

2115

Heterocypris spec.

Von der bereits in meinen »Brackwassostracoden von Nordostbrasilien« (1939) kurz charakterisierten, aber nicht benannten *Heterocypris*-Art aus einem Fischteich des Stadtteils Afogados von Recife (coll. SCHUBART) fand ich mit *H. communis* zusammen in dem Staubecken von Borborema (Parahyba) einige reife Weibchen und in zwei Felstümpeln bei Benito (Parahyba) eine Anzahl Larven mittleren Alters (coll. LENZ). Leider genügte auch in diesem Falle der Erhaltungszustand der Muscheln nicht den für eine Neubeschreibung zu stellenden Anforderungen. Ich lasse deshalb auch jetzt noch die Art unbenannt und verweise im übrigen auf meine oben angeführte Arbeit.

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 — Süß- und Brackwasser-Ostracoden von Bonaire, Curaçao und Aruba. Zool. Jb. Syst. 64 (1933).
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A Monograph of the Genus *Macrostomum* O. Schmidt 1848.
Part VII.

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(With 34 Figures.)

Eingeg. 9. September 1939.

Macrostomum saifunicum NASSONOV.

(*M. kawamurai* OKUGAWA, Species Dubia.)

1929. *Macrostomum saifunicum*, N. NASSONOV in: Bull. Ac. Sci. Moscou, sér. VII, 20, 817—836, t. I.

Macrostomum saifunicum NASSONOV lives in the waters of Lake Biwa and in the "Sudussuri-Gebiet".

The colorless animal contains a brownish enteron. The body is anteriorly rounded and reduced, while the posterior body tapers to a small spatulate tail (Fig. 1). NASSONOV (1929) gives the animal's length as 2 mm. and OKUGAWA (1930) found it to measure

up to 2.5 mm. in length. The body is flatter than in *M. japonicum* OKUGAWA.

Curved and straight rhabdites are congregated in groups of three and four over the body surface. In these structures, one end is blunted, while the other end is sharply pointed.

The eyes (Fig. 1) are small, reniform organs with distinct lens. They occupy a position antero-dorsal to the pharynx.

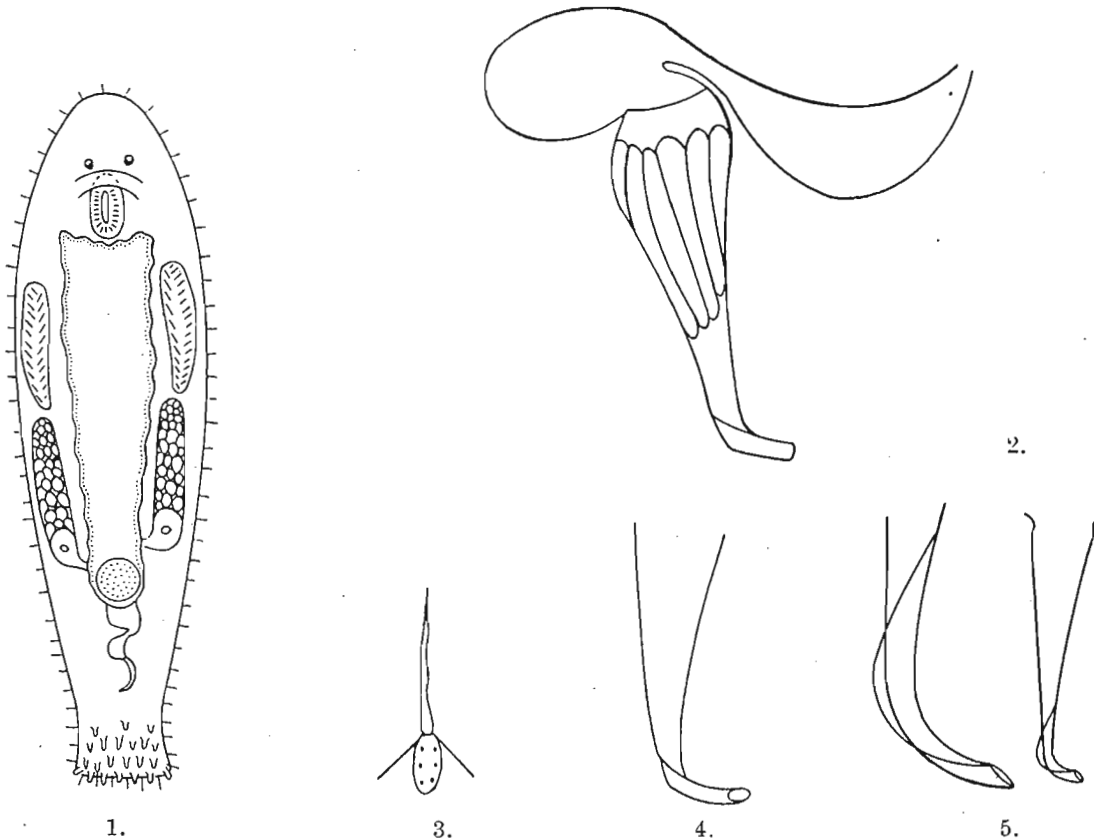


Fig. 1. *M. saifunicum* Nasonov. Gross anatomy, \times ?. (After Okugawa, 1930, pl. III, Fig. 6.)
 Fig. 2. *M. saifunicum* Nasonov. Male sex apparatus, \times ?. (After Okugawa, 1930.)
 Fig. 3. *M. saifunicum* Nasonov. Sperm-cell, \times ?. (After Okugawa, 1930.)
 Fig. 4. *M. saifunicum* Nasonov. Penis-stilette, \times ?. (After Okugawa, 1930, Fig. 8.)
 Fig. 5. *M. saifunicum* Nasonov. Penis-stilette, \times ?. (After Okugawa, 1930, Fig. 1.)

The small mouth opening (Fig. 1) is "spaltförmig". The pharynx is small and is provided with numerous gland-cells.

The reproductive organs have a grayish tint. The testes (Fig. 1) are smooth-walled organs located laterally in the second body fifth. They are not lobed. The vesicula seminalis appears to be divided, that is, it probably possesses an anterior false division. The vesicula granulorum may be spherical or oval in shape. The ductus ejaculatorius is a very fine canal. The penis-stilette (Figs. 4—5) has the form of an extended cone with a terminal bend. There is a fine lamella at the bend of the stilette. The end of the stilette is obliquely truncated, backwardly directed toward the base of the penis. The external opening is terminal, and ellipsoidal in

shape. The stilette measures up to 150μ in length. Longitudinal packets of granules are found in the proximal part of the genital canal (Fig. 2).

The ovaries are lobed.

The sperm-cells resemble those of *M. tuba* GRAFF. This cell (Fig. 3) is provided with a pair of setae interspersed between the spindle-shaped head and the tail. These setae are highly vibratile processes.

This description was taken from NASSONOV (1929).

Species Diagnosis.

Macrostomum saifunicum NASSONOV: Body anteriorly rounded, posteriorly reduced, spatulate tail not pronounced, colorless, false vesicula seminalis present, penis-stilette is extended cone with terminal bend which has unique lamella, opening produced by oblique truncation, length 150μ , sperm-cell composed of spindle head, tail, and paired lateral setae, body length up to 2.5 mm.

Macrostomum stylopencillum JONES.

"*Macrostomum stylopencillum* JONES¹ may be collected in masses of eel grass in the brackish waters of Currituck Sound, North Carolina.

This translucent animal measures 1 mm. by .13 mm. This species has a typical *Macrostomum* shape except that the posterior tail region is unusually slender and lacks spatulation. The anterior end is semi-acuminate in contour (Fig. 6).

Numerous rhabdite gland-cells originate dorsal to the pharynx and spread out fan-wise toward the dorsal side. Part of this system extends to empty anteriorly. The rhabdites are uniformly but sparsely distributed elsewhere upon the dorsal surface. They are heavily concentrated at the anterior and posterior ends. Rhabdites are sparsely supplied ventrally. In this form, rhabdites measure 22μ by 5μ . There are a few rhammiten which empty anteriorly. Cilia and sensory hairs are present.

The two ganglionic halves of the 'brain' combine at the narrow commissure to produce a crescent shape. The brownish black eyes are located dorso-posterior to the 'brain'. These visual structures, which measure 11.5μ in diameter, are composed of the three morphological divisions—rhabdome, ellipsoid and myoid, as delineated in KEPNER and STIFF (1932). The spherules comprising the pigment-cup measure about 6.4μ in diameter.

¹ I am indebted to Dr. E. RUFFIN JONES, William and Mary College, for the material and the description of this flatworm.

The morphology of the digestive system is regular. The lobate cells of the enteron appear to be unusually large.

The excretory system was not studied in detail.

The testes are deeply lobed and semi-follicular in structure. They measure about 22μ in diameter. The vesicula seminalis and the vesicula granulorum were not studied in detail. The penis-stilette (Fig. 6) has been minutely studied and figured. This stilette measures 64μ in length and presents the figure of an entirely straight sided and very sharp pencil-point. The opening is terminal. The sperm-cell in this species measures 22.5μ in length.

The female reproductive system is entirely regular in its morphology. The maturing egg in the female genital atrium is unusually large."

The literature upon the genus does not contain a description comparable to that given *M. stylopencillum* JONES.

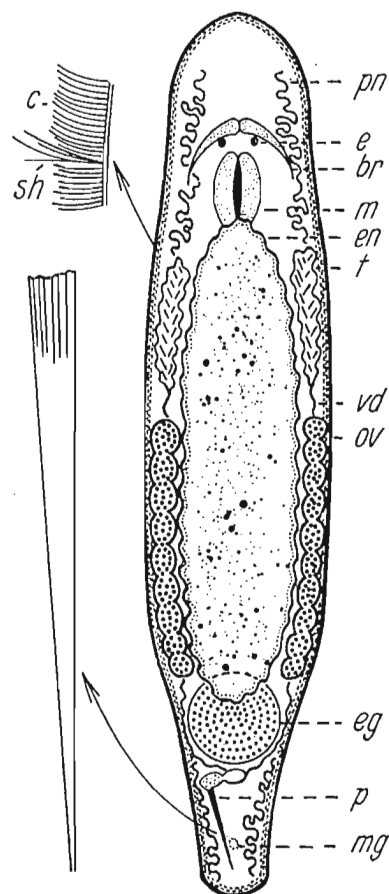


Fig. 6. *M. stylopencillum* Jones. Dorsal view of gross anatomy, 87 \times . Ciliation, 90 \times . Penis-stilette, 900 \times .

