

REPORT OF THE BIOLOGICAL SURVEY OF MUTSU BAY
32. MEDUSAE FROM MUTSU BAY (REVISED REPORT)¹⁾

By

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Since the publication of the first report on the medusae from Mutsu Bay in 1927, several forms which were not referred to at that time, have been collected from the Bay and kindly sent to the writer for identification by Dr. S. KOKUBO and other gentlemen of the Asamushi Marine Biological Station. A list of all the medusae hitherto found there will be given in the following, with some short additional notes. Medusae treated in this paper are mostly forms of the temperate waters or cosmopolitan species, but the seven species; *Sarsia tubulosa*, *Hybocodon prolifer*, *Catablema multicirrata*, *Willsia flavicirrata*, *Melicertum octocostatum*, *Aglantha digitale* and *Cyanea capillata*, are circumboreal in distribution.

Hydromedusae

Order ANTHOMEDUSAE

Family CODONIDAE

Sarsia tubulosa (SARS)

Sarsia mirabilis: UCHIDA, 1927, pp. 179-180; — 1930 p. 330.

The species was formerly described as the American medusa, *S. mirabilis*, which was definitely identified with this species by KRAMP (1927) and THIEL (1932). The medusa is frequently collected on the coasts of Hokkaido from spring to summer. Several specimens of this species were found in surface tows on April 30, 1929.

Hydrocoryne miurensis STECHOW

Hydrocoryne miurensis: STECHOW, 1909, pp. 35-39; UCHIDA, 1932, pp. 135-138.

This species was described on the basis of the polyp generation by STECHOW (1908 & 1909). The medusa form was described by the present

¹⁾ Contribution from the Marine Biological Station, Asamushi, Aomori-ken, No. 151.

writer on young medusae liberated from the hydroids collected in July 1929 in Mutsu Bay. Medusae about cubic in shape on account of four well developed radial canals, 1-1.5 mm high and 0.8-1.2 mm wide. Mesogloea rather thin but rigid. Exumbrella sprinkled with remarkable nematocyst clusters. Four radial canals straight and broad, opening into a large stomach cavity. A ring canal straight. A large tentacle bulb, occurring at the base of the radial canals, is provided with thick nematocyst layers on the axial side and a large dark brown ocellus on the abaxial side. Tentacles hollow, broad near the base but generally narrowing to the terminal portion. Nematocyst clusters of the tentacles conspicuous in the main shaft except at the basal portion where only a few of them are scattered. Velum comparatively narrow. Manubrium flask-shaped and reaching midway the bell down the bell cavity, provided with a round mouth. In newly liberated medusae an apical canal, the remnant of budding, extends upwards from the stomach cavity, opening outside. Gonads not yet developed in these specimens. Manubrium slightly brown, ocelli and radial canals dark brown.

Localities. This hydroid seems to be rather common on Japanese coasts since it has been found in Misaki, Asamushi, Akkeshi, Onagawa Bay and Shimoda, Shizuoka Pref.

Family **TUBULARIIDAE** HINCKS, 1868 emend UCHIDA, 1927.

Euphysa sp.

Euphysa sp.: UCHIDA, 1927, p. 217.

A single specimen was collected on March 14, 1926.

Hybocodon prolifer L. AGASSIZ

Hybocodon prolifer: UCHIDA, 1927 (a), pp. 217-218; —, 1927 (b), pp. 162-163 & pp. 192-193.

The species is one of the cold water forms. It is common on coasts from Hokkaido to Kamchatka. The development of the eggs to actinulae on the manubrium of the mother medusa was described in the former paper (1927, b, pp. 162-163). Medusae and actinulae are not rare in early spring.

Family **CLADONEMATIDAE** GEGENBAUR, 1885.

Cladonema radiatum var. *mayeri* PERKINS

Cladonema radiatum var. *mayeri*: UCHIDA, 1927 (a), p. 218 —, 1927 (b), pp. 197-198.

Cladonema mayeri: KRAMP, 1928, pp. 43-45.

This medusa is a form of the European medusa, *Cladonema radiatum* with hexamerous symmetry. KRAMP (1928) described the Japanese medusa as a species distinct from the European species. Recently WEILL (Bull. Biol. France et Belg., T. 71, pp. 438-465) having studied on specimens from the Bermudas, came to the conclusion that the three species of *Cladonema*: i. e. *C. radiatum*, *C. perkins* and *C. mayeri*, must be merged into the first species *radiatum*. This species is common in summer in Japan from the Kurile Islands southwards to Misaki.

Family **TIARIDAE** HAECKEL, 1879

Urashimea globosa KISHINOUE

Urashimea globosa: UCHIDA, 1927 (a), pp. 218-219, —, 1927 (b), pp. 205-207; —, 1930, p. 330; THIEL, 1932, p. 138.

This medusa is widely distributed on the Pacific coasts of Japan; from Saghalien, through Hokkaido to the middle part of Honshu.

Leuckartiara octona (FLEMING)

Leuckartiara octona: UCHIDA, 1927 (b), pp. 211-212. —, 1930, p. 331.

