

This table is taken from Key West; my observations were at the Tortugas. There may be differences in the amount and the curve of variation in different places. But this would make but little difference in the result. I believe we may say with confidence that the annual growth of madreporine points in the Gulf is not more than $3\frac{1}{2}$ –4 inches per annum.

ART. X.—*Brief Contributions to Zoology from the Museum of Yale College.* No. XXXIII.—*Results of Dredging Expeditions off the New England Coast in 1874*; by A. E. VERRILL.

IN the last number of this Journal a general statement was made of the operations in connection with the U. S. Fish Commission, located during the summer of 1874 at Noank, Connecticut, on Fisher's Island Sound, and close to the eastern end of Long Island Sound.

In the following article only a brief summary of the results can be given; the full details will eventually appear, however, in the report of the Commissioner.

The total number of recorded stations, where dredgings were made during the summer, is 180, but many others, not registered, were made by members of the party. A large number of additional localities along the shores and in the shallow waters of the harbors were explored by hand nets and otherwise with excellent results. Temperatures were not taken at all the dredging localities, and therefore, in the accompanying table, such localities have been, for the most part, omitted.

The localities dredged may be conveniently grouped as follows:

a. Fisher's Island Sound, mostly hard gravelly and stony bottoms, often rocky, and occasionally with some sand or mud, the depth varying from 4 to 15 fathoms. The tidal currents were rather strong and the bottom temperatures were low (usually 61° to 65° F.).

b. Block Island Sound, including a wide region from off Point Judith, R. I., to Race Point, at the western end of Fisher's Island; the depth varying from 5 fathoms or less to upwards of 40 fathoms, near Race Point (No. 45). The currents are strong, especially toward Race Point, and the temperatures are low (56° to 64°). The bottom is generally gravelly, stony, or sandy, occasionally rocky, and but seldom muddy. An extensive "scollop-bank" (*Pecten tenuicostatus*) occurred in 18 to 22 fathoms, south of Watch Hill, where many interesting species were found, among which was *Leptasterias compta*.*

* This species, when living, is of a beautiful violet color (rarely brownish). Occasionally there are six rays. It is a delicate and rather fragile species, the

c Off Block Island and south of Montauk Point, L. I., including various fishing banks or "ledges," among which is Coxe's Ledge, about 18 to 20 miles east-southeast from Block Island. Among these localities there are both hard gravelly and muddy bottoms, and some that are sandy. The greatest depths were 32 to 34 fathoms, muddy, about 10 miles southeast from Block Island (Nos. 161, 162); and 25 fathoms, sandy, about 11 miles southeast from Montauk Point (No. 116). Throughout this region the bottom temperatures were found to be low ($45\frac{1}{2}^{\circ}$ to 57°), and the fauna correspondingly arctic.

d. The eastern part of Long Island Sound, from Fisher's Island and Gardiner's Island to the mouth of the Connecticut River, the depths varying from 3 or 4 to 50 fathoms, the deepest water occurring a few miles west of Race Point (see Nos. 35, 36, 45, 46), where the tidal currents are very strong and the bottom rocky. The bottoms are variable, but mostly stony or gravelly, and not unfrequently more or less muddy, while the temperature in all the deeper localities was low (58° to 62°) and the fauna arctic.

e. Shallow water localities in the harbors and estuaries near Noank, Stonington, etc. The bottoms are generally muddy and mostly thickly covered with eel-grass (*Zostera marina*).

f. Gardiner's Bay, Long Island. The localities were mostly sandy; the depths 3 to 10 fathoms; and the bottom temperatures were higher (64° to 68°) and the fauna more southern than in the more open sounds.

g. Great Peconic and Little Peconic Bays, and Greenport Harbor, L. I. In these localities the temperatures were much higher (71° to $72\frac{1}{2}^{\circ}$) than those of the other localities examined, and the fauna was very decidedly southern, including some species not before observed north of Florida and South Carolina. In Little Peconic Bay the bottoms were mostly sandy and shelly (mainly *Crepidula fornicata*, both dead and living), and the depths were 4 to 13 fathoms. In Great Peconic Bay the water was shallow, 4 to 6 fathoms, and the bottoms muddy and rather barren in all the localities examined.

As the faunæ of the various kinds of bottoms and shores, both of the bays and harbors and of the outer cold waters, have been fully described, and most of the species enumerated by me, in a recent work,* it will not be necessary to give, at this time, more than a summary of those species not included in

rays easily becoming detached. Hundreds of specimens of this hitherto rare species were obtained at this locality. At this place two fishes (a species of *Liparis* and a young hake, *Phycis*) were often found in the gill-cavity of the Pectens with *Pinnotheres maculata*.

