

ART. XIII.—*Descriptions of the two genera of tubicolous Annelids, Paravermilia and Pseudovermilia, with species from Bermuda referable to them*; by K. J. BUSH, Ph.D.

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THESE two genera, *Paravermilia* and *Pseudovermilia*, are most readily recognized by the greater or less development of the thoracic membrane and by the form of the terminal tooth on the uncini. Both have bulbous opercula with horn-colored chitinous caps; both have simple, regularly tapered setæ on the thorax, becoming more or less angular and bent on the abdomen; both have somewhat similar shaped uncini.

PARAVERMILIA Bush 1905.

Harriman Alaska Expedition, XII, pp. 221 and 223, 1905; this Journal, p. 54, 1907.

Species of good size are found at Bermuda, usually in dead coral, which agree in having a good sized bulbous four-sided operculum protected by a horn-colored chitinous end varying in form and composed of a number of pieces fitting closely one above the other; the peduncle attached to one side of the base on a line with the front wall is rounded, much annulated, and often curved in contraction.

Branchial lobes in the form of rather stout, more or less elongated, rounded stems, bear rather stout, about equal branchiæ arranged in a semi-circle; crowded pinuæ abruptly decrease in length near the end of the rachis leaving a conspicuous oblanceolate or somewhat club-shaped terminal portion varying in length in preservation, probably extensile in life, the cells on the inner surface of the shorter ones being much crowded.

Thoracic membrane conspicuously developed, forming a deep, much ruffled, 3-lobed collar, deepest in the middle, with very large angular side lobes often overlapping medially, extending backward along the sides as a conspicuous border diminishing more or less abruptly between the 5th and 6th fascicles of setæ, not produced posteriorly. Seven fascicles of setæ at the end of six tori on the thorax. Setæ long tapered blades with slender lash-like ends, in the posterior bundles a few with broader more curved blades with broader serrate ends, on the collar a few inferior capillary ones resembling the slender ends of the superior ones. The uncini form a single series along the posterior border of separate rectangular membranous areas successively increasing in size. They are narrow or thin in front view with one series of striated teeth which in profile are sharp,

appressed, above one large truncated, more prominent, terminal one; abdominal uncini much smaller. Abdominal setæ more or less curved or bent, with elongated, regularly tapered, somewhat angular blades; hair-like along caudal region.

The rounded, more or less thickened tubes taken from dead coral seldom show any distinguishing characters. Roughened by irregular lines of growth and occasional resting stages, a few show a varying number of longitudinal lines or carinæ.

Each species, however, can be readily identified by the form of the horn-colored cap on its operculum, the other characters appearing to differ only relatively.

The generic name *Paravermilia* was proposed for this group of species, with *P. bermudensis* as type.

PARAVERMILIA BERMUDENSIS Bush 1905.

Nine tubes of moderate size were found in 1898 and 1901, dredged in 30-40 feet in Great Harbor and other localities at Bermuda. They were taken usually from dead coral but occasionally were attached to mollusks, forming an irregularly twisted mass. The surface is sometimes ornamented with five conspicuous, longitudinal carinæ, the two outer ones usually the largest.

The species can be readily recognized by the good-sized bulbous operculum on its long, rounded, much annulated peduncle, capped by an elongated horn-colored chitinous cone which is asymmetrical and usually much curved, a few only having the cone erect. This cone, resembling a tiny spiral shell, is made up of numerous saucer-shaped pieces diminishing in size to the minute rounded tip, and are defined by darker rings sometimes numbering twelve; some are occasionally wanting on the end. The erect cone is shorter, made up of longer fewer pieces shown by a less number of rings; these may be designated as variety *minor*.

The branchiæ, about 12 in each lobe, are usually too much curled to determine their length; those of one animal are extended and appear equal to about the length of the thorax and are folded closely around the peduncle with the entire operculum exposed.

Thoracic membrane very delicate, excessively developed, the angular side lobes folding over each other enwrapping the body. Teeth on uncini sometimes numbering 18; caudal, hair-like setæ exceedingly long.

PARAVERMILIA INTERMEDIA sp. nov.

Three animals, smaller than *P. bermudensis*, often light olive-green in color, have from 10-12 branchiæ in each lobe and about 16 teeth on the largest thoracic uncini.

