

ON A COLLECTION OF POLYCHAETA FROM SOUTHERN CALIFORNIA

By E. and C. BERKELEY

At intervals during the past few years Prof. G. E. MacGinitie, of the Kerckhoff Marine Laboratory, Corona Del Mar, California, has sent us specimens of Polychaeta collected by him in the vicinity of his laboratory, or at points not more than a few miles distant. This is the source of most of the material described in this paper. In addition some of the specimens were collected by Dr. MacGinitie at other localities in Southern California. Yet others by Dr. W. G. Hewatt, of the Texas Christian University, at Santa Cruz Island during the summer of 1939 and kindly submitted by him to us for report. Forms taken both intertidally and by dredge are included. Notes indicating the depth of dredging operations did not always accompany the specimens, but the depth is given in the following pages when known and the locality at which each species was collected is stated unless this was Corona Del Mar or the vicinity. If no statement to the contrary appears the species under discussion in the notes which follow was collected intertidally.

The collection comprises 154 species. Thanks to the pioneer work of Johnson, Moore and Chamberlin and, more recently, to that of Treadwell, Hartman and others, the polychaete fauna of the Californian coast is fairly well known. Nevertheless the present collection contains 45 species, or varieties, new to the coast, of which 9 are new to science. Types of the new species and varieties are in the authors' collection.

The following is a complete list of the species represented; those we believe to be new to California are indicated by an asterisk:

APHRODITIDAE

- Aphrodite armifera* Moore
- Aphrodite brevitentaculata* Essenberg
- Aphrodite refulgida* Moore

POYNOIDAE

- Lepidonotus coelorus* Moore
- Thormora (Lepidonotus) johnstoni* (Kinberg)
- Harmothoe imbricata* (Linné)
- Harmothoe hirsuta* Johnson
- **Harmothoe lunulata* (Delle Chiaje)
- **Malmgrenia nigralba* Berkeley
- Halosydna insignis* Baird
- Halosydna johnsoni* (Darboux)
- Lepidametria gigas* (Johnson)
- Arctonoe vittata* (Grube)
- Arctonoe pulchra* (Johnson)

ACOETIDAE

- Panthalis pacifica* Treadwell.
- **Polyodontes maxillosus* Ranzani
- Peisidice aspera* Johnson

SIGALIONIDAE

- **Sigalion ovigerum* Monro
- **Psammolyce spinosa* Hartman
- Sthenelais tertiaglabra* Moore
- Sthenelais fusca* Johnson
- **Sthenelanella atypica* sp. n.

CHRY SOPETALIDAE

- Chrysopetalum occidentale* Johnson
- Paleanotus chrysolepis* Schmarda

AMPHINOMIDAE

- Chloeia pinnata* Moore
- Eurythoe paupera* (Grube)
- Eurythoe* sp.?
- Euphrosyne arctia* Johnson
- Euphrosyne hortensis* Moore

PHYLLODOCIDAE

- Phyllodoce ferruginea* Moore
- **Phyllodoce* (*Anaitides*) *madeirensis* Langerhans
- Eumida sanguinea* (Oersted)

SYLLIDAE

- Syllis armillaris* Malmgren
- Syllis elongata* (Johnson)
- **Syllis hyalina* Grube
- **Syllis fasciata* Malmgren
- **Syllis gracilis* Grube
- **Trypanosyllis gemmipara* Johnson
- Odontosyllis phosphorea* Moore
- **Odontosyllis polycera* (Schmarda)
- **Odontosyllis parva* Berkeley

HESIONIDAE

- Podarke pugettensis* Johnson
- **Loandalia fauveli* sp. n.

NEREIDAE

- Nereis pelagica* Linné
- Nereis callaona* (Grube)
- Platynereis dumerilii* (Audouin & Milne-Edwards), var. *Agassizi*
- Nereis pseudoneanthes* Hartman
- Nereis neonigripes* Hartman
- Nereis vexillosa* Grube
- Nereis procera* Ehlers

NEPHTHYDIDAE

- Nephtys caecoides* Hartman
- **Nephtys dibranchis* Grube

SPHAERODORIDAE

- **Ephesia gracilis* Rathke

GLYCERIDAE

- Hemipodia borealis* Johnson
- Glycera capitata* Oersted
- **Glycera gigantea* Quatrefages
- Glycera rugosa* Johnson
- **Goniada maculata* Oersted
- Glycinde armigera* Moore

EUNICIDAE (LEODICIDAE)

- Eunice biannulata* Moore
Eunice siciliensis Grube
**Eunice vittata* (Delle Chiaje)
Eunice enteles Chamberlin
Marphysa sanguinea (Montagu)
Rhamphobrachium longisetosum Berkeley
Onuphis elegans (Johnson)
Onuphis eremita Audouin & Milne-Edwards
**Onuphis eremita* Audouin & Milne-Edwards var. *parva* var. n.
Onuphis irridescens (Johnson)
Onuphis nebulosa Moore
Diopatra ornata Moore
Diopatra californica Moore
Hyalinoecia tubicola (O. F. Müller)
Lumbrinereis erecta Moore
**Lumbrinereis latreilli* Audouin & Milne-Edwards
Lumbrinereis impatiens Claparède
Lumbrinereis inflata Moore
**Lumbrinereis ligulata* sp. n.
Drilonereis filum Claparède
Arabella attenuata Treadwell
Arabella iricolor (Montagu)
**Arabella geniculata* (Claparède)
Arabella semimaculata Moore
**Dorvillea* (*Staurocephalus*) *rudolphii* (Delle Chiaje)

ARICIIDAE

- **Aricia macginitii* sp. n.
Haploscoloplos kerguelensis (McIntosh)
Nainereis laevigata (Grube)

SPIONIDAE

- **Scololepis indica* Fauvel
Nerinides acuta (Treadwell)
Laonice cirrata (Sars)
Prionospio pinnata Ehlers
**Polydora giardi* Mesnil

CHAETOPTERIDAE

- Chaetopterus variopedatus* Rénier
**Mesochaetopterus rickettsii* sp. n.

CIRRATULIDAE

- Cirriformia* (*Audouinia*) *tentaculata* (Montagu)
Cirriformia (*Audouinia*) *luxuriosa* (Moore)
Tharyx sp.?
**Chaetozone spinosa* Moore var. *corona* var. n.
Dodecaceria pacifica (Fewkes)

CHLORAEMIDAE

- Flabelligera commensalis* Moore
Stylarioides inflata (Treadwell)
Stylarioides papillata (Johnson)
Stylarioides plumosa (O. F. Müller)
Stylarioides eruca (Claparède)

SCALIBREGMIDAE

- Oncoscolex pacificus* (Moore)

OPHELIIDAE

- Ophelia limacina* (Rathke)
Armandia brevis (Moore)
Travisia gigas Hartman
Travisia brevis Moore
Polyophtthalmus pictus (Dujardin)

CAPITELLIDAE

- Notomastus giganteus* Moore
**Dasybranchus caducus* Grube var. *lumbricoides* Monro

ARENICOLIDAE

- Arenicola cristata* Stimpson

MALDANIDAE

- **Clymene* (*Euclymene*) *grossa* Baird var. *newporti* var. n.
**Axiothella rubrocincta* (Johnson) var. *complexa* var. n.
Asychis disparidentata Moore

AMMOCHARIDAE

- Ammochares fusiformis* (Delle Chiaje)

SABELLARIIDAE

- Sabellaria californica* Fewkes
Sabellaria cementarium Moore
**Sabellaria spinulosa* Leuckart var. *alcocki* Gravier

STERNASPIDAE

- Sternaspis fossor* Stimpson.

AMPHICTENIDAE

- Pectinaria belgica* (Pallas)

AMPHARETIDAE

- Ampharete arctica* Malmgren
Schistocomus hiltoni Chamberlin
Amage anops (Johnson)
Amphicteis gunneri (Sars)
**Samytha bioculata* Moore

TEREBELLIDAE

- **Amphitrite cirrata* (O. F. Müller)
Terebella californica Moore
Eupolymnia crescentis Chamberlin
**Pista cristata* (O. F. Müller)
Pista alata Moore
Pista fratrella Chamberlin
Thelepus setosus (Quatrefages)
Terebellides stroemi Sars
Loimia montagui (Grube)
**Streblosoma bairdi* (Malmgren)

SABELLIDAE

- Demonax leucaspis* Kinberg
Pseudopotamilla ocellata Moore
Branchiommata mushaensis Gravier
**Branchiommata burrardum* Berkeley
**Branchiommata roulei* Gravier
**Myxicola aesthetica* Claparède
Myxicola infundibulum Rénier
Chone infundibuliformis Kröyer

SERPULIDAE

- Serpula vermicularis* Linné
Hydroides norvegica (Gunnerus)
Hydroides uncinata (Philippi)
Salmacina dysteri (Huxley) var. *tribranchiata* (Moore)
**Apomatus timsii* Pixell
**Protula tubularia* (Montagu)
Spirobranchus spinosus Moore
**Crucigera websteri* Benedict
**Spirorbis marioni* Caullery & Mesnil

FAMILY APHRODITIDAE

APHRODITE ARMIFERA Moore

Moore, 1910, p. 371; Hartman, 1939A, p. 20.

Aphrodite raripapillata Essenberg, 1917, p. 413.

Seven specimens, the largest of which is 38 mm. long, the smallest only 8 mm. Dredged in 5 to 17 fms.

The spurs on the ventral neurosetae are conspicuous in the smaller specimens, but in the larger ones they are less frequent and in some they are entirely absent. Otherwise the specimens agree closely with Moore's description. *A. raripapillata* is differentiated from *A. armifera* by little but the absence of spurred ventral neurosetae and these are very readily overlooked. We regard the species as synonymous.

APHRODITE BREVITENTACULATA Essenberg

Essenberg, 1917, p. 411.

A single specimen in which the palps are lacking. Dredged "off Balboa".

APHRODITE REFULGIDA Moore

Moore, 1910, p. 376; Hartman, 1939A, p. 23.

Six specimens dredged in 5 fms. The largest is about 37 mm. long, the smallest less than 10 mm.

FAMILY POLYNOIDAE

LEPIDONOTUS COELORUS Moore

Moore, 1903, p. 412; Hartman, 1938A, p. 108, (*with synonymy*).

Ten specimens. Two from holdfast of kelp, two dredged in Monterey Bay, (one in 50 to 60 fms., the other in 16 fms.), and six from Santa Cruz Is. in 20 fms.

THORMORA (LEPIDONOTUS) JOHNSTONI (Kinberg)

Monro, 1928A, p. 556; Hartman, 1939A, p. 50.

Halosydna lagunae Hamilton, 1915, p. 235.

Four specimens, two of which are from Santa Cruz Is., agree exactly with Hamilton's description of *Halosydna lagunae*, which is undoubtedly *Thormora johnstoni*. The genus *Thormora* is readily distinguished by the two types of notosetae. Monro records the species from Panama and gives good figures of the elytron and of both types of notosetae. As Hamilton points out, this species bears a very striking superficial resemblance to *Halosydna insignis* Baird.

HARMOTHOE IMBRICATA (Linné)

Fauvel, 1923, p. 55.

Four specimens. Two dredged in 12 to 17 fms. off Corona Del Mar, have the almost smooth elytra and setae with reduced transverse ridges characteristic of the commensal form of this

species. One is heavily pigmented black and the other lightly brown. The other two, from Santa Cruz Is., one of them dredged in 15 fms., are of the normal non-commensal form.

HARMOTHOE HIRSUTA Johnson

Johnson, 1897, p. 182; Monro, 1928A, p. 558; Hartman, 1939A, p. 51.

Three specimens, one of them from Santa Cruz Is. The anterior eyes are large and, though situated laterally, they extend on to both the dorsal and ventral surfaces of the prostomium. The large tubercles on the elytra are as Johnson and Hartman describe, only in the case of the first few pairs are they simple and spine-like as figured by Monro (1928A, p. 559, fig. 8).

HARMOTHOE LUNULATA (Delle Chiaje)

Fauvel, 1923, p. 70; McIntosh, 1900, p. 342.

