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A NEW GENUS OF CAPILLARIIDS FROM BIRDS, TRIDENTOCAPILLARIA GEN. N. (NEMATODA: CAPILLARIIDAE)

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Abstract. A new genus of the family Capillariidae, *Tridentocapillaria* gen. n., has been established. A type species is *Tridentocapillaria tridens* (Dujardin, 1845) comb. n. Other species of this genus are *T. eurycerca* (Oschmarin et Parukhin, 1963) comb. n., *T. parusi* (Wakelin, Schmidt et Kuntz, 1970) comb. n., and *T. javanensis* (Wakelin, Schmidt et Kuntz, 1971) comb. n. The new genus is characterized by the presence of a trilobed pseudobursa formed by three processes, and a vulvar appendage is always present in females. The genus includes species parasitic in the intestine of birds of the orders Passeriformes and Piciformes.

A relatively simple but not clearly arranged division of the family Capillariidae into genera, which was appropriate to the low-level knowledge of the morphology of numerous members of this family at that time, was somewhat ammended already by Freitas (1959). However, only a more detailed knowledge of these nematodes in the following period enabled Moravec (1982) to present a new system. In this system Moravec (1982) advanced right and reasonable generic differentiation based mainly on the structure of caudal end in males. In his concept the capillariids were arranged in 16 genera, those of birds in 7 genera. The number of genera of the family Capillariidae has recently increased to 22 (cf. Moravec et al. 1987), but no one of the newly established genera involved species parasitic in birds. Although this new system has not been accepted by all authors, the recent significant taxonomic papers (e.g., Baruš et al. 1981; Moravec 1983, 1987; Baruš and Libosvárský 1984; Campbell 1984; Mas-Coma and Esteban 1985; Baruš and Sergeeva 1989) have shown that a division of the Capillariidae into several genera was fully justified. In our opinion, the assumption that the whole group of capillariids belongs to a single genus, *Capillaria* s. l., which was expressed by Baylis (1931) and even recently by some other authors (e.g. Anderson and Bain 1982), is outdated.

During a revision of capillariids parasitizing birds of the Palaearctic Region and the pertinent literature we have found that four of the species are closely related and possess identical morphological characteristics which distinguish them from all remaining species of this family. Also in the present generic system of Capillariidae the characters of these species are so different that we consider it suitable to establish a new systematic category at the generic level.

RESULTS AND DISCUSSION

I. Determination of the type species of the genus

We have studied the morphology of the species described by Dujardin (1845) under the name *Thominx tridens*. In previously published monographs this species has been placed in the genera *Capillaria* Zeder, 1800, *Echinocoleus* López-Neyra,

1947, and *Thominx* Dujardin, 1845 (after the original concept). Since the original description, *T. tridens* has not been registered for a long time. As late as in 1943 Read redescribed this taxon (male and female) on the basis of material recovered from *Agelaius phoeniceus* (Passeriformes from the USA (Wisconsin). Later on there appeared several papers describing this species (with illustrations of its morphology) from various hosts of the order Passeriformes (Baruš and Garrido 1968; Wakelin et al. 1970; López et al. 1981; Borgarenko and Sergeeva 1980). At the present time, the morphology of this species is known in detail and we establish it a type species of a new genus — *Tridentocapillaria* gen. n., particularly with respect to a characteristic morphology of its pseudobursa.

II. Diagnosis of the genus *Tridentocapillaria* gen. n.

Capillariinae: caudal lateral alae in male absent; bilobed membranous pseudobursa poorly developed. Tail end of male terminating in three strongly developed processes, two lateral and one median (dorsal). A well developed papilla on each lateral process of pseudobursa. Single strongly sclerotized spicule present, with proximal part situated outside cloaca. Spicule sheath in distal part armed with sclerotized, well developed and relatively large spines. Stichosome consisting of one row of stichocytes. Four bacillary bands present: dorsal, ventral, and two lateral. Female vulva always with a vulvar appendage. Outer egg-shell having a characteristic structure. Intestinal parasites of birds (of the orders Passeriformes and Piciformes).