This medusa is a form of temperate oceans and was occasionally collected on the southern coasts of Honshu and Kyushu. A specimen was found in Mutsu Bay in February, 1927. This medusa was further obtained in Akkeshi Bay, Hokkaido last autumn.

Catablema multicirrata KISHINOUE

Catablema multicirrata: UCHIDA, 1927, p. 213; —, 1930, p. 331; THIEL, 1932, p. 136; UCHIDA, 1933, p. 130.

This medusa is a boreal form and was caught in Japan in the following localities; Kurile Islands, Hokkaido and Mutsu Bay. This species is further known near Kamchatka, Unalaska Island and Greenland. Examples found in the Bay harboured young forms of the actinian, *Peachia quinquecapitata*.

Family **CYTAEIDAE**

Podocoryne simplex KRAMP

Podocoryne simplex: KRAMP, 1928, pp. 45-47; UCHIDA, 1930, p. 331.

Several young medusae were collected in Mutsu Bay in April, 1926.

They are furnished with two opposite tentacles on the bell margin and four medusa buds on the manubrium. This species is likewise known from Misaki and the coast of Yamagata Pref.

Turritopsis nutricula MC CRADY

Turritopsis nutricula: UCHIDA, 1927 (a), p. 219; —, 1927 (b), pp. 217-218. —, 1930, pp. 331-334; —, LING, 1937 (a), pp. 354-355.

Turritopsis pacifica: KRAMP, 1928, pp. 53-54.

The identification of *T. pacifica* with *T. nutricula* was discussed by the present writer in 1930 after examining the type specimens of the former species studied by the first investigator, O. MAAS. According to LING (1937) this medusa is distributed in the Pacific southwards to the Chekiang coast.

Family BOUGAINVILLIIDAE

Rathkea octopunctata (M. SARS)

Rathkea octopunctata: UCHIDA, 1927 (b), pp. 224-225; —, 1930, p. 334; —, 1933, p. 130.

Rathkea blumenbachi: UCHIDA, 1927 (a), p. 219.

In the first report on the medusae from Mutsu Bay the present writer reported this medusa as *R. blumenbachi*. As to the synonymy of the medusa, KRAMP (1926, Danish Ingolf Ex., vol. 5, pp. 58-66) gave an important account. This species was found also from the coasts of Kamchatka and Korea.

Family SPIROCODONIDAE

Spirocodon saltatrix (TILESUS)

Spirocodon saltatrix: UCHIDA, 1927 (a), pp. 219-220; —, 1927 (b), pp. 230-233; KRAMP, 1928, pp. 61-62.

This large beautiful anthomedusa is common in Japanese waters from Mutsu Bay southwards to Kyushu, but is not known from any other locality.

Family WILLIIDAE

Willisia flavicirrata (BRANDT)

Willisia stellata: UCHIDA, 1927 (b), pp. 235-236. *Willisia stellata*; UCHIDA, 1930, pp. 334-335.

Willisia pacifica: UCHIDA, 1927, p. 236.

Willisia pacifica: UCHIDA, 1930, pp. 334-335.

This medusa is variable in the number of the primary radial canals. The Japanese medusae described by MAAS and UCHIDA as *W. pacifica* and *W. stellata* are probably united into the medusa described by BRANDT (1838) as *Proboscidactyla flavicirrata*.

This medusa is common on the coasts of Hokkaido in summer. Several specimens were found in Mutsu Bay on June 26, 1928 and July 17, 1928.

LEPTOMEDUSAE

Family LAFOEIDAE

Melicertum octocostatum (M. SARS)

Melicertum octocostatum: KRAMP, 1919, pp. 52-57; —, 1933, pp. 237-239; RANSON, 1933, p. 316-318.

Melicertum campanula: UCHIDA, 1927 (a), pp. 220-221; KRAMP, 1933, pp. 237-239; THIEL, 1932, p. 143.

In 1933 KRAMP, who examined both European species *octocostatum* and the American species *campanula*, came to the conclusion that *M. campanula* is merely a somewhat larger growth-form of *M. octocostatum*. The Japanese medusae, though deficient in the longitudinal lines of nematocyst-like cells on the subumbrella, have been here identified with *M. octocostatum* following KRAMP's proposition. On July 11, 1929 six specimens of this species were collected at Muroran, Hokkaido. Most of these specimens lack the subumbrellar longitudinal lines of nematocyst-like cells. A single comparatively young medusa has four or five dotted longitudinal subumbrellar lines, but these lines are not distinct and are quite different from radial canals in appearance.

Distribution. Northern parts of the Atlantic, on European and American coasts.

Family EUCOPIDAE

Eucheilota paradoxa MAYER

A single specimen probably belonging to this species was obtained in Mutsu Bay in August, 1921. It agrees exactly with MAYER's description. This medusa is often found in the summer months at Misaki.

Obelia sp.

Medusae of *Obelia* are frequently observed in plankton from the Pacific coasts of Japan, but the specific identification of most of them is difficult without any knowledge of their hydroids.

