

STUDIES ON THE TURBELLARIAN FAUNA OF
THE NORFOLK AREA

VI. ANATOMY OF *Macrostomum appendiculatum* VAR. *stirewalti*
NEW VARIETY

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PLATE 1

The Norfolk region presents an excellent opportunity for the study of marine and freshwater forms, because here may be found one of the most variable ecologic habitats in this country. Thus, it is not surprising that in a few months time we have gathered data upon nearly fifty new Turbellaria. This paper presents the microscopic anatomy of one of these, a new variety of a rhabdocoelid, *Macrostomum appendiculatum* var. *stirewalti*.*

Ecology.—This free-living worm inhabits the fresh water lakes of the water supply system of the City of Norfolk (Smith Lake and Little Creek Reservoir) and the series of ponds paralleling Shore Drive near Lynnhaven Inlet, Princess Anne County, Virginia. The animal was first taken in February, 1940, under a two inch layer of ice associated with an abundance of *Ricciocarpus*, *Sagittaria* and *Spirogyra*. Crustacea and Protozoa were also numerous. Altitude, about 4 feet. Geology, estuarine sand.

*Description.***—Body colorless, dorsoventrally compressed (Fig. 1), anteriorly truncated, posteriorly slightly spatulate, broadest at mid-body level. Length ca. 1.5 mm. Epidermis of flat pentagonal cells bearing an even coat of cilia (ca. 5 μ). Sensory hairs overall, extremely long (ca. 45 μ) single and in groups of two and three. Spines confined to cephalic and caudal extremities. Rhabdoids abundant; rhabdites (ca. 13 μ) in groups of 7 to 9 overall except sub-anteriorly, sparse and single there (Fig. 4), *Stabchen* numerous, ventro-radially dispersed at female

* Named for Dr. M. A. Stirewalt in recognition of profound studies upon American Turbellaria. A research grant from the Virginia Academy facilitated this study.

** Measurements given are average figures taken from the study of many specimens.

gonopore (Fig. 9), *Rhammiten* abundant, anteriorly strongly developed above and below "brain" commissure. "Brain" of paired cerebral ganglia mesially united by restricted commissure, paired nerves course latero-longitudinally. Eyes (*ca.* 20 μ), black and paired (Fig. 3) disposed at postero-dorsal cerebral surfaces. Mouth limited by ciliated longitudinal lips, located antero-ventrally in mid-line. *Pharynx simplex* antero-ventral, abundantly supplied with latero-posteriorly directed system of slender pyriform pharyngeal glands (Fig. 2) bearing granules and *Rhammiten*. Enteron colorific, sac-like and extensive with ciliated endodermal epithelium. Excretory system of paired and separate lateral protonephridia each opening externally (Fig. 4) just meso-dorsal to anterior tip of the testes, terminal flame cells (Fig. 5) numerous. Testes obovate (Fig. 6), smooth-walled, located latero-ventral and only slightly posterior to anterior end of enteron. Vasa deferentia extending caudally from posterior extremity to each testis to unite just before entrance into vesicula seminalis. "False" vesicula seminalis not observed. Vesicula seminalis muscular, contractile and spheroidal, thin-walled when distended with sperm (Fig. 8), thick-walled when empty. Portal between sperm and granule sac controlled by sphincter. Vesicula granulorum muscular and contractile, proximally supplied with ciliated crypts, distally with rosette of granuliferous gland cells (Fig. 8) extending into genital canal of penis stilette. Penis stilette (Fig. 8) a conical tube housed in a muscular tunic, proximally truncated and crenate, distally attenuated and curved at *ca.* a right angle, opening long, sub-terminal and on convexity of apical flexure, greatest total length 50 μ , base 26 μ , stilette normally rests at *ca.* a 45° angle to longitudinal axis of body. Male gonopore ciliated and *ca.* 165 μ from posterior tip of body. Mature sperm cell (*ca.* 26 μ) highly mobile with anteriorly located hyaline granule (Fig. 7), *Nebengeisseln* lacking. Female genital system typical for genus. Ovary *ca.* one fourth as long as body. Eggs spherical and grayish brown (*ca.* 200 μ). Female genital atrium (Fig. 8) discrete, non-collapsible, finely ciliated, spheroidal. Female gonopore ventro-posterior in longitudinal mid-line, *ca.* 290 μ from posterior tip of body.