Type species of the genus: *Tridentocapillaria tridens* (Dujrardin, 1845) comb. n.
Type host: *Erithacus* sp. (after López-Neyra 1947).
Terra typica: France.
Other species: *Tridentocapillaria eurycerca* (Oschmarin et Parukhin, 1963) comb. n.:
T. parusi (Wakelin, Schmidt et Kuntz, 1970) comb. n.;
T. javanensis (Wakelin, Schmidt et Kuntz, 1971) comb. n.

A redescription of the type species of the new genus will be given in further text. Other species will be only briefly commented. The last three of the above species are of similar morphology as *T. tridens*. It is possible that studies of the original material will reveal that they are conspecific.

Systematic notes and differentiation of the new genus *Tridentocapillaria*: According to Moravec (1982), hitherto known species of capillariids parasitizing birds have been divided into 7 genera. The original system of 16 genera of Capillariidae, as it was said above, was later supplemented to comprise now 22 genera including species parasitic in both coldblooded and warmblooded vertebrates of the world fauna. However, the number of genera, including nematodes of the family Capillariidae parasitic in birds, remained unchanged. Our differentiation of the new genus *Tridentocapillaria* is based on the system of Capillariidae, in which three subfamilies were established by Lomakin and Romashev (1987). On the basis of fundamental characters, i.e. presence of a well sclerotized spicule, armed spicule sheath, and situation of the spicule outside pseudocloacal canal, the genus *Tridentocapillaria* belongs to the subfamily Capillariinae Railliet, 1915. In the concept of Lomakin and Romashov (1987) this subfamily contains five genera: *Capillaria* Zeder, 1800; *Eucoleus* Dujardin, 1845; *Echinocoleus* López-Neyra, 1947; *Pterothominx* Freitas, 1959; and *Schulmanela* Ivashkin, 1964. In our opinion, three other genera should be included: *Piscicapillaria* Moravec, 1982; *Amphibiocapillaria* Moravec 1982, and probably also *Paratrichosoma* Ashford et Muller, 1978. Thus the subfamily Capillariinae consists of nine genera, four of them comprising species parasitic in birds (*Capillaria*, *Echinocoleus*, *Eucoleus*, and *Pterothominx*).

On the basis of the presence of a conspicuous median (dorsal) pseudobursa process the new genus *Tridentocapillaria* can be distinctly differentiated from all remaining genera of the family Capillariinae, with the exception of *Piscicapillaria*. Moreover, the genus *Tridentocapillaria* differs from the other genera in the following characters: from *Schulmanela*, *Paratrichosoma* and partly also *Piscicapillaria* in the presence of vulvar appendage in female; from *Pterothominx* in the absence of lateral caudal alae in male; from *Eucoleus* (which has only three bacillary bands) in the number of bacillary bands; from *Schulmanela* (in which stichosome consists of two or three rows of stichocytes) in the formation of stichosome; from *Eucoleus*, *Paratrichosoma* and *Amphibiocapillaria* (which have a poorly sclerotized spicule and much smaller size) in the strongly sclerotized spicule.

As it was said above, the genus *Tridentocapillaria* resembles *Piscicapillaria* in the presence of median (dorsal) process of pseudobursa, but it differs from it in many other characters, even in the general patterns of the posterior extremity of male. All hitherto described males of species belonging to *Piscicapillaria* have a membraneous spherical bursa surrounding the posterior extremity (including median unpaired caudal process). In the genus *Tridentocapillaria*, the membraneous part of pseudobursa is developed only in form of two small lobes surrounding the lateral processes of pseudobursa. The cuticle adheres to the median odd process (dorsal) so that the general shape of the pseudobursa is markedly trilobed. In the majority of *Piscicapillaria* females the vulvar appendage is absent; according to Moravec (1987) it is evidently present only in the species *P. rhinobati* Jonston et Mawson, 1945. The vulvar appendage is present in females of all four species of *Tridentocapillaria*.

