

A C T A Z O O L O G I C A
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Nematode genera of the family *Tripylidae* (Nematoda, Enoplida)

[4 text-figures]

Rodzaje nicieni z rodziny *Tripylidae* (Nematoda, Enoplida)

Роды нематод семейства *Tripylidae* (Nematoda, Enoplida)

The family *Tripylidae* was first described by OERLEY (1880). Later the investigators included various genera in it, but the systematics presented in the old studies is only of historical importance nowadays. W. SCHNEIDER (1939) classified two genera, *Tripyla* BASTIAN, 1865, and *Tobrilus* ANDRÁSSY, 1959, (= *Trilobus* BASTIAN, 1865, preocc.) in this family and distinguished two subgenera, *Tripyla* s. str. and *Trischistoma* COBB, 1913, in the first of them. In his outstanding work, T. GOODEY (1951) recognized *Trischistoma* COBB, 1913, to be synonymous with *Tripyla* BASTIAN, 1865, and left the two genera in the family *Tripylidae* just as W. SCHNEIDER (1939) did. The American authors, HOOPER and CAIRNS (1959), offering the systematics of the family after PENNAK considered four genera in it: *Tripyla* BASTIAN, 1865, *Tobrilus* ANDRÁSSY, 1959, *Trischistoma* COBB, 1913, and *Prismatolaimus* de MAN, 1880. I have already discussed the systematic position of the last genus (BRZESKI, 1960). MEYL (1960) as well as CLARK (1961) quite agreed with T. GOODEY (1951). LOOF (1961), however, suggested that in accordance with the assumptions of de MAN (1884), COBB (1893), and SCHURMAN STEKHOVEN (1951) the species *Tripyla monohystera* de MAN, 1880, and *T. arenicola* de MAN, 1880, do not belong to this genus, but should probably be placed in *Trischistoma* COBB, 1913.

In addition to the genera mentioned above two others described in the family *Tripylidae* are *Frostia* ALLGÉN, 1952, from Kenya and *Andrassya* BRZESKI, 1960, from Poland. The systematic position of these genera will be discussed below.

I am most deeply indebted to Dr. P. A. A. LOOF (Wageningen, Holland) for a number of specimens of various species and for his valuable remarks and informations. My heartfelt thanks are also due to Dr. S. A. SHER (Riverside,

California) and Dr. R. H. MULVEY (Ottawa, Canada) for the preparations that I received from them. I wish to express my gratitude to Dr. J. B. GOODEY (Harpenden, Great Britain), Dr. I. ANDRÁSSY (Budapest, Hungary), and Dr. H. GOFFART (Munich/Westf., Germany) for their valuable remarks and concern with my work.

The material used for this study was derived from Poland, Holland, Yugoslavia, Canada, U. S. A. (California and S. Carolina), and the Hawaiian Is. A total of 1000 nematode specimens of the family *Tripylidae* were examined.

The family *Tripylidae*

Emendation. Stoma funnel-shaped or tubular with one or more teeth. Stoma walls moderately sclerotized. Amphids caliciform or funnel-shaped, opening with a narrow slit transverse to the body axis. Oesophagus cylindrical, somewhat tapering or with a pear-shaped bulb at end; frequently dilated in its anterior portion. Oesophageal glands opening near anterior end of body. Oesophago-intestinal valve composed of three lobular glands, mostly embracing the anterior portion of intestine. Transparent zone present in some genera. Oesophago-intestinal valvae bulging occasionally into the intestine. In females ovaries paired, or single and prodelphic. Copulatory spicules paired, accessory piece present. In males preanal papillae, 1 to over 20 in number, sometimes arranged in a row reaching to the cephalic portion. Caudal glands and their orifice present.

They are fresh-water and amphibious nematodes.

Type genus: *Tripyla* BASTIAN, 1865.

Other genera:

Tripylina gen. nov.

Tobrilus ANDRÁSSY, 1959

(syn. *Trilobus* BASTIAN, 1865, nec *Trilobus* BRÜNNICH, 1781)

Andrassya BRZESKI, 1960

Key to the genera

1. Female reproductive organs paired 2
- Female reproductive organs prodelphic *Tripylina* gen. nov.
2. Oesophagus cylindrical 3
- Oesophagus with pear-shaped bulb at end *Andrassya* BRZESKI
3. Cuticle at the anterior body end smooth *Tobrilus* ANDRÁSSY
- Cuticle transversely annulated *Tripyla* BASTIAN

Tripyla BASTIAN 1865 (Fig. 1 a-e)

Syn. *Promononchus* MICOLETZKY, 1923; *Tripula* BASTIAN, 1865 — lapsus calami.

