

REDESCRIPTION OF *LEPTOSPHAEROMA GOTTSCH EI*
HILGENDORF (ISOPODA, SPHAEROMATIDAE),
WITH SOME BIOLOGICAL NOTES ¹⁾

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With Text-figures 1-26

At a meeting of an academic club held in Berlin on December 15, 1885, the occurrence of a peculiar platybranchiate sphaeromatid in southern Japan was reported by Franz Martin Hilgendorf, former professor of natural history at the Tokyo College of Medicine (1873-1876) and curator at the Zoological Museum of Berlin at that time (1876-1904). The peculiarly formed isopod, collected by Hilgendorf's compatriotic geologist Carl Christian Gottsche at Mogi southeast of Nagasaki, Kyushu, during his stay in Japan (1881-1884), was introduced to science under the name *Leptosphaeroma Gottschei*, representing a new genus and a new species. The report was later printed in a paper (Hilgendorf 1885), but it was short and without any figures.

Twenty years later, the eminent Danish carcinologist H. J. Hansen touched on this species in his famous paper on the classification of the Sphaeromatidae (Hansen 1905), according to his own observations on the type specimens borrowed from the Berlin Museum. Again, however, his description was very short and without figures. Ever since, no record has been made nor any detailed redescription has been tried on this interesting sphaeromatid.

Several years ago, Dr. Taiji Kikuchi of the Amakusa Marine Biological Laboratory, Kyushu University, kindly entrusted the writer with several isopod samples from the coasts of Amakusa Peninsula for identification. A preliminary observation revealed that a peculiar sphaeromatid species belonging to the platybranchiate group was included in the samples, but no further identification was possible at that time due to unavailability of relevant literature.

Recently, the writer was given an opportunity to study some isopod samples collected from Osaka Bay, central Japan, and deposited at the Osaka Museum of Natural History by the courtesy of Mr. Noboru Nunomura of the museum, and again noticed occurrences of the same sphaeromatid specimens in the samples from Kôbe.

1) Contributions from the Seto Marine Biological Laboratory, No. 619.

Contributions from the Amakusa Marine Biological Laboratory (Kyushu University), No. 237.

In the meantime, several occasions came on the writer to examine sphaeromatid samples from the interstitial environment on sandy beaches near the Seto Marine Biological Laboratory, Sirahama. Among the samples, specimens of a minute platybranchiate sphaeromatid species were observed rather frequently and sometimes even in considerable numbers, but they were again left unidentified because they were all juveniles and also because of lack of literature.

In 1975, the writer was favored with a good chance to stay at the Zoological Station in Naples, where he could find time to work on the specimens mentioned above, consulting an excellent literature available at the station. Closer examina-

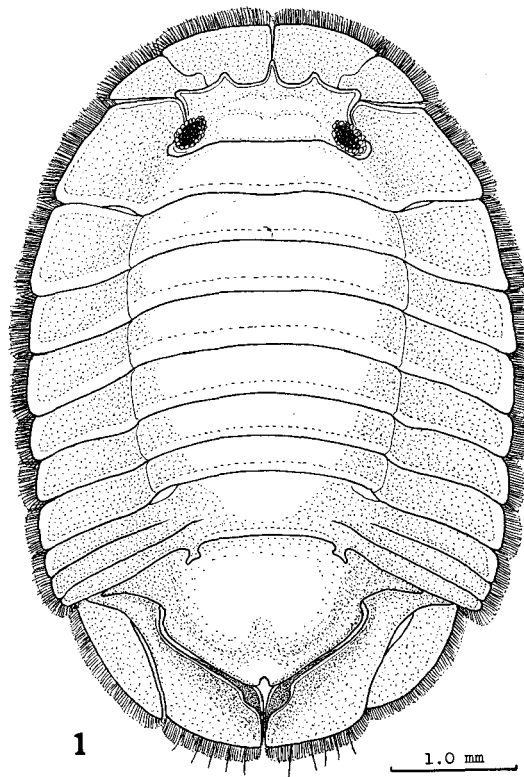


Fig. 1. *Leptosphaeroma gottschei* Hilgendorf, adult male, from Amakusa, Kyushu.

tions of the specimens and comparisons with literature have at last revealed that the adult specimens from Amakusa and Kôbe can be identified with *Leptosphaeroma gottschei* of Hilgendorf (1885), and that the juvenile specimens from the interstitial environment at Sirahama are in all probability referable to the young stages of the same species.

