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AND POLYCHAETOUS ANNELIDS
of the Barbados-Antigua Expedition of 1918

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PROFESSOR BOHUMIL SHIMEK, Ph.D., Editor

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REPORT ON THE ANTS

Collected by the Barbados-Antigua Expedition
from the University of Iowa in 1918

WILLIAM MORTON WHEELER
Bussey Institution, Forest Hills, Boston, Massachusetts

Although there has been considerable collecting of ants on the Windward Islands, only the species of St. Vincent and Grenada have been listed hitherto. Professor Dayton Stoner has recently sent me the ants which he collected as entomologist of the Barbados-Antigua Expedition of the University of Iowa, and during July, 1920, I was able to collect on both of the islands while on my way to British Guiana. Owing to the protracted and almost unprecedented drought, however, I was unable to secure many species. The following list is based on these small collections, on material that has been accumulating in my cabinet and on that collected by Professor A. Forel in Barbados while on his journey to Colombia in 1896. The total is rather meager and most of the species are well-known, widely distributed West Indian forms.

Family **Formicidae**
Subfamily **Ponerinae**

Platythyrea punctata F. Smith var. *pruinosa* Mayr.—Barbados. First taken on the island by Professor Forel. Professor Stoner captured two workers.

Odontomachus haematoda L. subsp. *insularis* Guérin.—Antigua: St. John (Stoner; Amer. Mus. Exped.) ♂ ♀. Barbados (Forel, Stoner) ♂. Bridgetown (Wheeler) ♂. This ant is common throughout the West Indies and tropical Florida. To the many known localities I may add Montserrat and St. Kitts, from which I have received workers taken by Mr. H. A. Ballou.

Subfamily **Myrmicinae**

Cardiocondyla emeryi Forel.—Male and female specimens re-

corded by Forel from Barbados and Guadeloupe. The species was first found on St. Thomas but has since been taken in many widely separated localities: Madeira, Syria, East Indies, Madagascar, Florida, etc.

Monomorium minutum Mayr.—Barbados (H. A. Ballou) ♀ ♀ ♂. The specimens are very close to if not identical with the typical form of the species from Southern Europe. There can be little doubt that this, like the following *Monomoriums*, has been introduced into the islands by commerce.

Monomorium carbonarium F. Smith subsp. *ebeninum* Forel.—Antigua: St. John (Stoner) ♀.

Monomorium floricola Jerdon.—Barbados (Forel).

Monomorium (Parholcomyrme) destructor Jerdon.—Antigua: St. John (Stoner, Wheeler) ♀. I took this ant on the flowers of a Bignoniaceous tree in the botanical garden. Introduced from the Indomalayan Region.

Monomorium (Xeromyrme) salomonis L. subsp. *subopacum* F. Smith.—Antigua: St. John (Wheeler) ♀. Running on logs near the wharves. Evidently introduced from Spain or North Africa.

Solenopsis geminata Fabr.—Antigua (Amer. Mus. Exped.) ♀; Barbados (Forel, H. A. Ballou), Bridgetown (Wheeler) ♀.

Pheidole fallax Mayr subsp. *jelskii* Mayr var. *antillensis* Forel, 2 ♀.—Antigua (Stoner) ♀; St. John (Amer. Mus. Exped.) ♀. Barbados (Forel, Stoner) 2 ♀. Also recorded by Forel from Guadeloupe and common on many other West Indian Islands.

Pheidole subarmata Mayr var. *elongatula* Forel.—Barbados (Forel) 2 ♀.

Crematogaster (Orthocrema) brevispinosa Mayr var. *brevidentata* Forel.—Barbados: Bathsheba, 200 m. (Forel) ♀.

Crematogaster (Orthocrema) brevispinosa Mayr var. *minutior* Forel.—Barbados: Bridgetown (Wheeler) ♀, running on tree-trunks.

Crematogaster (Orthocrema) carinata Mayr.—Barbados: Bridgetown (Wheeler) ♀; nesting in the bark of living trees. This species was originally described from Brazil, whence it may have been introduced into Barbados. The specimens agree

perfectly with Mayr's description and figures in his work on the ants of the Novara Expedition.

Crematogaster (Orthocrema) steinheili Forel.—Barbados (Forel) ♀ ♀ ♂.

Triglyphothrix striatidens Emery.—Barbados (W. G. Jeffreys) ♀. Cited by Forel. This species is of recent importation from the Old World tropics.

Wasmannia auropunctata Roger.—Barbados (Forel) ♀ ♂.

Atta columbica Guérin var. *lutea* Forel.—Barbados (W. G. Jeffreys) ♀. Originally described from the island in 1893, but seems not to have been taken since.

Subfamily Formicinae

Brachymyrmex cordemoyi Forel.—Taken by Forel in Barbados and Guadeloupe. Originally from the Argentine, this minute ant is becoming tropicopolitan. Forel has also recorded it from the Seychelles.

Brachymyrmex heeri Forel subsp. *obscurior* Forel.—Barbados and St. Lucia (Forel) ♀ ♂; Bridgetown (Wheeler) ♀ ♀.

Prenolepis (Paratrechina) longicornis Latr.—Antigua: St. John (Stoner) ♀; Barbados: Garrison (W. Norwell) ♀; Bridgetown (Wheeler) ♀ ♀.

Prenolepis (Nylanderia) vividula Nyl. var. *antillana* Forel.—Barbados (Forel).

Camponotus (Myrmosphincta) sexguttatus Fabr.—The finding of a new and beautiful color variety of this variable species among the specimens collected by Professor Stoner in Antigua has led me to revise the materials in my collection, with the following results:

Camponotus (Myrmosphincta) sexguttatus (typical). Fabricius' types were from St. Croix Island. I have seen no specimens from this precise locality, but considerable material in my collection from St. Thomas (Morrison), Porto Rico and Culebra Island (Wheeler), and Desecheo Island (F. E. Lutz) is very probably typical. Emery synonymizes the *C. ruficeps* Fabr. (female) from the Essequibo River with the previously described *sexguttatus* (worker), and I have taken colonies at Kartabo and Kalacoon, British Guiana, which must be very near the type-locality of *ruficeps*. I have before me also

series of specimens from St. Vincent (E. O. Hovey), Bridgetown, Barbados (Wheeler), Castries, St. Lucia (E. O. Lutz, Wheeler, J. C. Bradley); Dominica (Lutz, Wheeler), Fort de France, Martinique (Forel, Wheeler); San Lorenzo, Sanchez and San Francisco Mts., Santo Domingo (Busek); Corozal, Panama (Wheeler); Nicaragua (W. Fluck), etc. I believe that Emery is right in treating *C. bimaculatus* F. Smith as a mere synonym of *sexguttatus* (typ.). There is considerable variation in the maculation of the gaster in workers from the same colony, and in minor individuals the spots are usually developed only on the second segment. The type of *bimaculatus* is from St. Vincent. What Forel has designated as var. *bimaculatus* from Brazil and Paraguay is, in my opinion, var. *fusciceps* Emery, which is not known to occur in the West Indies, though I have specimens of it from Kaieteur, British Guiana (F. E. Lutz). I received numerous workers, females and males from Fiebrig, who collected them on the Parana River, Paraguay. It is probably a part of this series which was identified as *bimaculatus* by Forel. The var. *fusciceps*, however, has the head of the female and major worker black with its anterior portion and the mandibles dark brown or castaneous, and not yellowish red as in the West Indian form described by Smith.

Camponotus sexguttatus var. *grenadensis* Forel.—This variety was originally described from the island of Grenada, but Forel found it also in Barbados and it has been taken in the same locality by Jeffreys and Stoner. I have specimens of all three phases taken in Grenada by Professors Roland Thaxter and C. T. Brues. The variety is easily recognized by its color, the head, thorax and petiole of the worker and female being light yellowish red. The paired ivory-colored spots on the black or dark brown gaster are well-developed. The wings of the female are more yellowish and the pterostigma paler than in the typical *sexguttatus*. The male is dark brown with the dorsal surface of the head and thorax and the articulations of the legs and gaster testaceous. As in other varieties the second gastric segment has a couple of narrow transverse, pale spots at its base. The wings are scarcely paler than in the male of the typical form.

Camponotus sexguttatus var. *antiguanus* var. nov.

Worker major and minor. Clear reddish yellow throughout, except the mandibles and antennæ which are red, and a large poorly defined ivory white spot on each side of the second gastric segment.

Male. Brownish yellow; antennæ and legs pale brown; petiole and gaster darker, the latter with pale borders to the segments and a pair of whitish, transverse spots at the base of the second segment.

Seven workers and a single male taken on Antigua by Professor Dayton Stoner. Among the materials in my collection I find also the three following undescribed forms:

Camponotus sexguttatus var. *montserratensis* var. nov.

Worker and female. Colored like the preceding variety but lacking the pale spots on the second gastric segment. The wings and their veins in the female are very yellow, the pterostigma brown.

Male. Resembling the male of *antiguanus*, but the funiculi, legs and petiole are yellow like the head and thorax. Wings colored as in the female.

Described from six workers, two females and three males taken on the Island of Montserrat, June 19, 1912, by Mr. H. A. Ballou, "on a sour-sop tree."

Camponotus sexguttatus var. *unitaniatus* var. nov.

Worker. Dark brown; the spots on the second gastric segment fused to form a broad white fascia, usually indented in the middle behind, those on the third segment transverse and rather large but not confluent, those on the first segment small. The worker major has the head entirely brownish yellow and decidedly opaque.

Several workers from Chaquimayo, Peru, collected by Prof. Nils Holmgren (Stockholm Museum).

Camponotus sexguttatus subsp. *basirectus* subsp. nov.

Worker minor. Differing from the typical *sexguttatus* as follows: the head is more narrowed and dorsally more depressed at the occiput, the thorax is longer and more slender, epinotum more elongate, with its base in profile straight and the mesoëpinotal constriction much shorter and shallower, the epinotum more elongate, with its base in profile straight and horizontal, nearly twice as long as the declivity and meeting it at a distinct though obtuse angle. The gaster is decidedly larger and more elongate, the legs and antennæ more slender. The surface of the body and especially of the head is more opaque and somewhat more sharply shagreened. The hairs are distinctly longer and more abundant on the body. The color is dark reddish brown, the legs yellowish brown; the spots on the first to third gastric segments ivory yellow, very large, those on the first and second segments rather rounded and almost meeting in the middle line.

Described from several specimens taken by H. Mosén in Brazil and lent by the Stockholm Museum. This may be a distinct species, but I attach it provisionally to *sexguttatus* as I have seen only minor workers.

The following table may serve to identify the workers of the various described varieties and subspecies of *sexguttatus*.

1. Epinotum in profile convex and arcuate above.
Bolivia subsp. *biguttatus* Emery
Epinotum in profile straight or more or less depressed above2.
2. Mesoëpinotal impression feeble; epinotum long, its base in profile straight and horizontal, forming a distinct angle with the declivity.
Brazil subsp. *basirectus* subsp. nov.
Mesoëpinotal impression deeper; epinotum shorter, its base in profile high in front, sloping backwards and not forming a distinct angle with the declivity (subsp. *sexguttatus* Fabr.)3.
3. At least the gaster dark brown or black5.
Gaster as well as head and thorax yellowish red4.
4. Gaster with cream-colored spots on second segment.
Antiguavar. *antiguanus* var. nov.
Gaster immaculate. Montserrat.....var. *montserratensis* var. nov.
5. Head, thorax, petiole and appendages yellowish red.....6.
At least the thorax dark brown or black.....7.
6. Spots on the first and second gastric segments fused to form fasciæ.
Peru var. *albotæniolatus* Fabr.
Spots on the gaster not fused to form fasciæ. Grenada.
Barbadosvar. *grenadensis* Forel
7. Spots on at least one of the gastric segments confluent and forming fasciæ 8.
Spots on the gastric segments not confluent.....9.
8. Only the spots of the second gastric segment confluent.
Peru var. *unitæniatus* var. nov.
The spots of the first, second and third segments confluent to form fasciæ. Boliviavar. *ornatus* Emery
9. Antennal scapes in female and worker major surpassing the head by a little more than $\frac{1}{4}$ their length; hairs on posterior tibiæ a little longer than the diameter of the tibiæ10.
Scapes longer, surpassing the occiput by $\frac{1}{3}$ their length; funicular joints longer; hairs on the posterior tibiæ a little shorter than the diameter of the tibiæ. Brazil, Peru.....var. *decorus* F. Smith

10. Head of female and worker major more or less extensively light red anteriorly; sometimes the whole head is yellowish red; spots present in female on first to fourth gastric segments; worker major often with spots on first and third as well as on the second segment; worker minor usually with spots only on the second segment. West Indies, Central America, Guiana.....*sexguttatus* (typical)
Head of female and worker major dark brown or castaneous anteriorly; female with a pair of large spots on the second and small spots on the first and third segments; major and minor worker with spots only on second segment. Argentine, Paraguay, Bolivia, Brazil, British Guiana.....var. *fusciceps* Emery

REPORT ON THE SPIDERS

Collected by the Barbados-Antigua Expedition
from the University of Iowa in 1918

ELIZABETH B. BRYANT

Museum of Comparative Zoology, Cambridge, Massachusetts

During the spring of 1918 Dr. Dayton Stoner of the University of Iowa collected some spiders at Antigua and Barbados. Many of them are forms common throughout the West Indies and South America, but six have been found to be new species. A few immature specimens cannot be identified, and three specimens which are represented by only one sex have been left with only a generic determination. Of the twenty-nine species of spiders, nine families are represented. The Argiopidæ has nine species, the Clubionidæ six, the Salticidæ four, and the other families are represented by but one or two species each.

The types have been placed in the Museum of Comparative Zoölogy at Cambridge and the paratypes and remainder of the collection in the Zoölogical Museum at the University of Iowa.

Very few spiders have been collected at either Antigua or Barbados. In 1878 Becker described *Lycosa (Tarentula) beckeri* and two years later Keyserling described from the same collection *Sparassus antiguensis*, a spider that since has been found at Hayti and Porto Rico.

The arrangement in families and genera follows Simon's "Histoire Naturelle des Araignées" and Petrukevitch's "Index-Catalogue of Spiders of North, Central, and South America," American Museum of Natural History, Bulletin 29, 1911, except the Walckenaer names based on Abbot's unpublished drawings.

Order ARANEIDA

Family Aviculariidæ

Cyrtopholis bartholomei (Latreille)

1832. *Mygale bartholomei* Latreille, Nouv. ann. museum, Vol. 1, p. 69.

1879. *Crypsidromus gypsator* Becker, Ann. soc. ent. Belgique, Vol. 22, p. 85.

1903. *Cyrtopholis venatorius* Simon, Hist. nat. araignées, Vol. 2, p. 931.

Antigua. Reported from several islands in the West Indies.

Family Sicariidæ

Scytodes fusca Walckenaer

1837. *Scytodes fusca* Walckenaer, Ins. aptères, Vol. 1, p. 272.

1873. *Scytodes guyanensis* Taczanowski, Hor. soc. ent. Ross, Vol. 10, p. 108.

Antigua. A common house spider in the West Indies.

Family Pholcidæ

Physocyclus globosus (Taczanowski)

1873. *Pholcus globosus* Taczanowski, Hor. soc. ent. Ross, Vol. 10, p. 105.

1893. *Physocyclus globosus* Simon, Hist. nat. araignées, Vol. 1, p. 470, fig. 457.

Antigua. A common house spider in Central America, West Indies, and southern United States.

Family Argiopidæ

Tetragnatha antilliana Simon

1897. *Tetragnatha antilliana* Simon, Proc. Zool. Soc. London, p. 868.

Barbados. Found in the West Indies and Central America.

Prionolama gracilis, sp. nov.

Plate I, figs. 1-3

♂ total length 5 mm. ♀ total length 6 mm.

♂ Lateral eyes in contact. The fang of the mandible of the male has no cusps; the upper margin of the fang groove with three large teeth at the apex; the lower margin with several small teeth. The tibia of the palpus is one-fourth longer than the patella. The legs have very few spines.

♀ Abdomen gibbous anteriorly. The lower margin of the fang groove has two teeth near the apex. The spines on the legs are very few.

I am not quite satisfied as to the generic position of this species. It agrees with the description of *Prionolama* Simon, in the position of the lateral eyes, but it is not caudate. It agrees with *Agriognatha* O. P. Cambridge (1896) in the ar-

rangement of the eyes, but it is not caudate and it lacks the single stout spine on the apex of femur II. It agrees with *Cyrtognatha* Keyserling (1881), in the position of the lateral eyes and the shape of the labium. Simon in his key in Hist. nat. araignées, 1894, Vol. I, p. 723, wrongly quotes Keyserling in the shape of the labium.