Cuticle and subcuticle transversely annulated. Stoma tubular, armed with one or several teeth, of which the dorsal one is the largest and best developed. The oesophago-intestinal valvae are well developed and embrace the walls of the

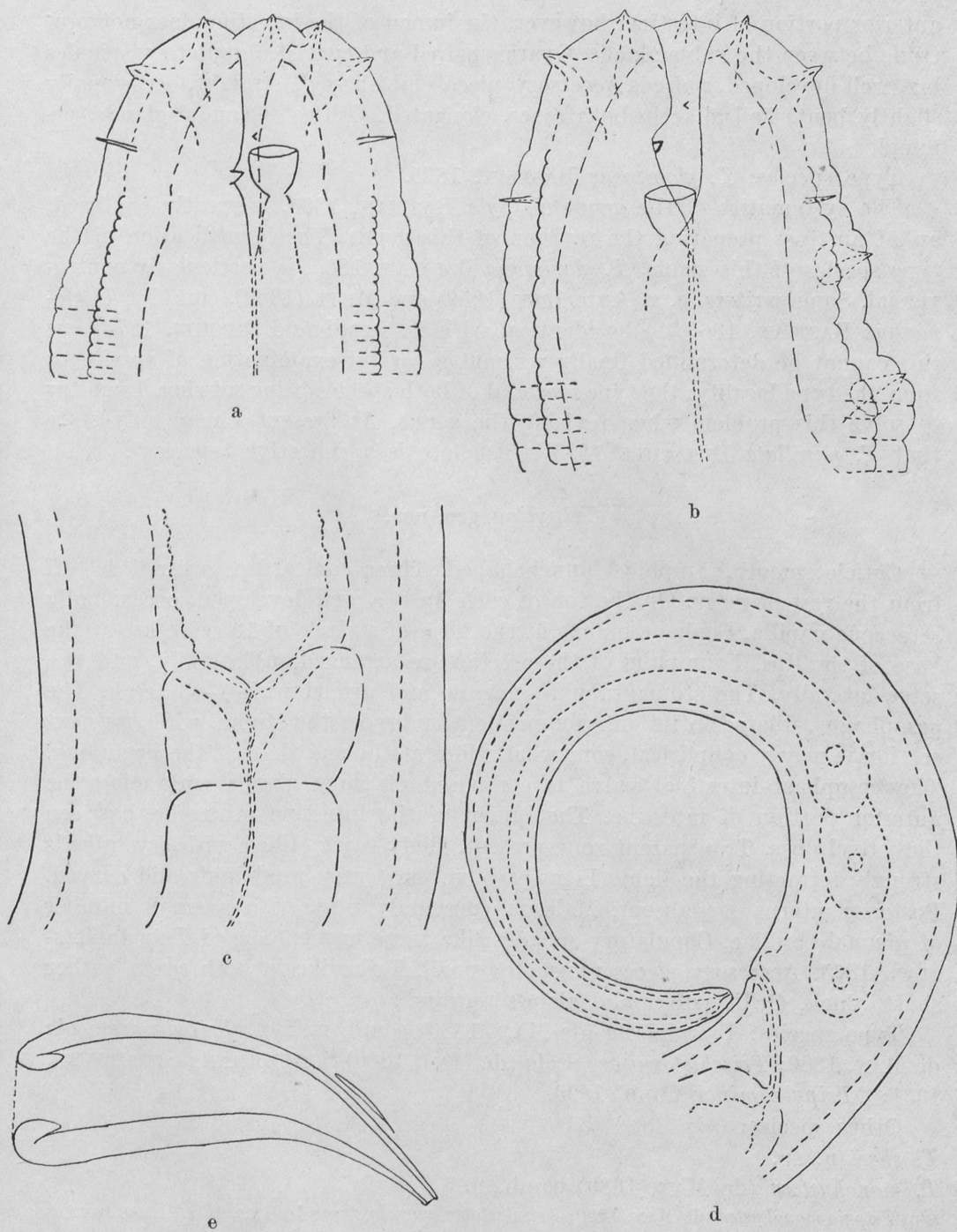


Fig. 1. *Tripyla cornuta* SKWARRA, 1921

a. head of female; b. head of male; c. oesophago-intestinal valve; d. tail of female; e. copulatory spicules and accessory piece.

anterior portion of intestine; however, the lumen of the intestine does not protrude between the valve glands. Ovaries paired and curved. Copulatory spicules big, well developed, paired. Accessory piece club-shaped, straight, occasionally slightly bent. Tail alike in both sexes, elongated. Orifice of caudal glands terminal.

Type species: *T. glomerans* BASTIAN, 1865.

The systematics of the genus *Tripyla* BASTIAN, 1865, is greatly confused, and I am just preparing the revision of this genus. The identification of the type species of this genus, *T. glomerans* BASTIAN, 1865, is particularly controversial. Some writers, e. g. ANDRÁSSY (1952) and MEYL (1960), consider *T. glomerans* BASTIAN, 1865, to be identical with *T. papillata* BÜTSCHLI, 1873, but this cannot be determined finally without a careful examination of specimens from the type locality, the type material of both species being missing. I will try to solve this problem when revising the genus. At present I may only state that *T. papillata* BÜTSCHLI, 1873, sensu lato is a collective „species“.