Recognizing that the original description of *Leptosphaeroma gottschei* was quite simple and inadequate and also that the present species is very unique among the sphaeromatid isopods from the view point of morphological adaptation, a detailed

redescription is intended herein together with some notes on the biological characteristics of this interesting species.

The writer is much obliged to Dr. T. Kikuchi and Mr. N. Nunomura, both referred to above, for their kindness to have allowed him to study the interesting material. He is also grateful to Prof. Taiji Imamura of the Ibaraki University and again to Mr. Nunomura for the donation of interstitial isopod samples. In the analysis and final identification of the specimens the writer owes much to the facilities of the Zoological Station of Naples, and his deep appreciation goes to the staff of the same station as well as those of the Japan Society for the Promotion of Science, Tokyo, through whose courtesy his stay at Naples was realized.

Leptosphaeroma gottschei Hilgendorf, 1885

(Jap. name: Hirata-umisemi, nov.)

Figs. 1-26

MATERIAL EXAMINED: 1) 2 ♂♂. Takino-chaya, Tarumi, Kôbe, Osaka Bay; under stones in the intertidal zone. Coll. Y. Shibata; Mar. 28, 1960. 2) 1 ♂ and 2 gravid ♀♀. Tsûji-jima, Amakusa, Kyushu; under stones at low-water level. Coll. T. Kikuchi; Mar. 9, 1966. 3) 17 juv. South coast of the campus of the Seto Marine Biological Laboratory (SMBL), Sirahama; interstitial space on sandy beach. Coll. T. Imamura; June 23, 1966. 4) 3 juv. North coast of the SMBL; interstitial space on sandy beach. Coll. N. Nunomura; July 12, 1972. 5) 8 juv. North coast of the SMBL; interstitial space at 50 cm water depth on sandy beach. Coll. N. Nunomura; Aug. 24, 1972.

DESCRIPTION: *Adults* — Both sexes similar, sexual dimorphism not pronounced except of size. Body (Fig. 1) elliptical in outline, exceedingly flattened, only slightly convex dorsally in the central region, surface finely granulated, and densely haired all along the margins. Two proximal peduncular segments of 1st antenna strongly expanded, forming a rounded broad rim in front of cephalon; inner margin of the expansion of one peduncle touches that of the opposite peduncle in the mesial line. Epimerae of pereonites 1-7 well developed, quadrangular in outline. Lateral parts of the anterior segment of abdomen also well developed. Pleotelson completely surrounded by very long inner rami of uropods, the margin thickened and recurved downwards but not shelved, the apex turned somewhat upwards, vaulted, with a longitudinal groove below, so that an aperture, visible from behind, is formed between the margin of pleotelson and uropodal inner rami; no tubercle nor special structure of any kind discernible on the dorsal surface of pleotelson.

