MYSIDACEA FROM THE CENTRAL AND WESTERN PACIFIC V. GENERA *HETEROERYTHROPS, MEIERYTHORPS, PLEURERYTHROPS, GIBBERYTHROPS, ILLIGIELLA, DACTYLAMBLYOPS, PSEUDAMBLYOPS, PARAMBLYOPS, DACTYLERYTHROPS* AND *NAKAZAWAIA* (TRIBE ERYTHROPINI)

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With Text-figures 1–15 and 4 Tables

Genus *Heteroerythrops* O.S. Tattersall 1955

Characteristics of the genus

1. Antennal peduncle long and robust; outer distal angle of first segment not produced; articulation between second and third segments very oblique.

2. Antennal scale very small; no spinous process at distal end of naked part of outer margin of scale.

3. Mandibular palp large, with second segment very broadened.

4. Uropod long, with endopod nearly as long as exopod.

5. Telson very short and triangular, armed on apex with a pair of spines and one or two median plumose setae; lateral margin smooth.

Type species

Heteroerythrops purpura O.S. Tattersall 1955.

Remarks

The present genus is closely related with the genus *Katerythrops* in the general form, especially in the very small antennal scale and triangular telson. There are differences, however, between both genera as follows; 1) in the present genus the scale unarmed with a spinous process at the distal end of naked outer margin, while in *Katerythrops* armed with a remarkable spinous process; 2) telson short triangular, armed with a pair of spines and one or two plumose setae on narrow apex in the genus *Heteroerythrops*, while it is elongate triangular, armed with two pairs of spines on narrow apex.

The present genus is composed of 3 species, *H. purpura* from off Angra Pequena and *H. microps* and *H. tanseii* from Japan.

Key for the identification of the species in the genus *Heteroerythrops*

1. Antennal peduncle very long, twice as long as antennular peduncle. Merus of

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second thoracic endopod swollen, about 1 and 1/4 times as long as wide..... ..... *H. microps* Murano (Japan)

- Antennal peduncle equal to or slightly less than antennular peduncle in length. Merus of second thoracic endopod slender, more than 5 times as long as wide. 2

2. Eye wider than stalk. Antennal peduncle shorter than antennular peduncle. First thoracic endopod with carpo-propodus longer than width and setae on dactylus not forming a fan. .....*H. purpura* O.S. Tattersall (Off Angra Pequena, Japan)

- Eye as wide as stalk. Antennal peduncle as long as antennular peduncle. First thoracic endopod with carpo-propodus shorter than width and strong setae on dactylus forming a fan. .....*H. tanseii* Murano (Japan)

Heteroerythrops microps Murano 1966

Heteroerythrops microps Murano, 1966: 115–118.

Occurrence:
St. 84–2*, 1 adult female (8.0 mm).
(* Already reported by Murano, 1966.)
Remarks:

There are no records in addition to the type specimen. The type specimen was transferred under the control of the National Science Museum, Tokyo (NSMT-Cr. 7088).

Geographical distribution:

The species has been only recorded from Sagami Bay, Japan.

Vertical distribution:

The specimen was collected by an oblique haul from the depth of 740 m to the surface, therefore, the exact depth where the species is inhabiting is unknown.

Heteroerythrops purpura O.S. Tattersall 1955

(Fig. 1)

Heteroerythrops purpura O.S. Tattersall, 1952: 121–123.

Occurrence:
St. 161, 1 adult female (5.8 mm).
St. 169–3, 1 adult male (6.3 mm).
Remarks:

The present specimens differ from the type one collected from off the west of Angra Pequena in the following points; 1) in the type specimen posterior margin of carapace emarginate, leaving the last 2 thoracic segments exposed in dorsal view,

while in the present ones the posterior margin emarginate, but covering whole thoracic somites (Fig. 1a); 2) third segment of antennular peduncle as long as the first in the type specimen, while it longer than the first in the present ones (Fig. 1b); 3) antennal scale as long as antennal peduncle, armed with setae on whole length of inner margin and an distal 1/3 of outer margin in the type specimen, whereas the scale much shorter than antennal peduncle, armed with setae on distal 1/3 of inner margin and on distal 1/6 of outer margin (Fig. 1c); 4) first endopod of thoracic leg more slender in the type specimen (Fig. 1d); 5) third segment of mandibular palp more slender in the type specimen (Fig. 1e).

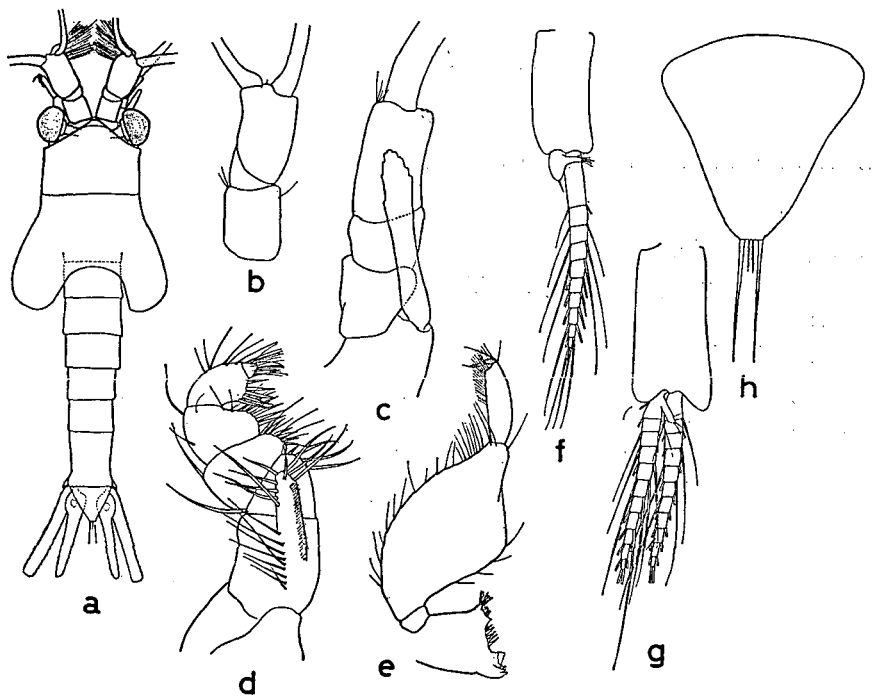

Fig. 1. *Heteroerythrops purpura* O.S. Tattersall; a, adult male in dorsal view, ×9; b, antennular peduncle of female, ×27; c, antenna, ×24; d, endopod of first thoracic leg, ×41; e, mandible, ×30; f, first pleopod of male, ×19; g, fourth pleopod of male, ×19; h, telson, ×41.

Although these differences, especially in the scale, are not so small, these must have resulted from geographical or intraspecific variation.

The male is recorded here for the first time. Pleopods of male are so developing to natatory organ that the distal end of the last pair is extending backwards beyond 2/3 of the exopod of uropod. The first pair of legs bear very small unjointed endopod and 10-segmented exopod (Fig. 1f). Exopod and endopod of the fourth pair are equal in length and segmented into 11 (Fig. 1g). Pseudobranchial process from endopod is small and slender.

Geographical distribution:

The type specimen, being single record until now, was collected from the Atlantic Ocean off Angra Pequena. The present occurrence from Suruga Bay, Japan, therefore, is very interesting and seems to suggest that the species is widely distributed in the world oceans.

Vertical distribution:

The type specimen was taken with a closing net by a vertical haul from 600-m depth to 500-m depth. The present male specimen was taken by the ORI-net with an opening-closing device from the layer between 420-m and 700-m depths. The species is a mesopelagic form.

Heteroerythrops tanseii Murano 1966

(Fig. 2)

Heteroerythrops tanseii Murano, 1966: 112–115.

Occurrence:

St. 67–7*, 1 adult female (6.7 mm).

(* Already reported by Murano, 1966.)

Remarks:

Re-examination was made for comparing this species with *H. purpura* collected from Suruga Bay, Japan. The original description of the first thoracic endopod must be revised as follows: endopod short and expanded; dactylus wider than long, spines on lateral margins arranging in a fan-shape with terminal nail which is not distinguish-

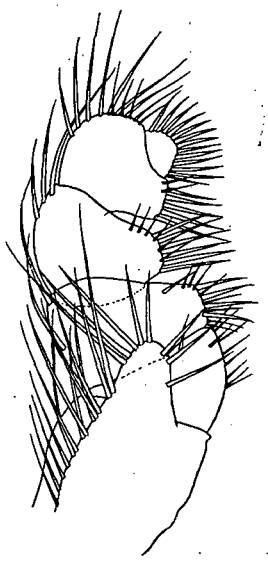

Fig. 2. *Heteroerythrops tanseii* Murano; endopod of first thoracic leg, ×57.

able at all from lateral spines; carpo-propodus wider than long, with inner margin inwardly expanded and armed with 5 or 6 strong setae; lobe from basis wide, as long as broad, continued backwards as a flat ridge fused with the segment and armed with about 13 long plumose setae along its outer ridge (Fig. 2).

The present species is closely allied to *H. purpura,* but is distinguished from the latter in the following points; 1) eye clearly wider than eyestalk in *H. purpura,* while as wide as stalk in *H. tanseii*; 2) carapace produced into a right-angled rostrum in *H. purpura,* while it produced into a much wider than right angle in *H. tanseii*; 3) antennular peduncle longer than antennal peduncle in *H. purpura,* while both are about same length in *H. tanseii*; 4) third segment of mandibular palp more sleuder in *H. purpura* than in *H. tanseii*; 5) first thoracic endopod in *H. tanseii* more robust, with dactylus armed with strong setae arranging a fan-shape.

Hitherto, the type specimen has been only recorded.

The type specimen was placed under the authoriy of the National Science Museum, Tokyo (NSMT-Cr. 7089).

Geographical distribution:

The species is only known from Suruga Bay, Japan.

Vertical distribution:

The specimen was collected by an oblique haul from the depth of 1300 m to the surface, so that the exact depth at which the species is living is unknown. In the original description in 1966 I mistaked on the collection data. The vertical range "0–1750 m" must be revised to "0–1300 m".

Meierythrops gen. nov.

Diagnosis

Carapace somewhat inflated, with anterior margin evenly rounded, leaving eye and antennular peduncle exposed in dorsal view. Eye normal, small, set apart, not depressed dorso-ventrally. Antennular peduncle with first segment not produced at outer distal corner; segmentation between second and third segments very oblique. Antennal scale small and slender; outer margin naked, terminating into a denticle. Mandibular palp with slender second segment. Maxillule with distal margin obliquely truncate. Pleopods of male well developed and natatory. Uropod long; exopod with truncate apex. Telson very short, triangular, armed with a pair of slender spines and one median plumose seta on narrow apex; lateral margin smooth.

Type species

Meierythrops pacifica gen. nov., sp. nov.

Remarks

The new genus closely resembles *Heteroerythrops* and *Katerythrops* but is distinguishable from the former in the small antennal scale with a denticle at the tip of naked outer margin and from the latter in the short triangular telson armed with a pair of spines and a plumose seta between them.

Meierythrops pacifica gen nov., sp. nov.

(Figs. 3 and 4)

Occurrence:

St. H10–10, 1 near-adult female (4.3 mm), 1 immature male (3.8 mm).

St. H10–15, 1 adult male (4.6 mm).

Description:

Body small, with cephalothorax somewhat inflated (Fig. 3b). Carapace with anterior margin broadly rounded, leaving eye and antennular peduncle completely exposed in dorsal view; posterior margin leaving last thoracic segment uncovered for deep emargination (Fig. 3a). Eye small, widely set apart; cornea globular, as wide as eyestalk (Fig. 3a and b). Antennular peduncle robust; first segment slightly longer than width; third segment obliquely jointed with the second, as long as preceding 2 segments combined (Fig. 3a). Antennal peduncle somewhat shorter than antennular peduncle (Fig. 3a). Antennal scale small and slender, as long as antennular peduncle, extending beyond distal margin of antennal peduncle by 1/7 of

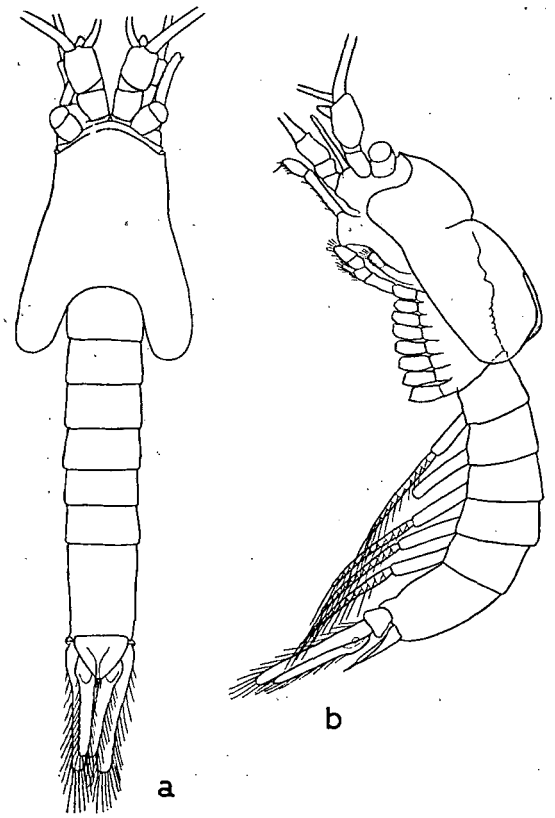

Fig. 3. *Meierythrops pacifica* gen. nov., sp. nov.; a, adult male in dorsal view, ×16; b, adult male in lateral view, ×16.

length of scale, 6 times as long as broad; external margin unarmed, concave, terminating into a small denticle; internal margin convex, setose except for basal 1/4; terminal lobe extending beyond terminal denticle of external margin; sympod not produced at outer distal corner (Fig. 4a). Mandibular palp allied to that of *Katerythrops* (Fig. 4b). Maxillule peculiar in shape; apex of third segment very obliquely truncate, armed with strong spines arranged scarsely (Fig. 4c). First thoracic endopod robust and short; carpo-propodus armed with 3 strong setae on distal half of inner margin; merus wider than long, armed with 3 strong setae on inner margin; lobe from basis rectangular, twice as long as broad, continued backwards as a flat ridge fused with the segment (Fig. 4e). Abdomen rather thick; anterior 5 segments subequal, sixth segment longer than sum of preceding 2 segments, 1.5 times as long as broad (Fig. 3a). Pleopods of male well developed and natatory (Fig. 3b); no legs with complete form in the present specimen of adult male. Uropod long; exopod 3 times as long as telson, with truncate apex; endopod somewhat shorter than exopod, no spines on inner margin of statocyst region (Fig. 4g). Telson very short, triangular, much shorter than width at base, less than half length of last abdominal segment; apex narrow, armed with a single median plumose seta and a pair of slender spines which are longer than 1/3 of length of telson; lateral margin slightly convex and unarmed (Fig. 4f).

