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Northwest Pacific  
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**Abstract** *Abralia similis*, a new species of Oegopsid squid belonging to the Family Enoploteuthidae is described. This species was collected with midwater trawl of the R/V *Kaiyo-Maru* from the Northwest Pacific Basin and Shikoku Basin. It is characterized by five subocular photophores with no interposed ones, two small tentacular hooks and dorsal flap, and three offset crests on the hectocotylus.

*Abralia* GRAY, 1849 is the most diverse genus among the members of the squid Family Enoploteuthidae. Some 16 nominal plus one unnamed species have been recorded from warm water regions of the Atlantic, Pacific and Indian Oceans. However, intraspecific relationships, infraspecific variabilities and zoogeography of them have not always been well worked out. More precise study on identity of each species will be badly needed for understanding of the taxonomy of this genus.

During the systematic study of midwater cephalopods collected by the R/V *Kaiyo-Maru* from the Northwest Pacific Basin, another undescribed species of the genus *Abralia* was discovered. The description goes in the following lines.

Before going further, we wish to extend our thanks to Dr. T. UMEZU and Dr. K. TABATA for generous offer of such an interesting material for our disposal. We thank Mr. M. SWEENEY for the loan of type material from the U. S. National Museum of Natural History, and Dr. R. E. YOUNG, University of Hawaii, for his gift and loan of comparative specimens from the Hawaiian waters. We are grateful to Captain S. SUYEKI and the crew of the R/V *Kaiyo-Maru* for their greatest effort in sampling the biological specimens.

Family Enoploteuthidae PFEFFER, 1900

*Abralia similis* n. sp.

Material examined: Holotype male (DML 18.6 mm), *Kaiyo-Maru* St. 13 (July 13, 1986) 30°03.2'N 134°03.5'E, 0-550 m; Paratype No. 1 female (DML 21.3 mm) Ditto; Paratype No. 2 male (DML 17.7 mm), *Kaiyo-Maru* St. MT14 (June 9, 1979) 30°04.5'N 143°46.6'E, 500-900 m; Paratype No. 3 female (DML 32.4 mm), *Kaiyo-Maru* St. 35 (July 31, 1986) 30°04.6'N 134°27.9'E, 0-560 m; Paratype No. 4 male (DML 19.0

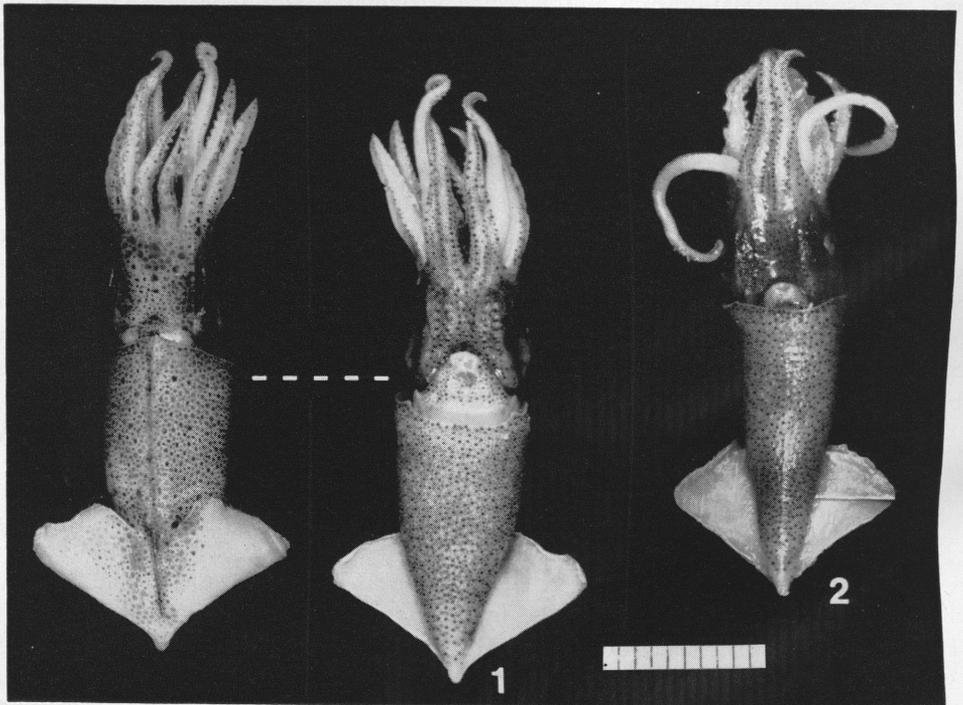
mm), *Kaiyo-Maru* St. MT30 (June 18, 1979) 29°58.8'N 143°53.1'E, 0–700 m; Paratype No. 5 female (DML 25.8 mm), *Kaiyo-Maru* St. 28 (June 17, 1979) 30°08.7'N 144°13.2'E, 0–1500 m.