* Report on the Marine Invertebrates of Southern New England; Appendix of 1st Report of the U. S. Commissioner of Fish and Fisheries, 1874: also a separate edition.

that report, and now for the first time recorded from the southern coast of New England.

It may, however, be well to state that the fauna of the localities included under the groups *a*, *b*, *c* and *d*, is nearly identical with, though a little more arctic than, that of the outer waters off Martha's Vineyard and Cuttyhunk Island, described in the report referred to; while that of the localities under *e*, *f* and *g*, is essentially the same as that of Vineyard Sound and the estuaries and harbors connected with it, as described in the same work, though the fauna of the Peconic Bays is a little more southern than that of Vineyard Sound or Wood's Hole.

List of species new to the fauna of Southern New England.

In this list I have included, also, a few species added to the fauna during excursions from New Haven, by myself and others, though not obtained during the explorations by the Fish Commission. A few species, marked (*), not new to the fauna, have also been introduced in order to confirm the localities, or to correct the nomenclature. But numerous species, especially of Crustacea and Sponges, added to the fauna last summer, are here omitted, because not yet sufficiently studied. Many of them are undescribed.

Arachnida.

Pycnogonum littorale Müller = *P. pelagicum* Stimpson. West of Race Point, 50 fathoms (Nos. 35, 36).

Thalassarachna Verrillii Packard. Low water and just below, and in pools, among eel-grass, ascidians, hydroids, etc.

Crustacea.

The Crustacea have been identified by Mr. S. I. Smith.

**Hyas coarctatus* Leach. Coxe's Ledge, 21 fathoms; Block I. Sd. (Nos. 85-90).

Dexamine Thea? Boeck. Noank Harbor, among eel-grass.

Melita dentata Boeck. Off Fisher's Island, 9 fathoms; off Watch Hill, 18 fathoms; off Race Pt., 42 fathoms.

Melita, sp. nov. East-southeast 10 miles from Block Island, 32 fathoms, muddy; off Isles of Shoals, N. H., 35 fathoms.

**Ampelisca macrocephala* Lilj. = *Ampelisca*, sp., Smith in Report on Invert., p. 561, pl. iv, fig. 17. Off Buzzard's Bay, 29 fathoms, 1871.

A. typica Boeck. Fisher's I. Sd., 17 fathoms; Block I. Sd., 17 to 19 fathoms (Nos. 74, 75); off Saybrook, Conn.; Noank, among eel-grass.

A. limicola Bate (Stimpson sp.). Noank Harbor, among eel-grass and mud, common; Fisher's I. Sd., 3 to 6 fathoms, sandy.

Ampelisca, sp. nov. Fisher's I. Sd., 7 to 9 fathoms; Block I. Sd., 17 to 19 fathoms (Nos. 74, 75); off Martha's Vineyard, 23 fathoms, 1871.

Xenoclea megachir Smith. Trans. Conn. Acad., 1874. Off Watch Hill, 18 fathoms.

**Hyperia medusarum*. Off New Haven; Noank; Vineyard Sound, and northward, on *Cyanea* and other jelly-fishes.

H. spinipes Boeck. Vineyard Sound.

Several other species of Amphipods, not yet determined, were obtained.

Anilocra, sp. New Haven, in mouth of *Loligo* (Clark).

Tanais vittatus Lilj. Noank Harbor, on piles at low water, and among eel-grass.

Other species of Isopods occurred, among them a curious new species allied to *Paranthura*, from off Watch Hill, 18 fathoms.

Argulus, sp. On *Fundulus pisculentus*, Noank, etc.

Several undetermined species of Lernæans occurred on the sturgeon, drum-fish (one in the gill-cavity and another on the skin and fins), orange file-fish, skate, etc.

Balanus porcatus Costa. Off Watch Hill, 18 fathoms; Long. I. Sd., 24 to 50 fathoms, off Race Point, (Nos. 35, 36, 47).

Annelida.

Sthenelais, sp. nov. Various localities in Block I. Sd.; Fisher's I. Sd.; and Long. I. Sound, 10 to 40 fathoms, on sandy bottoms.

Pholoe minuta Malmgren. Block I. Sound, 17-21 fathoms, mud.

Nephtys caeca Malmgren. Off Stonington, 4-5 fathoms, Aug. 16.

Phyllodoce Grænelandica Ersted. Fisher's Island Sound, 12-14 fathoms.