One of the four examples agrees very closely with the descriptions of this species given by Fauvel and McIntosh. The other three, which were taken from tubes of *Mesochaetopterus rickettsii* n. sp., with which they were doubtless commensal, are smaller and differ in the following particulars:

1. The dorsal cirrus is very long, quite smooth and gently tapered.
2. The setae are all finer and softer than in the species or in any variety of it we know. The majority of the neuropodial setae are bidentate, only a few of the most dorsal of them have very fine simple tips. The notopodial setae are finer and softer than those of the neuropodium.

The general form of the setae in both rami is as McIntosh figures (1900, pl. 39, figs. 12 to 16).

On the basis of the differences enumerated the form commensal with *Mesochaetopterus* might well be regarded as a new variety of *H. lunulata* were it not undesirable to add yet another to the many varieties already recorded (see Fauvel, 1923, p. 72). The species is known to be a very variable one. Monro (1928A, p. 559) described the variety *pacifica* from the Panama region, but there seems to be no record of it further north in the Pacific area.

MALMGRENIA NIGRALBA Berkeley

Berkeley, 1923, p. 213.

A single specimen, dredged in 5 to 15 fms. off Santa Cruz Is. Superficially this form resembles *Harmathoe lunulata* very closely, but that species has the lateral tentacles inserted ventrally, instead of sub-terminally as in the present form, and has not the distinct netting on the elytra which characterizes *M. nigralba*.

HALOSYDNA INSIGNIS Baird

Moore, 1910, p. 329.

Polynoe brevisetosa (Kinberg), Johnson, 1897, p. 167.

Polynoe insignis (Baird), Johnson, 1901, p. 387.

Moore (1908 and 1910) has drawn attention to the great variability of this species in coloration, nature of elytra, form of dorsal cirrus, and other characters. We have ourselves commented on its near approximation, if not identity, with *H. johnsoni* Darboux (= *H. californica* Johnson), elsewhere (1939, p. 325). Typically *H. insignis* is characterised by the possession of elytra heavily and irregularly marked with dark pigment, stout dorsal cirri abruptly constricted distally and ending in fine tips, neurosetae with simple hooks, and notosetae mostly curved and coarse, in contrast with *H. johnsoni* which, typically, has elytra with a netted groundwork and comparatively little pigmentation, slender and gradually tapering dorsal cirri, neurosetae with bifid tips, and notosetae mostly straight and fine.

The great majority of the large number of specimens in this collection (several of which are from Santa Cruz Is.) attributable to either of these species possessed the above characters in a variety of combinations. We have separated them according to the degree of agreement with one or other of the two types, but we believe the separation to be an artificial one and that all should be comprised within a single species. Only 7 out of some 50 specimens examined agreed in all particulars with *H. insignis*, whilst 4 had a majority of the characters of that species. The remainder had a majority of *H. johnsoni* characters, but only 3 agreed in all particulars with that species.

In more southerly waters specimens agreeing in most, or all, particulars with *H. johnsoni* seem to be commoner than those agreeing more closely with *H. insignis*. In a collection from Mexico on which we recently (1939) reported all were of the former type. *H. johnsoni* has not been recorded, and does not seem to occur, off the coast of British Columbia or in more northerly waters. In this region complete, or very close, conformity with the *H. insignis* type is general. Both types are found both free living and as commensals, particularly with terebellids. They both tend to assume the same modifications, such as multiplication of segments and elytra, smoother and thinner elytra, less coloration, reduction or absence of notosetae, and neurosetae with much reduced transverse ridges, in the latter condition.

The evidence seems to point to a transition from the typical *H. insignis* to the typical *H. johnsoni* proceeding from north to south along the west coast of North America, with a region in the neighborhood of Southern California characterised by a predominance of intermediary types.

Ehlers (1901) identifies *H. insignis* Baird with *H. patagonica* Kinberg; Seidler (1923) and Hartman (1939A) return it to the species *H. brevisetosa* Kinberg, in which Johnson (1897) originally placed it.

HALOSYDNA JOHNSONI (Darboux)

Hartman, 1938A, p. 34 (*with synonymy*).

This is by far the commonest polynoid in the collection and is represented by both the free-living and the commensal forms. Most of the specimens were taken in the intertidal zone, but some were dredged. Several are from Santa Cruz Is.

As we noted under *H. insignis* the majority of the specimens do not conform in all particulars with the type, only 3 out of 50 examples so conforming. Those ascribed to this species had a majority of *H. johnsoni* characters, the other characters being those of *H. insignis*.

Prof. MacGinitie reports the species occurring as a commensal with *Polynices lewisii*, *Kellettia kelletii*, and *Bursa californica*, as well as with terebellids (usually *Thelepus setosus* Quatrefages).

Johnson (1901) changed the specific name of this species from *reticulata* to *californica* on the ground that the former name was pre-occupied. Seidler (1923) returns it to *reticulata*; Monro (1928A) also retains the older name. Hartman (1939A) points out that Darboux substituted the specific name *johnsoni* for *reticulata* earlier than Johnson's revision.

LEPIDAMETRIA GIGAS (Johnson)

Hartman, 1939A, p. 47 (*with synonymy*); Berkeley, E. and C., 1939, p. 325.

A single specimen. Commensal with *Thelepus setosus* Quatrefages.

ARCTONOE VITTATA (Grube)

Hartman, 1939A, p. 116 and 1939A, p. 30 (*with synonymy*).

Two specimens from Santa Cruz Is., dredged in 2 to 3 fms., have smooth, transparent, almost colorless, elytra with entire edge which nearly cover the dorsum. There is no pigment band across segments 7-8. One is about 15 mm. long and consists of 38 setigers. The other is incomplete.

The specimens do not fully agree with the descriptions of *Arctonoe vittata* in that the dorsal cirri extend well beyond the ends of the setae, notosetae are well represented throughout the body, and a few of the bifid supra-acicular neurosetae, characteristic of the first setigers, persist to the end. Moreover, many of the hooks of the sub-acicular neurosetae, though of the form peculiar to *Arctonoe*, are distinctly fringed. We have encountered the last two characters, though in a less degree, in other examples, classified as *Halosydna lordi*, from the Nanaimo region.

We have little doubt the present specimens are correctly ascribed despite these deviations, all of which are in characters

which are modified in adaptation to commensal life in typical representatives of the genus *Arctonoe*. The specimens probably represent the non-commensal form of the species.

ARCTONOE PULCHRA (Johnson)

Hartman, 1938A, p. 116.

Polynoe pulchra, Johnson, 1897, p. 177.

Halosydna pulchra, Moore, 1908, p. 329; Berkeley, 1923, p. 212.

Lepidasthenia pulchra, Treadwell, 1937, p. 144.

A single specimen, put up with a specimen of *Loimia montagui* (Grube), with which it was, presumably, commensal. It has the irregular arrangement of the elytra after XXIII which Johnson describes and which led Treadwell to place the species in the genus *Lepidasthenia*. Hartman (1938A) places it, together with *A. tuberculata*, *A. fragilis*, and *A. vittata*, all of which are usually found as commensals and have other characters in common, in Chamberlin's genus *Arctonoe*.

The species occurs commonly as a commensal with echinoderms. We know of no previous record of its association with a terebellid.

FAMILY ACOETIDAE

PANTHALIS PACIFICA Treadwell

Treadwell, 1914, p. 184; Hartman, 1939A, p. 87.

Three anterior ends and a median portion dredged in 12 to 15 fms. Excepting in the presence of eyes there seems little to differentiate this species from the European *P. oerstedii* Kinberg. Fauvel (1932, p. 39) regards *P. jogasimae* Izuka, which has well defined eyes, as synonymous with *P. oerstedii* and points out that the ocular characters of the latter species are very variable.

POLYODONTES MAXILLOSUS Ranzani

Fauvel, 1923, p. 97 and 1932, p. 35.

An anterior fragment, dredged in 7 to 8 fms., consisting of 25 setigers, agrees, so far as comparison can be made, with the description given by Fauvel. The fragment is 17 mm. wide at its widest point. The first foot points slightly forward, as in *P. melanonotus* (Grube), but in all other respects, particularly in the characters of the setae, the presence of branchiae from the thirteenth foot, and of pockets on the elytra, agreement with *P. maxillosus* is close.

PEISIDICE ASPERA Johnson

Johnson, 1897, p. 184.

A single specimen taken in Monterey Bay in 16 fms. has 21 pairs of elytra. Otherwise agreement with Johnson's description is exact.

FAMILY SIGALIONIDAE

SIGALION OVIGERUM Monro

Monro, 1924, p. 47 and 1936, p. 103.

Four specimens, three of which were dredged in 12 to 17 fms. None complete posteriorly. The largest, which is about 3 mm. wide, as preserved, agrees closely with Monro's descriptions and has the characteristic ovigerous elytra in the posterior region. The others, which are about 2 mm. wide, differ in that they have very distinct eyes and, just posterior to them, there is a median tentacle narrower and slightly shorter than the very small lateral tentacles. In these specimens the elytra in the posterior region are characteristically carried on tall and massive elytophores, but they are not ovigerous. In none of the specimens have setae corresponding to Monro's figure (1936, p. 104, fig. 12d) been made out. In their place are multi-articulate bristles with obscure articulation between shaft and blade, but the shafts have not "fist-shaped" terminations.

We do not regard the presence of the median tentacle in the smaller specimens as excluding them from the genus *Sigalion* since they agree closely with it in all other respects and similar cases of the occurrence of such a tentacle in members of the genus have been recorded elsewhere (Berkeley, E. & C., 1939, p. 328). Augener's genus *Eusigalion* seems to be unnecessary (see Hartman, 1939A, p. 57).

PSAMMOLYCE SPINOSA Hartman

Hartman, 1939A, p. 72.

Two specimens, both incomplete posteriorly, dredged in 20 fms. at Santa Cruz Is. agree in a majority of characters with this species, but in some resemble *Ps. fimbriata* Hartman (1939, p. 74) more closely. The elytra do not cover the tips of the parapodia and their marginal papillae are much longer at the outer edge than elsewhere. The superior neurosetae have long spinose regions at the ends of the shafts. In these respects the specimens resemble *Ps. spinosa*. On the other hand the shape of the cirratorphore of the median tentacle and the position of the eyes are, on the whole, in accordance with Hartman's figure (Pl. 20, fig. 245) of the prostomial region of *Ps. fimbriata*, but lateral tentacles are very clearly visible on the dorsal side of the first setiger, which she does not show. The pilose nature of the ventrum and the arrangement of filiform papillae on the ventral side in the anterior region of the body, as well as the concentration of long papillae on the ventral surface of the parapodia, are in accordance with the description of *Ps. fimbriata*.

On the whole we seem to have here a form linking Hartman's two species and suggesting that they are all variants of one form.

STHENELAIS TERTIAGLABRA Moore

Moore, 1910, p. 395.

Sthenelais hancocki, Hartman, 1939A, p. 65.

A large number of specimens of this species are in the collection, some from Monterey Bay. All were dredged in depths varying from 12 to 33 fms.

The compound neuropodial setae with spirally fringed shafts (Moore, 1910, pl. 33, fig. 117), which occur in the anterior setigers, have, in most cases, bifid tips, but the secondary tooth is sometimes not readily seen. Moore draws attention to the uncertainty of this character in the case of the multiarticulate setae with smooth shafts. The heavy setae with short unjointed appendages (Moore, 1910, pl. 33, fig. 119) which Moore says occur "behind XXX" may be as far forward as XXV, but in some cases are not present until LXV, or even nearer the anal extremity. Therefore, in specimens which are incomplete posteriorly, the absence of this seta cannot be relied upon as a diagnostic character. The pigment-deposit on the elytra is a deep rusty red in some specimens, little more than a brownish shading in others, and it may be anything between these extremes.

There seems to be no significant character differentiating *St. hancocki* Hartman from *St. tertiaglabra*. Both are described from Monterey Bay and we believe them to be synonymous.

STHENELAIS FUSCA Johnson

Johnson, 1897, p. 185; Hartman, 1939A, p. 61.

One complete and one incomplete specimen, dredged in 20 to 33 fms.

STHENELANELLA ATYPICA sp. n.

Several specimens dredged off Balboa and at Newport Bay; depth unrecorded. Two off Corona Del Mar in 12 to 17 fms.