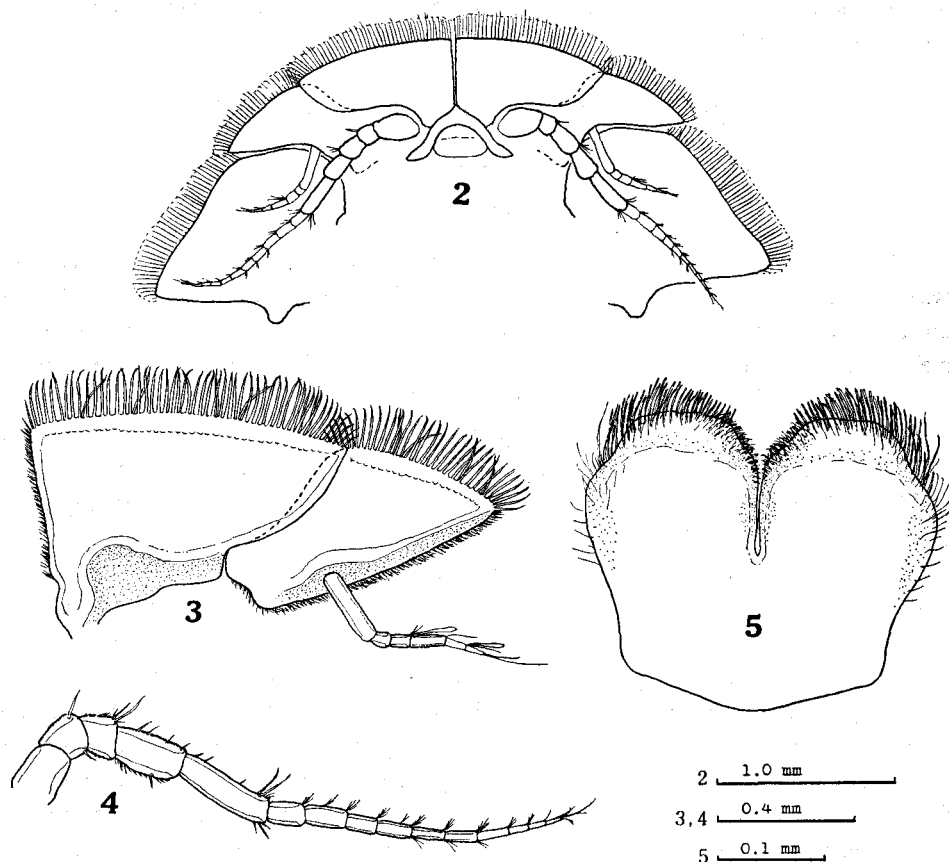
Cephalon rather small, with a rostral process and strongly sinuous frontal margins. Each eye with ca. 30-35 ocelli. First antenna (Figs. 2, 3) short, reaching the middle of 1st pereonite; flagellum with 5 segments, peduncle much deformed, proximal 2 segments thickened and strongly expanded with frontal margins fringed densely by hairs. Second antenna (Figs. 2, 4) exceeding the posterior margin of 1st pereonite; flagellum with 10 segments, as long as peduncle.

Epistome (Fig. 2) triangular, rapidly widening posteriorly and embracing the

basal half of upper lip which is semi-circular and wider than long.

Lower lip (Fig. 5) with expanded, roughly hexagonal lobes, distal margins densely haired.

Left mandible (Fig. 6), incisor with 3 teeth and 4 pectinate setules. Right mandible (Fig. 7), incisor with 4 teeth and 4 pectinate setules. Molar process oblique and expanded. Mandibular palp (Fig. 6) 3-segmented; proximal 2 seg-



Figs. 2-5. *Leptosphaeroma gottschei* Hilgendorf, adult male.

2. Ventral view of cephalon and 1st pereonite, showing antennae, epistome and upper lip in situ. 3. First antenna, ventral view. 4. Second antenna, ventral view. 5. Lower lip.