Phialidium discoida (MAYER)

Phialidium discoida: UCHIDA, 1927 (b), pp. 221-222.

The medusa is frequently collected on the coasts of Honshu from the later part of summer to the early part of autumn. The young medusae of this species, which are provided with only eight tentacles, four perradial and four interradial, bear already well developed round gonads on their radial canals.

Family MESONEMIDAE

Aequorea coerulea (BRANDT)

Aequorea coerulea: UCHIDA, 1927 (a), pp. 222-224.

This species is a warm water form. It reaches nearly 150 mm in diameter. The distribution of this medusa in Japan is around Honshu. Specimens from Mutsu Bay were observed to harbour large young forms of the actinian *Peachia quinquecapitata*.

Family OLINDIADAE

Gonionemus oshoro UCHIDA

Gonionemus oshoro: UCHIDA, 1929, pp. 359-360.

Gonionemus murbachi (in part): BROCH, 1929, pp. 488-389.

Gonionema murbachi var. *oshoro*: UCHIDA, 1927 (a), pp. 224-225.

This species is distributed around Hokkaido and on northern coasts of Honshu. It is found among Sargassum during July-August and is injurious to sea-bathers on account of its nematocysts. The present author described the medusa as a variety of the American species, *G. murbachi* but afterwards separated it as a distinct species. BROCH states that the species is related to *G. vertens* rather than to *G. murbachi* but is different from the former in the form of the gonads. Reading UCHIDA's paper (1929) he wrote personally that the institution of *G. oshoro* as a distinct species seems to be more right than to keep it as a variety of *G. murbachi*.

TRACHOMEDUSAE

Family TRACHYNEMATIDAE

Aglantha digitale MÜLLER

Aglantha digitale: UCHIDA, 1927 (a), p. 225; —, 1928, p. 79; —, 1930, p. 335; THIEL, 1932, p. 154; UCHIDA, 1933, p. 132.

The medusa is one of the boreal forms and is common in the waters of Hokkaido and the Kurile Islands. The species is known in Japan southwards to Misaki in the Pacific and off Fukui Pref. in the Japan Sea.

Family GERVONIIDAE

Liriope tetraphylla (CHAMISSO et EYSENHARDT)

Liriope tetraphylla: UCHIDA, 1928, pp. 82-83.

This medusa is common around Honshu and southern parts of Hokkaido. Large examples are usually obtained in winter in southern parts of Honshu.

Scyphomedusae

CUBOMEDUSAE

Charybdea rastonii HAACKE

Charybdea rastonii: UCHIDA, 1927 (a), p. 226; —, 1929, pp. 157-172.

The detailed description of this medusa was given by the present writer (1929). The species appears in Japan in September in bays of Honshu and Kyushu, especially in warm waters. It is further known in the Japan Sea from points on the western coast of Hokkaido such as Oshoro and Rumoé. Recently THIEL (1936, in BRONN's Klassen u. Ordnungen, Bd. 2) examined the Japanese medusa sent by the writer and reduced the species of the genus to the single Mediterranean species *C. marsupialis*. Though his conclusion is very probably correct, it seems to the present writer to be a little premature, because the former species has not been collected in such great numbers as the Japanese species and its metamorphosis has not been studied. The form of gonads, pedalia and velar canals is variable according to growth stage.

STAUROMEDUSAE

Stenocyphus inabai (KISHINOUE)

Stenocyphus inabai: UCHIDA, 1929, pp. 107-112.

By the kindness of Prof. S. HÔZAWA the author could examine several specimens of this stalked medusa of warm waters, which were collected in August, 1931 in Mutsu Bay. This species has been recorded only from the coasts of Honshu and Kyushu.

Haliclystus auricula CLARK

Haliclystus auricula: UCHIDA, 1927 (a), pp. 226-228; —, 1929, pp. 113-130; LING, 1937 (b), pp. 6-10.

This medusa is common in Mutsu Bay and the southern and western coasts of Hokkaido, but it is occasionally found, though not large in numbers, on several coasts of Honshu and Shikoku. Recently LING recorded the species from Tsingtao, China.

Sasakiella cruciformis OKUBO

Sasakiella cruciformis: UCHIDA, 1927 (a), pp. 228-229; —, 1929, pp. 140-149; LING, 1937 (b), pp. 16-25.

Detailed notes of the medusa were given by UCHIDA (1929). Recently LING reported the species from Tsingtao, China and described several abnormal forms. The species is hitherto known in Japan from southern parts of Hokkaido (Oshoro and Muroran) and northern parts of Honshu (Mutsu Bay and Onagawa Bay).

SEMAEOSTOMAE

Family PELAGIDAE

Dactylometra pacifica GOETTE

Dactylometra pacifica: UCHIDA, 1927 (a), pp. 229-230; —, 1935, p. 44.

The medusa is one of the commonest medusae in Japanese waters being found from winter to summer on the coasts of Honshu, Shikoku, Kyushu, Loochoo Islands and Korea. In Mutsu Bay it is occasionally abundant during spring and summer. The species is further, though seldom, found on the coasts of Hokkaido and Saghalien as a temporary visitor.

