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SOME CESTODES FROM FLORIDA SHARKS

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THE four cestode worms herein reported were collected by Stewart Springer, of the Zoological Research Supply Co., from sharks taken off the Gulf coast of Florida near Englewood. Two of them—*Dasyrhynchus insigne* and *Nybelinia palliata*—have previously been reported from the same or related hosts at Woods Hole, Mass.; *Diploötobothrium springeri* represents a new genus and species and is the second tetrarhynchidean known with double sets of reproductive organs; and the other, *Thysanocephalum rugosum*,<sup>1</sup> is a new species from the same host as *T. thysanocephalum*.

Genus THYSANOCEPHALUM Linton

THYSANOCEPHALUM RUGOSUM, new species

FIGURE 2, a-d

Two specimens of this worm were obtained from the spiral valve of a tiger shark, *Galeocerdo arcticus*; one had a total length of 48 cm. and had mature but not ripe segments at its end, while the other was only 14 cm. long and showed no evidence of segmentation. Neither specimen showed any trace of the true scolex such as occurs in the other species of *Thysanocephalum*, but the general character of the worm, the structure of the pseudoscolex, and the anatomy of the mature segments leave no doubt concerning the close affinity of this worm with members of the genus *Thysanocephalum*. It can only be conjectured that the true scolex has been lost or atrophied in these specimens.

*Specific description.*—*Pseudoscolex* very highly developed, and complexly crinkled as in old specimens of *T. thysanocephalum*, but larger than in that species, measuring 2.8 to 4.2 mm. across.

Neck 2 to 3.3 mm. broad at junction with pseudoscolex, narrowing rapidly to a diameter of 1.4 to 1.7 mm. less than a centimeter from the head. This diameter is uniformly maintained for a long distance but gradually increases again to a diameter of about 3 mm., which is maintained throughout most of the length of the worm. Total length of longest strobila 48 cm. Cuticle of entire strobila marked by chitinous reticulations about  $5\mu$  to  $7\mu$  thick, enclosing irregular spaces  $50\mu$  to  $120\mu$  across and giving a peculiar and very characteristic scaly appearance. Apparently three pairs of longitudinal excretory ducts are present: A very broad ventral one accompanied by a narrow dorsal one, dividing the segment transversely about 1:2:1, and an additional pair of fairly broad outer ducts much nearer the margins. Segmentation begins between 15 and 20 cm. from head. At 25 cm. the segments are 0.2 to 0.25 mm. long; at 40 cm., 0.7 mm. long; and at 45 cm., 1.5 mm. long. No ripe segments present.

Genital pores irregularly alternate, majority opening at left, situated a little behind middle of lateral margin. Cirrus sac very long (1.3 mm.) and in oldest segments  $450\mu$  broad, curving forward. Vas deferens much coiled, especially after leaving cirrus pouch, where the coils occupy the area bounded by the cirrus pouch, anterior loop of vagina, and uterus. Testes very numerous, about  $60\mu$  to  $80\mu$  in diameter, occupying practically all available space between the outer excretory ducts. Vagina lies just anterior to cirrus pouch, with its mouth just in front of the opening of the pouch. Its distal portion is enlarged with thickened walls, narrowing to a thin-walled tube just inside the inner excretory ducts; it makes a broad curve forward and then continues sinuously along the midline toward the posterior end of the segment. Here it has several loops, surrounded by Mehlis's gland. The ovaries extend across the posterior part of the segment between the outer excretory ducts, each one about  $900\mu$  broad and  $300\mu$  anteroposteriorly. The uterus runs forward dorsal to the vagina on the median line; it develops into a series of kinks, which

FIGURE 2.—NEW CESTODES FROM FLORIDA SHARKS.

- a-d. *Thysanocephalum rugosum*, new species: a, Pseudoscolex; b, portion of pseudoscolex much enlarged, showing thickened crinkled edges; c, mature segment about 45 cm. from head, cuticle and layer of yolk glands stripped off; d, younger segment about 30 cm. from head.
- e-i. *Diploötobothrium springeri*, new genus and species: e, Scolex; f, mature segment about 28 cm. from head, cuticle and layer of yolk glands stripped off; g, ripe segment about 40 cm. from head, cuticle and layer of yolk glands stripped off; h, portion of proboscis indicated by "A" on fig. i, from opposite side; i, partially everted proboscis, shaded part indicating invaginated portion.