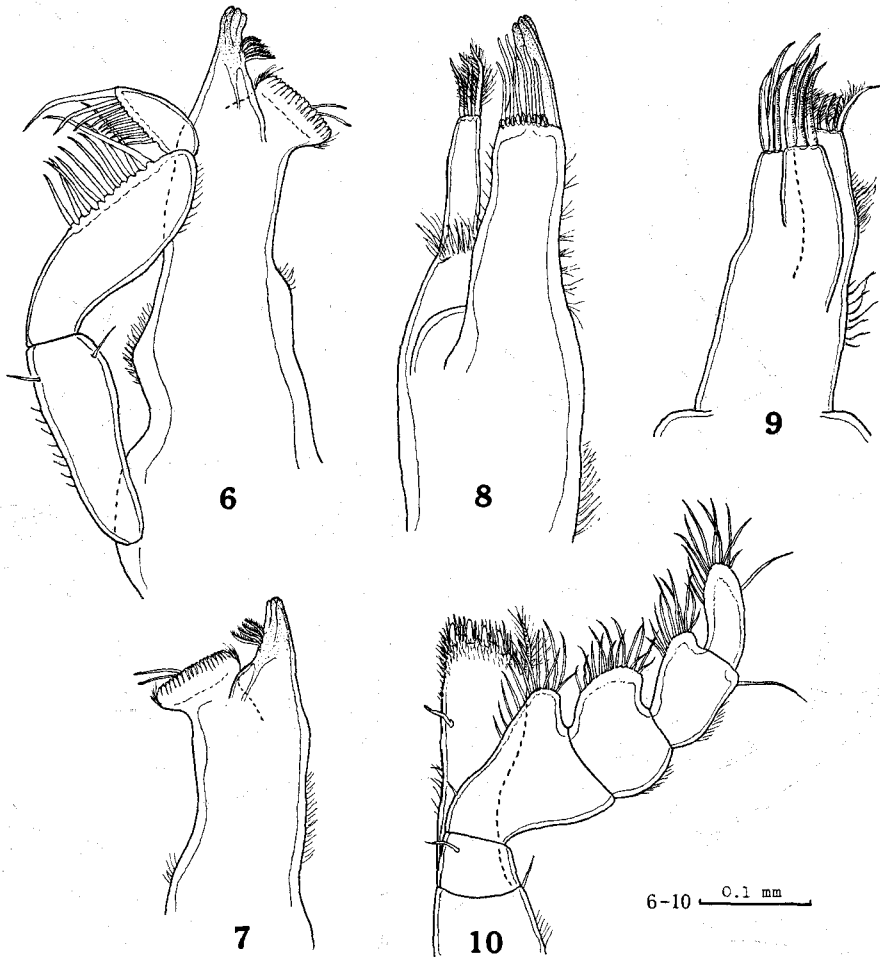
ments stout, subequal in length and each slightly more than twice of distal segment; distal 2 segments bear each 9-10 setae on outer margin.

First maxilla (Fig. 8), inner lobe with 3 hooked pectinate setules, outer lobe with 3 teeth and 5-6 spines.

Second maxilla (Fig. 9), inner lobe with 2 basally pectinate setules and 5-6 smaller pectinate setules between, both lappets of outer lobe each with 3 or 4 dentate spines.

Maxilliped (Fig. 10), palp 5-segmented, middle 3 segments provided each with an inner distal lobe; endite extending beyond the distal end of 3rd segment but not reaching that of 4th segment of palp.

First pereopod (Fig. 11) short and stout; propodus swollen, carpus very short and covered by merus which is strongly produced at outer distal corner. Second



Figs. 6-10. *Leptosphaeroma gottschei* Hilgendorf, adult male.

