

SOME FURTHER RECORDS OF PELAGIC POLYCHAETA FROM
THE NORTHEAST PACIFIC NORTH OF LATITUDE 40° N. AND
EAST OF LONGITUDE 175° W., TOGETHER WITH RECORDS
OF SIPHONOPHORA, MOLLUSCA, AND TUNICATA FROM
THE SAME REGION¹

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Abstract

Seventeen species of pelagic Polychaeta from the northeastern Pacific are recorded. Of these, five (*Sphaerosyllis pirifera* Claparède, *Dorvillea kefersteini* McIntosh, *Spiophanes cirrata* Sars, *Magelona* sp., and *Flabelligera affinis* Sars) are species which, whilst not exclusively pelagic, are known to swim at some stage, particularly as larvae. One record (*Pedinosoma curtum* Reibisch) is new to the Pacific Ocean, two (*Pontodora pelagica* Greef and *Callizona nasuta* Greef) are new to the northeastern Pacific region, and four (*Pelagobia longicirrata* Greef, *Lopadorhynchus uncinatus* Fauvel, *Sagitella kowalewskii* Wagner, and *Callizona angelini* (Kinberg)) are records of northerly extensions of distribution. The first observation of a larval Cossura (probably of *C. longocirrata* Webster and Benedict) is recorded. *Poebius meseres* Heath is recorded from a number of stations and the classification of Poebiiidae is discussed.

Eight species of Siphonophora are listed, all of which constitute new records for the region covered by the present collections. Six species of Mollusca, comprising five Pteropoda and one Heteropoda, are recorded, none of which have been identified previously in northeastern Pacific plankton. Three of the genera of Pteropoda (*Anopsia*, *Thliptodon*, and *Cliopsis*) are characteristic of warmer seas, the other two, and the heteropod, are widely distributed. Of the two species of Tunicata listed one is new to the northeastern Pacific.

Introduction

In 1957 (6) we recorded a number of pelagic polychaetes which had been collected in plankton samples by the vessels engaged in the survey activities of the Fisheries Research Board of Canada in the northeast Pacific during 1955 and 1956. The present paper records species taken in the course of similar activities during 1957, 1958, and 1959, together with notes on a few others which, though not usually regarded as pelagic, have been found free-swimming in the region in which the collections were made.* Several of the species mentioned herein were already recorded in 1957, but from single, or few, specimens. Others (such as *Tomopteris septentrionalis* Quatrefages and *Plotohelmis tenuis* (Apstein)), which are of very general occurrence, are now omitted.

During the years we have been examining specimens from these plankton collections we have encountered a number of animals belonging to groups other than the Polychaeta. These we have sent to specialists in the several fields for identification and we now append their findings in respect of the Siphonophora, Mollusca, and Tunicata.

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*For chart of this region see reference 6.

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Polychaeta

Phyllodocidae

Pelagobia longicirrata Greef. Fauvel (12), Ushakov (36)

47° 00' N., 136° 07' W., 150–0 m, one specimen

50° 07' N., 144° 50' W., 150–0 m, one specimen

50° 05' N., 145° 20' W., 150–0 m, one specimen

50° 01' N., 145° 02' W., 150–0 m, one specimen

43° 42' N., 136° 00' W., 300–200 m, four specimens

45° 02' N., 147° 06' W., 150–0 m, one specimen

50° 00' N., 145° 00' W., 150–0 m, several specimens

The present records extend the distribution of this species in the northeast Pacific northwards, that of Treadwell (35, as *P. vigiueri*), at 40° N., being the most northerly previous one. In the northwest Pacific Ushakov (37, map 1) indicates its occurrence at about 55° N. and he has also recorded it in the north polar region (38). It is widely distributed in the Atlantic, in the Mediterranean and Indian oceans, and in the Antarctic. It may, therefore, be regarded as cosmopolitan.

This species and *P. vigiueri* Gravier have been confused in the literature. They are now regarded as synonymous (37).