Procerea gracilis Verrill. Noank Harbor.

Eusyllis lucifera Verrill, sp. nov.* Noank, on piles, and eel-grass, July 11-31.

Syllis pallida Verrill, sp. nov.† Plate III, fig. 6. Noank Harbor, Aug. 15-17.

Syllis, sp. A yellowish white species, with broad obtuse palpi, and moniliform antennæ and cirri; Block Island Sound, 17-21 fathoms, Aug. 21.

Lumbriconereis obtusa Verrill. Noank Harbor, 1-1½ fathoms, mud and dead eel-grass, July 8.

L. acuta Verrill, sp. nov.‡ Off Block Island, 14 fathoms, Aug. 19.

Ophelia denticulata Verrill, sp. nov.§ Off Block Island, 14 fathoms, Aug. 19.

Arenicola marina Malmgren. In sand at low-water on a beach about 3 miles west of Noank, July 9.

Trophonia aspera Stimpson.

Brada, sp. Block I. Sound, 17-24 fathoms.

Polydora, sp. Burrowing in dead shells of *Pecten tenuicostatus*; off Block Island; Block I. Sound, 18-21 fathoms.

Polydora, sp. Noank Harbor, 1-1½ fathoms, mud and dead eel-grass.

Praxilla, sp. Off Sea-flower Reef, 6-9 fathoms, sand.

Ancistria capillaris Verrill. Off Block Island, 15-20 fathoms, mud.

Cistenides granulata Malmgren. Long I. Sound, off Race Point, 50 fathoms.

Thelepus cincinnatus Malmgren. Coxe's Ledge, 20 fathoms, sand and gravel.

Polycirrus, sp. A bright red species, with brilliant blue phosphorescence. Off Watch Hill, 18-22 fathoms; Coxe's Ledge, 20 fathoms; Bay of Fundy, low-water to 50 fathoms.

* *Eusyllis lucifera* Verrill, sp. nov.

Body rather slender, about 18mm. long; head broader than long, emarginate behind, wider and broadly rounded in front, eyes rather large, the anterior pair a little wider apart than the posterior; palpi broad and short, about one-third as long as the head, blunt or obtusely rounded in front; antennæ stout, tapering, the median considerably longer and larger than the lateral, about equal to twice the breadth of the head; tentacular cirri, like the antennæ and dorsal cirri, transversely wrinkled, the upper ones about equal to the median antennæ, the lower ones a little smaller; dorsal cirri of the first segment longer than the antennæ, the length exceeding three times the breadth of the head; cirri of the two following segments less than half as long; those on the fourth longer and on succeeding segments generally alternately longer and shorter, but mostly less than half the diameter of the body. Color yellowish white, with a dark intestinal line. Phosphorescent with a bright green light.

† *Syllis pallida* Verrill, sp. nov. Plate III, figure 6.

Body slender, tapering to both ends, about 15mm. long and .5 to .75mm. broad. Head small, length about equal to breadth, rounded behind, produced in front, with a slight antero-lateral angle on each side; palpi large, elongated, lanceolate, obtuse at tips; eyes small, the anterior very wide apart. Antennæ and cirri rather short, distinctly annulated or moniliform; the median antenna largest; dorsal cirri variable in length, or alternately longer and shorter. The longer ones about one half longer than the breadth of the body, composed of 17 or 18 annulations. Color white, with a yellowish intestinal line posteriorly. None of the setæ have setiform tips.

‡ *Lumbriconereis acuta* Verrill, sp. nov. Plate III, fig. 5.

This is a slender species, easily distinguished by its very long acute head, which is about three times as long as broad. The lateral appendages are short, with a short obtuse upper lobe.

§ *Ophelia denticulata* Verrill, sp. nov.

Body long and round; 9 anterior segments with short setæ; 18 with slender tapering branchiæ, denticulate on the front edge; 5 caudal segments with long setæ; anal segment with 16 to 18 slender acute papillæ, and two larger lanceolate ones below. Length, 70mm.; diameter, 6mm.

Pista cristata Malmgren. Long Island Sound, off New London, 8 fathoms, mud and sand (loc. 17), July 17.

Chone, sp. North of Block I., 18–24 fathoms, mud and sand, Aug. 6; Coxe's Ledge, 21 fathoms.

Filigrana implexa Berkeley. Fisher's I. Sound; Coxe's Ledge, 21 fathoms.

Spirorbis nautiloides (?) Lamarck. Fisher's I. Sound; Coxe's Ledge, 21 fathoms.

Spirorbis, sp. Shell bicarinated. With last.