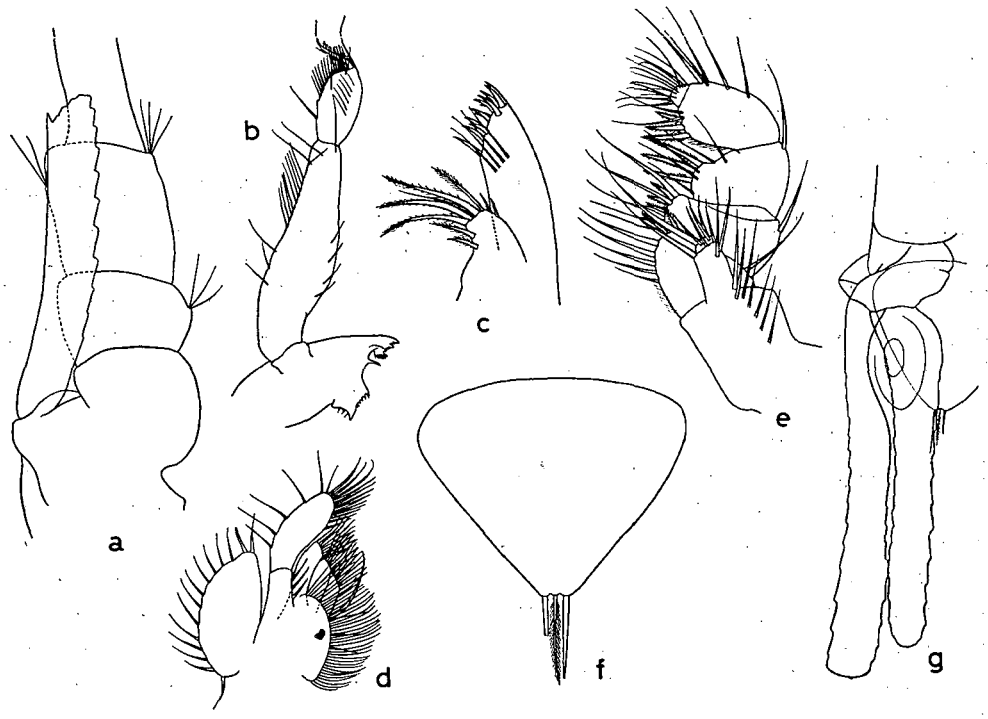

Fig. 4. *Meierythrops pacifica* gen. nov., sp. nov.; a, antenna, ×81; b, mandible, ×49; c, maxillule, ×99; d, maxilla, ×49; e, endopod of first thoracic leg, ×81, f, telson, ×70; g, uropod, ×49.

Type-series:

Holotype (NSMT-Cr. 7090), adult male of 4.6 mm from St. H10-16; allotype (NSMT-Cr. 7091), immature female of 4.3 mm from St. H10-10.

Remarks:

This species is very closely allied to *Katerythrops triangulata* reported from South India by Panampunnayil in 1977, but is barely distinguishable from the latter in the telson. In the Indian species there is no indication of any trace of plumose setae (Panampunnayil, personal communication).

The type specimens are stored in the National Science Museum, Tokyo.

Distribution:

The holotype was taken from the layer of 320 to 500 m deep and the others were from 340 to 500 m. The species is a mesopelagic form.

Genus *Pleurerythrops* Ii 1964

Characteristics of the genus

1. Antennal scale with large terminal lobe occupying 2/3 of scale at least.
2. Fifth pleopod of male with endopod longer than exopod and armed with modified setae.
3. Telson without lateral spines, armed with 2 pairs of spines and a pair of median plumose setae on narrow apex.
4. A constriction present between thorax and abdomen.

Type species

Pleurerythrops inscita Ii 1964

Remarks

The present genus is closely related with the genus *Amathimysis* Brattegard, but differs from the latter in the telson armed with a pair of apical median setae. From other genera of Erythropini this genus is easily distinguished in the character of the fifth pair of male pleopods furnished with modified setae. The antennal scale with large terminal lobe and the deep constriction between thorax and abdomen may be also mentioned as generic merits.

When the genus was established, Ii (1964) pointed out a small papilliform processes on the ventral median line of abdominal segments as a generic character. In *P. secunda*, however, it was not so noticeable and in female it was not found at all.

In 1977 Panampunnayil instituted the third species of the genus, *P. constricta*, for the acceptance of an adult female collected off the coast of Kerala, South India, and showed five morphological differences between the type species, *P. inscita*. Of which, a character, the absence of sternal processes in the female of *P. constricta*, is not useful as a base for the differentiation because it is common that these processes are not present in the female as shown in the most related species *P. secunda*. The number of spines on the inner margin of endopod of uropod mentioned as other one character seems to be variable as noted in "Remarks" of *P. secunda*. Now, differences between both species, *P. constricta* and *P. inscita*, are recognized in the

shape of carapace, the spinous process on antennal sympod and the constriction of telson, but it appears that these are not so distinct. Re-examination based on many specimens will be needed.

Three species are known. In the present collections one species, *P. secunda,* was obtained.

Key for the identification of the species in the genus *Pleurerythrops*

1. Inner pair of spines on apex of telson straight and slender; apical median setae on telson normal ..... *P. secunda* Murano (Japan)
- Inner pair of spines on apex of telson blade-shaped; apical median setae on telson very thick at base 2
2. Rostral plate obtusely rounded; outer distal angle of antennal sympod armed with one small spinous process; constriction absent on lateral margin of telson ..... *P. inscita* Ii (Singapore)
- Rostral plate broadly triangular; outer distal angle of antennal sympod armed with 2 spinous processes; distinct constriction present near base of lateral margin of telson..... *P. constricta* Panampunnayil (South India)

Pleurerythrops secunda Murano 1970

(Fig. 5)

Pleurerythrops secunda Murano, 1970a, 257–260.

Occurrence:

St. 391–1, 1 immature female (4.0 mm).
St. 391–2, 1 immature female (2.5 mm).
St. 392–5, 5 adult females (3.9 to 5.3 mm), 1 immature female (3.7 mm) and 4 immature males (less than 4.4 mm).
St. 440, 1 adult female, 1 adult and 2 immature males.
St. 492–1, 1 immature male (3.7 mm).
St. H33, 1 adult male (6.5 mm).
St. H35, 2 adult females (5.9 and 6.0 mm).
St. H36, 1 immature male (5.3 mm).
St. H42, 1 adult male (4.7 mm) and 1 immature male (4.4 mm).
St. H44, 1 adult female (4.3 mm) and 1 adult male (4.8 mm).
St. S1*, 22 females (up to 5.5 mm) and 11 males (up to 4.9 mm).
St. S2*, 1 female.
St. S3*, 1 female.
Specimen No. E-9, 1 adult female (3.9 mm); Aug. 6, 1975, Ariake, Nagasaki Prefecture, collected directly by diving from near-bottom at a depth of about 40 m.

Specimen No. E-11, 1 immature female (2.9 mm); Date unknown, Mouth of Omura Bay, Nagasaki Prefecture, collected by a net with sledge from near-bottom. (* Already reported by Murano, 1970a)

Remarks:

From the examination of specimens newly collected, it was found that there are some intraspecific variations in the antennal scale, uropod and telson. In a specimen collected from East China Sea (St. H35) the scale is more slender (3 times as long as broad) than those of the type specimens (about 2.5 times) and the spinous process terminating the naked outer margin is located at a little front from the middle of the total length of outer margin as in *P. inscita* (Fig. 5a). In regard to the uropod, this specimen also differs from the type specimens. It is more slender than in the type specimens and the endopod bears only 2 spines at statocyst region (Fig. 5c).

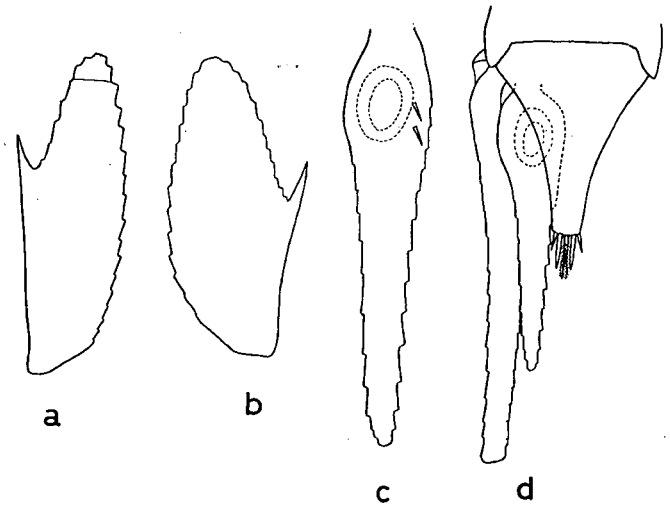

Fig. 5. *Pleurerythrops secunda* Murano; a, antennal scale of female from East China Sea, ×68; b, antennal scale of female from Arikake, ×68; c, endopod of uropod of female from East China Sea, ×68; d, telson and uropod of the same female, ×48.

In the examination on 12 individuals newly collected from East China Sea the external spine of the scale was found in a little front of the middle of the scale length for 5 individuals, in a little rear for 5 and at just middle for 2, and the number of spines on inner margin of the endopod of uropod was varied from 1 to 20. These variations showed no relation with the sampling area or the body size in adult.

With respect of the telson there were found some specimens that the distal margin is broader than those of the type specimens and apical 2 pairs of spines are somewhat shorter and thicker than those of the type specimens (Fig. 5d).

The present species very closely resembles *P. inscita*. With respect to the differences between both species, I mentioned four points, i.e. antennal scale, maxilla, uropod and telson in my previous report. Of these, as mentioned above, in the

ratio between breadth and length of the scale, the location of terminal spine of naked outer margin of the scale and the number of spines on inner margin of the endopod of uropod, the intraspecific variations were observed, so that these can not be adopted as the characters for the identification of the species. Now, the most available character is found in the apical armature of telson.

The type specimens are transferred under the control of the National Science Museum, Tokyo (Holotype NSMT-Cr. 7092; Allotype, NSMT-Cr. 7093; Paratypes, NSMT-Cr. 7094).

Geographical distribution:

Known from the southern area of Japan: near Amami Oshima Is.; East China Sea; Ariake, Nagasaki Prefecture and Suruga Bay.

Vertical distribution:

The present species has a considerable large vertical range. The shallowest record was from 28 to 35 m in Suruga Bay and the deepest one from 240 m in the same bay.

Genus *Gibberythrops* Illig 1930

Characteristics of the genus

1. Eye normal, not depressed dorso-ventrally.
2. Thorax without sternal processes between pairs of thoracic legs.
3. Telson elongate triangular, armed on narrow apex with a pair of long spines and a pair of plumose setae between them.
4. Lateral margin of telson with small spines on distal half of the margin, increasing length distally.
5. Pseudobranchial processes on endopods of male pleopods slender.

Type species

Gibberythrops acanthura (Illig) 1906

Remarks:

In 1930 *Gibberythrops* was created by Illig for the reception of already known species *Pareythrops acanthura,* which was named for the specimens from the Indian Ocean by himself in 1906. In 1936, Coifmann transferred this species from *Gibberythrops* to *Erythrops,* though the name *Gibberythrops* was retained as a subgenus name. In 1939, this species was again referred to *Gibberythrops* by Tattersall from the characters of thorax without sternal processes and difference in shapes of eye and telson, and at the same time, he added the second species *Gibberythrops brevisquamosa* to this genus. The second species was found by Illig in 1906 and was named *Erythrops brevisquamosa.* Later, this species was transferred to *Hypererythrops* by himself (1930), and was again put back to *Erythrops* as well as the first species by Coifmann in 1936. Historical change of the scientific name of 2 species is summarized as follows:

Illig, 1906	Illig, 1930	Coifmann, 1936
Parerythrops acanthura	*Gibberythrops acanthura*	*Erythrops* (*Gibberythrops*) *acanthura*
Erythrops brevisquamosa	*Hypererythrops brevisquamosa*	*Erythrops brevisquamosa*

Tattersall, 1939

Gibberythrops acanthura

Gibberythrops brevisquamosa

As shown above, Illig, who is an author for both species, thought that the differences between these 2 species were generic. I am also of the same opinion with him.

For the second species, it seems to be reasonable to refer to a new genus, *Illigiella,* because there is no appropriate genus to receive this in the known genera.

In 1969 the present author instituted a new genus new species *Eoerythrops typicus.* When he instituted the new genus, he hesitated to refer *E. typicus* to the genus *Gibberythrops* for the reason of the dissimilarity in the telson between *G. brevisquamosa. G. brevisquamosa* is transferred to a new genus *Illigiella,* as will be described later, so that the author proposes to cancel the genus *Eoerythrops* and to unite these 2 genera, *Gibberythrops* and *Eoerythrops.*

Now, this genus contains 3 species, *G. acanthura, G. typicus* and *G. stephensoni.*

Key for the identification of the species in the genus *Gibberythrops*

1. Apex of antennal scale extending far beyond spinous process terminating naked outer margin. Cornea as wide as eye stalk. Telson armed with 4 to 5 spines on distal 1/3 of lateral margin. .....*G. acanthura* (Illig) (India Ocean, Aden Bay)
- Apex of antennal scale not extending beyond spinous process. Cornea much wider than stalk. Telson with 12 to 15 spines on lateral margin. 2
2. Antennal scale nearly 5 times as long as broad; external margin nearly straight. Telson elongate-triangular, armed with spines on distal half of lateral margin. ..... *G. typicus* (Murano) (Japan)
- Antennal scale about 6 times as long as broad; external margin curved outwardly. Telson elongate-linguiform, armed with spines on distal 2/5 of lateral margin. ..... *G. stephensoni* (Tattersall) (Great Barrier Reef, SW Japan)

Gibberythrops typicus (Murano) 1969

Eoerythrops typicus Murano, 1969: 210–211; 1970b: 140–141; 1976: 20.