Antigua. Two males and three females.

Leucauge hortorum (Hentz)

1847. *Epeira hortorum* Hentz, Jour. Boston Soc. Nat. Hist., Vol. 5, p. 477, pl. 31, fig. 19; reprint, 1875, p. 118, pl. 13, fig. 19.
1884. *Argyropeira hortorum* Emerton, Trans. Conn. Acad., Vol. 6, p. 332, pl. 37, figs. 29-32.

Antigua. Found from Canada to northern South America.

Argiope argentata (Fabricius)

1775. *Aranea argentata* Fabricius, Syst. Entom., p. 433.
1839. *Argiope fenestrinus* Koch, Die Arach., Vol. 5, p. 39, pl. 155, fig. 361.
1893. *Argiope argentata* McCook, American Spiders, Vol. 3, p. 220, pl. 16, figs. 1-2.

Antigua. A tropical and subtropical spider of the western continent from North Carolina south to Patagonia.

Argiope trifasciata (Forskål)

1775. *Aranea trifasciata* Forskål, Desc. Anim., p. 86.
1847. *Epeira fasciata* Hentz, Jour. Boston Soc. Nat. Hist., Vol. 5, p. 468, pl. 30, fig. 8; reprint 1875, p. 107, pl. 12, fig. 8.
1884. *Argiope transversa* Emerton, Trans. Conn. Acad., Vol. 6, p. 330, pl. 34, fig. 20, pl. 38, figs. 15-18.

Antigua. A common spider from Canada to Chili.

Eustala prompta (Hentz)

1847. *Epeira prompta* Hentz, Jour. Boston Soc. Nat. Hist., Vol. 5, p. 472, pl. 31, fig. 4; reprint 1875, p. 112, pl. 13, fig. 4.
1884. *Epeira parvula* Emerton, Trans. Conn. Acad., Vol. 6, p. 317, pl. 34, fig. 12, pl. 37, figs. 1-2.

Antigua; Barbados. A common spider in the United States and West Indies.

Eustala fusco-vittata (Keyserling)

- 1863 (1864). *Epeira fusco-vittata* Keyserling, Sitz. ber. Isis, p. 129, pl. 6, figs. 7-8.
1893. *Cyclosa thorelli* McCook, American Spiders, Vol. 3, p. 228, pl. 19, fig. 11.

Antigua; Barbados. South America and the West Indies.

Araneus oaxacensis (Keyserling)

- 1863 (1864). *Epeira oaxacensis* Keyserling, Sitz. ber. Isis, p. 121, pl. 5, figs. 12-16.
1888. *Epeira vertebrata* McCook, Proc. Acad. Philadelphia, p. 196, figs. 6-10.

Antigua; Barbados. Found in the West Indies, Mexico and on the Pacific coast.

Gasteracantha tetracantha (Linnæus)

1767. *Araneus tetracantha* Linnæus, Syst. Nat., 12th Edition, Vol. 2, p. 1037.
1837. *Plectana linnæi* Walckenaer, Ins. aptères, Vol. 2, p. 163.
1845. *Gasteracantha quadridens* Koch, Die Arach., Vol. 11, p. 59, pl. 374, fig. 880.
1893. *Gasteracantha pallida* McCook, American Spiders, Vol. 3, p. 209, pl. 14, fig. 8.

Antigua. A small *Gasteracantha* which has been found on several islands of the West Indies and in California.

Family Clubionidæ

Heteropoda venatoria (Linnæus)

1767. *Araneus venatoria* Linnæus, Syst. Nat., 12th Edition, Vol. 2, p. 1035.
1837. *Olios antillianus* Walckenaer, Ins. aptères, Vol. 1, p. 568.

Barbados. A cosmopolitan tropical and subtropical spider.

Pseudosparianthus antiguensis sp. nov.

Plate I, fig. 4

♀ total length 17 mm.

Cephalothorax, legs, and mandibles orange yellow, the former with many small black bristles; sternum, mouth parts, and coxæ somewhat paler. Abdomen pale grayish yellow without markings, thickly covered with small dark bristles. Anterior row of eyes slightly procurved, medium eyes largest and nearer each other than to the laterals. Pos-

terior row of eyes procurved, the lateral slightly larger than posterior medium, the posterior medium slightly nearer each other than to the laterals. Abdomen twice as long as broad, attenuate behind; the spinnerets borne on a small jointed projection. Upper margin of mandible with three distinct teeth. Tibiæ I and II, 2-2-2, robust spines beneath. Metatarsi I and II with a sub-basal pair of long spines beneath. Metatarsi and tarsi I, II, and III densely scopulate. Vulva wider than long.

This spider does not agree with the description of *Stasina* or *Pseudosparianthus*, but it agrees with *Pseudosparianthus variabilis* Cambridge and *Pseudosparianthus cubana* Banks in having but one pair of spines under the anterior metatarsi, but differs from both in the shape of the vulva and in its much greater size.

Antigua. One female.

Chiracanthium inclusum (Hentz)

1847. *Clubiona inclusa* Hentz, Jour. Boston Soc. Nat. Hist., Vol. 5, p. 451, pl. 23, fig. 18; reprint 1875, p. 85, pl. 10, fig. 18.

1890. *Chiracanthium viride* Emerton, Trans. Conn. Acad., Vol. 8, p. 184, pl. 5, fig. 12.

Antigua; Barbados. Found from Canada south to Central America and West Indies.

Aysha tenuis (L. Koch)

1866. *Anyphaena tenuis* L. Koch, Fam. Drassiden, p. 211, pl. 9, fig. 140.

1897. *Aysha tenuis* Simon, Proc. Zool. Soc. London, p. 879.

Antigua; Barbados. Found on San Domingo, Hayti, Porto Rico, and St. Vincent.

Syrisca keyserlingi Simon

1887. *Teminius insularis* Keyserling, Verh. Zool. Bot. Ges. Wien, Vol. 37, p. 422, pl. 6, fig. 1.

1897. *Syrisca keyserlingi* Simon, Hist. Nat. araignées, Vol. 2, p. 129. (*insularis* preoccupied by Lucas.)

Barbados. Found on Hayti and Cuba.

Family **Lycosidæ**

Sosippus insulanus sp. nov.

Plate I, fig. 5

♀ total length 11 mm.

Cephalothorax dark brown with a pale submarginal band and a central

light band narrowing between the posterior row of eyes, dilate in the cephalic area and narrowing in the thoracic part and having a pair of narrow longitudinal dark lines in the dilated portion. Abdomen with a central dark area anteriorly, followed by the usual herring bone markings; ventral area light. Legs with very faint traces of brown. Vulva small.

Barbados. One female.

Lycosa sancti-vincenti Simon

1897. *Lycosa sancti vincenti* Simon, Proc. Zool. Soc. London, p. 888.

Antigua. One female. Found only on St. Vincent.

Family **Oxyopidæ**

Oxyopes salticus Hentz

1845. *Oxyopes salticus* Hentz, Jour. Boston Soc. Nat. Hist., Vol. 5, p. 196, pl. 16, fig. 10; reprint 1875, p. 47, pl. 6, fig. 10.

1876. *Oxyopes gracilis* Keyserling, Verh. Zool. Bot. Ges. Wien, Vol. 27, p. 698, pl. 2, figs. 63-64.

Antigua; Barbados. A common spider south and west of New York, in the West Indies and Central America.

Oxyopeidon maculipes sp. nov.

Plate I, fig 6

♀ total length 4½ mm.

Cephalothorax yellowish-brown, darkened on the sides and reddish between the eyes. Clypeus and sides with many lanceolate white scales. The eyes are about equal distances apart; the anterior medium very much smaller than the laterals, which are placed a little below them. The eyes of the posterior row, subequal and much smaller than the anterior laterals; the posterior medium eyes are hardly twice as far apart as from the laterals; the posterior laterals are at an equal distance from the anterior laterals and posterior medium. The abdomen is grayish with light areas on each side and faint light markings behind. The legs are yellowish, the anterior pair are missing; the others are marked with dark as follows; a spot under the middle of femora II, at basal end of tibia II and tip of tibia III, at tip of femora IV and at base of tibia IV. The vulva is very similar to *Oxyopeidon lætum* Cambridge.

Antigua. One female.

Family **Salticidæ**

Wala vernalis (Peckham)

1893. *Anoka vernalis* Peckham, Proc. Zool. Soc. London, p. 701, pl. 62, fig. 9.

Antigua; Barbados. A common spider in the West Indies.

Cyrene gratiosa sp. nov.

Plate II, figs. 1-2

♀ total length 7 mm.

The cephalothorax is dark brown with scattering white hairs about the eyes and a marginal stripe of white on the sides. The clypeus is covered with thick white hairs. There is a narrow stripe of white scales extending from the posterior eye row to within a short distance of the posterior margin of the thorax. The abdomen has a basal band of white across the anterior end and a narrow central white spot extending to the middle of the abdomen. The posterior part has the common herring bone markings. The sternum is nearly twice as long as wide, slightly narrowed in front, and is constricted into a short truncate lobe between the posterior coxæ. The venter is pale with rows of dark spots. The legs are light with slight indications of markings at the ends of some of the joints. Tibiæ I and II with 2-2-2 spines beneath, Tibiæ III and IV without small dorsal spine. Vulva figured.

Antigua. Several females.

Sidusa stoneri sp. nov.

Plate II, figs. 3-5

♂ total length 4 mm. ♀ total length 4 mm.

♂ The cephalothorax is dark brown, almost blue black in the eye area, with scattered flat iridescent scales and with an elongate pale mark on each side of the posterior part. Clypeus uniformly dark. The quadrangle of eyes is a little wider in front than behind, is a fourth wider than long and occupies two-fifths of the cephalothorax. The abdomen has an anterior medium dark stripe, posteriorly divided into herring bone markings. The upper sides darker having a distinct pale mark between the sides and the medium mark. Under side of the abdomen is black. Clypeus and mandibles entirely dark; sternum and coxæ pale. Legs I and II reddish brown with patella and tibia thinly fringed with short hairs on the anterior side. All tarsæ pale. Legs III and IV pale with dark stripes and spots. Palpus dark with patella covered with snow white hairs.

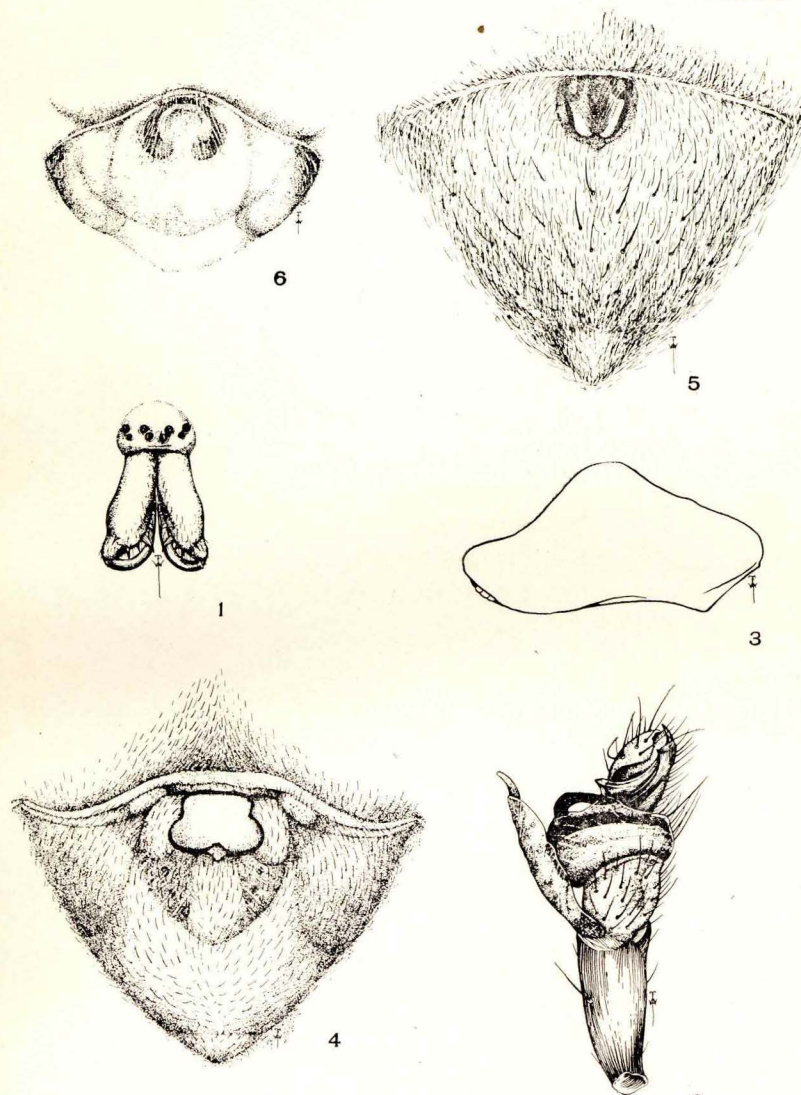
♀ Clypeus dark with central pale spot. Sternum, legs and venter pale; the latter with a few dark spots. The pale markings on the cephalothorax more extended and the lateral dark markings of the abdomen more distinct than in the male. Vulva figured.

Antigua. One male and one female and three immature females.

With our present knowledge it is not possible to place more definitely the following species:

Misumena ♂ Barbados.*Olios* immature Antigua.*Pardosa* ♂ Antigua.*Dendryphantes* ♀ Antigua.

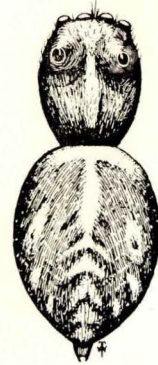
PLATE I



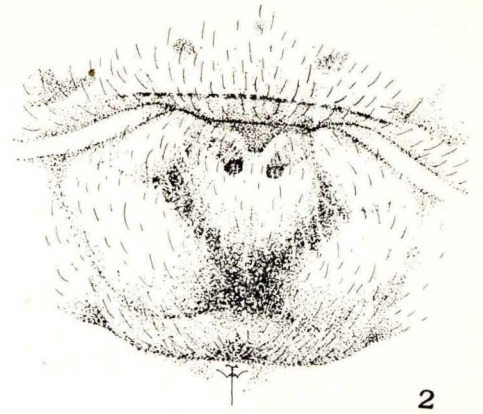
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PLATE I

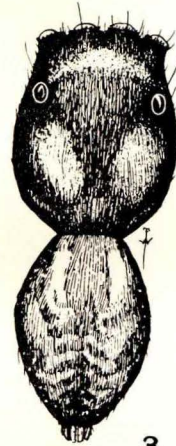
- Fig. 1. *Prionolama gracilis*, eyes and mandibles of male
 2. male palpus
 3. abdomen of female
 4. *Pseudosparianthus antiguensis*, vulva
 5. *Sosippus insulanus*, vulva
 6. *Oxyopcidon maculipes*, vulva



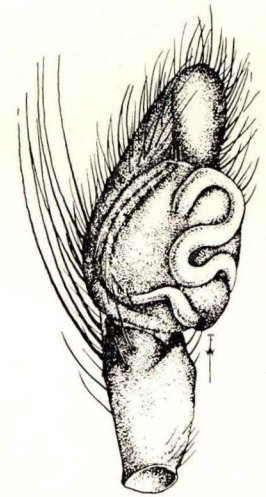
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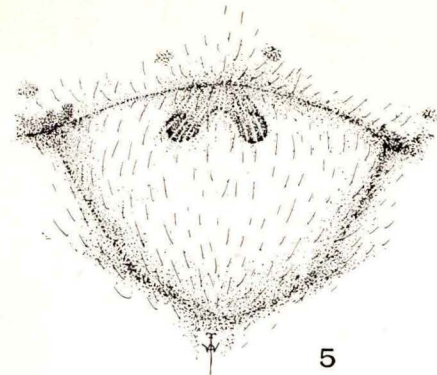
3



4

PLATE II

- Fig. 1. *Cyrene gratiosa*, female
 2. vulva
 3. *Sidusa stoneri*, male
 4. male palpus
 5. vulva



5

REPORT ON CERTAIN FAMILIES OF HEMIPTERA-HETEROPTERA

Collected by the Barbados-Antigua Expedition
from the University of Iowa in 1918

H. G. BARBER

Roselle, N. J.