Bdellodea, Gephyrea, etc.

Ichthyobdella, sp. Parasitic on sculpin (*Cottus*, sp.), Thimble Islands, May, 1874. Whitish, with reddish intestinal lines.

Chaetoderma nitidulum Loven. Off Block I., 32–34 fathoms, mud (loc. 161, 162.)

Tristoma laeve Verrill,* sp. nov. Block I., in mouth of bill-fish.

T. cornutum Verrill.† Block I., on gills of bill-fish (*Tetrapturus albidus*).

Nitzschia elegans Baer. On gills of sturgeon (*Acipenser oxyrhynchus* Mitchel).

Turbellaria.

Lineus viridis V. = *Nemertes viridis* Verrill, Rep. on Invert., p. 628. Noank, low water and 1 fathom, mud.

Tetrastemma dorsalis McIntosh. Noank harbor, on eel-grass and in 1–1½ fathoms, mud, July 8; Casco Bay.

T. elegans Verrill (= *Hecate elegans* Girard). Fisher's Island Sound.

Body about 14mm. long, slender, depressed, tapering to tail; head wider than neck, obtuse or emarginate; eyes conspicuous, nearly in a square, the anterior ones a little nearer together than the posterior. Color of body light yellow, with a broad band of deep brown on each side, leaving a wide dorsal stripe. A pale yellow variety (?), from Noank harbor, has the lateral bands rather ill-defined, consisting of more or less separated specks.

T. candida (?) Ersted. Noank harbor, 1–1½ fathoms, mud; Casco Bay.

Amphiporus bioculatus McIntosh. Noank harbor, 1–1½ fathoms, mud, July 7; Fisher's I. Sd., 7 fathoms, mud and sand.

A. hastatus McIntosh (?). Block I. Sd., 18–45 fathoms, Aug. 6.

Cephalothrix linearis Ersted. Noank harbor, 1–1½ fathoms, mud and eel-grass; Casco Bay, low water.

Gastropoda and Lamellibranchiata.

**Scalaria Grœnlandica*. Block Island Sound, 17–24 fathoms, Aug. 6.

Velutina lævigata. Off Watch Hill, 18–20 fathoms.

**Stylifer Stimpsonii* Verrill. Block I. Sound (Nos. 85–90), 6–15 fathoms.

**Tonicella marmorea* Carpenter. (*Chiton marmoreus* Gould.) Off Block Island.

Philine quadrata. Off Montauk Point, 20–25 fathoms, sand (Nos. 115, 116).

Montagua Bostoniensis (Cauthouy, sp.). South of Fisher's Island, 32 fathoms, Aug. 11 (No. 91); off Montauk Point, Aug. 13 (No. 14).

Embletonia fuscata Gould; also var. *remigata* and var. *lanceolata* (Gould). Occurs of all shades of color, from pale flesh-color to dusky brown. Piles at Noank, common on hydroids.

* *Tristoma laeve* Verrill, sp. nov.

Length about 15mm., very thin, and broad elliptical; anterior end somewhat produced and broadly rounded; posterior end emarginate; dorsal surface smooth; lower with minute granule-like papillae. Color white, translucent. Posterior sucker large, about a third of the breadth of the body, campanulate, the central area large, with seven angles, from which seven lines radiate; the edge is divided into very numerous denticles; anterior suckers also large, about one-half as broad as the posterior, separated by a space less than their diameter.

† *Tristoma cornutum* Verrill, sp. nov.

Body thin, broad elliptical, or oblong, emarginate posteriorly; anterior end narrowed, produced, and with a short, tapering, tentacle-like process at each angle; upper surface with minute rounded granules and small scale-like wrinkles; smooth beneath. Posterior sucker small, less than one-fourth the breadth of the body, its border divided into much fewer and larger teeth than in the preceding species; anterior suckers two-thirds as broad as the posterior, nearly two diameters apart. Color light red or flesh-color.

Doto formosa Verrill, sp. nov.* Off Point Judith, 10–14 fathoms, Aug. 19.

Idalia modesta Verrill, sp. nov.† Off west end of Fisher's Island, Aug. 25, 1874, on sandy and muddy bottom; Block Island Sound, 17–24 fathoms, Aug. 6; north of Little Gull Island, 40 fathoms (No. 19).

Entalis striolata Stimpson. Off Block Island, 20–25 fathoms (115, 116).

Thracia myopsis. West of Fisher's Island, 7–9 fathoms, Aug. 25.

Tunicata.

Amarœcium glabrum Verrill. Off Block Island.

Bryozoa.