Of importance for the differentiation of the two genera is also the different systematic position of their definitive hosts and their ecology. The genus *Piscicapillaria* includes only species parasitizing fish, whereas *Tridentocapillaria* are parasites of birds. These facts led us to the decision to establish the genus *Tridentocapillaria* as a new systematic category in the subfamily Capillariinae.

III. Redescription of the type species of the genus *Tridentocapillaria*

Tridentocapillaria tridens (Dujardin, 1845) comb. n. Fig. 1

Specimens available in our collections were reexamined and the data published previously by Baruš and Garrido (1968) and Borgarenko and Sergeeva (1980) were supplemented. The material originated from Cuba (from the hosts *Wilsonia citrina*, *Dendroica dominica dominica*, *D. fusca*, *Mniotilta varia*, *Vireo griseus noveboracensis*, *Piranga rubra*) and Tadzhikistan (from the hosts *Pastor roseus* and *Emberiza bruniceps*).

Localization: small intestine.
Synonyms: *Thominx tridens* Dujardin, 1845; *Trichosoma tridens* (Dujardin, 1845) Diesing, 1851; *Capillaria tridens* (Dujardin, 1845) Travassos, 1915; *Echinocoleus tridens* (Dujardin, 1845) López-Neyra, 1947; *Capillaria pirangae* Durbin, 1952, sensu Wakelin et al. (1970).

Description (measurements in mm): Both males and females possessing four bacillary bands (dorsal, ventral and two lateral). Width of lateral bacillary bands in female 0.041—0.050, of ventral and dorsal bacillary bands 0.006. Lateral bacillary band in regions of male posterior extremity 0.027 wide. Bacillary bands consisting of relatively large hypodermal cells, with short duct in shape of truncated cone with wide base. Size of hypodermal cells 0.005×0.005 in 0.125 wide female body

portion; height of cell duct 0.002—0.003. Stichocytes arranged in one row; their number 37—54 in male and 40—64 in female. Size of stichocytes very variable; length of stichocytes situated in middle part of stichosome 4 times greater than their width. Two large cells situated at junction of oesophagus and intestine. Mouth opening situated terminally.