Occurrence:

St. 3–3*, 1 adult male (12.0 mm) and 1 near-adult female (9.6 mm).

St. 15*, 1 near-adult female (9.6 mm).

St. 221–5**, 1 adult male (10.7 mm).

St. 293–2**, 1 adult male (11.0 mm) and 1 immature female (8.2 mm).

St. 341, 1 immature male (12.2 mm), 3 immature females (10.4, 9.4, and 9.0 mm) and 1 young form (6.0 mm).

(* Already reported by Murano, 1969 and ** by Murano, 1970b)

Remarks:

As noted in the paragraph of the genus the telson of this species resembles that of *G. acanthura*, but in the eye and antennal scale they are considerably different.

Geographical distribution:

Only known from central Japan.

Vertical distribution:

The present species seems to be a benthic form living at depths of 100 to 400 m.

Gibberythrops stephensoni (Tattersall) 1936

Metamblyops stephensoni Tattersall, 1936: 152–153
Eoerythrops amamiensis Murano, 1976: 20–22.

Occurrence:

St. 440*, 10 adult males (5.5 to 6.1 mm) and 1 near-adult female (5.1 mm).
(* Already reported by Murano, 1976, as *Eoerythrops amamiensis*.)

Remarks:

In 1936, Tattersall collected somewhat damaged specimens from Great Barrier Reef and gave a scientific name *Metamblyops stephensoni* by reason of the telson without a pair of apical plumose setae. In 1976, Murano instituted *Eoerythrops amamiensis*, which has telson armed with a pair of plumose setae on apex. Both species are quitely the same except of one point, the presence or absence of apical plumose setae of the telson. Apical plumose setae of the latter species are growing on dorsal surface just behind the apex (see Murano, 1976, Fig. 25), so that if specimens are damaged to the setae, it is very difficult to find the scar. Tattersall has surely overlooked it by the observation on damaged specimens. It is unquestionable that *E. amamiensis* is a synonym of *M. stephensoni*, and the species must be transferred to the genus *Gibberythrops*.

Geographical distribution:

The species is known from Great Barrier Reef and Amami-Oshima Island, southwestern Japan.

Vertical distribution:

The specimens from Japan were collected from the sea-floor at a depth of 138 to 141 m with the bottom-net.

Genus *Illigiella* gen. nov.

Diagnosis

Body slender. Eye functionally normal, globular, not depressed dorso-ventrally. Thorax without sternal processes on ventral surface between pairs of thoracic legs. Pseudobranchial process from endopod of pleopod slender. Telson rather truncate, armed on distal margin with a pair of plumose setae and 2 pairs of spines, of which inner pair are very short; lateral margin armed on distal 1/3 with a few short spines gradually growing longer posteriorly.

Type species:

Illigiella brevisquamosa (Illig) 1906

Remarks:

As stated in the paragraph of the *Gibberythrops*, this new genus is instituted for the reception of the already known species under the name *Gibberythrops brevisquamosa*. The difference between *Gibberythrops* is found in the telson. In the new genus the distal end of the telson is rather truncate and armed with a pair of short spines besides long ones, while in *Gibberythrops* the distal end is narrow and without short spines.

In the shape of the telson the new genus is very closely allied to *Atlanterythrops*, but it is different from the latter bearing the antennal peduncle which the third joint is obliquely connected with the second. From *Erythrops* and *Hypererythrops* the new genus is easily distinguished by the absence of sternal processes and the shapes of eye and telson. This genus is composed of only one species.

Illigiella brevisquamosa (Illig) 1906

Erythrops brevisquamosa Illig, 1906; Coifmann, 1936: 34–35.
Hypererythrops brevisquamosa, Illig, 1930: 429–430.
Gibberythrops brevisquamosa, Tattersall, 1939: 245; Ii, 1964: 336–341; Murano, 1970b: 139–140.

Occurrence:

St. 3–3, 10 females and 14 males
St. 3–4, 1 female.
St. 3–7, 1 female and 1 male.
St. 3–9, 2 females and 4 males.
St. 6–1, 4 females and 1 male.
St. 6–6, 2 females and 3 males.
St. 6–7, 1 female.
St. 13, 2 females.
St. 15, 1 male.
St. 51, 1 female.
St. 54–3, 1 female and 1 male.
St. 55, 1 male.
St. 60–1, 7 females and 1 male.
St. 60–2, 1 male.
St. 60–3, 18 females and 2 males.
St. 84–2, 2 males.
St. 86–8b, 1 female.
St. 93–1, 1 female and 1 male.
St. 93–2, 1 female.
St. 103, 1 female.
St. 123, 1 male.
St. 126–1, 1 male.
St. 127–11, 1 female.
St. 127–15, 8 females.
St. 127–17, 2 females.
St. 127–19, 4 females and 1 male.
St. 128–5, 1 female and 1 male.
St. 130–1, 2 females and 3 males.
St. 152, 1 female and 5 males.
St. 154, 1 female.
St. 155, 3 females.
St. 208, 1 female.
St. 221–5, 1 female.
St. 293–3*, 1 male.
St. 310, 24 females and 15 males.
St. 383, 1 female.
St. 457, 1 female and 1 male.
St. 526, 3 females and 4 males.
St. 533, 4 males.
St. 557–1, 271 females and 272 males.

(* Already reported by Murano, 1970)

Body length:

Adult female and male up to 9.4 mm.

Remarks:

Comparison between the specimens from the Indian Ocean and Japan was enoughly made by Ii (1964). There are not any additional comments longer. This is one of the most common species in the layer of 200 to 600 m deep of Sagami and Suruga Bays.

Geographical distribution:

Before the records by Ii (1964) from Japan this species has only been known from the Indian Ocean and its adjacent seas. From Japan it has been recorded from Sagami Bay and Suruga Bay and just vicinity of both bays.

Vertical distribution:

This species was obtained from mid-layers of 255 to 315 m, 290 to 420 m and 515 to 585 m by the horizontal hauls of the ORI-net with an opening-closing device. While this was taken by the bottom-net from the sea-floor of 370 to 380 m, 370 to 430 m and 570 to 660 m and by the ORI-net accidentally touched the sea-floor of 280 m in an oblique haul, especially in the latter case 543 individuals were done for one haul. It may rather be a bottom-living species than to be a mesopelagic form in the mid-layer, and this is supported by the fact that the species has never been collected from off-shore areas while the species is common in Sagami and Suruga Bays.

The collection by an oblique haul from 104-m depth to the surface is the shallowest record in Japan.

Genus *Dactylamblyops* Holt and Tattersall 1906

Characteristics of the genus

1. Eye more or less imperfectly developed, not contiguous each other by a membranous integument; visual elements imperfectly formed.
2. Telson elongate linguiform or elongate triangular; lateral margin armed on distal half to distal 2/3 with numerous spines; apex generally without median plumose setae.
3. Antennal scale generally large and usual type in Erythropini.

Type species

Dactylamblyops hodgsoni Holt and Tattersall 1906

Remarks

This genus was instituted by Holt and Tattersall in 1906 for the reception of *D. hodgsoni* collected from the Antarctic Ocean. At that time they defined this genus as follows. "Eyes more or less pyriform in shape, not flattened, placed close together but not contiguous, bearing on the inner dorsal surface a short digitate process; visual elements imperfectly developed. Telson without median setae. Second thoracic limbs with the endopods well developed and considerably longer than the endopods of the first limbs". Now, however, characteristic of the genus is only found in the imperfectly developed eye being not contiguous each other, since the diagnosis was revised little by little owing to the addition of many species to this

genus. At present 13 valid species are known from the world oceans and seas, and these can be principally divided by the form of eye into 7 groups.

1. *hodgsoni*-group. Eye pyriform, not flattened, with a digitate process on inner dorsal surface; cornea imperfectly developed. Telson elongate linguiform or elongate triangular, armed with many spines on distal half of lateral margin and apex, without plumose setae or a tiny spine on apex. Composed of following 5 species; *D. hodgsoni* Holt and Tattersall, *D. fervida* Hansen, *D. latisquamosa* (Illig), *D. murrayi* Tattersall and *D. stenurus* Murano. Only these 5 species agree with the original diagnosis of the genus by Holt and Tattersall and must be referred as true members of the genus *Dactylamblyops*.

2. *sarsi*-group. Eye sharply pointed in front; cornea without facets at all. Telson linguiform, armed with many spines on distal half of lateral margin and apex, without apical plumose setae. Composed of only one species, *D. sarsi* (Ohlin). This species was originally described in 1901 as *Amblyops sarsi* by Ohlin, and was transferred to this genus by Holt and Tattersall in 1906 when the genus was established by them. As stated already by Ii(1964) the condition of eye of *D. sarsi* is considerably different from the type species of the genus, so that it seems that this species should be transferred to a genus other than *Dactylamblyops*.

3. *thaumatops*-group. In the membranous ledge around the outer part of eye, this differs from *hodgsoni*-group. Composed of 2 species, *D. thaumatops* Tattersall and *D. iii* Nouvel and Lagardère. For the character of very peculiar eye, it appears to be proper to establish a new genus for these 2 species.

4. *goniops*-group. Eye rectangular in shape, depressed dorso-ventrally; cornea without facets at all. Telson armed with a single tiny spine between long spines on apex. Composed of a single species, *D. goniops* Tattersall. The species should be also transferred to separate genus other than *Dactylamblyops* in the characteristics of eye and telson.

5. *tenella*-group. Eye depressed dorso-ventrally, with pointed apex; cornea without facets at all. Telson without plumose setae and tiny spine at apex. This group contains 2 species, *D. tenella* Birstein and Tchindonova and *D. pellucida* Birstein and Tchindonova.

6. *solivaga*-group. Eye elliptical, depressed dorso-ventrally; visual elements imperfectly developed. Telson triangular, armed with a pair of long spines and a single (or one pair) seta on apex and with 6 spines which become longer distally on lateral margin. Composed of one species, *D. solivaga* Birstein and Tchindonova.

7. *laticauda*-group. Eye large, set close together in proximal half; anterior half triangular, produced anteriorly with rounded apex. Terminal spine of naked outer margin of scale located at middle of scale. Telson rather truncate than linguiform, armed with a pair of plumose setae. Composed of only one species, *D. laticauda* Birstein and Tchindonova.

As stated above, I am of opinion that only *hodgsoni*-group is the true members of *Dactylamblyops* and the other 6 groups should be transferred to separate genus other than *Dactylamblyops*, because the species of the latter groups considerably differ from

those of *hodgsoni*-group in the characters of eye, telson and scale. I must, however, remain the species belonging to these 6 groups in the genus *Dactylamblyops*, because their exact systematic positions have not become clear yet. In this collections 4 species were represented.

Key for the identification of the species in the genus *Dactylamblyops*

1. Eye with membranous ledge around outer part of eye.....(*thaumatops*-group)... 2
- Eye without membranous ledge around outer part of eye 3
2. Membranous ledge running equatorially.....*D. thaumatops* Tattersall (Ireland, Bay of Biscay)
- Membranous ledge running in lower part.....*D. iii* Nouvel and Lagardère (Central Japan)
3. Telson armed with a single or a pair of plumose setae on apex. 4
- Telson unarmed with any of plumose setae on apex. 5
4. Spinous process terminating naked outer margin of antennal scale located at distal part of scale; telson elongate triangular, armed with about 6 spines on lateral margin and with a pair of spines and a single seta on narrow apex. ..... (*solivaga*-group)... .....*D. solivaga* Birstein and Tchindonova (Kurile)
- Spinous process terminating naked outer margin of antennal scale located at middle of scale length; telson truncate, armed with many spines on lateral margin and with 5 pairs of spines and a pair of plumose setae on distal margin .... (*laticauda*-group)... ..... *D. laticauda* Birstein and Tchindonova (Kurile)
5. Eye pyriform; cornea more or less developed imperfectly..... .....(hodgsoni-group) ... 6
- Eye triangular or rectangular in shape in dorsal view; cornea considerably reduced. 10
6. Rostrum triangular with acutely pointed apex.....*D. latisquamosa* (Illig) (Equatorial Indian Ocean)
- Rostrum evenly rounded or triangular with rounded apex..... 7
7. Rostrum evenly rounded. .....*D. hodgsoni* Holt and Tattersall (Antarctic)
- Rostrum triangular with rounded apex. 8
8. Scale short, not extending beyond distal margin of third segment of antennular peduncle..... *D. fervida* Hansen (Indonesia)
- Scale long, extending beyond distal margin of third segment of antennular peduncle. 9
9. Ocular papilla long and slender, extending beyond distal margin of eye; distal 1/3 of antennal scale extends beyond antennular peduncle; telson elongate

linguiform. ..... *D. murrayi* Tattersall
(Arabian Sea and Japan)

- Ocular papilla short and thick, never extends to distal margin of eye; distal half of antennal scale reaching beyond antennular peduncle; telson elongate triangular. ..... *D. stenurus* Murano
(Japan)

10. Eye rectangular in dorsal view, set close together; telson armed with a median short spine. ..... (*goniops*-group)...
..... *D. goniops* Tattersall
(Ireland and Faroes)

- Eye triangular or rhombic in dorsal view, set apart; telson unarmed with a single short spine on apex. 11

11. Rostrum angled, with upturned edge; eye with prominent papilla.....
..... (*sarsi*-group)...
..... *D. sarsi* (Ohlin)

- Rostrum rounded, without upturned edge; eye without prominent papilla.
..... (tenella-group)

12. Telson elongate triagular, more than 2.5 times as long as broad.....
..... *D. pellucida* Birstein and Tchindonova
(Japan)

- Telson linguiform, less than 2.5 times as long as broad. .....
..... *D. tenella* Birstein and Tchindonova
(Japan)

Dactylamblyops iii Nouvel and Lagardère 1976

(Figs. 6 and 7)

Dactylamblyops thaumatops, Ii, 1964: 284–288.
Dactylamblyops iii Nouvel and Lagardère, 1976: 1292.