Pontodora pelagica Greef. Fauvel (12), Ushakov (37)

50° 00' N., 145° 00' W., 1250–0 m, five anterior, one posterior, one median portion

The specimens agree with Fauvel's (12) and Ushakov's (37) descriptions. The cirri are not easily distinguished and a few of them are lost in some of the specimens. The orange spotting (due, apparently, to an oily secretion) is very conspicuous in some of them.

The species has not been described previously from the northeast Pacific and there appears to be no record of it anywhere in the north Pacific north of about 40° N. (37). Ushakov (37) records several instances of its occurrence off the coast of Japan and from the Arctic Ocean between 75° N. and 85° N. (38). He considers *Epitoka pelagica* Treadwell is a synonym, a conclusion with which we agree. All other records from the Pacific are from the southern hemisphere (35). The species is known from the Mediterranean and, in the Atlantic, from the Canary Islands.

Lopadorhynchus uncinatus Fauvel. Fauvel (12), Wesenberg-Lund (39), Dales (11)

54° 30' N., 152° 00' W., 150–0 m, one specimen

A single complete specimen a little more than 1 mm long, probably larval, agrees completely with the characters of the adult as given by the above

authors. Dales' record from about 38° N. (11, Fig. 6) is the most northerly in the northeast Pacific hitherto. It is now recorded considerably further north. Treadwell (35, as *L. brevis* and *L. nans*) records it from off Japan and from numerous stations in the South Pacific. It is common in the Mediterranean and is recorded from the north and south Atlantic.

Pedinosoma curtum Reibisch. Reibisch (31), Fauvel (12)

53° 32' N., 151° 57' W., 150–0 m, one specimen

A single specimen 1 mm long agrees with the descriptions of Reibisch and Fauvel. The species has not been recorded previously from the Pacific. Earlier records are mainly from the southern Atlantic between the equator and 20° N., the most northerly point reached being in the neighborhood of the Azores (31, Taf. 7), and in the Mediterranean.

Phalocrophorus pictus Greef. Fauvel (12)

50° 28' N., 131° 11' W., 150–0 m, one specimen

43° 42' N., 136° 00' W., 150–0 m, two specimens, one with extended jaws

50° 01' N., 145° 02' W. (approximate), one specimen

Our previous record of this species (6) remains the farthest north in the north Pacific.

Typhloscolecidae

Travisioopsis lobifera Levinsen. Fauvel (12)

51° 00' N., 130° 00' W., 20-m tow, three large specimens

50° 00' N., 145° 00' W., 150–0 m, three specimens

47° 30' N., 138° 54' W., surface, one specimen

This species was recorded from a single specimen in 1957 (6). It is now found at about the same latitude, but further east.

Typhloscolex mülleri Busch. Fauvel (12)

50° 55' N., 129° 08' W. (approximate), 50-m tow, one specimen

50° 27' N., 132° 11' W., 150–0 m, one specimen

52° 02' N., 136° 00' W., 50-m tow, two specimens

55° 03' N., 149° 54' W., 150–0 m, one specimen

54° 30' N., 152° 00' W., 150–0 m, one specimen

In addition to the above the species has been taken from four other stations in the map area for which bearings are not available. It was reported in 1957 (6) from three stations and would thus appear to be fairly common.

Sagitella kowalewskii Wagner. Fauvel (12)

50° 01' N., 145° 02' W., 1200–0 m, one specimen

43° 42' N., 136° 00' W., 300–200 m, four specimens

50° 01' N., 145° 02' W., 150–0 m, one specimen

This species was recorded by one of us (E. B.) off the west coast of Vancouver Island at about 49° N. in 1930 (2). This remained the most northerly point in the northeast Pacific from which it was known until the present

records. It was, however, previously found at a slightly more northerly station in the northwest Pacific by Ushakov (37, map 4). It is more generally known from warmer seas.