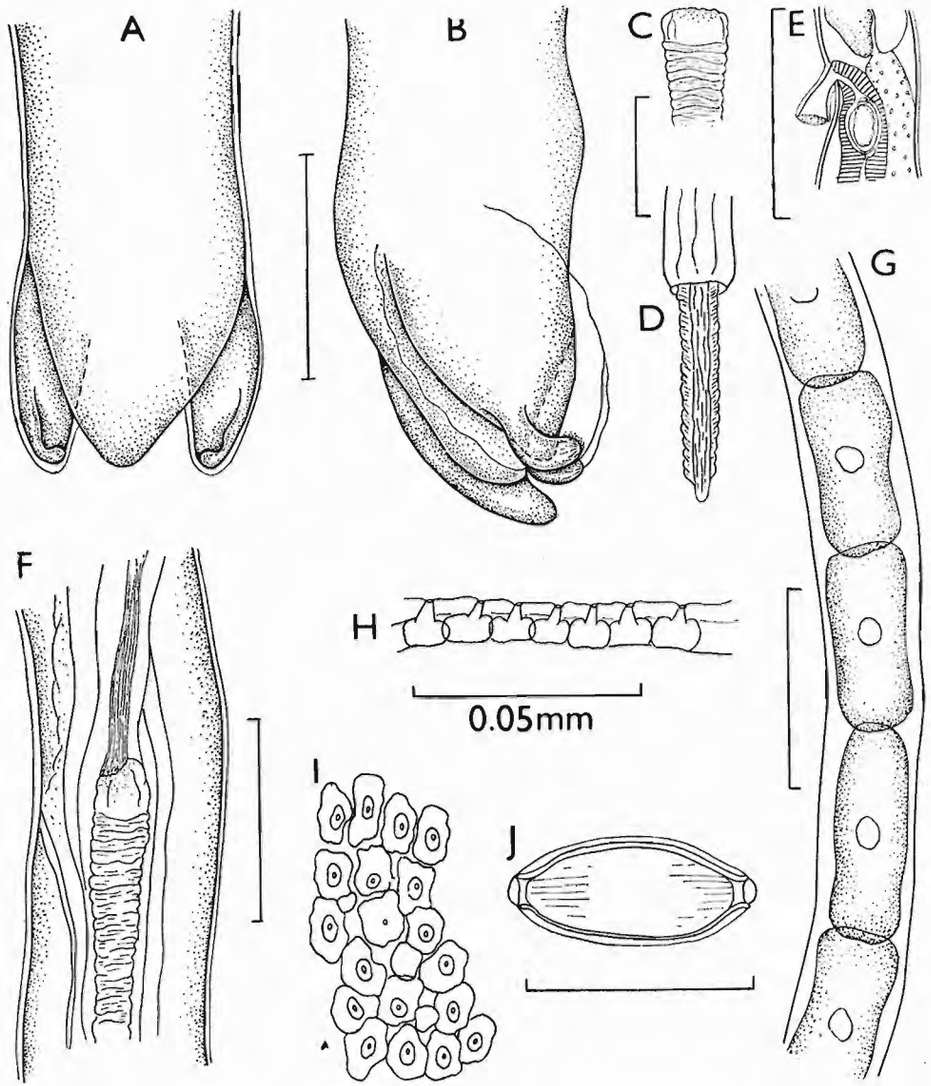

Fig. 1. *Tridentocapillaria tridens* (Dujardin, 1845) from *Emberiza bruniceps*. **A** — pseudobursa (dorsal view); **B** — pseudobursa (lateral view); **C** — proximal end of spicule; **D** — distal end of spicule; **E** — vulva region (lateral view); **F** — region of proximal end of spicule; **G** — stichocytes; **H** — bacillary band (lateral view); **I** — bacillary band (apical view); J — egg. Original (scale bar 0.05 mm).

Male: Body 12.99—15.48 long. Narrowed head end 0.007—0.010 wide. Body width 0.015—0.018 at level of oesophagus, 0.049—0.056 at body end in front of pseudobursa, and 0.045—0.052 at level of stichosome end. Stichosome 5.81—6.30 long. Stichocytes at stichosome end measuring 0.085—0.095 × 0.037—0.042.

Caudal end of body widened and forming three rounded, well developed lobes. One of them median (dorsal) and two lateral. Dorsal process 0.035—0.040 wide and 0.028 to 0.037 long. Lateral processes 0.027—0.036 long and 0.037—0.040 wide. Membraneous pseudobursa present, moderately developed and consisting of two lateral parts covering lateral lobes (processes) of pseudobursa. Pseudobursa 0.047—0.062 long and 0.062 to 0.089 wide (in dorsoventral position). Single spicule triangular in section, strongly sclerotized, with a marked transverse structure. Spicule length 1.10—1.63; distal end narrowed and rounded, 0.006—1.012 wide; proximal end 0.020—0.023 wide. Spicule width 0.017 in middle portion. Proximal end of spicule located outside cloaca, in small spicular canal. Long muscular retractor attached to tip of proximal spicule end at one side and to body wall at the opposite side. Portion of cloaca in front of spicule with thickened walls. Spicule sheath situated inside cloaca, its distal part being armed with strongly sclerotized spines. Cloaca opening situated on ventral side of body, subterminally. Tubular seminal vesicle terminated by sphincter. Intestine opens into ejaculatory duct somewhat ahead from the cloaca.

Female: Body 18.5—29.2 long; its width 0.014—0.015 at head end, 0.022—0.025 at level of oesophagus end, 0.09—0.11 at level of stichosome end, and 0.11—0.14 at level of vulva. Posterior end of body rounded and 0.039—0.056 wide. Anus situated subterminally, at 0.027—0.029 from posterior body end. Stichosome 6.28—7.27 long; size of stichocytes at level of stichosome end 0.11—0.15 × 0.055—0.070. Vulva situated on ventral side of body, a small distance from posterior margin of last stichosome cells. Vulvar appendage bell-shaped, 0.046—0.074 long and 0.032—0.035 wide. Vagina straight, with strongly muscular walls; eggs arranged in one row. Eggs with protruding plug at each pole; height of plug 0.0025—0.0030. Egg size 0.057—0.070 × 0.027—0.037. Thickness of egg shell 0.0017—0.0018 on sides and 0.0020—0.0022 at poles. Outer egg shell with fine, longitudinally striated structure.