Occurrence:

St. 6–5, 5 females and 1 male.
St. 53, 1 female.
St. 54–2, 1 female.
St. 54–5, 1 female.
St. 60–2, 4 females.
St. 66–6, 1 male.
St. 67–4, 1 young form.
St. 67–7, 7 females and 1 male.
St. 93–2, 6 females and 1 male.
St. 104–6, 2 females, 2 males and 2 young forms.
St. 123, 4 females and 2 young forms.
St. 126–2, 1 female and 1 male.
St. 128–5, 5 females and 1 male.
St. 139, 1 male.
St. 151, 5 females and 2 males.
St. 152, 12 females and 4 males.
St. 154, 6 females and 10 males.
St. 155, 5 females and 2 males.
St. 160, 1 male.
St. 169–4, 1 male.
St. 184–5, 1 female and 1 male.
St. 206, 2 females.
St. 310, 26 females and 7 males.
St. 344, 1 male.

St. 363–7, 1 female and 2 males. St. 363–12, 1 female.
St. 526, 3 females and 2 males. St. 533, 4 females and 2 males.
Specimen No. E-3, 3 females and 2 males; June 2, 1971; 34°55.0′N, 138°38.5′E; ORI-net, 2000 m wire paid out oblique tow.
Specimen No. E-4, 1 female and 1 male; May 14, 1977; 35°01.3′N, 139°22.8′E; ORI-net, 2000 m wire paid out oblique tow.
Body length:
Adult female 9.6 to 12 mm, adult male 9.2 to 10.6 mm.
Remarks:

This species was established by Nouvel and Lagardère in 1976 for the reception of specimens, collected from Japan, which have been already identified by Ii (1964) with *D. thaumatops* named by Tattersall (1907) for the specimens obtained from southwest of Ireland and Faroes. Ii indicated the differences between the specimens from both localities as follows; 1) the colour of pigment of eye, 2) the number of spines on the telson and 3) the proportional length of the thoracic limbs, antennal scale and telson. He thought, however, that these differences are quite insignificant when compared with the complete agreement between them in other important points. As the basis of the institution of the new species, Nouvel and Lagardère

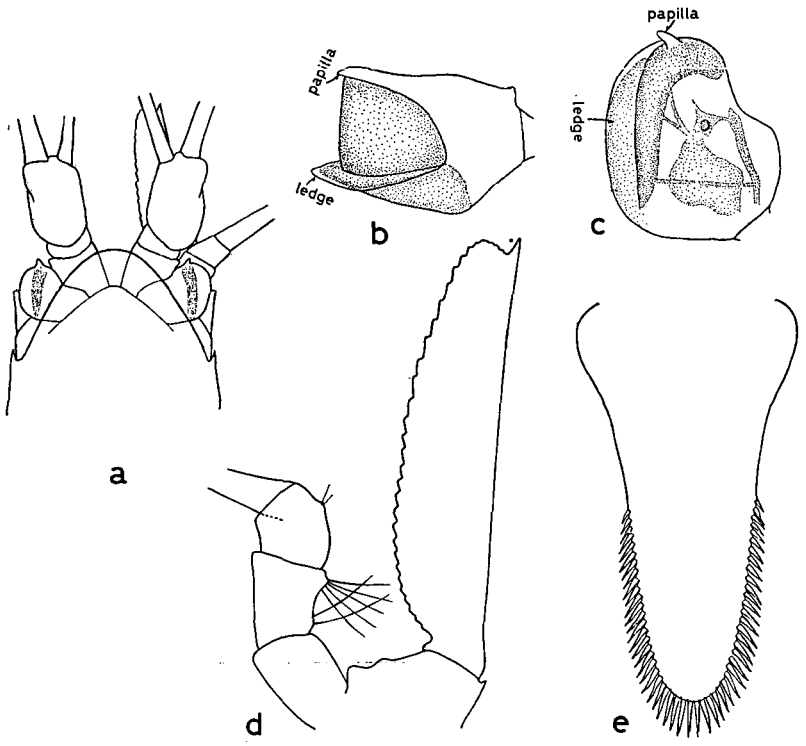

Fig. 6. *Dactylamblyops iii* Nouvel and Lagardère; a, anterior end of adult female, ×15; b, eye in lateral view, ×40; c, eye in dorsal view, ×40; d, antenna, ×90; e, telson, ×23.

mentioned the differences in the following respects besides those pointed out by Ii, 1) the shape of rostral plate, 2) the number of setae on the maxillule, 3) the number of spines on the telson and 4) the shape and length of the eye.

I can also indicate the differences between both species as follows; 1) rostral plate somewhat narrowly rounded in *D. thaumatops* than in *D. iii* (Fig. 6a), 2) antero-lateral corner of carapace evenly rounded in *D. thaumatops,* while projected in *D. iii* in dorasl view (Fig. 6a), 3) in *D. thaumatops* eye pyriform in lateral view, with membranous ledge running equatorially around outer part, bearing papilla on inner upper surface near eyestalk, whereas in *D. iii* eye rectangular in lateral view, with membranous ledge running on lowest part (Fig. 6b), bearing papilla at apex of eye (Fig. 6c), 4) sympod of antenna without spinous process at outer distal corner in *D. thaumatops,* while with a small spinous process at outer distal corner in *D. iii* (Fig. 6d), 5) antennal scale with terminal spine of outer margin which extends well beyond apex in *D. thaumatops,* while terminal spine extends slightly beyond apex of scale in *D. iii* (Fig. 6d).

Geographical distribution:

The present species is only known from Sagami Bay and Suruga Bay, Japan. In both bays it is commonly collected from deeper layers.

Vertical distribution:

The collections by the ORI-net with an opening-closing device show that the species is a mesopelagic form inhabiting in the layers from 350 to 1200 m deep (Fig. 7). I cannot judge that whether the occurrence from 70 to 130 m at night is an exact record or some mistakes involved through collecting or subsequent treatment.

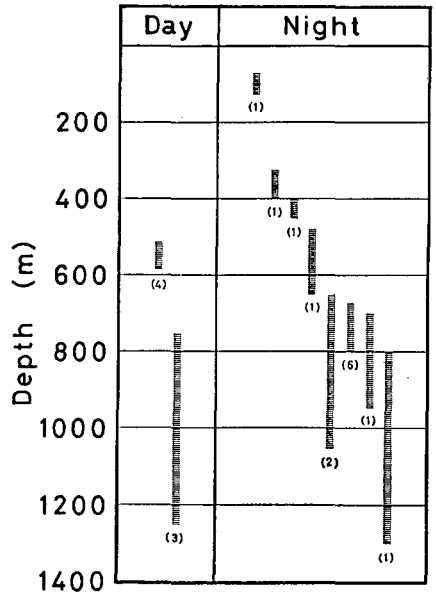

Fig. 7. Vertical distribution of *Dactylamblyops iii* Nouvel and Lagardère. The numerals in parentheses show the number of specimens collected.

Dactylamblyops murrayi Tattersall 1939

(Fig. 8)

Dactylamblyops murrayi Tattersall, 1939: 235–237; Ii, 1964: 289–293.

Occurrence:

St. 6–5, 1 female.
St. 104–6, 2 females.
St. 108, 1 female and 3 males.
St. 123, 1 female and 1 male.
St. 137, 1 male.
St. 138, 1 female and 1 male.
St. 139, 1 female and 1 male.
St. 154, 1 female and 1 male.
St. 176–4, 1 male.
St. 176–6, 1 female and 1 male.
St. 182, 1 female.
St. 202, 2 females and 1 male.
St. 206, 1 female.
St. 212, 1 male.
St. 344, 2 males.
St. 442, 1 male.

Specimen No. E-5, 1 female; June 2, 1971; 34°55.0'N, 138°38.5'E; ORI-net, 2000 m wire paid out oblique tow.

Specimen No. E-6, 1 female; May 14, 1977; 35°01.3'N, 139°22.8'E; ORI-net, 2000 m wire paid out oblique tow.

Body length:

Adult female 12.0 to 12.7 mm, adult male 11.4 to 12.4 mm.

Remarks:

Ii (1964) collected a single adult female from Sagami Bay, Japan, and gave full

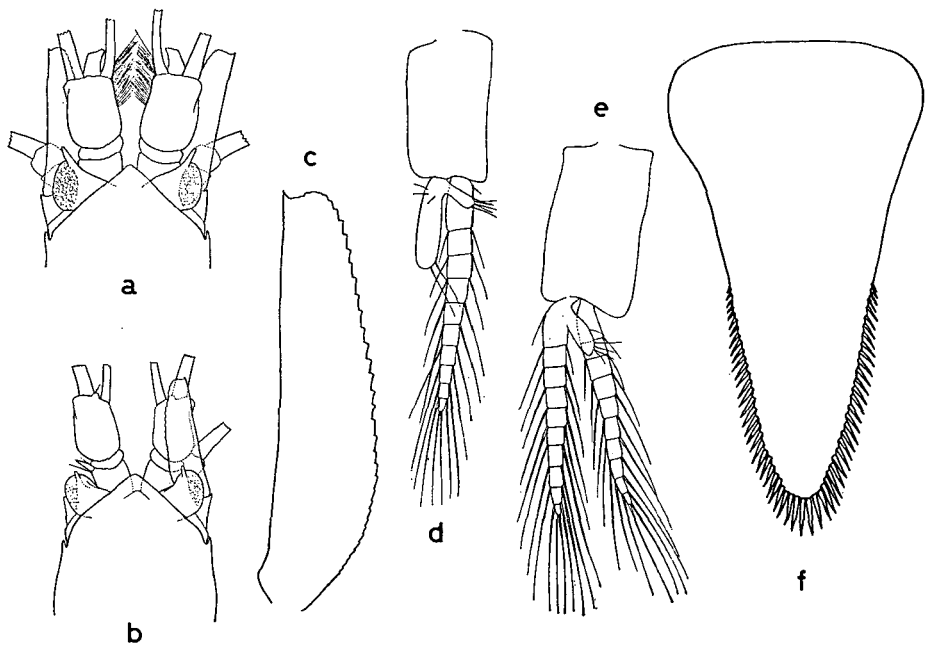

Fig. 8. *Dactylamblyops murrayi* Tattersall; a, anterior end of adult male, ×11; b, anterior end of adult female, ×11; c, antennal scale, ×60; d, first pleopod of male, ×22; e, fourth pleopod of male, ×22; f, telson, ×37.

description on his specimen except of the antennal scale broken at the tip. The scale of the present specimens shows following characteristics; about 4 times as long as broad and extending beyond antennular peduncle for distal 1/4 to 1/5 of scale, external margin nearly straight, terminating into a rather small spinous process which is on the same level as apex of scale (Fig. 8c). These are partly different from those of the type specimen in which the scale is 5 times as long as broad and extending beyond antennular peduncle for nearly 1/3 of its length. Besides the antennal scale, the Japanese specimens differ from the Arabian ones in the shape of rostral plate and the number of spines on telson. On the difference in the length of ocular papilla pointed out by Ii (1964), it appears that there is the intraspecific variation.

Male of this species is recorded for the first time: antennular peduncle somewhat robust in male than in female (Fig. 8a and b), pleopods well developed, natatory and biramous, first pair with 10-segmented exopod and unsegmented endopod (Fig. 8d), in second to fifth pairs endopod and exopod 10-segmented, equal in length, without any modified setae (Fig. 8e).

Collection records show that a couple of animals were often collected in one haul. This fact may indicate a part of the behaviour of this species in the sea.

Geographical distribution:

Only known from the Arabian Sea and Sagami Bay and Suruga Bay, Japan.

Vertical distribution:

This species was collected by the ORI-net with an opening-closing device from the layers of 670–800 m in the daytime and from the layers of 550–1200 m at night. In oblique hauls the species was never obtained in collections when the net did not extend to the layers deeper than the depth of 480 m. The species is a mesopelagic form living in waters deeper than about 500 m.

Dactylambyops stenurus Murano 1969

Dactylamblyops stenurus Murano, 1969: 212–214.

Occurrence:

St. 76–2*, 1 adult female (ca. 20 mm).
St. 79*, 1 immature female (15 mm).
St. 104–2*, 1 female (cephalothorax only).
St. 107*, 1 immature female (12 mm); 2 immature males (11 and 12 mm).
St. 110*, 1 adult female (16 mm).
St. 116*, 1 immature female (10.6 mm).
St. 185*, 3 adult (one of them 13.1 mm) and 1 immature females; 4 adult (2 of them 14.0 and 15.6 mm) and 1 immature males.
St. 310, 1 young form.
St. 312, 1 adult male (16.9 mm).
(* Already reported by Murano, 1969.)

Remarks:

As discussed in my preceding paper (1969) the present species is distinguishable from other species of the genus in the eye with short and thick ocular process, in the antennal scale extending forward for half of its length beyond the antennular peduncle, and in the triangular telson with narrowly rounded apex.

The type specimens are transferred under the control of the National Science Museum, Tokyo (Holotype, NSMT-Cr. 7095; Paratypes, NSMT-Cr. 7096).

Geographical distribution:

Only known from Sagami Bay, Suruga Bay and their adjacent waters.

Vertical distribution:

The species was never collected by oblique hauls in which the net did not reach beyond a depth of 1000 m, so that it appears to be a bathypelagic form living in waters deeper than 1000 m.

Dactylamblyops pellucida Birstein and Tchindonova 1958

(Fig. 9)

Dactylamblyops pellucida Birstein and Tchindonova, 1958: 312–313.

Occurrence:

St. 67–7, 1 adult male (11.7 mm).

St. 154, 1 adult male (11.7 mm).

St. 454, 1 anterior half of body, sex unknown.

Specimen No. E-7, 1 adult male (11.5 mm); June 13, 1976; from 34°40.3′N, 138° 35.2′E to 34°38.2′N, 138°34.4′E; ORI-net, 0-1250 m oblique tow.