These all agree with *St. uniformis* as described by Moore (1910, p. 391) except in one significant particular. The characteristic neurosetae, on the basis of which the genus is differentiated from *Sthenelais*, are not present in the second to the fourth setigers. In these setigers the shafts and ends of the neurosetae are not fused and they approximate to those typical of *Sthenelais*. They are of three kinds. Falcigers with smooth ended, rather heavy shafts and rather long unindentate end-pieces (fig. 1). Compound setae almost as heavy as the falcigers with long bi- or tri-articulate unindentate end-pieces and smooth shafts (fig. 2). Similar, but more slender, setae with heavily fringed ends to the shafts and longer end-pieces (fig. 3). These last may be bidentate in the second setiger. These setae are rapidly modified in more posterior setigers until, at the sixth to the tenth setiger, all have assumed the forms described and figured by Moore for *St. uniformis*.

The agreement of these specimens with *St. uniformis* was so close in every other particular that we had been inclined to attribute them to that species and to regard Moore's specimen as either imperfect or imperfectly described. The recent redescription of *St. uniformis* by Hartman (1939A, p. 69), based on many specimens, which confirms the implication of Moore's description with regard to the setae of the first setigers, leads us to doubt this assumption and to give the present specimens specific rank. However, it seems not unlikely that *St. uniformis* and *St. atypica* represent no more than phases of one species.

Long delicate threads emerge from the parapodia, beginning at the 15th setiger, similar to those described by Treadwell (1914, p. 184) and Hartman (1939A, p. 69) in the case of *St. uniformis*. We agree with the latter author as to their interpretation.

FAMILY CHRYSOPETALIDAE

CHRYSOPETALUM OCCIDENTALE Johnson

Johnson, 1897, p. 161; Monro, 1933A, p. 19.

Two specimens dredged in 12 fms. We are inclined to agree with Monro that there seems no sufficient reason for separating this species from *C. debile* Grube.

PALEANOTUS CHRYSOLEPIS Schmarda

Monro, 1933A, p. 19; Hartman, 1939B, p. 8; 1940, p. 201.

Heteropale bellis Johnson, 1897, p. 163.

A single specimen "from hydroid-barnacle mass on bottom of boat".

FAMILY AMPHINOMIDAE

CHLOEIA PINNATA Moore

Moore, 1911, p. 239; Monro, 1933A, p. 7; Berkeley, E. and C., 1939, p. 323.

Two small specimens, one about 12 mm. long, the other only half this length. The former dredged in 55 fms. in Monterey Bay, the latter in 15 fms. off Corona Del Mar.

Gills began on the fourth setiger and are as described by Moore. Both specimens have the purplish pigment area in front of the lateral tentacles, which Monro regards as characteristic, and have no distinct dorsal markings. We have given reasons elsewhere (1939) for doubts as to the validity of the separation of this species from *C. viridis* Schmarda.

EURYTHOE PAUPERA (Grube)

Ehlers, 1901, p. 33; Chamberlin, 1918, p. 173; Berkeley, E. and C., 1935, p. 767.

Eurythoe californica, Johnson, 1897, p. 159.

Twenty-four specimens, nineteen of which are from Santa Cruz Is. The specimens are all small, but can be identified by the form of the caruncle and by the setae.

EURYTHOE sp. ?

A single specimen from Santa Cruz Is. cannot be assigned to a species with any confidence since it is small and has the proboscis extended, which makes determination of the prostomial characters difficult. It differs from the foregoing (*E. paupera*) in setal characters, the most outstanding of which is the presence of bifid neurosetae with long serrate tips such as are figured for *Pareurothoe borealis* (Sars) by Okuda (1938, p. 80, fig. 2g).

EUPHROSYNE ARCTIA Johnson

Johnson, 1897, p. 159.

Three specimens from Monterey Bay in 55 fms. The caruncle reaches to the posterior edge of V.

EUPHROSYNE HORTENSIS Moore

Moore, 1905, p. 534.

One small specimen from Santa Cruz Is.

FAMILY PHYLLODOCIDAE

PHYLLODOCE FERRUGINEA Moore

Moore, 1909B, p. 337.

A single specimen. Dredged off Balboa; depth unrecorded.

PHYLLODOCE (ANAITIDES) MADEIRENSIS Langerhans.

Fauvel, 1923, p. 150; Monro, 1933A, p. 21.

Several specimens, four of which were dredged in 7 to 20 fms., one of them in Monterey Bay. Four are from Santa Cruz Is.

Many of the specimens are small, but an individual from La Jolla is 150 mm. long. As Monro points out (1933A) *P. medipapillata* Moore, which is recorded from California, resembles this species closely, but they differ in that there are setae on III in *P. medipapillata*, none in *P. madeirensis*.

EUMIDA SANGUINEA (Oersted)

Fauvel, 1923, p. 166; Berkeley, 1924, p. 289.

A single specimen from Santa Cruz Is.

FAMILY SYLLIDAE

SYLLIS ARMILLARIS Malmgren

Fauvel, 1923, p. 264.

Four specimens "from boat bottom"; one from Santa Cruz Is.

SYLLIS ELONGATA (Johnson)

Moore, 1909B, p. 236; E. and C. Berkeley, 1938A, p. 41.

Pionosyllis elongata, Johnson, 1901, p. 403.

Two specimens, both from Santa Cruz Is., have transverse bands of pigment across the dorsum of the first few anterior segments. Otherwise agreement is good.

SYLLIS HYALINA Grube

Fauvel, 1923, p. 262; Monro, 1933A, p. 30; Hartman, 1939B, p. 10.

Two specimens, both from Santa Cruz Is. Hartman records the species from Galapagos, Monro from Panama. *S. prolifera*, which is recorded from the Nanaimo region (Berkeley, 1923, p. 207), is probably the same species (see Fauvel, 1923, p. 263 and 1935, p. 300). With the present record its distribution throughout a considerable length of the coast of N. W. America is indicated.

SYLLIS FASCIATA Malmgren

Malmgren, 1867, p. 161; Fauvel, 1934, p. 304.

Two specimens, both from Santa Cruz Is. This is the form reported from the Nanaimo region (Berkeley, 1923, p. 205), with some doubt, as *S. borealis*. It is characterized by a light rusty-brown coloration of the dorsum of the anterior region, long slender articulated dorsal cirri, compound setae with unindentate end-pieces of moderate length, and rather heavy simple spines in the posterior parapodia.

SYLLIS GRACILIS Grube

Fauvel, 1923, p. 259; Monro, 1933A, p. 30.

A single example from Santa Cruz Is., dredged in 20 fms. The species is characterized by the presence of true ypsiloid setae in the median parapodia. *S. palifica* Ehlers and *S. longissima* Gravier are, as far as we know, the only other species of Syllis which have these setae. These two species are almost identical except in point of size. Ehlers (1901, p. 92) suggests that *S. longissima* may be no more than the giant form of *S. palifica*. The present species is differentiated from both by having fewer articles in the dorsal cirri of the median region, which are regularly alternated long and short, and bidentate compound setae.

TRYPANOSYLLIS GEMMIPARA Johnson

Johnson, 1901, p. 405; Berkeley, 1923, p. 207; Berkeley, E. and C., 1938A, p. 42.

Two specimens, both from Santa Cruz Is. This species has not been reported previously south of Puget Sound.

ODONTOSYLLIS PHOSPHOREA Moore

Moore, 1909B, p. 327; Berkeley, E. and C., 1938A, p. 42.

A large number of typical specimens, all dredged, some in 12 to 17 fms.; in the case of the others there is no record of the depth. A single specimen, collected intertidally at Santa Cruz Is., approximates to the variety *nanaimoensis* Berkeley.

ODONTOSYLLIS POLYCERA (Schmarda)

Monro, 1933A, p. 36.

A single specimen from Santa Cruz Is. The species is distinguished by the slate-grey colour of the dorsal surface, the very large and deeply pigmented occipital flap, and the characters of the pharynx.

ODONTOSYLLIS PARVA Berkeley

Berkeley, 1923, p. 208.

Four specimens from Santa Cruz Is. This species was described from a single incomplete specimen and has not been recorded since. There is, however, nothing to add to the original description from a consideration of the present specimens. The anal cirri have not remained intact in either of them. One has swimming-bristles well developed.

FAMILY HESIONIDAE

PODARKE PUGETTENSIS Johnson

Johnson, 1901, p. 397; Gravier, 1909, p. 622; Okuda, 1936A, p. 413.

Several specimens, dredged in 7 fms. One specimen is marked "commensal with *Patiria miniata*." One from Santa Cruz Is.

The original description has been amplified by Gravier and again by Okuda. The species is common in the Nanaimo region. Gravier records it from Peru and Okuda from Japan. It is thus of wide distribution in the Pacific area.

LOANDALIA FAUVELI sp. n.

A single complete specimen in three pieces, from mud-flats, Newport Bay. There is some difficulty in measuring these fragments and in counting the segments, since the median and posterior ones are much twisted and the anterior one is enclosed in a piece of a tightly-fitting annulated tube resembling that of a Phyllochaetopterid. Approximately, the three pieces measure jointly 125 mm. and consist of 300 segments. The width is barely 1 mm. at the widest point. The body is pearly white throughout, the anterior portion being strikingly iridescent.

In general morphological characteristics the form resembles *Loandalia aberrans* Monro (1936, p. 193). The head is similar, but, whereas Monro was unable to differentiate the buccal segment from the prostomium, there appears to be a definite groove separating them in the present form. The first six setigers are broader and shorter than those which follow and are deeply furrowed longitudinally, giving this region the appearance of a thorax. In this region there are no notopodia (fig. 4).

The first parapodium bears a single colourless bristle. From the second to the end of the body denticulate bristles, exactly like

those figured by Monro for *L. aberrans* (1936, p. 194, fig. 34g) are present. From the seventh setiger back a notopodium occurs bearing a single heavy colourless spine (fig. 5). More posteriorly this spine is accompanied, in some parapodia, by two very fine capillary setae extending well beyond the lobe and lying completely parallel to one another throughout their length. In each case the termination of these setae is obscured by a small mass of detritus and the form cannot be made out (fig. 6).

The last three setigers and the pygidium are abruptly much smaller than the preceding segments, which may indicate regeneration. The pygidium, so far as can be made out, is a rounded lobe bearing three small papillae, but no anal plate, such as is figured by Monro for *L. aberrans*.

Monro's species is the only representative of the genus *Loandalia* previously described. The present species differs from it most outstandingly in the entire absence of branchiae.

Prof. Fauvel was kind enough to examine our specimen. In connection therewith he writes us as follows: "In my paper (*Annélides Polychètes de l'Annam*, 1935, p. 333, fig. 6) I made a mistake. What I wrongly figured as a back part of *Telehsapia* is really the head of a *Loandalia*, very likely the same as your specimen and, curiously enough, found also among, but not in, tubes of *Phyllochaetopterids*. Latterly I met with another anterior end amongst *Polychaeta* from the "Siboga" expedition. I am now satisfied that *Loandalia* and *Telehsapia* are both of them aberrant Hesionids."

Prof. Fauvel has recently (1939, p. 39) published the substance of these remarks. We take pleasure in naming the present species after him.

FAMILY NEREIDAE

NEREIS PELAGICA Linné

Fauvel, 1923, p. 336.

Several typical specimens, some dredged in 13 to 17 fms. A number of them from Santa Cruz Is.

NEREIS CALLAONA (Grube)

Ehlers, 1901, p. 108; Hartman, 1940, p. 227.

Nereis heterocirrata Treadwell, 1931, p. 1.

Nereis eucaipitis, Hartman, 1936A, p. 468; 1938B, p. 14.

Two specimens, both from Santa Cruz Is.

PLATYNEREIS DUMERILII (Audouin and Milne-Edwards)

var. *Agassizi* Ehlers.

Monro, 1933A, p. 44.

Nereis agassizi, Ehlers, 1868, p. 542; Johnson, 1901, p. 399.

Several specimens; a number of them from Santa Cruz Is. The majority dredged in 5 to 20 fms. The spotted phase described by Treadwell (1914) as *Nereis notomacula* is plentifully represented. The fusion of the paragnaths of the proboscis, which distinguishes the genus *Platynereis*, is much more apparent in some of the specimens from Santa Cruz Is. than in those from farther south. We have pointed out elsewhere (1935, p. 769) that irregularity in this respect is characteristic of the variety *Agassizi*. In the same paper we recorded the occurrence of an individual in which a number of the specialized crotchet setae which characterize the variety were present in the notopodium, instead of the usual one or two. This condition is common in many of the examples from Santa Cruz Is.