Syllidae

Sphaerosyllis pirifera Claparède. Fauvel (12)

57° 32' N., 151° 42' W., 150–0 m, one specimen

This species, previously recorded from both coasts of Vancouver Island (3), has not, hitherto, been taken as a plankton. Fauvel (12) mentions swimming forms with long natatory setae in the male. These characterize the present specimen. It is interesting to find it so far from coastal waters.

Autolytus varius Treadwell. *Sacconereis*. E. and C. Berkeley (3)

53° 53' N., 148° 00' W., 150–0 m, four specimens

This species is a well-known offshore plankton in the Nanaimo region in the *Sacconereis* phase, but has not previously been found so far at sea. The specimens are typical.

Alciopidae

Callizona angelini (Kinberg). Fauvel (12)

50° 00' N., 145° 00' W., 150–0 m, two specimens

52° 30' N., 142° 00' W., surface at night, one specimen

53° 17' N., 143° 53' W., 25-m tow, one specimen

50° 00' N., 145° 00' W., 150–0 m, three specimens

55° 40' N., 151° 10' W., surface, one specimen

The earliest records of this species in the northeast Pacific were off the east coast of Vancouver Island at about 50° N. lat. and 125° W. long. (2). In 1957 (6) we listed a second one at about the same latitude, but as far west as 169° W. The present records are from stations intermediary in longitude between these extremes, thus extending the distribution across a considerable region of the width of the map area at about 50° N. lat. The northerly range is now extended to 55° N. lat.

The species is recorded off Japan and, widely, between 20° N. lat. and 20° S. lat. by Treadwell (35, as *Rhynchonerella pycnocera*). It is fairly common in the Atlantic (39).

Callizona nasuta Greef. Fauvel (12), Wesenberg-Lund (39)

48° 32' N., 126° 09' W., 50–0 m, one specimen

45° 00' N., 147° 00' W., 150–0 m, one anterior fragment

54° 30' N., 152° 00' W., 150–0 m, one anterior fragment

This species has not been recorded previously from the northeast Pacific. It is, however, known off the coast of Japan (37). The present specimens are typical and are readily recognizable even in the absence of the posterior regions. There is only one heavy and simple acicular seta in any of the anterior setigers. This, the projection of the central part of the prostomium in front of the eyes, and the narrow, sharply pointed, dorsal cirri are quite characteristic. It is known from the Atlantic and Mediterranean.

Tomopteridae

Tomopteris (Johnstonella) renata. E. and C. Berkeley (3)

50° 26' N., 151° 24' W., 150–0 m, one incomplete specimen

50° 01' N., 145° 02' W., 1200–0 m, one incomplete specimen

50° 01' N., 145° 02' W., 150–0 m, three good specimens

50° 01' N., 145° 02' W., 150–0 m, one specimen

55° 00' N., 150° 00' W., 60-m tow, one good specimen

In our 1957 paper (6) we commented on the absence of this species from the plankton samples and suggested that it might be an inshore form in the northeast Pacific, though it had been taken in open waters from regions farther west (36). The above records show that this surmise was erroneous. The characters differentiating the present species from *T. pacifica* Izuka, which we pointed out in our previous paper (6), are well exemplified in the present specimens. The last one listed is the largest yet known (45 mm long, excluding the tail).

Eunicidae

Dorvillea kefersteini McIntosh. McIntosh (27), Fauvel (12)

50° 55' N., 129° 08' W., 50–0 m, one specimen

The single small specimen (about 5 mm long as preserved) agrees with this species except in that the antennae are rather shorter and thicker than described (cf. ref. 12, Fig. 177 *m*). This may well be due to excessive contraction. The dorsal cirri lack both cirrophores and acicula, a character it shares with *D. gracilis* Hartman, but it differs from that species in having the palps non-articulate, except at the tips, and parapodia with much longer setal lobes.

D. kefersteini is not a true pelagic species, though McIntosh (27) records its ability to swim. It has not been recorded previously from the west coast of North America.