Through the courtesy of Professor Dayton Stoner I have been privileged to study certain families of the Hemiptera-Heteroptera taken by the Iowa Expedition to Barbados and Antigua Islands in the West Indies during the summer of 1918. Only the following five families were submitted to me: *Coreidæ*, *Pyrrhocoridae*, *Lygaeidæ*, *Reduviidæ*, and *Tingidæ*.

The collection, though small in number of species represented, contains some long series which have been of great assistance in helping to trace the synonymy of several doubtful forms. Only one species, *Doldina antiguensis*, is new. None of the others are endemic to these particular islands but have a more or less wide distribution throughout most of the other islands of both the Lesser and Greater Antilles. In fact most of them are common continental species, the majority ranging from northern South America through Central America and Mexico to the southern United States.

Family **Coreidæ**

Phthia picta Drury

1770. *Phthia picta* Drury, Ill. Nat. Hist. 107, Pl. 45, Fig. 1.

Six specimens from Barbados. This is a widely distributed and common species in the neotropical realm where it is often injurious in gardens. Its extreme variability has given rise to a long synonymical list (McAtee Bull. Brklyn. Ent. Soc. XIV, 13, 1919.) Readily distinguished from the larger and more brightly colored *lunata* Fab., the only other species likely to be found in the West Indies, *P. picta* has been recorded from the

following islands: Cuba, Guadeloupe, Antigua, Grenada, San Domingo, and Porto Rico. In the United States it occurs in Florida, Texas, and southern California.

Coreocoris fusca Thunberg

1783. *Coreocoris fusca* Thunberg, Nov. Ins. Sp., II, 44.
 1832. *Coreus confluentus* Say, Het. N. Harm. Ind., 11.
Sagotylus confluentus (Uhler, Distant, L. and S. Cat., not Say.)
 1852. ? *Spartocera alternata* Dallas, List, II, 374.

Six adults and twenty-six nymphs from Antigua. A common species within its recorded range from Argentine Republic on the south to Mexico, West Indies, and the southern United States. Having such a wide range it is naturally subject to considerable color variation, as remarked by Stal. Lethierry in 1881, recorded *Spartocera alternata* Dallas, originally described from Brazil, as occurring in Guadeloupe and Martinique. As Dallas' description corresponds almost exactly to certain darker forms of *fusca* there is little doubt in my mind that the two refer to the same species. Although the species known as *confluenta* Say from the southern United States is paler and the males have the posterior margin of the genital segment a little more deeply sinuate, I can find no structural differences which will serve to separate this as a distinct species. Say's *diffusus* from North Carolina is quite distinct from *fusca* Thunb. *C. batatas* Fab. is also common throughout the West Indies, although none were secured by the Iowa Expedition. This latter species was named by Uhler as *fusca* from Grenada and St. Vincent according to Distant, who has seen the identical specimens.

C. fusca has been recorded from Cuba, St. Bartholomew, St. Vincent, Grenada, Guadeloupe, Martinique, and Porto Rico. I have also seen specimens from Jamaica and Dominica in the collections of the American Museum of Natural History.

Chariesterus gracilicornis Stal

1870. *Chariesterus gracilicornis* Stal, Enum. Hem., I, 178.

Twenty-three specimens from Antigua. Occurs throughout the West Indies, having been recorded from St. Eustatius, Cuba, Porto Rico, Jamaica, and Isle of Pines. I have seen specimens

from Cuba, San Domingo, St. Croix, Guadeloupe, Jamaica, and Porto Rico (Coll. Am. Mus. Nat. Hist.).

This species differs from *antennator* Fab. in having the elongate basal segment of the antennæ unarmed and the third segment much less expanded; the lateral edge of the pronotum without spines. Uhler reports *C. antennator* from Cuba. Specimens of this latter species from Andros Is., Bahamas, are in the collection of the American Museum of Natural History.

Catorhintha guttula Fabricius

1794. *Catorhintha guttula* Fabricius, Ent. Syst., 162.

Thirty-four specimens from Antigua. Hitherto reported from Cuba, Jamaica and Grenada (Uhler as *selector* Stal). Mr. Harold Morrison took it in San Domingo and I found it common in Porto Rico. W. L. Distant reports that Uhler's *selector* from Grenada is *guttula* Fab. I have seen specimens of the former species taken by Mr. Morrison in San Domingo. *C. guttula* is distinguished from *selector* by having the head provided with a spine at the base of each antenna and the black tergum bi-maculate with yellow. *C. mendica* is larger, more maculate with fuscous, and has relatively shorter and blunter spines on the head.

Key to species of *Catorhintha*

1. Apex of antenniferous tubercles unarmed; tergum black immaculate. *selector* Stal
 Apex of antenniferous tubercles outwardly produced in a spine; tergum bimaaculate with yellow.2.
2. Size larger (10-12 mm.). Legs and ventral parts more maculate with fuscous. Apex of head more anteriorly prolonged. Spines of head less acute and relatively shorter*mendica* Stal
 Size smaller (8-9 mm.). Legs and ventral parts paler and less maculate with fuscous. Apex of head less drawn out and spines of the head more attenuated and acute*guttula* Fab.

Anasa scorbutica Fabricius

1775. *Anasa scorbutica* Fabricius, Syst. Ent., 706.

Two specimens from Antigua. Recorded from the following islands: Cuba, Jamaica, St. Vincent, Grenada, and Guadeloupe. Specimens from Porto Rico and San Domingo are in the collection of the American Museum of Natural History. Other

species of *Anasa* known and recorded from the West Indies are *bellator* Fab., *andresii* Guer., *acutangula* Stal and possibly *tristis* DeGeer. *A. scorbutica* is readily differentiated from the other named species by having the head armed with a long slender spine above each antenna and having the hind femora armed with two stout teeth or spines.

Key to the species of *Anasa*.

1. Head behind antenna unarmed; head bivittate with black; hind femora unarmed*acutangula* Stal
Head behind antenna armed with a more or less evident spine or tubercle2.
2. Head dorsally yellowish with two wide black vittæ3.
Head dorsally destitute of two black vittæ4.
3. Apex of tylus not extended beyond apex of antenniferous tubercles; longer and more slender apical segment of antenna more or less ochraceous; median longitudinal pale calloused line of pronotum conspicuous to near posterior margin; narrow species.
andresii Guer.
Apex of tylus well extended beyond apex of antenniferous tubercles; shorter and stouter apical segment of the antenna concolorous; tubercles at base of antenna sometimes obsolete; median longitudinal line of pronotum narrow, inconspicuous and obsolete behind middle; broader species.
tristis DeGeer
4. Head behind antenna armed with a short tubercle or spine; hind femora beneath destitute of distinct spines*bellator* Fab.
Head behind antenna armed with a long, sharp spine; hind femora beneath armed with one or two conspicuous spines toward apex.
scorbutica Fab.

Leptocoris filiformis Fabricius

1775. *Leptocoris filiformis* Fabricius, Syst. Ent., 727.

Four specimens from Antigua. Recorded from the following islands: Cuba, Isle of Pines, Jamaica, Grenada, St. Vincent, and Porto Rico. The collection of the American Museum of Natural History contains material from Haiti, Cuba, and Porto Rico. A closely related species, *L. tipuloides* DeGeer, has been taken by Mr. Morrison in San Domingo. *L. filiformis* is smaller and more slender than *tipuloides* with the second and third segments of the antenna nearly equal; the veins at the apical margin of the corium fuscous, but the basal part of the mem-

brane never infuscated; apex of the posterior femora very rarely reddish; the sinus of the male genital segment being much more deeply sinuate.

Megalotomus rufipes Westwood

1842. *Megalotomus rufipes* Westwood, Hope Cat., II, 19.
1842. ? *Alydus simplex* Westw., Hope Cat., II, 18.
1842. *Alydus consobrinus* Westw., Hope Cat., II, 20.
1860. *Alydus pallescens* Stal, Rio Jan. Hem., I, 34.
1871. *Alydus debilis* Walker, Cat. Het., IV, 160.
1901. *Megalotomus jamaicensis* Distant, Ann. Mag. Nat. Hist., VII, 427.

Fifty-one specimens from Antigua and nine from Barbados. This is a very common species throughout the West Indies. Recorded from the following islands: Cuba, Isle of Pines, Jamaica, Grenada, St. Vincent, and Guadeloupe. The collection of the American Museum of Natural History contains specimens from Cuba, San Domingo, Guadeloupe, Porto Rico, and Martinique. It is subject to great color variation, as pointed out by Van Duzee (Bull. Buffalo Soc. Nat. Sci., VIII, 12, 1907). There is no doubt in my mind that Distant has re-described one of the many color forms as *M. jamaicensis* from Jamaica.

This species may be recognized from our *M. quinquespinosus* Say by having the humeral angles produced in an acute backwardly directed spine and the fourth antennal segment longer than the second and third segments taken together; the terminal segment not pale ringed at base.

Harmostes serratus Fabricius

1794. *Harmostes serratus* Fabricius, Ent. Syst. IV, 75.

Twenty-four specimens from Antigua. Known as a common species in the West Indies and already recorded from Jamaica, Cuba, San Domingo, Grenada, and St. Vincent. Specimens from Cuba, Jamaica, and Porto Rico are in the collection of the American Museum of Natural History.

The apex of the tylus is produced into a sharp spine, and the antenniferous tubercles are also outwardly armed with sharp spines; the lateral margins of the pronotum serrate; the apex of the rostrum reaches upon the base of the abdomen. Johnson and Fox (Ent. News, III, 59, 1892) report *nebulosus* Stal from

Jamaica. This may be a misidentification. Gibson (Ent. News, XXVIII, 444, 1917) is certainly in error in stating that the beak in *serratus* does not extend beyond the metasternum and in reporting the species as occurring over practically the entire United States. Van Duzee in his Catalogue records it from Florida and Texas.

Harmostes affinis Dallas

1852. *Harmostes affinis* Dallas, List Hem. II, 522.

Seven specimens from Antigua. These answer in every respect to Dallas' short description of the species, the habitat of which was unknown. Mr. Van Duzee in recording the species from Florida (Bull. Buffalo Soc. Nat. Sci., IX, 161, 1909) gives a good account of the differences between this species and *serratus*. It is known also from Jamaica.

Corizus hyalinus Fabricius

1794. *Corizus hyalinus* Fabricius, Ent. Syst. IV, 168.

Three specimens from Antigua. This species, almost cosmopolitan in its range, has been recorded from Cuba, Jamaica, and Grenada. I have determined specimens in the collection of the American Museum of Natural History from Cuba, San Domingo, Antigua, and Porto Rico. The West Indian specimens differ in no respect from those in the United States. Van Duzee in 1909 reported it from the Bermuda Islands.

Corizus sidae Fabricius

1794. *Corizus sidae* Fabricius, Ent. Syst. IV, 169.

1859. *Corizus pictipes* Stal, Freg. Eug. Resa, Ins., 239.

1842. *Corizus vincentii* Westwood, in Hope Cat. II, 26.

One hundred and four specimens from Antigua and three from Barbados. A widely distributed and common species throughout most of the neotropical realm, spreading into the southern United States. Reported from Grenada, St. Vincent, Jamaica, Cuba, and Isle of Pines. Specimens from San Domingo, Guadeloupe, Porto Rico, Cuba, and Jamaica are to be found in the American Museum of Natural History collections. Mr. Morrison has taken it also in St. Croix. This species is

subject to great color variation. Owing to Distant's excellent figure of *C. vincentii* Westw. (Proc. Zool. Soc. Lond., Pl. XXX, Fig. 3, 1901) it is possible to pronounce it as one of the many color forms of *C. sidae*. The artist has, however, made the first segment of the antenna a little too short.

Jadera haematoloma Herrich-Schäffer

1847. *Jadera haematoloma* Herrich-Schäffer, Wanz. Ins., VIII, 103, Fig. 873.

One brachypterous specimen from Antigua. It has been reported from Cuba and Jamaica. There is some doubt concerning the identity of this single, rather badly greased specimen, because of its red color. The head, antennæ, legs, and abbreviated membrane are black; elsewhere red, probably due to its immaturity.

Family **Pyrrhocoridae**

Dysdercus discolor Walker

1872. *Dysdercus discolor* Walker, Cat. Het., V, 190.

1881. *Dysdercus delauneyi* Lethierry, Ann. Soc. Ent. Belg., XXV, 10.

1894. *Dysdercus annuliger* Uhler, Proc. Zool. Soc. Lond., V, 189.

Although this was not taken in either Antigua or Barbados the collection contains one specimen from Montserrat, two from St. Lucia and two from Grenada. Lethierry in 1881 described this as *D. delauneyi* from Guadeloupe. Uhler in 1894 re-described it as *D. annuliger* from Grenada and also reports it from St. Vincent in 1894. Distant (Ann. Mag. Nat. Hist., 1902) states that Uhler's species is the same as Walker's. Ballou (West Indian Bulletin 1906) reports *delauneyi* (= *annuliger* Uhler) from Montserrat, Guadeloupe, Dominica, Martinique, St. Lucia, Barbados, St. Vincent, Grenada, and the Grenadines. I have seen specimens from Dominica in the collection of the American Museum of Natural History.

It is a dark red species subject to some color variation, but when fully colored has the vertex of the head, more or less of the posterior lobe of the pronotum, and the corium and legs fuscous; the antennæ are black except at base with a conspicuous pale ring at base of the fourth segment. Often the legs and antennæ are more or less red. All ventral parts of

the body are red, with the incisures of abdomen piceous. Membrane fuscous narrowly pale-bordered. Other species of *Dysdercus* reported from the West Indies are *andreae*, *caribbaeus*, *fervens*, *jamaicensis*, *mimus*, *sanguinari*, *fernaldi*, and *suturrellus*. Some of these are undoubtedly synonyms.

Dysdercus andreae Linné

1758. *Dysdercus andreae* Linné, Syst. Nat., ed. X, 448.

One hundred from Antigua with several nymphs; one from St. Kitts, one from Virgin Islands and one from Montserrat. This is a very common species in the West Indies referred to by Ballou in 1906 as the Leeward Islands Cotton Stainer. It has been found in southern Florida. Recorded from Cuba, Jamaica, St. Bartholomew, Antigua, Montserrat, San Domingo, St. John, St. Kitts, Nevis, and Guadeloupe. Specimens from Cuba, Porto Rico, San Domingo, Antigua, St. Croix, Jamaica, Dominica, and Virgin Islands are in the collection of the American Museum of Natural History.

D. andreae is a small, very prettily marked species varying considerably in size and in the amount of black markings present. Specimens occur without the usual black fascia anteriorly and posteriorly on the pronotum and others as well without the typical black clavus and transverse fascia of the corium, or the latter much reduced in size. Occasionally the anterior and posterior margins of the pronotum are concolorous in place of white. The legs vary from red to all black.

Dysdercus howardi Ballou

1906. *Dysdercus howardi* Ballou, West Indian Bull., VII, 64-85.

Not in the collections made in Antigua and Barbados. However in the material sent to me by Mr. Stoner are two specimens of *D. howardi* from Trinidad, from whence they were described. These specimens were apparently labeled by Mr. Ballou from whom Mr. Stoner secured them. One of them bears a blank red label on the pin, indicating that it came from the type material.

D. howardi is very like *D. ruficollis* Linn., but distinct from that species by being narrower and with a longer head. It also

resembles pale forms of *discolor* Walk. Whether it will stand distinct from the numerous other described forms from South America I am unable to decide at the present time. The head, basal segment of the antenna, anterior lobe and lateral margins of the pronotum, rostrum, and legs are reddish-ochraceous. The posterior lobe of pronotum, scutellum, and corium is ochraceous. The base of the fourth segment of the antenna and the collar of pronotum are white. The pleura are ochraceous-red with the anterior margin of propleuron and the posterior margins of all pleura and the acetabula broadly white. The venter is yellow with the incisures narrowly piceous. In the male the rostrum reaches to the apex of the second ventral segment of the abdomen. The membrane is fuscous, narrowly margined with pale yellow.

Family Lygaeidae

Ortholomus jamaicensis Dallas

1852. *Ortholomus jamaicensis* Dallas, List Hem. II, 555.

1894. *Nysius providus* Uhler, Proc. Zool. Soc. Lond. V, 182.
(Specimens from the West Indies.)