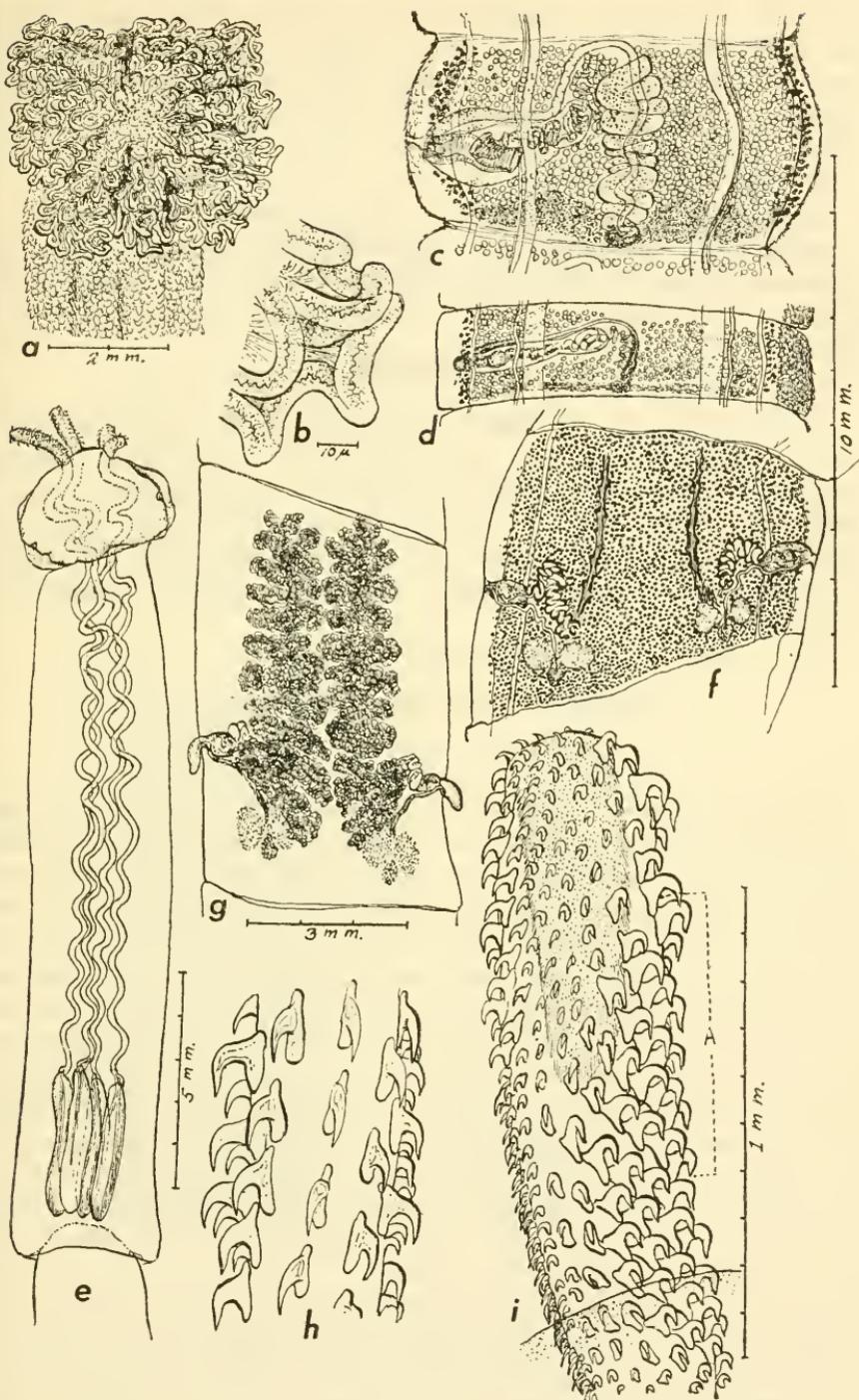


FIGURE 2.—(For explanation see opposite page.)

eventually appear as a series of pouches. The vitelline glands are very numerous at the sides, and probably cover the dorsal and ventral faces of the segments, though in the segments prepared for study they were peeled off to make the deeper-lying organs visible.

*Host.*—*Galeocerdo arcticus* (Faber).

*Location.*—Spiral valve.

*Type specimen.*—U.S.N.M. Helm. Coll. No. 36785.

*Remarks.*—Although strikingly similar to *Thysanocephalum thysanocephalum* (Linton, 1889), this species differs in general size and shape, proportions of segments, and particularly in the reticulations of the cuticle.