Spionidae

Spiophanes cirrata Sars. E. and C. Berkeley (4)

48° 33' N., 123° 30' W., surface, eight larval specimens

The specimens vary in length from 1 to 2 mm. The longer individuals are at an advanced larval stage consisting of 20 segments. Most of the swimming setae have been shed. These larvae are readily differentiated from those of *S. bombyx* (Claparède), the only other, and much less common, species known in the region, by the absence of prostomial "horns" and the presence of tridentate crotchets in posterior setigers.

The adults of this species are mud dwellers. The larvae have not been described, but a very complete account of those of a very nearly allied form, *S. kröyeri* Grube, is given by Hannerz (15). The present specimens agree closely with this account. It would not be anticipated that the single character differentiating *S. cirrata* from *S. kröyeri* (the presence of "soies bacillaires" in the former, but not in the latter) would be apparent in the larvae. Larvae of *S. kröyeri* are said to be common at particular seasons in the plankton in Gullmar Fjord, Sweden (15).

Magelonidae

Magelona sp. E. and C. Berkeley (4)

44° 9' N., 130° 53' W., 100–0 m, four larvae

51° 34' N., 133° 24' W., 50–0 m, one larva

Most of the specimens are less than 2 mm long. Whilst their generic identity can be recognized from the long papillated palps the adult characters are not sufficiently developed for specific determination. Adults of two species, *M. japonica* Okuda and *M. pitelkai* Hartman, are known from the region. Assuming the larvae to belong to one or other of those species, *M. pitelkai* seems to be the more probable, judging by the form of the prostomium and of the special setae of the ninth setiger. The larvae of neither *M. japonica* nor *M. pitelkai* have been recorded. Those of other species of *Magelona* are known to occur in the plankton (33, 22).

Cirratulidae

Cossura sp. (probably *C. longocirrata* Webster and Benedict). E. and C. Berkeley (5)

51° 34' N., 133° 24' W., 50–0 m, one larva

The specimen is about 2 mm long and consists of about 22 segments. Measurements are difficult owing to its curled condition. It is incomplete posteriorly. The single long median cirrus (branchia) is characteristic of the genus, but specific identification is impossible. It is probably *C. longocirrata* Webster and Benedict, since this is the only *Cossura* recorded from the northwest coast of North America north of California (5). Two other species are known from California, *C. candida* Hartman and *C. pygodactylata* Jones. The former is excluded in the present instance since the branchial process is attached to the second, instead of the third, setiger; the latter, however, remains a possibility (18). No setae other than very long fine larval capillaries can be detected. We have been unable to find any previous record of a larval *Cossura*.

Chloraemidae

Flabelligera affinis Sars. Fauvel (13)

Friday Harbour, Wash., U.S.A., swarming at dock

Five specimens, the longest of which measures 20 mm, were taken at a night light by Dr. R. L. Fernald of the Friday Harbour Laboratories. They were sexually mature and spawning. The only reference we have been able to trace to the swarming of this species is given by McIntosh (28) as having been observed by Dr. H. C. Sorby in the River Orwell, in England. Its occurrence at Friday Harbour (which falls within the region dealt with in this paper) seems noteworthy.

There is no previous record of the occurrence of the species at Friday Harbour nor elsewhere on the northwest coast of North America, *F. infundibuliformis* (Johnson) being the only representative of the genus known hitherto in the region. The present specimens differ from *F. infundibuliformis*, and

agree more closely with *F. affinis*, in respect of the much smaller number of segments, less sharply curved hooks, and the possession of two types of stalked cuticular papillae. The two species are, however, very closely allied. Pettibone (29) regards them as synonymous.

Miscellaneous Larvae

In addition to the above many larvae too small or imperfect to identify to species occur in the material. Amongst these, Spionidae are the most frequent, many of them sufficiently advanced to place in the genus *Polydora* by the presence of the modified fifth setiger. Eunicidae (*Dorvillea*?) and several kinds of Polynoidae also occur. The distribution seems to be indiscriminate.