IV. Other species of the genus *Tridentocapillaria*

In addition to the type species, three other previously described species corresponding to the generic diagnosis are placed in this genus.

1. ***Tridentocapillaria eurycerca*** (Oshmarin et Parukhin, 1963) comb. n. Fig. 2

This species was described by Oshmarin and Parukhin (1963) from the intestine of *Picus canus* (Piciformes) from the Primorye region (USSR) under the name *Thominx eurycerca*. Moravec (1982) placed it in the genus *Echinocoleus* López-Neyra, 1947. The diagnosis of this genus, however, is not quite suitable for this species, since the data on the presence or absence of the median (dorsal) process are lacking in the description of pseudobursa (see López-Neyra 1947). A characteristic feature of this taxon is the presence of widened trilobed tail, armed spicule sheath, strongly sclerotized spicule, and absence of caudal lateral alae in male, as well as the presence of vulvar appendage in female. We have therefore assigned this species to the genus *Tridentocapillaria*.

It should be noted, however, that on the basis of principle morphometrical characters *T. eurycerca* is closely related to *T. tridens*. A single more important difference

is the length of spicule, which 1.1—1.6 mm in *T. tridens* and 2.7 mm in *T. erycerca*. While discussing the validity of *T. eurycerca* it is necessary to consider the fact that this species was found in and described from a host belonging to the order Piciformes, whereas *T. tridens* has not been registered to parasitize these birds, with a single exception. Wakelin et al. (1971) found a single specimen (female) in *Blythipicus rubiginosus parvus* (Piciformes) and tentatively identified it as *Capillaria tridens* (= *Tridentocapillaria tridens*).

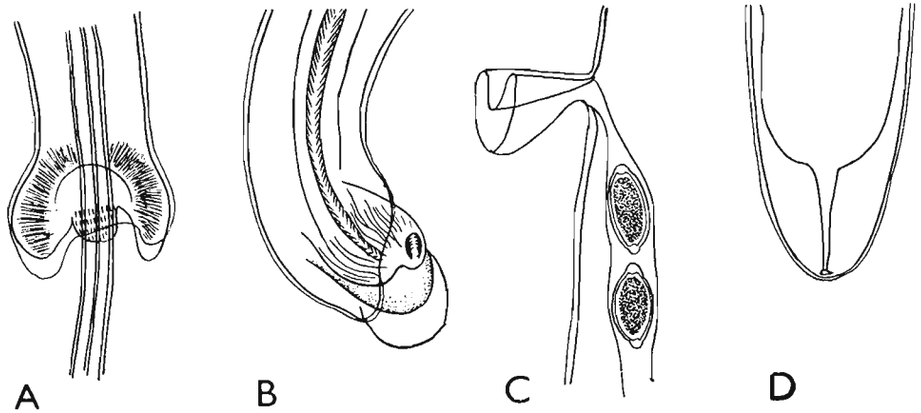

Fig. 2. *Tridentocapillaria eurycerca* (Oshmarin et Parukhin, 1963) from *Picus canus*. **A** – – pseudobursa (ventral view); **B** – – pseudobursa (lateral view); **C** — vulva region (lateral view); **D** — posterior end of female body (ventral view). After Oshmarin and Parukhin (1963).

In the original description of *T. eurycerca*, Oshmarin and Parukhin (1963) differentiated this species only from *Capillaria phasianina* Kotlan, 1940. According to the present views about the species composition of the genus *Capillaria*, especially of species parasitic in birds (see Baruš and Sergeeva 1989), *C. phasianina* belongs to this genus. Consequently, there are evident and marked differences between *C. phasianina* and *T. eurycerca* in the formation of pseudobursa in males (at generic level) and in other characters.