Tripylina gen. nov.

Cuticle smooth. Amphids funnel-shaped. Three conical lips are not set off from the rest of body. On the top of each lip is a well-developed, occasionally setaceous papilla. Cephalic organs in the form of a circle of 10 setae are at the base of the lips. Four pairs of these setae are arranged sublaterally, and two setae laterally. The stoma tubular, narrow and armed with 1—3 teeth. The oesophagus, dilated in its anterior portion, embraces the stoma, while its next section is nearly cylindrical, somewhat wider at the end than at the beginning. The oesophago-intestinal valve is composed of three glands embracing the anterior portion of intestine. The lumen of the intestine protrudes between the alveoli. Transparent zone present. Body cavity filled with crystalloids strongly refracting the light. Females have one ovary prodelphic and curved. Posterior uterus sac absent. Males uncommonly rare, with a small number of preanal papillae. Copulatory spicules like those in members of *Tripyla* BASTIAN, 1865. Accessory pieces unusually small. Tail alike in both sexes, rather short, thick. Orifice of caudal glands terminal.

Type species: *T. arenicola* (de MAN, 1880) comb. n. Syn. *Tripyla arenicola* de MAN, 1880; *Trischistoma arenicola* (de MAN, 1880) SCHUURMANS STEKHOVEN, 1951; ?*Tripyla minor* COBB, 1893.

Other species:

T. sheri n. sp.

T. monohystera (de MAN, 1880) comb. n.

syn. *Tripyla monohystera* de MAN, 1880; *Trischistoma monohystera* (de MAN, 1880) SCHUURMANS STEKHOVEN, 1951.

De MAN (1884) and COBB (1893) supposed that the species *Tripyla arenicola* de MAN, 1880, and *T. monohystera* de MAN, 1880, do not belong to the genus *Tripyla* BASTIAN, 1865, but they refrained from transferring them to another

genus until some male specimens were found. It was only SCHUURMANS STEKHOVEN (1951) that, basing upon the structure of amphids, transferred both the species to the genus *Trischistoma* COBB, 1913, (I take the name *Trischistomosa* COBB, 1913, used by this author for a mistake, because the context suggests that he meant the genus *Trischistoma* COBB, 1913). LOOF (1961) has recently recognized the old idea of de MAN (1884) true, but he has left the generic name of *Tripyla* BASTIAN, 1865, as being in general use, unchanged.

***Tripylina arenicola* (de MAN, 1880) comb. n. (Fig. 2a-d)**

Lectotype: female (after LOOF, 1961), length — 0.99 mm; $a = 22.8$; $b = 5.5$ (LOOF gives $b = 55$, but it is probably a misprint); $c = 18.2$; $V = 62.2$.

Ten females from Poland, length — 0.8—1.0 mm; $a = 18.3$ —26.7; $b = 5.5$ —6.4; $c = 14.0$ —18.2; $V = 62.2$ —66.0.

Cuticle smooth, about $0.7\ \mu$ thick in the vulva region. The body tapers anteriorly, its width at the height of the oesophagus end being twice as large as that at the base of the cephalic setae. The amphid, about $3\ \mu$ wide, lies below the teeth and occupies about $1/8$ of the body diameter. The cephalic setae are $6\ \mu$ and $16\ \mu$ long. The longer ones are somewhat shorter than the body width at their base (about 80%). The stoma has delicately thickened walls. The dorsal tooth is in the anterior third of the stoma, at about $1/2$ — $2/3$ of the width at the base of setae from the anterior end of the body. The size of the dorsal tooth approximates to $1\ \mu$. About $3\ \mu$ below it are two small teeth, arranged subventrally. The length of the stoma equals its width at the base of the lips. The oesophago-intestinal valve consists of three lobular glands and it embraces the anterior portion of intestine. The transparent zone is very narrow. The lumen of the intestine protrudes between the glands of the valvae.

The female reproductive organs are five times as long as the body width. The curved portion takes a third of their length. The ovary consists of several rows of cells and occupies $1/6$ of the total length of the reproductive system. The oviduct occupies about a half of its length and the uterus about a third. The vagina with weakly chitinized walls takes up about $1/6$ of the body breadth. Posterior uterus sac absent; female tail about 2.5 times as long as anal diameter of body. Tip of tail equal to $1/5$ — $1/6$ of anal width; caudal glands arranged in tandem system, one after another; orifice of caudal glands terminal. Male unknown.

Type locality: Katwijk (Holland)

Geographical distribution: Poland, Holland (probably throughout Europe), Fiji Is. (?).

***Tripylina sheri* n. sp. (Fig. 3a-e)**

Holotype: female, length — 1.2 mm; $a = 31.5$; $b = 5.4$; $c = 12.6$; $V = 65$.