NEREIS PSEUDONEANTHES Hartman

Hartman, 1936A, p. 470.

Two specimens, both from Santa Cruz Is.

NEREIS NEONIGRIPES Hartman

Hartman, 1936A, p. 471.

Fourteen specimens, one of which was dredged in 5 fms. All are from Santa Cruz Is.

NEREIS VEXILLOSA Grube

Ehlers, 1868, p. 573; Johnson, 1901, p. 399; Moore, 1909B, p. 244; Berkeley, 1924, p. 290.

Five specimens from Santa Cruz Is. Monro (1933, p. 42) quotes Moore's description of this species as "the Pacific representative of *Nereis limbata*". He points out that the latter species is a synonym of *N. succinea* and considers that *N. vexillosa* is no more than a variety of it.

Apart from its greater size and the invariable absence of group V of the paragnaths in *N. vexillosa*, which Monro recognises as differentiating characters, we are inclined to doubt the similarity for the following additional reasons:

1. The superior dorsal parapodial lobe is much longer and more cylindrical in the median and posterior regions of the body in *N. vexillosa* than in *N. succinea*.
2. The heavy homogomph notopodial setae of the posterior parapodia have smooth spindle-shaped end-pieces in *N. vexillosa*, quite unlike the hooked, hirsute, asymmetrical ones in *N. succinea*. (See Fauvel, 1923, p. 347, fig. 135, l.)
3. The heterogomph setae are also distinctly dissimilar (see Johnson, 1901, pl. 4, fig. 37 and Fauvel, 1923, p. 347, fig. 135m).

NEREIS PROCERA Ehlers

Ehlers, 1868, p. 557; Johnson, 1901, p. 400; Berkeley, E. and C., 1935, p. 768.

A few typical specimens, dredged in 5 to 17 fms. One, from Santa Cruz Is., is incomplete and its identification doubtful.

FAMILY NEPHTHYDIDAE

NEPHTHYS CAECOIDES Hartman.

Hartman, 1938c, p. 148.

Nephtys assimilis Oersted, Berkeley E. and C., 1935, p. 770.

A number of examples, one of which was dredged in 5 fms. off Santa Cruz Is. Two types are represented, differing only in the character of the setae. In the majority of the specimens the setae are all as described for the species, in others they are in part long and silky and the specimens resemble *N. caeca* Fabricius, var. *ciliata*, differing mainly in the characters of the proboscis. This is probably the epitokous form of *N. caecoides*.

In one individual, which is otherwise of the normal type, the first branchia is present on the third setiger and the characteristic prostomial markings are not present, but agreement in other respects is reasonably good.

NEPHTHYS DIBRANCHIS Grube

Monro, 1933, p. 56; Hartman, 1938c, p. 146.

One complete specimen and several fragments dredged in 20 fms. off Santa Cruz Is. This appears to be the most northerly record of the species.

FAMILY SPHAERODORIDAE

EPHESIA GRACILIS Rathke

Fauvel, 1923, p. 377.

Two specimens, dredged in 20 fms. off Santa Cruz Is. *E. papillifer* (Moore) which is recorded from California (Moore, 1909B, p. 333) and from the Nanaimo region (Berkeley, 1927, p. 412), differs from the present species in little but the absence of the setae of the form figured by Fauvel (fig. 148f).

FAMILY GLYCERIDAE

HEMIPODIA BOREALIS Johnson

Johnson, 1901, p. 411.

Five specimens, all from Santa Cruz Is.

GLYCERA CAPITATA Oersted

Fauvel, 1923, p. 385.

Two specimens, both dredged; one in 67 fms., in the case of the other the depth is unrecorded.

GLYCERA GIGANTEA Quatrefages

Fauvel, 1923, p. 387.

A single small specimen. This has the three-lobed parapodium characteristic of young forms of the species (see Fauvel, 1923, p. 389). The branchiae are all retracted.

GLYCERA RUGOSA Johnson

Johnson, 1901, p. 409.

Several specimens. Some dredged in 7 to 17 fms., others collected intertidally.

GONIADA MACULATA Oersted

Fauvel, 1923, p. 392; Hartman, 1940, p. 251.

Two specimens, one incomplete. Both dredged; depth unrecorded. The complete specimen is the smaller and is only about 30 mm. long, the other would probably have measured about 50 mm. when complete. They are thus both small representatives of the species, but are typical in other respects.

GLYCIDAE ARMIGERA Moore

Moore, 1911, p. 307.

A single specimen; dredged; depth unrecorded.

FAMILY EUNICIDAE (LEODICIDAE)

EUNICE BIANNULATA Moore

Moore, 1904, p. 487; Berkeley, E. and C., 1939, p. 335.

Eunice longicirrata, Webster, *var.*, Hartman, 1938D, p. 97.

A single specimen. Hartman (1938E, p. 11) confirms the above synonymy.

EUNICE SICILIENSIS Grube

Fauvel, 1923, p. 405.

Nicidion edentulum, Ehlers, 1901, p. 130.

Two specimens. The first, taken amongst roots of *Phyllospadix*, is a large one in several pieces which are considerably curled and their length cannot be measured. The width is about 4 mm. over the setae. It agrees in all respects with the descriptions of the species except that there is a slight branching of a few of the branchiae. In this it approaches *Palolo* (*Eunice*) *pallidus* Hartman (1938D, p. 99), but it differs from that species in having three acicula in some of the anterior segments. In the latter character it resembles *E. paloloides* Moore. We are inclined to think that these characters are variable and that both the latter species should be regarded as variants of *E. siciliensis*.

The second specimen, which is from Santa Cruz Is., dredged in 10 fms., is incomplete posteriorly and small, measuring barely 1.5 mm. in width. It agrees in all respects except that there is

no sign of branchiae. *Nicidion edentulum* Ehlers is thus characterized and is generally regarded as the juvenile form of *E. siciliensis*.

EUNICE VITTATA (Delle Chiaje)

Fauvel, 1923, p. 404.

Two specimens, dredged in 5 fms., agree closely with the descriptions except that only one inter-segmental red line can be made out. Monro (1933, p. 61) lists the species from Panama, but it has not been recorded previously from the Californian coast. *E. hawaiiensis* Treadwell, known from that region, comes very near it, differing mainly in its more complex branchiae.

EUNICE ENTELES Chamberlin

Chamberlin, 1918, p. 175.

Leodice monilifer Chamberlin, 1919A, p. 11 (Hartman, 1938D, p. 97).

Four specimens, all from Santa Cruz Is.

MARPHYSA SANGUINEA (Montagu).

Fauvel, 1923, p. 408; Ehlers, 1868, p. 360.

Marphysa californica Moore, 1909B, p. 25.

Four specimens, one of which is much larger than the other three. This specimen is about 11 mm. wide at the widest point and has a regenerated posterior region. The branchiae have from 4 to 6 branches. When fully developed these are definitely pectinate as figured by Ehlers (1868, pl. 16, fig. 8).

RHAMPHOBRACHIUM LONGISETOSUM Berkeley

Berkeley, E. and C., 1938B, p. 428.

Two anterior fragments dredged in 17 fms. and 33 fms. respectively.

ONUPHIS ELEGANS (Johnson)

Johnson, 1901, p. 406; Berkeley, E. and C., 1935, p. 771.

Five specimens, dredged in 12 to 17 fms. The species comes very near to *O. holobranchiata* Marenzeller, which is recorded only from Japan.

ONUPHIS EREMITA Audouin and Milne-Edwards

Fauvel, 1923, p. 414; Berkeley, E. and C., 1935, p. 771.
Two typical specimens.

ONUPHIS EREMITA, var. PARVA var. n.

A number of specimens dredged in 12 to 17 fms., none of which are quite complete, agree in general morphological characters with *O. eremita*, but are far too small for that species, though they are sexually mature. The largest is 18 mm. long for

54 segments and 1.5 mm. wide at the widest point. The change from simple to compound branchiae occurs at any point between the 23rd and 30th setiger, varying in different specimens. The pectinate branchiae have 4 to 5 branches. Minute eye-spots are present.

The ground colour of the variety, as preserved, is deep ivory with conspicuous iridescence and there are brown bands on the anterior segments which are broken further back.

ONUPHIS IRIDESCENS (Johnson)

Northia iridescens, Johnson, 1901, p. 408.

Several specimens, one of which was taken in Monterey Bay. All dredged in 12 to 17 fms.

ONUPHIS NEBULOSA Moore

Moore, 1911, p. 269; Monro, 1933A, p. 76.

Four specimens, all incomplete posteriorly, dredged in 12 to 17 fms. They are all about 1 mm. wide. The modification of the larger compound tridentate crotchet of the anterior segments into a heavier simple one, which persists long after the fine compound crotchets have been replaced by capillaries, is characteristic of this species. Moore found that this modified crotchet persisted until the 14th setiger, after which there was a gap of a few segments before the bidentate crotchets appeared. Monro recorded the tridentate crotchets up to the 17th setiger and the bidentate ones on the 18th.

In two of our specimens in which we have determined the point of transition we find the last tridentate crotchet on the 13th and 14th setigers respectively. In both cases a pair of bidentate crotchets appears in the immediately succeeding segment. Evidently there is some variation in this respect.

DIOPATRA ORNATA Moore

Moore, 1911, p. 273; Berkeley, E. and C., 1939, p. 338.

A large number of specimens, all dredged in 5 to 17 fms., one from Santa Cruz Is., belong to the genus *Diopatra*. Many of them are fragmentary. They vary in width from 2 mm. to 8 mm. and are up to 170 mm. in length.

We ascribe all but four of them to this species in spite of the fact that there is a great deal of variation in respect of at least three characters which are commonly regarded as specifically diagnostic. These are the relative length of the dorsal and ventral cirri of the first setiger, and the first occurrence of gills and of heavy ventral crotchets respectively. The gills may begin on the 5th or 6th somite and the crotchets anywhere from the 16th to the 30th, and the incidence of neither seems to bear any relation to the size of the individual concerned. In the light of

the variation in these characters it becomes difficult to differentiate this species from *D. californica* Moore. The comb-setae form the best basis of differentiation. In *D. californica* they have a small number (7 or 8) of very coarse teeth (Moore, 1904, pl. 37, fig. 5), in *D. ornata* there are numerous (upwards of 20) very fine ones (Moore, 1911, pl. 18, fig. 82). The nature of the acicula also affords some guide. In the former species they are pliable, usually bent, and may be dark tipped; in the latter they are more rigid and have no dark tips.

Fragments of two kinds of tube accompany the material. The commoner kind has a rather thick wall of sandy mud with smoothly rounded transverse corrugations. The other is constructed of thin membranous material heavily beset with pieces of detritus, chiefly fragments of seaweed, and very little shell, set quite irregularly.

DIOPATRA CALIFORNICA Moore

Moore, 1904, p. 484.

The four specimens ascribed to this species were all dredged; the depth is unrecorded. They are differentiated from *D. ornata* in the manner indicated in the preceding paragraph. *D. ornata* is, apparently, a very much commoner species in the region covered by this collection than *D. californica*.

HYALINOECIA TUBICOLA (O. F. Müller)

Fauvel, 1923, p. 421.

Hyalinoecia juvenalis, Moore, 1911, p. 277.

A large number of specimens, all dredged in depths varying from 7 to 67 fms. and ranging in length up to about 70 mm. have enabled us to study the variation within this species in some detail. Capillaries may or may not occur in the first three setigers. The crotchets of these setigers may be either pseudo-compound, as figured by Moore for *H. juvenalis*, (1911, pl. 18, fig. 89), or simple, as figured by Fauvel for *H. tubicola* (1923, p. 421, fig. 166p), or both may occur together. The condition in this respect seems to bear little relation to the size of the individual. The gills start at about somite 19 in the smaller individuals, at about somite 22 in the larger ones.

Having regard to these variations it would seem that there is no justification for separating *H. juvenalis* from the older species.

LUMBRINEREIS ERECTA Moore

Moore, 1904, p. 490.