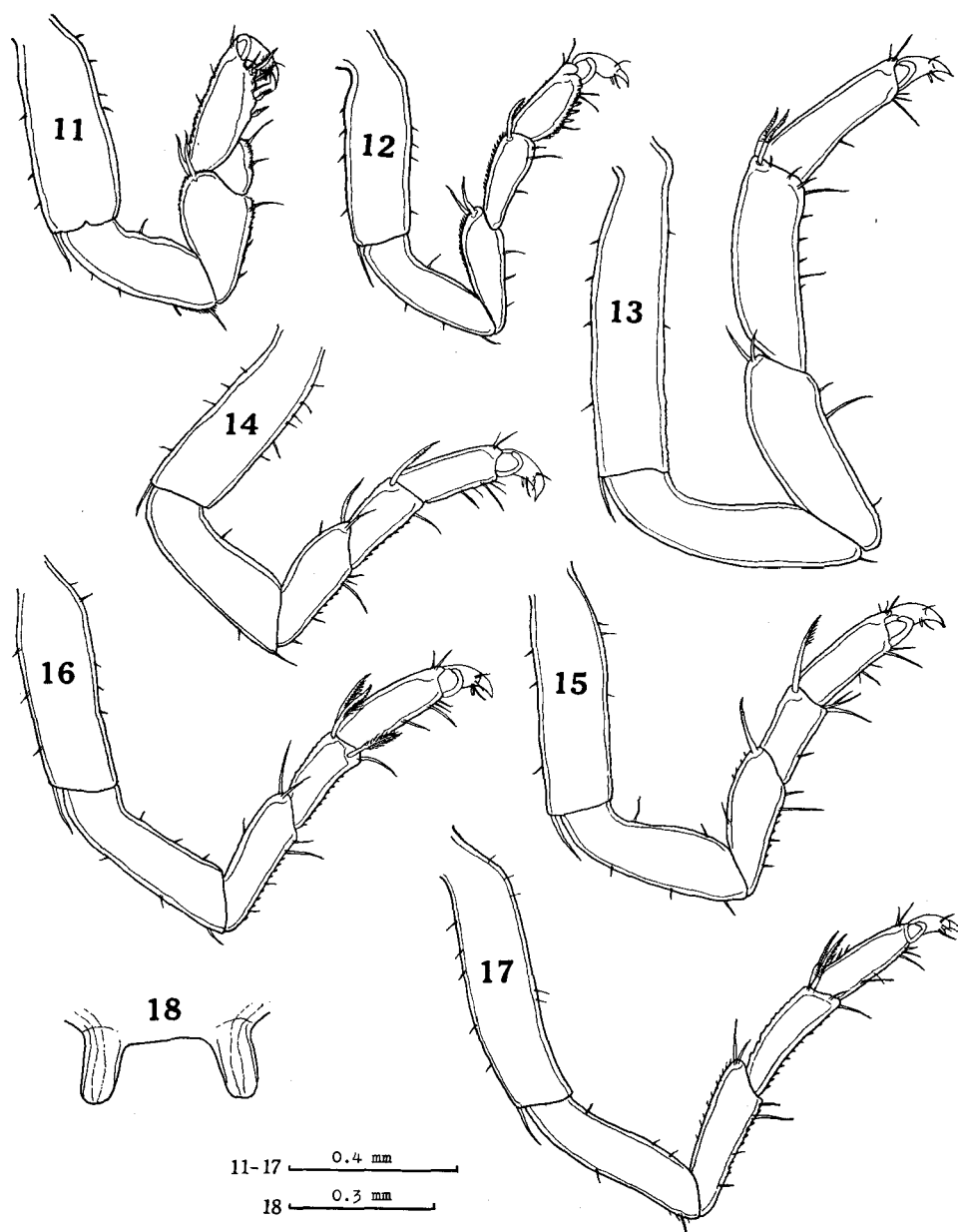
6. Left mandible, with mandibular palp. 7. Right mandible, distal part.
8. First maxilla, right. 9. Second maxilla, left. 10. Maxilliped, left.

pereopod (Fig. 12) slender; propodus less swollen and merus less produced than in 1st pereopod. Third to 7th pereopods (Figs. 13-17) all similar in structure; 3rd pereopod longest and most robust, while 7th pereopod most slender.

Penes (Fig. 18) short, bluntly tipped, and widely separated at base.