Remarks:

Morphological characters of the present specimens are as follows: carapace relatively long, as long as abdomen; posterior margin shallowly emarginate, covering major part of first abdominal somite in dorsal view; frontal margin produced anteriorly into a short triangular rostral plate (Fig. 9a). Third joint of antennular peduncle of male broader than preceding joint and longer than first and second joints combined (Fig. 9b). Antennal scale a little shorter than antennular peduncle, less than 4 times as long as broad; apex truncate, not extending to tip of terminal spine of naked outer margin being slightly convex (Fig. 9b and c). Ultimate abdominal somite long, twice as long as broad and 3 times as long as preceding one (Fig. 9a). Telson elongate triangular, somewhat longer than ultimate abdominal somite, 2 and 1/3 times as long as maximum breadth at base (Fig. 9g). Endopod of uropod extending beyond tip of apical spines on telson, unarmed or armed with a single spine at statocyst region (Fig. 9a and f). Pleopods of male well developed and natatory; first pair of legs with short and unjointed endopod and 8-segmented exopod; fourth pair of legs with 7-segmented endopod which is somewhat longer than exopod 8-segmented (Fig. 9d and e).

The present specimens are different from the type specimen in the following

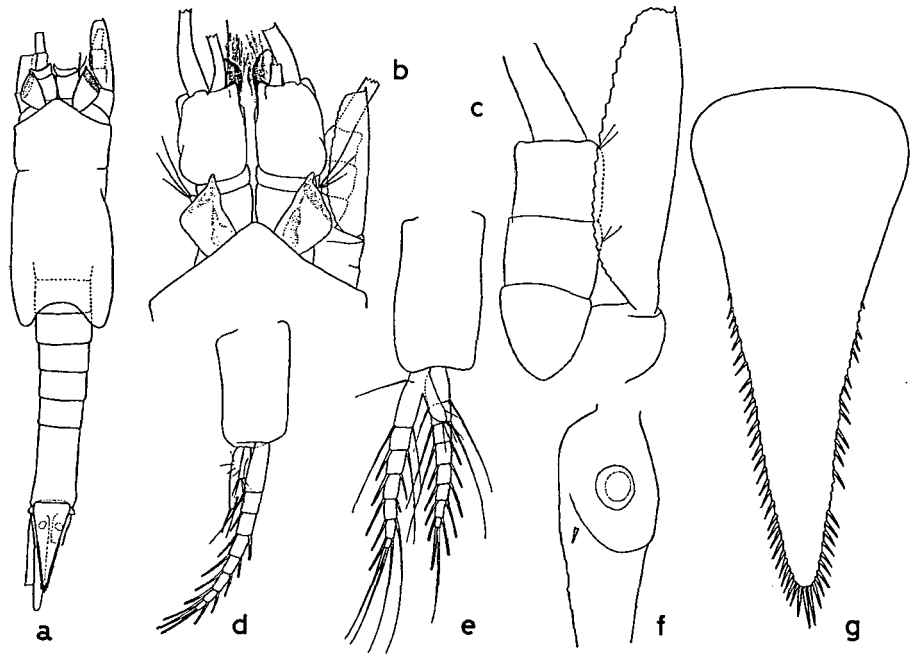

Fig. 9. *Dactylamblyops pellucida* Birstein and Tchindonova; a, adult male in dorsal view, ×7, b, anterior end of adult male, ×13; c, antenna, ×28; d, first pleopod of male, ×17, e, fourth pleopod of male, ×17; f, proximal half of endopodous uropod, ×31; g, telson, ×31.

respects; 1) in the type specimen antennal scale more than 4 times as long as broad, while in the present specimens less than 4 times; 2) in the type specimen telson more than 2.5 times as long as broad and armed with 25 spines on lateral margin, while in the present specimens 2 and 1/3 times as long as broad and armed with 32 spines; 3) in the type specimen endopod of uropod not extending beyond the tip of apical spines on telson, armed with 4 slender spines at statocyst region, while in the present specimens the endopod far extending beyond spines on telson, unarmed or armed with a single short spine on the statocyst region.

These differences do not seem to be specific and the shape of eye and the general feature of the telson show close similarity. Therefore, the present specimens are identified with this species.

Geographical distribution:

The type specimen was collected from the offing far south of Honshu Island, Japan. Out of the present 4 specimens, 3 were obtained from Sagami Bay and the other one from adjacent area of Amami Oshima Island, southwestern Japan. The species seems to be widely but rarely distributed in the neighbouring area of Japan.

Vertical distribution:

All the specimens were collected vertically or obliquely, so that we can not know the exact depth at which the species is living. However, the data in the present collections, although it is a few, show that the species is a bathypelagic form inhabiting in the layer at a depth of about 1000 m.

Pseudamblyops conicops Ii 1964

(Figs. 10 and 11)

Pseudamblyops conicops Ii, 1964: 275–279.

Occurrence:

St. 54–2, 2 females.
St. 66–6, 1 female and 1 male.
St. 67–6, 1 female.
St. 76–2, 2 males.
St. 84–3, 1 male.
St. 93–2, 7 females and 6 males.
St. 104–6, 1 female.
St. 107, 1 male.
St. 110, 1 female.
St. 126–2, 9 females.
St. 138, 1 female.
St. 152, 19 females and 5 males.
St. 155, 3 females and 1 male.
St. 159, 1 female.
St. 169–3, 2 females.
St. 177–4, 2 females.
St. 177–6, 1 female.
St. 183–5, 1 female.
St. 184–5, 4 females and 1 male.
St. 288, 1 male.
St. 328, 2 females and 4 males.
St. 363–6, 4 females.
St. 363–12, 1 female.
St. 457, 17 females and 4 males.
St. 533, 9 females and 1 male.
St. 589, 3 females and 4 males.
St. 60–2, 10 females and 5 males.
St. 67–4, 1 female and 2 males.
St. 67–7, 39 females and 18 males.
St. 80, 7 females and 2 males.
St. 93–1, 7 females and 1 male.
St. 104–2, 7 females.
St. 104–8, 3 females.
St. 108, 7 females and 4 males.
St. 123, 3 females.
St. 128–5, 9 females and 14 males.
St. 151, 14 females and 4 males.
St. 154, 33 females and 11 males.
St. 156–1, 1 male.
St. 160, 1 female.
St. 176–6, 7 females and 3 males.
St. 177–5, 3 females and 3 males.
St. 182, 12 females and 11 males.
St. 184–4, 1 female.
St. 185, 1 female.
St. 310, 87 females and 25 males.
St. 344, 19 females and 1 male.
St. 363–7, 69 females and 33 males.
St. 383, 11 females and 2 males.
St. 526, 53 females and 6 males.
St. 575, 1 female and 1 male.

Specimen No. E-10, 54 females and 19 males; June 2, 1971; Suruga Bay, 34°55.0′N, 138°38.5′E; 2000 m wire paid out oblique tow.

Body length:

Female up to 13.3 mm, male up to 12.6 mm.

Remarks:

The type specimens of Ii seem to be immature. The maximum size in the present collections was 13.3 mm in the female and 12.6 mm in the male, while all specimens examined by Ii were less than 10 mm. Differences probably caused from the developing state are found between the type specimens and the present ones in the eye, telson and pleopods of male. The eye shows sexual dimorphism; in the female it bears a minute papilliform process on the inner lateral surface near the

tip (Fig. 10f), and in the male the process is similar to that of the female in young immature (Fig. 10e), but it is so large that only a little smaller than the size of eye except the process in adult (Fig. 10c). With respect to the apical armature of telson, Ii found that there were 3 forms, one with a minute spine at the mid-line of apex, the second one with a single thin plumose seta, and the remaining one without both spinule and plumose seta. He thought that the presence of a single tiny spine is the most normal armature in this species. In the present specimens 4 forms were found.

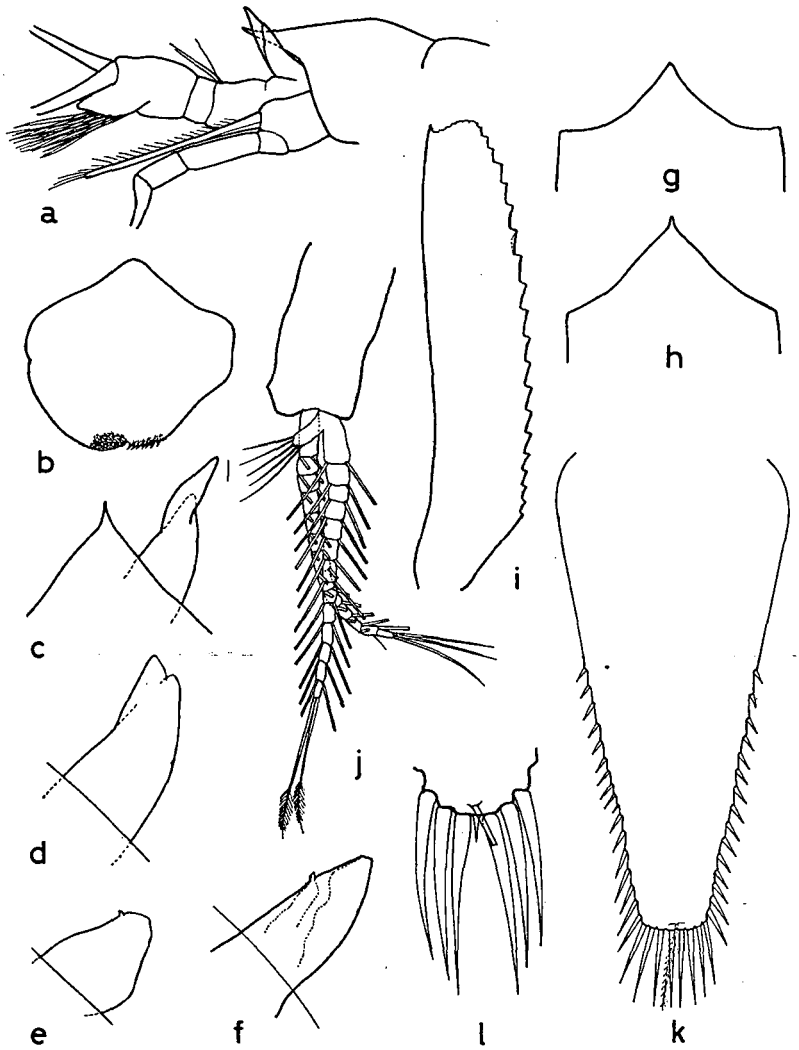

Fig. 10. *Pseudamblyops conicops* Ii; a, adult male in lateral view, ×20; b, labrum, ×46; c, rostrum and right eye in dorsal view in adult male, ×20; d, right eye in immature male of 8.5 mm, ×64; e, right eye in immature male of 8.5 mm, ×64; f, right eye in adult female, ×29; g and h, rostrum, ×20; i, antennal scale, ×46; j, fourth pleopod of male, ×26; k, telson, ×43; l, distal end of telson, ×123.

Table 1. Apical median armature of telson of *Pseudamblyops conicops* Ii.

Apical armature of telson	Seta		Both seta and tiny spine	Tiny spine		Nothing
Sex	Female	Male	Male	Female	Male	Female
Body length (mm)	11.2	12.0	9.7	6.0	8.4	6.0
		12.3	10.4	6.9	8.9	7.1
		12.4		8.4	8.9	10.1
		12.4		8.5	9.3	10.9
				8.6	9.4	11.7
				8.7		11.9
				9.1		12.2
				9.2		13.2
				9.3		
				9.6		
				9.8		
				11.2		

Besides 3 forms mentioned by Ii, there was one form which bears both spinule and seta (Fig. 101). The relation between the body size and the apical form of telson was examined and given in Table 1. As shown in this table the presences of plumose seta in adult and tiny spine in immature seem to be the normal forms. I could not judge whether the fourth form is of a stage just before adult or abnormal one. The absence of both spinule and seta has probably resulted from damage because the species is very fragile.

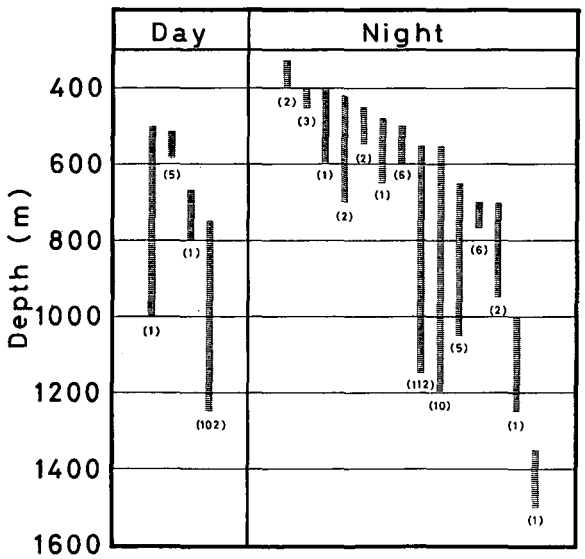

Fig. 11. Vertical distribution of *Pseudamblyops conicops* Ii. The numerals in parentheses show the number of specimens collected.

Fourth pleopod of male extends to the middle of telson. Endopod of its fourth pair is slightly longer than the exopod and terminates into 2 long and somewhat modified setae (Fig. 10j). Intraspecific variation was observed in the apex of rostrum (Fig. 10g and h). Generally, the tip is more acutely pointed than that of Ii's figure.

Genus *Paramblyops* Holt and Tattersall

Characteristics of the genus

1. Eye consisting of separate, flat plates without visual elements or pigment.
2. Antennal scale long, with terminal spine of outer margin extending beyond truncate apex.
3. Sternal processes present on second to eighth thoracic sterna in male and immature female.
4. Telson large, linguiform, with broad, truncate apex armed with 5 to 6 pairs of spines of varing size, with or without median setae; lateral margin with 12 to 23 short spines.

Type species

Paramblyops rostrata Holt and Tattersall 1905

Remarks:

By the imperfectly developed and plate-shaped eye the genus *Paramblyops* resembles *Ambtyops,* but differs from the latter in the eye set apart, the shape of eyeplate, the broad truncate telson, the projected rostral plate and the sternal processes in adult male and immature female. Five species including the present new species from Japan have been referred to this genus. One species, *P. japonica,* is represented in this collection.