The operculum has the asymmetrical horn-colored cap, shorter and broadly rounded at tip, made up of but three unequal saucer-shaped pieces below the good-sized bulbous end-piece.

The small tube has five, unequal, rather fine, rounded longitudinal threads.

PARAVERMILIA AMBLIA sp. nov.

Five specimens about the size of *P. bermudensis* have 14-16 branchiæ in each lobe and the thoracic membrane very excessively developed. The large, sometimes cylindrical, operculum has a comparatively short, broadly rounded, symmetrical, light horn-colored cap of one or two convex or dome-shaped pieces covered by a very large, elongated, broadly rounded end-piece. Occasionally one occurs in which the pieces decrease in diameter; the cap tapered.

PARAVERMILIA ANNULATA (Schmarda).

Vermilia annulata Schmarda, Neue Wirbellose Thiere, II. p. 28, text figure and pl. XXI, fig. 176, 1861; non Ehlers, Blake annelids, p. 308, pl. 58, figs. 12-16; pl. 59, figs. 1-3, 1887; ? non Augener, Westindische Polychæten, p. 184, 1906.

Placostegus annulatus Mörch, Revisio Serpulidarum, p. 422, 1863.

? *Vermilia annulituba* Augener, op. cit., p. 185, pl. 8, figs. 153-161.

Seven specimens taken from dead coral from Castle Harbor, Bermuda, are larger than any of the preceding forms, the largest one with much curled branchiæ measuring about 22^{mm}. There are from 12-14 branchiæ in each lobe and 16 teeth on the largest uncinus.

The horn-colored chitinous cap of the operculum is concave on the end, being composed of two or three saucer-shaped pieces, destitute of an additional convex end-piece found in the other species. It is very like Schmarda's figure and description and also the figure given by Augener as *Vermilia annulituba* found north of Martinique in 210 fathoms.

The thoracic membrane in this very much larger species is not clearly defined, especially in the figure, and the terminal tooth on the uncinus is represented as bluntly rounded. Schmarda's figure also is not sufficiently clear for definite comparison.

The two animals found off Cuba in 292 and 310 fathoms, described and figured by Ehlers under Schmarda's name, on comparison were found to differ not only from this species but also from each other. Through the courtesy of Dr. Woodworth of the Museum of Comparative Zoology, these specimens have recently been examined and found to be two distinct species referable to two different genera.

One (No. 809), from 292 fathoms, described and represented in figure 13, plate 58, has an asymmetrical tapered segmented cone on the operculum, the end broken off, very closely related to, if not identical with, *P. intermedia* from Bermuda. The branchiæ are described as numbering 20 or 21 in each lobe but are represented as about half that number. The operculum of the other (No. 1,223) from 310 fathoms is not quite accurately shown in figure 14, an important line through the middle being omitted. The chitinous end is composed of two parts; a lower saucer-shaped piece with raised center on which rests a second cup-shaped piece with slightly convex top and upright flaring rim. This bears some resemblance to the chitinous opercular end found in species of *Pomatostegus*, but the peduncle shows no trace of side appendages characteristic of that genus. Unfortunately the specimen has become much dried so that important characters cannot at present be determined with sufficient accuracy to reveal its generic position.

PSEUDOVERMILIA Bush 1907.

This Journal, p. 54.

Three species, two from Bermuda (*Spirobranchus occidentalis* McIntosh, 1885, and an undescribed one) and one from the southern coast of Patagonia (*Vermilia nigropileata* Ehlers, 1900-'01), have a small, more or less elongated bulbous operculum gradually expanding from a long, slender, rounded peduncle becoming flattened and broadened distally, protected by a dark horn-colored (appearing as black) chitinous end differing in form; no thoracic membrane, i. e., no free border along the sides and posteriorly, but a well-developed 3-lobed collar; 7 fascicles of setæ and 6 short tori in straight series on the thorax; simple regularly tapered setæ, those on the abdomen bent and broadly angular at base, hair-like along caudal region; uncini with numerous appressed teeth, the terminal one large with notched or bifid end. No genus being known which includes all of these characters, the name *Pseudovermilia* was proposed with *occidentalis* McIntosh as type.