Family CYANEIDAE

Cyanea capillata ESCHSCHOLTZ

Cyanea capillata: UCHIDA, 1927 (a), pp. 230-232.

The medusa is an arctic form and is not rare in summer in waters of Hokkaido and Saghalien, but rather rare in Mutsu Bay. Mainly on the basis of the canal system, species of *Cyanea* seem to be able to be divided into two groups; *capillata*-group and *nozakii*-group. Medusae belonging to the former group are mostly distributed in the boreal regions, while those of the latter are restricted to warm and tropical waters.

RHIZOSTOMAE

Family RHIZOSTOMIDAE

Rhopilema asamushi UCHIDA

Rhopilema esculenta var. *asamushi*: UCHIDA, 1927 (a), pp. 233-236.

In the writer's former report this medusa was described as a variety of *R. esculenta* but it is easily distinguishable from the latter by the brown coloration and more robust appendages of oral arms. This species seems to be widely distributed in the Japan sea, from Mutsu Bay southwards. In medusae used as food material in Korea and Kyushu two forms are found; one brown and the other blue. The blue form is *R. esculenta* and the brown one is probably *R. asamushi*. The writer examined a well-developed specimen of *R. asamushi* which was collected and preserved in the Amakusa Marine Biological Station.

CTENOPHORA

Hormiphora palmata CHUN

Hormiphora palmata: UCHIDA, 1927 (a), p. 236.

This medusa occurs during April-July in Honshu and Hokkaido.

Beroë ramosa KOMAI

Beroë ramosa: UCHIDA, 1927 (a), p. 237.

This ctenophore has been hitherto known only from North Japan.

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MEDUSAE IN ONAGAWA BAY AND ITS VICINITY

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(With seven figures)

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Regarding the medusan fauna of the Northern Pacific coasts of Honshu only very meagre reports have been made. Recently through the kindness of Dr. T. IMAI the author had an opportunity to examine the medusae collected by the officers of the Onagawa Oceano-chemical Institute of the Tôhoku Imperial University from Onagawa Bay and its vicinity during these three years. From this collection it has been found that the medusae of Onagawa Bay are mostly in common with those from Mutsu Bay. Influenced by the cold current Oyashio cold water forms, such as *Sarsia tubulosa*, *Leuckartiara brevicornis*, *Willsia flavicirrata* and *Eutonia indicans* have been examined in this collection. Carried by the warm current Kuroshio, *Pelagia panopyra* was found off Onagawa Bay. As new forms to the Japanese waters *Leuckartiara brevicornis* and *Eucope fragilis* n. sp. have been here enumerated. The synonymic references of most of medusae here considered have mostly been omitted, because they have been given in the report on the medusae from Mutsu Bay (1938).

HYDROMEDUSAE

Anthomedusae

- 1) *Sarsia tubulosa* (SARS)
- 2) *Hydrocoryne miurensis* STECHOW
- 3) *Leuckartiara brevicornis* (MURBACH et SHEARER)
- 4) *Turritopsis nutricula* MC CRADY
- 5) *Nemopsis dofleini* MAAS
- 6) *Spirocodon saltatrix* (TILESUS)
- 7) *Willsia flavicirrata* (BRANDT)

Leptomedusae

- 8) *Eucope fragilis* n. sp.

- 9) *Eutonia indicans* HARTLAUB
- 10) *Obelia* sp.
- 11) *Tima formosa* AGASSIZ
- 12) *Aequorea coerulescens* (BRANDT)
- 13) *Gonionemus* sp.

Trachomedusae

- 14) *Aglantha digitale* MÜLLER

SCYPHOMEDUSAE

Stauromedusae

- 15) *Haliclystus auricula* CLARK
- 16) *Sasakiella cruciformis* OKUBO
- 17) *Sasakiella tsingtaoensis* LING?

Cubomedusae

- 18) *Charybdea rastonii* HAACKE

Semaestomae

- 19) *Pelagia panopyra* PÉRON et LESUEUR
- 20) *Dactylometra pacifica* GOETTE

Hydromedusae

ANTHOMEDUSAE

Sarsia tubulosa (SARS)

Sarsia tubulosa: UCHIDA, 1938, pp. 37-38.

Four specimens were collected on June 24, 1936 at Konorihama.

Distribution. North Atlantic coasts of Europe and America. In Japan: Hokkaido and Mutsu Bay.

Hydrocoryne miurensis STECHOW

Hydrocoryne miurensis: UCHIDA, 1938, pp. 37-38.

Four polyps were collected at Ishihama on April 25, 1926. No medusa bud observed.

Distribution. Only in Japan: Pacific coasts of Hokkaido and Honshu, from Akkeshi southwards to Shimoda, Shizuoka Pref.

Leuckartiara brevicornis (MURBACH et SHEARER)

Leuckartiara brevicornis: HARTLAUB, 1913, pp. 304-308; KRAMP, 1926, pp. 80-83; THIEL, 1932, pp. 135-136.