Twenty-six specimens from Antigua and two from Barbados. Hitherto recorded from Jamaica, St. Vincent, Grenada, Porto Rico, San Domingo, and Cuba. I have studied material from Jamaica, Cuba, Porto Rico, San Domingo, and St. Thomas in the collection of the American Museum of Natural History. Although closely related to *O. longiceps* Stal, which I have treated as a synonym of *scolopax* Say, it can be differentiated from that species as follows: besides being smaller, its head is not drawn out quite so much anteriorly and the second and third antennal segments are a little longer with these parts, the legs and parts of the body less pilose.

Nysius ericae Schilling

1829. *Nysius ericae* Schilling, Beitr. Z. Ent., I, 86, Pl. 7, Fig. 10.

1852. *Nysius scutellatus* Dallas, List Hem., II, 553.

Three specimens from Antigua and two from Barbados. Described from Jamaica by Dallas as *Nysius scutellatus*. After very careful comparison of specimens from Porto Rico with Dallas' description and with specimens of *ericae* from the east-

ern United States, I am forced to the conclusion that they are the same species. I can find no structural or color differences and feel no doubt in pronouncing them identical. I have seen this from Porto Rico, San Domingo, St. Thomas, and St. Croix. *Nysius basalis* Dallas from Jamaica is a much larger species.

Ischnorhynchus championi Distant

1882. *Ischnorhynchus championi* Distant, B. C. A., 193, Pl. XIX, Fig. 3.

One specimen of this little ochraceous species from Barbados. Described from Guatemala by Distant, it has been reported from Grenada, St. Vincent, and Jamaica in the West Indies. It is a very common species in Porto Rico, where I took it by sweeping low herbage.

Blissus leucopterus Say

1832. *Blissus leucopterus* Say, Heter. New Harm., 14.

1918. *Blissus leucopterus* var. *insularis* Barber, Bklyn. Ent. Soc., XIII, 38.

Seven specimens from Antigua. Probably occurs in most if not all of the Islands, as it has been recorded from Cuba, Jamaica, Grenada, and St. Vincent and I have seen specimens from Porto Rico, St. Croix, and San Domingo. Only one of the specimens in the collection is brachypterous. This variety, or race, occurs also in Florida.

Paromius longulus Dallas

1852. *Paromius longulus* Dallas, List Hem., II, 578.

Seventy from Antigua. Very common throughout the West Indies, ranging from northern South America to the southern United States. It has been recorded from Cuba, Isle of Pines, Porto Rico, and Jamaica. I have seen material from Jamaica, St. Croix, St. John, Antigua, San Domingo, Cuba, and Porto Rico as well as from the Bahamas.

Orthæa bilobata Say

1832. *Orthæa bilobata* Say, New Harm. Ind., 17.

Thirteen from Antigua and nine from Barbados. This species also has a wide distribution, from Argentine Republic in South

America through the intervening territory to the United States. Found throughout the West Indies and recorded from Cuba, Grenada, Jamaica, and St. Vincent. The American Museum of Natural History has material from Cuba, Dominica, San Domingo, Guadeloupe, Jamaica, St. Croix, and Porto Rico. Van Duzee also reported it from the Bermuda Is. in 1909.

O. bilobata is nearly twice the size of the next species, with a distinct transverse fuscous band across the corium.

Orthæa vineta Say

1832. *Orthæa vineta* Say, New Harm. Ind., 16.

Ten from Antigua and two from Barbados. According to my records this is distributed from Brazil, Ecuador, and Colombia through Central America, Mexico, and the West Indies to the southern United States. It is moreover not confined to the Nearctic and Neotropical realms, as it has been reported from Fiji, Tahiti, Hawaiian Is., Australia, Oriental, and Ethiopian countries. It is recorded from Cuba, Jamaica, St. Vincent, and San Domingo. I have examined specimens from Porto Rico, St. Croix, Dominica, and St. Thomas.

Family **Reduviidæ**

Zelus longipes Linné

1767. *Zelus longipes* Linné, Syst. Nat., ed. XII, 724.

1825. *Zelus rubidus* Lep. et Serville, Encyl., X, 724.

1835. *Zelus speciosus* Burmeister, Handb., II, 227.

Four adults and five nymphs from Antigua. This is the commonest and most conspicuous member of the genus from the Antilles. It has been recorded from Cuba, Isle of Pines, Jamaica, Haiti, St. Thomas, and Guadeloupe. The American Museum of Natural History possesses long series from Cuba, Jamaica, Dominica, Guadeloupe, St. Croix, San Domingo, and Porto Rico. In connection with the recording of this species in Mexico, Central America, and South America Champion (B. C. A., 252-253, 1899) gives a good account of the synonymy and varieties. This author suggests that *rubidus* is perhaps not really distinct from *longipes* from the Island of St. Thomas. After the examination of many West Indian specimens I am

convinced that there is no good reason for keeping these separate. Occasionally the white bands on the legs and antenna are absent. I have not been able to distinguish Stal's species *mactans*, described from Cuba, from some of the varieties of *longipes*. It may prove to be but another variety.

Doldina antiguensis n. sp.

Testaceous, with the costal area of corium lightly embrowned, veins pale, attenuated apical angle bright red. Veins of the membrane lightly infuscated. Head, seen from above, with the post-ocular part gradually narrowed to the basal constriction, the two sides not at all parallel to each other; this region about twice the length of the pre-ocular part, long pilose laterally. The two post-antennal spines erect, acute, about as long as one-half the diameter of eye; ventral surface of head very sparsely pilose. Antennae long, first segment reaching to apex of scutellum, very shortly and sparsely pilose. Pronotum one-fifth longer than wide, posteriorly armed with four rather long, erect, acute spines, those of the disk slightly longer than the humeral ones; the anterior lobe furnished with a somewhat elevated or calloused orbicular area on each side of a longitudinal, median shallow sulcus; transversely lightly impressed just behind the middle; lateral margins lightly embrowned; posterior lobe about one-third longer than the anterior lobe, closely punctate; provided anteriorly on either side of the middle with a short slightly elevated carina, evanescent before middle of the disk; between these provided with a distinct, rather deep, broad, median sulcus extended to line of discal spines; extending anteriorly just within the humeral spines on either side is another shallow sulcus fading out about the middle with a short slightly elevated carina, evanescent before middle of the disk; between this and the carina is a short, almost obsolete sulcus more evident anteriorly; the lateral margins provided with a faint carina. The posterior margin of the pronotum straight in the middle, produced on either side of the base of the scutellum into a short, scooped out, obtuse lobe. Clavus apically and inner area of the corium membranaceous, translucent; between the elevated pale veins opaque and somewhat roughly punctate, slightly embrowned. Membrane reaching only a trifle beyond apex of the abdomen. Beneath shining testaceous, pilose; first three abdominal segments armed at the posterior apical angles with conspicuous spines. Length, male, 17 mm., width 2½ mm.

Type, a single male from Antigua, July 15, 1918, collected by Professor Dayton Stoner. Owing to the kindness of Professor Stoner the type is deposited in the collection of the American Museum of Natural History.

This species is apparently closely related to *D. carinulatus* Stal, the female of which was described from Brazil. Stal's description is so meager that it is impossible without an ex-

amination of the type to determine with certainty the affinity of *antiguensis* with Stal's species. They agree in having the first three segments of the abdomen armed with spines, but the spines of the posterior lobe of the pronotum are not short nor are the median spines shorter than the lateral ones. Dr. E. Bergroth (Entomological News, XXIV, 263-264, 1913) described two new species of this genus from the United States. He mentions among other characters of his female *pratermissa* from Charlotte Harbor, Fla., that the posterior lobe of the pronotum is unarmed. Through the kindness of Mrs. Slosson I have a female of this same series and a male specimen from Everglade, Fla., collected by Mr. William T. Davis. Both of these specimens have a very small spinule or acute tubercle near the humeral angle. It is possible that the character of these spines is variable.

Family Tingidæ

Teleonemia sacchari Fabricius

1794. *Teleonemia sacchari* Fabricius, Ent. Syst., IV, 77.

Two specimens from Antigua. This has been reported from Cuba, St. Bartholomew, St. Vincent, Grenada, and Jamaica in the West Indies. It is fairly common in Porto Rico and has been found in Florida.

REPORT ON THE AQUATIC HEMIPTERA

Collected by the Barbados-Antigua Expedition

from the University of Iowa in 1918

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There is before me a very interesting small collection of water-bugs, the fruit of the University of Iowa expedition in 1918. This little lot, as always in aquatic Hemiptera from little-known places, is extremely puzzling, because, while all the forms are well-marked, there is no certainty but what there is one, or more, undescribed species present. This can be decided positively only by a monographic study of genera, for which material in the aquatic forms is, alas, but too scanty. In this collection there are long series of two forms only—*Arctocorisa antiguensis* n. sp., and *Gerris (Limnogonus) guerini* L. & S. (*marginatus* Guér.). There are also several each of *Buenoa albida* Fieb. and *Pelocoris femoratus* P. B. The others are only in ones and twos and appropriate comment (or protest) is made where it seems called for.

The order of the families here set forth is that of "A Catalogue of the Aquatic and Semiaquatic Hemiptera" by Kirkaldy and Bueno, in Proceedings of the Entomological Society of Washington, XI, pp. 173-215. It is unnecessary to repeat here in detail the arguments for this arrangement and establish why the order in Van Duzee's *Catalogue* has not been followed for these families. Protracted study over a long period of years, adequacy of material, and acquaintance with the immature stages and familiarity with life-histories have led me to this arrangement as the more philosophical and that which represents most nearly, according to the present state of our knowledge, the phylogenetic affinities of these families. The true waterbugs form an unbroken series starting with the *Acan-*

thiidae (Saldidae), and going through *Ochteridae*, *Gelastocoridae*, *Naucoridae*, and *Belostomatidae* to the *Corixidae*, the most specialized, and possibly, the most aberrant of these groups in the series. The *Notonectidae* do not seem to fit in this linear arrangement and may temporarily be regarded as in the nature of an off-shoot. The *Gerridae* and *Mesovelidae* are respectively connected with the *Reduviidae* and the *Nabidae*, and may be placed in that linear order, although not related to each other.

Family Corixidae

Arctocorisa antiguensis n. sp.

Description—Head: Tumid, with a blunt median longitudinal carina in the male; eyes $\frac{4}{5}$ as wide as the vertex; face flat in female, foveate in male.

Pronotum: Rastrate, more or less oval, anterior margin straight; with 8 or 9 black lines crossing it, sometimes interrupted; proportion of length to width, 3 to 7.

Tegmina: Clothed with long, fine prostrate hairs; clavus rastrate, also apical part of corium. Membrane without veins, of homogeneous texture, with short, fine light hairs; black vermiculate markings, varying in intensity with the age of the specimen, lighter toward the apex of the clavus, in which they become a few transverse irregular lines. The vermiculate markings coalesce to form longitudinal stripes, more or less pronounced.

Palae: In the female, triangular in section and fossate on the face, the upper edge and each edge of face closely set with long setae; length to width as 10 to 3; middle legs slender, femur nearly equal in length to the total length of the tibia, tarsus, and tarsal claw; tarsal claws long, slender, slightly longer than tarsus; the length of the tarsus together with its claws nearly one and one-half times as long as the tibia. Hind legs stout; coxae elongate, stout, somewhat flattened; femora short, stout, apically amplified, set with short stout spines on the outer edge and fringing natatorial hairs on the inner; tibiae flattened, paddle-shaped, a row of moderately long spines on the outer edge, and heavily fringed with swimming hairs on the inner; proportional lengths of coxa to femur to tibia to tarsus as 18 to 18 to 23 to 9.

In the male, *palae* spatulate and curved, usual fringing hairs on lower edge, a long row of stout legs on the curved side, a short row on the straighter; middle legs slender and cylindrical, coxae small; femur to tibia to tarsus to claws as 30 to 16 to 10 to 14; claws simple, slender. Hind legs as in female. Asymmetry to right.

Females: length, 8.3 mm. to 8.5 mm.; width 3.4 mm. to 3.8 mm.

Males: length, 7 mm. to 8 mm.; width 3 mm. to 3.2 mm.

These measurements are not quite exact, as the specimens are somewhat distorted.

Type: male, Antigua, July 28, 1918, L. Stoner.

Allotype: female, Antigua, July 28, 1918, D. Stoner.

Paratypes: males, 18 specimens, Antigua, July 28, 1918, D. and L. Stoner; 1 Barbados, May 16. Females, 19, Antigua, same date.

Type and holotype in collection of the State University of Iowa; paratypes in same and in collection of J. R. de la Torre-Bueno.

The preceding description is frankly conventional and leaves much to be desired. Many structures are omitted or referred to very superficially, but enough has been given to fix the species. The ordinary descriptions of the palæ do not seem to me to convey a definite picture; they are far too generalized and too subtle characters to be put into words without making microscopic mounts both for description and for identification. It is to be hoped that when Dr. Hungerford completes his studies, the group will be on a firm foundation of pure structure, a condition which at present does not exist. To be sure, pattern in this group gives a certain individual aspect to each species, but unless we know the group as a whole a description of the color pattern is vague and conveys no mental image. There are other structures, quite visible, the sternites, for example, which should yield excellent comparative characters, but which do not appear to have been thus far employed in this family.

In addition to the 73 adults from which the type series was taken, there are six nymphs in various instars.

Family *Belostomatidæ*

Belostoma impavidum n. sp.

Description—*Head*: Tylus, long, two-thirds as long from eyes to tip as from anterior margin of eyes to anterior margin of thorax; the usual elliptical suture anteriorly; a few scattered short hairs are visible at a magnification of 74. Eyes one and one-half times as broad as long, overlapping prothorax at anterior angles. Antennæ concealed, as usual. Rostrum free, reaching distal end of anterior coxæ, thin, curved, length 7 mm.; three visible segments; formula: I, concealed; II, 3; III, 2.5; IV, 1.2; segment III with long, narrow palps, .3 mm. long. Width of head, 7 mm., length, 5 mm.

Prothorax: Usual shape; anterior width, 5.8 mm., posterior, 10 mm.; median length 5.4 mm.; thoracic groove, 4 mm. from anterior margin;

the usual foveæ on each side of the median line, anteriorly. Anterior angles concealed under fringing hairs of eyes. Prosternum with a thin rounded median keel between the anterior coxæ. Anterior legs: tibia and tarsus together equal in length to femur; tarsal joints equal, tarsal claw a little more than half as long as a tarsal joint; femora 3 mm. wide at the widest part, quite stout, 7.5 mm. long.; face of femur with heavy pile in tufts; tibia simple.

Metathorax: Not visible, except scutellum, which is shorter than broad (5 to 6.5 mm.), length measured from prothoracic groove or indentation to apex, and breadth at groove; rugose, as usual.

Hemelytra: Junction equal in length to length of scutellum; clavus punctate, corium reticulately veined, margin punctate becoming obsolete apically; reticulation rises from the vein parallel to the claval suture, which sweeps around parallel to the margin of the membrane; veins of membrane practically parallel, forming 13 narrow longitudinal cells, the first two and the last two shorter than the others, the rest of nearly equal length, all being cut off by a marginal vein which is a continuation of the claval suture.

Middle legs: Claws .5 mm. long; third tarsal joint, .75 mm., second, .6 mm.; first, short, triangular. Tibia flattened, shorter than femur, which latter is grooved, with coarse pile on the edges of the groove to correspond with the pile on the tibia; mostly concealed in the groove of the joint; coxæ large, rounded trapezoidal, trochanters large, one side rounded, side applied to femora flattened.

Hind legs: Longest, tibia and femur of equal length; tibia flattened, angular, broad distally, with the usual long swimming hairs; exterior edge flattened, with a row of spines or stiff bristles on each angle; femur rounded, stouter than the tibia, with a shallow groove for the reception of the latter. Tarsi lost in type.

Mesosternum: Short medially and converted into two large prominent coxal acetabulæ, produced laterally till they meet the second abdominal segment, and beyond. *Metasternum* narrow, set in fork of mesosternum and with large acetabulæ.

Abdominal segments: Visible, 5, the first concealed, the second showing triangularly in the angle between the meso- and metasternum, disappearing in the posterior coxæ; third, fourth, and fifth segments equally wide at connexivum, third and fourth narrowed at the keel, the former slightly narrower than the latter, fifth of equal width throughout, a little narrower than the sixth, which also is of equal width throughout; seventh two-thirds wider than the sixth, and covered at the middle by the genital plate, split into two lobes at the extremity; genital plate as long as wide, rounded at the distal end. The usual narrow paired strap-like, hairy respiratory appendages.

