN). Stn CP 1327,

17°13.3'S, 177°51.6'E, 370–389 m, 7 Aug 1998, 6 ♂ 7.5–10.4 mm, ♀ 9.0 mm, 4 ♀ ovig. 9.5–10.6 mm, 1 juv. (MNHN). Stn CP 1348, 17°30.3'S, 178°39.6'E, 353–390 m, 11 Aug 1998, ♂ 10.5 mm, ♀ ovig. 10.9 mm (MNHN). Stn CP 1349, 17°31.1'S, 178°38.8'E, 244–252 m, 11 Aug 1998, ♀ 10.0 mm (MNHN). Stn CP 1390, 18°18.6'S, 178°05.1'E, 234–361 m, 19 Aug 1998, ♀ 11.9 mm (MNHN). BORDAU 1, Stn CP 1406, 16°39'S, 179°37'E, 360–380 m, 25 Feb 1999, 2 ♂ 10.8, 10.0 mm (MNHN). Stn CP 1448, 16°45'S, 179°59'E, 410–500 m, 4 Mar 1999, ♂ 10.0 mm (MNHN).

Vanuatu. MUSORSTOM 8, Stn CP 964, 20°19.60'S, 169°49.00'E, 360–408 m, 21 Sep 1994, coll. B. Richer de Forges, ♀ ovig. 13.0 mm, 2 juv. (MNHN). Stn CP 1047, 16°53.62'S, 168°10.49'E, 486–494 m, 30 Sep 1994, coll. B. Richer de Forges, 3 ♂ 10.1–10.8 mm, ♀ 10.4 mm, 1 juv. (MNHN). Stn CP 1088, 15°09.23'S, 167°15.13'E, 425–455 m, 6 Oct 1994, coll. B. Richer de Forges, ♂ 11.6 mm, ♀ 11.3 mm (MNHN). Stn CP 1106, 15°05.27'S, 167°11.88'E, 305–314 m, 7 Oct 1994, coll. B. Richer de Forges, ♂ 9.3 mm (parasitized), 2 ♀ ovig. 13.2, 12.7 mm, ♀ broken (MNHN). Stn CP 1137, 15°41.52'S, 167°02.67'E, 360–371 m, 11 Oct 1994, coll. B. Richer de Forges, ♂ 11.0 mm, ♀ broken (MNHN).

New Caledonia. BATHUS 1, Stn CP 695, 20°34.59'S, 164°57.88'E, 410–430 m, 17 Mar 1993, ♂ 8.6 mm (MNHN). BATHUS 4, Stn CP 946, 20°33.8'S, 161°58.35'E, 386–430 m, 10 Aug 1994, ♂ 11.5 mm (MNHN).

Redescription.—Dorsal surface of carapace boldly granulate. Front prominently produced, frontal lobes anteriorly rounded, minutely granulate, pilose. Postorbital region depressed, concave. Rounded ridge extending from outer orbital margin across hepatic region. Subhepatic margin of carapace mammiform, separated by shallow arc from trituberculate anterolateral margin. Intestinal region swollen, demarcated by in-

distinct grooves, bearing conical tubercle posteriorly. Posterior margin bearing laterally 2 lamellar denticles (Fig. 2B). Third maxillipeds bearing conical granules anteriorly. Thoracic sternites granulate.

Cheliped and pereopods closely granulate throughout. Cheliped merus in adult male 0.85 as long as carapace; fingers nearly as long as upper margin of palm.

Male abdomen minutely granulate, preapical denticle narrowly triangular. Shaft of first male pleopod nearly straight, apical process incurved, looped (Figs. 5A, B).

Distribution.—Western Pacific: Fiji, Vanuatu, New Caledonia, Philippines; 234–500 m.

Remarks.—*Toru pilus* differs from the other species described herein of *Toru*, in having a prominently produced front, pronounced postorbital concavity, ridged hepatic region, and distally looped first male pleopod.

The male holotype of *T. pilus* is badly broken; the detached chelipeds (Tan 1996, fig. 4H, 8b) do not belong with the carapace; the distal segment of the first male pleopod is looped, not as depicted by Tan (1996, fig. 8a, f). The female paratype is entire.