Species Diagnosis.

Macrostomum stylopencillum JONES new species: Body slender with narrow tail-region lacking spatulation, colorless, rhabdites sparse ventrally, cilia and sensory hairs present, testes semi-follicular, penis-stilette (64μ long) is elongate funnel with crenate base and extremely sharp termination, opening terminal, body length up to 1 mm.

Macrostomum tennesseensis mihi.

Macrostomum tennesseensis mihi is found in abundance in the waters of the lake at Fountain City, Tennessee, near Knoxville. Specimens have also been taken in the springs and streams of the adjoining Whittle Springs region and in the South Knoxville community.

This animal ranks with *M. tuba* VON GRAFF as the largest species in the genus that I have studied. Its length averages over 3 mm. It is colorless with the exception of the eggs and the ovaries, which are gray-black. The head region is narrower than the caudal region. There are "Rhabditenstrassen" present whose components

are unusually small. The spatulate condition in the tail is only apparent when the tail-region adheres to the sub-stratum.

This species is more abundantly supplied with rhabdites than any other that I have observed. They occur in groups of from 8 to 10. When the tail is spread in a spatulate form, the rhabdites are useful in adhesion, and then only by applying their several

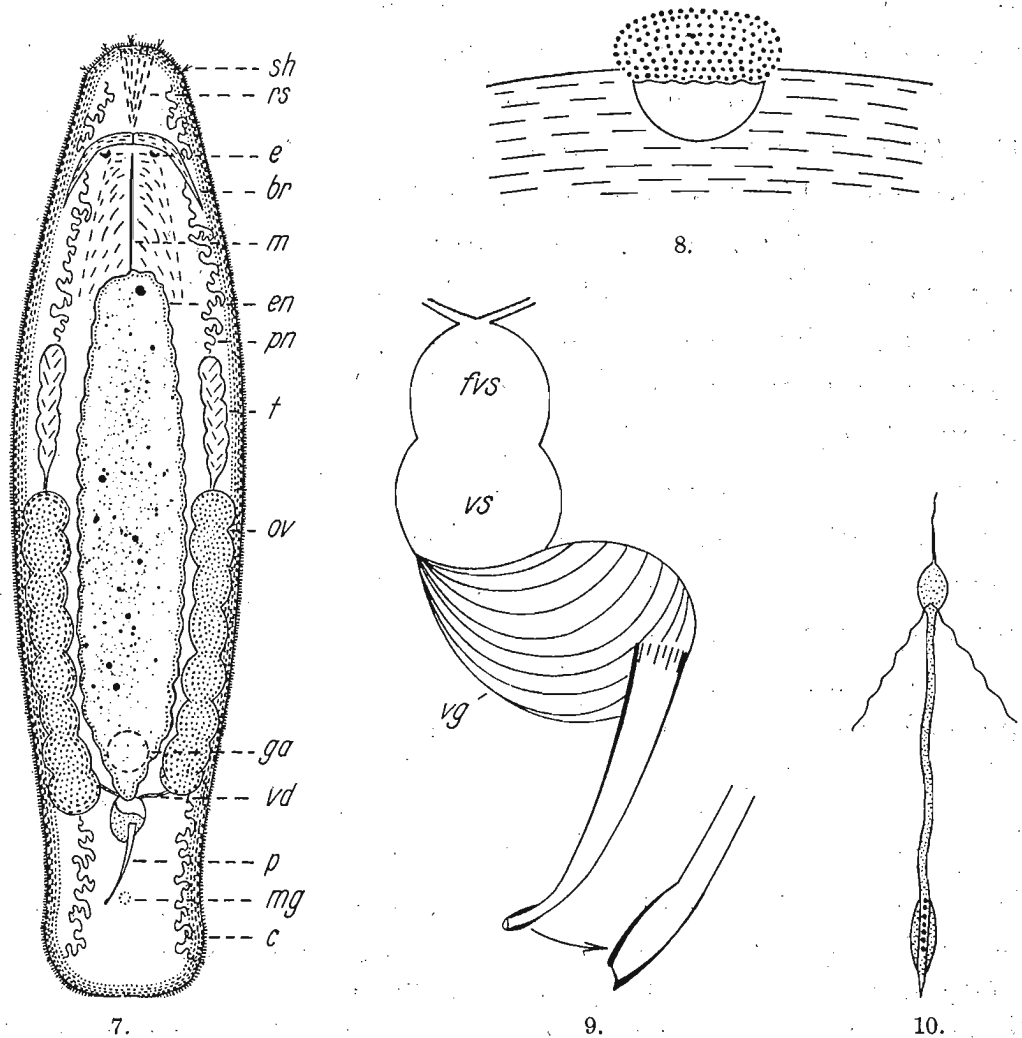


Fig. 7. *M. tennesseensis* mihi. Dorsal view of gross anatomy, 30 ×.

Fig. 8. *M. tennesseensis* mihi. Gross anatomy of eye, 600 ×.

Fig. 9. *M. tennesseensis* mihi. Male sex apparatus, 180 ×. Detail of terminus of penis-stilette, 600 ×.

Fig. 10. *M. tennesseensis* mihi. Mature sperm-cell, 1200 ×.

points at an angle of about 15° to the sub-strate. The posterior body is supplied with neither sensory hairs (Fig. 7, *sh*) nor spines. Sensory hairs in tufts of from three to five are present in the anterior region. There are no lateral sensory hairs.

The lens of the eye (Fig. 8) is embedded in the tissue of the "brain" while the accompanying pigment-cup is not. The pigment-spherules composing the cup are the smallest that I have studied (Fig. 8).

The mouth (Fig. 7, *m*), which is inordinately long, is guarded by the usual type of gland cells which are sparsely distributed about it. The dorsally located enteron (*en*) presents regular features. Two laterally placed protonephridial tubes (*pn*) are present.

The testes (Fig. 7, *t*) are located mid-way between the enteron and body wall. They are slightly indented. A large false vesicula seminalis is generally present. There are no distinct ciliated chambers in the vesicula granulorum (Fig. 9, *vg*), in whose walls the longitudinal muscle bands are particularly apparent. The penis-stilette averages (Fig. 9, *p*) 170 μ in length. This tubular structure presents the figure of a long funnel with a widened crenate base and a slightly expanded termination (Fig. 9). The opening is terminal. The male gonopore, into which the stilette is directed, has ciliated lips.

This species possesses a unique sperm-cell. This singular cell (Fig. 10) measures 36 μ in length and is equipped with the characteristic pair of anterior setae, a very thin feeler, and a tail region which bears a pair of lateral undulating flanges, in which region the chromatin granules are located. Chromatin granules are usually located in the anterior region of the sperm cell in *Macrostomum*. The feeler is a highly vibratile process.

Those organs composing the female reproductive system are of the usual type.

In defining this species one must compare it with the other species whose stilettes possess enlarged terminal ends. Thus, *M. tennesseensis* mihi must be shown comparable to *M. reynoldsi* mihi, *M. lewisi* mihi, *M. bulbostylum* mihi, and *M. tuba* von GRAFF. *M. reynoldsi* mihi possesses a long, curiously bent stilette with a flattened rounded end. *M. lewisi* mihi has a stilette which is bent in two right angles and has an enlarged termination which is not symmetrical. The stilette of *M. bulbostylum* mihi is an extremely long tube with a symmetrical, knobbed termination. *M. tuba* von GRAFF presents a long, straight stilette with a symmetrically enlarged end. The stilette of *M. tennesseensis* mihi has only one thing in common with the above described stilettes: the termination is enlarged. This enlargement is not symmetrical. The opening is slightly oval in shape. In addition, the sperm-cells of these four species differ.

Species Diagnosis.

Macrostomum tennesseensis new species: Body elongate, boat-shaped, anterior width less than posterior, colorless, "Rhabditenstrassen" present, epidermal spines lacking, mouth unusually long, ciliated chambers lacking in vesicula granulorum, penis-stilette is slender funnel (170 μ long) with crenate base and curved terminal region with slightly thickened walls, opening terminal, sperm-cells have unique position of chromatin granules in posterior part, pair of lateral setae present, body length over 3 mm.

Paratype: U.S.N.M. No. 20447.

Macrostomum thermale REISINGER.

1934, *Macrostomum thermale*, E. REISINGER in: Arch. Hydrobiol. Suppl. Bd. Tropische Binnengewässer 12 (1), 239—262, tf. 1—4.

Macrostomum thermale REISINGER has been collected from the warm calcium salt springs of Kuripan, West Java, in masses of *Oscillatoria*. The temperature range of this habitat is 37.4° to 45°. The salt content is almost isotonic (K = 32%, Chloride = 16.3%).

This animal is barge-shaped [Fig. 11 (a)] being truncated at both ends of its broadened body. The length is 1 mm. The body is entirely colorless.

Many transitional types of rhabdites occur in the epidermis. They are normally developed in parenchymal gland-cells. The sensory hairs resemble those of *M. appendiculatum* (O. FABR.).

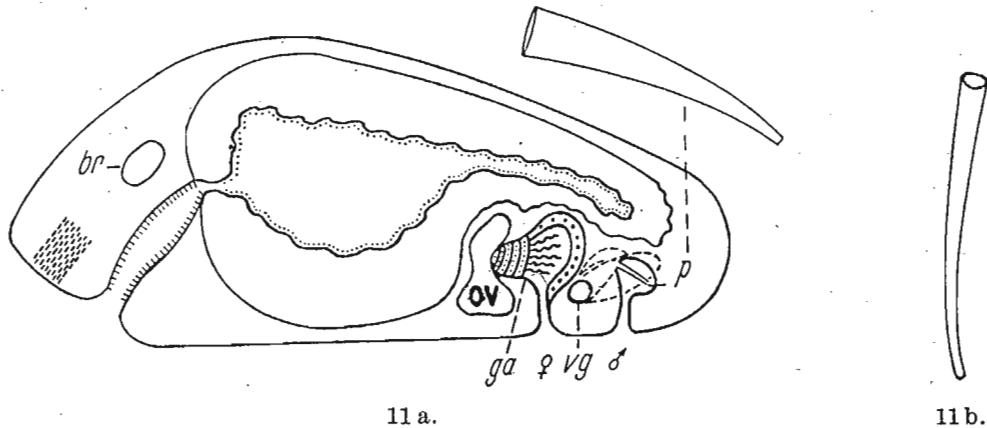


Fig. 11 a. *M. thermale* Reisinger. Sagittal section, 147 ×. Detail of penis-stilette, ca. 336 ×. (After Reisinger, 1934, p. 248, Fig. 4.)