* *Discoporella verrucaria* Smitt = *Diastopora patina* Verrill, in Report on Invert. S. N. E., 1873. Fisher's Island Sound.

* *Tubulipora serpens* (irregular variety) = *T. flabellaris* Verrill, in Report on Inv.

Alcyonidium, sp. A smooth red species, incrusting shells. Off Watch Hill, 18–22 fathoms, on shells of *Pecten*; Casco Bay; Bay of Fundy.

Bicellaria ciliata Blainville. Fisher's I. Sound, 8–12 fathoms; Bay of Fundy, 10 to 30 fathoms; off Gay Head, 19 fathoms.

* *Biflustra tenuis* V. = *Membranipora tenuis* Desor; Verrill, in Report on Invert., p. 712. Low-water to 40 fathoms.

Membranipora unicornis Flem., and var. *Americana* (D'Orb.). New Haven, on algæ, etc.; Fisher's I. Sound; Block I. Sound; Casco Bay; Bay of Fundy, etc.

* *Cribrilina puncturata* Smitt. Plate III, fig. 2, = *Escharipora punctata* V., in Rep. on Invert., p. 713. New Haven, Noank, etc.

Porina ciliata Smitt. New Haven, on red algæ; Thimble Islands; Fisher's I. Sound; Vineyard Sound, 5–8 fathoms, on shells of *Mactra*.

Escharella pertusa ? † Fisher's I. Sound; Block I. Sound; eastern end of Long I. Sound, 8–40 fathoms; Bay of Fundy.

Hippothoa biapertura Smitt. § New Haven, on red algæ; Thimble Islands, in pools; off Watch Hill, 3–5 fathoms; Vineyard Sound, abundant.

H. reversa V., sp. nov. || Off Gay Head.

Eschara verrucosa, var. *propinqua* Smitt. Off Buzzard's Bay, 25 fathoms; Nantucket Shoals, abundant; Bay of Fundy, etc.

* *Doto formosa* Verrill, sp. nov. Plate III, fig. 4.

Dorsal papillæ about 8 on each side, stout, ovate, narrowed at base, covered with numerous short, obtuse or rounded, small, white-tipped papillæ. Tentacles slender, the sheaths funnel-shaped, obliquely truncated, with slight emarginations in front and on the outer side. Body translucent white; tentacle-sheaths and dorsal papillæ covered with flake-white specks. Length about .5 of an inch.

† *Idalia modesta* Verrill, sp. nov. Plate III, fig. 3.