Since the original description this medusa from Alaska by MURBACH and SHEARER, the species has not been recorded from the North Pacific, though HARTLAUB and KRAMP examined fair numbers of this medusa collected in the North Atlantic. This

is one of the circumboreal forms. A single specimen was obtained in Okati Bay on May 21, 1937. The specimen measures 20 mm in height and 15 mm in diameter, the apical jelly mass being 6 mm high. Gelatinous substance fairly thick and rigid. Tentacles more than 120 in number, thickly set on the bell margin. They are laterally compressed and rapidly tapering in the distal portion. The tentacle bases are broad but the terminal shafts are narrow and coiled. No ocellus could be seen in this preserved specimen. Radial canals wide and zig-zag on the margins, becoming narrow in the upper portion. Ring canal narrower than the radial canals. Manubrium about 6 mm in length, reaching about midway the bell cavity, with large gastric portion and four well-developed crisped lips.

Gonads developed on the interradial portions of the manubrium. Each gonad has the typical *Leuckartiara* folds on both sides. The lateral folds are transversely arranged and seven or eight in number. The intermediate portion between these folds presents a complicated meshed appearance; this feature is quite different from other species of this genus and resembles the gonads of *Neoturris* and some of *Catablema*. The upper part of the gonad is a mixture of folded and meshed structure.

Distribution. Circumboreal, found in both the North Atlantic and the North Pacific.

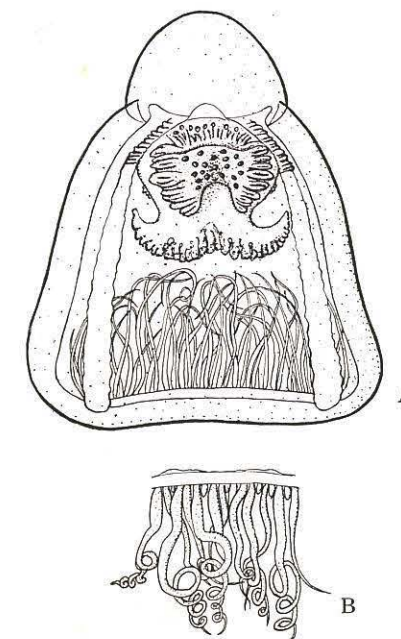


Fig. 1. *Leuckartiara brevicornis* (MURBACH et SHEARER); A side view, B axial view of a part of the bell margin.

Turritopsis nutricula MC CRADY

Turritopsis nutricula: UCHIDA, 1938, p. 40; LING, 1937 pp. 354-355.

About forty examples were obtained at Tori-shima on August 19, 1935.

Distribution. Atlantic coasts of Europe and North America. Mediterranean Sea. In the Pacific, from Hokkaido to Tsingtao. China.

Nemopsis dofleini MAAS

Nemopsis dofleini: UCHIDA, 1927, pp. 223-224; — 1930, p. 334.

About a dozen specimens were collected by a dredge in Onagawa Bay on July 2, 1935 and more than twenty examples were obtained in Koyatori Bay on July 18, 1935. The specimens in these two collections are large, over 20 mm high and about 18 mm wide, but more or less damaged.

Distribution. Only in Japanese waters, from Saghalien, Hokkaido to the Inland Sea, Honshu.

Spirocodon saltatrix (TILSIUS)

Spirocodon saltatrix: UCHIDA, 1938, p. 40.

Four specimens collected in front of the Oceano-chemical Institute on Jan. 11, 1936. The smallest specimen is 7 mm high and with 3 long and a pair of short tentacles in each octant. Radial canals give rise to many simple side branches. A large specimen, 62 mm high, 35 mm wide on the apical level and 56 mm wide on the basal level was caught at Konorihama on April 20, 1936.

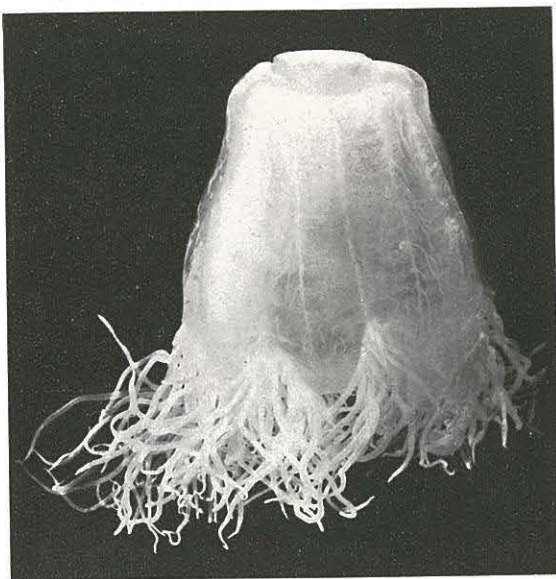


Fig. 2. *Spirocodon saltatrix* (TILSIUS) $\times 3/5$.

Distribution. Only in Japan, common in Honshu and Kyushu in February and March.

Willsia flavicirrata (BRANDT)

Willsia pacifica: UCHIDA, 1930, p. 334.