***Toru septimus*, new species**
Figs. 2C, 5C, D

Type Material.—Holotype: Loyalty Is., Stn DW 421, 20°26.27'S, 166°40.17'E, 245 m, 16 Feb 1989, 1 ♂ 13.1 mm (MNHN B.28513). Paratypes: Idem, 1 ♂ 12.2 mm, 2 ♀ 13.4, 13.3 mm (MNHN B.28514).

Material examined.—Fiji. MUSORSTOM 10, Stn CP 1386, 18°18.5'S, 178°05.1'E, 230–344 m, 19 Aug 1998, 1 juv. (MNHN).

Vanuatu. MUSORSTOM 8, Stn CP 963, 20°20.10'S, 169°49.08'E, 400–440 m, 21 Sep 1994, coll. B. Richer de Forges, 4 ♂ 10.1–14.8 mm, 6 ♀ 10.5–13.9 mm, 1 juv. (MNHN). Stn CP 986, 19°20.57'S, 169°31.48'E, 602–648 m, 23 Sep 1994, coll. B. Richer de Forges, ♀ 12.8 mm

(MNHN). Stn CP 1006, 18°50.24'S, 168°56.87'E, 574–611 m, 25 Sep 1994, coll. B. Richer de Forges, 1 juv. (MNHN). Stn CP 1017, 17°52.80'S, 168°26.20'E, 294–295 m, 27 Sep 1994, coll. B. Richer de Forges, ♂ 12.3 mm, ♀ 12.1 mm (MNHN). Stn CP 1018, 17°52.88'S, 168°25.08'E, 300–301 m, 27 Sep 1994, coll. B. Richer de Forges, ♂ 11.7 mm, ♀ broken (MNHN). Stn CP 1092, 15°10.80'S, 167°12.33'E, 314–321 m, 6 Oct 1994, coll. B. Richer de Forges, 3 juvs. (MNHN). Stn CP 1094, 15°08.02'S, 167°11.99'E, 312–314 m, 6 Oct 1994, coll. B. Richer de Forges, 1 juv. (MNHN).

Loyalty Is. MUSORSTOM 6, Stn DW 417, 20°41.80'S, 167°03.65'E, 283 m, 16 Feb 1989, ♂ 12.7 mm (MNHN). Stn DW 423, 20°25.85'S, 166°40.50'E, 280 m, 16 Feb 1989, 1 juv. (MNHN). Stn DW 440, 20°48.80'S, 167°17.25'E, 288 m, 19 Feb 1989, ♀ 12.6 mm (MNHN). Stn DW 451, 20°59'S, 167°24.50'E, 330 m, 20 Feb 1989, ♀ 7.3 mm (MNHN). Stn DW 457, 21°00.42'S, 167°28.71'E, 353 m, 20 Feb 1989, 2 juvs. (MNHN). Stn DW 479, 21°09.13'S, 167°54.95'E, 310 m, 22 Feb 1989, ♂ 13.0 mm, 1 juv. (MNHN). Stn DW 481, 21°21.85'S, 167°50.30'E, 300 m, 23 Feb 1989, ♀ 12.0 mm (MNHN). BATHUS 1, Stn CP 707, 21°42.72'S, 166°35.75'E, 347–375 m, 19 Mar 1993, 2 ♂ 9.9, 12.6 mm, 1 juv. (MNHN). BATHUS 2, Stn CP 742, 22°33.45'S, 166°25.86'E, 340–470 m, 14 May 1993, ♀ ovig. 13.6 mm (MNHN).

New Caledonia. Lagoon, 22°33.41'S, 166°25.74'E, 300 m, 12 Sep 1994, ♀ 9.5 m (MNHN). BIOCAL, Stn CP 105, 21°31'S, 166°22'E, 330–335 m, 8 Sep 1985, 2 ♂ 9.0, 12.5 mm, ♀ 9.0 (MNHN B18412). Stn CP 108, 22°03'S, 167°06'E, 335 m, 9 Sep 1985, ♂ 10.5 mm, ♀ ovig. 13.5 mm (MNHN B19177).