About 150 additional specimens from 36°N 146°E; 34°45'N 149°E; 34°45'N 150°E; 34°15'N 150°E; 34°N 144°E; 34°N 148°E; 33°N 156° 30'E; 32°45'N 146°E; 32°45'N 148°E; 32°30'N 150°E; 32°30'N 158°30'E; 32°15'N 146°E; 30°N 134°E; 30°N 147°E, all collected by the R/V *Kaiyo-Maru*.

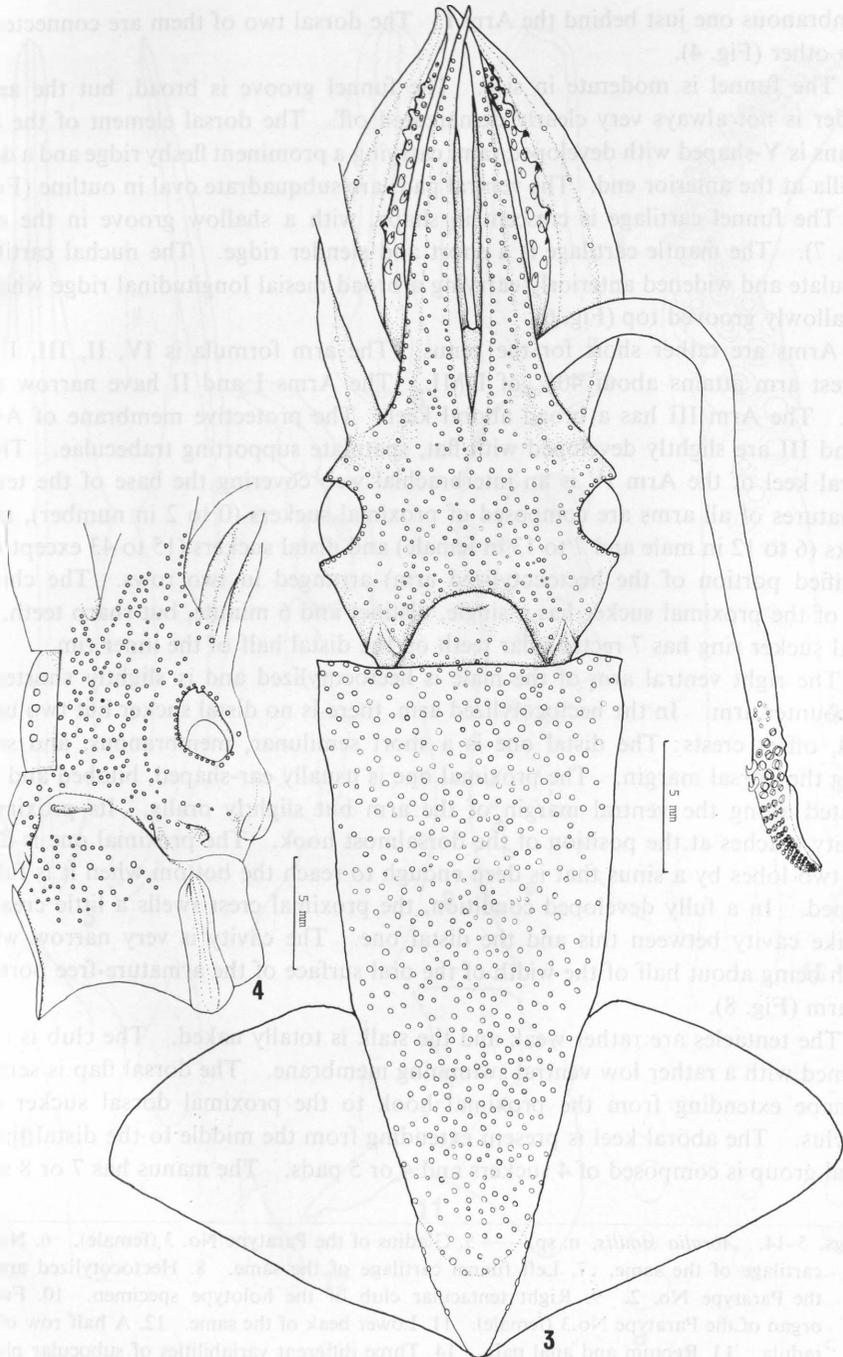
Description: The mantle is muscular, short conico-cylindrical, terminating in a blunt end of a short tail. The mantle width is about 35 to 55% of DML. The anterodorsal end forms an obtuse angle in the middle, while anteroventral margin is broadly emarginated leaving blunt angles on both sides.