A number of specimens of various sizes. Most of them are taken from amongst roots of *Zostera* and *Phyllospadix*. Two are from Santa Cruz Is. The longest complete example measures 240 mm. In most cases the capillary setae extend only to about

the 75th setiger, but in two of them they persist to the end of the body. Moore says the capillaries cease at the 50th setiger. Dr. Hartman has recently examined the co-types of *L. erecta* deposited at the Philadelphia Academy of Science and finds that the specimens all have capillaries in some parapodia to the end of the body (*private communication*).

LUMBRINEREIS LATREILLI Audouin and Milne-Edwards

Fauvel, 1923, p. 431.

Four specimens, three collected intertidally at Santa Cruz Is., the fourth dredged in 16 fms. in Monterey Bay.

LUMBRINEREIS IMPATIENS Claparède

Fauvel, 1923, p. 429; Berkeley, E. and C., 1935, p. 772.

A single small specimen "from holdfast of seaweed". *L. zonata* Johnson is probably a synonym of this species (see Hartman, 1938E, p. 12).

LUMBRINEREIS INFLATA Moore

Moore, 1911, p. 289.

Lumbrinereis cervicalis Treadwell, 1922, p. 176.

A single specimen dredged in 20 fms. off Santa Cruz Is.

LUMBRINEREIS LIGULATA sp. n.

A number of specimens, dredged in 12 to 17 fms. None are quite complete, but both anterior and posterior portions are represented in an almost entire condition. The largest specimen has a maximum width of about 3 mm., the smallest about 1 mm.

The prostomium is pointed, almost as long as the first three segments, and has well defined nuchal organs. The buccal segment is only a little longer than the succeeding one. The lobes of the most anterior parapodia are short and rounded, the posterior longer than the anterior. Farther back both lobes lengthen considerably and in the median region they become extremely elongated and continue so to the posterior end. In the median and posterior regions the lobes are quite slender and of equal length. They resemble almost exactly those of the parapodium of *L. bifilaris* Ehlers (1901, pl. 18, fig. 6). At the posterior end of some of the smaller specimens these lobes are so long relative to the width of the body as to meet across the dorsum.

Simple bladed setae occur in the first 80 setigers. These are accompanied by compound crotchets in the first 50 setigers. Five or six of these crotchets are present in the first few setigers. Their number gradually decreases in more posterior ones and from the 25th setiger to the 50th, they are gradually replaced by simple crotchets which persist to the end of the body. The

bladed setae and both the compound and simple crotchets resemble very closely those of *L. latreilli* (Fauvel, 1923, p. 431).

The occurrence of compound crotchets in the first 50 setigers differentiates this species from the other three with both the lobes of the median and posterior parapodia elongated which have been described from the west coast of N. America. These are *L. bifilaris* Ehlers, *L. bifurcata* McIntosh, and *L. bicirrata* Treadwell. In the characters of the parapodia and the setae *L. ligulata* unites those of *L. bifilaris* and *L. latreilli*. In the structure of the jaws it differs from both, the principal difference being that in M2 there are usually only three teeth on either side. Occasionally a fourth small tooth appears on one side. The dental formula is as follows: 3+3-4; 1+1; 1+1.

DRILONEREIS FILUM (Chaparède)

Fauvel, 1923, p. 436; Monro, 1933A, p. 88.

Drilonereis falcata, Moore, 1911, p. 298.

A single specimen dredged in 20 fms. off Santa Cruz Is. Monro points out the similarity of this species to *D. falcata*. We regard them as synonyms.

ARABELLA ATTENUATA Treadwell

Treadwell, 1906, p. 1172.

One anterior and two posterior fragments, dredged; depth unrecorded. The species is distinguished by the very broad, bluntly rounded aciculum projecting for some distance from the tip of each parapodium. The specimens are small, averaging only about 1 mm. in width.

ARABELLA IRICOLOR (Montagu)

Fauvel, 1923, p. 438.

Arabella mimetica Chamberlin, 1919A, p. 12.

Eight specimens, seven of which are from Santa Cruz Is. The form of the first maxilla distinguishes this species from the nearly allied *A. geniculata*. Our suggestion (1932, p. 313) that *A. mimetica* is synonymous with this species is confirmed by Hartman (1938E, p. 12) after re-examination of Chamberlin's type.

ARABELLA GENICULATA (Claparède)

Fauvel, 1923, p. 439.

A single specimen taken from roots of *Phyllospadix*. The specimen is unusually large, measuring 340 mm. in length and 6 mm. in width. No eyes can be made out. This is probably a matter of age.

ARABELLA SEMIMACULATA (Moore)

Aracoda semimaculata Moore, 1911, p. 295.

Arabella munda, Chamberlin, 1919B, p. 258.

Two specimens from *Zostera* roots and "rocky shore" Corona Del Mar, respectively, and a large number from similar situations at Santa Cruz Is. Amongst the latter is a specimen 500 mm. long and several approximate to this length. This is much longer than any of Moore's examples of *A. semimaculata* or of Chamberlin's specimen of *A. munda* which Hartman (1938E, p. 12), after examining the type, regards as the same species. Eyes can be made out only with difficulty, or not at all, in the larger specimens. In smaller ones they are clearer and the outer ones are larger than the inner.

We have separated this species from *A. iricolor* by the peculiar digitate, obliquely directed, lobes of the posterior parapodia. This seems to be the only character upon which a distinction can be based and we are by no means sure it is a valid one since we find amongst a large number of specimens examined, of approximately equal size, that the character is developed in varying degree and it is possible to arrange a series of intermediaries connecting those with the almost typical *iricolor* foot with those with the foot characteristic of *semimaculata*.

DORVILLEA (STAUROCEPHALUS) RUDOLPHII (Delle Chiaje)

Fauvel, 1923, p. 446.

A single specimen. Hartman (1938D, p. 101) has described a nearly allied species *D. articulatus* from California from which the present specimen differs in the particulars stressed in her description (p. 102).

FAMILY ARICIIDAE

ARICIA MACGINITHI sp. n.

This fine *Aricia* is described from a single specimen from the mud-flats, Newport Bay. It is about 210 mm. long, with a maximum width of about 5 mm. in the thoracic region. This region is flattened, whilst the abdomen is rounded. There are 29 thoracic setigerous segments. Gills start on the 5th setigerous segment. They are lanceolate throughout the body and attain their greatest size at about the mid-region, where the bases meet across the dorsum.

In the thoracic region the dorsal ramus of the parapodium has a lanceolate cirrus and a bundle of slender camerated capillary setae. The ventral ramus is a flattened vertical pad with a narrow elongated lamella bearing from 11 to 16 long conical papillae. Immediately adjacent to the row of papillae is a close row of many subuluncini (fig. 7) and anterior to this row are three or four rows of deep yellow crotchets with strongly bent and rounded tips (fig. 8). No capillaries could be found in the ventral ramus.

From the 12th setigerous segment to the end of the thoracic region the most anterior row of crotchets is replaced by a row

of very heavy brown spines about twice as thick as the crotchets and projecting very little. Most of these are straight rods and have square or rounded ends, but, judging by a few which were observed just emerging from the parapodium, this is a condition of wear and they have bluntly pointed tips when unworn (fig. 9). There are about 20 of these heavy spines in the 13th setigerous segment and they gradually decrease in number as the lobe bearing them shortens, in more posterior segments.

Dense rows of ventral papillae begin on the 14th setigerous segment and continue to the 34th. From the 20th to the 32nd setigerous segment the rows are double.

In the abdominal region the parapodium carries a long dorsal cirrus, a bundle of dorsal setae, similar to those occurring in the thorax, and an erect bilobed ventral ramus with shorter, but similar, capillaries. There is no intermediary cirrus and no forked setae could be made out.

The pygidium is well defined and the anus is surrounded by a rugose ring (fig. 10). The preserved specimen has neither colour nor markings.

The replacement of the entire anterior row of neural crotchets by heavy straight spines in the parapodia of the posterior region of the thorax, coupled with the absence of ventral capillaries in the thorax and that of both intermediary cirrus and forked setae in the abdominal region, differentiates this species from others of the genus.

A. johnsoni Moore and *A. nuda* Moore are the only members of the genus previously described from the coast of California. Both differ from the present species in significant particulars. We name it with pleasure after Prof. G. E. MacGinitie.

HAPLOSCOLOPLOS KERGUELENSIS (McIntosh)

Monro, 1936, p. 160.

Scoloplos kerguelensis, McIntosh, 1885, p. 355.

Scoloplos elongata, Johnson, 1901, p. 412.

Scoloplos acmeiceps, Chamberlin, 1919A, p. 15.

A single specimen agrees with Monro's amended description of this species. *Scoloplos elongata* appears to differ in no particular from this description. Hartman (1938E, p. 13) finds, after examination of the type, that *Scoloplos acmeiceps* is a synonym of *Scoloplos elongata*.

NAINEREIS LAEVIGATA (Grube)

Fauvel, 1927, p. 22; Berkeley, E. and C., 1932, p. 313.

Nainereis robusta, Moore, 1909B, p. 262.

Nainereis longa, Moore, 1909B, p. 264; Berkeley, 1927, p. 413.

Seven specimens taken from roots of *Zostera* and *Phyllospadix*. Four of them from Santa Cruz Is.

FAMILY SPIONIDAE

SCOLOLEPIS INDICA Fauvel

Fauvel, 1928, p. 93 and 1932, p. 170.

Two anterior and three median fragments, from Mission Bay, San Diego, agree with Fauvel's descriptions in every particular except that the crotchets are tridentate in the more posterior segments of the median fragments. The species has been recorded previously only from India.

NERINIDES ACUTA (Treadwell)

Spio acuta, Treadwell, 1914, p. 199.

This species, originally described from two anterior fragments collected at San Diego, California, and not since recorded, is represented in the collection by five specimens, four of which are complete. The absence of a branchia on the first setigerous segment necessitates transference of the species to the genus *Nerinides*. We are able to amend the original description from the more complete material in the following particulars.

There is a triangular thickening at the base and on the dorsal side of each tentacle somewhat similar to the sheath described by Okuda in *N. papillosus* (Okuda, 1937, p. 219), but less complex (fig. 11).

The lobe of the ventral remus in the posterior parapodium is very long and extends vertically to a narrow notch which divides it from the dorsal remus. The setae are confined to the basal end of the lobe and below them is a small projection (fig. 12).

Ventral crotchets start at about the 30th setiger. They are bi-dentate and have hoods with a terminal aperture (fig. 13).

The anus is terminal and below it is a turgid flange the edge of which is entire (fig. 14).

The presence of setae in both rami of the first setiger of this species differentiates it from other members of the genus.

LAONICE CIRRATA (Sars)

Fauvel, 1927, p. 38; Berkeley, E. and C., 1936, P. 474.

Spionides japonicus. Moore, 1907, p. 204.

Spionides foliata, Moore, 1923, p. 182 (*vide* Hartman, 1936B, p. 32).

Several specimens, one of which is from Monterey Bay and one from Santa Cruz Is. All dredged in 12 to 17 fms.

PRIONOSPIO PINNATA Ehlers

Ehlers, 1901, p. 163; Fauvel, 1932, p. 173.

Paraprionospio tribranchiata, Berkeley, 1927, p. 415.

Prionospio alata, Moore, 1923, p. 185.

Several specimens, dredged in 12 to 17 fms., one of which has two tongue-like processes emerging from the mouth and projecting laterally. We have occasionally observed this in ex-

amples from the Nanaimo region and we mention it here because these processes are at first glance liable to be mistaken for frontal horns such as occur in *Scololepis*.

In the description of *Paraprionospio tribranchiata* it is surmised that the species may prove to be a synonym of *Prionospio pinnata*. We can now confirm this synonymy and we follow Söderström (1920, p. 228) and Fauvel in considering Caullery's genus *Paraprionospio* unnecessary.

POLYDORA GIARDI Mesnil

Mesnil, 1896, p. 195; Fauvel, 1927, p. 50.

A single specimen, incomplete posteriorly, dredged in 20 fms. off Santa Cruz Is., agrees, so far as can be determined, with this species.

Branchiae begin on the 10th setiger. Dorsal setae are present on the 1st setiger, and the characters of the setae of the 5th setiger are in accordance with Mesnil's description.

Originally recorded from France, this species seems to have been noted since only from Ireland (Southern, 1914, p. 104).