Poeobiidae

Poeobius meseres Heath. Heath (17), Pickford (29)

53° 13' N., 160° 53' W., 400–200 m, several

53° 49' N., 159° 32' W., 300–200 m, several

54° 17' N., 146° 37' W., 400–300 m, several

51° 51' N., 146° 37' W., 400–300 m, several

51° 48' N., 153° 20' W., 400–300 m, several

54° 26' N., 158° 07' W., 400–300 m, several

48° 20' N., 175° 30' W., 300–200 m, several

48° 10' N., 171° 21' W., 200–100 m, several

52° 01' N., 169° 44' W., 400–300 m, several

49° 19' N., 175° 30' W., 200–100 m, several

51° 43' N., 155° 00' W., 150-m tow, several

53° 33' N., 148° 00' W., 150-m tow, several

The first observations of this species in our plankton material were made in 1956. It was not, however, reported in 1957 (6) since its identity had not then been determined. All, except the last two, of the above records date from 1956 when it occurred plentifully between long. 146° N. and long. 175° N. in the vicinity of 50° lat. The last two records date from 1958; since that time it has been found frequently in samples from 150 m or deeper. The species was originally recorded in 1930 from Monterey Bay, California (17), and subsequently in the same locality and elsewhere off the coast of California (16). At about the same time it was taken off SE. Alaska (30). Since then it has been collected by a number of expeditions exploring the north Pacific. McGowan (26) summarizes the localities (Fig. 3) and indicates a lack of data on distribution in the region of the area covered in the present paper. It has always been taken at moderate to deep levels. Most of the examples we have examined have been in the contracted condition figured by Heath (17, Plate 1, Fig. 1); only a few had the ends of the palps and tentacles emerging. Through the kindness of Dr. O. Hartman we have, however, been able to examine specimens collected off northern California by Dr. Martin Johnson which show the anterior region fully emerged and expanded as shown in her figure (16, Plate 1, Fig. 6). The length of our specimens varied from 6 to 17 mm.

The genus *Poeobius*, with type species *P. meseres*, was described from material collected in Monterey Bay, California, by Heath (17) and was regarded as a member of a new family Poeobiidae, to be included, provisionally, in the Echiuroidea. It was, however, recognized that it had certain affinities with the Polychaeta. Classification with the Echiuroidea was accepted by later workers until disputed by Fisher (14), who stressed the characters in which it differs from the Echiuroidea and agrees with the Polychaeta, but, in the absence of several characters hitherto regarded as essential to Polychaeta, found difficulty in including it in that group either. He suggested the setting up of a new phylum Poeobioidea to accommodate it. Pickford (30) whilst agreeing with Fisher as to its exclusion from Echiuroidea considered that, in the light of such affinities with Polychaeta as Heath and Fisher had pointed out and of others she was able to indicate, classification in that group was justified and concluded that it is an "aberrant polychaete". We are inclined to share Fisher's difficulty in including it in the Polychaeta in the complete absence of paired appendages, somatic segmentation, and setae.

Hartman (16) accepted Pickford's view and carried the argument in favor of polychaete analogy a stage further, suggesting its classification with the Flabelligeridae, but, in spite of the characters common to that family and *Poeobius*, which she indicated, the analogy is not altogether satisfying, in particular with regard to the comparison which is made between the gelatinous sheaths which occur in both. These differ fundamentally. That in *Poeobius* is internal, occupies a well-defined area between the hypodermis and the somatic musculature, and is sufficiently rigid to give the body in life considerable turgidity (17, p. 228). In *Flabelligera* the jelly is external, mucous, and follows only roughly the contour of the animal to form a protective covering.

On the whole there seems to be a case for classifying *Poeobius* amongst the Archiannelida, a group lending itself to the reception of such anomalous Annelida, until something is known of its development.