The fins are transversely broad, wider than long, short sagittate in outline with blunt lateral angles. The fin length is about 45–60% of DML, while the width attains about 90–110% of DML (Figs. 1–3).

The head is subcubic in shape, with large eyes on the lateral sides, equal to or slightly narrower than the mantle opening. The eyelid has a shallow sinus in front. There are four pairs of low fleshy crests on the posterior periphery of the head: Prominent trapezoid one on the posterior rim of the funnel groove, rectangular one far posterior to the tentacle, low membranous one posterior to the eye, and another low



Figs. 1, 2. *Abralia similis*, n. sp. — 1. A female from 86KOC25B. 2. Holotype.



Figs. 3, 4. *Abralitia similis*, n. sp. — 3. Ventral view of the Paratype No. 5 (female).  
 4. Ventrolateral view of the head of the Paratype No. 3 (female).

membranous one just behind the Arm I. The dorsal two of them are connected with each other (Fig. 4).

The funnel is moderate in size. The funnel groove is broad, but the anterior border is not always very clearly demarcated off. The dorsal element of the funnel organs is Y-shaped with developed rami carrying a prominent fleshy ridge and a delicate papilla at the anterior end. The ventral pads are subquadrate oval in outline (Fig. 10).

The funnel cartilage is crescent in shape, with a shallow groove in the middle (Fig. 7). The mantle cartilage is a short and slender ridge. The nuchal cartilage is spatulate and widened anteriorly carrying a broad mesial longitudinal ridge which has a shallowly grooved top (Fig. 6).

