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FISCHOEDERIUS PHILIPPINENSIS, A NEW SPECIES OF GASTROTHYLACID PARASITE FROM RUMINANTS IN THE PHILIPPINES*

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ABSTRACT

Fischoederius philippinensis n. sp. is described and illustrated from specimens recovered from the rumina of *Bubalus bubalis, Bos taurus* and *Capra hirgus* in the Philippines. It is characterized by the acetabulum which is of the gastrothylax type; the pharynx which is of the calicophoron type; the terminal genitalium which is of the microbothrium type; the testes which are median and in the same plane in the dorso-ventral direction forming a hemispherical bulge on the floor of the ventral pouch and the more lateral location of the caeca. The new species is differentiated from all known species of the genus. The synonymy of *Fischoederius fischoederi, E. ceylonensis* and *F. siamensia* with *F. elongatus* is confirmed. *Fischoederius boyangensis* and *F. compressus* are regarded as junior synonyms of *F. cobboldi* and *F. elongatus*, respectively. *A new type of terminal genitalium observed in F. cobboldi* and *F. skrjabini* and designated as the cobboldi type is described and illustrated. A key to separate the species of the genus *Fischoederius* including the new species is given.

Introduction

In the course of our studies on the gastrohylacid (pouched amphistomes) parasites of ruminants in Asia, examination of several collections from animals in the Philippines revealed the presence, among other known species, of an undescribed species. This new species forms the subject of this paper. The already known species recovered in this work will be dealt with in a separate paper.

Materials and Methods

A total of 233 specimens of the new species recovered from the rumina of *Bubalus bubalis, Bos taurus* and *Capra hircus* were examined. The origins of the hosts are Batangas, Iloilo and Pangasinan.

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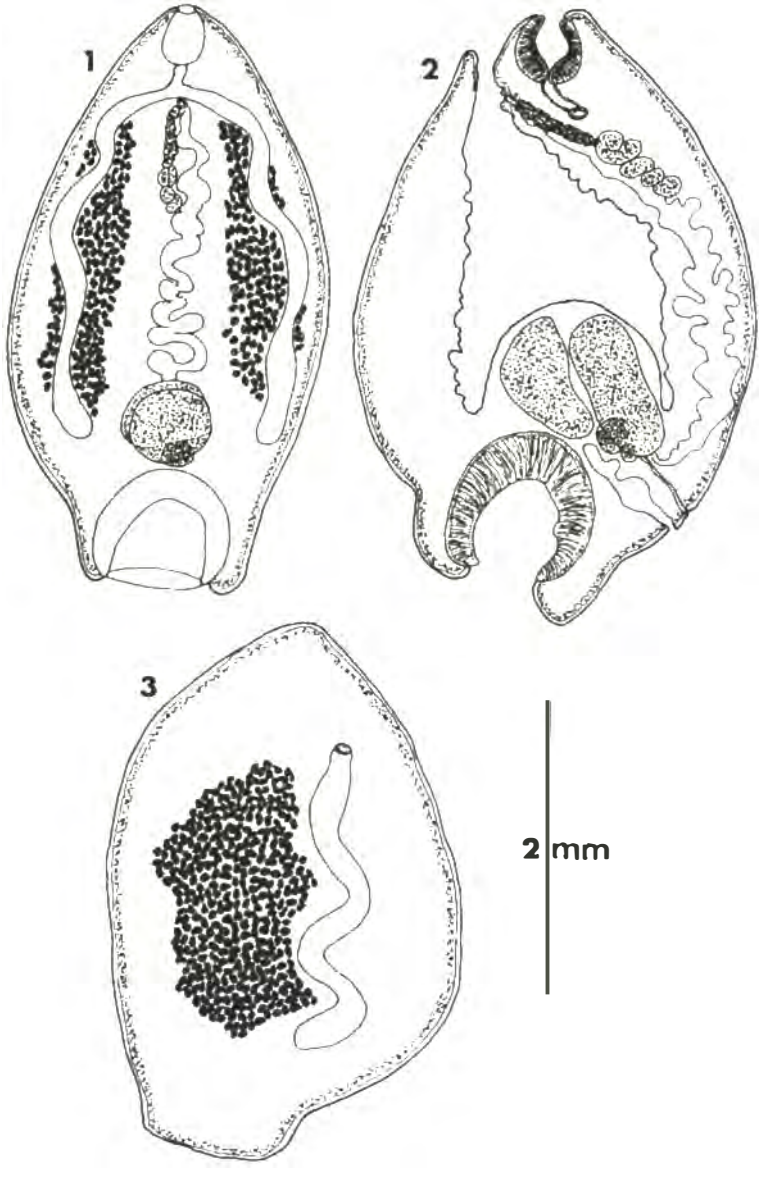
Fifteen specimens were prepared as stained whole mounts. Twenty five specimens were stained and thick hand sections were made following the technique described by Eduardo (1982) using aceto-alum-carmine as stain. Another 15 specimens were processed for histological sectioning following the paraffin wax method. Transverse and sagittal sections were prepared and stained with haematoxylin and eosin.