Color: The usual olivaceous-brown of the family, lighter and darker in irregular patches (This may not be so in other specimens and no reliance

is to be placed on it for differentiation; it is given only to complete the picture.)

Dimensions: Total length without appendages, 29.9 mm.

Greatest width, 14 mm.

Head: Long, 3.5 mm., wide, 6 mm., including eyes.

Prothorax: Long, 5.4 mm.; wide, at apex 5.8 mm., at base, 10 mm.

Scutellum: Long, 5 mm.; wide, 6.5 mm.

Abdomen, from apex of scutellum: Long, 16 mm.; wide, at widest part, 14 mm.

Note that the lengths are given with the parts of the bug in natural position; that is, head up, prothorax set back till its posterior edge is on groove in scutellum. The total length is derived by adding together the lengths of the head, thorax, scutellum, and abdomen from apex of scutellum. Much confusion in water bugs has arisen from neglect of this precaution. In the killing bottle many insects curl somewhat, or exert parts habitually concealed; thus making a long collum or vertex; or lengthening or shortening some body segment.

Type: 1 male Antigua, June 28, 1918, Stoner, in collection of the University of Iowa. There are also 4 nymphs, one about the second stage, and the others about the fourth or fifth.

This species somewhat resembles *Belostoma fuscipes* Latr., but does not seem to belong to any of the species described of late years by Montandon. It is therefore described as new.

Family Naucoridae

Pelocoris femoratus Pal. Beauv.

So far as descriptions and published distribution go, this is our common North American form. It is accordingly given as such. It has heretofore been recorded from Guadeloupe and other West Indian Islands. There are nine adults and eighteen nymphs in all stages from Antigua, June 28 and July 28, 1918.

Family Notonectidae

Notonecta indica Linné

Two adults, one melanic, (June 28), and the other with the usual black membrane, (July 6), and also 3 nymphs, all from Antigua, are in the lot. The species has been recorded from Cuba only in the Antilles.

Buenoa antigone Kirk.

This seems to be the above species. At least, there is no other description fitting it so closely as the one named here. One specimen from Antigua, July 28, 1918. Heretofore recorded from Cuba, Jamaica, and Santo Domingo.

Buenoa albida Champion

Here is another form of doubtful authenticity! Ten specimens from Antigua, July 28; and three from Barbados, May 16. This species seems to be known only from Mexico.

Family Gerridae

Gerris (Limnogonus) guerini L. & S. (*marginatus* Guérin)

There are forty adults and three nymphs from Barbados, May 21, and eight adults from Antigua, July 28, 1918. Two of the adult males are winged and twenty-four are apterous; five of the females are winged and eighteen are apterous.

This is a common West Indian species, heretofore recorded from Cuba, St. Vincent, Grenada, and Jamaica.

The three continental American forms from the Atlantic and Gulf sides of North America (of which this species is one) may thus be separated:

- 1 Antennal segment I longer than IV; small forms (less than 8 mm. long) 2
Antennal segment I subequal to IV; larger forms (over 8 mm. long); antennal formula, I and IV : II : III.....*hyalinus* Fabr.
- 2 Antennal segment I nearly twice as long as IV, which is subequal to II and III, II shortest; abdominal segments pilose dorsally as well as ventrally in apterous; antennal formula, I : III and IV : II; 4½ to 6 mm. long.....*hesione* Kirkaldy.
- 3 Antennal segment I but little longer than IV, which is longer than III and subequal to II; III shortest; abdominal segments glabrous dorsally in apterous, comparatively slender form; antennal formula* I : IV : II : III; 7 to 7 ¼ mm. long. *guerini* L. & S.

Rheumatobates sp. (*tenuipes* Meinert?)

One specimen taken at Barbados on May 21. This cannot be identified specifically on account of the absence of legs and antennæ.

* (By antennal formula is meant the order of the comparative lengths of the antennal segments).

Family **Mesoveliidæ***Microvelia* (?) *pulchella* Westw.

One apterous specimen, Barbados, May 21, 1918, Stoner. This is the Westwoodian species type of the genus, so far as it is possible to determine from a single apterous specimen. Here is another group in which color has been much used as a specific character. In *Microvelia*, my esteemed contemporaries to the contrary notwithstanding, the only characters for distinguishing surely the winged and wingless forms are the head and its appendages, the legs, and the genitalia. The genus is certainly dimorphic; perhaps even polymorphic. It is a truism of taxonomy that the presence or absence of wings modifies profoundly the structure of the thorax, that portion of the body which contains and serves as anchorage to the alar muscles. Wing conditions *per se*, and therefore thoracic size and structure, cannot be used as specific characters to fix a species in all its forms. We must of necessity lay stress on the unchanging structures named above. For this reason, no specific description of any waterstrider for one form only may be considered adequate; and no description which does not lay stress on the unvarying structure is complete. The description may be excellent for one or another form, but useless for the undescribed one in the absence of the required universal characters.

Family **Mesoveliidæ***Mesovelia* sp.

One specimen, Antigua, June 28, 1918. Stoner. This specimen is in fair condition only. It is neither our Eastern United States *bisignata* Uhler, nor the smaller Antillean *M. amæna* Uhler. It may be *mulsanti* B. White, but this is a mere guess. Notwithstanding Horváth's 1915 monograph, the group continues in unsatisfactory condition. As may be noted, I still employ Uhler's name *bisignata* for our Eastern species, in the face of Champion's dictum in *Biologia Centrali Americana*. The species of *Mesovelia* are readily separable, but here again my preceding remarks apply. Horváth, to be sure, has drawn attention to two processes on the male genital plate, yet these alone are insufficient, for I have been able to separate by good characters Kirkaldy's *M. orientalis* from Horváth's *vittigera*,

even though Horváth has synonymized them. Furthermore, all records of *M. mulsanti*, except the original one, are to be suspected and to be discarded, at least for the time being.

Here is the writer's *obiter dictum* on aquatic Hemiptera in general. It is far from wise, of course, for a writer to lay stress on any one idea, for it is likely to give rise to notions as to the poise of the stresser. But I here and now say that my insistence on structure rather than color for descriptive purposes rests on the difficulty of unravelling the snarl of such groups as the genus *Buenoa*, for instance. Take, for example, the four new species described in *Biologia Centrali Americana*. They are described by color, except for three or four *variable* structural characters, like impressions in the pronotum, common to several species; or distance between the eyes, a secondary sexual character; or length, which is variable within the species, and which may refer to more than one species, anyhow. I have before me hundreds of *Buenoa* and *Anisops* as I write. All have the same sordid white or yellowish glassy, transparent, more or less iridescent wing-covers—pearly, as they are so justly called. All have more or less—and variable—black and yellow markings in the thorax and scutellum. Of course, they differ structurally, but such things are not mentioned in the specific description. So when we have three or four forms of about the same size (within the specific limits), although we can indeed separate them structurally, which of the four, is, say, *albidus*, according to the description? One considers the distribution and hazards a guess. It is probably right on distribution and general considerations, but it is scarcely scientific. All one can do is to hope for the best. It is possible to declare it a new species, but there is always the uncertainty as to its real status; and why add to synonymy, already overloaded? No identification of aquatic Hemiptera may at present be accepted without question, except in those forms which have been worked over of late years monographically for limited groups, and in which authors have come to clean-cut conclusions. As to others, like this family and many others of the water-bugs, we have many descriptions, but no comprehensive work, and no work based on structure pure and simple. The species in these families in the Eastern United States have been controlled and

are now distinguishable with certainty. But where is the material in abundance to work up other faunas? A certain amount is available on this side of the water, but the inaccessibility of the European collections makes difficult hard-and-fast tenable determinations. Collections of aquatic Hemiptera here and abroad are entirely inadequate. These insects are not the favorites of collectors; they are picked up in the most casual manner here and there; and later inadequately characterized by perfectly competent entomologists with an entirely superficial knowledge of the aquatic groups of Hemiptera as a whole—a knowledge very necessary to a proper discrimination and appreciation of characters, as well as to adequate descriptions based on fixed structures.

But nothing will ever be done permanently on any of the groups of aquatic Hemiptera until they are put on a thorough-going basis of pure structure. Anything other than this is trifling and negligible.



1



2

Fig. 1. *Belostoma impavidum* new species (dorsal view)
2. *Belostoma impavidum* new species (ventral view)

REPORT ON SOME POLYCHAETOUS ANNELIDS

Collected by the Barbados-Antigua Expedition
from the University of Iowa in 1918

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INTRODUCTION

The annelids discussed in this report were collected at two of the British West Indies, Barbados and Antigua, which lie in the North Torrid Zone. Barbados, which is the most seaward of the group, is located at 13° 4' north latitude and 59° 37' west longitude. It has a heavy rainfall, but no streams. The island is rising, and consequently it has a very regular coastline. Antigua is located at 17° 6' north latitude and 61° 45' west longitude. It has scant rainfall because it is located in the belt of calms. Since the island is sinking, the coast line has deep indentations; this gives rise to very different habitats. The normal rise and fall of the tide at each island is from two to four feet. Along the shores at low tide specimens were found in the sand, under rocks, in the little tide-pools, on the reefs and flats, in old coral-stone, and along the shallow seabottom. Deep-sea dredging was done at Barbados at a depth of 130-140 fathoms. In all, three chief methods were used in obtaining this material: tide-collecting, dredging, and diving.

CLASSIFICATION

Phylum *Annulata*—Bilaterally symmetrical animals with an extensive coelome, distinct segmentation, and unjointed appendages.

Class *Chaetopoda*—Segments bearing lateral groups of setæ.

Sub-class *Polychæta*—Setæ borne on parapodia.

Order *Errantia*—Carnivorous free Polychæta with protrusible pharynx bearing jaws. Branchiæ generally on dorsal parapodia.

Family *Amphinomidae*—Body vermiform or oval and flattened. Head bearing a peculiar sense organ, the "caruncle."

1. *Hermodice carunculata*.
2. *Eurythæ pacifica*.

Order *Sedentaria*—Vegetable feeding Polychæta which permanently inhabit tubes. No protrusible pharynx; no jaws or teeth. Branchiæ, when present, usually confined to anterior end and sometimes represented by modified tentacles.

Family *Serpulidæ*—Tubes calcareous.

1. *Spirobranchus giganteus*.
2. *Pomatostegus stellatus*.

Family *Sabellidæ*—Flexible tubes constructed of mud and sand.

1. *Sabella melanostigma*.
2. *Dasychone conspersa*.
3. *Parasabella sulfurea*.
4. *Bispira (Sabella) melania*.

DISCUSSION OF ANNELIDS

The phylum Annulata contains the highest type of worms. They are found in abundance everywhere, some species growing to the length of a foot or two. Some are carnivorous, others vegetarian, while many are mud-eaters that swallow mud and sand to obtain the organisms contained therein. They comprise the segmented worms, which number about 4,000 species divided into four classes: the *Archannelida*, *Chaetopoda*, *Hirudinea*, and *Myzostomida*.

All annulates are bilaterally symmetrical, with head distinct, body elongated, digestive tube present, cœlome extensive, appendages paired and unjointed. Segmentation is the most characteristic feature of the annelids, each segment containing a separate and similar set of internal organs. In most annelids the head is more or less distinctly marked, containing mouth, brain, and sometimes bearing tentacles, cirri, palpi, and eyes. Lateral appendages in the annelids are muscular projections of the body wall, called parapodia.

In all annelids except the very lowest a well-developed system of blood-tubes, often carrying red blood, is found. The most important of these are: a dorsal longitudinal tube just above the intestine, a ventral tube just beneath it, and transverse tubes connecting the two. The excretory system consists of a pair of coiled tubes in each somite, which are called nephridia. Each one of these opens into the body cavity at one end and carries liquid waste through a nephridial pore to the outside. The nervous system consists, in most cases, of a cerebral ganglion, œsophageal connectives, and a double ventral nerve-cord,

segmented into a series of ganglia. In the unisexual annelids the reproductive organs are not well marked except during the breeding season. In the hermaphroditic forms, which have a direct development, there is a complicated system of reproductive organs.

All annelids live in water or in moist places on the land or in the earth, the majority being marine. They swim mostly at night, and serve as food for fish and other animals.

The class Chaetopoda, or "bristle-worms," comprises the Earth-worms, Fresh-Water Worms, and Marine Annelids. This class has bunches of bristles, or setæ, on both sides of each segment of the body, which serve as organs of locomotion. The setæ are of various shapes and colors. They are usually chitinous and vary with the genera. This class contains two subclasses: (1) the *Polychæta*, and (2) the *Oligochæta*.

The subclass *Polychæta*, to which the annelids described in this paper belong, are the "many-bristled" worms. They are mostly marine, divided into two orders: (1) the Errantia, or free-swimming; (2) Sedentaria, or sedentary worms. Many Polychæta are beautifully colored—some in vivid reds, greens, blues, and yellows; others in the more sober shades of browns and grays. Some are iridescent; some are phosphorescent.

The majority of the Polychæta have a cylindrical and very mobile body and have a considerable number of segments, definite in number in some groups and varying in others. The segments composing the trunk may be all alike or may constitute two more or less sharply marked regions, the thorax and the abdomen, which differ in the character or in the arrangement of the chætæ. The body-wall consists of a cuticle, an epidermis, muscular layers, and a layer of peritoneum. The cuticle is perforated in many places by the ducts of the unicellular glands of the epidermis, which consists of a single row of cells. In the tubicolous forms these glands secrete the material used in the construction of the tube. In addition, the epidermis frequently contains sensory cells, which are in many cases contained in sensory papillæ. The muscular part of the body wall consists of two layers. The outer layer has the fibres disposed circularly, while the inner one has them arranged longitudinally. The peritoneum is a single layer of cells.

Among the Polychæta, one branch has a head consisting of a prostomium and a peristomium. The former is a lobe overhanging the mouth and frequently bears paired eyes, tentacles, and palpi. The latter is the first complete ring and usually bears cirri. The second branch of Polychæta has a peristomium which is frequently notched. It completely hides the prostomium, which becomes an insignificant organ. The tentacles are reduced, but the palpi become greatly developed. In neither branch do the prostomium and peristomium bear parapodia.

The external segmentation affects the internal structure by dividing the cœlome into somites by means of septa. In burrowing and tubicolous forms the septa are frequently incompletely developed, or even absent; and when the body is less distinctly segmented externally, it varies greatly in diameter during movement. The alimentary system presents certain modifications of a systematic value. It consists of mouth, buccal cavity, pharynx, œsophagus, digestive glands, stomach, intestine, rectum, and anus. In the Nereidiformia the pharynx is protrusible in part, forming a proboscis which is worked by the pharyngeal muscles. Those worms having a proboscis also possess jaws and numerous denticles.

The circulatory or vascular system is well developed. This consists of a dorsal and of a non-contractile ventral vessel, extending along the whole length of the body and giving off paired segmentally-arranged vessels, which pass to the intestinal wall and to the body wall. This system of vessels in the majority of cases contains a respiratory fluid colored red by hæmoglobin in solution. The blood flows anteriorly in the dorsal vessel and posteriorly in the ventral vessel.

The nervous system consists of a dorsal cerebral ganglion, or "brain," connected by circum-œsophageal commissures with the anterior end of a ventral chain of ganglia. The circum-œsophageal commissures spring from the outer corner of the brain, and from each arises a nerve which leads to the head sense organs. The first ventral ganglion lies in the third segment and represents at least two ganglion-pairs fused together.

Special respiratory organs are present in the Polychæta in the form of projections of the parapodia or the appendages of the head.

With a few exceptions the Polychæta are unisexual. The sexual cells are developed in all cases from the lining epithelium of the body-cavity. The exact spot where this occurs varies in different cases. The eggs and spermatozoa in the Polychæta are discharged into the sea either by rupture of the body wall or through the nephridial pore. The male and female elements unite, after which the fertilized eggs undergo development in one of three ways: (1) free-floating; (2) embedded in jelly; or (3) attached to the body or to the tube of the worm. The larval forms differ greatly from the adults. The free-swimming larva is known as a "Trochosphere." In different species, however, the larva present various departures from this type. The little animal is equipped for an independent life by means of provisional chætæ which help to keep it balanced. It is quite at the mercy of the sea, which disseminates the species by carrying it hither and thither. The larvæ of certain species occur at definite periods in great numbers at the surface of the sea, where they serve as food for other animals.