First pleopod (Fig. 19), endopod very narrow, 5 times as long as wide, with

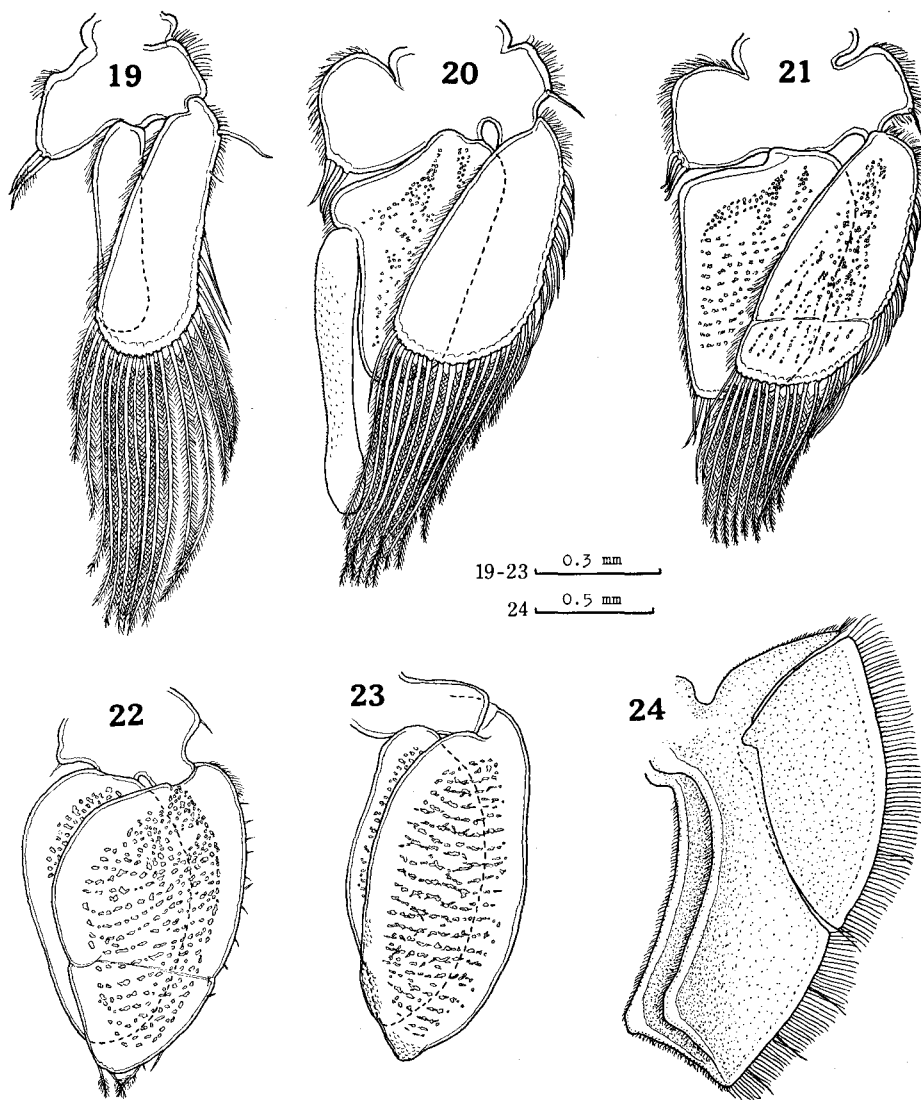
ca. 12 setae, exopod with ca. 20 setae. Second pleopod (Fig. 20), endopod with ca. 18 setae and exopod with ca. 30 setae. Male stylus broad, with a slightly expanded round tip, extending beyond the apex of endopod by a little less than 1/2



Figs. 11-18. *Leptosphaeroma gottschei* Hilgendorf, adult male.

11. First pereopod. 12. Second pereopod. 13. Third pereopod. 14. Fourth pereopod.
15. Fifth pereopod. 16. Sixth pereopod. 17. Seventh pereopod. 18. Penes.

of its own length. Third pleopod (Fig. 21), endopod with ca. 14 setae, exopod 2-segmented and with ca. 28 setae. Fourth pleopod (Fig. 22), both rami thin and without transverse folds, endopod without setae, exopod 2-segmented and with ca.



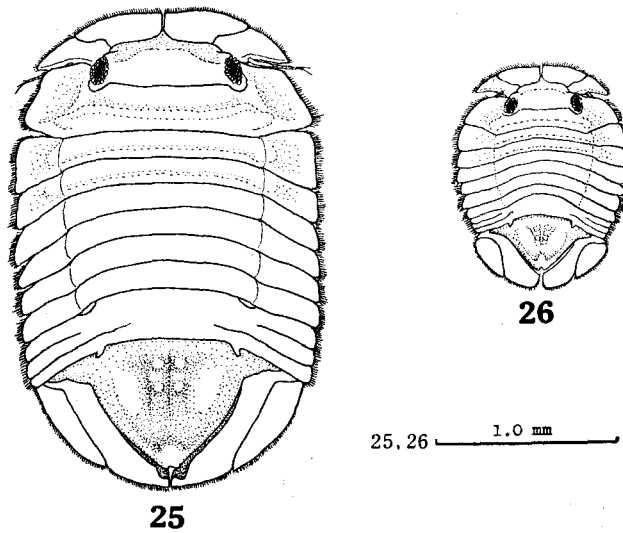
Figs. 19-24. *Leptosphaeroma gottschei* Hilgendorf, adult male.

19. First pleopod. 20. Second pleopod. 21. Third pleopod. 22. Fourth pleopod.
23. Fifth pleopod. 24. Uropod, ventral view.

4 weak setae at apex. Fifth pleopod (Fig. 23), both rami thin, without transverse folds and quite lacking setae, exopod with 3 squamiferous, weak protuberances on inner distal corner.