Paratypes: 10 females, length — 0.8—1.3 mm; $a = 22.7$ —33.0; $b = 4.3$ —6.0; $c = 10.6$ —16.3; $V = 56$ —65.

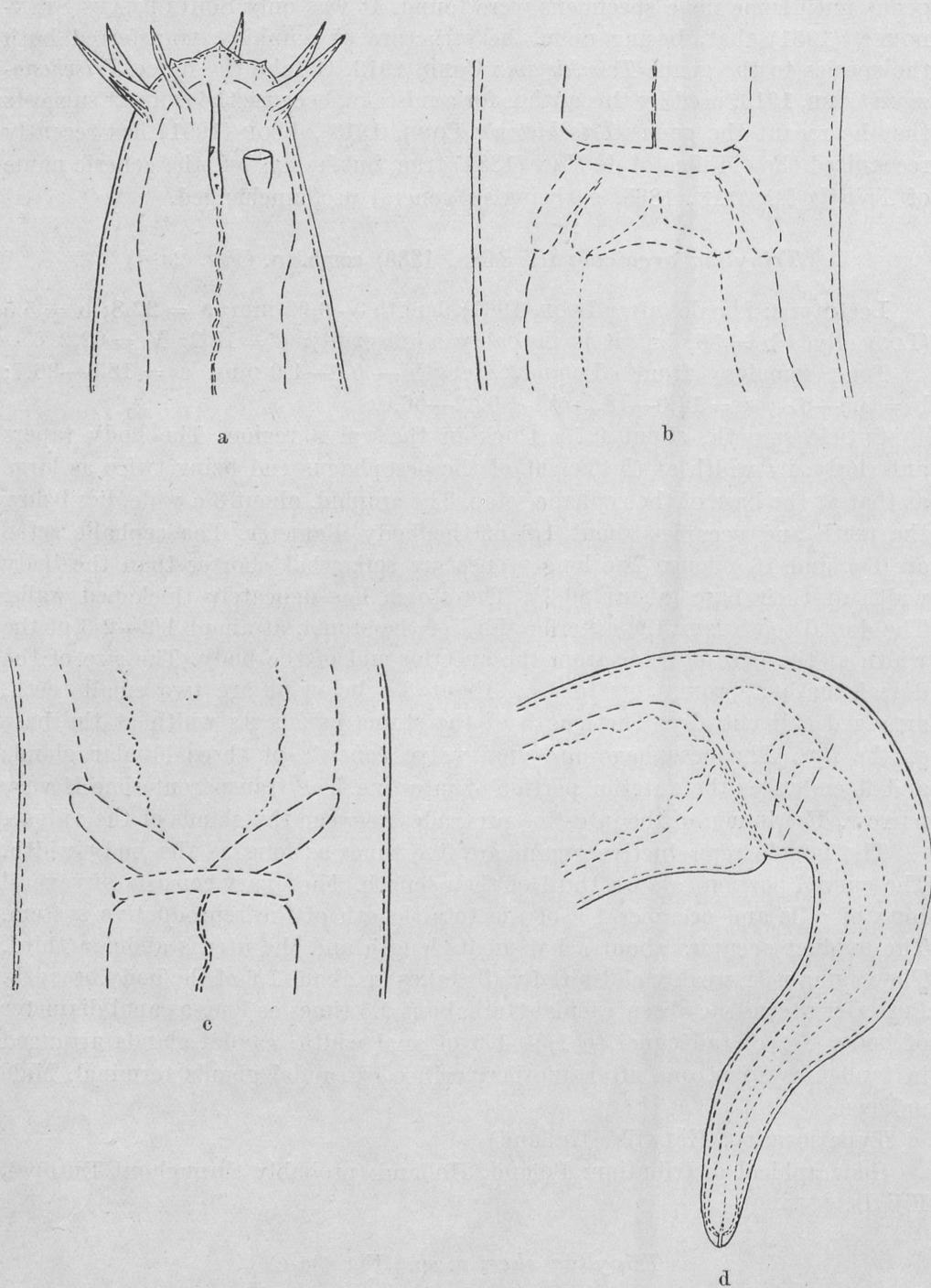


Fig. 2. *Tripylina arenicola* (de MAN, 1880) comb. n.
a. head of female; b. oesophago-intestinal valve, sublateral position; c. oesophago-intestinal valve, lateral position; d. tail of female.