Chesterfield Is., MUSORSTOM 5, Stn 258, 25°32.8'S, 159°46.10'E, 300 m, 8 Oct 1986, ♂ 12.5 mm (MNHN B21212). Stn 261, 25°26.58'S, 159°45.88'E, 300 m, 8 Oct 1986, ♂ 13.7 mm (MNHN B18372). Stn 268, 24°44.70'S, 159°39.20'E, 280 m, 9 Oct

1986, ♂ 13.9 mm (MNHN B21211). Stn 268, 24°44.70'S, 159°39.20'E, 280 m, 9 Oct 1986, 3 ♂ 9.1–13.0 mm (MNHN B18378). Stn 275, 24°46.60'S, 159°40.30'E, 285 m 9 Oct 1986, ♂ 10.8 mm, 2 ♀ 13.1, 14.1 mm, 1 juv. (MNHN B18376). Stn 276, 24°48.90'S, 159°40.90'E, 269–258 m, 9 Oct 1986, 4 ♂ 10.7–13.1 mm, ♀ 7.8 mm, ♀ ovig. 11.8 mm (MNHN B18493). Stn 277, 24°10.60'S, 159°34.90'E, 270 m, 10 Oct 1986, 2 ♂ 10.4, 13.5 mm, 2 juv. (MNHN B18368). Stn 280, 24°09.99'S, 159°35.75'E, 270 m, 10 Oct 1986, 4 ♂ 10.3–10.5 mm, 2 ♀ 10.3, 10.0 mm, 3 juvs. (MNHN B18377). Stn 281, 24°10.54'S, 159°34.32'E, 272 m, 10.10.1986, ♀ ovig. 11.1 mm (MNHN B18484). Stn 284, 24°09.96'S, 159°33.49'E, 10 Oct 1986, ♀ ovig. 13.5 mm (MNHN B18374). Stn 285, 24°09.35'S, 159°34.04'E, 245–255 m, 10 Oct 1986, ♂ 11.8 mm (MNHN B18495). Stn 287, 24°05.40'S, 159°36.30'E, 270 m, 10 Oct 1986, ♀ ovig. 11.2 mm (MNHN B18490). Stn 288, 24°04.80'S, 159°36.80'E, 270 m, 10 Oct 1986, ♂ 12.6 mm, 3 juv. (MNHN B18488). Stn 289, 24°01.50'S, 159°38.40'E, 273 m, 10 Oct 1986, 8 ♂ 10.3–12.4 mm, 9 ♀ 9.2–13.0 mm, 1 juv. (MNHN B18454). Stn 291, 23°07.70'S, 159°28.40'E, 300 m, 11 Oct 1986, ♂ 11.2 mm, ♀ damaged (MNHN B18485). Stn 307, 22°11.07'S, 159°24.07'E, 350–345 m, 12 Oct 1986, ♂ 10.4 mm, ♀ ovig. 13.7 mm (MNHN B18489). Stn 309, 22°10.20'S, 159°22.80'E, 340 m, 12 Oct 1986, ♂ 10.6 mm (MNHN B18492). Stn 319, 22°24'S, 159°16.50'E, 320–325 m, 13 Oct 1986, ♂ 9.7 mm (MNHN B21321). 22°40'S, 167°10'E, 200–350 m, 10 Oct 1986, ♂ 9.2 mm (MNHN B19163). BATHUS 4, Stn DW 902, 19°00.84'S, 163°14.83'E, 341–351 m, 4 Aug 1994, ♂ 14.3 mm, 1 juv. (MNHN). Stn CP 905, 19°02.45'S, 163°15.65'E, 294–296 m, 4 Aug 1994, ♂ 13.8 mm (MNHN).

Description.—Carapace with dorsal surface evenly, minutely granulate. Frontal lobes squat, rounded, pilose. Subhepatic margin of carapace mammiform, separated by shallow arc from trituberculate antero-

lateral margin. Intestinal region swollen, demarcated by indistinct grooves, bearing conical tubercle posteriorly. Posterior margin bearing laterally 2 lamellar, rounded denticles. Third maxilliped pilose, bearing conical granules anteriorly (Fig. 2C). Thoracic sternites granulate.