Fig. 11 b. *M. thermale* Reisinger. Penis-stilette, ×?. (After Riedel, 1932, p. 24, Fig. 17.)

Cyanophil gland-cells located just under the anterior tip of the body supply an erythrophil secretion. Adhesive glands are absent in the weakly developed posterior adhesive disk.

The short mouth [Fig. 11 (a)] is flanked by brownish secretory streamers; toward the enteron the pharyngeal cavity assumes a square-shape. The enteron is quite spacious, being composed of claviform cells containing vacuoles, granules and secretory droplets, while "Körnerkolben" are lacking. The epithelial elements are not specifically divided into assimilatory and gland cells. This animal approaches those forms with intraplasmatic digestion.

The protonephridia are not detectable in sectioned material. From this REISINGER (1934, p. 243) infers that they are either weakly developed or lacking. This incorrect inference is based upon ignorance of the difference between live and fixed material in *Macrostomum*. Protonephridia have never been described from fixed and sectioned material. REISINGER (1934, p. 243) draws the

following conclusion as based upon the apparent absence of protonephridia: "Vermutlich ein neuer Beleg der für Turbellarien schon oft festgestellten Abhängigkeit der Protonephridiengestaltung vom osmotischen Druck des Wohnmediums. Im vorliegenden Fall (Gesamtkonz. = 31—35.6%!) ergeben sich Bedingungen wie bei marinen Formen."

The anatomy of the nervous system and sense organs resembles in all essential points the description given by LUTHER (1905) for *M. appendiculatum* (O. FABR.). The postpharyngeal commissure is strongly developed. The pharyngeal nerve ring and the "tail" ganglia are proportionately weakly developed. The eyes particularly are comparable to those of *M. appendiculatum* (O. FABR.).

The oblong, weakly indented testes occupy a mid-body position. Spermatogonia and spermatocytes are situated parietally within the testes. The indentation of these structures, it is inferred, is probably indicative of an earlier rudimentary follicular arrangement of the gonadal elements. The vesicula seminalis is medially situated. The smaller vesicula granulorum and the stilette are located upon the right side of the mid-line of the body [Fig. 11 (a)]. The penis-stilette is a simple, slightly curved funnel with a terminal opening [Fig. 11 (a) + (b)] which measures 80 μ in length. There is a space at the end of the genital canal which might be termed a male genital atrium, however, it is not ciliated. The margins of the male gonopore are ciliated.

The ovaries [Fig. 11 (a), *ov*] are laterally indented and extend anteriorly to the testes. They are apparently composed of from four to eight follicles per ovary. Only a few cells are active in the ovaries; the remainder being abortive in nature. The epithelium of the female genital atrium has no cilia and is syncitial². The genital atrium has a delicate muscular housing.

There is a peculiar thick-walled condition of the fore wall of the genital atrium in mature animals. It is inferred that the passage way between these thick walls may act first as a ductus spermaticus and later as a means of conducting the maturing egg into the genital atrium, since sperm-cells are always massed at that point. Obviously the egg uses this path as a means of gaining entry into the atrium, but there is no evidence that sperm-cells have ever been found in the oviducts of *Macrostomum*.

A spindle is developed simultaneously with the egg shell in the genital atrium. In this egg only two chromosomes have been

² Present author's note: Cilia do not always show in fixed material.

seen, however, it must be borne in mind that a proper chromosomal study cannot be made upon examination of sectioned material only, and for this reason this appears to be a doubtful chromosome number.

A comparison is drawn between the acoeles and *Macrostomum* by REISINGER (1934, p. 250), who likens the female genital canal to the acoelus vagina, the genital atrium to the bursa, which before oviposition is used as a uterus. From this comparison REISINGER believes that *M. thermale* REISINGER is a primitive *Macrostomum*. This description was taken from REISINGER (1934).

Species Diagnosis.

Macrostomum thermale REISINGER: Body short, rounded at extremities, colorless, rhabdites, sensory hairs and cilia present in epidermis, "Körnerkolben" lacking, post-pharyngeal commissure strongly developed, penis-stilette is simple, slightly curved funnel, ovaries follicular, body length up to 1 mm.

M. timavi GRAFF.

1905. *Macrostomum timavi*, L. GRAFF in: Z. wiss. Zool., 83, 82, t. 2, f. 3, 4.

1905. LUTHER, A., p. 82, f. 2, f. 3, 4.

1908. GRAFF, L., in BRONN, H. G., pp. 2568, 2590, 2596.

1913. GRAFF, L., p. 53, f. 59, 60.

Macrostomum timavi VON GRAFF was studied from collections made in the brackish waters of Duino on the Adriatic Sea.

This animal resembles *M. appendiculatum* (O. FABR.) in shape. The penis-stilette is of the *M. tuba* VON GRAFF type. The distal part of the stilette (Fig. 12) is slightly curved and has an expanded termination which is split in two parts. The length of this stilette is 90 μ . The sperm-cells, which are filamentous and finely pointed at both ends, measure 100 μ . This is an unusually long sperm-cell for a *Macrostomum*.

This scanty description was taken from the above references.

Species Diagnosis.

Macrostomum timavi VON GRAFF: Body shape resembles *M. appendiculatum* (O. FABR.), penis-stilette is funnel with widened base extending to expanded curved termination (length 90 μ), opening terminal, sperm-cell (100 μ long) filamentous, finely pointed extremities.

Macrostomum tuba GRAFF.

1828. *Derostoma platurus*, ANT. DUGÈS in: Ann. Sci. nat., 15, 142, f. 4, t. 7.

1831. *Turbella platurus* (HEMPRICH & EHRENBERG), Symb. phys., Phytoz. Turbell. fol. a.

1874. L. GRAFF³.

1882. *Macrostoma tuba*, L. GRAFF, Monogr. Turbell., 1, 242, t. 4, f. 14—16.

1890. *Macrostoma platurus*, L. VAILLANT in: Hist. nat. Annel., 3 (II), 642.

1905. *Macrostoma tuba*, A. LUTHER in: Festschr. Palmén, 1 (5), 4, 49, ff. 1, 4, f. 1, f. 3, 12—16, 20—26; t. 2, f. 4, 5; t. 4, f. 12, 13, 26, 27, 30, 40—42.

1909. *Macrostoma tuba*, L. GRAFF in: BRAUER, Süsw., 19, 77, f. 159, 160.

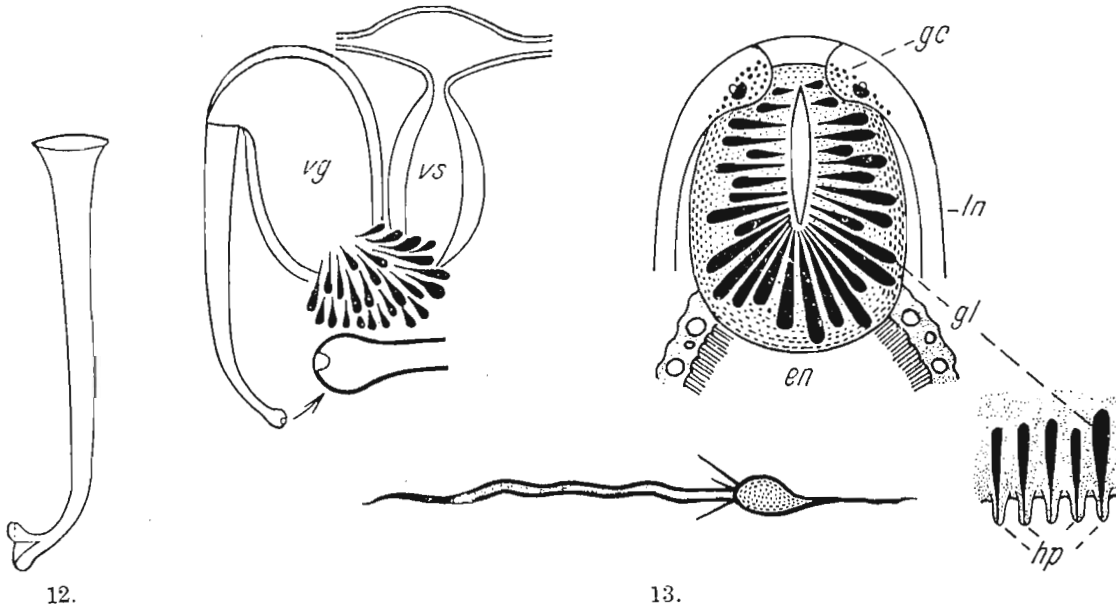


Fig. 12. *M. timari* Graff. Penis-stilette, \times ?. (After Graff, 1905, Taf. 5, Fig. 3.)
 Fig. 13. *M. tuba* Graff. Details of male sex apparatus, \times ?. (After Graff, 1882, Taf. 4, Fig. 14.) Pharynx and "brain", \times ?. (After Graff, 1882, Taf. 4, Fig. 15.) Mature sperm-cell, \times ?. (After Graff, 1882, Taf. 4, Fig. 2.) "Haftpapillen", \times ?. (After Graff, 1882, Taf. 4, Fig. 16.)

1908. GRAFF, L., in BRONN, H. G., pp. 2023, 2290, t. VI, f. 27; t. XXV, f. 27; t. XXIX, f. 6; t. XXX, f. 14; tf. 58.

1913. GRAFF, L., p. 852, tf. 12, 57, 58.

1915. FULIŃSKI, B.

1915. MEIXNER, J., p. 470.

1918. LUTHER, A., p. 48.

1923. NASSONOV, N., p. 33—0.

1926. STEINBÖCK, O., p. 430.

1926. VALKANOV, A.

1927. BEKLEMISCHEFF, W., p. 202, t. 1, f. 5, 6.

1927. RUHL, L., p. 160, tf. 12, 13.

1927. VIALLI, M.

1929. SIBIRIAKOVA, O. A., pp. 238, 239, f. 14.

1930. GIEYSZTOR, M., pp. 305—311, tf. 2, 3.

1930. OKUGAWA, K., p. 77.

1932. FULIŃSKI, B., and E. SZYNAL, pp. 191, 207.

1932. KEPNER, W. A., and N. W. STIFF, pp. 221—229, tf. 1, pl. 1, f. 2—6.

1933. BRESSLAU, E., in KRUMBACH and KÜKENTHAL (1), p. 221.

1934. REISINGER, E., p. 241.

1935. PHILLIPS, H., pp. 322—330, tf. 1—25.

³ This author was not able to find the 1874 reference to VON GRAFF's work.
 Zool. Anz. Bd. 129.