FAMILY CHAETOPTERIDAE

CHAETOPTERUS VARIOPEDATUS Rénier

Fauvel, 1927, p. 77.

Two specimens, one of them small.

MESOCHAETOPTERUS RICKETTSII sp. n.

One complete, but badly preserved, specimen, in several pieces, and an anterior portion are in this collection. Another anterior portion, from Ensenada Estuary, Mexico, had previously been sent to us by Mr. E. F. Ricketts, who also sent eight similar fragments from Newport Bay, California, in 1932. All these anterior portions consist of the anterior region of the body and a variable number of the most anterior segments of the median region.

The following description is based upon a consideration of all the material at our disposal.

In size, in superficial appearance, and in general morphological structure, the species resembles *M. taylori* Potts. The fragments of the only complete specimen measure jointly about 333 mm. in length and the greatest width, at the first segment of the median region, is about 10 mm. Some of the anterior fragments are wider than this and evidently belong to larger animals.

The prostomium is low and rounded. The peristomium is large, erect, flaring and unpigmented. Its dorsal lobes do not cover the prostomium which is, therefore, clearly visible on the dorsal surface. The peristomial tentacles are grooved and 30 to 40 mm. long and there is no trace of a second pair of tentacles. The anterior region consists of 9 to 13 setigers. It is about 16 mm. long in the complete specimen. It differs in no essential

character from the same region in other members of the genus. The modified setae of the 4th setiger resemble those of *M. minuta* (Potts, 1914, p. 964, fig. 4B), whilst the remainder of the notopodials are like those of *M. taylori* (Potts, 1914, p. 965, fig. 5A),

The median region consists of 21 setigers and is about 110 mm. long in the complete specimen. None of the setigers are as elongated as they are in other members of the genus. The first is about the length of the whole anterior region and more posterior ones are increasingly shorter. At the posterior end of the 2nd and of every succeeding setiger of this region the walls of the ciliated groove bear on each side a small semi-circular expansion. The flaps so formed are held more or less vertically. These represent the very much larger and more complicated expansions found, similarly situated, in other members of the genus and we take it that their presence characterizes the median region. The dorsal surface of all the segments in this region is coated with dark brown glandular tissue forming close transverse furrows and the white lateral frill characteristic of *M. taylori* is not present. The notopodia are all alike throughout the region and are unilobed triangular processes supported by bundles of fine capillaries with flattened ends (fig. 15). The uncini in this region are somewhat variable, but generally resemble those of *M. taylori* as figured by Potts (1914, p. 962, fig. 3).

The posterior region measures about 208 mm. and consists of some 80 setigers, so far as can be made out in the poor condition of preservation of the only entire specimen. The transition from the median to the typical abdominal segments is more gradual in this species than in other members of the genus. The notopodia carry about three capillaries each with sickle-shaped ends extending freely (fig. 16) and these are present to the end of the body. The uncini are essentially similar to those of the median region.

The tube is thin and smooth and covered with a sparse coating of sand. It may extend for more than a metre. It resembles that of *M. taylori* in both these respects.

The genus *Mesochaetopterus* was established by Potts (1914) for the two species *M. taylori* and *M. minuta*. Since then two others, *M. alipes* Monro, and *M. japonicus* Fujiwara, have been added. The number of median segments in these four species consists, in accord with the generic description, of "2 or 3 elongated segments". In the present species there appears to be 21 of these. Since we have only the one specimen with this region complete we are unable to say whether this number of median segments is constant. In all other respects it is so typical a *Mesochaetopterus* that we place it within the genus though this may involve modifying the generic definition to include species with a greater number of median segments than those described hitherto.

We take pleasure in naming the species after Mr. E. F. Ricketts.

FAMILY CIRRATULIDAE

CIRRIFORMIA (AUDOUINIA) TENTACULATA (Montagu).

Audouinia tentaculata, Fauvel, 1927, p. 91; Berkeley, E. and C., 1935, p. 772 (with synonymy).

Several specimens, many of which are from Santa Cruz Is. Hartman (1936B, p. 31) suggests the generic name *Cirriformia* in place of *Audouinia* which, she points out, is preoccupied.

CIRRIFORMIA (AUDOUINIA) LUXURIOSA (Moore)

Monro, 1933B, p. 1055.

Cirratus luxuriosus, Moore, 1904, p. 493.

Several specimens. The species is distinguished by the gradually increasing distance between branchia and notopodium from the anterior to the posterior region of the body. In the anterior segments they are almost in contact. Posteriorly the branchia assumes an almost mid-dorsal position. The only other species of which we know in which this arrangement occurs is *A. semicincta* Ehlers, which may be a synonym.

THARYX SP.?

One specimen, dredged in 12 to 17 fms. It is incomplete posteriorly, less than 1 mm. wide, and the segments are very short and crowded. The prostomium is conical. There are no eyes. Only stumps of the tentacular filaments and branchiae, or scars of attachment showing where they have been, remain. There are 4 achaetous anterior segments which have no indication of having carried branchiae. The fifth segment is the first setiger and carries on its anterior border the remains of a pair of tentacular filaments and of a pair of branchiae. Succeeding setigers have each a pair of branchiae for at least the anterior half of the fragment.

Throughout the length of the fragment the dorsal setae are long, smooth hair-like capillaries, whilst the ventral setae have serrated blades and are drawn out to fine tips. In the anterior region they are much longer than posteriorly and are alternately long and short in the rows, the longer ones having very extended tips (fig. 17). In the posterior region the ventral setae are more nearly of one length in the rows and are broader, more curved, and more coarsely serrated (fig. 18).

We know of no *Tharyx* which has setae of this peculiar type.

CHAETOZONE SPINOSA Moore, var. CORONA var. n.

Chaetozone spinosa, Moore, 1903, p. 468.

Four specimens, dredged in 12 to 17 fms., one of which is complete, except that only a few branchiae remain. One of the others is an anterior fragment with most of the branchiae attached, and two have only a few branchiae and no caudal ends.

The complete specimen is about 18 mm. long and 1.5 mm. wide. The largest of the others is nearly 2 mm. wide. All are thus considerably smaller than the type of Moore's species.

Like the stem species the variety *corona* is characterized by the presence of stiff spines, together with very long, fine, capillary setae throughout the body in both rami. The capillaries agree closely with Moore's description and figure (pl. 26, fig. 73), but the spines in the anterior region have no delicate tips. They are all alike throughout the body and resemble those Moore describes for posterior segments only (pl. 26, fig. 74). Moreover the variety has a pair of well-defined crescentic eyes placed laterally on the prostomium.

DODECACERIA PACIFICA (Fewkes)

Moore, 1909B, p. 268; Berkeley, E. and C., 1932, p. 314.

A number of typical specimens.

FAMILY CHLORAEMIDAE

FLABELLIGERA COMMENSALIS Moore

Moore, 1909B, p. 286.

Several specimens taken from amongst the spines of the sea-urchin *Srongylocentrotus purpuratus*.

The rami of the parapodia are widely separated and the notosetae are in fan-shaped bunches extending over the dorsum. The body is quite free from mucus investment, sand, or mud. These characteristics differentiate it from *F. affinis* Sars (c.f. Monro, 1933B, p. 1056).

STYLARIOIDES INFLATA (Treadwell)

Trophonia inflata. Treadwell, 1914, p. 213.

A large number of specimens dredged in 5 to 16 fms., some in Monterey Bay. One from 20 fms. off Santa Cruz Is. All agree closely with Treadwell's description, assuming that he has mistaken the dorsal for the ventral side of the animal. This seems probable from the position he gives the hooks. The species is distinguished by the fringes of large papillae on the margins of the somites in the anterior region and the longitudinal lines of similar papillae on either side of the body. Many of the specimens have the anterior region of the body inflated in the manner described by Treadwell, but regarded by him as possibly due to preservation.

STYLARIOIDES PAPILLATA (Johnson)

Trophonia papillata, Johnson, 1901, p. 416.

Six small specimens, only one of which is accompanied by a record of its origin. This was dredged in 12 to 17 fms. off Corona Del Mar.

STYLARIOIDES PLUMOSA (O. F. Müller)

Fauvel, 1927, p. 116.

Several small specimens, most of them in poor condition. One dredged in Monterey Bay in 55 fms., the remainder off Corona Del Mar in 5 to 17 fms.

The species is differentiated from *St. papillata* by the shorter and less conspicuous setae and papillae. Otherwise, as Monro points out (1933B, p. 1059) they are not easy to distinguish.

STYLARIOIDES ERUCA (Claparède)

Fauvel, 1927, p. 119.

Trophonia capulata, Moore, 1909B, p. 284.

A number of specimens, all, except one, dredged in 5 to 17 fms. One from Santa Cruz Is. The distribution of the papillae seems to be the only character differentiating this species from *Trophonia capulata* Moore, which was described from a single specimen. The coating of sand makes it difficult to determine the exact arrangement of the papillae.

FAMILY SCALIBREGMIDAE

ONCOSCOLEX PACIFICUS (Moore)

Berkeley, 1930, p. 68.

Schleroecheilus pacificus, Moore, 1909B, p. 282; Ashworth, 1915, p. 415.

Two examples of this rare and interesting species; one incomplete posteriorly. Both from Santa Cruz Is. The characters of the species and the grounds on which it is placed in the genus *Oncoscolex* have been given by one of us elsewhere (Berkeley, 1930, p. 68).

There has been some confusion in the interpretation of the genus *Oncoscolex* which Hartman (1938E, p. 14) has clarified in redefining Chamberlin's genus *Kebuita*. *Oncoscolex heterochaetus* Augener belongs to this latter genus.

As Ashworth points out the present species agrees in general with *Oncoscolex dicranochaetus* Schmarda. However, the shape of the body is not vermiform as in that species (see Schmarda, 1861, pl. 26, fig. 206), but resembles that of *Scalibregma inflatum* Rathke.

FAMILY OPHELIIDAE

OPHELIA LIMACINA (Rathke)

Fauvel, 1927, p. 132; Hartman, 1938D, p. 107.

Four specimens.

ARMANDIA BREVIS (Moore)

Ammotrypane brevis, Moore, 1906, p. 254 and 1908, p. 354; Treadwell, 1922, p. 179.

Armandia brevis, Hartman, 1938D, p. 102.

Armandia bioculata, Hartman, 1938D, p. 105.

Several specimens from Balboa beach and "off Balboa". Others from "tide-pool", Monterey Bay. They agree closely with Treadwell's modified description of *A. brevis* Moore except that in some cases prostomial eyes are more or less clearly visible; a point not mentioned by either Moore or Treadwell.

Hartman differentiates the species *A. bioculata* from *A. brevis* on this character, and on the different shape of the lateral eyes, the absence of a branchia on the last setiger, and the different type of pygidium. In a large number of specimens of *A. brevis* from B. C. waters which we have examined the lateral eyes vary considerably in size and shape in different individuals, the branchiae extend to the last setiger, but the last pair is in some cases quite vestigial, and the pygidium is as Hartman describes for *A. bioculata* and Treadwell (1922, p. 179, and fig. 37, p. 181) had already described for *A. brevis*. In the type specimen of *A. brevis* the pygidium was evidently imperfect. We regard *A. bioculata* as a synonym of *A. brevis*.

TRAVISIA GIGAS Hartman

Hartman, 1938D, p. 103.

Four specimens, the largest, collected on sandy shore, Newport Bay, is about 75 mm. long and 10 mm. wide at the widest point. The other three dredged in 12 to 17 fms.

This species has a pygidium with six long digitiform anal cirri. Three species of *Travisia* which have this character had been described earlier, *T. japonica* Fujiwara, *T. pupa* Fauvel (non Moore), and *T. chinensis* Monro (non Grube). These are very near to each other and Fauvel (1936, p. 77) considers them identical. The present species differs from all three in the form of the pygidium (in spite of its having six long cirri) and in the broad leaf-like lappets of the parapodia of the posterior region.

TRAVISIA BREVIS Moore

Moore, 1923, p. 220.

Four specimens, three of which were dredged in 55 fms. in Monterey Bay, the fourth taken "off Balboa".

POLYOPHTHALMUS PICTUS (Dujardin)

Fauvel, 1927, p. 137; Hartman, 1939B, p. 18.

Three specimens from Santa Cruz Is.