Cheliped and pereopods closely granulate throughout. Cheliped merus in adult male nearly as long as carapace; fingers as long as upper margin of palm.

Male abdomen minutely granulate proximally, preapical denticle triangular. Shaft of first male pleopod sinuous, apical process bent at right angle, sigmoid (Figs. 5C, D).

Etymology.—From Latin, *septem*, seven, for the shape of the apical process of the first male pleopod.

Remarks.—*Toru septimus*, new species, differs from the closely allied *T. trituberculatus* in its finer granulation on carapace and chelipeds, the rounded, rather than subquadrate, frontal lobes, and in the sigmoid shape of the apical process of the first male pleopod.

Distribution.—Western Pacific: Fiji, New Caledonia, Loyalty Is., Vanuatu; 200–648 m.

Toru trituberculatus (Sakai, 1961), new combination
Figs. 2D, 5E, F

Randallia trituberculata Sakai, 1961:134, pl. 3, fig. 2; 1965:42, pl. 17, fig. 2; 1976:98, pl. 29, fig. 1, text-fig. 53.—Sertene, 1968:45.—Serène & Vadon, 1981:119, 124.—Richer de Forges, 1983:634.—Chen, 1989:215, fig. 14, pl. 3, fig. 2.—Takeda, 2001:230.—Chen & Sun, 2002:340, fig. 150, pl. 14.3.

Material examined.—Japan. Shikoku I., Tosa Bay, 19 Nov 1958, coll. T. & K. Sakai, ♂ 12.7 mm, ♀ 11.4 mm (USNM 120707). Tosa Bay, 3 ♂ 11.8–13.0 mm (SMF, ex. coll. Sakai). ♂ 13.2 mm (SMF, ex. coll. Sakai). Mimase, Dec 1961, ♂ 13.5 mm (SMF,

ex. coll. Sakai). Mimase, Mar 1963, ♂ 13.0 mm (SMF, ex. coll. Sakai).

Indonesia. Tanimbar I., KARUBAR, Stn CP 67, 8°58'S, 132°06'E, 233–146 m, 1 Nov 1991, ♂ 8.6 mm (MNHN). Stn CP 86, 9°26'S, 131°13'E, 225–223 m, 4 Nov 1991, 5 ♂ 8.6–11.1 mm, 6 ♀ 9.0–11.9 mm (MNHN).

Philippines. MUSORSTOM 1, Stn 27, 13°59.8'N, 120°18.6'E, 192–188 m, 22 Mar 1976, ♀ 11.2 (MNHN B18084). Stn 30, 14°01.3'N, 120°18.7'E, 186–177 m, 22 Mar 1976, ♂ 7.1 mm (MNHN B18086). Stn 34, 14°01.0'N, 120°15.8'E, 191–188 m, 23 Mar 1976, ♀ 10.6 mm (MNHN B18083). Stn 51, 13°49.4'N, 120°04.2'E, 200–170 m, 25 Mar 1976, ♂ damaged, ♀ ovig. 11.3 mm (MNHN B18085). Stn 64, 14°00.5'N, 120°16.3'E, 194–195 m, 27 Mar 1976, ♀ 8.3 mm (MNHN B18082). MUSORSTOM 3, Stn 88, 14°01'N, 120°17'E, 183–187 m, 31 May 1985, ♀ ovig. 10.7 mm (MNHN B17982). Stn CP 100, 14°00'N, 120°18'E, 189–199 m 1 Jun 1985, ♂ 11.0 mm (MNHN B17983). Stn CP 108, 14°01'N, 120°18'E, 188–195 m, 2 Jun 1985, ♂ 9.9 mm, ♀ ovig. 11.1 mm (MNHN B17984). Stn CP 120, 12°06'N, 121°16'E, 219–220 m, 3 Jun 1985, 2 ♀ 7.9, 8.8 mm (MNHN B17986). Stn CP 139, 11°53'N, 122°14'E, 240–267 m, 6 Jun 1985, 10 ♂ 10.1–11.8 mm, 6 ♀ 7.6–11.3 mm (MNHN B17985).