We have not suceeded in obtaining the original material of *C. eurycerca* without which the validity of this taxon cannot be ascertained. We therefore consider it possible and purposeful to assign *C. eurycerca* as a valid species to the new genus *Tridentocapillaria.*

2. ***Tridentocapillaria parusi*** (Wakelin, Schmidt et Kuntz, 1970) comb. n. Fig. 3

Wakelin et al. (1970) described a new species, *Capillaria parusi*, recovered from the intestine of *Parus monticolus insperatus* and *Sitta europaea formosana* (Passeriformes) from Taiwan. It should be noted that the authors kept their opinion that the family Capillariidae consists of a single genus.

On the basis of principle morphological characters, i.e. trilobed posterior extremity of male and presence of median (dorsal) pseudobursa process, this species can be included in the genus *Tridentocapillaria*. This is supported also by the fact that in the original description of this taxon, Wakelin et al. (1970) stressed its morphological similarity to *T. tridens* (= *C. tridens*). The authors found differences between the two species in morphometrical characters in both males and females, in the size and morphology of eggs, and in the shape of median (dorsal) pseudobursa process. According to Wakelin et al. (1970), the tip of this process is divided into two smaller lobes in *T. parusi*; in *T. tridens*, however, the tip of the dorsal process is not divided. We consider this character to be most important for the differentiation of the two species, though its stability should be verified on a larger material. The authors of the original description pointed out that the validity of *C. parusi* (= *T. parusi*) is supported also by the finding of this taxon in hosts of the family Paridae (since in their opinion it is the first record of capillariids in birds of this family). We therefore consider it possible to include this species in the genus *Tridentocapillaria*, because its morphology conforms to the generic diagnosis.

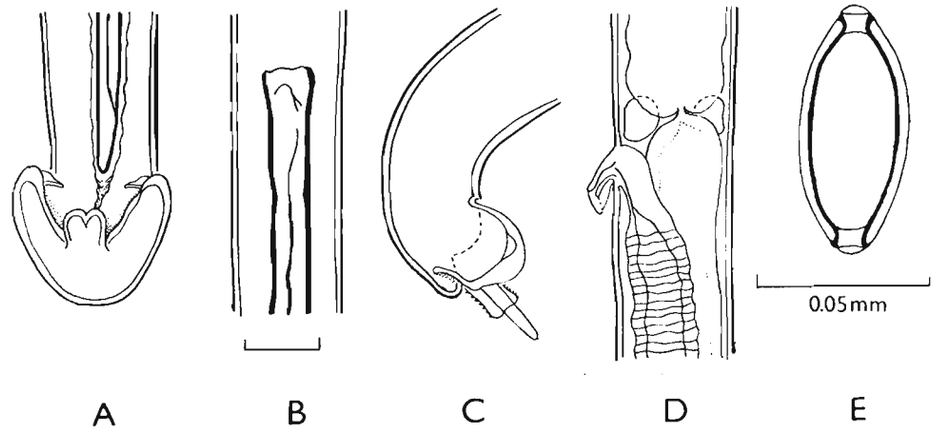

Fig. 3. *Tridentocapillaria parusi* (Wakelin, Schmidt et Kuntz, 1970) from *Parus monticolus* and *Sitta europaea*. **A** – – pseudobursa (ventral view); **B** — region of proximal end of spicule; **C** — pseudobursa (lateral view); **D** — vulva region (lateral view); **E** — egg. After Wakelin et al. (1970). (Scale bar 0.05 mm.)

3. ***Tridentocapillaria javanensis*** (Wakelin, Schmidt et Kuntz, 1971) comb. n. Fig. 4

This species has been described by Wakelin et al. (1971) from the intestines of several bird species of the order Piciformes (from Taiwan and Borneo) under the name *Capillaria javanensis*. We have not managed to differentiate it from *T. tridens* and *T. eurycerca* on the basis of the description. Wakelin et al. (1971) consider it morphologically similar to *T. eurycerca*, differing from this species in the size of body, eggs and spicule, as well as in the shape of lateral lobes of pseudobursa. Since these authors registered and determined both species (*T. tridens* and *T. javanensis*) in the same collection of capillariids, it may be supposed that they could differentiate them on the basis of some characters which are not distinct in the descriptions. Since this species conforms to the generic diagnosis of *Tridentocapillaria*, we consider it possible to place it in this genus. However, *T. javanensis* could not be distinguished from *T. eurycerca* in the key.