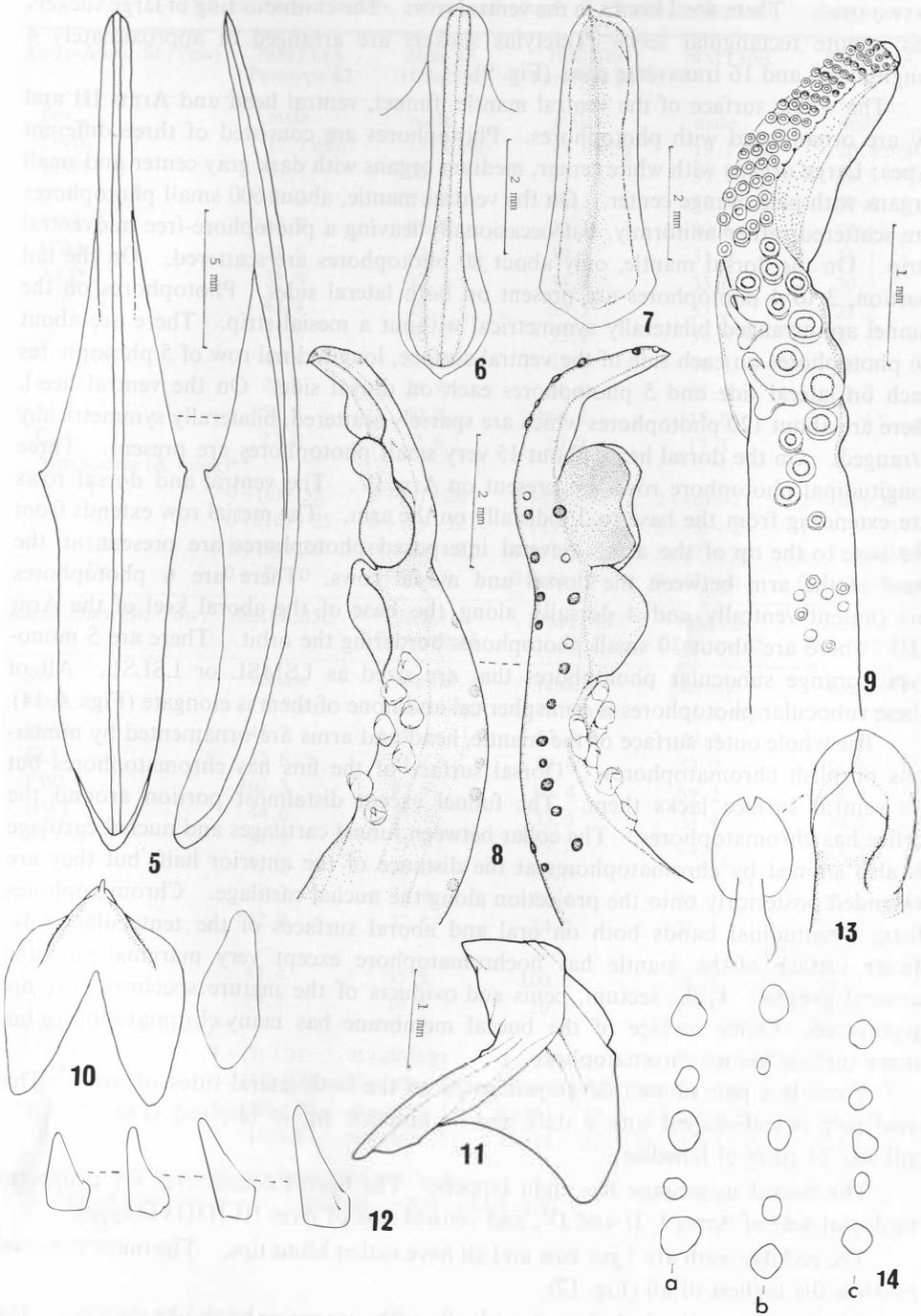
Arms are rather short for the genus. The arm formula is IV, II, III, I. The longest arm attains about 40% of DML. The Arms I and II have narrow aboral keel. The Arm III has a broad aboral keel. The protective membrane of Arms I, II and III are slightly developed with flat, spatulate supporting trabeculae. The low aboral keel of the Arm IV is an interbrachial web covering the base of the tentacle. Armatures of all arms are composed of proximal suckers (0 to 2 in number), median hooks (6 to 12 in male and 7 to 13 in female) and distal suckers (15 to 43 except on the modified portion of the hectocotyized arm) arranged in two rows. The chitinous ring of the proximal sucker has a single, distinct and 6 minute, but sharp teeth. The distal sucker ring has 7 rectangular teeth on the distal half of the inner rim.

The right ventral arm of the male is hectocotyized and is slightly shorter than the counter arm. In the hectocotyized arm, there is no distal sucker but two unequal sized, offset crests: The distal one is a short semilunar, membranous, and situated along the dorsal margin. The proximal one is usually ear-shaped, bilobed and fleshy, situated along the ventral margin of the arm but slightly orally. Its proximal extremity reaches at the position of the dorsalmost hook. The proximal one is divided into two lobes by a sinus that is deep enough to reach the bottom when it is fully developed. In a fully developed condition, the proximal crest swells a little creating a slit-like cavity between this and the distal one. The cavity is very narrow with its width being about half of the width of the oral surface of the armature-free portion of the arm (Fig. 8).