FAMILY CAPITELLIDAE

NOTOMASTUS GIGANTEUS Moore

Moore, 1906, p. 227; Fauvel, 1932, p. 194; Berkeley, E. and C., 1935, p. 772.

One specimen, from Annaheim Slough, incomplete posteriorly; a number of caudal ends of unrecorded origin. The speci-

men from Annaheim Slough is about 7 mm. wide across the thoracic region. Moore did not observe the genital pores. The present specimen has these on the first 17 abdominal segments. An example we recorded from Elkhorn Slough, California, had 13, whilst Fauvel's specimen, from Puri, India, had only 9. Presumably the number of pores which may be functional at any one time may vary.

DASYBRANCHUS CADUCUS Grube var. LUMBRICOIDES Monro
Monro, 1933B, p. 1059.

A single example measures about 5 mm. in width and 300 mm. in length, but it is incomplete posteriorly. The notopodial uncini of the anterior abdominal segments form an almost continuous band on the dorsum, as described and figured by Monro. The abdominal crotchets are as figured by Fauvel (1927, p. 148) for the stem species.

The only significant particular in which this variety seems to differ from *D. glabrus* Moore (1909B, p. 280) is that in the latter there is no interrampal break in the line of uncini in the first twelve abdominal segments.

FAMILY ARENICOLIDAE

ARENICOLA CRISTATA Stimpson

Fauvel, 1927, p. 163.

Two specimens.

FAMILY MALDANIDAE

CLYMENE (Euclymene) GROSSA Baird var. NEWPORTI var. n.

One complete example and two fragments, one anterior and the other posterior, which seem to belong together. The characters are those of the stem species except the following:

1. The edges of the twelve lappets formed by the notching of the posterior border of the cephalic plate are not finely denticulate.
2. There are two non-setigerous pre-anal segments.

Pennate, as well as limbate, setae occur in our specimens and are not described by Ehlers in *Cl. grossa* (1901, p. 190), but this was probably an oversight.

Cl. tropica Monro (1928B, p. 97) differs from the present variety in having the lappets of the posterior border of the cephalic plate separated to form coarse teeth, in having only one pre-anal segment, and in the detailed character of the uncinus. We agree with Fauvel (1939, p. 4) that *Cl. tropica* should be regarded as no more than a variety of *Cl. grossa*.

AXIOTHELLA RUBROCINCTA (Johnson) var. COMPLEXA var. n.

Two complete examples and some fragments. The variety differs from the stem species (see Johnson, 1901, p. 418) in the following particulars:

1. The cephalic plate has three or four irregularly placed lateral notches on each side of the flaring rim.
2. The nuchal organs are straight and long extending over seven-eighths of the length of the plate.
3. There is a low collar on the anterior margin of the 4th setiger.

The collar on the 4th setiger is quite definite and not to be confused with the telescoping effect often found in the stem species (c.f. Arwidsson, 1922, p. 29 and Monro, 1937, p. 310). It is best seen when the animal is fully extended.

We follow Monro in placing the species in the genus *Axiiothella*, basing the characterization of this genus on the presence of uncini in the anterior segments, and disregarding the presence of the collar on the 4th setiger. The characters of this variety lend support to Monro's view.

ASYCHIS DISPARIDENTATA Moore

Maldane disparidentata, Moore, 1904, p. 494 and 1923, p. 237.

Two entire specimens and two fragments, dredged in 12 to 17 fms.

FAMILY AMMOCHARIDAE

AMMOCHARES FUSIFORMIS (Delle Chiaje)

Berkeley, 1930, p. 67.

Owenia fusiformis, Fauvel, 1927, p. 203.

Ammochares occidentalis, Johnson, 1901, p. 420.

Four specimens taken "off Balboa" and one from Santa Cruz Is.

FAMILY SABELLARIIDAE

SABELLARIA CALIFORNICA Fewkes

Moore, 1909B, p. 293.

A large number of specimens, several of which are from Santa Cruz Is. Nine of the latter were dredged in 5 fms. The species is readily distinguished by the black recumbent median series of paleae which cover the inner series (Moore, pl. 9, fig. 66).

SABELLARIA CEMENTARIUM Moore

Moore, 1906, p. 248.

Three specimens, one dredged in 12 fms. off Corona Del Mar, the other two which are small, in Monterey Bay in 5 fms.

As Monro points out (1933B, p. 1064) this species is probably unique in the genus in having the paleae of the inner series stouter and more spoon-shaped than those of the middle series (see Moore, pl. 12, fig. 45).

SABELLARIA SPINULOSA Leuckart var. ALCOCKI, Gravier

Fauvel, 1927, p. 211.

A single specimen dredged in 12 fms., is certainly attributable to this variety. A second one is doubtful since the anterior end is regenerating.

FAMILY STERNASPIDAE

STERNASPIS FOSSOR Stimpson

Moore, 1908, p. 358 and 1909A, p. 144; Berkeley, 1930, p. 69.

A large number of specimens, dredged in 5 to 17 fms.

FAMILY AMPHICTENIDAE

PECTINARIA BELGICA (Pallas)

Fauvel, 1927, p. 220.

Six specimens, dredged; depth unrecorded. This is the species previously recorded by us (1935, p. 773) as *P. auricoma*. As in the former specimens examined the uncinus in these has fewer large teeth than is usually recorded for that of *P. belgica*, but it agrees in all other respects. Ehlers (1901, p. 205) records *P. belgica* from the Magellan region with uncini having 5 teeth, which is the number commonly occurring in our specimens.

FAMILY AMPHARETIDAE

AMPHARETE ARCTICA Malmgren

Malmgren, 1865, p. 364; Moore, 1908, p. 348 and 1923, p. 200; Berkeley, 1929, p. 311; Okuda, 1936B, p. 153.

A large number of specimens dredged in 8 to 17 fms. Two from Monterey Bay in 16 fms. and three from Santa Cruz Is. in 2 to 7 fms.

Genus SCHISTOCOMUS Chamberlin CHAR. EMEND.

Like Sosanopsis in having tentacles, in lacking postbranchial spines, in bearing fifteen pairs of fasciae of capillary setae and four pairs of branchiae. It differs from that genus in having the branchiae of two types, one pair being of the ordinary, smooth, simple, subulate form and the other three with the edges divided, two pinnately, bearing two close series of lamellar branches, and one with an essentially single series of branches in the genotype.

Genotype *S. hiltoni* Chamberlin.

SCHISTOCOMUS HILTONI Chamberlin

Chamberlin, 1919A, p. 17; Fauvel, 1932, p. 219.

Seven specimens dredged in 5 to 17 fms. One from Santa Cruz Is. collected intertidally. The genus *Schistocomus* was set up by Chamberlin for this species and defined as having no tentacles. Fauvel described a specimen from Madras of which he says "the buccal tentacles are very likely lacking". Of the eight

specimens in the present collection four show no sign of tentacles externally and, in this condition, agree exactly with Chamberlin's and Fauvel's descriptions. In the other four specimens, which agree in all other respects, tentacles are present. The degree of extension of the tentacles varies between the individuals; in one case they can only just be seen emerging from the mouth, in another the buccal membrane is fully extended and bears a large number of long and smooth tentacles. When the tentacles are thus extended the head region no longer has the truncated appearance which characterizes individuals in which they are retracted.

This observation renders necessary the above modification of the definition of the genus. The presence of tentacles brings the genus very near to *Sosanopsis* Hesse, but it is differentiated from that genus by the presence of two kinds of branchiae.

AMAGE ANOPS (Johnson)

Moore, 1923, p. 210; Berkeley, 1929, p. 310.

Sabellides anops, Johnson, 1901, p. 424.

Two specimens dredged in 12 to 17 fms. As has been previously pointed out (Johnson, 1901 and Berkeley, 1929) this species resembles *A. auricula* Malmgren very closely and it is doubtful whether the two should be regarded as separate.

AMPHICTEIS GUNNERI (Sars)

Fauvel, 1927, p. 231; Okuda, 1938, p. 101.

Two specimens, dredged in 12 to 17 fms., both without branchiae. *A. glabra* Moore (1905, p. 849) seems to be this species.

SAMYTHA BIOCULATA Moore

Moore, 1906, p. 253.

Amage bioculata, Fauvel, 1932, p. 218.

Two specimens dredged in 12 to 17 fms. Branchiae are lacking in both, but the scars indicate that they were arranged as Moore describes. Eyes could be distinguished, but only with difficulty. In one specimen most of the uncini are 6-toothed, a few 5-toothed; in the other this condition is reversed.

FAMILY TEREHELLIDAE

AMPHITRITE CIRDATA (O. F. Müller)

Fauvel, 1927, p. 251.

This is a poorly preserved and incomplete specimen, only part of the thoracic region being present. It agrees in all comparable particulars. The species has been recorded previously only from more northerly latitudes and not from the west coast of N. America, but there seems little to differentiate it from *A. radiata* Moore (1905, p. 858 and 1908, p. 350) from Alaska.

TEREBELLA CALIFORNICA Moore

Moore, 1904, p. 496.

One poorly preserved specimen. Monro (1933B, p. 1072), quoting Hesse, suggests doubtfully that this form may be a *Neoleprea* since "the notopods begin on the 3rd segment (?)". However, Moore (p. 498) states that they begin on IV and this is borne out both by the present specimens and others we have examined from California.

EUPOLYMNIA CRESCENTIS Chamberlin

Chamberlin, 1919B, p. 265.

A number of specimens, dredged in 12 to 17 fms. Monro (1933B, p. 1072) suggests that this species is synonymous with *E. nebulosa* (Montagu). Hartman (1938E, p. 17) regards Chamberlin's species as valid and has summarized the main points of difference between the two. Examination of the present specimens confirms her findings.

PISTA CRISTATA (O. F. Müller)

Fauvel, 1927, p. 266.

Four specimens. One taken "off Balboa" (depth unrecorded), two off Corona Del Mar in 12 to 17 fms., and one in Monterey Bay in 55 fms. The species has been recorded from Alaska, British Columbia and Washington, but, apparently, not farther south on the west coast of N. America.

PISTA ALATA Moore

Moore, 1909B, p. 273; Monro, 1933B, p. 1066.

Thirteen typical specimens. The majority are in tubes constructed of fine sandy mud, but in one case the tube is coated with shelly material.

PISTA FRATRELLA Chamberlin

Chamberlin, 1919A, p. 18.

Four poorly preserved specimens. Two dredged in Monterey Bay in 50 to 60 fms.; the others from "holdfast of kelp" (origin unrecorded).

THELEPUS SETOSUS (Quatrefages)

Fauvel, 1927, p. 273; Berkeley, E. & C., 1939, p. 342.

Two specimens, one of them from Santa Cruz Is. The specimen from Newport Bay had *Lepidametria gigas* (Johnson) with it as commensal.

In our 1939 paper we expressed the opinion that *Th. setosus* (Qfges) was identical with *Th. crispus* Johnson. More recently we have examined some specimens of the latter species and have satisfied ourselves that this opinion is erroneous. The differences are discussed in a paper on the polychaeta of Western Vancouver Island and the Queen Charlotte Islands now in preparation.

TEREBELLIDES STROEMI Sars

Fauvel, 1927, p. 291.

Four specimens, dredged in 5 to 17 fms. The average length of the specimens is about 35 mm.

LOIMIA MONTAGUI (Grube)

Marenzeller, 1884, p. 205; McIntosh, 1922, p. 147;
Berkeley, E. & C., 1935, p. 773.

Two small, badly preserved specimens. Most of the thoracic uncini are 5-fanged, some 6-fanged. The uncinus has no pronounced sub-rostral tooth. A note with one of the specimens records that *Parapinnixia affinis* was found with it as commensal. The other had a specimen of *Arctonoe pulchra* (Johnson) put up with it, which, presumably, was also a commensal. This is an unusual association.

STREBLOSOMA BAIRDI (Malmgren)

Fauvel, 1927, p. 275.

Thirteen specimens, three of which are from Santa Cruz Is. Seven of the specimens are only 5 to 10 mm. long and not more than 1 mm. wide. We regard these as young forms of *S. bairdi* rather than mature individuals of *S. crassibranchia* Treadwell (1914, p. 208), which is a small form and is recorded from the collection of the University of California with locality of origin indicated as uncertain, because of the forms of the capillaries and uncini.

