
THE NEMERTEANS OF PORTO RICO.

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WESLEY R. COE, Ph. D.,

Yale University.

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The collections of the U. S. Fish Commission steamer *Fish Hawk* at Porto Rico during the months of January and February, 1899, include only 15 entries of nemerteans, indicating a remarkable scarcity of this group of worms in the localities visited.¹ Eight species are represented, as follows:

1. *Drepanophorus crassus* (Quatr). One specimen from off Guaniquilla.
2. *Tæniosoma delineatum* (Delle Chiaje). One fragmentary specimen from Ensenada Honda, Culebra.
3. *Tæniosoma discolor*, sp. nov. Two large, well-preserved specimens from Ensenada Honda, Culebra.
4. *Micrura leucopsis*, sp. nov. Four specimens. Hucares.
5. *Cerebratulus antillensis*, sp. nov. Several ruptured individuals. Mayaguez Harbor.
6. *Lineus albocinctus* Verrill. Ensenada Honda, Culebra. Two specimens.
7. *Lineus* or *Micrura*, sp. indet. Several fragmentary specimens. Ensenada Honda, Culebra.
8. *Cerebratulus*, sp. indet. One specimen. Ensenada Honda, Culebra.

Of these eight species, only three can be referred to previously described forms and three are apparently new to science. The specimens comprising the remaining two, being known only from preserved material, without color notes, presented no tangible characteristics which would lead to their ready diagnosis and can not be referred to any species. The three species described as new possess such well-marked peculiarities of color and structure that the following descriptions will doubtless render them easy of redetermination in spite of the absence of drawings.

1. *Drepanophorus crassus* Quatr.

Cerebratulus crassus Quatrefages, Ann. Sci. Nat. (3), vi, 1846.

Drepanophorus crassus Joubin, Faune Française: Les Némertiens. Paris, 1893.

A single specimen, which may be referred to this species with a good deal of certainty, was dredged off Guaniquilla, on coral and sandy bottom, in 8½ fathoms. The color of the preserved specimen is pale yellow, but its internal anatomy and the arrangement of the ocelli agree perfectly with those of *D. crassus*, so far as could be determined. A detailed account of the anatomy and histology of this species may be found in Bürger's monograph of the Nemerteans of the Gulf of Naples (Fauna u. Flora, Monogr. 22).

The specimen collected at Porto Rico was about 20 mm. in length. The species is found in warm waters around the whole circumference of the globe. It is common in the Mediterranean and is reported from the British Channel, Madeira, Mauritius, Sanroa, Panama, and other tropical localities.

¹ This scarcity of nemerteans is even more striking in the collections of Professor Verrill at Bermuda, where but four species are recorded (Trans. Connecticut Acad., X, p. 596-598, 1900), and in the collections of Ehrhardt at Barbados, where Bürger found but two species (Zeits. f. wiss. Zool., LXI, p. 16-37, 1895).

2. *Tæniosoma delineatum* (Delle Chiaje).¹

Polia delineata Delle Chiaje. Memorie sulla storia e notomia degli animali senza vertebre del regno di Napoli. Naples, 1823-1829.

Eupolia delineata Hubrecht. Notes from the Leyden Museum, I, 1879.

This species was represented by a portion of a single small individual from Ensenada Honda, Culebra. This fragment includes about 25 mm. from the anterior end of the body and shows the characteristic structure and markings of the species.

Bürger (Fauna u. Flora von Neapel) records this species from Barbados, and Verrill² has collected it in the Bermudas. It is likewise found in the warm waters around the whole circumference of the globe—from the Mediterranean, South Atlantic, East Indies, Polynesia, etc.

3. *Tæniosoma discolor*, sp. nov.

Body of large size, rather stout, with rounded margins. One of the preserved specimens showed a conspicuous dorsal ridge, with a median groove running throughout its length.

Color.—There are no notes on the colorations of the living worms. The color of the preserved specimens is white, or grayish, with a broad, median band of darker color throughout the length of the dorsal surface. This darker band is about one-half the width of the body and appears to have been brownish or purplish in life. The sides and ventral surface were probably whitish in color.