Cuticle smooth, 1—1.5 μ thick in vulva region. Body slightly tapering anteriorly; width at base of cephalic setae about 70—75% of that at base of oesophagus. Amphid, 1.5—2 μ broad, occupying about one-tenth of body diameter. It is placed below the dorsal tooth. The longer cephalic setae measure 12—13 μ , and the shorter ones 5 μ . The longer setae are equal to about 60% of the body width at their base. The stoma has slightly thickened walls. The dorsal tooth is at the middle of the length of the stoma, about 65% of the body width at the base of setae from the anterior end. The size of the dorsal tooth is 1.5—2 μ , and the tooth is curved towards the anterior end of the body. About 2 μ above the dorsal tooth is a small tooth, arranged subventrally. There are no teeth below the dorsal tooth. The length of the stoma, measured from the anterior end of the body, is equal to the width at the base of the setae. The oesophago-intestinal valve consists of three well-developed, egg-shaped glands, which embrace the intestine. The lumen of the intestine protrudes between the glands. The transparent zone is narrow.

The female reproductive organs are about 6—7 times as long as the body width at the height of the vulva. The curved portion takes up 45—55% of the length. The ovary, composed of several rows of cells, occupies 1/5—1/6 of the total length of the organs, the oviduct a half, and the uterus about a quarter. The vagina, with its walls slightly thickened, occupies about 1/4—1/5 of the body width. The dimensions of the vulval labia are very variable.

The female's tail is about 3.7—4.5 times as long as the anal width of the body. The tip of the tail equals about 1/5 of the anal width. The caudal glands are arranged in the tandem system, one after another, their orifice being terminal. The male is unknown.

Type locality: Berkeley (California, U. S. A.), soil.

I possess the holotype and 7 paratypes in my collection. Ten paratypes are kept in the collection of the Department of Plant Nematology, University of California in Riverside (California, U. S. A.).

I have named the species *T. sheri* n. sp. in honour of the eminent systematist of nematode parasites of plants, Dr. S. A. SHER (Riverside, California, U. S. A.), to whom I am indebted for donation of the preparations of the species under description.

Differential diagnosis. *T. sheri* n. sp. most resembles *T. arenicola* (de MAN, 1880) comb. n., but it differs from this species in the following characters: the smaller amphid (1.5—2 μ or 1/10 of body width against 3 μ and 1/8 in *T. arenicola*), the larger dorsal tooth (1.5—2 μ against 1 μ), the presence of a subventral tooth in front of the dorsal and the lack of other teeth behind it, the length of the curved portion of the female reproductive organs (45—55% against 33%), and the length of the tail (3.7—4.5 of anal width against 2.5).

From *T. monohystera* (de MAN, 1880) comb. n. it differs in the position of the dorsal tooth (1/2 of the body width at the base of the setae from the anterior end of the body against 4/3), the position of the vulva ($V = 56$ —65 against