Siphonophora

Identification of the Siphonophora was kindly undertaken by Dr. G. O. Mackie, of the University of Alberta, who had already collected and identified some of the species recorded from localities in the region covered by the present paper. At his request these records are included here. They are indicated under each species by his initials or by those of the following collectors who sent him material: Mr. H. Menkes, of the Canadian Hydrographic Survey, Mr. A. Fontaine, of Victoria College, Victoria, B.C., and Dr. C. Carl, of the Provincial Museum, Victoria, B.C. Dr. Mackie wishes to acknowledge help he has received in the identifications from Mr. A. K. Totton of the British Museum.

Calcyophorae

Vogtia sp. K  lliker. Bigelow (9), Moser (25, Tafs. 17 and 18)

50° 00' N., 145° 00' W., 1200–0 m, one specimen, fragmentary

V. pentacantha Kölliker occurs in the Bering Sea and northwestern Pacific (9). It is characteristically a deep-sea form (25).

Dimophyes arctica Chun. Moser (25, Taf. 26)

50° 00' N., 145° 00' W., 150–0 m, one anterior nectophore

55° 58' N., 150° 46' W., 10–0 m, three anterior, one posterior nectophore (H. M.)

50° 00' N., 145° 00' W., 1200–0 m, one anterior nectophore

Collected in Bering Sea by U.S. Fisheries Steamer "Albatross" (9).

Muggiaea atlantica Cunningham. Moser (25, Taf. 1)

Ladysmith Harbour, V.I., 10-m tow, five complete polygastric stages and eight mature eudoxids (G.O.M.)

Friday Harbour, Wash., U.S.A. From float at night light, six polygastric specimens (G.O.M.)

A cosmopolitan species in little-contaminated coastal waters. Recorded from Monterey Bay, Cal., U.S.A. (10).

Physonectae

Agalma elegans Sars. Kawamura (19, unnumbered plate, Fig. 11), Totton (34, Fig. 24)

53° 30' N., 138° 53' W., 150–0 m, 29 adults, 16 larvae

52° 08' N., 133° 26' W., 20-m tow, one adult

48° 00' N., 133° 12' W., 150–0 m, seven larvae

53° 28' N., 133° 32' W., 150–0 m, five larvae

55° 00' N., 150° 00' W., 21–0 m, five larvae (H. M.)

55° 00' N., 155° 00' W., surface, five larvae (H. M.)

Occurs at Misaki, Japan (19). Not previously recorded from northeast Pacific.

Forskalia sp. Kölliker. Bedot (1), Totton (34, Figs. 29, 30, and 31)

54° 15' N., 134° 40' W., 100–0 m, one juvenile

This genus has not been recorded previously from the northeast Pacific.

Apolemia uvaria Lamarck. Moser (24, Fig. 507), Bigelow (8)

52° 02' N., 136° 00' W., 150–0 m, three specimens

This monotypic genus has not been recorded previously from the north Pacific.

Nanomia bijuga Delle Chiaje. Bigelow (8), Kawamura (19), Totton (34, Fig. 19D)

52° 00' N., 127° W., 150–0 m, one nectophore

Oak Bay, Victoria, B.C., surface, two specimens (A. F.)

Friday Harbour, Wash., U.S.A. From below the wharf at night light.

Twelve specimens, the largest with eight nectophores, the smallest with three. Luminescent, the luminescence appearing to correspond with the distribution of the reddish pigment (G.O.M.).

Occurs at Misaki, Japan (19). Not previously recorded from northeast Pacific.

Nanomia sp. (? *N. cara* Agassiz). Totton (34, Fig. 19A-C)

Oak Bay, Victoria, B.C., surface, two specimens (A. F.)

Between Sidney Island and Forest Island, B.C., one specimen (C. C.)

There is no previous record of *N. cara* from the north Pacific.

Mollusca

Prof. J. E. Morton, of the University of Auckland, New Zealand, was kind enough to classify the Mollusca in the collection and to him we extend cordial thanks. The quotations in the list which follows are from his notes. None of the species identified have been recorded previously from the northeastern Pacific.