Size.—The largest specimen was nearly a meter in length, about 8 mm. wide, and 5 mm. in thickness.

Ocelli.—The head contains numerous minute ocelli. These are arranged in two broad, irregular groups of 50 to 80 or more each on the antero-lateral margins of the head. A pair of very slight lateral grooves extend from the terminal proboscis pore (when the head is extended) along the lateral margins for a short distance. The groups of ocelli are situated on the dorsal sides of the grooves. A distinct annular groove, marking the division between the retractile snout and the parts immediately following, lies directly posterior to the groups of ocelli.

Habitat.—Ensenada Honda, Culebra, February, 1899. Two large, well-preserved specimens.

[Bürger³ describes, from a single, headless fragment, a species from Barbados which may possibly be identical with the above. This species (*Eupolia antillensis*) was 75 cm. long and 6 to 7 mm. wide. The dorsal surface of the preserved specimen was marbled brown, while the ventral surface and sides were yellowish white or gray. In its internal organization the species reveals the characteristic features of the genus.]

Cephalic glands.—In regard to the cephalic glands, nearly always so well developed in the group, *T. discolor* surpasses nearly all others in the magnitude to which these glands are developed. They not only fill up a large portion of the tissues of the head in front of the brain, but extend back of the mouth and some little distance into the oesophageal region. In the mouth region these cephalic glands are situated within the outer longitudinal muscular layer, and encroach so greatly upon the area of this layer that they actually occupy more space than is given to the muscular fibers themselves. Immediately dorsal to the mouth the glands lie directly outside the circular muscular layer, and form a mass which is, in section, four times as thick as the more superficially placed muscles of the outer longitudinal layer. On the sides of the mouth the glands are scattered irregularly among the fibers of the outer muscular layer. Behind the mouth they become gradually less voluminous, and disappear somewhat farther back. I have not seen that they discharge elsewhere than on the anterior end of the head.

Cutis.—The cutis glands also reach an enormous development. At the tip of the snout these glands are not sharply separated from the cephalic glands mentioned above, but a little way back they become separated into a sharply limited layer immediately beneath the fibrous layer of the integument. This layer of cutis glands is, in most regions, at least double as thick as the epithelial layer of the integument. Beneath the glandular layer lies the fibrous connective tissue layer of the cutis, of

¹In the Proceedings of the Washington Academy of Sciences (vol. III, p. 3, 4, 1901) I have given my reasons for adopting the generic name *Tæniosoma* (Stimpson) instead of *Eupolia* (Hubrecht), which is still used by most European writers.

²Trans. Connecticut Acad., X, p. 597, 1900. The species is here referred to *T. curtum*, but a number of specimens collected in the spring of 1901 undoubtedly belong to *T. delineata*. This further increases my conviction that the former is but a variety of the latter species.

³Beitr. z. Anat., Systematic u. Geogr. Verbreitung der Nemertinen. Zeits. f. wiss. Zool., LXI, p. 29, 1895.

varying thickness, but on the whole somewhat surpassing the glandular layer in volume. The muscular layers of the body walls are as in other species.

The œsophagus is surrounded with numerous blood spaces of larger area than in most species.

The *cerebral sense organs* are remarkably voluminous, and lie immediately behind, and in close contact with, the dorsal ganglia. Anteriorly they extend forward beneath these ganglia, and their anterior extremities lie externally in the angle between the dorsal and ventral ganglia. A small canal leads from the anterior extremity of each sense organ obliquely forward and opens to the exterior in a shallow groove on the ventro-lateral aspect of the body a little in front of the anterior portion of the brain. The buccal nerves are very large.

The proboscis is small, and the proboscis sheath short. The muscular and other layers in each are quite as in related species.

4. *Micrura leucopsis*, sp. nov.