A peculiar worm, *Palolo viridis*, is used as food for man. This worm spawns on two days in October and on two in November—the day on which the moon is in her last quarter, and the day before. At these times they leave the reefs and come to shore. The natives of Samoa and Fiji eat these alive or baked, tied up in leaves. They consider these so great a delicacy that the chiefs who live on the shore send them as gifts to those living inland.

A few Polychæta are pelagic, while the majority live on the sea-bottom. They occur in the greatest abundance near the shore; but they are also found at all depths in the ocean, where the tube-dwelling forms are more abundant than the free forms. A considerable number are commensals, habitually associating with other animals for the sake of food and shelter. Tubes and horny jaws of various Polychæta have been detected in the strata from the Cambrian period onwards.

The geographical distribution of these worms is wide-spread. Many genera are cosmopolitan, although only a few species are common to all the great oceans.

Order *Errantia*: Carnivorous, free Polychæta with protrusible pharynx, bearing jaws. Branchiæ generally on dorsal parapodia.

Family *Amphinomida*: The body in this family is either vermiform, as in the genus *Eurythæ*, or flattened, as in the genus *Hermodice*. The head bears a peculiar sense organ, called the dorsal ridge or "caruncle," which is a leaf-like process overlapping three or more segments. The parapodia bear gills.

Hermodice carunculata Kingberg

Plate V, Figs. 2 and 3; Plate VI, Figs. 3, 4, 5, and 6

The largest specimen found is 230 mm. long and 20 mm. wide at its maximum breadth. It decreases posteriorly to about 5 mm. at the anal segment. The body is a compressed quadrangular shape in cross-section, flat ventrally and slightly arched dorsally. On the dorsal side the color is pale olive-green, shading to gray laterally; while on the ventral side the color is a tan-gray, with a distinct bluish-black median stripe along the ventral groove. This stripe is not so evident in the young forms. The caruncle, located dorsally, is oval and extends posteriorly to the fifth segment. It consists of two rows of somewhat converging laminae, eight in number. From the anterior end projects the median unpaired palp, at each side of which are located two black eye-spots. The other four palpi are shorter. The first pair are located in front of the anterior pair of eyes and are at the anterior edge of the mouth elevation. The more posterior pair are farther apart and are located at the sides of the second pair of eyes. The mouth is oval. The posterior circumference of the mouth opening is on the edge of the fourth segment of the ventral surface. The median parts of the fifth and sixth segments enter into the formation of a lip. There are two rows of parapodia, dorsal and ventral, separated from each other by a wide side-wall of the body. The ventral row is arranged in a straight line. The dorsal parapodia, on the other hand, are alternately drawn nearer the ventral ones. This outstanding peculiar characteristic makes them appear as a double row. Each of the ventral parapodia bears a wide fan-shaped bundle of setæ with a small cirrus. There are two kinds of setæ: the one rather wide and finely toothed along the concave edge; the other with a sharp spur-like projection. The dorsal parapodia are larger. Each one

bears a flat bundle of setæ, a long slender cirrus, and a branchia. The bristles are simple, long, thin, and hair-shaped. The cirrus has a broad base and extends from the posterior edge. The branchiæ spring from one main trunk and are branched dichotomously several times. The filaments are fringe-like. The specimen described above was found near the "Pillars of Hercules," Antigua.

The *Hermodice* is a very predacious animal. It is found under stones at low-tide, and it is difficult to capture because of the nettle-like sting of the setæ. The writer's own experience in securing the above described specimen illustrates emphatically the paralyzing effect of the sting of these setæ. As the writer was lifting a stone, she suddenly discovered this monstrous worm endeavoring madly to get away and hide under surrounding rocks. Being unfamiliar with the habits of this animal as well as unwarned of the disastrous results of touching it, she seized it with bare hands in order to prevent the escape of so splendid a specimen. Immediately her fingers and palms were covered with slender, sharp, glassy setæ, which worked their way under the skin and into the flesh. For about a week following, the fingers were numb and apparently deprived of the sense of touch.

Localities: Jamaica, Florida Cape, Hayti, Antigua, and Dry Tortugas.

Eurythæ pacifica Kingberg

Plate VI, Figs. 1 and 2

A description of this species was not found in any literature available, except in the narrative and preliminary report of the Barbados-Antigua Expedition by Prof. C. C. Nutting. The body of the present specimen is 160 mm. long. It is about twice as broad as it is thick, measuring 10 mm. at its greatest width. It is quite flat on the dorsal side. There are 120 segments. The color of the body is bright red, while that of the parapodia is an orange-red. This vivid color is probably an evidence of warning, because these animals, which the natives call "sea scorpions," are very pugnacious. The caruncle is a simple, smooth, longitudinal swelling, the most posterior edge of which is on the third segment. In front of the caruncle are four black eye-

spots. The anterior pair are the larger. There are five short Indian-club shaped palpi. The unpaired one is the shortest and scarcely as high as the caruncle. The mouth is oval and extends back as far as the third segment. The median parts of the fourth and fifth segments enter into the formation of a lip. The parapodia appear to be in two rows, dorsal and ventral. These may be the notopodia and neuropodia. Although they meet at the first segment, from the second segment to the posterior region they are widely separated; from here they gradually converge to the end. Each of the ventral parapodia bears a small bundle of setæ with a stout cirrus. The setæ are very thick and stiff, and extend straight out. They terminate in two points of unequal length, the longer and wider of which has the greater curvature. The cirri are on the posterior border of the parapodia. They originate from a thick base and extend to a blunt point. The dorsal parapodia are short and thick. They bear large bundles of setæ, a cirrus like that of the ventral parapodia, and the branchiæ. The setæ of the dorsal parapodia, which extend outward and upward, are of two kinds: the one fine, glistening bristle-like setæ, simple and linear in shape; the other kind serrated with toothed edges pointed backward. The branchia is a low, brush-shaped structure. It is located back of the dorsal cirrus and extends toward the flat dorsal surface. There are about eight short stems arising from a main trunk. These subdivide into small branches, and they end in thick, wedge-shaped filaments.

The anus is dorsal and is located on the third from the last segment. The last segment bears two small knobby cirri. This specimen was found in a conch-shell at Barbados.

Localities: Mau Wau, Formosa; Batan Island; Tataan, Tawi Tawi, San Pascual, Burias Island; Barbados.

Order *Sedentaria*—Vegetable feeding Polychæta which permanently inhabit tubes. No protrusible pharynx; no jaws or teeth. Branchiæ, when present, usually confined to anterior end and sometimes represented by modified tentacles.

Family *Serpulidæ*—Tubes calcareous.

Spirobranchus giganteus Pallas

Plate VI, Figs. 6, 7, and 8

This is a relatively large specimen 75 mm. long, including the branchiæ, 9 mm. wide in the thoracic region, and tapering posteriorly. The body, which is divided into thorax and abdomen, is oval in cross-section. On each side of the thorax, which is divided into 6 segments, there are 6 bundles of setæ, located just above the thoracic membrane. The setæ on the collar are of two kinds, which differ only in length and in degree of curvature. The longer ones are slightly bent; the shorter ones are strongly curved. The thorax is also provided with an undulated membrane on each side, employed chiefly in smoothing the inside of the tube. This is a modification of the cirri. The shield glands are confined to this region. The branchiæ, which are 15 mm. in length, are in two bundles, each having 5 whorls. The branchial filaments are numerous and are situated on a broad base. The peduncle is large, wide, but thin. Its edges are almost cutaneous and protrude like wings so that the branchiæ can be withdrawn into them. The operculum is plate-shaped, and out of its depression arise two large antler-like processes and two smaller horn-like processes. The former extend outward and have several sharp prongs; the latter have three small teeth near the tip. This operculum is a modification of two of the branchial filaments. The collar is ruffled and is divided by the ventral groove into two symmetrical lobes, each of which bears a chalky-white spot.

This animal builds a convoluted calcareous tube, smooth and porcelain-like within. The interior is a deep lavender, shading to white at the rim. The colors of the animal itself are very striking. The branchiæ and antlers are deep carmine red; the operculum is yellow; and the body of the worm is flesh-colored. Contrasted with the white tube, this highly-colored annelid is decidedly showy. When disturbed, it quickly withdraws into its dwelling. A number of specimens were found with tubes attached to the links of an old anchor-chain in English Harbor. Prof. A. O. Thomas kindly assisted in the work of collecting these specimens; but it was impossible to secure any perfect tubes, because they are curved and were so solidly cemented

to the links of the chain. A number of embryos were found in the bottom of one of the tubes. Professor Nutting has described this annelid in his narrative.

Localities: Jamaica; English Harbor, Antigua; Florida.

Pomatostegus stellatus Schmarda

Plate VI, Figs. 9 and 10

This Serpulid is 55 mm. long, including the branchiæ, and it is 5 mm. wide in the thoracic region. The body is hemispherical in cross-section and has a wide ventral groove. The body is flesh-colored with yellow cross stripes shining like silk. The thorax includes 7 segments, each bearing setæ laterally. As in the specimen previously described the cirri of the thorax are modified into an undulating membrane used in smoothing the inside of the tube. In the present specimen, however, this membrane begins at the second thoracic segment, and without interruption it continues into the collar. The collar is very high and frilled; and in the ventral median line it is projected into a long, pointed triangular lobe, which lies between the two whorls of the branchiæ. The ventral shields are confined to this region.

The collar setæ are long and slender, slightly constricted and then enlarged just below the head of the main shaft. In the thorax the setæ are limbate and are of different lengths. The uncini in the thoracic tori are large and number about 12 to each torus. They are of the same shape in the abdominal region, but are fewer to a row.

The branchiæ are spiral, about a turn and a half. The filaments are bright rose color, lightly barred with white. The operculum in this specimen is yellow, and it has three vertical disks, united by a central vertical column. The number of disks varies from 3 to 5 in different specimens. The peduncle is wide and thin. Its edges are cutaneous and wing-like.

This worm builds a calcareous tube like that of *Spirobranchus*. It was found attached to the links of an old anchor-chain at English Harbor, Antigua.

Localities: Jamaica; Porto Rico; English Harbor, Antigua; Culebra.

Family *Sabellidæ*—Flexible tubes constructed of silk-like material with mud and sand.

Sabella melanostigma Schmarda

Plate VII, Figs. 4, 5, and 6

The body is 47 mm. long including the branchiæ. It is 6 mm. wide at its greatest breadth. It gradually decreases posteriorly. The body is compressed and has 130 segments. The color of the body is yellowish-brown. On the side of each segment there are two distinct black spots, one dorsal and one ventral to the setæ fascicles. These spots are larger anteriorly on the dorsal side, but reversed posteriorly, where they grow smaller and gradually disappear. There is a conspicuous black spot on the dorsal side of the buccal segment. They are also present on the dorsal basal lobes of the branchiæ. Under the microscope these spots seem to be pigment. Does this indicate the presence of eyes on the body?

The thorax has 9 segments. The ventral groove is missing on the thoracic plate. Except for difference in size the fascicles of setæ are like those of the abdomen to about the fifteenth abdominal segment, where the setæ change to just the one kind, namely—the blade-like form. The tori shorten here, and the uncini are small.

The setæ are a glistening yellow, very large and stiff. They are of two kinds, grading into each other from a spatulate to a simple blade. The latter are the longer and are dorsal. The uncini have a comb-like arrangement in the tori, the hooks pointing anteriorly. The posterior edge of each torus is widened into a membranous fin-like web. The uncini have a long shaft-like elongation and are capped with teeth.

The branchiæ are brown at the base, but the color soon changes to yellow. They are about 20 mm. long. The basal lobe is curved in and projects above the collar. There are 19 pairs of branchial filaments, which are nearly of equal length. Each filament bears 4 or 5 pairs of eye spots. The collar is low, with a gap between the lobes on both the dorsal and the ventral sides.

This specimen was found in a tide-pool at Needham's Point, Barbados. A group of these delicately tinted Sabellidæ thickly

floored the tide-pool. They appeared to be similar in structure, but after close study several genera were found among them.

Localities: Jamaica; Barbados; Dry Tortugas; Ponce, Boqueron Bay, reef at Ponce, Mayaguez, Guanica Bay and Hucars.

Dasychone conspersa Ehlers

Plate VII, Figs. 1, 2, and 6

This beautiful little Sabellid could be seen under the water only at low-tide. Being very sensitive to stimuli, it would withdraw quickly into the tube upon being disturbed. The body is fuscous brown, irregularly sprinkled with dark spots. At the base the branchiæ are a reddish brown, shading to yellow at the tips. The branchial filaments are alternately crossed at irregular intervals by red and brown bands. The branchiæ are bilobed. They are situated on a short basal lamina, each bearing 19 filaments nearly equal in size except two smaller ventral ones. Each filament is closely pinnated. A short portion of the apex of each rachis is free from pinnules. On the back or outward aspect of the rachis there are two sets of sense organs in pairs and alternating with each other: (1) the black eye-spots; (2) the smooth whitish filaments, probably tactile in function.

The body, including the branchiæ, is 26 mm. in length. The greatest width, which is at the third segment, is 3.5 mm. The body narrows anteriorly, and posteriorly it decreases to almost 2.5 mm., but widens a little before coming to a blunt end. There are 87 segments. In general the body is flattened except in the thoracic region, where it is strongly arched dorsally and flat ventrally. There are 4 buccal tentacles: 2 short triangular dorsal ones and 2 narrow elongated ventral ones. The buccal segment is short and is fortified by a small bundle of setæ and a ventral shield. The collar is low and in 2 lobes, gaping wide dorsally and meeting ventrally. The lobes are slightly elongated and triangular. On the ventral side in the posterior region there is an elongated trough-like depression, extending through about 20 segments. In the bottom of this depression lies the ventral groove, which extends forward to about the ninth seg-

ment. The ventral shields of the 9 thoracic segments are dilated anteriorly into acute angles.

The setæ, which are brown in color, are stout with a broad border. They are alike in both regions except for size, being larger in the thoracic region. In this region the tori extend from the setæ fascicles to the shields. The abdominal tori are much shorter. The uncini are of the same shape throughout, but are smaller in the abdominal region. They are S-shaped, and on the terminal curve of the hook they are armed with a few teeth. They are in single rows. The dark spots between the bundles of setæ and between the tori are larger in the thoracic segments.

The light brown tubes are thin, fragile, and paper-like in texture. On the outer side they are covered with a fine gray mud.

Localities: Jamaica; Key West; Falmouth Harbor, Antigua.

Parasabella sulfurea Treadwell

Plate VII, Figs. 7, 8, 9, 10, and 11

The specimen here described is 67 mm. long, 18 mm. of which is in the length of the branchiæ; it is 5 mm. wide at its maximum breadth, tapering posteriorly to a sharp point. It is quite flat and arched slightly on the dorsal side. The color of the body is a pale purplish-brown, shaded deep in mid-dorsal line. At the base the branchiæ are purple, gradually shading to a lavender, and merging to yellow at the tips. The branchiæ rise from a rounded base and have no inrolling on the dorsal side. A short portion of the distal end of the rachis is naked (no pinnæ). The slender filaments are webbed at the base. There are about 15 pairs. Just beyond the web and extending more than half way, each filament bears on either side of its outer surface a row of minute purple spots.

The collar is low and the ends widely separated dorsally, but nearly in contact ventrally. Each ventral lobe is pad-like, or thickened. The edge is recurved. The torus of the first segment is arranged obliquely posterior to the dorsal free end of the collar. The torus is lateral and ventral to the setæ fascicles in the thoracic region. The latter includes 9 segments. Beginning with the abdomen and extending throughout the remainder of

the body, the torus is ventral to the setæ fascicles. The setæ of the first setigerous segment are of two kinds: one is long, slender, and shaft-like, with the apex bent and narrowed to a point; the other is stout, with apex rounded and covered with spines, and terminating in a short, slender point. The setæ are of two kinds: slender forms with curved apex, the bent portion having spines; and stouter forms with rounded ends. The uncini in the torus are arranged in a single row in comb-like fashion. They are S-shaped.

Specimens of these tube-dwelling worms were found inhabiting mud tubes in a tide-pool at Barbados.

Localities: Dry Tortugas; Barbados.

? *Bispira melania* (Schmarda)

Plate I, Figs. 1 and 2; Plate II, Figs. 1, 2, 3, and 4; Plate III, Figs. 1 and 2; Plate IV, Figs. 1, 2, 3, 4, 5, 6, 7, 8, and 9

Following a recent determination of Professor Treadwell's the writer is placing this specimen provisionally in *Bispira*. She, however, has never read a description of this genus and is therefore unable to verify the assignment. Schmarda describes the species in question as *Sabella melania* in the following manner:

Sabella melania Schmarda

Taf. XXIII. Fig. 192

Char.