Key for the identification of the species in the genus *Paramblyops*

1. Eye with anterior angles produced into 2 long processes. 2
- Eye without such 2 processes. 3
2. Carapace produced into a long acute rostrum. Telson armed with spines on whole length of lateral margin.....*P. bidigitata* Tattersall (SE of Ireland)
- Carapace produced into somewhat broadly rounded rostrum. Telson armed with spines on distal half of lateral margin. .....*P. japonica* sp. nov. (Japan)
3. Eye narrow, with pointed apex. Apex of rostrum clearly rounded. .....*P. globorostris* Birstein and Tchindonova (Kurile-Kamchatka Trench)
- Eye forming broad plate, antero-lateral angle produced into a strong point. Apex of rostrum acutely or bluntly pointed. 4
4. Anterior margin of carapace produced into blunt right-angled rostrum, not denticulated. Very strong spear-shaped process projecting forward between

antennules. .....*P. brevirostris* O.S. Tattersall
(Palmar Archipelago)

- Anterior margin of carapace produced forward into long pointed rostrum, finely and evenly denticulated. Spear-shaped process not present. .....
.....*P. rostrata* Holt and Tattersall
(NE Atlantic)

Paramblyops japonica sp. nov.

(Fig. 12)

Occurrence:

St. 118, 1 immature male (12.8 mm) and 1 immature female (10.5 mm).

Specimen No. E-8, 1 immature male (12.4 mm); Dec. 3, 1967; from 36°19.8'N, 141°40.0'E to 36°18.4'N, 141°41.0'E; collected from sea-floor at a depth of 1690 m by plankton net attached to mouth of beam trawl.

Description:

Carapace produced into short triangular rostrum with somewhat broadly rounded apex extending to distal margin of first joint of antennular peduncle; anterolateral corner rounded with shoulder in dorsal view (Fig. 12a); posterior margin emarginate, leaving last thoracic somite exposed in dorsal view. Eye set widely

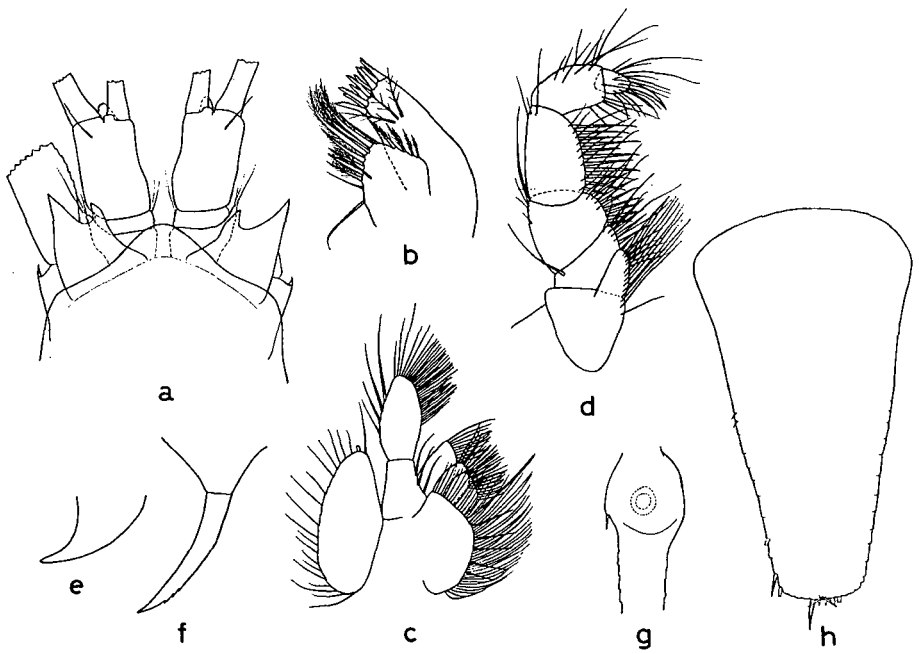

Fig. 12. *Paramblyops japonica* sp. nov., a, anterior end of immature male in dorsal view, ×46; b, maxillule, ×52; c, maxilla, ×35; d, first thoracic endopod, ×35; e, sternal process of second thoracic somite, ×78; f, sternal process of eighth thoracic somite, ×78; g, basal half of endopodous uropod, ×53; h, telson, ×59.

apart, without visual elements; anterior angles produced into 2 long acute processes, of which the outer is nearly twice as long as the inner and extending beyond distal margin of second joint of antennular peduncle (Fig. 12a). Antennular peduncle robust; first joint with outer distal corner produced into an acute process; second joint short, more than 3 times as wide as long; third joint longer than preceding 2 joints together, about 1 and 2/3 times as long as wide (Fig. 12a). Sternal process on each of second to eighth throacic somites prominent, forwardly directed, scythe-shaped and armed with spinules of less number than those of *P. bidigitata* (Figs. 12e and f). Telson trapezoid, slightly shorter than last abdominal segment, somewhat shorter than twice as long as wide at base; lateral margin nearly straight, with 12 to 13 spines on distal half, but most of these lateral spines are broken off in the present specimens so that it is impossible to describe the true length; distal margin convex, slightly wider than 1/3 of maximum width at base, armed with 6 pairs of spines, of which innermost pair are very short; second inner pair nearly 5 times as long as innermost pair; other apical spines broken off. A pair of apical plumose setae present (Fig. 12h). Uropod damaged in distal part; endopod armed with a single spine on inner margin at region of statocyst (Fig. 12g).

Type series:

Holotype, immature male of 12.8 mm (NSMT-Cr. 7097); allotype, immature female of 10.5 mm (NSMT-Cr. 7098), both from St. 118.

Remarks:

All the present specimens are immature and showing the poor condition for the damage in the shape of antennal scale and the armature of telson which are important taxonomical characters. However, the shapes of rostral plate, eye and telson clearly indicate the difference from 4 already known species of the genus.

This species is most closely allied to *P. bidigitata* in the shapes of eye and telson, but differs from the latter in the shape of rostrum and the armature of telson. In the present species the rostrum is produced into a short triangular process with broadly rounded apex, while in *P. bidigitata* it is acutely produced. The telson in this species is armed with spines on distal half of the lateral margin and with a pair of median short spines on the distal margin, whereas in *P. bidigitata* the telson is armed with spines on almost whole length of lateral margin and with a single median spine on distal margin.

By the 2 processes from the anterior angles of eye this species is easily distinguishable from other 3 species of this genus, *P. rostrata, P. brevirostris* and *P. globorostris*.

Genus *Dactylerythrops* Holt and Tattersall 1905

Characteristics of the genus

1. Eye with no definite eyestalk, connected medially by a membranous integument.
2. Visual elements perfectly or imperfectly reduced.
3. Telson subtriangular; lateral margin armed distally with a number of evenly spaced, progressively lengthening spines; apex narrowly truncate or rounded,

armed with spines, with or without median plumose setae.

Type species

Dactylerythrops dactylops Holt and Tattersall 1905

Remarks

The present genus is distinguishable in the form of eyes connected medially by a membranous integument from the related genera, *Amblyops*, *Paramblyops* and *Dactylamblyops*. Now, only 5 species are included in this genus, and these can be divided into 3 groups.

1) *dactylops*-group. Eye with visual elements imperfectly developed; antennular and antennal peduncles normal in strusture; telson with apical plumose setae. Consisted of 3 species, *D. dactylops D. bidigitata* and *D. dimorpha.*

2) *gracilura*-group. Eye without visual elements; antennular peduncle with third segment with a deep wavy groove running from side to side in dorsal view giving the appearance of a definite articulation; antennal peduncle with third segment in different plane from the second; telson without apical plumose setae. Consisted of only one species, *D. gracilura.*

3) *chrotops*-group. Eye without visual elements; antennular and antennal peduncles normal in structure; telson without apical plumose setae. Consisted of one species, *D. chrotops.*

Key for the identification of the species in the genus *Dactylerythrops*

1. Antennular peduncle with third segment with a deep wavy groove running from side to side in dorsal view. Antennal peduncle with third segment in a different plane from second one. .....*D. gracilura* Tattersall (W. of Ireland)
- Antennular and antennal peduncles normal in structure 2
2. Eye without visual elements. Telson without apical plumose setae. .... *D. chrotops* Murano (Central Japan)
- Eye with visual elements imperfectly developed. Telson with apical plumose setae. 3
3. Two finger-like processes on eye. Antennal scale more than twice as long as the peduncle, with apex not extending beyond terminal spine of outer margin. ..... *D. bidigitata* Tattersall (W. of Ireland)
- One finger-like process on eye. Antennal scale only somewhat longer than the peduncle, with apex extending beyond terminal spine of outer margin. 4
4. Antennal scale 3.5 times as long as broad, with terminal lobe as long as broad, 1/4 of scale in length (sex unknown).....*D. dactylops* Holt and Tattersall (W. and SW. of Ireland, Faroes)
- Antennal scale in female 2.5 times as long as broad, with terminal lobe broader than long, 1/4 of scale in length; in male 3.5 times as long as broad, with terminal

lobe broader than long, 1/6 of scale in length. .....
.....*D. dimorpha* Nouvel and Lagardère
(Bay of Biscay)

Dactylerythrops chrotops Murano 1969

(Fig. 13)

Dactylerythrops chrotops Murano, 1969: 214–217; 1970: 141.

Occurrence:
St. 60–1*, 1 adult male (10.6 mm).
St. 151*, 1 adult male (10.6 mm).
St. 293–2**, 31 immature females (less than 6.9 mm).
St. 293–3**, 10 immature females (less than 6.7 mm).
St. 533, 1 adult (10.0 mm) and 6 immature (8.9 to 10.1 mm) females; 1 adult (10.3 mm) and 3 immature (7.6 to 9.3 mm) males; 1 young form unknown sex.
(* Already reported by Murano, 1969, and **by Murano, 1970.)
Remarks:

Female is described here for the first time. There are some differences from the male as follows; carapace covering completely pseudorostral process immediately below carapace, major part of first joint of antennular peduncle and antennal sympod; antennular peduncle more robust in male than in female; both inner and outer margins of second joint swollen laterally and terminating into longer and thicker setae than in male; third joint armed with 6 or 7 long setae on distal half of inner margin (Fig. 13a); apex of telson, which was damaged in the type specimen, furnished with a pair of long and slender spines being about 2/9 of length of telson, without plumose setae (Fig. 13b).

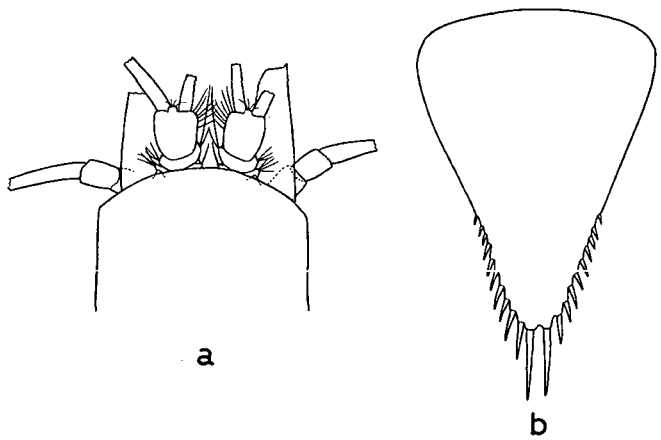

Fig. 13. *Dactylerythrops chrotops* Murano; a, anterior end of adult female, ×12; b, telson, ×38.

The type specimen is transferred under the control of the National Science Museum, Tokyo (NSMT-Cr. 7099).

Geographical distribution:

Only known from Sagami Bay and Suruga Bay, Japan.

Vertical distribution:

Two specimens from St. 60–1 and St. 151 were collected with the ORI-net by a horizontal tow at the layer from 515 to 585 m deep and by an oblique tow from the 810–m depth to the surface. In the other collections the specimens were obtained with the bottom-net from the sea-floor. The specimen may be a benthic form.

All the specimens from 2 stations, Sts. 293–2 and 293–3, which were towed at depths of 220 to 330 m and 370 to 430 m, respectively, were females less than 6.9 mm long. Whereas, 11 specimens from St. 533, which was towed at the depth of 570 to 660 m, ranged from 7.6 to 10.3 mm in body length. This may show that this species migrates to deeper layers as they grow larger.

Genus *Nakazawaia* gen. nov.

Diagnosis

Eye functionally normal, not depressed dorso-ventrally. Antennal peduncle with third segment in a different plane from second segment. Telson triangular with narrow truncate apex armed with a pair of long spines at corners and 2 or 3 spines between them; lateral margin armed with spines on whole length; apical plumose setae absent. Pleopods of male developed; endopod of fourth pair furnished with modified setae on penultimate and antepenultimate segments; second to fifth pleopods furnished with accessory lobes on pseudobranchial processes.

Type species

Nakazawaia japonica gen. nov., sp. nov.

Remarks

The present genus is easily distinguishable from other genera of Erythropini in the characteristics of the male pleopods, modified setae on endopod of fourth pair and accessory lobe on pseudobranchial processes of endopods of second to fifth pleopods. In Erythropini, there are some genera, such as *Parapseudomma, Australerythrops, Pseuderythrops, Pteromysis* and *Holmesiella,* bearing the fourth pleopod armed with modified setae. Among them, the present genus is allied to *Pteromysis* or *Holmesiella* in the oblique connection between second and third segments of the antennal peduncle. In the latter 2 genera, however, the modified seta occurs at ultimate segment.

It seems that the species armed with the accessory lobe on pseudobranchial process is only found in *Synerythrops intermedia.* In many respects, of course, the present genus is different from that species.

The genus is named in honour of Mr. K. Nakazawa, who was the first eminent taxonomist of mysids in Japan.

Nakazawaia japonica gen. nov., sp. nov.

(Figs. 14 and 15)

Occurrence:

St. 440, 1 adult female; 3 adult (5.3 and 5.8 mm) and 3 immature (5.6 and 4.8 mm) males.

St. 636, 2 adult females (5.8 and 6.3 mm).