Drawings were prepared with the aid of an AO drawing tube. Measurements were done using a calibrated eyepiece micrometer.



Figures 1-3. *Fischoederius philippinensis* n. sp. 1. Whole worm, ventral view; 2. Whole worm, sagittal view; 3. Extreme lateral part, sagittal view.

Description

The body is small (Figures 1 & 2), cylindrical, 1.93-4.10 mm long; 2.15-2.69 mm in greatest width in the dorso-ventral direction.

The acetabulum terminal is 0.76-1.08 mm in external diameter in the dorso-ventral direction; with ratio to the length of the body at 1:4.1 to 1:4.8. It is of the gastrothylax type (*sensu* Nasmark, 1937) (Figure 4) with the following of circular muscle units: d.e.c. = 32-38; d.i.c. = 29-33; v.e.c. = 35-45; v.i.c. = 26-33; m.e.c. = 5-8.

The pharnyx is 0.35-0.57 mm long; 0.30-0.53 mm in greatest width in the dorso-ventral direction; with ratio to the length of the body at 1:8 to 1:10; and to the external diameter of the acetabulum at 1:2.2 to 1:3.4. It is of the calicophoron type (*sensu* Dinnik, 1964) (Figure 5) in median sagittal section, with its internal surface lined by small tubercle-like papillae. The oesophagus 0.21-0.40 mm long, with the musculature of wall fairly uniform in thickness. It has no posterior bulb or sphincter and its 1 μmen is lined throughout its length by hyaline layer. Caeca in lateral sides forming shallow dorso-ventral bends in their course (Figures 1 & 3) terminate posteriorly at the level of the testes with their blind ends directed ventrally.