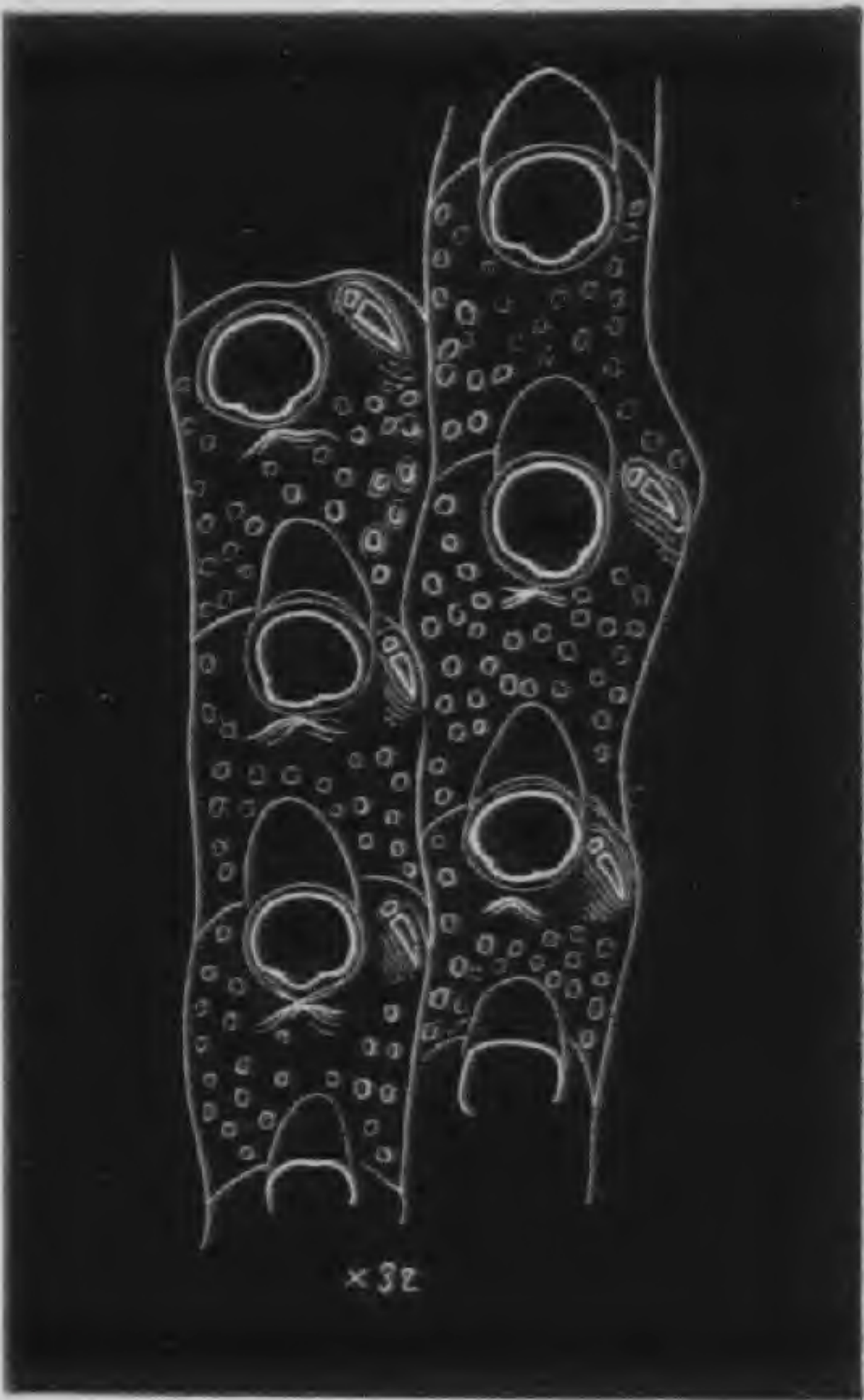
Body oval, very convex. Tentacles long, about equal to breadth of body, slightly serrate or wrinkled; obtuse; cirri at their bases about half as long, very slender, with acute white tips. Branchiæ about 12, rather long, pinnate; two slender cirri close together, behind the bases of the gills on each side; four much smaller conical papillæ in a row on each side. Color of back and branchiæ deep orange-brown, mottled with yellowish and greenish white. Length about .5 of an inch.

‡ This species has large zoœcia, with numerous coarse pores; œcia large, sub-globular, roughened with prominent granules, and perforated by small pores; apertures with a broad shallow sinus, and small lateral denticles within; avicularia lateral, rarely present, opposite the side of the aperture, broad, obtusely rounded, the point directed toward the aperture.

§ To the genus *Hippothoa*, as limited by Smitt in his recent work on Florida Bryozoa, belong *Escharella variabilis* and *Mollia hyalina* of my Report on Invert. of Southern New England. The former is very nearly allied to, if not identical with *H. Isabelleana* of Smitt, Florida Bryozoa, p. 44, plate VIII, figs. 166–168, 1873.

|| *Hippothoa reversa* Verrill, sp., nov. Plate III, fig. 1. Zoœcia oblong, the front perforated with scattered pores of moderate size; apertures rounded, with a shallow rounded sinus; a small mucro is often present in front of the aperture; avicularia narrow, elongated, acute, somewhat curved, raised above the level of the zoœcia, the point most raised, and directed outward and backward.