St. H36. 16 adult (5.3 to 6.3 mm) and 4 immature females; 6 immature males (up to 6.6 mm).

St. H41, 1 immature female (4.4 mm).

St. H42, 1 adult female (6.4 mm) and 1 adult male (5.7 mm).

Description:

Body somewhat robust (Fig. 14a). Carapace produced anteriorly into broadly rounded rostral plate, leaving antennular peduncle uncovered in male, covering basal part of antennular peduncle in female; anterolateral corner produced in dorsal view; posterior margin emarginate, leaving last thoracic somite exposed (Fig. 14a, b and c). Eye developed, set part, a little longer than width, not depressed dorsoventrally; cornea occupied more than half of eye, clearly wider than stalk (Fig. 14b and c). Antennular peduncle robust in male, first segment a little wider than long,

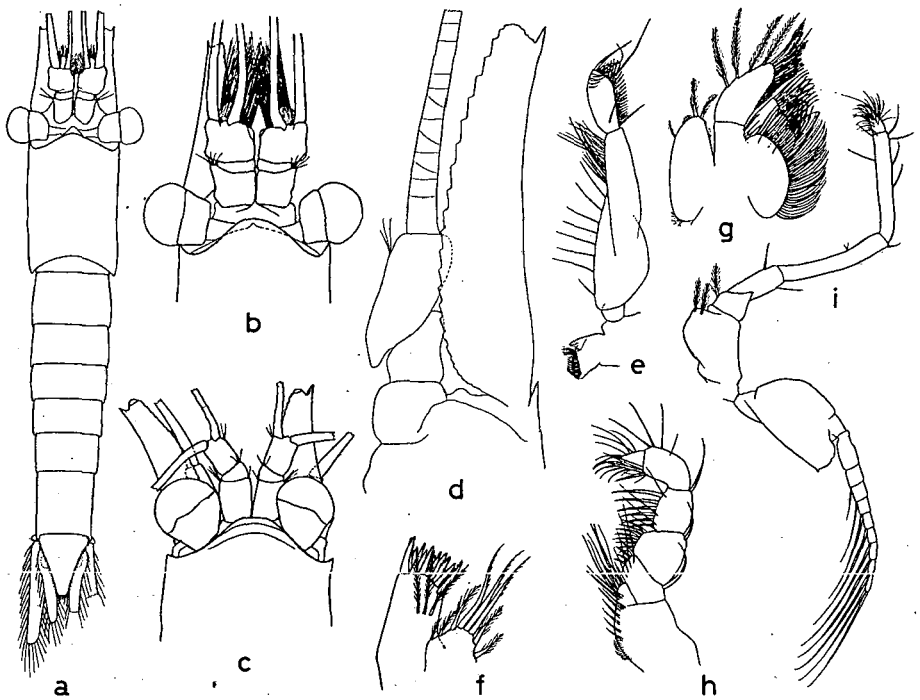

Fig. 14. *Nakazawaia japonica* gen. vov., sp. nov.; a, adult male in dorsal view, ×11; b, anterior end of adult male, ×21; c, anterior end of adult female, ×21; d, antenna, ×29; e, mandible, ×29; f, maxillule, ×170; g, maxilla, ×29; h, endopod of first thoracic leg ×52; i, second thoracic leg, ×35.

with outer distal corner remarkably produced and tipped with setae; second segment very short, 1/3 of first segment in length; third segment wider than long, 1 and 1/4 times as wide as second segment; in female rather slender; first segment 1 and 1/3 times as long as broad; second segment with inner margin being 3 times as long as outer one; third segment narrower than second, 1.5 times as long as broad (Fig. 14 b and c). Antennal peduncle extending to middle of third segment of antennular peduncle; third segment longer than sum of preceding 2 segments, connected in different plane from second segment (Fig. 14 d). Antennal scale long, nearly twice as long as antennal peduncle, extending beyond distal margin of antennular peduncle for its distal half in male and for distal 1/3 in female, becoming narrower apically; external margin naked and slightly concave, terminating into spinous process which is at the same level with apex of scale; terminal lobe short, half length of its width (Fig. 14 d). Maxilla with exopodite furnished with only 2 setae at apex and one seta on lateral margin (Fig. 14g). Second thoracic endopod slender, with carpus and propodus being same length (Fig. 14i). Abdomen 6-segmented; first segment 1 and 1/2 times as long as broad; second to fifth segments subequal; sixth segment longest, 1 and 3/4 times as long as fifth segment, 1 and 1/5 times as long as broad

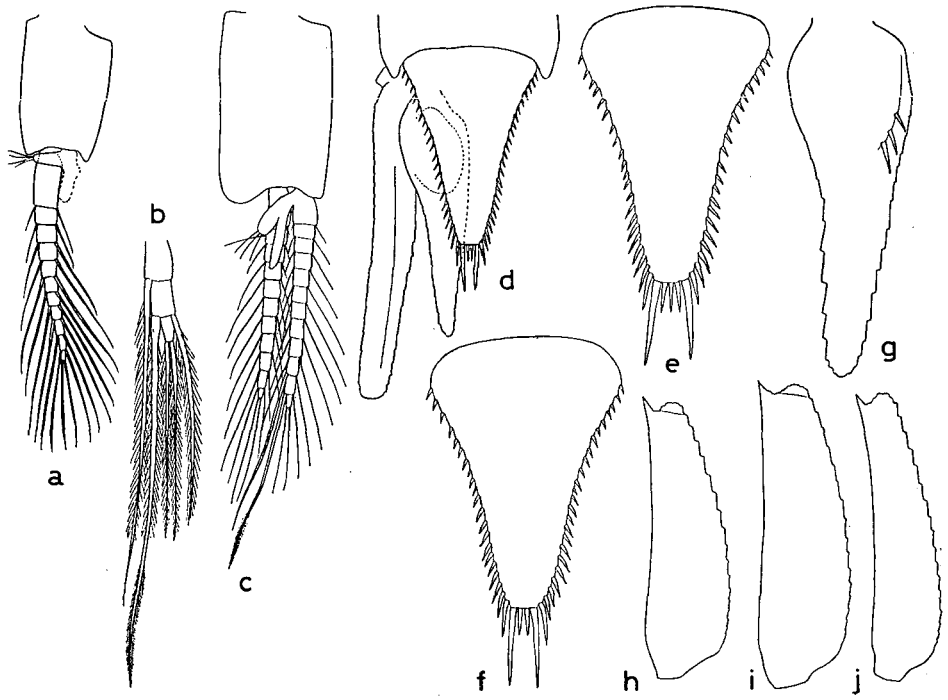

Fig. 15. *Nakazawaia japonica* gen. nov., sp. nov.; a, first pleopod, ×35; b, distal part of endopod of fourth pleopod, ×86; c, fourth pleopod, ×35; d, telson and uropod of one of the paratypes, ×35; e, telson of the holotype, ×29; f, telson of the allotype, ×29; g, endopod of uropod, ×52; h, antennal scale of a female (3-spine form) from St. H36; i, antennal scale of a female (2-spine form) from St. H36; j, antennal scale of a male (2-spine form) from St. 440.

(Fig. 14a). Pleopods of male developed, natatory and biramous; first pair of legs with unsegmented short endopod and 11-segmented exopod (Fig. 15a); fourth pair with 12-segmented endopod and 11-segmented exopod; endopod slightly longer than exopod and armed on outer distal end of penultimate segment with a long seta furnished with fine short setae on distal 1/3 and on antepenultimate segment with a long seta, but shorter than that on penultimate one, ultimate segment with a pair of normal setae; pseudobranchial process on second to fifth pleopods with long narrow accessory lobe projecting distally (Fig. 15 b and c). Telson triangular with narrow truncate apex, as long as last thoracic somite, less than 1.5 times as long as broad at basal widest part; lateral margin concave, armed on whole length with 21 to 23 short spines, of which those on distal 1/3 increase length distally; posterior margin narrow, only 1/7 of maximum width at base, armed with a pair of long spines and 2 (holotype) or 3 (allotype) short spines put between them, longer spines 3 times as long as shorter ones. Uropod moderate; endopod longer than telson by 1/3 of its length, armed with 3 spines on inner part of ventral surface at statocyst region; exopod twice as long as telson (Fig. 15 d and g).

Type series:

Holotype (NSMT-Cr. 7100), adult male of 5.3 mm from St. 440; allotype (NSMT-Cr. 7101), adult female of 5.4 mm from St. H36; and paratypes (NSMT-Cr. 7102 and 7103), 5 specimens from St. 440 and 25 specimens from St. H36.

Remarks:

A noticeable intraspecific variation was observed in the shape of antennal scale. In the holotype the scale is somewhat slender and 4 and 1/3 times as long as broad (Fig. 14d), while in the allotype and other one female from St. H36 it is 3.5 times (Fig. 15h and i). Terminal spine of outer margin extends to the same level as the apex of scale in the holotype (Fig. 14d), but is extending clearly beyond the apex in the allotype (Fig. 15h). Distal suture is absent in the holotype (Fig. 14d), but is present in the specimens from H36 (Fig. 15h).

On the basis of the number of short spines between a pair of long spines at corners of distal margin of telson, there are 2 forms, two-spine form and three-spine form. The two-spine form was found in the all specimens from St. 440, St. H41 and St. H42 and the three-spine form from St. 636. Twenty-five specimens from St. H36 were of three-spine form except of 3 specimens which were of two-spine form.

Geographical distribution:

Collected from East China Sea and Suruga Bay, Japan.

Vertical distribution:

All specimens were collected with the bottom-net from the sea-floor at the depths of 100 to 200 m.

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Appendix-table 1. Tansei-Maru stations from which the collections reported here were taken.

Station No.	Date	Ship time	Position	Sampling depth (m)	Net and remarks
3–3	Jan. 21, 1964	14:19–15:33	From 35°13.8′N, 139°15.5′E to 35°11.9′N, 139°15.5′E	0–500	ORI-net; oblique tow
3–4	" 21, "	15:51–16:46	From 35°12.1′N, 139°15.2′E to 35°14.3′N, 139°15.3′E	0–205	" "
3–7	" 21, "	22:55–23:41	From 35°13.1′N, 139°15.7′E to 35°11.5′N, 139°15.7′E	0–440	" "
3–9	" 22, "	01:10–02:24	From 35°13.5′N, 139°15.5′E to 35°11.1′N, 139°15.7′E	0–440	" "
6–1	" 24, "	10:20–11:43	From 35°06.1′N, 139°20.4′E to 35°06.1′N, 139°16.5′E	0–470	" "
6–5	" 24, "	16:06–16:54	From 35°06.0′N, 139°19.0′E to 35°05.5′N, 139°19.4′E	0–720	" "
6–6	" 24, "	21:26–23:06	From 35°06.0′N, 139°20.4′E to 35°05.8′N, 139°16.0′E	0–405	" "
6–7	" 24–25, "	23:41–00:59	From 35°06.1′N, 139°20.5′E to 35°05.7′N, 139°16.8′E	0–255	" "
13	" 27, "	11:27–12:16	From 35°13.6′N, 139°22.6′E to 35°11.9′N, 139°22.8′E	0–420	" "
15	" 27, "	15:44–16:34	From 35°01.9′N, 139°40.3′E to 35°03.2′N, 139°41.8′E	0–510	" "
51	May 21, "	08:21–09:17	From 35°01.8′N, 139°39.7′E to 35°00.0′N, 139°38.7′E	0–460	" "
53	" 21, "	13:55–14:47	From 34°54.6′N, 139°23.2′E to 34°53.8′N, 139°23.3′E	0–715	" "
54–2	" 21, "	21:42–22:32	From 35°10.4′N, 139°14.6′E to 35°08.4′N, 139°14.1′E	325–405	" horizontal tow
54–3	" 21–22, "	23:37–00:47	From 35°07.9′N, 139°13.5′E to 35°08.4′N, 139°13.6′E	290–420	" "
54–5	" 22, "	03:06–03:56	From 35°11.1′N, 139°13.3′E to 35°09.2′N, 139°13.1′E	70–130	" "
55	" 23, "	07:18–08:10	From 34°47.6′N, 139°12.5′E ot 34°46.7′N, 139°11.2′E	0–540	" oblique tow
60–1	" 24, "	14:42–15:35	From 35°02.6′N, 138°40.2′E to 35°04.1′N, 138°41.7′E	0–380	" "
60–2	" 24, "	17:10–18:00	From 35°01.4′N, 138°39.2′E to 35°02.5′N, 138°40.2′E	515–585	" horizontal tow
60–3	" 24, "	19:25–20:15	From 35°01.2′N, 138°39.3′E to 35°03.1′N, 138°40.4′E	255–315	" "
66–6	Aug. 14, "	01:32–02:32	From 35°00.3′N, 139°20.0′E to 35°01.4′N, 139°21.8′E	700–950	" "
67–4	" 15–16, "	23:18–00:18	From 34°53.8′N, 138°39.4′E to 34°52.3′N, 138°40.3′E	400–450	" "
67–6	" 16, "	03:40–04:40	From 34°55.1′N, 138°38.8′E to 34°53.4′N, 138°38.5′E	1000–1250	" "
67–7	" 16, "	05:30–06:25	From 34°53.3′N, 138°38.4′E to 34°52.2′N, 138°38.0′E	0–1300	" oblique tow
76–2	" 18, "	17:50–20:23	From 34°34.4′N, 138°33.1′E to 34°28.2′N, 138°34.0′E	0–2300*	" "

Appendix-table 1. (Continued)