Redescription.—Carapace with dorsal surface granulate, granules more prominent anteriorly. Frontal lobes squat, subquadrate, minutely granulate, pilose. Subhepatic margin of carapace prominently granulate, mammiform; separated by shallow arc from trituberculate anterolateral margin. Intestinal region swollen, demarcated by distinct grooves, bearing conical tubercle posteriorly. Posterior margin bearing laterally 2 lamellar, rounded denticles (Fig. 2D).

Third maxillipeds pilose, bearing conical granules anteriorly. Thoracic sternites granulate.

Cheliped, pereopods closely granulate throughout. Cheliped merus in adult male

0.85 as long as carapace; fingers as long as upper margin of palm.

Male abdomen minutely granulate proximally, preapical denticle triangular. Shaft of first male pleopod sinuous, apical process bent at right angle, tip upcurved (Figs. 5E, F).

Color.—"[T]he carapace . . . is yellowish-red, but the surface near the postero-lateral and posterior margins is pale whitish" (Sakai 1965:42).

Distribution.—Pacific Ocean: Japan, Indonesia, Philippines; 35–267 m.

Remarks.—*Toru trituberculatus* is not "most closely related to *R. distincta* Rathbun (1906)" as claimed by Sakai (1961: 135), it belongs in a different genus. *Toru trituberculatus* differs from *Tanaoa distinctus* in having a lingulate telson in the male, anteriorly excavate lateral walls of the male abdominal sulcus, prominent margins to the female abdominal cavity, and bearing a digitate apical process on the male first pleopod.

Key to Species of *Toru*, new genus

1. Anterolateral margin of carapace lacking tubercles 2
- Anterolateral margin of carapace trituberculate 3
2. Lateral margin medially set with small tubercle; pereopods closely granulate *T. granuloides*, new combination
- Lateral margin uniformly rounded; anterior margin of pereopodal meri, carpi and propodi prominently spinose *T. mesjatzevi*, new combination
3. Front prominently produced, postorbital region concave; hepatic region ridged; first male pleopod distally looped *T. pilus*, new combination
- Frontal lobes squat, postorbital region not concave; hepatic region lacking ridge; first male pleopod distally bent at right angle 4
4. Carapace and chelipeds finely granulate; apical process of first male pleopod sigmoid, tip not upcurved *T. septimus*, new species
- Carapace and chelipeds prominently

granulate; apical process of first male pleopod not sigmoid, tip upcurved

. *T. trituberculatus*, new combination

Urashima, new genus

Diagnosis.—Carapace subrhomboidal, globose. Front narrow, bilobed. Eyes small, retractible. Outer orbital margin trisutured, V-shaped gap proximally on ventral margin. Antennules obliquely folded, basal antennular segment squat, operculiform, sealing bottom half of antennular aperture. Antennae small, slender, basal antennal segment inserted in orbital hiatus. Postorbital region concave. Hepatic, branchial regions demarcated by grooves, 2 pairs of pits along cardiobranchial grooves. Intestinal region swollen, demarcated by grooves. Posterior margin of carapace narrow, bilobate.

Third maxilliped exopod slightly shorter than endopod, not quite sealing efferent branchial channel; endopod of adult female medially with vertical line of setae; merus of endopod subtriangular, shorter than subrectangular ischium. Anterior margin of efferent branchial channel produced, bilobed, separated by narrow groove from lower orbital margin.

Chelipeds subequal. Cheliped merus subcylindrical; fingers laterally compressed, as long as upper margin of palm, inner margins denticulate. Pereopods slender, prominently granulate, short; all but last dactyl as long as propodi; upper surface setose, tips corneous.

Fourth thoracic sternite swollen laterally. Abdominal sulcus of male deep, elongate, nearly reaching buccal cavity, anterior margin raised. Abdominal segments 3–6 of male fused, basio-lateral regions inflated, fused segment narrowing distally, bearing denticle at distal margin; lateral margin carinate, carina fitting into groove at suture between sternites 4 and 5. Telson slender, nearly half as long as fused segment, not reaching tip of abdominal sulcus. Abdominal segments 4–6 of female fused, shield-like; margin of abdominal cavity promi-

ment, rampart-like. Telson ogival, basal margin sinuous.