1936. HYMAN, L., p. 14, pl. III, f. 1—5.

1937. FERGUSON, F. F., p. 30.

Macrostomum tuba VON GRAFF is an inhabitant of fresh water in many countries. It has been reported from France, Germany, Austria, Russia, Italy, Bulgaria, and the United States. A variety has been reported from Japan. The type of habitat seems to be ponds, lakes and rice fields.

The animal has a broadly rounded anterior and a reduced posterior end. The widest part is just behind the pharynx at about one-fourth of the body length. This form appears to be colorless in the European representative. It measures up to 2.5 mm. in length. Despite the large number of references to this form there is no figure existing on its gross anatomy.

Rhabdites are described as being more thickly concentrated on one end and measure 15μ in length. They are developed in groups of from two to seven over the body surface. The ciliated body surface is also supplied with sensory hairs which are thickly arranged at the anterior end. The epidermis of the "tail" region is supplied with "Haftpapillen". Subdermal mucous glands empty to the exterior by means of these papillae (Fig. 13).

The eyes are found in the normal position anterior to the pharynx. The anatomy of the brain has not been described, but is said to compare with that of *M. appendiculatum* (O. FABR.) (*M. hystrix* OERS.).

There is no definite boundary to the oval pharyngeal cavity. This cavity, which is bordered by the usual gland-cells which radiate into the parenchyma, is an elongated slit when viewed in optical section. The cavity is flattened laterally. The mouth occupies the anterior part of this pharyngeal slit. The elongate intestine has many small, lateral diverticula in its walls.

The testes occupy a position lateral to the anterior third of the intestine. The cavities are conspicuous, being outlined by grayish masses of sperm-cells. The vasa deferentia follow the usual lateral course to converge just posterior to the end of the intestine where the false vesicula seminalis is developed. The long axis of the vesicula seminalis is approximately at right angles to the longitudinal body axis. A short ductus ejaculatorius joins the seminalis with the vesicula granulorum, which extends laterally and somewhat anteriorly from the latter organ. VON GRAFF described the vesicula seminalis thusly: "Der muskulöse Theil des Penis ist retortenförmig und (wie in meinen aus dem Jahre 1874 stammenden Notizen steht) von einem Drüsenepithel ausgekleidet und empfängt in seinem

Grunde eine Anzahl kleiner accessorischer Drüsen, welche die zwischen Penis und der dickwandigen Samenblase eingeschaltete Verengerung besetzen." Apparently VON GRAFF did not consider the vesicula granulorum as a discrete organ, and yet his figure shows them to be discrete. Both the seminalis and granulorum empty by contraction.

The penis-stilette is joined by a narrow tube to the distal part of the granulorum. The stilette is an elongated tube which is gradually reduced in size from its base to its enlarged termination. VON GRAFF's original description shows it to be curved distally only. The termination of the stilette has a true bulbar-form in that the walls are not thickened but merely expanded. The opening is terminal and circular in shape. The stilette measures about 300 μ in length.

The sperm-cell (Fig. 13) is composed of a fine feeler, a body region, and a long filamentous "tail". Three lateral setae are present at the origin of the "tail."

The ovaries are transparent and follicular in form. They occupy a lateral position in the mid-body. The follicles which join in the "Sammelgang" are comprised of many oöcytes. The morphology of the oviducts, common oviduct, and genital atrium is regular.

Species Diagnosis.

Macrostomum tuba VON GRAFF: Body rounded anteriorly, posteriorly reduced, colorless, sensory hairs abundantly supplied anteriorly, "Haftpapillen" posteriorly developed, accessory gland-cells communicate with vesicula granulorum at ductus ejaculatorius, penis-stilette is elongate, gradually reduced tube with distal bulbus (length about 300 μ), opening terminal and circular, sperm-cell has feeler, middle part, lengthy tail, three lateral setae, ovaries follicular, body length up to 2.5 mm.

Macrostomum tuba var. *gigas* OKUGAWA.

Macrostomum tuba var. *gigas* OKUGAWA has been found at Kyota, Osaka, and at Lake Biwa, Japan.

This form has an acuminate anterior end and a spatulate posterior "tail" region. The body is widest at the mid-level and measures 3.5 mm. by .8 mm.

The reniform eyes are distinctly provided with lens. The excretory system is provided with a posterior commissure. The posterior region is supplied with "Haftpapillen".

The testes in their morphology resemble those of *M. tuba*

VON GRAFF. The vesicula seminalis and vesicula granulorum occupy a median posterior position.



Fig. 14. *M. tuba gigas* Okugawa. Terminus of penis-stilette, \times ?. (After Okugawa, 1930.)

The penis-stilette is slightly curved and measures about 200μ . The distal region is knobbed; the walls at this point being asymmetrically thickened, while the caliber of the genital canal remains the same in this region. The opening is terminal and circular in shape (Fig. 14, *op*).

Variety Diagnosis.

Macrostomum tuba var. *gigas* OKUGAWA: Body anteriorly acuminate, posterior spatulate, excretory system with posterior commissure, "Haftpa-pillen" present, penis-stilette (length 200μ) is elongate bent tube with knobbed termination, opening terminal and circular, body measures up to 3.5 mm. in length.

Macrostomum vej dovskýi mihi.

The material for the study of *Macrostomum vej dovskýi* mihi⁴ was collected by Dr. T. K. RUEBUSH of the Osborne Zoological Laboratory, who kindly forwarded it to me. This animal lives in the waters of the Yale Game Preserve, New Haven, Connecticut.

The animal has a colorless boat-shaped body (Fig. 15) with a pronounced spatulate "tail". The average measurements are 1.7 mm. by .7 mm. Epidermal green-brown cells of about 27μ in diameter are present as inclusions.

Rhabdites, sensory hairs and cilia are present on the epidermis. The sensory hairs are chiefly confined to the lateral areas. Spines are absent.

The eyes are embedded in the edge of the "brain". The "brain" is regular in morphology.

The position of the testes is unusually anterior (Fig. 15, *t*). They have smooth lateral walls and heavily indented median walls. Vasa deferentia (*vd*) extend from the testes in a normal manner to the vesicula seminalis (*vs*) located in the mid-line of the body. The vesicula granulorum has ciliated chambers. The penis-stilette connects with the vesicula granulorum (*vg*) in a special neck-like part of that structure. The penis-stilette (Fig. 16) is unusually small for an animal of this size. It measures 35μ in length. Morphologically, the stilette is a simple, curved, funnel-like tube with a sub-terminal opening which is subtended by the pointed end.

⁴ *M. vej dovskýi* is named in honor of the venerable Dr. F. VEJDOVSKÝ of Prague, who has consistently furnished valuable research in *Turbellaria* over an unusual period of time.

The base is crenated. The male gonopore (*mg*) is ciliated and is located at the end of the stilette.

With the exception of the width of the ovaries and oviducts, the female sexual system bears no especial features.

The sperm-cell (Fig. 17) is spindle-shaped and measures 50μ in length. Two setae are present and there is a very large undu-

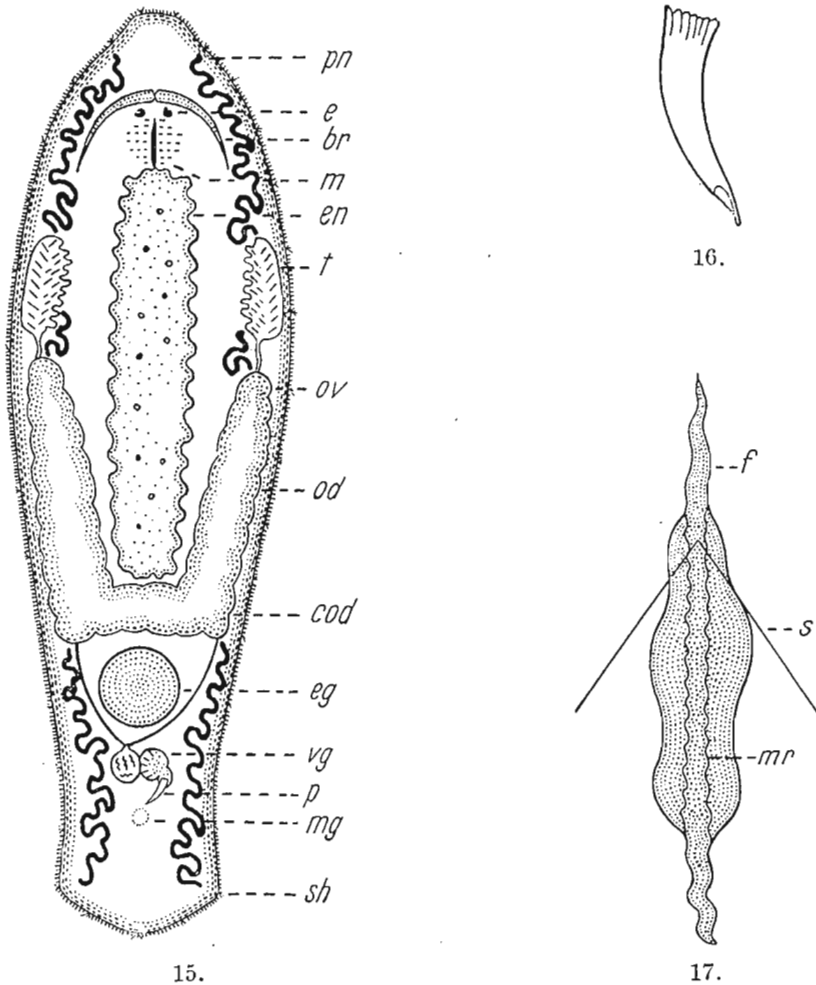


Fig. 15. *M. vej dovskij mihi*. Dorsal view of gross anatomy, 50 \times .
 Fig. 16. *M. vej dovskij mihi*. Penis-stilette, 600 \times .
 Fig. 17. *M. vej dovskij mihi*. Mature sperm-cell, 1000 \times .

lating "Mittelrippe" on the mid-line of the surface of the cell extending from feeler to "tail". Chromatin material is not visible in this sperm-cell.

Previous workers in this field have not described an animal having the features which are peculiar and specific to this species.

Species Diagnosis.