A rather compact species, 50 to 100 mm. long and about 4 mm. wide. The head is marked off from the succeeding portions of the body, when contracted, by a narrow constriction extending entirely around the body. The head is variable in shape and is acutely pointed or broadly rounded, according to the state of contraction. The mouth is of large size; the lips are whitish in color. The cephalic furrows are of moderate length, reaching back to the annular constriction when contracted. The mouth lies a little farther back than the posterior ends of the cephalic furrows—not reaching forward to the annular constriction. The body is somewhat flattened both above and below, but the lateral margins are rounded. The caudal cirrus is colorless and of moderate size, or rather small. The proboscis is colorless, of moderate size.

Color.—As preserved in formalin the color is homogeneous slaty blue or purplish, with a tinge of gray, except on the head. The color of the head is similar to that of the body, but is clearer and not so grayish. The tip of the snout, both above and below, is pure white (at least after preservation in formalin). This white patch surrounds the proboscis pore and extends backward a short distance along the cephalic furrows. No ocelli could be found. It is possible that such are present, but could not be detected on account of the extremely dark and opaque color of the body. After standing 2½ years in alcohol the color is still as dark as after the first month.

Hucars: Four specimens, one of which is 100 mm. in length after preservation in alcohol.

In internal anatomy this species presents very few peculiarities. The great abundance of pigment, which gives the species its very dark color, is situated mainly in the cutis. It occurs also in lesser quantities in the connective tissue among the muscular fibers, and a considerable layer of it lies just external to the circular muscular layer.

The cutis glands are well developed, and extend as a thick layer well down into the outer longitudinal muscular layer.

The brain and cerebral sense organs are as in other species. The dorsal median nerve is conspicuous.

The nephridia reach forward to the mouth, but do not extend far back into the œsophageal region. The nephridial canals are small and profusely branched. There are several remarkably narrow efferent ducts on each side, opening on the dorso-lateral aspects of the body.

[*Lincus albonasus*, which Verrill has described from Bermuda (Trans. Connecticut Acad., x, p. 598, 1900), is widely different from the above, the two species agreeing only in having the tip of the head white in color.]

5. *Cerebratulus antillensis*, sp. nov.

As preserved in alcohol the head is pear-shaped and very much flattened; the body is much flattened and has thin edges. The cephalic furrows are long and deep, reaching a little farther back than the anterior end of the mouth. Mouth of moderate size. Proboscis pore subterminal. A conspicuous pit lies exactly terminal, and this is nearly, but not quite, reached by the cephalic furrows. As seen in microscopic sections this terminal pit represents a very highly developed frontal sense organ.

Color.—In formalin the color of the body is faintly reddish, mottled thickly with brownish on the dorsal surface. Under sides and anterior margins of head paler.

Mayaguez Harbor, Pt. del Algarrobo, in sand or mud, at a depth of 161 to 172 fathoms. One specimen, much broken. Length in life was probably 100 to 150 mm.

Several fragments of the same species, two of which have well-preserved heads, were taken in sand or mud at the entrance to Mayaguez Harbor in 12 to 13 fathoms.

The posterior portion of another specimen, probably of this species, was taken in the same harbor in sticky mud at a depth of $4\frac{1}{2}$ fathoms.

The internal anatomy of this species is closely similar to that of other species of the genus. A very highly developed frontal sense organ lies directly dorsal to the proboscis pore, as was mentioned above. This is situated directly between the anterior ends of the cephalic furrows and consists of a deep pit lined with specialized epithelium.

A broad blood lacuna lies in the anterior portion of the head. This divides a little farther back into two lateral lacunæ beside the rhynchodæum, as usual. Lateral and circum-oesophageal blood lacunæ as in other species. The dorsal vessel leaves the proboscis sheath a little way behind the nephridiopores, and therefore at about two-thirds the distance toward posterior end of oesophageal region.

The proboscis sheath has a very distinct inner longitudinal muscular layer and an outer layer of circular muscles.