Taxonomic disposition.—*Macrostomum appendiculatum* var. *stirewalti* displays the specific characters of *Macrostomum appendiculatum* (O. Fabricius, 1826) Graff, 1905, but is delimited from this and other previously described representatives of *Macrostomum* as may be seen by reference to the key to the genus in Ferguson (1939-1940). In the

species the body is anteriorly blunt and posteriorly spatulate. The protonephridial system empties externally just posterior to the mouth and has a distinct caudal commissure. The sperm cell (ca. 50 μ) is a highly differentiated one possessing feeler, tail and body regions, plus lengthy paired *Nebengeisseln*. The penis stilette (ca. 59.8 μ) is relatively slender with a terminal lip or flange extending beyond the opening (see Ferguson, 1939, p. 51, Fig. 3). The numerous references to the species are given in the monograph on the genus by Ferguson (1939-1940).

Differential diagnosis.—*Macrostomum appendiculatum* var. *stirewalti*. Body anteriorly truncate, lacks marked spatulation, posteriorly colorless, length 1.5 mm. Rhabdites, *Stabchen* and *Rhammiten* abundant. Epidermal cilia, elongate sensory hairs and spines present. Protonephridia open dorsally at anterior tip of each testis. Vesicula granulorum with ciliated crypts and distal complement of granule glands. Penis stilette (ca. 50 μ) a conical tube with broad crenate base, lacking terminal lip or flange, opening at convexity of apical flexure, long and oval. Mature sperm cell elongate, threadlike (ca. 26 μ), lacking differentiation except for hyaline inclusion. Female sexual apparatus of usual type.