Male first pleopod elongate, stocky, distally flattened; second pleopod short, recurved, distally attenuate.

Type species.—*Randallia pustuloides* Sakai, 1961.

Species.—*Urashima lamellidentatus* (Wood-Mason, 1892), *Urashima pustuloides* (Sakai, 1961).

Etymology.—*Urashima*, according to Japanese legend, was a handsome fisherman who married a mermaid and dwelt with her undersea. The name *Urashima* is to be considered as an arbitrary combination of letters, and heretofore takes the gender masculine.

Remarks.—*Urashima*, new genus, differs from the other genera discussed herein in the laterally compressed cheliped fingers, the granulate pereopodal carpi and propodi, and the oar-shaped first male pleopod.

Urashima lamellidentatus (Wood-Mason, 1892), new combination

Fig. 2E

Randallia lamellidentata Wood-Mason, 1892: pl. 5, figs 5, 5a, 5b.—Alcock, 1894:404; 1896:195; 1899:26.—Kemp & Sewell, 1912:29.—Ihle, 1918:312.—Serène, 1954:491; 1968:45.—Yaldwyn & Dawson, 1976:96.—Richer de Forges, 1983:634.

Type Material.—Holotype: Andaman Is. 11°3.40'N, 92°46.40'E, ♂ juv. cl 11.9 mm (NHM 1896.9.8.7 ex. Indian Museum).

Redescription.—Dorsal surface of carapace unevenly tuberculate, tubercles more pronounced laterally, posteriorly. Frontal lobes squat, rounded, minutely granulate. Anterior margin of efferent branchial channel deeply sutured (Fig. 2E). Third maxilliped unevenly granulate, endopod merus with median rise proximally.

Subhepatic margin of carapace with lamellate crest, followed by pearliform granule. Branchial margin of carapace with 2 lamellate crests separated by granulate den-

ticle. Posterolateral margin set with pearliform granules. Posterior margin laterally with lamellate rounded denticles. Intestinal region inflated, bearing posteriorly small, upcurved conical tubercle.

Cheliped stout, prominently granulate; merus two-thirds as long as carapace, granules larger, pearliform distally. Upper margin of palm prominently crested, fingers laterally compressed; upper, lower margins carinate. Pereiopodal carpi and propodi bearing rows of conical granules on upper margin, as well as merus of last pereopods.

Thoracic sternites granulate. Fused abdominal segments in male lacking horizontal ridge, distal tubercle spur-like, prominent. Margins of abdominal sulcus in female lamellate, prominent. First male pleopod stout, sinuous, distally flattened, oar-like.

Color.—“[W]hite, with a pinkish blush” (Alcock 1894:404).

Distribution.—Indian Ocean: Andamans, Maldives; 340–640 m.

Remarks.—*Urashima lamellidentatus* differs from *U. pustuloides* in bearing lamellate crests on the anterolateral margins of the carapace, and lamellate rounded denticles laterally on the posterior margin of the carapace.

Urashima pustuloides (Sakai, 1961), new combination

Figs. 2F, 5G, H

Randallia pustuloides Sakai, 1961:135, pl. 3, fig. 4; 1976:99, 100, pl. 30, fig. 1, text-fig. 54.—Yaldwyn & Dawson, 1976:96.—Richer de Forges, 1983:634 (tab.).—Chen, 1989:219, fig. 16.—Tan, 1996:1054.—Takeda, 1997:238.—Ikeda, 1998:83, pl. 20, figs 1a, b, 2, 3a–b.—Ng et al., 2001:10.

Type Material.—Paratypes: Japan. Shikoku I., Mimase, Tosa Bay, coll. K. Sakai, ♂ 34.3 mm, 2 ovig. ♀ 38.0, 38.9 mm (NHM 1961.6.5.46–48).

Material examined.—Japan. Shikoku I., Mimase, Tosa Bay, coll. K. Sakai, ♀ 37.6

mm (SMF). ♂ 35.3 mm (SMF). ♂ 35.6 mm, ♀ 38.4 mm (SMF). ♂ 36.7 mm (SMF). ♂ 37.2 mm, ♀ 37.6 mm (SMF 7700). Dec 1961:2 ♂ 26.7, 36.3 mm (SMF). 250 m, Apr 1968, ♂ 37.1 mm, ovig. ♀ 38.6 mm (SMF 15103). Off Ashizuri, 366 m, 24 Nov 1958, 2 ♀ 36.7, 37.7 mm, ♀ broken (SMF).