One of the larger specimens is in its tube, which is very fragile, heavily whorled, and incrustated with fine particles of micaceous sand. A single example of this species has been recorded from Friday Harbour, Washington (Weese, 1932); except this we know of no previous record from the N. E. Pacific area.

FAMILY SABELLIDAE

DEMONAX LEUCASPIS Kinberg

Monro, 1933B, p. 1075 (*with synonymy*).

Two small specimens from Santa Cruz Is. This is the form recorded from Alaska (Bush, 1904, p. 200) and from the Nanaimo region (Berkeley, 1930, p. 70) as *Parasabella media* Bush. It is characterized by the broadly lanceolate setae which accompany the bladed capillaries in the thoracic notopodium.

PSEUDOPOTAMILLA OCCELATA Moore

Moore, 1905, p. 559; Hartman, 1938E, p. 26 (*with synonymy*).

A number of specimens some of which are very small. All from Santa Cruz Is.

BRANCHIOMMA MUSHAENSIS Gravier

Monro, 1933B, p. 1078 (*with synonymy*).

A single specimen from rocky shore, La Jolla. The tube is incrustated with coarse shelly sand.

BRANCHIOMMA BURRARDUM Berkeley

Berkeley, 1930, p. 71.

Two small, but typical, specimens dredged in 50 to 60 fms. in Monterey Bay. Both have the spatulate thoracic setae which characterize the younger forms of this species.

Monro suggests (1933B, p. 1078) that this species and *B. bioculatum* Ehlers may be synonymous, but, judging by Ehler's (1887, p. 260) description of the latter, there are differences in the number and character of the eyes, in the shape of the collar lobes, and in that of the thoracic uncini.

We are unable to follow the suggestion of synonymy of the present species with *Pseudopotamilla splendida* Moore which is made by Hartman (1938E, p. 27) since the latter species has no eyes.

BRANCHIOMMA ROULEI Gravier

Gravier, 1909, p. 655.

Two specimens; one from "holdfast of seaweed", the other dredged in 12 to 17 fms.

MYXICOLA AESTHETICA (Claparède)

Fauvel, 1927, p. 344.

Two specimens dredged in Monterey Bay in 5 fms.

MYXICOLA INFUNDIBULUM (Rénier)

Fauvel, 1927, p. 342.

Myxicola pacifica Johnson, 1901, p. 431.

Myxicola monacis Chamberlin, 1919A, p. 20.

Three specimens, 50 mm., 70 mm., and 85 mm. long respectively. The points of differentiation between *M. monacis* and *M. pacifica* described by Chamberlin seem to come within the limits of variation. Both agree with *M. infundibulum*. Hartman (1938E, p. 19) confirms this.

CHONE INFUNDIBULIFORMIS Kröyer

Fauvel, 1927, p. 334.

A single small specimen. We recorded this species from Elkhorn Slough, California (1935, p. 774). This was the first record from the west coast of N. America. It has been found since in the Nanaimo region.

FAMILY SERPULIDAE

SERPULA VERMICULARIS Linné

Fauvel, 1927, p. 351.

Serpula columbiana, Johnson, 1901, p. 432.

A single specimen from Santa Cruz Is.

HYDROIDES NORVEGICA (Gunnerus)

Fauvel, 1927, p. 356; Rioja, 1925, p. 83.

A few almost straight tubes from "piling at Newport Bay". From these we were able to extract one complete and one incomplete animal. The complete specimen agrees closely with the descriptions of this species given by Fauvel and Rioja.

HYDROIDES UNCINATA (Philippi)

Fauvel, 1927, p. 357.

A single example from "holdfast of seaweed".

SALMACINA DYSTERI (Huxley) var. TRIBRANCHIATA (Moore)

Monro, 1933B, p. 1090.

Filograna tribranchiata, Moore, 1923, p. 250.

Several tube masses from Corona Del Mar, Monterey Bay, and Santa Cruz Is. Some dredged in 5 to 17 fms. Most of the tubes were empty, but a few animals extracted from material from each locality have the distinctive character Moore described.

APOMATUS TIMSII Pixell

Pixell, 1912, p. 787.

A single specimen dredged in 50 to 60 fms. in Monterey Bay. *A. ampulliferus* Philippi seems to differ from this species only in the more anterior incidence of the thoracic bladed sickle setae characteristic of the genus.

PROTULA TUBULARIA (Montagu)

Fauvel, 1927, p. 382.

A single specimen taken from the gravity tank of the salt water system of the laboratory at Corona Del Mar. Monro (1933B, p. 1088) records a variety *balboensis* of this species from Panama which differs very little from the stem species. Excepting this, the species has not been recorded from the N. E. Pacific, but there are two records of it from Japan (Fauvel, 1936, p. 89 and Okuda, 1938, p. 104), in both cases from aquarium tanks.

SPIROBRANCHUS SPINOSUS Moore

Moore, 1923, p. 248.

Sixteen specimens, eleven of which are from Santa Cruz Is. The operculum is as described by Moore except that, in the case of some of the specimens from Santa Cruz Is., the armature is more complex, consisting of four long compound spines and two short spiny bosses. There are two kinds of collar setae, characteristic bayonet-shaped ones and the small tapering spines described by Moore. The former type were doubtless lost from his specimen. Monro (1933B, p. 1080) surmises this to have been the case and suggests that *S. spinosus* is identical with *S. giganteus* Pallas, a widely distributed species of warmer seas. This

would seem probable but that no specimen of *S. spinosus* is yet known which approaches the size of *S. giganteus*. The latter is said to reach a length of some 80 mm. Moore's specimen of *S. spinosus* was 23 mm. long and the largest in this collection is between 25 and 30 mm.

CRUCIGERA WEBSTERI Benedict

Benedict, 1886, p. 550.

One specimen from "boat bottom," Newport Bay. Monro (1933B, p. 1079) suggests that *C. zygophera* Johnson may be a synonym of this species. We do not think this is the case. We have examined many specimens of *C. zygophera* and find that the number of radii of the operculum, though variable, never exceeds 30. In the present species there are, according to Benedict, about 50, and this is approximately the number in our specimen. The projections on the stem of the operculum are entirely different in the two species. In *C. zygophera* there are three, two long and equal ones projecting laterally and a third on the opposite side of the stem which is little more than a boss and may be concave. In *C. websteri* there are four, all of about equal length and all projecting laterally forming a symmetrical cross, as figured by Benedict (Pl. 21, fig. 24). Finally, the tubes differ materially. That of *C. zygophera* varies from an almost smooth condition to an angulated one of more or less complexity, but there are never definite serrated ridges such as characterize that of *C. websteri*.

SPIROBIS MARIONI Caullery and Mesnil

Caullery and Mesnil, 1897, p. 199.

Several specimens from an aquarium tank at the laboratory, Corona Del Mar. Agreement with this species is good except that the operculum is somewhat simpler than it is represented in Caullery and Mesnil's figure. This shows a rather heavy central column, which is represented in our specimens by only a low boss.

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DESCRIPTION OF FIGURES

- Figs. 1 to 3. *Sthenelanelia atypica* sp. n. Neurosetae from 2nd setiger.
 Fig. 4. *Loandalia fauveli* sp. n. Anterior region.
 Fig. 5. *Loandalia fauveli* sp. n. Eighth setiger.
 Fig. 6. *Loandalia fauveli* sp. n. Notopodium of posterior region.
 Fig. 7. *Aricia macginitii* sp. n. Subuluncinus.
 Fig. 8. *Aricia macginitii* sp. n. Crotchet.
 Fig. 9. *Aricia macginitii* sp. n. Spine.
 Fig. 10. *Aricia macginitii* sp. n. Pygidium.
 Fig. 11. *Nerinides acuta* (Treadwell). Base of tentacle.
 Fig. 12. *Nerinides acuta* (Treadwell). Posterior parapodium.
 Fig. 13. *Nerinides acuta* (Treadwell). Ventral crochet.
 Fig. 14. *Nerinides acuta* (Treadwell). Pygidium.
 Fig. 15. *Mesochaetopterus rickettsii* sp. n. Anterior portion of median
 region.
 Fig. 16. *Mesochaetopterus rickettsii* sp. n. Tip of notopodial capillary
 from posterior region.
 Fig. 17. *Tharyx* sp.? Long ventral seta from anterior region.
 Fig. 18. *Tharyx* sp.? Ventral seta from posterior region.

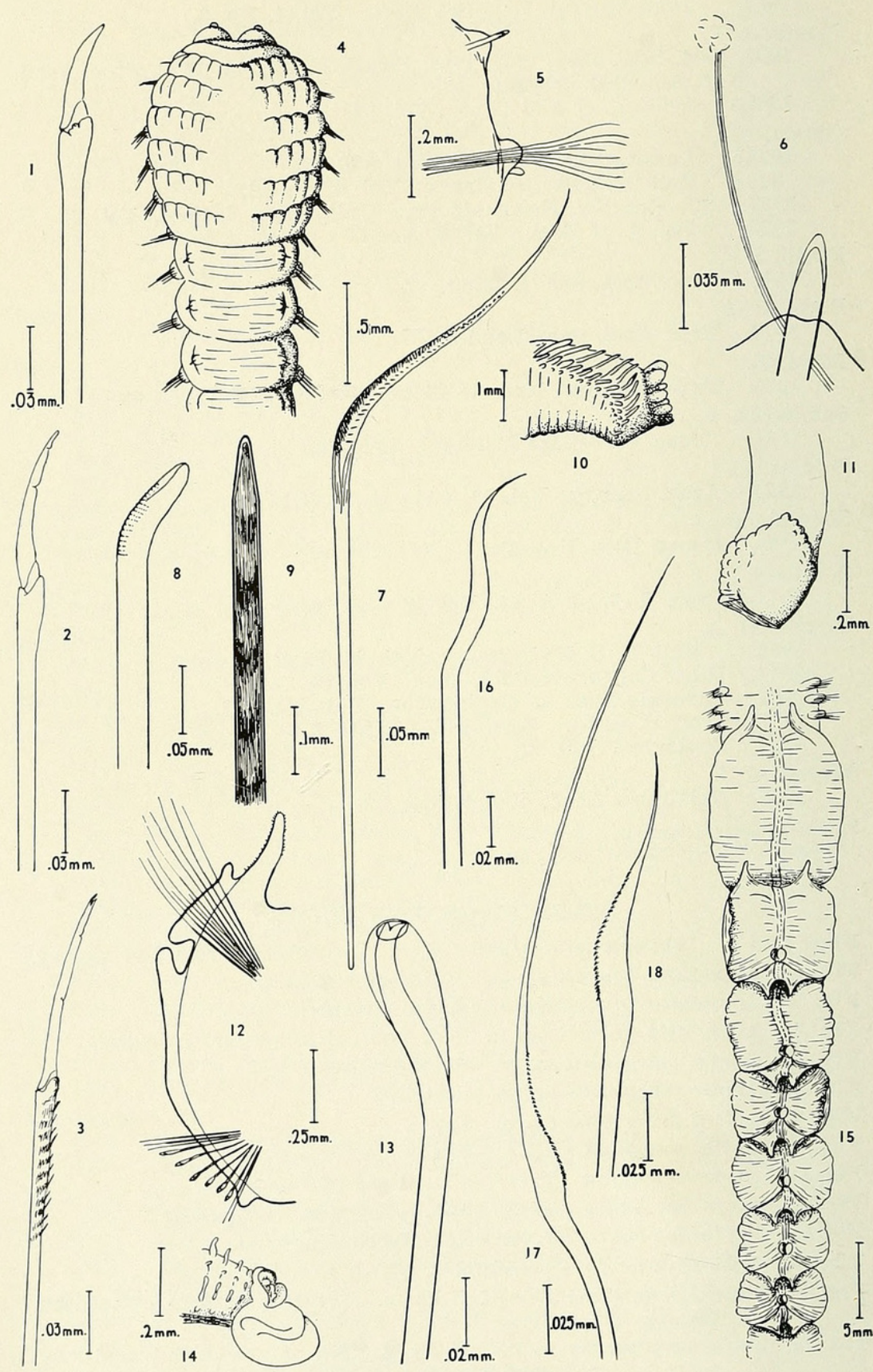


PLATE 5



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