#### DIPLOÖTOBOTRIUM, new genus

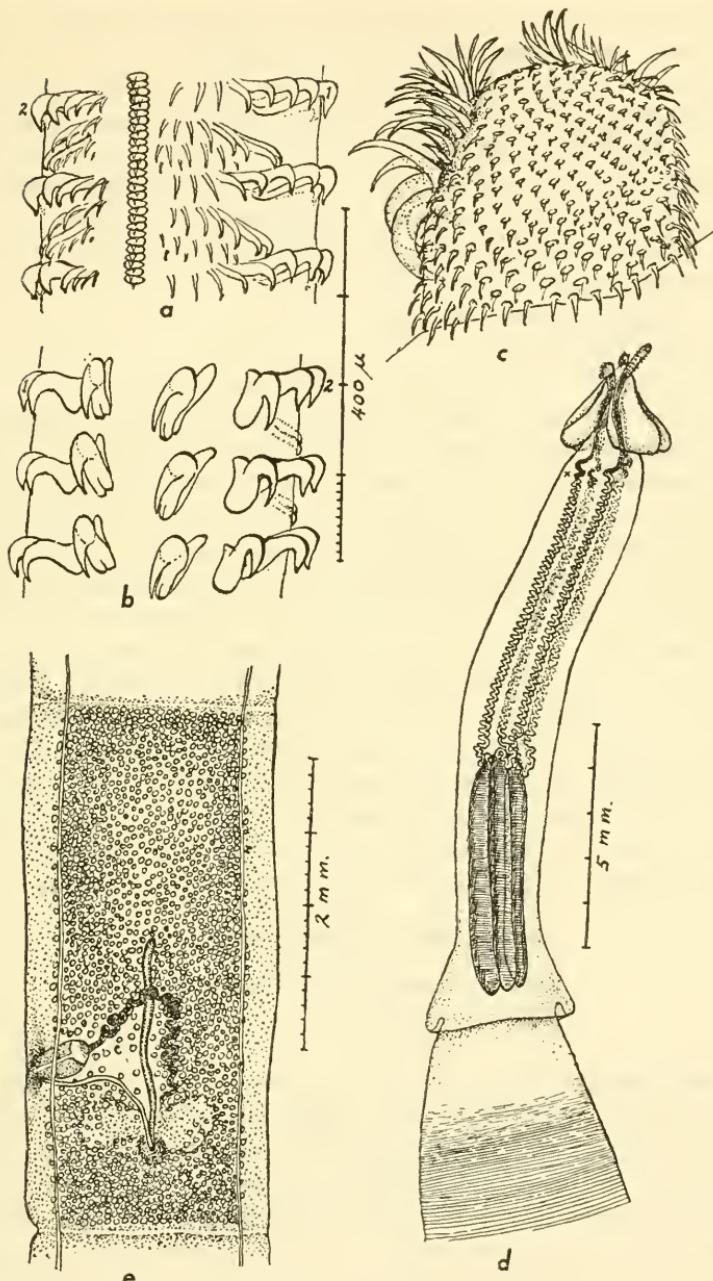
*Generic diagnosis.*—Bothria two, provided with ciliated pits laterally. Proboscides shorter than their sheaths, armed with diagonal rows of strong, recurved hooks, changing to small, irregularly arranged hooklets on inner side. Contractile bulbs elongate, the retractor muscles attached near their upper ends; strobila long, connected with scolex by unsegmented neck. Reproductive organs completely doubled.

*Type.*—*Diploötobothrium springeri*, new species.

#### DIPLOÖTOBOTRIUM SPRINGERI, new species

FIGURE 2, e-i

*Specific description.*—Scolex very broad and flat and very long (18 mm.). Bothria about 3 mm. long and 3.6 mm. broad. Width of head behind bothria 3.35 mm., nearly uniform for entire length. Proboscis sheaths in broad spirals, about five times as long as the bothria. Contractile bulbs about 3.5 mm. long and 0.47 mm. broad, the retractor muscles attached near the upper end. Proboscides about 2.5 mm. long and about 0.3 to 0.35 mm. broad exclusive of the hooks, 0.52 mm. broad including them. Hooks arranged in diagonal rows of 9 or 10 large, recurved, rose-thorn-shaped hooks, extending about two-thirds to three-fourths the distance around proboscis, the intervening area being occupied by small hooks more or less irregularly arranged; some of the small hooks near the base are only moderately curved and lack large bases. Largest hooks about  $125\mu$  long, with a base of similar length; smallest hooks only about  $20\mu$  long. Junction with strobila eraspedote. Total length about 48 cm. Faint striations, indicating the beginning of segmentation, first visible about 4 mm. behind scolex. Mature segments, 20 to 30 cm. behind head, about 6 to 7 mm. broad and 3.75 to 4.75 mm. long. Terminal ripe segments about 5 to 6 mm. broad and 8 mm. long. Genital atria situated about middle of margin of segment in mature proglottids, posterior to middle in ripe ones. Paired ovaries and

FIGURE 3.—*DASYRHYNCHUS INSIGNE* (Linton).