The tentacles are rather weak and the stalk is totally naked. The club is slightly widened with a rather low ventral swimming membrane. The dorsal flap is semilunar in shape extending from the proximal hook to the proximal dorsal sucker of the dactylus. The aboral keel is present extending from the middle to the distal tip. The carpal group is composed of 4 suckers and 4 or 5 pads. The manus has 7 or 8 suckers

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Figs. 5-14. *Abralia similis*, n. sp. — 5. Gladius of the Paratype No. 3 (female). 6. Nuchal cartilage of the same. 7. Left funnel cartilage of the same. 8. Hectocotyized arm of the Paratype No. 2. 9. Right tentacular club of the holotype specimen. 10. Funnel organ of the Paratype No.3 (female). 11. Lower beak of the same. 12. A half row of the radula. 13. Rectum and anal palp. 14. Three different variabilities of subocular photophores. a. Paratype No. 5. b. Male, 19.0 mm DML. c. Female, 26.5 mm DML.



in two rows. There are 2 hooks in the ventral row. The chitinous ring of large suckers has minute rectangular teeth. Dactylus suckers are arranged in approximately 4 longitudinal and 16 transverse rows (Fig. 9).

The whole surface of the ventral mantle, funnel, ventral head and Arms III and IV are ornamented with photophores. Photophores are consisted of three different types: Large organs with white center, medium organs with dark gray center and small organs with pale orange center. On the ventral mantle, about 600 small photophores are scattered rather uniformly, but occasionally leaving a photophore-free midventral strip. On the dorsal mantle, only about 80 photophores are scattered. On the tail portion, 3 to 4 photophores are present on both lateral sides. Photophores on the funnel are arranged bilaterally symmetrical without a mesial strip. There are about 26 photophores on each side of the ventral surface, longitudinal row of 5 photophores each on lateral side and 5 photophores each on dorsal side. On the ventral head, there are about 120 photophores which are sparsely scattered, bilaterally symmetrically arranged. On the dorsal head, about 15 very small photophores are present. Three longitudinal photophore rows are present on Arm IV. The ventral and dorsal rows are extending from the base to 3/4 distally on the arm. The mesial row extends from the base to the tip of the arm. Several interposed photophores are present at the base of the arm between the dorsal and mesial rows. There are 6 photophores are present ventrally and 4 dorsally along the base of the aboral keel of the Arm III. There are about 30 small photophores bordering the orbit. There are 5 monotypic, orange subocular photophores that are sized as LSMSL or LSLSL. All of these subocular photophores is semispherical and none of them is elongate (Figs. 4, 14).

The whole outer surface of the mantle, head and arms are ornamented by numerous purplish chromatophores. Dorsal surface of the fins has chromatophores but its ventral surface lacks them. The funnel except distalmost portion around the orifice has chromatophores. The collar between funnel cartilages and nuchal cartilage is also stained by chromatophores at the distance of the anterior half, but they are extended posteriorly onto the projection along the nuchal cartilage. Chromatophores form longitudinal bands both on oral and aboral surfaces of the tentacular stalk. Inner surface of the mantle has no chromatophore except very marginal area and around ganglia. Gills, rectum, penis and oviducts of the mature specimens are not pigmented. Outer surface of the buccal membrane has many chromatophores but inner surface has no chromatophore.

There is a pair of well developed palps on the both lateral sides of anus. This anal palp is leaf-shaped with a stalk and its anterior tip is bispired (Fig. 13). The gill has 24 pairs of lamellae.

The buccal membrane has eight lappets. The buccal connectives are connected to dorsal side of Arms I, II and IV, and ventral side of Arm III (DDVD-type).

The radular teeth are 7 per row and all have rather blunt tips. The outer marginal tooth is the highest of all (Fig. 12).

The lower jaw plate is darkened gradually without spot or hook-like staining. The

Table 1. Measurements, indices and counts of *Abralia similis* n. sp.