Macrostomum vej dovskij new species: Body boat-shaped, anteriorly acuminate, posteriorly spatulate, epidermal rhabdites, sensory hairs, cilia present, "brain" ganglia crescentric, testes far anterior, ciliated chambers in vesicula granulorum, penis-stilette (35μ long) is slightly curved funnel with crenate base and pointed end, opening oval and subterminal, sperm-cell

with feeler, middle undulant region, two lateral setae, and "tail" region (length $52\ \mu$) body length up to 1.7 mm.

Macrostomum virginianum FERGUSON.

1937. *Macrostomum virginianum* FERGUSON. F. F. FERGUSON in: Zool. Anz. **119**, 1/2 (1937).

The figures to the text of the above reference and the species diagnosis are included here for purposes of comparative study.

Species Diagnosis.

Macrostomum virginianum FERGUSON: Body dorso-ventrally compressed, extremities rounded, epidermal rhabdites, sensory hairs, spines, cilia present, ciliated chambers in vesicula granulorum, penis-stilette ($62\ \mu$ in length) is proximally bent at right angles, extends to sharpened termination with opening on convex side, sperm-cell composed of feeler, middle part with chromatin granules and two setae and "tail" region ($35\ \mu$ long), body length up to 1 mm.

Paratype: U.S.N.M. No's. 20472, 20473, 20474, 20475, 20476, 20477, 20478, 20479.

Macrostomum viride E. BENEDEN.

1870. *Macrostomum viride*, E. BENEDEN in: Étude Zoolog. et anat. du genre *Macrostomum* et description de deux espèces nouvelles. Bull. Ac. Méd. Belg. (2 sér) **30** (1870) 117, p. 11.

1882. *Macrostomum viride*, L. GRAFF, Monogr. Turbell., **1**, 243.

1885. *Macrostomum viride*, M. BRAUN in: Arch. Dorpat. Ges. Naturk. ser. **2**, **10**, 138.

1891. *Macrostoma viride*, ZACHARIAS in: ZACHARIAS, Tier u. Pflanzen. Süßw., **1**, 255, f. 52—54.

1894. *Macrostoma viride*, FUHRMANN in: Rev. Suisse Zool., **2**, 227.

1905. *Macrostoma viride*, A. LUTHER in: Festschr. Palmén, **1** (5), 4, 48. tf. 3, t. 1, f. 1, 9, 11; t. 2, f. 2, 3, 9; t. 3, f. 8; t. 4, f. 8—11, 23—25, 29, 36—39.

1909. *Macrostoma viride*, L. GRAFF in: BRAUER, Süßw., **19**, 77, f. 157.

1875. DE MAN, J. G., p. 99.

1905. BRINKMAN, A., p. 35.

1905. PLOTNIKOW, W., p. 63.

1907. HOFSTEN, N. v., p. 409.

1908. GRAFF, L., in BRONN, H. G., pp. 2152, 2233, 2239, 2290, 2573.

1912. HOFSTEN, N. v., p. 4.

1913. GRAFF, L., p. 51.

1915. MEIXNER, J., p. 468.

1917. BEKLEMISCHEFF, W., p. 349.

1918. LUTHER, A., p. 48.

1920. HOFSTEN, N. v., p. 4.

1923. NASSONOV, N., pp. 330, 342.

1926. NASSONOV, N., p. 821.

1930. OKUGAWA, K., p. 78.

1934. REISINGER, E., p. 247.

Macrostomum viride BENEDEN has a wide distribution, having been reported from the fresh waters of Sweden, Denmark, Germany, Switzerland.

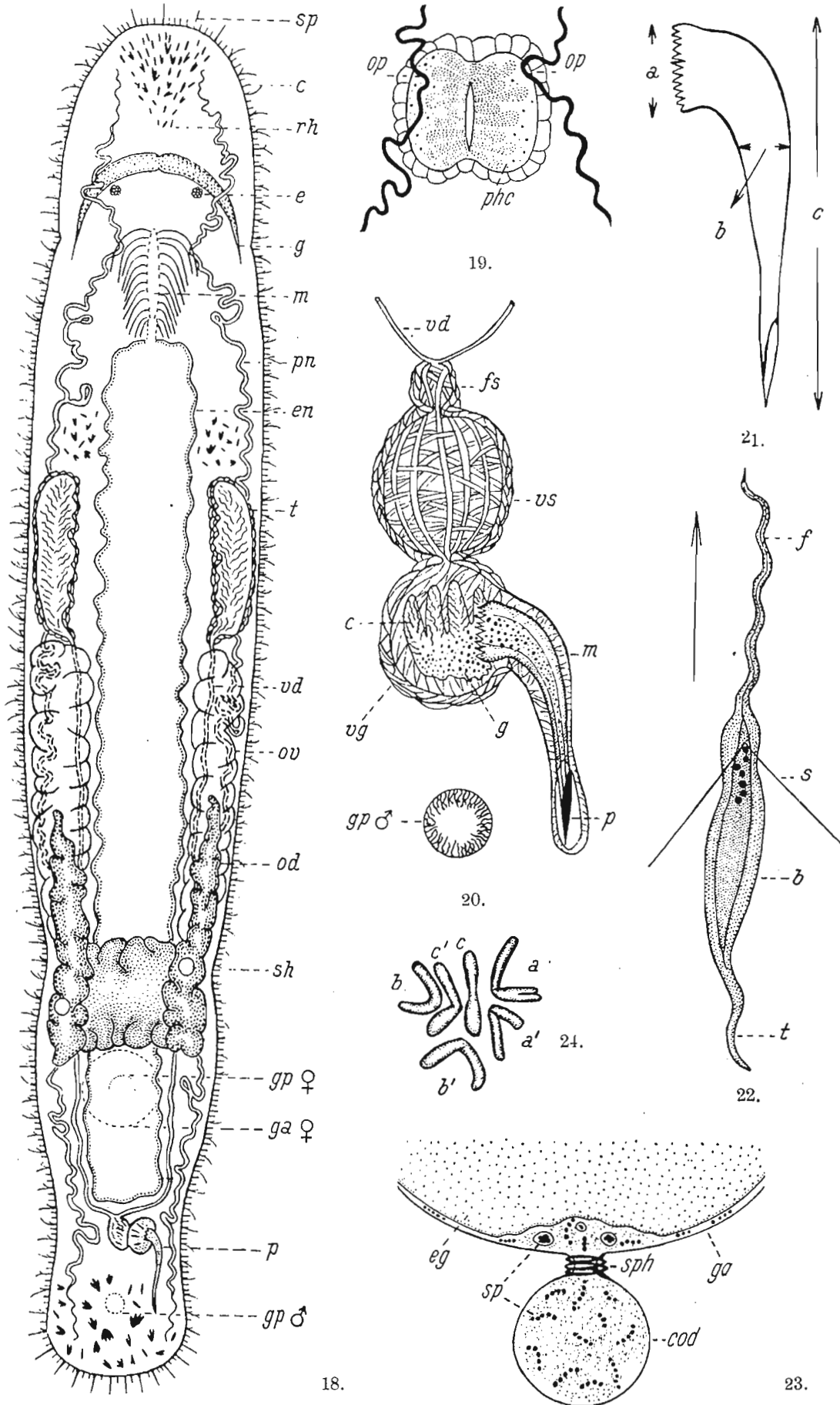


Fig. 18. *M. virginianum* Ferguson. Dorsal view of gross anatomy, 150 ×.

Fig. 19. *M. virginianum* Ferguson. Detail of protonephridia near mouth, 150 ×.

Fig. 20. *M. virginianum* Ferguson. Male sex apparatus, 400 ×.

Fig. 21. *M. virginianum* Ferguson. Penis-stilette, 835 ×.

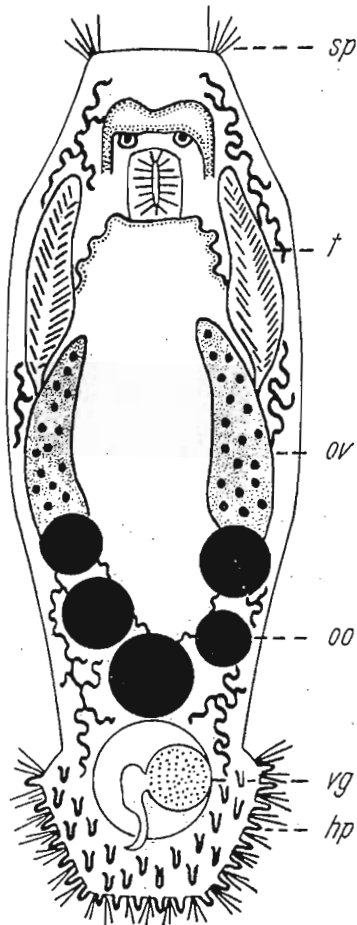
Fig. 22. *M. virginianum* Ferguson. Mature sperm-cell, 2250 ×.

Fig. 23. *M. virginianum* Ferguson. Section showing position of sperm-cells in female genital atrium and common oviduct, 780 ×. — Fig. 24. *M. virginianum* Ferg. Meiotic chromosomes, 8000 ×.

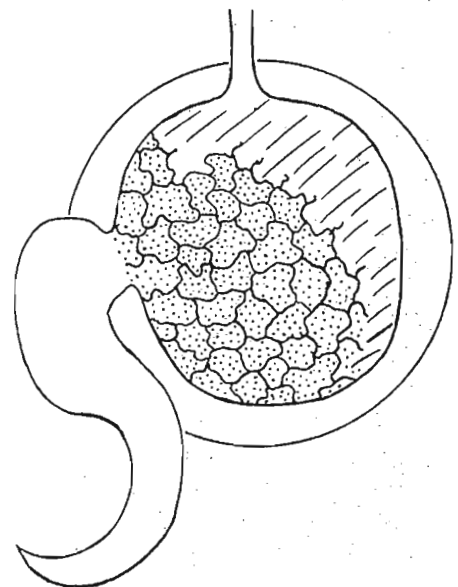
Italy, Belgium, France, Russia, and Siberia. It was originally described from Louvain in 1870.

This dorso-ventrally flattened animal is anteriorly truncated and has a posterior spatulate "tail" (Fig. 25).

The entire body, which measures 2 mm. by .5 mm., is ciliated except for the posterior adhesive disk, which is supplied with "Haftpapillen". Spines are interspersed between the papillae.



25.



26.

Fig. 25. *M. viride* Beneden. Dorsal view of gross anatomy, \times ?. (After Beneden, 1870, p. 11.)
 Fig. 26. *M. viride* Beneden. Penis-stilette, \times ?. (After Beneden, 1870, p. 11.)

Club-shaped rhabdites are developed in groups of two and five and measure about 14μ in length. They are more numerous posteriorly.