Branchial lobes more or less elongated, free, slightly spiral in retraction, rachis-like with few branchiæ on one side, not extending the entire length, leaving a small tapered end. Collar of about uniform depth, full, sometimes rolling, rounds abruptly on a line with the first torus, meeting along the median line of the thorax, with an incision or cleft on each side dividing it into three about equal parts or lobes with rounded ends. Setæ nearly colorless, rather stiff, with comparatively short abruptly tapered blades, those in the collar fascicle the shortest with a few capillary inferior ones. Un-

cini irregularly trapisiform with a number of sharp appressed teeth, the last one long, blunt and notched (bifid) on the end, those on the abdomen smaller and thicker, the notch on the end tooth not always discernible.

Tube conspicuously ornamented or sculptured when mature and perfectly developed, often marred by erosion, more or less spreading along the sides and attached the entire length (rarely lifted), the high median keel often prolonged as a spine-like projection at the aperture.

PSEUDOVERMILIA OCCIDENTALIS (McIntosh) Bush.

Spirobranchus occidentalis McIntosh, Challenger Report, XII, p. 429, pl. IV, fig. 10, pl. xxix a, figs. 31-2, 1885.

Pseudovermilia occidentalis Bush, this Journal, p. 54, 1907.

This species, recorded by McIntosh from off Bermuda in 435 fathoms attached to an echinoderm, is also found along the shores of Bermuda on the underside of the hat-coral (*Agaricea fragilis*) and other hosts.

It forms highly ornamented tapered tubes, usually isolated, variously curved and twisted, usually attached their entire length, thickened when mature and spreading along the sides with a high, conspicuous, dorsal keel often forming a spine-like projection at the aperture; conspicuously elevated transverse lines radiate from this ridge, arranged at first in herring-bone fashion beyond which they become irregularly curved; a small rounded thread rendered nodulose by the transverse ornamentations, separates the two series and a similar but less developed one sometimes appears just below the dorsal keel. This characteristic sculpture is often obliterated by erosion and the young seldom show any trace of the transverse lines, so that as a determining specific factor the tubes are of little use.

Animal is slender, rounded, the forty (40) or more segments defined only by series of uncini on the abdomen widely separated along the median portion, becoming crowded posteriorly.

Branchiæ long with very long slender crowded pinnæ abruptly decreasing in length, forming a broad truncated tip, 6 in each lobe. Operculum with a somewhat thickened slightly concave disc-like dark brownish horn-colored (appearing as black) chitinous end, having a long, sharp, thorn-like spine near one side, often irregularly bent. One operculum shows the end in the act of slipping off, revealing another disk beneath. Uncini with about 13 teeth, the last large and notched on the end; well figured by McIntosh.

The genus *Spirobranchus* to which McIntosh referred his species differs not only in having a calcareous end on the

operculum ornamented with antler-like spines, but has very strongly marked collar setæ.

The species described by Marion and Bobretzky from Marseilles and by Saint-Joseph from Cannes (see this Journal, p. 57) have a similar thorn-like projection on the operculum cap but the cap itself is elongated and composed of several pieces.

PSEUDOVERMILIA PILEUM sp. nov.

This species is very common along the shores of Bermuda. The tubes, similar to *P. occidentalis*, are found also on the hat-coral and on various shells (*Arca Adamsii*, *Turbo (Livona) picta*, *Astrarium longispinum*, *Chama bermudensis* and others). When uninterrupted in its development it has three prominent nodulose carinæ on top (one large keel-like median and two smaller lateral ones) separated by two deep grooves below which are conspicuous curved transverse lines. Young tubes invariably have three carinæ but seldom show any indications of the transverse sculpture.

The species is readily distinguished by its larger, more elongated operculum, having an elongated, asymmetrical, irregular, dark horn-colored (blackish) chitinous cone-like end, resembling a liberty-cap. The branchiæ number 7 in each lobe and the setæ appear broader and more abruptly tapered and the teeth on the uncini more numerous than in the preceding species. One smaller animal without an operculum has 9 branchiæ in each lobe.

The *P. nigropileata* Ehlers* is a closely related species with the opercular cone more symmetrical and larger.

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* Magellanische Anneliden, p. 222, 1900; Die Polychæten des Magellanischen und Chilenischen Strandes, p. 219, pl. xxv, figs. 14-23, 1901.