<i>Kaiyo-Mar</i> (St./Tow)	79MT14A Paratype #2	86St. 13 Holotype	79MT30 Paratype #4	79MT30B	80MT21A
Sex	male	male	male	male	male
DML	17.7 mm	18.6 mm	19.0 mm	19.1 mm	20.8 mm
MWI	53.7	38.7	37.9	37.7	36.5
FLI	49.2	51.6	46.3	52.4	51.4
FWI	110.2	98.9	92.1	90.6	72.6 <sup>+</sup>
HWI	31.6	42.5	39.5	31.9	35.1
ALI* I	33.9	32.3	34.2	33.0	30.3
II	42.4	38.7	39.5	37.2	33.2
III	35.6	36.3	35.7	39.3	25.5
IV	42.4	38.7	43.7	40.3	32.7
HcLI	28.3	25.8	31.6	31.4	21.2
TLI	150.9	80.7	145.8	117.8	21.6 <sup>+</sup>
CLI	27.1	22.6	20.0	17.3	—
Arm sucker (& hook)**					
I	0+(6)+32	0+(8)+26	1+(7)+34	2+(6)+27	2+(8)+32
II	0+(10)+25	0+(8)+32	1+(9)+38	2+(8)+28	1+(7)+33
III	1+(9)+26	0+(10)+22	0+(11)+32	1+(7)+20	1+(12)+43
IV	0+(7)+0	0+(7)+0	0+(6)+0	0+(7)+0	0+(6)+0
<i>Kaiyo-Mar</i> (St./Tow)	86KOC25C	86St.13 Paratype #1	79MT15B	79MT28 Paratype #5	86St.35 Paratype #3
Sex	female	female	female	female	female
DML	17.5 mm	21.3 mm	23.9 mm	25.8 mm	32.4 mm
MWI	45.7	38.5	52.3	39.5	34.6
FLI	52.6	51.6	59.0	53.2	56.5
FWI	102.3	85.9	95.4	89.2	88.9
HWI	44.6	41.3	33.5	38.4	30.9
ALI* I	31.7	31.0	27.2	24.0	25.5
II	41.2	36.6	33.5	33.7	30.1
III	34.3	33.8	31.4	32.2	27.8
IV	42.9	37.3	34.7	36.4	26.4
HcLI	—	—	—	—	—
TLI	83.4	95.8	100.0	91.5	94.1
CLI	19.7	16.9	20.5	17.4	16.7
Arm sucker (& hook)**					
I	1+(7)+31	0+(9)+21	0+(10)+32	1+(7)+37	0+(10)+30
II	0+(11)+25	0+(13)+27	0+(11)+24	0+(11)+33	0+(11)+37
III	1+(10)+22	0+(11)+25	0+(11)+25	0+(10)+30	0+(9)+33
IV	1+(10)+21	0+(10)+17	0+(11)+21	0+(12)+26	0+(12)+17

\* Measurements and counts of right arm series.

\*\* No. of proximal suckers+(median hooks)+distal suckers.

16.1  
37.3  
52.2  
88.2

78.3

jaw edge is not straight but has a slight notch. The hood is slightly longer than the crest length, and has ridges and a shallow notch behind. The shoulder has a low ridge and a little crest below the jaw angle. The wing is rather narrow and transparent with some ridges except for the shoulder area. The crest is round and rather narrow. A weak fold runs on the lateral wall and there seem to be an additional swelling below that (Fig. 11).

The gladius is typical for the genus. The vane is about 70% of pen length. The rachis gradually tapers to a posterior blunt end with a short end cone. The pen width is about 20% of pen length. The angle in cross-section of the gladius is about 90° in median portion (Fig. 5).

Measurements: See Table 1.

Type locality: Lat. 30°03.2'N, long. 134°03.5'E, 0–550 m deep. (The R/V *Kaiyo-Maru* St. 13: July 13, 1986).

Type depository: National Science Museum, Tokyo. NSMT Mo-66642 (Holotype), NSMT Mo-66647 to Mo-66647 (Paratypes No. 1 to 5).

Remarks: This is a medium-sized species of the genus. The male has mature spermatophores in the spermatophoric sac at 17 mm in DML. Female is slightly larger than male. This new species is characterized by having 5 subocular photophores and only 2 carpal hooks on the tentacular club.