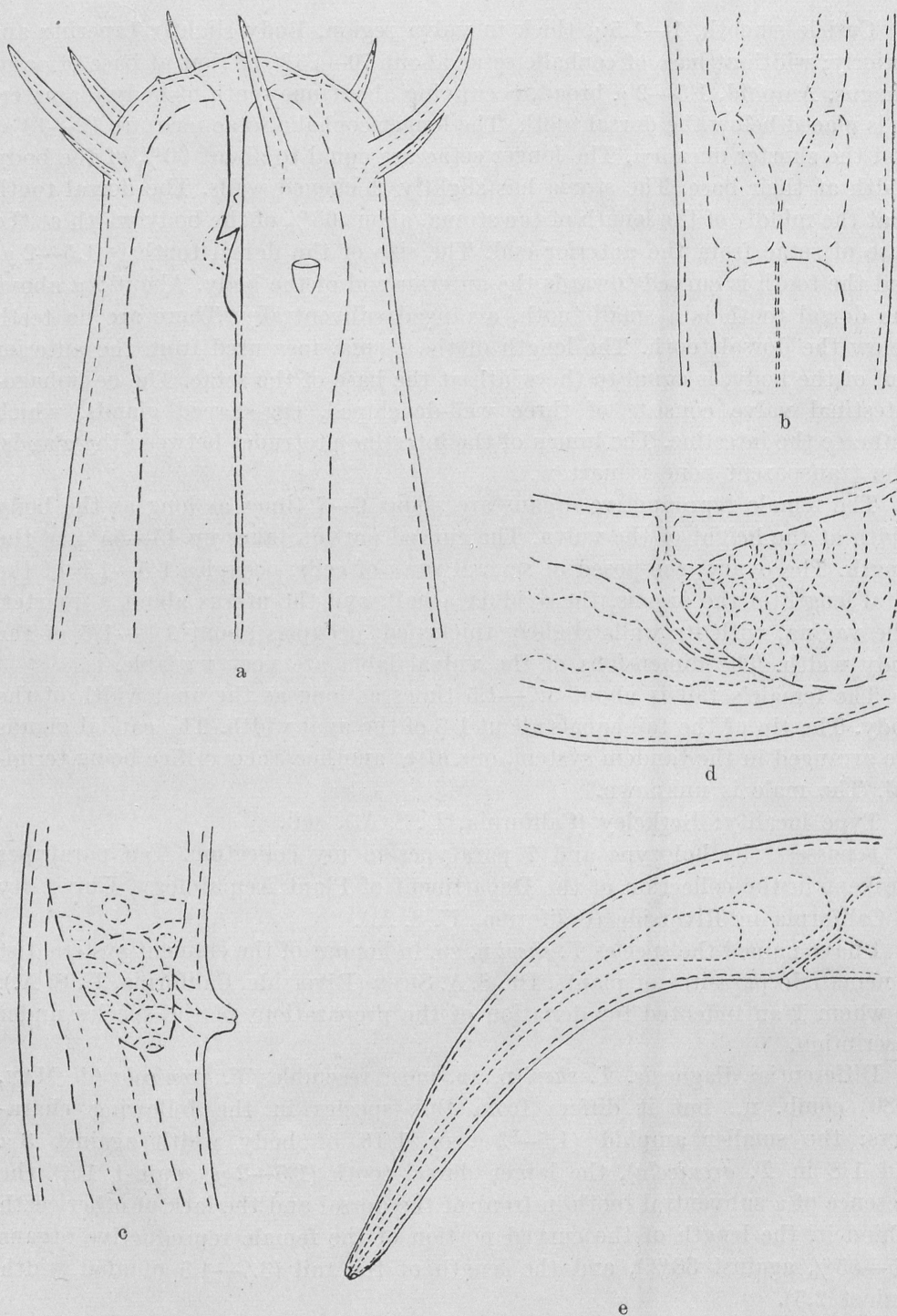


Fig. 3. *Tripylina sheri* n. sp.

a. head of female; b. oesophago-intestinal valve, lateral position; c—d. vulva regions of two females; e. tail of female.

Type species: *T. gracilis* (BASTIAN, 1865) ANDRÁSSY, 1959.

So far 44 species of the genus *Tobrilus* ANDRÁSSY, 1959, have been identified, a great part of these being inadequately described. This genus needs thorough revision.

Andrassya BRZESKI 1960

Cuticle delicately transversely annulated. Lips not set off, labial papillae weakly developed. Cephalic setae six in number, of which 4 arranged sublaterally and 2 laterally. They are uncommonly thin and delicate. Stoma slight, narrow, with unthickened walls and a small dorsal tooth. The oesophagus, swollen anteriorly, embraces the stoma, while its posterior portion forms a pear-shaped bulb without a valve apparatus. The transparent zone is present. The oesophago-intestinal valve bulges into the lumen of the intestine. The female reproductive organs are paired, opposite, and straight. Copulatory spicules paired, slender; accessory piece present. Caudal glands present, their orifice displaced on to the dorsal side.

Type species: *A. vivipara* BRZESKI, 1960.

No other species of the genus *Andrassya* BRZESKI, 1960, have been found as yet, and as for *A. vivipara* it is known only from small water reservoirs in the Mikolajki region in the Mragowo District. As I have left out some important morphological details in the original description, I am presenting a supplement based on the type specimens below.

Andrassya vivipara BRZESKI 1960 (Fig. 4a-e)

Females: length — 4.5—6.3 mm; a = 63.8—79.7; b = 7.9—10.7; c = 7.0—10.3; V = 44.3—38.7.

Body very thin, in its cephalic portion slightly broadened. Cuticle finely transversely annulated. The width of the striae in the vulva region amounts up to 1 μ . On the cuticle there is a distinct ornamentation of dots disposed in longitudinal and transverse lines. Four rows of setae are arranged sublaterally along the body. The lips are not set off, and the weakly developed labial papillae are displaced to the sides of the lips. The cephalic setae, 6 in number, are very slender, with 4 sublateral papillae below them. The stoma with practically unthickened walls is tubular and as long as the body width at the base of the setae. At the end of the stoma there is a small tooth set on the dorsal side. Amphid large, caliciform, situated below the tooth. Oesophagus swollen anteriorly, embracing the stoma. Middle portion of oesophagus thin, and the posterior one forms a pear-shaped bulb. Nerve ring at middle of oesophagus length. Transition zone between oesophagus and oesophago-intestinal valve. Valve bulging into the intestine. Intestine walls thin; tail alike in both sexes; caudal glands present, their orifice displaced on to the dorsal side.