The morphology of the "brain" is regular, being composed of two ganglia with an indented commissure. The eyes, which contain a lens, are connected to the posterior tissues of the "brain".

The enteron has many temporary lateral diverticula. This digestive sack with its greenish content furnished the specific name for this form.

The parenchyma in its absorption of the digested material is compared to the blood of higher forms by BENEDEEN.

The excretory system in *Macrostomum* was first described by BENEDEEN in this species. Previously this anastomosing system of tubules which extend the length of the body had been thought to be respiratory in nature. BENEDEEN refuted this theory of MAX SCHULTZE and O. SCHMIDT in his original description of this species remarking: "La respiration doit s'opérer avec la plus grande facilité par la surface du corps couverte de cils vibratiles et dépourvue de cuticule, et l'on ne voit guère la nécessité pour ces animaux d'avoir un appareil aquifère pour faciliter les phénomènes de respiration." The external opening to the protonephridia was not observed.

The testes (Fig. 25, *t*) are smooth-walled, elongate, oval organs which are described as being of a granular nature in their anterior region and being filled with a bolus of sperm-cells in various stages of development in the posterior region. The vesicula seminalis coalesces for its entire length with the vesicula granulorum. The penis-stilette is stated to be curved in an S-shape⁵ (Fig. 26). The mature sperm-cells have a long spindled head and a single seta which is inserted at the beginning of the "tail" region.

The ovaries are lobed, corresponding in their anatomy to the usual development in this genus. BENEDEEN first signified the method by which developing oöcytes are nourished in *Macrostomum*: "Dans les *Macrostomum* il n'existe pas de glande spéciale pour l'élaboration des éléments nutritifs du vitellus: c'est le protoplasme des œufs qui fait fonction de cellules sécrétoires, et l'œuf élabore lui-même, aux dépens du liquide nourricier les éléments destinés à nourrir le futur embryon. Cependant, chez le *Macrostomum viride*, il se développe dans le parenchyma, qui entoure les œufs les plus avancés, des cellules chargées de granulations vitellines, qui pénètrent dans le protoplasme des œufs encore dépourvus de membrane, pour se fondre avec le corps protoplasmique de l'œuf." BENEDEEN did not locate the female gonopore in this species.

This description was gleaned from the numerous references noted above upon this form.

Species Diagnosis.

Macrostomum viride BENEDEEN: Body dorso-ventrally flattened, anteriorly truncated with posterior spatulate "tail", "Haftpapillen" present, spines

⁵ The original drawing does not show it to be S-shaped.

present at extremities, testes and ovaries claviform, penis-stilette is curved in S-shape, sperm-cells with single seta, body length up to 2 mm.

Artificial Key to the Valid Species of the Genus
Macrostomum.

(Prepared by WAYLAND J. HAYES, JR.,

Miller School of Biology, University of Virginia.)

The following key is based largely upon the morphology of the penis-stilette because this has been recognized as a diagnostic feature in *Macrostomum* little likely to change with the physiological state of the animal and least likely to be altered by differences of technique used for living and fixed material. For the purpose of concise statement, certain definitions will be made here and

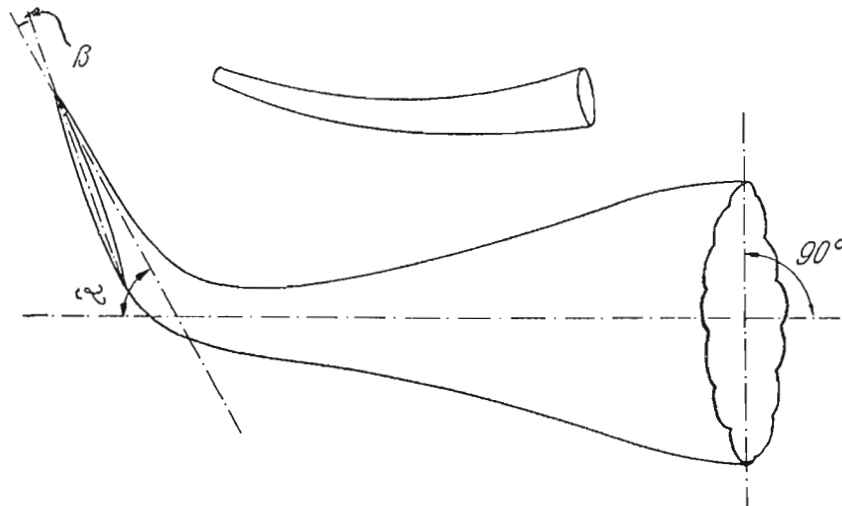


Fig. 27. Diagram to accompany Key.

complicated with throughout the key. A bent stilette (see diagram Fig. 27) is one evenly arced throughout its length. A flexed stilette (see diagram) is one consisting of two relatively straight portions whose axes differ by a certain angle of flexure (angle α). Either the proximal or the distal end of the stilette may be cut off squarely (so that the angle of truncation is 90°), or obliquely (so that the angle of truncation may be measured by an angle β , less than 90°).

1. (22) Stilette distally enlarged. 2
2. (7) Stilette enlargement not bulb-like, but flared or split terminally 3
3. (4) Terminus of stilette not split but flared. *M. glocostylum* mihi.
4. (3) Terminus of stilette split 5
5. (6) Lip of stilette on convexity of distal curve distinctly longer than the other lip *M. gieysztori* mihi
6. (5) Lips of stilette on convexity and concavity of distal curve equal in length *M. timari* GRAFF
7. (2) Stilette enlargement bulb-like, not split or flared terminally 8

8. (13) The very distal end of the stilette flexed or at least more markedly bent than the remainder of the shaft. 9
9. (10) Terminal thickening of stilette wall greater on the convexity of the curve and developed gradually along the entire length of the shaft.
M. infundibuliferum PLOTNIKOW
10. (9) Terminal thickening of the stilette wall approximately equal on the convexity and concavity of the curve 11
11. (12) Stilette with the opening directed backward toward the base of the shaft. *M. graffi* mihi
12. (11) Stilette with the opening directed somewhat to the side but not backward. *M. tennesseensis* mihi
13. (8) Distal end of stilette not flexed, the middle or basal portion flexed or unflexed. 14
14. (19) Shaft of stilette nearly straight or if gradually bent in the distal portion then with the distal enlargement due to an expansion of the lumen and not to a thickening of the wall 15
15. (16) Terminal enlargement symmetrical, not due to an enlargement of the lumen but to a marked thickening of the wall.
M. bulbostylum mihi
16. (15) Terminal enlargement asymmetrical, or if symmetrical, then due to an enlargement of the lumen not to a thickening of the wall . . 17
17. (18) Terminal enlargement due to expansion of the lumen.
M. tuba GRAFF
18. (17) Terminal enlargement due to thickening of the wall not to expansion of lumen. *M. tuba gigas* OKUGAWA
19. (14) Shaft of stilette distinctly flexed; the terminal enlargement not due to an enlargement of the lumen 20
20. (21) Shaft with two flexures; opening terminal. . . . *M. lewisi* mihi
21. (20) Shaft with three flexures; opening just proximal to the tip.
M. reynoldsi mihi
22. (1) Stilette not distally enlarged. 23
23. (78) Distal end of stilette acuminate or obliquely truncated 24
24. (71) Opening of stilette terminal 25
25. (28) Stilette a straight or nearly straight tube. 26
26. (27) Stilette about 4 times as long as wide . . *M. orthrostylum* BRAUN
27. (26) Stilette about 12 times as long as wide. *M. stylopencilum* JONES
28. (25) Stilette curved in some way, not straight. 29
29. (38) Stilette bent gradually along its entire length, not having a special flexure in any given region 30
30. (31) Wall of stilette provided with conspicuous ridges extending around the shaft. *M. gracile* PEREYASLAWZEWA
31. (30) Wall of stilette without ridges around the shaft 32
32. (33) Stilette bent to form an arc of 90° or less . . *M. thermale* REISINGER
33. (32) Stilette spiralled so that its perpendicular projection forms an arc greater than 270°. 34
34. (35) Basal opening of stilette on the side *M. viride* BENEDEN
35. (34) Basal opening of stilette distinctly terminal 36
36. (37) Stilette about 4 times longer than the greatest width.
M. collistylum mihi

37. (36) Stilette about 8 times longer than its greatest width.
M. lineare ULJANIN
38. (29) Stilette not gradually bent but flexed in one or more given regions 39
39. (44) One or more flexures of stilette near proximal end of shaft . . . 40
40. (43) Shaft with only one flexure 41
41. (42) Base of stilette crenate; length less than 75 micra.
M. virginianum FERGUSON
42. (41) Base of stilette not crenate; length greater than 75 micra.
M. boreale RIEDEL
43. (40) Shaft with two flexures *M. riedeli* mihi
44. (39) One or more flexures of stilette near distal end 45
45. (46) Ciliated pits present. *M. obtusum* VEJDOVSKÝ
46. (37) Ciliated pits absent 47
47. (48) Distal end of stilette cut off almost at right angles to the shaft; opening almost circular *M. curvistylum* mihi
48. (47) Distal end of stilette cut off at an angle of 40° or less to the shaft; opening narrowly elliptical. 49
49. (50) Stilette 200 or more micra long *M. intermedium* Tr.
50. (49) Stilette less than 200 micra long 51
51. (52) With two slight flexures in the shaft, one almost equidistant from the two ends, the other near the distal end. *M. gilberti* mihi
52. (51) Shaft with only a single flexure located near the distal end . . 53
53. (54) With striking pigmentation of the pharyngeal glands.
M. phillipsi FERGUSON and STIREWALT
54. (53) Without pigmentation of pharyngeal glands.
(*M. ruebushi* and varieties) 55
55. (68) Without a distinct lip extending distally beyond the terminal opening 56
56. (57) With the proximal end of the stilette markedly obliquely truncate.
M. ruebushi mihi
57. (56) With the proximal end of the stilette truncated at about right angles to the axis of the shaft 58
58. (59) With the distal part of the stilette flexed so as to form an angle of more than 90° with the shaft . . *M. ruebushi* var. *recurvostylum*
59. (58) With distal part of stilette flexed through an angle less than 90° 60
60. (61) Sensory hairs 75 μ long . . . *M. ruebushi* var. *finlandensis* mihi
61. (60) Sensory hairs not as long as 75 μ , usually much shorter; enteron not extending beyond the female genital pore, usually not reaching the level of the pore 62
62. (63) Sperm with neither flagella nor setae.
M. ruebushi var. *crenatostylum* mihi
63. (62) Sperm with either flagella or setae 64
64. (65) Sperm with flagella *M. ruebushi* var. *frigorphilum* mihi
65. (64) Sperm with setae 66
66. (67) Walls of stilette undulant, widest at the base; stilette about 72 μ long.
M. ruebushi var. *granulophorum* mihi
67. (66) Walls of stilette not undulant, slightly widened just below the base; stilette about 100 μ long *M. ruebushi* var. *truncatum* mihi