Uropods (Figs. 1, 24), inner ramus very long, thin along the outer margin but strongly thickened along the inner margin which is notched by a longitudinal groove between upper- and lower-sided ridges, with the inner distal corner on the upper side somewhat recurved, rami touching each other at the inner distal part and completely surrounding pleotelson; outer ramus short, lanceolately lamellate with pointed apex, and fitted into a shallowly gulfed proximal outer margin of inner ramus.

Juveniles — Somewhat different from adults in external shape. Juveniles around 2 mm in body length (Fig. 25) parallel-sided rather than elliptical in outline,



Figs. 25 & 26. *Leptosphaeroma gottschei* Hilgendorf, juveniles, from the interstitial environment at Sirahama.

25. Largest specimen, 2.3 mm BL. 26. Smallest specimen, 1.0 mm BL.

more convex dorsally; anterior 3 pereonites provided each with a transverse ridge on the dorsal surface, this is particularly prominent on 1st pereonite. Pleotelson with a pair of faint longitudinal ridges on the dorsal surface, each ridge consisting of a row of 2 tubercles, the apex turning upwards more prominently than in adults. Juveniles smaller than 2 mm in body length (Fig. 26) very flat, oval in outline and tapering posteriorly, widest on 4th pereonite rather than on 5th pereonite as in adults (*vide infra*); the transverse ridges on anterior 3 pereonites faintly discernible. The longitudinal ridges on the dorsal surface of pleotelson and the upward bending of pleotelsonic apex most prominently developed.

COLOR: Specimens preserved in alcohol are cream white with melanophores dispersed all over except of the central part of body. The melanophores are less numerous and relatively small in size in adults, while they are numerous and conspicuously large in juveniles. Eyes black both in adults and juveniles.

MEASUREMENTS (in mm):

		Total length	Body length	Body width
♂	{ Amakusa specimen A	5.8	5.0	3.9 (on 5th pereonite)
	{ Kôbe specimen A	5.5	4.8	3.3 (")
	{ Kôbe specimen B	5.2	4.6	3.6 (")
♀	{ Amakusa specimen B	3.7	3.4	2.7 (")
	{ Amakusa specimen C	3.6	3.2	2.6 (")

BIOLOGICAL NOTES: It is of much interest to note that, while adults of the present species were collected from under stones in the intertidal zone or at low-water mark, juveniles were found in the interstitial space on sandy beaches. To the writer's experience, juveniles of this species are by no means rare in the interstitial fauna, occasionally constituting one of its common elements, at Sirahama. The largest and smallest specimens ever observed in the interstitial space are respectively 2.3 mm and 1.0 mm in body length (Figs. 25, 26). Both of the two females collected from Amakusa were gravid; the number of eggs incubated were 18 in 3.4 mm-long (BL) specimen and 22 in 3.2 mm-long specimen. Eggs ovoid or elliptical, sometimes irregular in outline, measuring 0.25–0.33 mm × 0.35–0.45 mm. Most of individuals, adult or juvenile, were fixed folding the body, rather than rolling up into a ball, as usually in broad and flat sphaeromatids.

REMARKS: While provided with very peculiar morphological characteristics such as the strongly expanded peduncular segments in 1st antenna, the remarkable development and peculiarly thickened inner margin in uropodal endopods, etc., the present species otherwise shows a certain degree of similarity with some species of other sphaeromatid genera, for instance, *Gnorimosphaeroma* Menzies. It is especially noteworthy that juvenile *Leptosphaeroma* has transverse ridges on the anterior pereonites as well as two longitudinal ridges on the pleotelson; they remind of the similar structures found in the adults of *Gnorimosphaeroma salebrosum* Nishimura.

Although known only from four localities at present, the species may doubtless be distributed widely in southern Japan. The Island Tsûji-jima, Amakusa, one of the localities where adult specimens were collected for the present study, is quite near Mogi, the type locality of the species. Strangely enough, the writer has not yet succeeded, despite of intensive efforts, in finding any adult specimens of this species at Sirahama, though juveniles are rather commonly sampled from the interstitial environment as mentioned above.

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