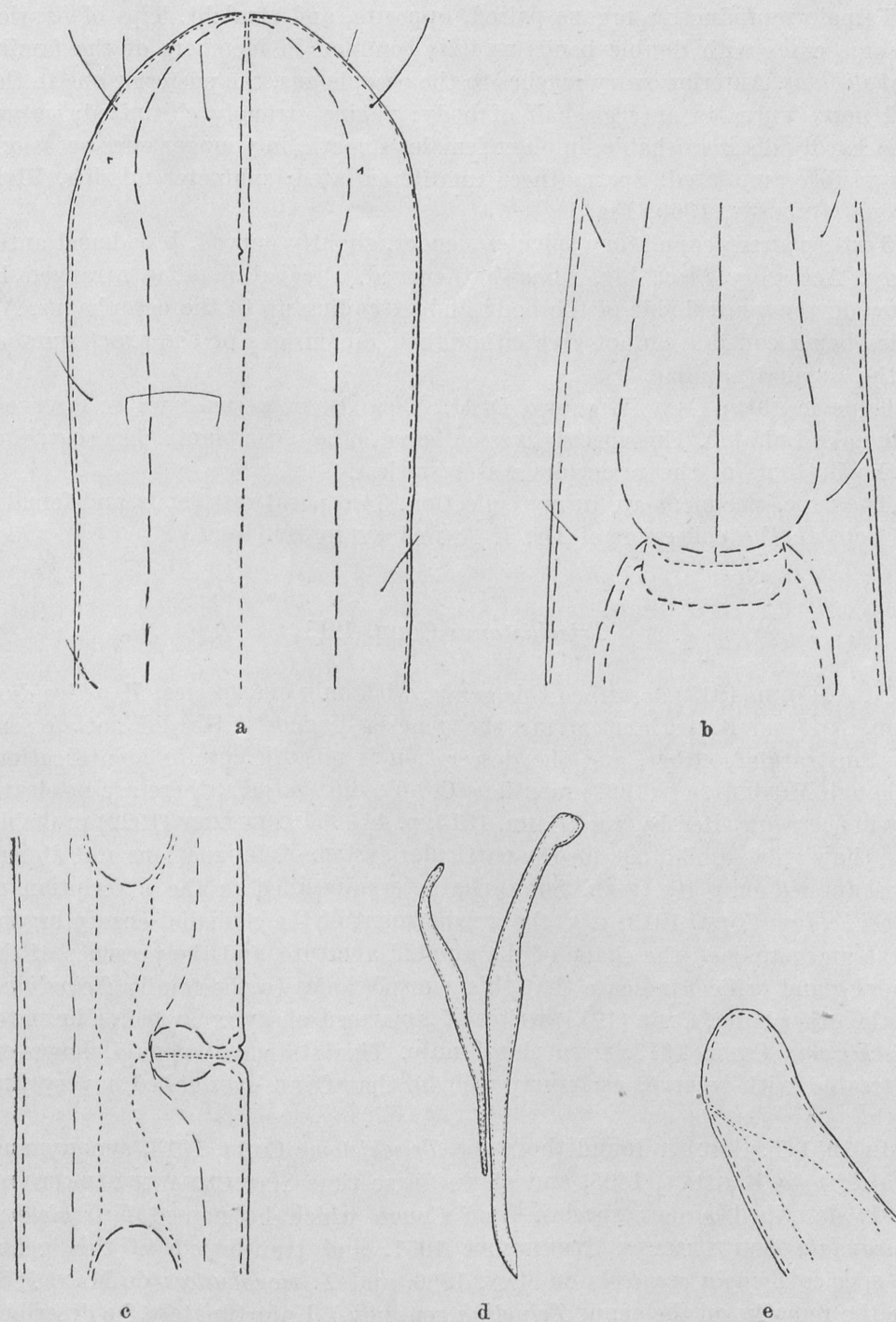


Fig. 4. *Andrassya vivipara* BRZESKI, 1960

a. head of female; b. oesophago-intestinal valve, c. vulva region; d. copulatory spicules and accessory piece; e. tip of tail with orifice of caudal glands.

Female reproductive organs paired, opposite, and straight. Tips of ovaries in some cases with double bends as it is common in members of the family *Cephalobidae*. Anterior ovary reaches to the oesophagus, the posterior one to the anal pore. Vulva in anterior half of body; vagina strongly chitinized; vulval labia hardly distinguishable, in older females smooth, in younger ones occasionally visibly annulated. Spermatheca undifferentiated; sphincter missing. Viviparous (BRZESKI, 1960, Fig. 1).

Testes paired; copulatory spicules slender, slightly curved, broadened anteriorly. Accessory piece big, somewhat curved. Preanal papillae arranged in a row on the ventral side of the body and extending up to the oesophagus. All males being coiled I cannot give either their dimensions or the exact number of the preanal papillae.

Type locality: Ossa (Mragowo Distr., Poland), in a small water reservoir near Lake Łukajno. This species lives on leaves of aquatic plants. The searching of the bottoms of the reservoirs was resultless.

The type specimens are in my collection. Two paratypes (male and female) are kept in the collection of Dr. I. ANDRÁSSY in Budapest.