- 68. (55) With a distinct lip extending distally beyond the terminal opening 69
- 69. (70) With proximal end of stilette truncated at right angles to the axis of the shaft *M. ruebushi* var. *carolinensis* mihi
- 70. (69) With proximal end of stilette truncated obliquely.
M. ruebushi var. *shenandoahensis* mihi
- 71. (24) Opening of stilette sub-terminal 72
- 72. (77) Opening set back from the distal end by a distance equal twice the length of the opening 73
- 73. (76) Protonephridia without vesicular dilations in their course . . . 74
- 74. (75) Protonephridia opening by paired lateral pores.
M. appendiculatum (O. FABR.)
- 75. (74) Protonephridia opening by a single median pore associated with the mouth *M. appendiculatum* var. *sillimani* mihi
- 76. (73) Protonephridia with large vesicles in the lateral main-stems.
M. beaufortensis FERGUSON
- 77. (72) Opening set back from the distal end of the stilette by a distance scarcely equal the length of the opening . . . *M. vej dovskýi* mihi
- 78. (23) Distal end of stilette blunt, truncated almost at right angles . . 79
- 79. (82) Shaft of stilette gradually and slightly curved, not distinctly flexed in any particular region 80
- 80. (81) Walls of the stilette equally thick on the concavity and convexity of the curve *M. thermale* REISINGER
- 81. (80) Wall of the stilette thicker on the convexity than on the concavity of the curve *M. infundibuliferum* PLOTNIKOW
- 82. (79) Shaft of stilette distinctly flexed 83
- 83. (84) Shaft of stilette flexed near the proximal end. . . *M. boreale* RIEDEL
- 84. (83) Shaft of stilette flexed near the distal end 85
- 85. (88) Shaft with two distinct flexures distally. 86
- 86. (87) Shaft with the convex side of the most distal flexure reinforced by a thickening of the wall. Neither flexure at right angles; the proximal flexure acute, the distal flexure obtuse . . . *M. beauchampi* mihi
- 87. (86) Shaft with the convex side of the most distal flexure not reinforced by a thickening. Both flexures of approximately 90°. *M. nassonovi* mihi
- 88. (85) Shaft with one distinct flexure. 89
- 89. (90) Proximal and obliquely truncate *M. rhabdophorum* BEKLEMISCHEFF
- 90. (89) Proximate end truncated at right angles to the axis of the shaft, with or without dentations 91
- 91. (92) With a lamella developed on the outside of the stilette wall along the distal third of the shaft *M. saifunicum* NASSONOV
- 92. (91) Stilette without a lamella 93
- 93. (94) With the terminal flexure less than 90°. . . *M. curvistylum* mihi
- 94. (93) With the terminal flexure more than 90° *M. japonicum* OKUGAWA

Species Dubiae of the Genus *Macrostomum* O. SCHMIDT.
Macrostomum album HIGLEY.

1918. *Macrostoma album*, R. HIGLEY in: Ill. Biol. Mono. 4 (3), 39—42, pl. 1, f. 21.

The work of HIGLEY (1918) upon this form is so meager in its taxonomy

and morphology as to warrant its permanent position in species dubiae of the genus *Macrostomum* O. SCHM. For example, she states that "male chitino spicules are shorter, more simple and not so sharply pointed" (HIGLEY 1918, p. 42). No such spicules exist in *Macrostomum*. Again she says: "Ovaries are dorsal to testes" (p. 42). This is not like any *Macrostomum* reported to date. Her form is therefore so poorly presented that I am scarcely justified in giving it the rank of a species dubiae; for I am of the opinion that she did not have a *Macrostomum*.

Macrostomum anocele RIEDEL.

1932. *Macrostomum anocele*, G. RIEDEL in Vidensk. Meddel. Dansk. naturh. Foren. **94**, 33—107, T. I—IV.

In a communication dated December 14, 1937, to this present author, Dr. GRETA RIEDEL has explained that *M. anocele* = *M. boreale* RIEDEL and that its presence in that paper is due to a typographical error.

Macrostomum hystrix OERSTED (LUTHER 1905).

1905. *Macrostoma hystrix* OERSTED, A. LUTHER in: Festschr. Palmén 1(5): 4, 48, tf. 2; t. 1, f. 2, 4—8, 10, 17—19, 27; t. 2, f. 1, 7, 8, 10; t. 3, f. 1—8; t. 4, f. 1—7, 16—22, 28, 31—35.

VON GRAFF (1913) has shown that *M. hystrix* OERSTED and *M. appendiculatum* (O. FABR.) are synonymous. Thus, this present author is prone to doubt the identity of the form described by LUTHER (1905) under the name of *M. hystrix* OERSTED, since it does not conform to the many accurate descriptions which have been given for *M. appendiculatum* (O. FABR.). Moreover, since the *M. hystrix* OERSTED of LUTHER (1905) very closely resembles *M. ruebushi finlandensis* mihi (*M. viride* BENEDEN of LUTHER 1905), *M. hystrix* OERSTED, *M. viride* BENEDEN of LUTHER 1905, and *M. ruebushi* var. *finlandensis* are synonymous. It is concluded that LUTHER was working with the same form when he gave the very fine anatomical descriptions of *M. hystrix* OERSTED and *M. viride* BENEDEN. They resemble greatly as pertaining to their morphology, the hyaline spaces in the surface epithelium, the anatomy and orientation of the eyes, the morphology and number of chromosomes, the morphology of the spermatozoa, and, above all, the extreme resemblance of the penis-stilettes (Compare Fig. 28, and Fig. 13, part VI). For these reasons and in the interest of better taxonomy in the genus *Macrostomum* the "*Macrostomum hystrix* OERSTED" is assigned to species dubiae with the hope that future work will clarify the situation.

Macrostomum kawamurai OKUGAWA.

1930. *Macrostomum kawamurai*, K. OKUGAWA in: Mem. Coll. Sci. Kyoto. Ser. B. **5** (1), (75—88), 77, tf. 6—9.

This form was erroneously identified by OKUGAWA (1930), who later realized his error in OKUGAWA (1932) in which paper *M. kawamurai* OKUGAWA = *M. saifunicum* NASSONOV. It must be said in favor of Dr. OKUGAWA that the excellency of his original description enabled him to correct this error later.

Macrostomum lutheri GIEYSZTOR.

1930. *Macrostomum lutheri*, M. GIEYSZTOR in: Arch. of Hydrobiol. and Ichthyol. 5 (3-4), 3, 4, f. 4.

One specimen of this poorly described species has been found at the University of Varsovie by Dr. MARJAN GIEYSZTOR.

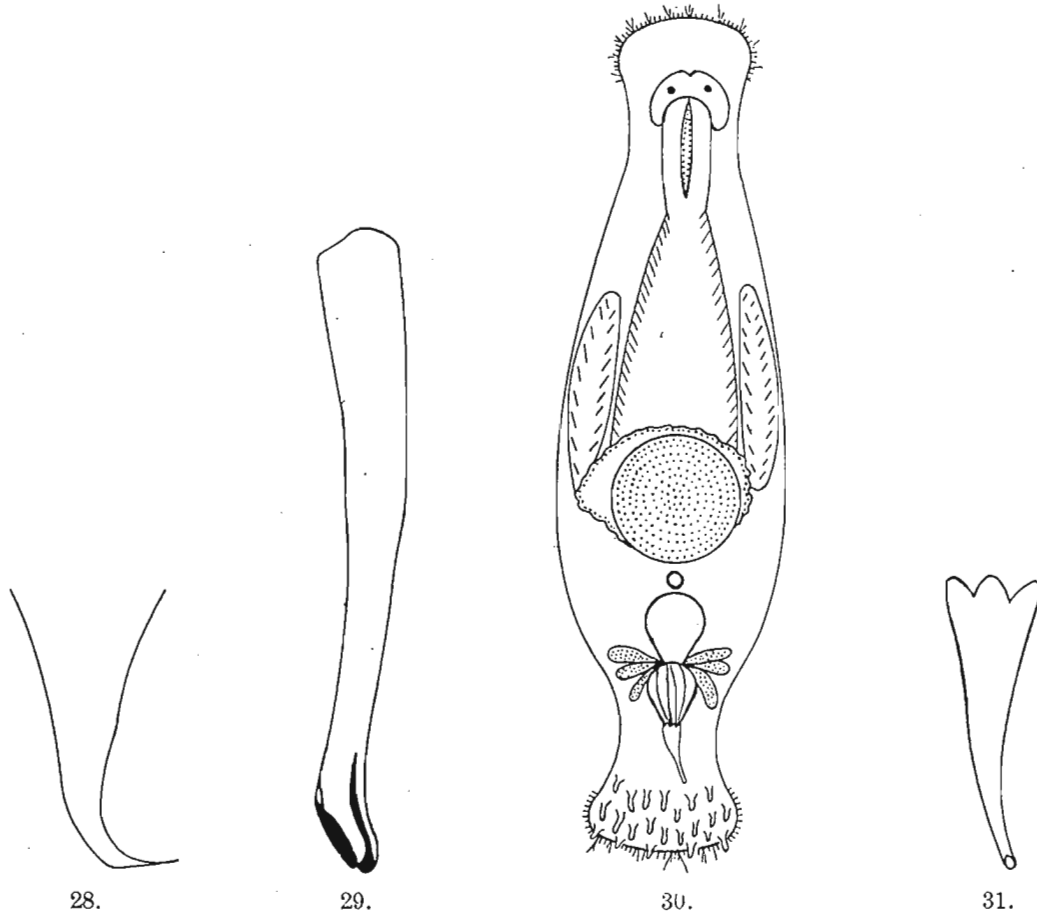


Fig. 28. *M. hystrix* Oersted. Penis-stilette, \times ?. (After Luther, 1905, Taf. III, Fig. 8.)

Fig. 29. *M. lutheri* Gieysztor. Penis-stilette, \times ?. (After Gieysztor, 1931, Fig. 4.)

Fig. 30. *M. megalogastricum* Pereyaslawzewa. Gross anatomy, \times ?. (After Pereyaslawzewa, 1892, pl. 17, Fig. 1.)