The species which have 2 tentacular hooks are *A. japonica*, *A. grimpei*, *A. marisarabica* and *A. sp.* RIDDELL, 1985. However, these species are distinguishable from the present new species in the following points:

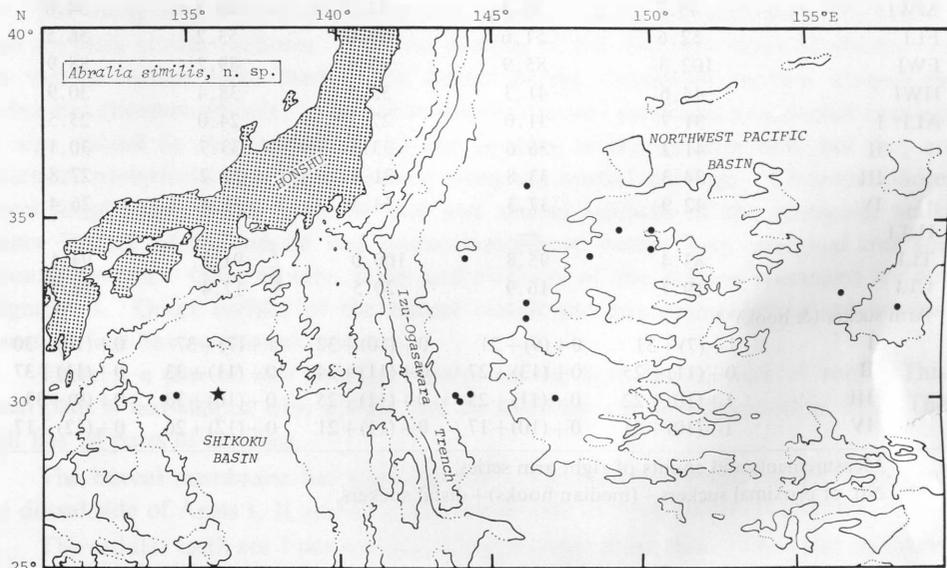


Fig. 15. Distribution (collecting stations) of *Abralia similis*, n. sp. A star indicates the type locality. (Bathymetrical contours in the Pacific are 2,000 m, 4,000 m and 6,000 m.)

*A. japonica* ISHIKAWA, 1929 has 5 subocular photophores but the animal is far larger than the present species (56 mm DML). *A. japonica* differs from the present new species by absence of carpal flap and by lack of distal sucker on Arm IV in female. The tentacular hooks is proportionally larger and has smaller number of manus sucker than in the present new species (3 versus 7 or 8).

An Atlantic species, *A. grimpei* VOSS, 1958 is a medium-sized species (32.5 mm DML) and has 5 basic subocular photophores with 2 intermediate minute ones. *A. grimpei* is close to the present new species, but it is different in having larger number of hooks on Arm IV (12 versus 7 to 10), and larger number of monotypic subocular photophores (7 versus 5).

An Indian Ocean species, *A. marisarabica* OKUTANI, 1983 is a small-sized species (19–26 mm DML) and has 5 basic subocular photophores with two or three intermediate photophores. The hectocotylus of *A. marisarabica* is very closed to that of the present new species. *A. marisarabica* is separable from the present new species by the larger number of subocular photophores (7 or 8 versus 5) and longitudinal linear arrangement of photophores on the mantle, funnel and head.

A Pacific species, *A. sp.* RIDDELL, 1985 is a small-sized species (23.6 mm DML) and has 5 monotypic subocular photophores of which marginal two are the largest. This species is the closest to the present new species, and differs merely by the absence of dorsal flap of the tentacle, unless overlooked.

An Atlantic species, *A. redfieldi* VOSS, 1955 is a medium-sized species (20–35 mm DML) and has 5 monotypic subocular photophores, 3 tentacular hooks and similar type of hectocotylus with three crests (CAIRNS, 1976; LIPINSKI, 1983). However, *A. redfieldi* has larger number of hooks on the arms (e.g. 11 to 16 on Arm I versus 6 to 10) and persistently more numerous subocular photophores. In the hectocotylus, dorsal crest is situated more dorsally extending to the middle of the arm.

Other known species having 3 or 4 tentacular hooks, *A. andamanica* GOODRICH, 1896, *A. siedleckyi* LIPINSKI, 1983, *A. trigonura* BERRY, 1913, and *A. veranyi* (RÜPPELL, 1844) are easily separable from the present new species by not only the number of tentacular hooks but also having two types of subocular photophores (VOSS, 1963).

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