Taiwan. I-Lan county, 1998, coll. T.Y. Chan, ♂ 32.8 mm (MNHN B26326). Tongkuang, 25 Feb 1995, 300 m, coll. T.Y. Chan, 2 ♂ 33.3, 33.6 mm, 2 ♀ 26.0, 25.9 mm (NTOU). Tashi, 5 Mar 1997, 200 m, coll. T.Y. Chan, ♀ 18.3 mm (NTOU).

Philippines. Btw Negros, Siquijor, R/V *Albatross* Stn 5538, 9°08.15'N, 123°23.20'E, 468 m, 19 Aug 1909, id. C.G.S. Tan, ♀ 38.3 mm (USNM). MUSORSTOM 2, Stn CP 20, 14°00'N, 120°18'E, 185–192 m, ♂ 25.9 mm (MNHN B18081).

Indonesia. KARUBAR, Tanimbar I., Stn CP69, 356–368 m, 8°42'S, 131°53'E, 2 Nov 1991, 2 ♂ 37.4, 38.2 mm, 3 ♀ 25.0–31.6 mm (MNHN). Stn CP 77, 352–346 m, 8°57'S, 131°27'E, 3 Nov 1991, 3 ♂ 25.3–27.2 mm, ♀ 38.9 mm (MNHN).

Australia. 18°05'S, 118°08'E, 440–442 m, 22 Aug 1983, ♀ 37.9 mm (WAM c14731). 14°51'S, 121°35'E, 300 m, 3 Aug 1989, ♂ 37.0 mm (WAM 577-92).

Redescription.—Dorsal surface of carapace unevenly tuberculate, larger, pustule-like tubercles on branchial region. Frontal lobes squat, rounded, minutely granulate. Anterior margin of efferent branchial channel deeply sutured (Fig. 2F). Third maxilliped unevenly granulate, merus with median ridge proximally.

Subhepatic margin of carapace inflated, median tubercle followed by 1 or 2 smaller, pearliform granules. Lateral margin of carapace medially with 3 flattened, triangular, upcurved denticles, decreasing in size posteriorly. Posterolateral margin set with pearliform tubercles. Posterior margin with lateral triangular denticles, closely set with pearliform tubercles. Intestinal region inflated, bearing posteriorly small, upcurved conical tubercle.

Cheliped prominently granulate; granules larger, pearliform distally; merus three-quarters as long as carapace. Fingers laterally compressed; upper, lower margins carinate. Pereiopodal meri distally granulate on upper margin, fifth merus bearing conical granules on posterior surface.

Thoracic sternites with low granulation. Fused abdominal segment in male lacking horizontal ridge, distal tubercle spur-like, prominent. Margins of abdominal sulcus in female lamellate, prominent. First male pleopod stout, sinuous, distally oar-shaped (Figs. 5G, H).

Distribution.—Pacific Ocean: Japan, Taiwan, Philippines, Indonesia, Australia; 85–468 m.

Remarks.—Sakai (1961), and Chen (1989) considered *Urashima pustuloides* related to *Tanaoa pustulosus*. However, *U. pustuloides* in addition to the characters cited by Chen (1989), and Takeda (1997), is easily distinguished from *T. pustulosus* in having laterally compressed, rather than rounded, cheliped fingers; granulate, rather than smooth pereiopodal carpi and propodi; and oar-shaped, rather than bearing preapical process on the first male pleopod.

Key to Species of *Urashima*, new genus

1. Anterolateral margins of carapace bearing lamellate crests; posterior margin of carapace with lamellate denticles; upper margin of cheliped palm prominently crested
 *U. lamellidentata*, new combination
- Anterolateral margins of carapace lacking lamellate crests; posterior margin of carapace with triangular denticles; cheliped palm subcylindrical
 *U. pustuloides*, new combination

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