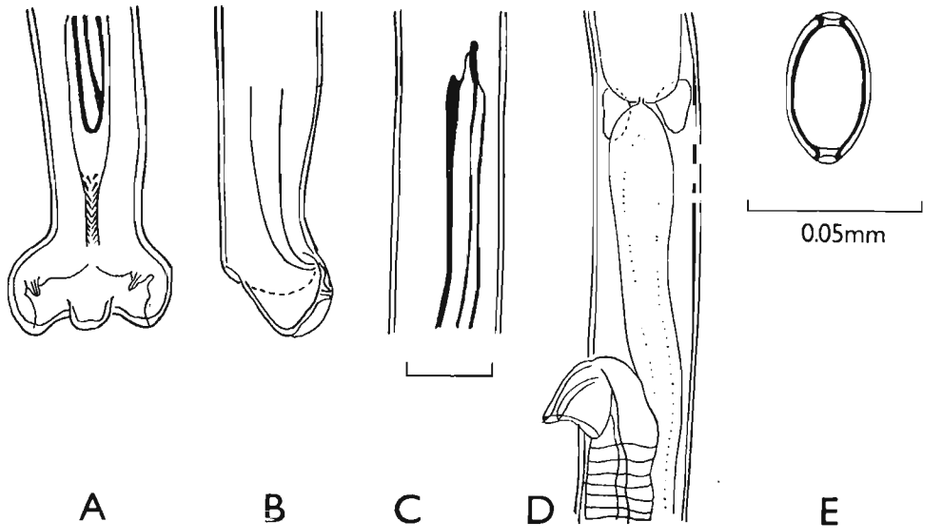

Fig. 4. *Tridentocapillaria javanensis* (Wakelin, Schmidt et Kuntz, 1971) from hosts of the order Piciformes. **A** — pseudobursa (ventral view); **B** — pseudobursa (lateral view); **C** — region of proximal end of spicule; **D** — vulva region (lateral view); **E** — egg. After Wakelin et al. (1971). (Scale bar 0.05 mm.)

KEY TO THE SPECIES OF THE GENUS *TRIDENTOCAPILLARIA*

1 Median (dorsal) process of pseudobursa with tip divided longitudinally into two small round lobes . . . . . *T. parusi*

— Median (dorsal) process of pseudobursa with tip not divided longitudinally, but widely rounded or bluntly conical 2

2 Spicule shorter than 2 mm; parasitic in the intestine of birds of the order Passeriformes . . . . . *T. tridens*

— Spicule longer than 2 mm (about 2.7 mm); parasitic in the intestine of birds of the order Piciformes . . . . . *T. eurycerca* (or *T. javanensis*)

НОВЫЙ РОД НЕМАТОД ОТ ПТИЦ, *TRIDENTOCAPILLARIA* GEN. NOV. (NEMATODA: CAPILLARIIDAE)

В. Баруш и Т. П. Сергеева

Резюме. Установлен новый род семейства Capillariidae, *Tridentocapillaria* gen. n. Типичным видом является *Tridentocapillaria tridens* (Dujardin, 1845) comb. n. В состав рода включены также следующие виды: *T. eurycerca* (Oschmarin et Parukhin, 1963) comb. n., *T. parusi* (Wakelin, Schmidt et Kuntz, 1970) comb. n., and *T. javanensis* (Wakelin, Schmidt et Kuntz, 1971) comb. n. Основными признаками нового вида являются наличие трехлопастной бурсы, состоящей из трех отростков и наличие отростка вульвы у самок. Новый род включает в себе виды, паразитирующие в кишке птиц, относящиеся к отрядам Passeriformes и Piciformes.

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