Die Farbe des Körpers ist ein dunkles Braun, beinahe schwarz; die Kiemen sind heller, die Fädchen abwechselnd schwarzbraun und gelbbraun. Die Länge des Körpers ist 150 mm, ein Drittel davon auf die Kiemen (46:100). Er zählt 144 Ringe. Die Borsten der sechs oberen grossen Bündel und die folgenden zeigen nur kleine Grossenunterschiede. In allen sind zweierlei Borsten, die einen haben parallele Conturen, die andern haben den einen Rand unter einen sehr stumpfen Winkel gebogen. Die Hakenborsten sind S-förmig, leicht gestreift. Die Röhren bestehen aus Schlamm.

Port Royal in Jamaica, in einer Tiefe von 2-10 Meter, gesellig beisammen.

These tube-dwelling worms are found on the old sea-wall surrounding the Dockyard at English Harbor, Antigua. With their plummy, graceful, vari-colored branchial crowns extending above the tubes, they present a gorgeous spectacle like an ex-

tensive submarine mural flower garden. Appearing just above sea-level, they continue in a solid mass almost to the bottom of the sea-wall. The numerous closely-set branchial filaments have a spread of 8 to 10 inches. They are beautifully colored in shades of brown with several series of color spots forming bands, the color combinations being fuscous brown banded with light tan spots, chocolate brown banded with white, dark purple with brown spots, and dark mahogany red banded with light brown. A few are almost white with indistinct barring like watered silk. This wonderful display of delicate feathery filaments in beautifully blended colors was a source of constant admiration to all the members of the expedition.

DESCRIPTION

External Features

The entire length of the specimen here considered is 120 mm., of which 90 mm. is in the length of the branchiæ. The body in the contracted condition measures 110 mm., but in life it could be extended to a much greater length. The maximum width is 20 mm., and the maximum thickness is 15 mm. The body is hemispherical in cross-section. The ventral side is flat, but the dorsal side is strongly arched. There are about 180 segments. The color of the dorsal side of the body is a reddish-brown, with a dark spot on each side of the segments just above the tori, which are a tan-brown. The ventral side of the body has a median band, 10 mm. wide, the color of which is a deeper reddish brown than that of the dorsal side. The lateral margins are of the same color as that of the dorsal tori. The bundles of yellowish setæ are closely set, appearing like a yellow stripe along the sides of the body.

The body is divided into head, thorax, and abdomen. The prostomium is compressed and bears two kinds of sense-organs; dorsal tentacles, two in number, and palps. Each palp is represented by a number of long, mobile filaments, arising from a common base which is set on an E-shaped lophophore. The branchial crown is nothing more than the greatly subdivided and enormously elongated palps. There are 80 branchial filaments, which are united near the base by a delicate web. Each filament is provided with secondary processes, called pinnæ. In addition to its sensory functions, each filament aids in conveying food to the mouth by the action of the pinnæ. The branchiæ are respiratory organs. The peristomium does not bear setæ or cirri, and it is reflexed to form a collar, which is two-lobed. The ends are widely separated on the dorsal side, while on the ventral side they are in contact. Each ventral end is prolonged into a triangular recurved lobe.

The thorax has 8 segments. The torus of the first segment is arranged obliquely just posterior to the dorsal free end of the collar on either side.

On the next 7 segments the torus is lateral and ventral to the setæ tuft. The thoracic segments are provided with shield glands, which are continued down the abdomen along the ventral groove.

The abdomen begins on the ninth segment, and throughout the remainder of the body the torus is dorsal to the setæ tuft, or fascicle. On reaching the thorax the median ventral groove bends to the left and is continued along the dorsal surface to the head. This groove is ciliated and serves to carry the feces out of the tube. The parapodia are not well developed.

The setæ fascicles on the thorax are like those of the abdomen, only much larger. There are two kinds of setæ: the one is shaped like a long, slender shaft, the apex being slightly bent and narrowing to a point, and it is lightly striated; the other is broader with a sharp angle at its maximum width, from which it gradually tapers to a point. The uncinii in the tori are sharply curved hooks, S-shaped and lightly striated.

Internal Anatomy

Literature on the internal anatomy is exceedingly scant. Descriptions are confined to external characters. Nereis is usually taken as a type for the Polychæta, but it is an errant carnivorous animal and differs from the sedentary and herbivorous forms.

Digestive System. The mouth is anterior and opens into the buccal cavity. There are no jaws. Eversion does not take place in this form. The œsophagus (pharynx), (Plate V, Fig. 1) is surrounded by a thick muscle. It protrudes into the stomach. The stomach is very large, extending through segments 2-7. In segments 4-7 the sides are deeply indented so as to make a series of chambers connected by comparatively narrow openings. This region also has numerous small, short cœca. The intestine (Plates VI and VII, Figs. 1, 2, 3, 4) is coiled, one full turn to three or four segments, or metameres, though this seems to vary. Anteriorly there are numerous cœca of all sizes, and these seem to alternate with radiating masses of chlorogogen; posteriorly the cœca are fewer and smaller, and the chlorogogen is more abundant, completely filling the cœlome. The anus is terminal.

Septa. These are apparently complete or nearly so in the abdominal region, but not in the thorax. Most of them seem merely a layer of peritoneum, non-vascular, and fully transparent; but at intervals, more or less irregular, there are muscular partitions varying in thickness. There is a dorsal longitudinal mesentery suspending the coiled intestine. The septa (and mesentery) do not extend through the muscular layer, and it is not always easy to correlate the segments with the external rings. The septa of the fifth and sixth segments are very vascular.

Muscular System. There is a uniform, continuous layer of circular muscle, vascular, separated from the longitudinal layer by a fairly thick layer of connective tissue. The longitudinal layer is divided into three longitudinal bands, one dorsal and two ventral. (Plate VI, Fig. 1). The setæ muscles were not investigated. The pharynx (œsophagus) is very muscular.

Circulatory System. In the abdominal region there is no dorsal vessel. One specimen had a dark line visible externally in the mid-dorsal region extending more than half way back, but investigation revealed no vessel. At any rate the muscular layer is too thick to permit such a vessel to be seen externally. The dark line was apparently due to a concentrated plexus of small vessels in the circular muscle layer. Other specimens do not show it. The chlorogogen masses of the intestinal region support a rich circum-intestinal plexus, that no doubt takes over the function of a dorsal vessel. (Plate VI, Fig. 1). There is a very conspicuous ventral blood vessel (Plate VI, Figs. 1 and 2) suspended by a longitudinal mesentery; circular vessels are present. In the thorax (Plate VIII, Fig. 1) a dorsal vessel is developed, and the five anterior metameres contain each a pair of large, thick-walled "hearts." (Plate VIII, Fig. 1). Whether these connect with a ventral vessel was not determined. The sixth and seventh thoracic segments have no "hearts," but the septa are very vascular. This vascular condition of the septa is also found in the anterior abdominal metameres, and one specimen showed a large sinus filled with blood so located as to simulate a "heart."

Nervous System. The ventral nerve cord is of the ladder type, (Plate VIII, Fig. 2). There are no discernible ganglionic enlargements. Directly above each hemisphere of the cord is a large hollow vessel (Giant fiber?). This hollow vessel is also found in the brain, which is located in the extreme anterior tip just above the mouth. (Plate V, Fig. 1) The nerves of the cord are large and regular, extending out at right angles.

Excretory System. The cœlome in the thoracic region is filled with gray, glandular tissue, taking the form of much lobulated sacs. Whether these form one or several nephridia is not clear. They fill the cavity of each metamere; and a portion extends forward into the head, where the two sides unite into a common external opening just above the brain. (Plate V, Fig. 1). Whether or not there are nephridia in the abdomen it is difficult to determine.

Reproductive System. Not identified. Probably consists of gonads that are inconspicuous except in the breeding time.

The Tube

The tube is made from a secretion from the ventral shield glands. This secretion serves to stick together fine particles of mud so as to form a cylindrical tube, which is lined internally by the hardened mucus. As the animal grows, the tube is lengthened by building on at the anterior end. The animal revolves in the tube, while the pinnae of the branchial filaments collect the particles of mud. The animal, rising partly out of the tube, uses the collar lobes as trowels which beat down the thin edge as they fold and clasp over the margin. The longest tube collected measures 190 mm.

When the animal is undisturbed, the branchiæ always protrude from the tube. At night they are only partially extended from the tube, though not expanded as during the day. Hundreds of specimens of this

tube-dwelling annelid were collected. It is necessary, however, to use great caution in capturing this worm, as it immediately withdraws into the tube if a shadow falls upon it or if the water is disturbed by the motion of oars. It is also necessary to work quickly; for the tube is of considerable length, and the inhabitant withdraws to the bottom of it and sometimes even escapes through the posterior end of the tube.

Localities: Port Arthur, Jamaica; English Harbor, Antigua.

CONCLUSION

It is the opinion of the writer that the species of *Bispira* just described was introduced at English Harbor, Antigua, probably at the beginning of the nineteenth century, when Nelson used the island as a naval base. These worms are found along the sea-wall at only one place on the island, namely, the dockyard where ships anchor. These sedentary tube-dwelling annelids might easily have been carried long distances attached to the bottom of ships or to anchors.

This annelid, being a tube-dwelling worm, has the body highly specialized anteriorly, while posteriorly some degeneration has taken place. The parapodia are greatly reduced along the entire length of the worm. Dissections show that the septa are incompletely developed in the thoracic region, and sometimes they are absent near the head. Absence of septa allows a free communication between successive segments and consequently a freer flow of coelomic fluid. With the disappearance of the septa there is a diminution in the number of nephridia. The coelome in the thoracic region is filled with gray glandular tissue which seems to be nephridia. A large portion extends forward into the head, where the two nephridia unite into a common external opening just above the brain. In the abdominal region there is no dorsal blood vessel. It seems to be replaced by a sinus. The ventral blood vessel is very conspicuous. The intestine is very much coiled. This is contrary to the usual type, which has a straight intestine. Probably this feature is due to the mode of life, as the worm is chiefly a vegetable feeder. The coils in the intestine give greater area for absorption.

Evidences of regeneration are shown in a number of specimens. One large worm that had lost its greatly specialized branchiæ had started to grow a new crown. Other specimens that had a few of the branchial filaments torn away were re-

placing them by a new fringe. Another specimen that had lost its posterior region was growing a new tail. Sir J. Dalyell noted in *Dasychone* that in the springtime the branchial crown was regenerated in about a month, while in winter a longer time was necessary. He also cut a *Dasychone* into three pieces. He reports the regeneration of parts as follows: "The hindmost produced a head, the anterior piece developed an anus, and the middle portion formed both head and tail!" This extensive power of regeneration is of extreme value to the Polychæta.

The species identified and described in this paper seem to be peculiar to the tropical regions. In Vol. XII of the "Harriman Alaska Expedition Reports" Miss Katharine Jeanette Bush in her report on the "Tubicolous Annelids of the Tribes Sabellides and Serpulides from the Pacific Ocean" does not record any of the species herein noted. Neither does J. P. Moore mention any of the species of these groups in his report of the "Sabellidæ and Serpulidæ from Japan." Prof. A. L. Treadwell, however, reports some from Porto Rico, Dry Tortugas, and the Bahamas. E. Ehlers has recorded and described a number from the Florida region. Ludwig K. Schmarda reports on some from Jamaica, and J. E. Benedict includes some in a report from Bermuda.

In considering the group as a whole the Leodicidæ has the greatest number of genera represented. There are perhaps eight to ten genera, but in many instances there is only one specimen to a species. In number of individuals Sabellidæ surpasses all other groups, as there are hundreds of specimens in several of the species collected.

ADDENDUM

In the foregoing pages the writer has stated that she had been unable to find a description of the genus *Bispira*. Since this paper has gone to press, however, she has received through the Library of the University of Iowa a copy of "The British Marine Annelids, Volume IV, Part II, Polychæta, Sabellidæ to Serpulidæ," written by Professor W. C. McIntosh and published by the Ray Society, London, 1923. In a short discussion of the genus *Bispira* Professor McIntosh states that the "bran-

chiæ arise from a a firm spiral base, and have . . . ocular spots on the outer edge." The specimen provisionally classified as *Bispira melania* does not have a spiral formation or ocular spots. If the presence of ocular spots is a generic character, this form does not fit in the genus *Bispira*. Professor A. L. Treadwell has kindly suggested following R. V. Chamberlin's classification in his monograph on the Pacific annelids, as his diagnostic generic characters seem very accurate; but to date the writer has not been able to secure this reference.

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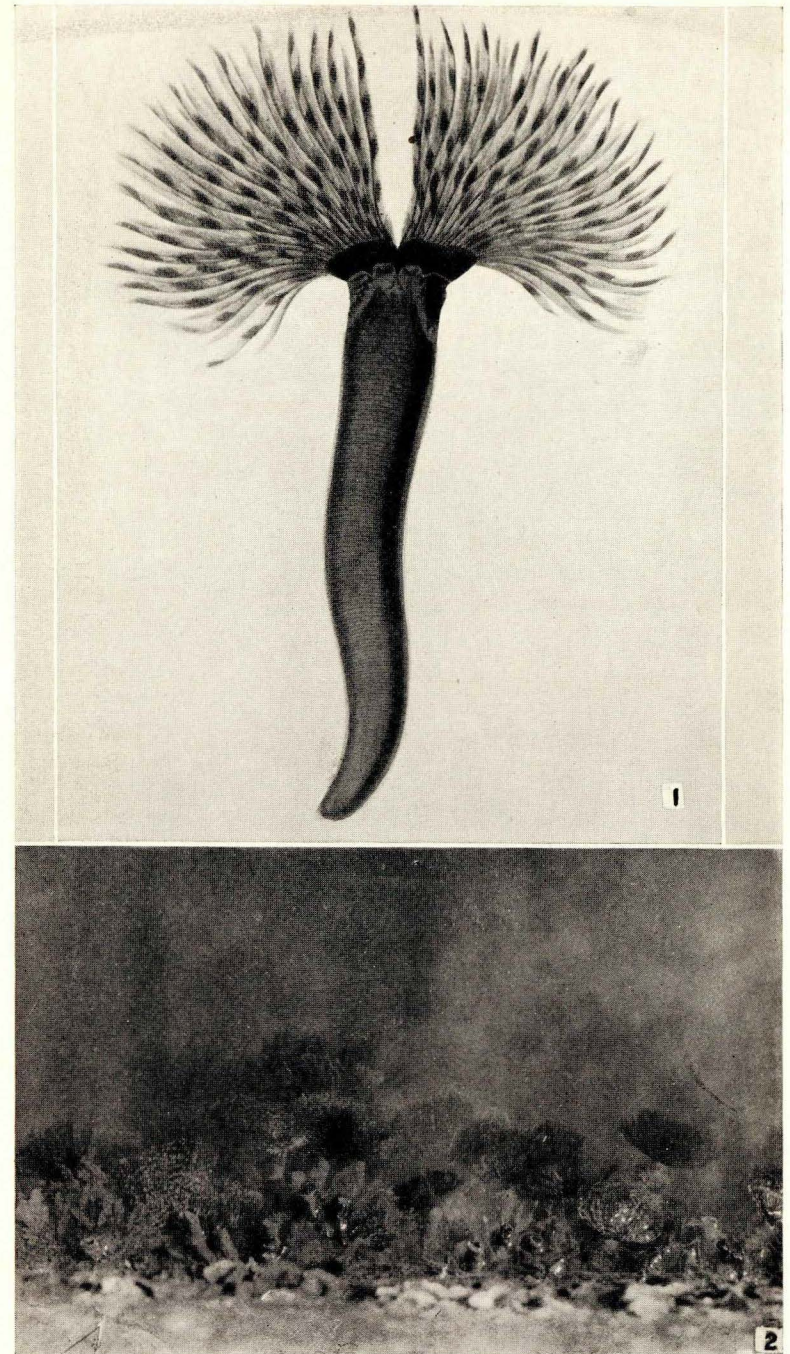
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(For legend see next page)

PLATE I

? *Bispira melania*

- Fig. 1. Dorsal view—branchiæ expanded
 2. Tube-dwellers in their natural habitat on the sea wall at English Harbor, Antigua

PLATE II

? *Bispira melania*

- Fig. 1. Specimen without branchiæ
 2. Specimen showing branchiæ regenerating
 3. Ventral view—branchiæ folded
 4. Branchial filaments