HETEROPODA

Atlanta sp. Thiele (32)

51° 51' N., 132° 00' W., 150-0 m, one specimen

A second specimen, for which bearings are not available, "apparently of the same species" is in the collection. "The species is probably not the Pacific *fusca*, recorded at least as far north as San Francisco, but too small (only 1.5 mm) to fit this specimen. I should assign it to *A. gaudichaudi*, very widespread in the Pacific and relatively much more abundant there than the more dominant Atlantic species *A. peroni*."

PTEROPODA

THECOSOMATA

Euclio pyramidata Linné. Thiele (32, as *Clio*)

52° 18' N., 134° 46' W., 150-0 m, one specimen

50° 08' N., 141° 02' W., 150-0 m, one specimen

A third specimen, the bearings for which are not available, clearly belongs to this species. "The lateral processes are only faintly marked, but the lateral edges are characteristically distinct. The strong median dorsal rib is also clearly diagnostic." Two of the specimens are only sufficiently well preserved to be identified to genus with certainty, but "probably, on geographical grounds, the common species *pyramidata*".

GYMNOSOMATA

Anopsia sp. Thiele (32)

53° 58' N., 142° 22' W., 150-0 m, one specimen

"Specimen in preserved state shell-less, and not easily determinable, though with a well marked toothed thecosome gizzard, upon dissection. With the transverse furrows marking the body, and the small glandular nodules in the loose skin, it has some of the characters of this problematic form."

Notobranchaea macdonaldi Pelseneer. Thiele (32)

52° 27' N., 167° 21' W., 150–0 m, one specimen

"Body shape much distorted and head and foot lobes alone give any clue as to the identity. Hook sacs, however, reveal the expected cluster of short wide hooks, and from what one can still detect there is a fair agreement with *Notobranchaea*. The Pacific distribution of this genus, however, is highly uncertain."

Thliptodon sp. (probably *diaphanus* Meisenheimer). Morton (23)

53° 23' N., 133° 45' W., 300–200 m, one specimen

Two further specimens, for which bearings are not available, are attributed to this genus. Characterized by "the general expansion of the head, the loosely fitting and very roomy "skin" surrounding the viscera and particularly the very roomy hook sacs, with a sheaf of rather golden-coloured long hooks". In one case "the everted hook sacs make it a fine specimen and give a good identification of character, with the golden chitinous appearance of the hook sheaves". "Of the *Thliptodon* spp. *diaphanus* is the best known of the Pacific ones, probably the only one, and occurs in the upper layers as well as the deeper water."

Cliopsis krohni Troschel. Massy (20), Thiele (32)

58° 29' N., 140° 51' W., 150–0 m, one specimen

Characterized by "the very small visceral nucleus inside a spacious gelatinous "skin" with small whitish glandular nodules, and a very long proboscis invaginated or coiled within. Also the very far forward position of the swimming wings".

Tunicata

Dr. Leo Berner, of the Scripps Institute of Oceanography, La Jolla, Cal., very kindly identified the following two species of pelagic Tunicata in material submitted to him. All were in the southern region of the area fairly close in shore.

DOLIOLIDA*Doliolum (Dolioletta) gegenbauri* Ulianin. Berrill (7)

44° 00' N., 127° 02' W., 150–0 m

42° 05' N., 127° 35' W., 150–0 m

46° 08' N., 127° 01' W., 150–0 m

This species is widely distributed in the Atlantic, but, in the Pacific, its previously recorded distribution seems to have been confined to the more southerly region.

SALPIDA*Salpa fusiformis* Cuvier. Berrill (7)

44° 00' N., 127° 00' W. (approximate), surface

42° 05' N., 127° 35' W., 150–0 m

Dixon Entrance, oblique tow, 100–0 m

This species is known from the Pacific coast of North America from California to Bering Sea (21).

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