Fig. 31. *M. megalogastricum* Pereyaslawzewa. Penis-stilette, \times ?. (After Pereyaslawzewa, 1892, pl. 17, Fig. 1.)

It is stated that the animal was so thoroughly flattened out in examination that only the stilette (Fig. 29) was studied. The other *Macrostomum* described by GIEYSZTOR (1931) appears to be a variety of

M. bulbostylum mihi.

M. lutheri GIEYSZTOR has a body length of more than 2 mm.

The penis-stilette (Fig. 28) is depicted as an irregular tube with a distal terminal splitting of the thickened walls.

Taxonomically, *M. lutheri* is placed in species dubiae of the genus *Macrostomum* because of the unscientific methods used and the lack of material upon this animal. It is this present author's opinion that the stilette shown in figure is a greatly flattened and distorted stilette of *Macrostomum bulbostylum* mihi described in the same paper (GIEYSZTOR 1931).

Macrostomum megalogastricum PEREYASLAWZEWA.

1892. *Macrostoma megalogastricum*, PEREYASLAWZEWA in: Zap. No-voross. Obsheh., 17 (3), 243, t. 3, f. 18.

1905. *Macrostoma megalogastricum*, A. LUTHER in: Zur Kenntnis der Gattung *Macrotoma*. Festschrift für Palmén. N. 05. Helsingfors, pp. 28—37.

1908. *Macrostomum megalogastricum*, L. GRAFF in: Klassen und Ordnungen des Tierreichs, wissenschaftlich dargestellt in Wort und Bild. 4: Vermes, Abt. Ic: Turbellaria. Leipzig, p. 2590.

1913. *Macrostomum megalogastricum*, L. GRAFF in: Tierreich. Turbellaria II. Rhabdocoelida. Berlin, p. 51.

Macrostomum megalogastricum PEREYASLAWZEWA is an inhabitant of the waters of the Black Sea. The inadequate description of the male genital system, and the failure to have observed the female system in the single specimen found constitutes reasons for placing the species of PEREYASLAWZEWA under the category of species dubiae. This author hopes that the drawings of the original work will aid future workers to recognize it and prompt them to redescribe it (Figs. 30 and 31).

Macrostomum ophiocephalum STEINBÖCK.

1931. *Macrostomum ophiocephalum*, O. STEINBÖCK in: Zool. Faoes. Copenhagen, p. 1—26, tf. 8, 9.

This species lacks foundation. STEINBÖCK inadequately described the stilette as being short and terminally bent. This would apply to many stilettes in the genus. Also, the fact that his form lacked eyes is not of taxonomic significance, since eyes may appear and disappear in the same animal. This variable feature cannot be used as a valid diagnostic character. Because of the above facts, and since only one specimen was examined, *M. ophiocephalum* STEINBÖCK is assigned to species dubiae.

Macrostomum pseudoobtusum BEKLEMISCHEFF.

1927. *Macrostomum pseudoobtusum*, BEKLEMISCHEFF, W. in: Bull. Inst. Biol. Perm. 5, 202, t. 1, f. 4.

Macrostomum pseudoobtusum BEKLEMISCHEFF is a marine form living in the Black Sea at Sewastopol. The description, as given by BEKLEMISCHEFF (1927, p. 202, t. I, fig. 7), is based upon a single specimen. The drawing of the stilette (Fig. 32) suggests that it may have been made from a distorted specimen. Thus, because of the scanty information, *M. pseudoobtusum* BEKLEMISCHEFF is placed in species dubiae.

Macrostomum setosum SCHMARDA.

1859. *Macrostomum setosum* SCHMARDA in: Neue wirbell. Th., 5, 1 I, p. 7, tf. 15, 15a.

1862. *Spiroclytus setosus*, DIESING in: SB. Ak. Wiss. Wien, 5, 45 I, p. 225.

1882. *Macrostomum setosum*, PARADI in: Math. term. Közlem., 18, 112.

1882. *Macrostoma setosum*, L. GRAFF, Mongr. Turbell., 1, 244.

1905. LULHER, A., pp. 26—28.

1913. GRAFF, L., p. 55.

Macrostomum setosum SCHMARDA is recorded here as a species dubiae because of the fact that, except for the contour of the body and the position of the eyes, no diagnostic features have been given for this species.

Macrostomum thermophilum RIEDEL.

1932. *Macrostomum thermophilum*, G. RIEDEL in: Vidensk. Meddel. Dansk. Naturhist. Foren. **94**, 33—107, t. I, f. 1; t. 11, f. 6; tf. 17, 26.

1934. REISINGER, E., p. 250.

Macrostomum thermophilum RIEDEL is an inhabitant of the hot springs of Disco Island in Engelskmandshavn, Greenland. This spring, whose temperature ranges between 15.5—17.0°, is situated 2 meters above the sea level,

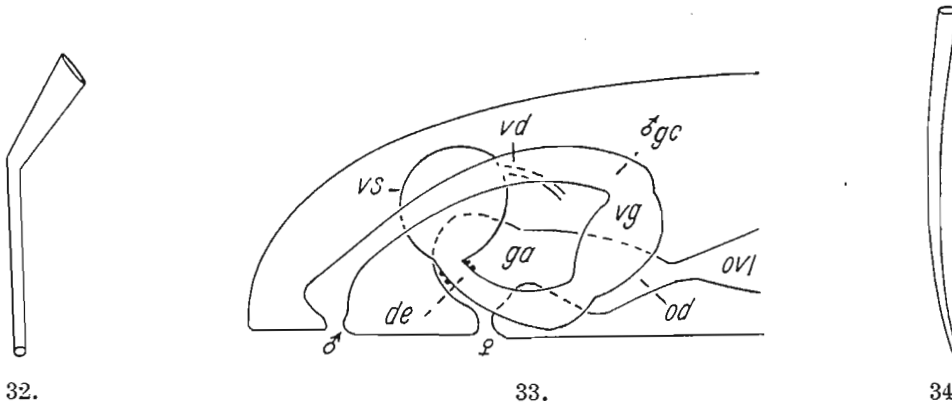


Fig. 32. *M. pseudoobtusum* Beklemischeff. Penis-stilette, ×?. (After Beklemischeff, 1927, Taf. I, Fig. 7.)
 Fig. 33. *M. thermophilum* Riedel. Sex apparatus, ×?. (After Riedel, 1932, Text-Fig. 14.)
 Fig. 34. *M. thermophilum* Riedel. Penis-stilette, ×?. (After Riedel, 1932, Fig. 17.)

thus it is inferred, that since the spring was once below the water level that this is possibly a primitive marine form.

The animal appears to have a cephalic region which is wider than the rest of the body. There is a spatulate "tail" region. The body-length is 3 mm. as determined by sectioned material. The epithelial cubical cells of the dorsal body-surface are 2.7 μ in height; the ventral ones measure 3 μ in height. The cilia extending from the basal body-layer measure from 3 μ to 4 μ dorsally and ventrally up to 5 μ in length. The circular and longitudinal muscular layers of the external body layer are strongly developed. The inner body musculature is weakly developed.

The glands are dispersed in relatively small numbers over the entire body. Only the small cyanophil glands in the region of the mouth opening, and the isolated adhesive glands of the posterior body are to be observed well. Rhabdites are in packets of four and five dorsally and are lacking ventrally.

The pharynx, which measures 54 μ in length, is accompanied by a muscle-fiber layer for its entire course. The pharyngeal glands are normally developed. The flagellated enteron, which has a well developed epithelium, is filled with the residue of diatoms. Parasitic protozoa occur in the enteric cells and parenchyma.

The male sexual apparatus is characterized by a spheroidal vesicula seminalis, a lengthened ductus ejaculatorius, and an ovoid vesicula granulorum (Fig. 33, vs, de, vg). The penis-stilette is a simple, slightly curved, slender, non-pointed funnel (Fig. 34).

The length of the club-shaped ovaries (Fig. 32, *ov*) is about 46μ . The circular muscles of the partially flattened female genital atrium (*ga*) are well developed. Sperm-cells are in evidence in this structure. This structure is supplied by large, granular, reddish secretions which empty posteriorly into it.

Taxonomically, *M. thermophilum* RIEDEL is disposed of in species dubiae. The following reasons are presented for this: The study was made upon an insufficient amount of material, only fixed material in the contracted state was used by RIEDEL, the "habit sketch" made by STEINBÖCK is very poor, the penis-stilette was neither measured nor carefully drawn, and, above all, in the drawing (Fig. 32) of the sex apparatus the vesicula seminalis is shown dorsal to the female genital atrium, while the vesicula granulorum and the major portion of the genital canal are found anterior to the female genital atrium. A generic characteristic is that the vesicula seminalis, the vesicula granulorum, the ductus ejaculatorius and both the penis-stilette and male genital canal are to be found posterior to the female genital atrium. The penis-stilettes of this dubious form and that of the well described *M. thermale* REISINGER resemble somewhat. Both forms are thermophilic.

"*Macrostomum tubum*" (*M. tuba* VON GRAFF?).

1936. "*M. tubum*" (VON GRAFF), HYMAN, L. H. in: Trans. Amer. micr. Soc. 55 (1), 14, Jan. 1936.

HYMAN (1936) described a form of *Macrostomum* taken from aquaria in the American Museum of Natural History, New York City. Since the plants contained therein were exotic, it is still problematical as to whether *M. tuba* VON GRAFF actually exists in the United States. The paper contains good descriptions, yet those portions of the anatomy which are of taxonomic value are weakly described. It is particularly desirable to have an accurate account and drawings of the excretory system, the sperm cell and a detail of the enlarged penis-stilette termination. For these reasons the "*Macrostomum tubum*" of HYMAN (1936) is placed in species dubiae until further work will clarify the situation.

***Dendrobaena diomedea* Cognetti, ein für Deutschland neuer Lumbricide.**

VON DIETRICH WILCKE, Berlin¹.

(Aus dem Zoologischen Museum der Universität Berlin.)

(Mit 3 Abbildungen.)

Eingeg. 21. September 1939.

Während der Bearbeitung schlesischer Lumbriciden entdeckte ich bei der Durchsicht des mir freundlicherweise von Herrn Dr. PFÜTZENREUTER aus der Sammlung des Beuthener Landesmuseums überlassenen Materials zwei Exemplare aus Gräben (Kreis Ottmachau, Oberschlesien), die sich schon auf den ersten

¹ Stipendiat der Notgemeinschaft der Deutschen Wissenschaft.