Trischistoma COBB, 1913

N. A. COBB (1913) described this genus, with only one species, *T. pellucidum* COBB, 1913, in it, without giving the generic diagnosis. He did not present any illustrations, either, and the description is insufficient for identification. Although MICOLETZKY (1922) mentions COBB's illustrations, there are no drawings in the work cited by him (COBB, 1913, p. 444). MICOLETZKY (1922) probably used the word „Abbildung“ for the particular system of designations and dimensions applied only by COBB. Some characters specified in the description of *T. pellucidum* COBB, 1913, e. g. the arrangement of the cephalic sensory organs (setae and papillae), the shape of the amphid aperture, and the presence of the caudal gland orifice, indicate that this genus belongs to the family *Tripylidae*. On the other hand, COBB (1913) writes of „unarmed pharynx“, which eliminates *Trischistoma* COBB, 1913, from this family. This statement should, however, be treated with reserve, as it may well be that COBB overlooked a very fine tooth.

In 1951 T. GOODEY found the name *Trischistoma* COBB, 1913, synonymous with *Tripyla* BASTIAN, 1865, and at the same time SCHUURMANN STEKHOVEN (1951) described a new species, from Congo which he named *Trischistoma conicaudata* SCHUURMANN STEKHOVEN 1951, and transferred to this genus the species *Tripyla arenicola* de MAN, 1880, and *T. monohystera* de MAN, 1880 (see the remarks on the genus *Tripylina* gen. nov.). Unfortunately, he described *Trischistoma conicaudata* from one larva only and it is impossible to identify this species. For this reason I consider the name *Trischistoma conicaudata* SCHUURMANN STEKHOVEN, 1951, to be a species inquirenda.

The opinion of T. GOODEY (1951) on the identity of the genera *Tripyla* BASTIAN, 1865, and *Trischistoma* COBB, 1913, was supported by many investigators, and it was only HOOPER and CAIRNS (1959) and LOOF (1961) that attempted to reconstitute COBB's name as a distinct genus.

Since the description of the type species *Trischistoma pellucidum* COBB, 1913, is not adequate for identification, I will regard this species as a species inquirenda, and consequently the genus *Trischistoma* COBB, 1913, as a genus inquirendum, until some specimens from the type locality (Jamaica) are described.

Frostia ALLGÉN 1952

C. ALLGÉN, the Swedish investigator, described (1952) a new genus and species, *Frostia pellucida* ALLGÉN, 1952, from two males from Kenya and included it in the family *Tripylidae*. As far as I know, this genus has not been recorded in literature since ALLGÉN's description. I consider the genus *Frostia* ALLGÉN, 1952, a genus incertae mediae, because some of its characters, such as the lack of stoma, the shape of amphids and the absence of accessory pieces (?) render it impossible to determine its systematic position in the family *Tripylidae*, but rather suggest that it should be eliminated from this family.

No members of the genera *Trischistoma* COBB, 1913, and *Frostia* ALLGÉN, 1952, were available for me and so they were not examined.

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STRESZCZENIE

W niniejszej pracy autor daje przegląd i opisy rodzajów nicieni z rodziny *Tripylidae*, zaliczając tu *Tripyla* BASTIAN, 1865, *Tripylina* gen. nov., *Tobrilus* ANDRÁSSY, 1959 i *Andrassya* BRZESKI, 1960. Rodzaj *Tripylina* jest najbliżiej spokrewniony z *Tripyla* i różni się od niego pojedynczymi gonadami samicy i budową zastawki przelykowo-jelitowej. Do tego rodzaju zalicza autor trzy gatunki: *T. arenicola* (de MAN, 1880) comb. n. (typ rodzaju), *T. monohystera* (de MAN, 1880) comb. n. i *T. sheri* n. sp.

Rodzaj *Trishistoma* COBB, 1913 i obydwą dotychczas znane w tym rodzaju gatunki *T. pellucidum* COBB, 1913 i *T. conicaudata* SCHUURMANS STEKHOVEN, 1951 uważa autor za genus et species inquirendae. Rodzaj *Frostia* ALLGÉN, 1952 jest uważany za genus incertae sedis i wydzielony z rodziny.

PEZIOME

В настоящей работе автор дает перечень и описание родов нематод семейства *Tripylidae*, зачисляя сюда *Tripyla* BASTIAN 1865, *Tripylina* gen. nov., *Tobrilus* ANDRÁSSY, 1959 и *Andrassya* BRZESKI, 1960. Род *Tripylina* наиболее близкий в родственном отношении к *Tripyla* и отличается от него только наличием одиночной гонады самки и строением кишечно-глоточной перегородки. К этому оудр автор зачисляет три вида: *T. arenicola* (de MAN, 1880) comb. n. (genotypus), *F. monohystera* (de MAN, 1880) comb. n. и *T. sheri* n. sp.

Род *Trishistoma* COBB, 1913 и оба известные до сих пор вида *T. pellucidum* COBB, 1913 и *T. conicaudata* SCHUURMANS STEKHOVEN, 1951 автор считает как genus et species inquirenda. Род *Frostia* ALLGÉN, 1952 автор считает как genus incertae sedis и выделяет из семейства.

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