Willsia stellata: UCHIDA, 1930, pp. 334-335.

Willia pacifica: UCHIDA, 1927, p. 236.

Willia stellata: UCHIDA, 1927, pp. 235-236.

Probosciodactylia flavicirrata: BRANDT, J. F., 1838, pp. 390-391.

The following examples were examined; three collected in front of the Oceano-chemical Institute on Jan. 11, 1936, ten in Onagawa Bay on Oct. 14, 1936 and eight at Konorihama on Oct. 15, 1937. The present author who examined only young specimens of this medusa identified the Japanese medusa with *Willsia stellata*. Recently he collected many examples and has come to the conclusion that the Japanese species is different from the European species in the possession of more tentacles and more ex-umbrellar nematocyst strings. Moreover the Japanese medusa is variable in the number of groups of radial canals which range from 4 to 9, while the European species has, so far reported, always 6 groups of radial canals. MAAS reported on the Japanese medusa that his specimens has 6×18 radial canals and the mouth was complexedly crisped. Among the specimens from Onagawa Bay there are specimens with 6×16 radial canals and 4×12 radial canals. In larger specimens the mouth is provided with crisped lips. The further detailed discussion of this species will be published in a paper on the medusae from Akkeshi Bay. The young hexamerous specimen of this medusa cannot be distinguished from the European species, *Willsia stellata*.

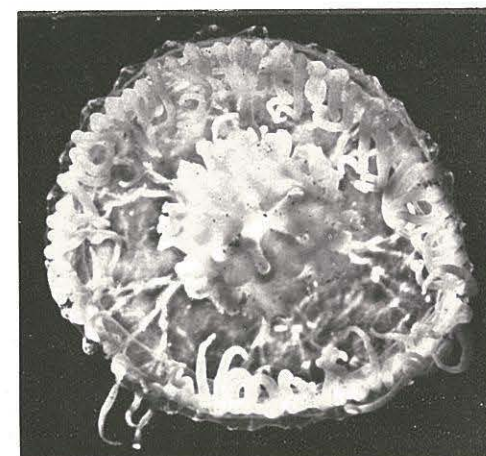


Fig. 3. *Willsia flavicirrata* (BRANDT) $\times 10$; six-sided specimen.

LEPTOMEDUSAE

Eucope fragilis n. sp.

Eight specimens were collected on June 24, 1936 at Konorihama.

They are all adult medusae, nearly similar in diameter and in number of tentacles. Body dome-shaped, 9–12 mm high and 5–6 mm wide. Gelatinous substance very thin and soft. Manubrium lacking peduncle, 1–1.5 mm long, four-sided, with well-developed lips. Four radial canals and a ring canal, narrow and straight. Tentacles 16 in all, four perradial, four

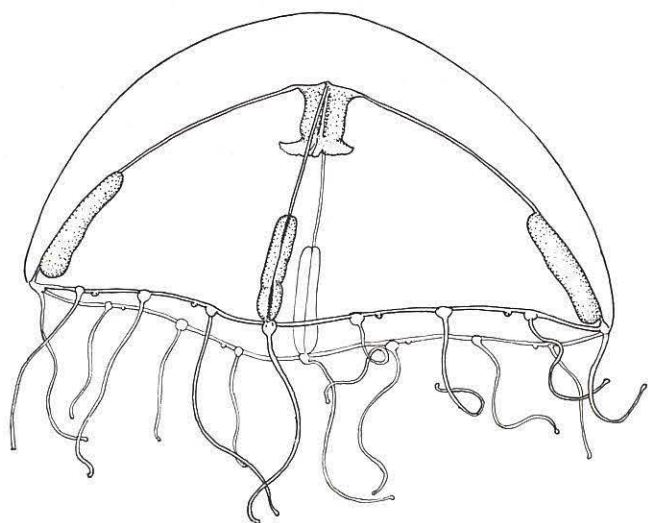


Fig. 4. *Eucope fragilis* n. sp.

interradial and eight adradial, the perradial ones slightly longer than the others and the adradial slightly shorter than the interradial. Tentacles hollow, each composed of a well-developed large tentacle bulb and a narrow distal shaft which is usually coiled in these preserved specimens. Statocysts, eight in number, situated between the adradial and the interradial tentacles, nearer to the former than to the latter. They are mounted on warts arranged along the ring canal. Small warts which are probably rudimentary tentacles are sometimes found midway on the ring canal between the adradial and interradial tentacles. Gonads linear sac-like, developed upon the lower half of the radial canals, shorter than half the length of the radial canals. Colourless in preserved specimens. Manubrium, tentacle bulbs and gonads opaque.

This species is different from most of the other medusae belonging to *Eucope* in having more than eight tentacles. But in regard to the number of tentacles it is probable to be young medusae of *E. globosa* (Haddon) occurring in English and Dutch waters. The Atlantic medusa having 32

or more tentacles in the adult is thick in jelly and higher than a hemisphere in shape. Moreover, gonads of *E. globosa* develop upon the radial canals as four small oval swellings at the middle parts of the four canals, while those of *E. fragilis* n. sp. are oblong and extend near the ring canal.