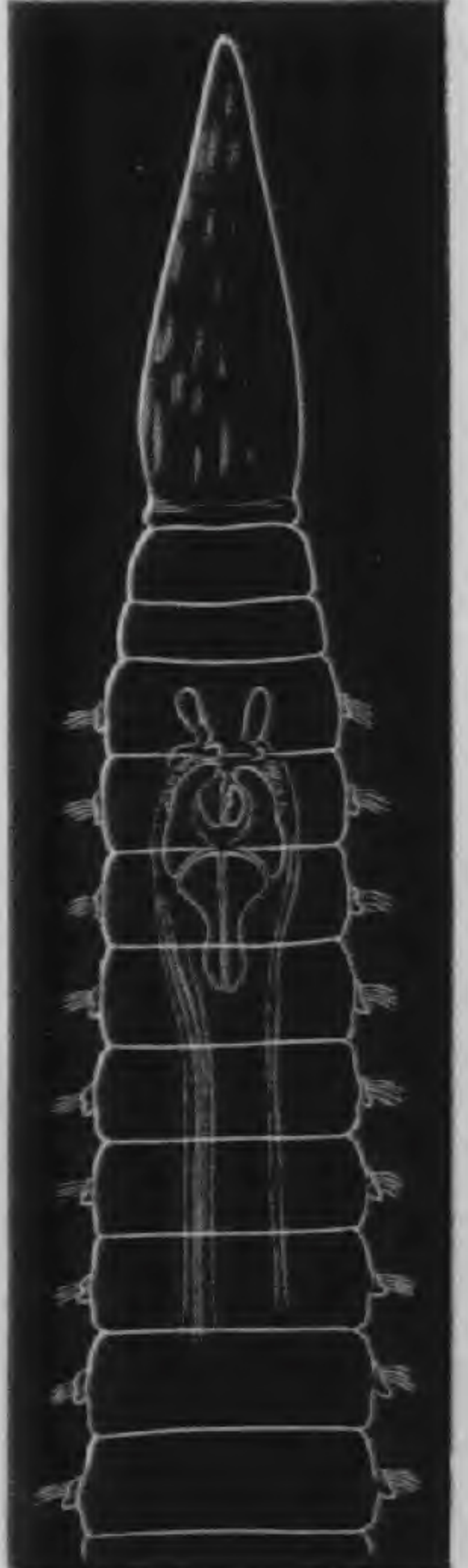
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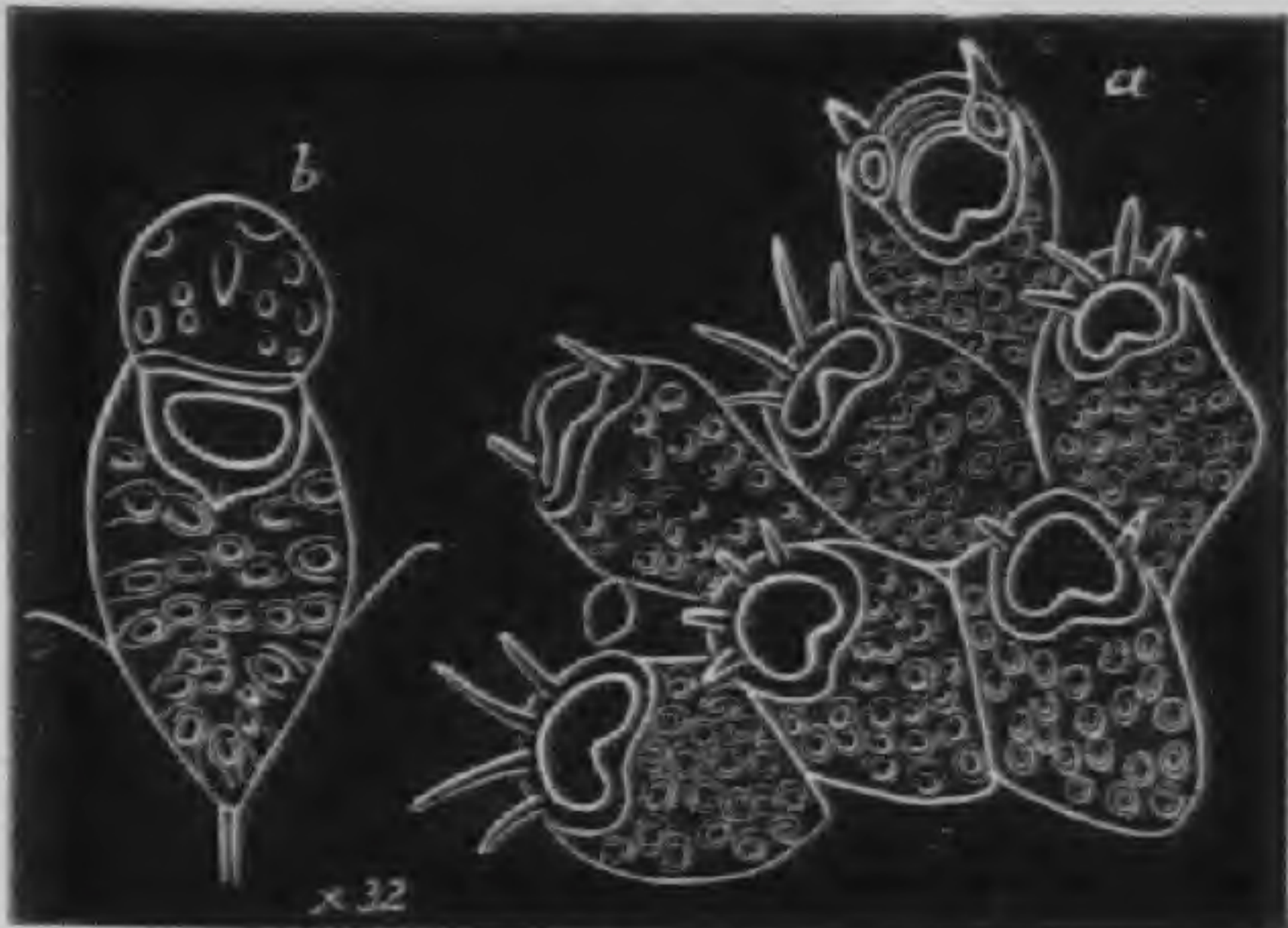