**a**, Portion of proboscis about 0.6 mm. from base; **b**, same, opposite side, hooks numbered 1 and 2 corresponding to similarly numbered hooks in fig. *a*; **c**, base of proboscis (remainder invaginated); **d**, scolex and anterior part of body ("X" indicates end of invaginated part of proboscis); **e**, mature segment 9 cm. from head, cuticle and layer of yolk glands stripped off.

Mehlis's gland grouped on each side, the complex about 1.4 to 1.5 mm. across, the midline of each about midway between margin of proglottid and median line of proglottid. Each ovary about  $630\mu$  to  $700\mu$  in diameter; Mehlis's gland about  $500\mu$  long and  $350\mu$  broad. Uterine stems in mature proglottids curve slightly inward; mature uteri barely touch at median line, and together occupy about three-fifths of width of segment. Cirrus sac about 1 mm. long and  $560\mu$  broad; everted cirrus  $700\mu$  long and  $220\mu$  broad. Eggs in the uterus are about  $75\mu$  long.

*Host.*—*Platysqualus tudes* (Cuvier).

*Location.*—Spiral valve.

*Type specimen.*—U.S.N.M. Helm. Coll. No. 36784.

*Remarks.*—The only other Tetrarhynchidea in which double sets of reproductive organs have been described are members of the genus *Dibothriorhynchus*, but the present worm certainly does not belong in that genus. Up to the present time all species of tetrarhynchideans having ciliated pits on the bothria have been placed in Linton's genus *Otobothrium*, but there is a very considerable variation in the proportions of the parts of the head and in the armature of the proboscides, and it may be that several genera will have to be recognized when the adults are known. *Otobothrium robustum* Chandler, 1935b, shows distinct affinity with the present species in the robust proportions of the head and in the armature of the proboscides, but it differs greatly in the distance between the bothria and the contractile bulbs and in the area on the proboscis occupied by small hooks. It is quite possible that *O. robustum* may prove to be a *Diploötobothrium*, but it may best be left where it is until the adult is known.

#### Genus DASYRHYNCHUS Pintner

DASYRHYNCHUS INSIGNE (Linton, 1924)

#### FIGURE 3

A worm obtained from the spiral valve of *Carcharias platyodon* (Poey) is assigned to this species. It agrees very closely with Linton's description of the worm except that in his specimens segments situated 10 cm. from the head and having a developing uterus are broader than long, whereas in my specimen proglottids 9 cm. from the head are over twice as long as broad. The contractile bulbs are longer relative to the rest of the scolex in my specimen than in Linton's, but the coiling of the proboscis sheaths shows that the middle portion of the head is considerably contracted. There are certain features of the armature of the proboscis not evident from Linton's figures; these are shown in my fig. 3, *a-c*, in order to facilitate diagnosis in the future. The worm was recorded by Linton (1924) from *C. milberti* and *C. commersonii* at Woods Hole.

Genus *NYBELINIA* Poche*NYBELINIA PALLIATA* (Linton, 1924)

This worm, designated *Tetrarhynchus palliatus* by Linton, was recorded by him from *Sphyrna zygaena* (Linnaeus) at Woods Hole. My specimen comes from the same host.

## NOTES ON TETRARHYNCHIDEAN LARVAE

I wish to take this opportunity to reallocate, generically, certain tetrarhynchidean larvae described by me (1935a), on the basis of the classification of this group as worked out by Pintner, Dollfus, et al. The species that I referred to as *Gymnorhynchus gigas* and *G. malleus* should be known as *Pterobothrium filicolle* (Linton, 1889) and *P. malleum* (Linton, 1924), respectively, since Southwell (1930) was evidently in error in considering *P. filicolle* synonymous with *Gymnorhynchus gigas* (Cuvier, 1817). The species I described as *Tentacularia lepida*, following Southwell's outmoded system, should be transferred to the genus *Callotetrarhynchus* Pinter, 1931, and be known as *Callotetrarhynchus lepidus*.

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