Eutonia indicans (ROMANCES)

Eutonia indicans: UCHIDA, 1933, p. 131.

A large specimen measuring about 40 mm in diameter was collected on May 11, 1937 at Myozinmae, Okati. Another specimen, smaller than the former, was obtained by Prof. S. HOZAWA at Izushima on April 20, 1931. This species is widely distributed in the North Atlantic.

Distribution in Japan. Kurile Islands and South-Eastern coasts of Hokkaido.

Obelia sp.

Seven specimens were collected on Oct. 20, 1936 in front of the Institute and about a dozen specimens were caught on Oct. 15, 1937 at Konorihama.

Tima formosa AGASSIZ

Tima formosa: UCHIDA, 1925, p. 92.

A single young specimen was collected at Mangoku-ura on Dec. 14, 1936. The bell of the example is dome-like, measuring 34 mm in diameter and 17 mm in height. Peduncle, cylindrical, slightly narrowed distally, hanging below the opening of the bell, 15 mm in the whole length, with manubrium 4 mm in length. Tentacles had mostly been shed off but seemingly about 10 in each quadrant. They are different in length and in this specimen not arranged regularly. The basal bulbs of the tentacles are long and somewhat ribbon-like, while the main shafts of the tentacles are narrow and prehensile. Between the tentacles are found statocysts and rudimentary tentacles, though they are often worn off. Gonads, very narrow, developed on nearly the whole length of the radial canals. They are infrequently waved in the parts of the peduncle but slightly folded in the subumbrellar part, especially in the middle or in the marginal portion. Manubrium with a short gastric part and with four well developed lips which are fairly crisped on the margins. From the slightly developed gonads it seems to be a young specimen of *T. formosa*, which was formerly recorded by the writer from Oshoro, Hokkaido. BIGELOW (1913)

recorded another species *T. saghalinensis* from Saghalien basing on a single large specimen. This species may be a well-developed specimen of the present species but is distinct by the shorter peduncle.

Distribution. American coasts of the North Atlantic. In the Pacific, Northern Japan.

Aequorea coerulescens (BRANDT)

Aequorea coerulescens: UCHIDA, 1938, p. 42.

A large specimen, 95 mm in diameter, was examined. It was caught in June, 1935 at Konorihama.

Distribution. Pacific coasts of Japan. Common in warm waters.

Gonionemus sp.

A damaged specimen. From the form of the umbrella it seems to belong to *G. depressum*. The specimen was obtained on July 17, 1936 in Ommaewan.

TRACHOMEDUSAE

Aglantha digitale MÜLLER

Aglantha digitale: UCHIDA, 1938, p. 43.

Four young specimens were collected off Enoshima on May 19, 1936. This is one of the circumboreal forms. On the Pacific coasts of Japan it was found southwards to Misaki.

Scyphomedusae

STAUROMEDUSAE

Haliclystus auricula CLARK

Haliclystus auricula: UCHIDA, 1938, p. 44.

An adult and two young specimens were collected on August 17, 1935 at Ishihama.

Distribution. In the Pacific from Northern part of Canada through Alaska, Hokkaido, Honshu, Shikoku to Tsingtao.

Sasakiella cruciformis OKUBO

Sasakiella cruciformis: UCHIDA, 1927, pp. 228-229; —, 1929, pp. 146-149; LING, 1937, pp. 16-25; UCHIDA, 1938, p. 44.

Six specimens were collected at Nonohama on August 19, 1935.

These preserved specimens are not so deeply pigmented. Among them the largest specimen is 17 mm in diameter with arms of 2.3 mm long, with eight primary tentacles and in each bunch 17 secondary tentacles.

This species is widely variable in colour. The medusae occurring at Oshoro are all black but those from Mutsu Bay black or brown. According to LING, specimens at Tsingtao are commonly light greenish brown, but variable from light green to deep brown. Moreover, pure green or yellow examples are seldom observed.

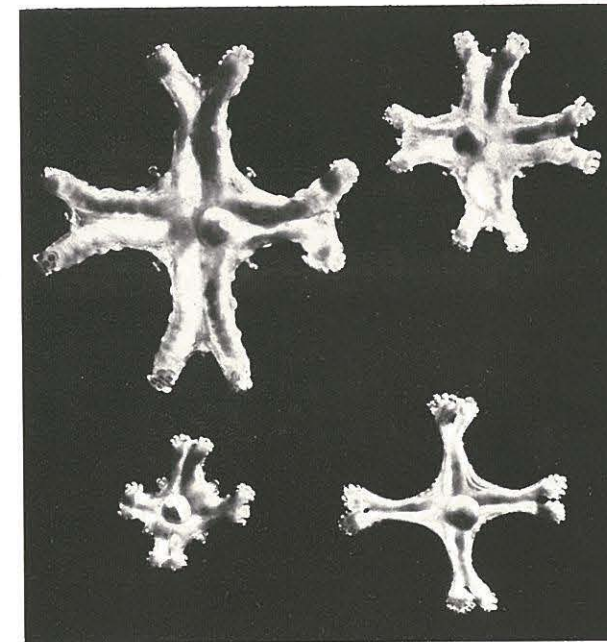


Fig. 5. Aboral views of three specimens of *Sasakiella cruciformis* OKUBO and an example of *Sasakiella tsingtaoensis* LING? which is figured in the lower corner on the right side. $\times 3$.