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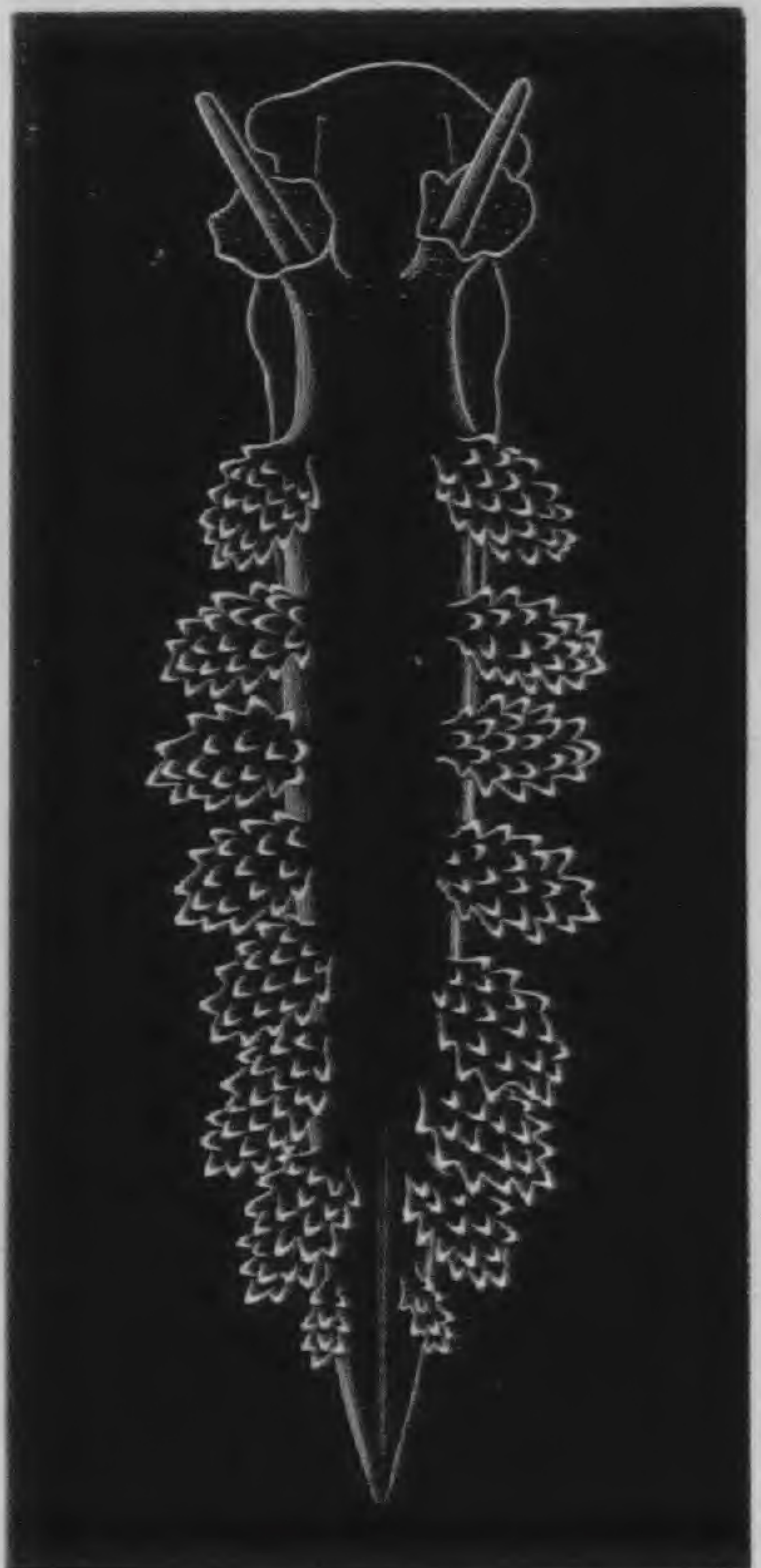
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