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LITERATURE

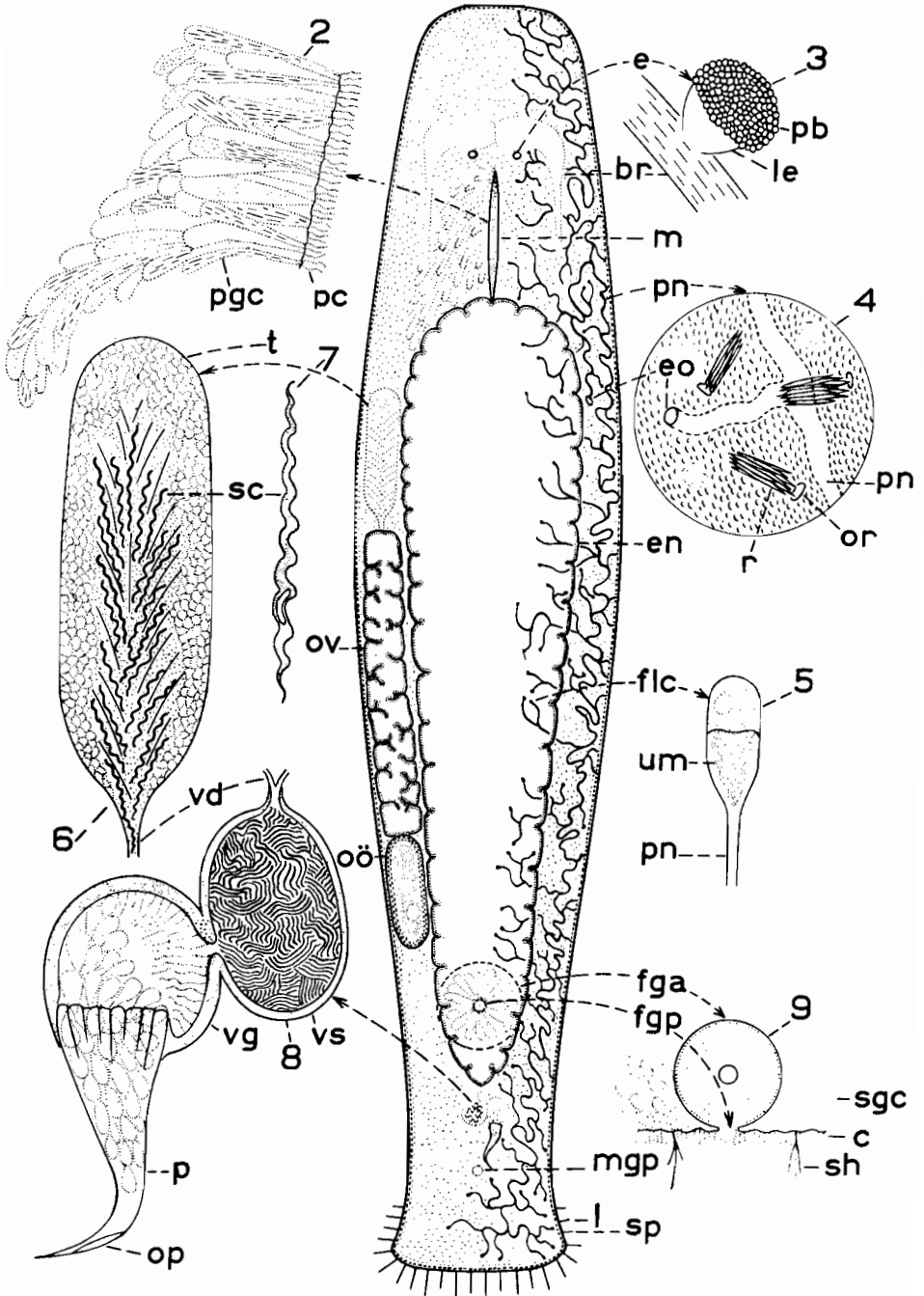
- FABRICIUS, O., Fortsaettelse af Nyezoologiske Bidrag VI. Nogle lidet bekendte og tildeels nye Fladorme (Planariae). Fore laestden I ste Juni 1820. Kong. Danske Vid. Selsk. Naturvid. og. mathem. Afhandlinger, II. Deel. Kjobdenhavn, 1826, pp. 13-35, tab. II und III, figs. sV.
- FERGUSON, F. F., A Monograph of the Genus *Macrostomum* O. Schmidt 1848. Part III. Zool. Anz. vol. 128: 49-53. 1939.
- GRAFF, L. v., Marine Turbellarien Orotavas und der Kusten Europas. II. Zeitschr. f. wiss. Zool. 83: 82-93. 1905.

EXPLANATION OF PLATE 1

- Fig. 1. Ventral view of gross anatomy. $\times 120$.
 Fig. 2. Optical section through wall of pharynx. $\times 750$.
 Fig. 3. Detail of "eye." $\times 675$.
 Fig. 4. Detail of external opening to protonephridia. $\times 750$.
 Fig. 5. Detail of terminal flame cell. $\times 525$.
 Fig. 6. Optical section through testis. $\times 300$.
 Fig. 7. Detail of mature sperm cell. $\times 1725$.
 Fig. 8. Dorsal view of male sex apparatus. $\times 675$.
 Fig. 9. Lateral view of terminal female genital apparatus. $\times 938$.

ABBREVIATIONS USED

br—"brain"	pb—pigment beaker
c—epidermal cilia	pgc—pharyngeal gland cells
e—"eye"	pn—protonephridium
en—enteron	r—rhabdites
eo—external opening to protonephridia	sgc— <i>Stabchen</i> gland cells
fga—female genital atrium	sh—sensory hairs
fgp—female genital pore	sc—sperm cell
flc—flame cell	sp—spines
le—"lens"	t—testis
m—mouth	um—undulating membrane
mgp—male genital pore	vd—vas deferens
or—opening to rhabdite gland cell	vg—vesicula granulorum
op—opening to penis stilette	vs—vesicula seminalis
p—penis stilette	



ANATOMY OF *MACROSTOMUM* *APPENDICULATUM* VAR. *STIREWALTI* N. VAR.