Distribution. From southern parts of Hokkaido, through Mutsu Bay, to Onagawa. In China, Tsingtao.

Sasakiella tsingtaoensis LING?

Sasakiella tsingtaoensis: LING, 1937, pp. 25-28.

The single specimen caught at Ishihama on August 17, 1935 coincides with the Chinese specimens in the outline of the body. The specimen is nearly colourless in preserved condition, 11 mm in diameter and has 15

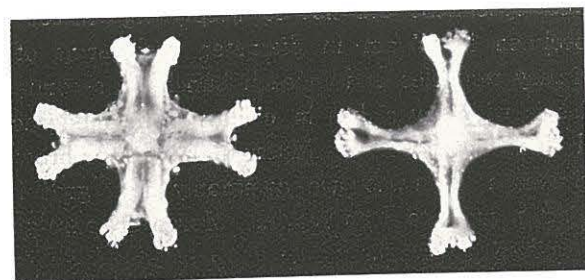


Fig. 6. Oral views of *Sasakiella cruciformis* OKUBO (on the left) and *Sasakiella tsingtaoensis* LING? (on the right side). $\times 3$.

tentacles in each adradial bunch, which are arranged in two or three rows. Nematocyst clusters sparsely distributed on the exumbrella but richly on the subumbrella. The specimen resembles the Chinese species in the slender body, especially narrowed near the base of the arms and in the lack of the four primary tentacles in the interradii but is quite different from the latter in the lack of the four primary tentacles in the perradii. These features must be noticeable, because *Sasakiella* is distinguished from *Kishinouyea* in the possession of eight primary tentacles in the perradii and interradii. Therefore, the example destitute of all primary tentacles seems to be eligible for *Kishinouyea* and may be identified with *Kishinouyea nagatensis*. The specimen, however, being in general agreement with the Chinese specimen, seems to be an abnormal specimen of the latter.

On account of the occurrence of this specimen and Chinese specimens of *S. tsingtaoensis*, however, the distinction between *Sasakiella* and *Kishinouyea* becomes very obscure. Moreover, the coloration of the Chinese *Sasakiella* is like that of medusae belonging to *Kishinouyea*. On the other hand, there exist the two facts that several hundreds of specimens of *S. cruciformis* observed in Japan and China are always provided with eight primary tentacles, while several dozens of individuals belonging to *Kishinouyea nagatensis* always entirely lack primary tentacles. At any rate, *Sasakiella* seems to have the tendency to lose the primary tentacles, first the interradial and then the perradial, and to diverge to *Kishinouyea*. It seems to the writer that it is very important for the study on the interrelation of these two genera to observe the metamorphosis of *Kishinouyea*. The metamorphosis of *S. cruciformis* has been already studied by the writer.

CUBOMEDUSAE

Charybdea rastonii HAACKE

Charybdea rastonii: UCHIDA, 1938, p. 43.

Two young medusae were obtained on November 18, 1936 in front of the Laboratory.

Distribution. In the Pacific, in warm waters. In Japan; from Hokkaido to Formosa.

SEMAEOSTOMAE

Palagia panopyra PÉRON et LESUEUR

Palagia panopyra: UCHIDA, 1935, p. 43.

Three medusae were collected off Kinkwazan on Sep. 25, 1936. This

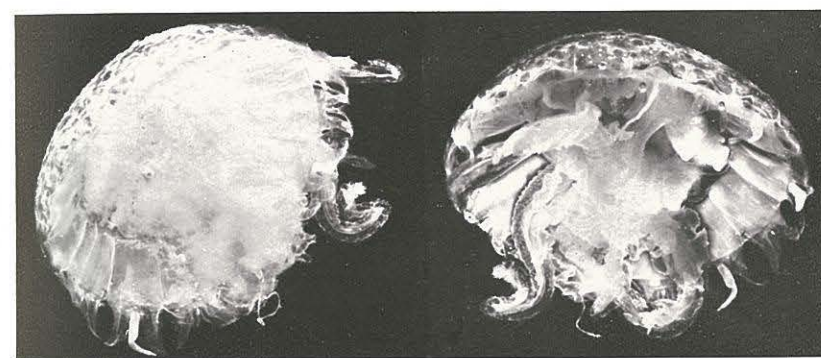


Fig. 7. *Palagia panopyra* PÉRON et LESUEUR, dorsal and ventral views. $\times 1$.

species is carried on the warm current, Kuroshio. The length of the oral arms is variable in preservation.

Dactylometra pacifica GOETTE

Dactylometra pacifica: UCHIDA, 1935, p. 44.

A specimen was obtained at Konorihama on August 28, 1936.

Distribution. From Honshu to the Loochoo Islands.

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