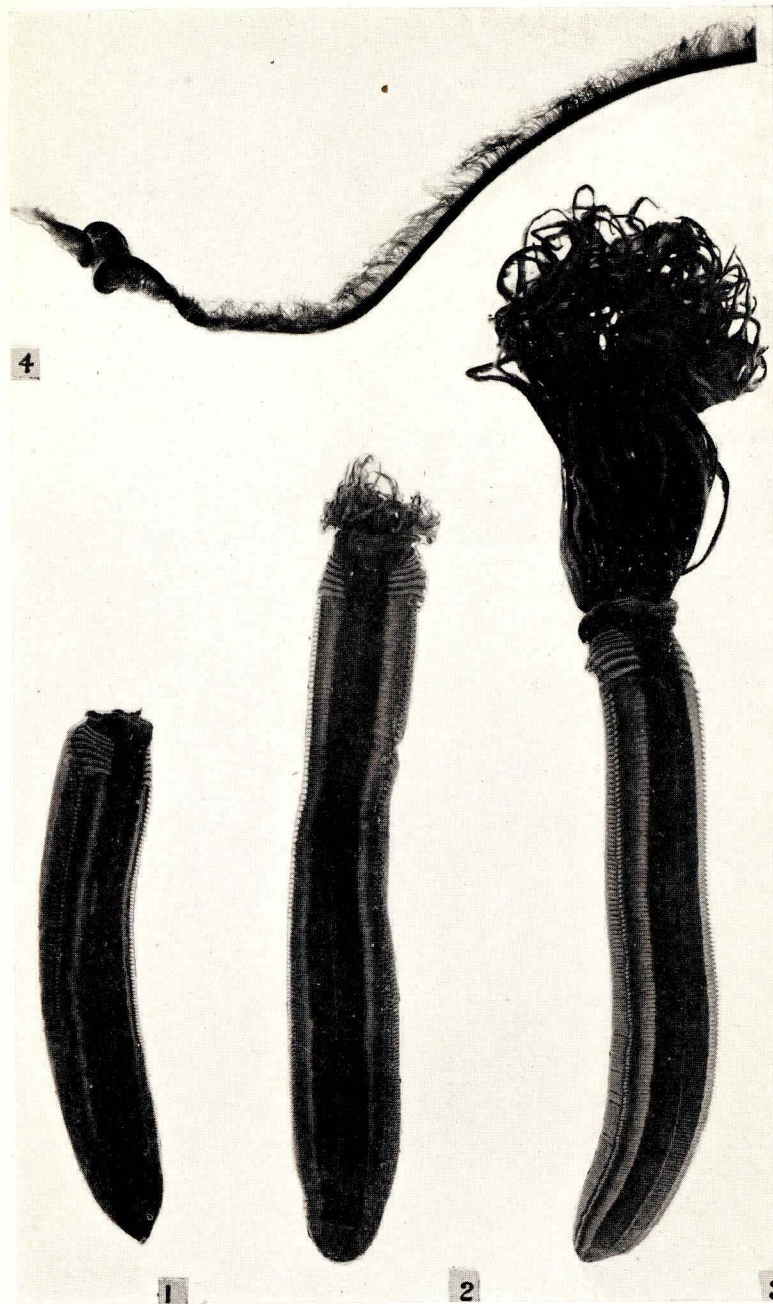


PLATE III

? *Bispira melania*

Fig. 1. Median longitudinal section through thorax
Partly diagrammatic (hearts are not cut) x 4

- a Esophagus
- b Stomach
- c "Hearts"
- d Nerve cord
- e Blood vessel
- f Nephridium
- g Abdominal region
- h First complete septum
- i Coeca
- j Nephridium
- k "Hearts"
- l Brain

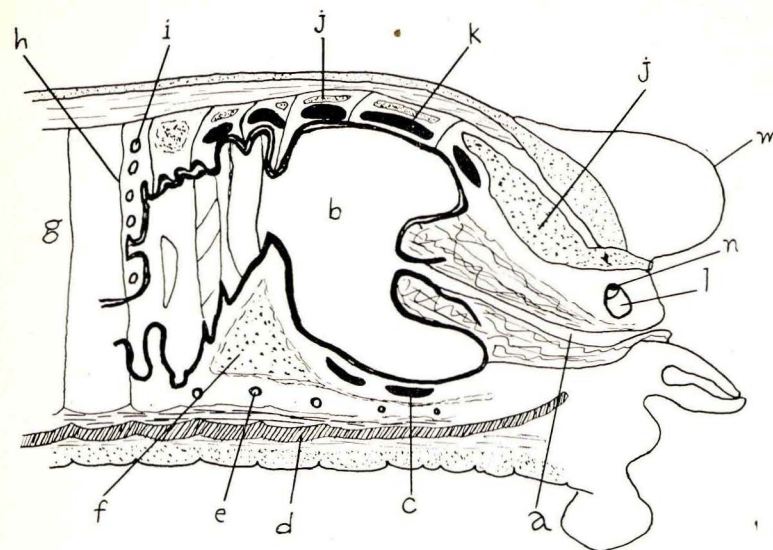


Fig. 2. Cross-section in region of intestine x 4

- a Circular muscle
- b Longitudinal muscle
- c Dorsal longitudinal mesentary
- d Blood vascular plexus
- e Coil of intestine
- f Intestine
- g Setae
- h Ventral blood vessel
- i Ventral groove
- j Nerve cord
- k Giant cells?
- l Chlorogogen?

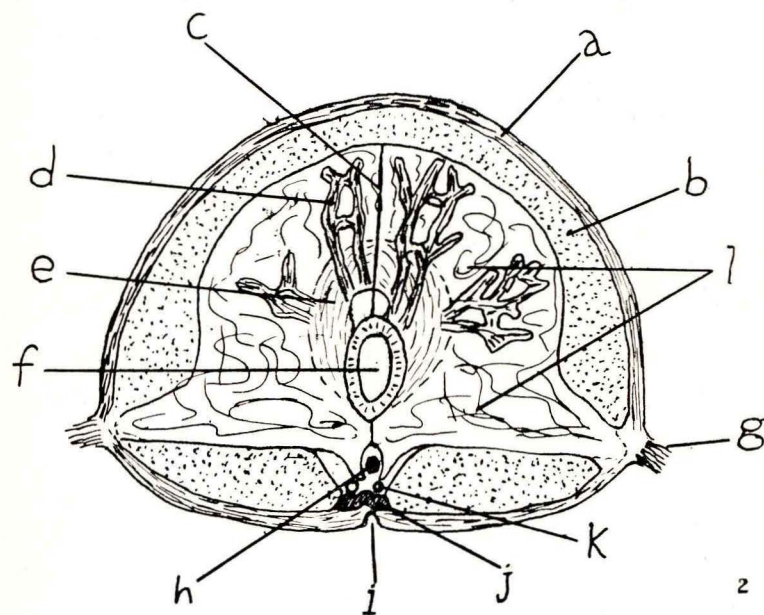
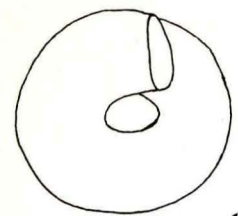


PLATE IV

? *Bispira melania*

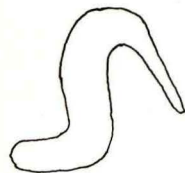
- Fig. 1. Single coil of intestine seen from end
 2. Coils of intestine seen from side
 3. Diagram of "hearts"
 a Esophagus
 b Stomach
 c Segments 1, 2, 3, 4, 5, 6, 7
 d Abdomen
- Fig. 4. Section of anterior region of abdomen
 a Coeca
 b Intestine
 c Chlorogogen
- Fig. 5. Longitudinal section in region of intestine x 4
 a Circular muscle
 b Longitudinal muscle
 c Section of coiled intestine
 d Food in intestine
 e Septum
 f Section of cæcum
 g Sections of ventral blood vessel
- Fig. 6. Portion of nerve cord
 7. Setæ with parallel striations
 8. Setæ with bent edge
 9. Hooked setæ from torus



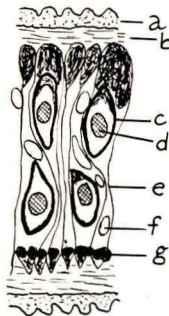
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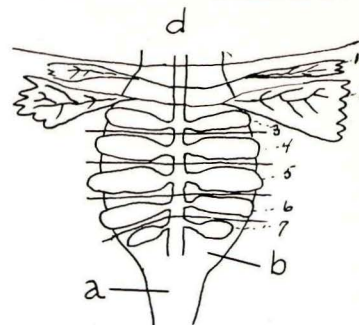
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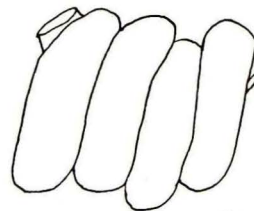
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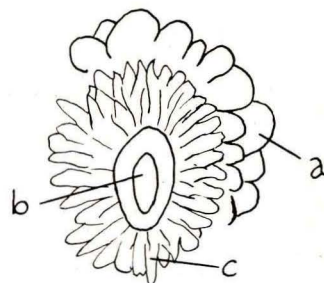
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PLATE V

? *Bispira melania*

Fig. 1. Living specimens expanded; one specimen in a tube

Hermodice carunculata

Fig. 2. Dorsal view

3. Ventral view

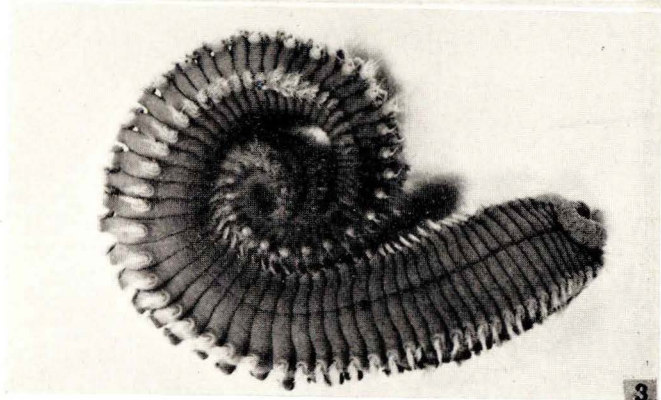
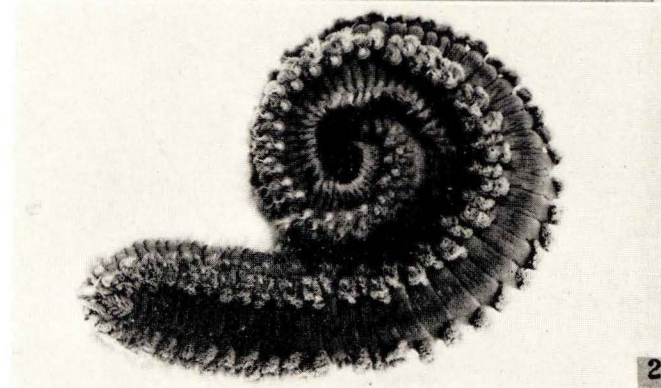
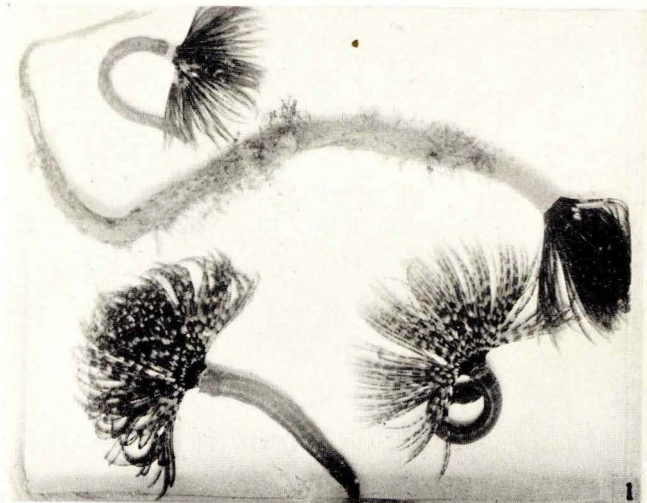


PLATE VI

Eurythæ pacifica

- Fig. 1. Parapodia with branchiæ
2. Seta

Hermodice carunculata

- Fig. 3. Ventral parapodium
4. Dorsal parapodium showing branchiæ
5 and 6. Setae

Spirobranchus giganteus

- Fig. 6. Operculum
7 and 8. Setae

Pomatostegus stellatus

- Fig. 9. Operculum
10. Seta

PLATE VI

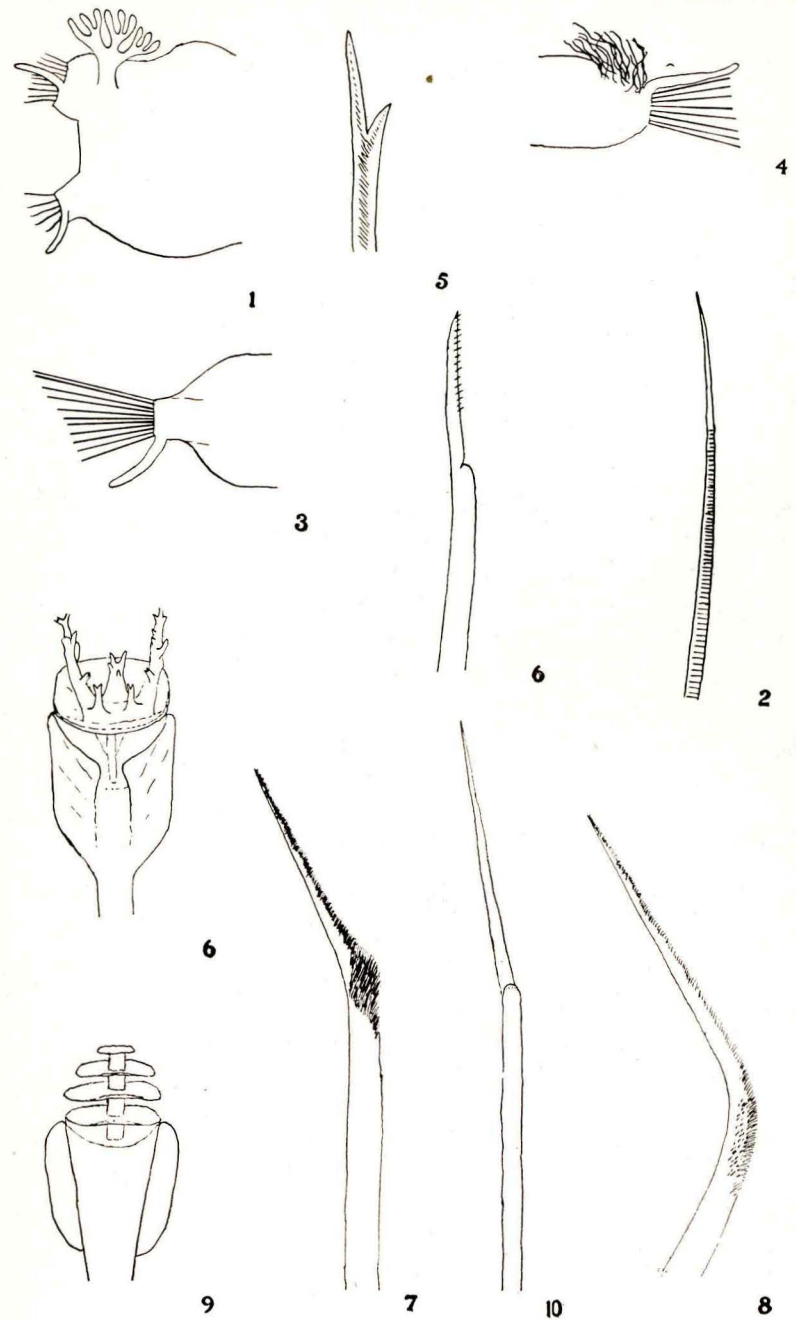


PLATE VII

Dasychone conspersa

- Fig. 1. Filament of branchiæ showing eye-spot and dorsal processes
 2. Uncini from thoracic torus
 3. Seta from thoracic fascicle

Sabella melanostigma

- Fig. 4. Collar and base of branchiæ
 5 and 6. Setæ (Greatly enlarged)

Parasabella sulfurea

- Fig. 7. Slender seta from second segment
 8. Rounded seta from second segment
 9. Collar and base of branchiæ
 10. Uncini thoracic torus
 11. Pennoned seta accompanying uncini