Station No.	Date	Ship time	Position	Sampling depth (m)	Net and remarks
79	Aug. 19, 1964	19:32–22:28	From 34°43.2′N, 139°52.2′E to 34°41.6′N, 139°43.4′E	0–1620*	ORI-net; oblique tow
80	" 20, "	01:30–02:37	From 34°58.6′N, 139°19.2′E to 34°00.4′N, 139°18.3′E	0–1260	" "
84–2	Oct. 25, "	15:52–16:25	From 35°07.1′N, 139°16.8′E to 35°06.3′N, 139°17.3′E	0–740	" "
84–3	" 25, "	16:34–17:45	From 35°06.3′N, 139°17.0′E to 35°04.4′N, 139°17.2′E	0–1000	" "
86–8b	" 27, "	13:50–14:10	From 35°00.2′N, 138°39.7′E to 35°00.5′N, 138°39.6′E	600 m wire out	" "
93–1	" 28, "	11:49–12:24	34°54.3′N, 138°39.1′E	0–620	" "
93–2	" 28, "	12:28–13:35	From 34°55.4′N, 138°38.7′E to 34°56.1′N, 138°38.3′E	0–1300	" "
103	Feb. 28, 1965	10:40–11:17	From 35°00.4′N, 139°36.8′E to 35°01.8′N, 139°38.7′E	0–400	" "
104–2	Mar. 1, "	11:39–12:55	From 35°02.5′N, 139°17.0′E to 35°02.9′N, 139°16.8′E	0–1300	" "
104–6	" 1, "	16:10–17:10	From 35°06.7′N, 139°16.9′E to 35°05.3′N, 139°17.1′E	670–800	" horizontal tow
104–8	" 1, "	20:12–21:03	From 34°59.3′N, 139°15.9′E to 35°00.2′N, 139°15.5′E	0–1100	" oblique tow
107	" 4, "	11:33–14:27	From 34°32.6′N, 138°35.4′E to 34°26.0′N, 138°35.6′E	0–2000	" "
108	Apr. 23, "	12:12–13:30	From 35°04.9′N, 139°19.6′E to 35.02.1′N, 139°18.9′E	0–1000	" "
110	" 23, "	19:07–20:24	From 34°49.9′N, 139°31.6′E to 34°49.6′N, 139°28.8′E	0–1440	" "
116	" 25, "	21:18–22:35	From 32°19.5′N, 139°30.0′E to 32°19.7′N, 139°33.0′E	0–1200	" "
118	" 26, "	11:27–12:40	From 33°01.2′N, 140°30.0′E to 33°03.7′N, 140°31.5′E	0–1250	" "
123	" 27, "	14:33–15:29	From 35°00.9′N, 139°36.7′E to 35°02.2′N, 139°34.2′E	0–670	" "
126–1	July 10, "	12:30–13:10	From 34°52.9′N, 138°38.5′E to 34°54.1′N, 138°38.6′E	0–400	" "
126–2	" 10, "	13:22–14:44	From 34°54.0′N, 138°38.4′E to 34°50.3′N, 138°38.4′E	0–530	" "
127–11	" 13, "	01:42–02:11	From 35°05.8′N, 138°39.6′E to 35°06.6′N, 138°41.1′E	0–124	" "
127–15	" 13, "	06:03–06:47	From 35°06.0′N, 138°39.7′E to 35°07.2′N, 138°42.1′E	0–259	" "
127–17	July 13, "	08:35–08:59	From 35°06.2′N, 138°39.5′E to 35°06.9′N, 138°40.7′E	0–104	" "
127–19	" 13, "	10:02–10:38	From 35°06.2′N, 138°39.3′E to 35°06.7′N, 138°40.6′E	0–207	" "
128–5	" 14, "	05:08–06:08	From 34°53.8′N, 138°37.8′E to 34°51.1′N, 138°38.0′E	2000 m wire out	" horizontal tow

Appendix-table 1. (Continued)

Station No.	Date	Ship time	Position	Sampling depth (m)	Net and remarks
130–1	" 15, "	10:35–11:59	From 35°05.4′N, 138°40.1′E to 35°06.1′N, 138°45.9′E	0–439	ORI-net; oblique tow
137	Apr. 19, 1966	10:07–11:22	From 35°00.7′N, 139°20.8′E to 35°57.9′N, 139°12.1′E	0–850	" "
138	" 19, "	13:43–14:55	From 35°00.6′N, 139°15.1′E to 35°02.8′N, 139°15.6′E	0–1000	" "
139	" 20, "	09:25–10:39	From 35°04.9′N, 139°22.2′E to 35°03.5′N, 139°25.1′E	0–850	" "
151	July 14, "	12:50–14:27	From 34°52.7′N, 138°38.3′E to 34.56.7′N, 138°38.6′E	0–810	" "
152	" 14, "	14:35–16:10	From 34°56.7′N, 138°38.6′E to 34°53.0′N, 138°39.8′E	0–1000	" "
154	" 15, "	00:50–02:39	From 34°53.4′N, 138°38.8′E to 34°57.2′N, 138°40.0′E	0–950	" "
155	" 15, "	02:45–04:30	From 34°57.2′N, 138°40.0′E to 34°52.9′N, 138°37.8′E	0–820	" "
156–1	" 15, "	17:00–18:46	From 34°32.3′N, 138°35.6′E to 34°35.5′N, 138°36.6′E	0–1000	" "
159	" 15–16, "	23:35–01:20	From 34°22.3′N, 138°30.0′E to 34°24.4′N, 138°32.3′E	0–1300	" "
160	" 16, "	01:25–03:05	From 34°24.4′N, 138°32.4′E to 34°27.4′N, 138°32.6′E	0–930	" "
161	" 16, "	03:14–05:00	From 34°27.4′N, 138°32.6′E to 34°29.2′N, 138°36.9′E	0–850	" "
169–3	" 17, "	21:48–22:48	From 34°28.9′N, 138°37.0′E to 34°37.5′N, 138°35.4′E	420–700	" horizontal tow
169–4	" 17–18, "	23:53–01:23	From 34°26.8′N, 138°34.6′E to 34°25.8′N, 138°30.7′E	800–1300	" "
176–4	" 18, "	19:28–20:28	From 34°49.2′N, 139°30.8′E to 34°47.3′N, 139°31.8′E	0–690	" oblique tow
176–6	" 19, "	03:08–04:38	From 34°49.5′N, 139°34.4′E to 34°47.4′N, 139°35.9′E	550–1200	" horizontal tow
177–4	" 19, "	22:41–23:47	From 34°49.0′N, 139°30.0′E to 34°47.1′N, 139°30.4′E	450–550	" "
177–5	" 19, "	19:28–20:58	From 34°48.3′N, 139°31.6′E to 34°45.5′N, 139°31.5′E	700–770	" "
177–6	" 20, "	05:05–06:35	From 34°43.3′N, 139°35.9′E to 34°45.9′N, 139°35.4′E	1350–1500	" "
182	" 23, "	05:35–06:48	From 34°49.6′N, 139°31.9′E to 34°47.5′N, 139°32.1′E	0–1150	" oblique tow
183–5	" 23, "	09:21–10:58	From 34°49.3′N, 139°30.3′E to 34°46.1′N, 139°30.3′E	500–1000	" horizontal tow
184–4	" 23, "	21:33–22:33	From 34°49.7′N. 139°32.6′E to 34°48.5′N, 139°32.4′E	400–600	" "
184–5	" 23, "	19:18–20:48	From 34°47.4′N, 139°34.0′E to 34°50.0′N, 139°32.0′E	650–1050	" "
185	" 24, "	05:44–08:01	From 34°41.0′N, 139°38.8′E to 34°44.2′N, 139°36.5′E	0–2000	" oblique tow

Appendix-table 1. (Continud)

Station No.	Date	Ship time	Position	Sampling depth (m)	Net and remarks
202	Oct. 18, 1966	14:49–15:12	34°44.8′N, 139°08.5′E	0–480	ORI-net; oblique tow
206	Jan. 18, 1967	18:42–19:50	From 35°10.2′N, 139°16.3′E to 35°07.9′N, 139°16.8′E	0–950	〃 〃
208	〃 18, 〃	21:07–22:03	From 35°10.7′N, 139°16.7′E to 35°10.2′N, 139°14.5′E	0–546	〃 〃
212	〃 19, 〃	07:59–09:07	From 34°58.8′N, 139°18.9′E to 34°59.6′N, 139°22.8′E	0–618	〃 〃
221–5	Apr. 23, 1968	13:30–14:16	Off Tateyama, Chiba Prefecture	370–380	Bottom-net
228	〃 25–26, 〃	23:15–01:02	From 34°42.0′N, 140°02.5′E to 34°42.0′N, 140°00.0′E	550–1150	ORI-net; horizontal tow
293–2	〃 13, 〃	13:00–13:37	From 35°00.3′N, 139°48.4′E to 35°00.0′N, 139°47.6′E	220–330	Bottom-net
293–3	〃 13, 〃	14:05–14:43	From 35°00.3′N, 139°47.2′E to 35°00.3′N, 139°47.3′E	370–430	〃
310	Nov. 3, 〃	18:10–19:44	From 34°54.1′N, 138°37.4′E to 34°56.9′N, 138°37.5′E	0–1150	ORI-net; oblique tow
312	〃 3, 〃	22:17–23:46	From 34°53.7′N, 138°38.9′E to 34°56.5′N, 138°39.2′E	0–1200	〃 〃
328	〃 7, 〃	17:50–19:05	Suruga Bay	500–600	〃 horizontal tow
341	May 9, 1969	00:10–01:05	35°04.4′N, 139°09.0′E	360–460	〃 〃
344	〃 9, 〃	06:44–07:51	From 34°58.7′N, 139°22.5′E to 34°57.0′N, 139°21.9′E	0–1200	〃 oblique tow
363–6	〃 10, 〃	12:09–13:09	From 34°50.5′N, 138°37.6′E to 34°52.5′N, 138°38.1′E	1000 m wire out	〃 horizontal tow
363–7	〃 10, 〃	15:02–16:02	From 34°52.3′N, 138°38.5′E to 34°50.4′N, 138°38.6′E	750–1250	〃 〃
363–12	〃 11, 〃	02:37–03:07	From 34°49.3′N, 138°37.8′E to 34°48.3′N, 138°37.4′E	480–650	〃 〃
383	〃 11, 〃	07:02–08:10	From 34°49.3′N, 138°37.1′E to 34°51.8′N, 138°37.4′E	0–1030	〃 oblique tow
391–1	〃 13, 〃	09:56–10:20	From 34°54.3′N, 138°27.8′E to 34°54.2′N, 138°27.1′E	42–66	Bottom-net
391–2	〃 13, 〃	10:23–10:48	From 34°54.2′N, 138°26.4′E to 34°54.4′N, 138°25.8′E	28–35	〃
392–2	〃 13, 〃	11:54–12:16	From 34°53.9′N, 138°26.0′E to 34°53.8′N, 138°25.6′E	32–44	〃
440	Apr. 22, 1970	20:05–20:38	28°10.5′N, 129°10.0′E	138–141	〃
442	〃 23, 〃	00:34–01:49	28°21.2′N, 128°57.8′E	0–900	ORI-net; oblique tow
454	〃 25, 〃	16:57–18:18	29°08.0′N, 129°39.1′E	0–1000	〃 〃
457	Oct. 11, 〃	09:50–11:05	From 35°00.5′N, 139°21.7′E to 35°59.6′N, 139°20.6′E	0–700	〃 〃
492–1	Jan. 21, 1971	03:19–03:37	34°50.0′N, 138°44.2′E	0–240	〃 Accidentally touched the sea-floor in oblique tow
526	〃 24, 〃	05:22–06:30	From 34°54.3′N, 138°38.5′E to 34°52.5′N, 138°38.4′E	0–1200	〃 oblique tow

Appendix-table 1. (Continued)

Station No.	Date	Ship time	Position	Sampling depth (m)	Net and remarks
533	Jan. 24, 1971	12:27–12:50	From 34°45.3′N, 138°22.8′E to 34°44.6′N, 138°22.7′E	570–660	Bottom-net
557–1	Aug. 13, "	23:08–23:27	From 35°06.2′N, 138°40.0′E to 35°06.3′N, 138°40.6′E	0–280	ORI-net; oblique tow
575	" 15, "	17:54–18:10	From 34°52.4′N, 138°36.6′E to 34°52.5′N, 138°37.0′E	1020–1248	Bottom-net
589	Aug. 17, "	12:27–13:48	From 35°03.1′N, 139°18.0′E to 35°02.9′N, 139°15.7′E	0–1350	ORI-net; oblique tow
636	Nov. 13, "	16:35–16:58	From 34°45.8′N, 138°20.9′E to 34°45.1′N, 138°20.5′E	0–105	Bottom-net

* The depth is estimated from the wire angle and wire length. In others it is estimated from the TSK Depth-Distance Recorder.

Appendix-table 2. Hakuho-Maru stations from which the collections reported here were taken

Station No.	Date	Ship time	Position	Sampling depth (m)	Net and remarks
H10–10	Dec. 9, 1967	13:20–15:12	From 37°24.5′N, 150°21.7′E to 37°23.6′N, 150°25.0′E	400–500	ORI-net; horinzontal tow
H10–16	" 10, "	00:00–01:50	From 37°34.5′N, 150°31.5′E to 37°35.2′N, 150°34.2′E	320–500	" "
H33	May 21, 1968	17:20–17:50	From 30°07.8′N, 125°43.2′E to 30°07.5′N, 125°44.0′E	76	Bottom-net
H35	" 21–22, "	23:45–00:10	From 29°26.0′N, 126°27.8′E to 29°25.4′N, 126°27.8′E	100	"
H36	" 22, "	05:18–05:58	From 28°41.0′N, 126°48.2′E to 28°40.2′N, 126°48.9′E	185	"
H41	" 24, "	09:02–09:35	From 28°01.8′N, 125°01.0′E to 28°02.0′N, 125°01.8′E	100	"
H42	" 24, "	13:04–13:31	From 27°23.8′N, 125°01.2′E to 27°23.5′N, 125°01.9′E	100	"
H44	" 24–25, "	23:35–00:10	From 26°44.0′N, 124°59.8′E to 26°43.5′N, 125°00.0′E	120	"

Appendix-table 3. Suruga-Maru stations from which the collections reported here were taken

Station No.	Date	Ship time	Position	Sampling depth (m)	Net and remarks
S1	July 14, 1967	07:50–08:20	From 34°55.6′N, 138°30.3′E to 34°55.4′N, 138°29.8′E	80	Plankton net attached to the mouth of a beam trawl.
S2	" " "	13:15–13:45	From 34°44.1′N, 138°19.7′E to 34°44.5′N, 138°20.0′E	"	"
S3	" " "	15:20–15:50	From 34°49.2′N, 138°21.5′E to 34°49.8′N, 138°21.6′E	"	"