The cutis glands are remarkably small and poorly developed. They do not reach one-fourth of the distance from the exterior to the circular muscular layer. The outer longitudinal muscular layer is much thicker than the two inner muscular layers combined.

The dorsal ganglia are very voluminous; they are nearly twice the diameter of the ventral. Each dorsal ganglion is divided posteriorly into two lobes, of which the upper, smaller lobe ends shortly, while the larger, ventral lobe continues directly into the cerebral sense organ. These sense organs are very highly developed; the canals communicating with the cephalic furrows pass at first to the internal ventral border of the sense organs, and then bend obliquely upward and outward to the lateral borders. Later the canal takes a curved course to the internal border again. Posteriorly the sense organs end blindly in the broad, lateral blood lacunæ.

The buccal nerves are large and conspicuous. The median dorsal nerve is very small.

Nephridia.—The nephridial canals are restricted to the middle third of the oesophageal region. The main canal on each side lies above the lateral blood lacuna in the angle between the proboscis sheath and the oesophagus, while a few branches pass ventrally and lie in contact with the circum-oesophageal blood spaces. A single pair of efferent ducts from near the posterior ends of the canals pass to the dorso-lateral aspects of the body, as usual.

Reproductive organs.—The genital products appear to be fully matured in January. The oviducts were then partially formed, and extended as rather wide tubes through the two inner muscular layers, but failed to penetrate far into the outer longitudinal muscular layer. The position of the oviducts is on the dorsal surface of the body and very near the middle line.

6. *Lineus albocinctus* Verrill.

Trans. Connecticut Acad., x, p. 598, pl. LXX, figs. 1, 1a, 1b, 1900.

The alcoholic specimen is short and thick-set, with short head, rounded body, and short cephalic furrows. Mouth just behind the posterior ends of the furrows. Color yellowish in alcohol, but gives no indication as to the original coloration, except that there is a series of narrow, transverse lines crossing the posterior portion of the body at fairly regular intervals. Proboscis slender, longer than the body when contracted, yellowish in alcohol.

Length of the contracted specimen 20 mm.; width 2 mm.

Ensenada Honda, Culebra. A more slender specimen from the same locality shows the transverse lines more distinctly, is more slender in shape, and has longer cephalic furrows.

While there remains the possibility that an examination of living individuals of these Porto Rican worms would reveal differences which would cause them to be separated from *L. albocinctus*, which Verrill has recently described from Bermuda, yet a comparison of preserved specimens from both localities indicates that they are specifically identical. The Bermuda specimens that I have seen were preserved in formalin and have retained well their original color, while in the alcoholic specimens from Porto Rico the color has almost disappeared. The Porto Rican specimens were considerably larger.

Professor Verrill's description of the living worms from Bermuda, is as follows: "Body not very long, slender, tapered posteriorly, a little flattened; head usually a little wider than body and more

depressed. Ocelli small, about 4 or 5 in single series on each side of the head. Lateral fosse large and long. Color dark, smoky-brown or nearly black, crossed by about 20 white rings, which become narrow white lines in contraction; neck usually with a wider white band; head with white edges and a median white dorsal spot. Under side whitish. Length, in extension, 35 to 50 mm.; diameter, about 1 to 1.5 mm. Low-tide, among corallines."

7. *Micrura* or *Lineus* sp.

A slender species with long, slender head, long cephalic furrows reaching back slightly farther than anterior end of mouth. Proboscis large in size and nearly as long as body of the worm. Length of the alcoholic specimen 140 mm.; body rather slender, with rounded margins.

One specimen with extruded proboscis from Ensenada Honda, Culebra. Two headless fragments from the same locality may be referred to the same species. The color of all the specimens has practically disappeared.

8. *Cerebratulus* sp.

The color of the single specimen, preserved in alcohol, has disappeared. Length of the body about 50 mm.; moderately slender, especially in the oesophageal region. The head is remarkably long, slender, sharply pointed, and flat. Mouth large; its anterior end reaches as far forward as the posterior ends of the cephalic furrows. Ensenada Honda, Culebra.