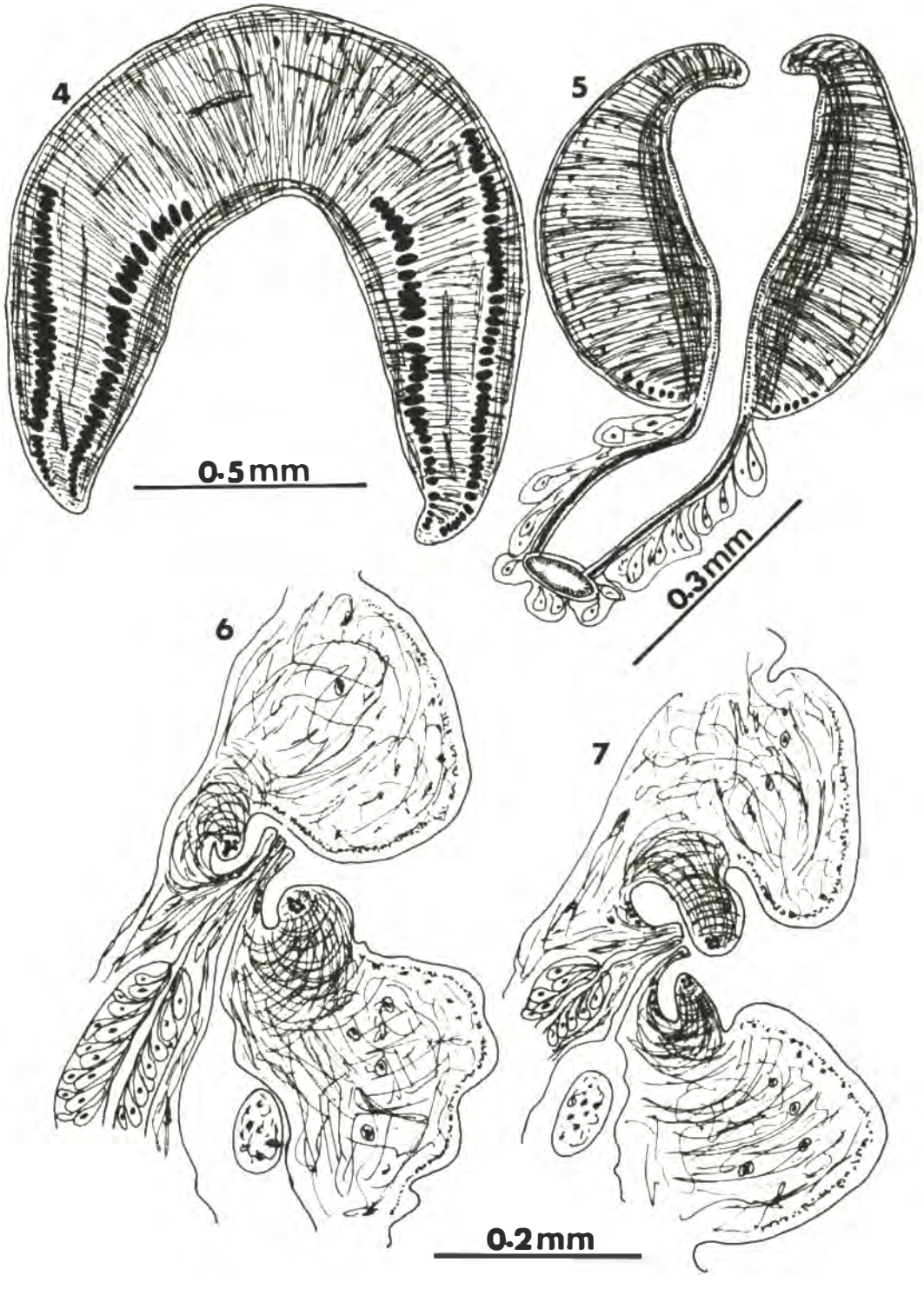
The testes (Figures 10 & 11) are smooth or slightly lobed, close to each other and in the same plane in the dorso-ventral direction, in the posterior half of the body anterior to the acetabulum. Their location forms a dome-shaped bulging at the bottom of the ventral pouch. The dorsal testis is 0.35-0.96 mm long, 0.42-1:08 mm in the dorso-ventral direction and the ventral testis, 0.41-0.95 mm long, 0.41-0.99 mm in the dorso-ventral direction. The seminal vesicle is thin-walled and coiled; pars musculosa thick-walled and coiled; pars prostatica relatively long (0.34-1.14 mm).

The ovary is subspherical and located in between the posterior borders of the testes and is 0.11-0.41 by 0.18-0.39 mm in size. The Mehlis' gland close to ovary is 0.07-0.25 by 0.09-0.23 mm. The Laurer's canal does not cross excretory vesicle or duct and opens on the dorsal surface about 0.41-0.48 mm anteriorly to the excretory pore. Vitellaria in lateral fields consisting of coarse vitelline follicles (Fig. 3) extend from the level posterior to the oesophageal bifurcation to the level of the testes; egg operculate, 100-105 by 50-55 microns.

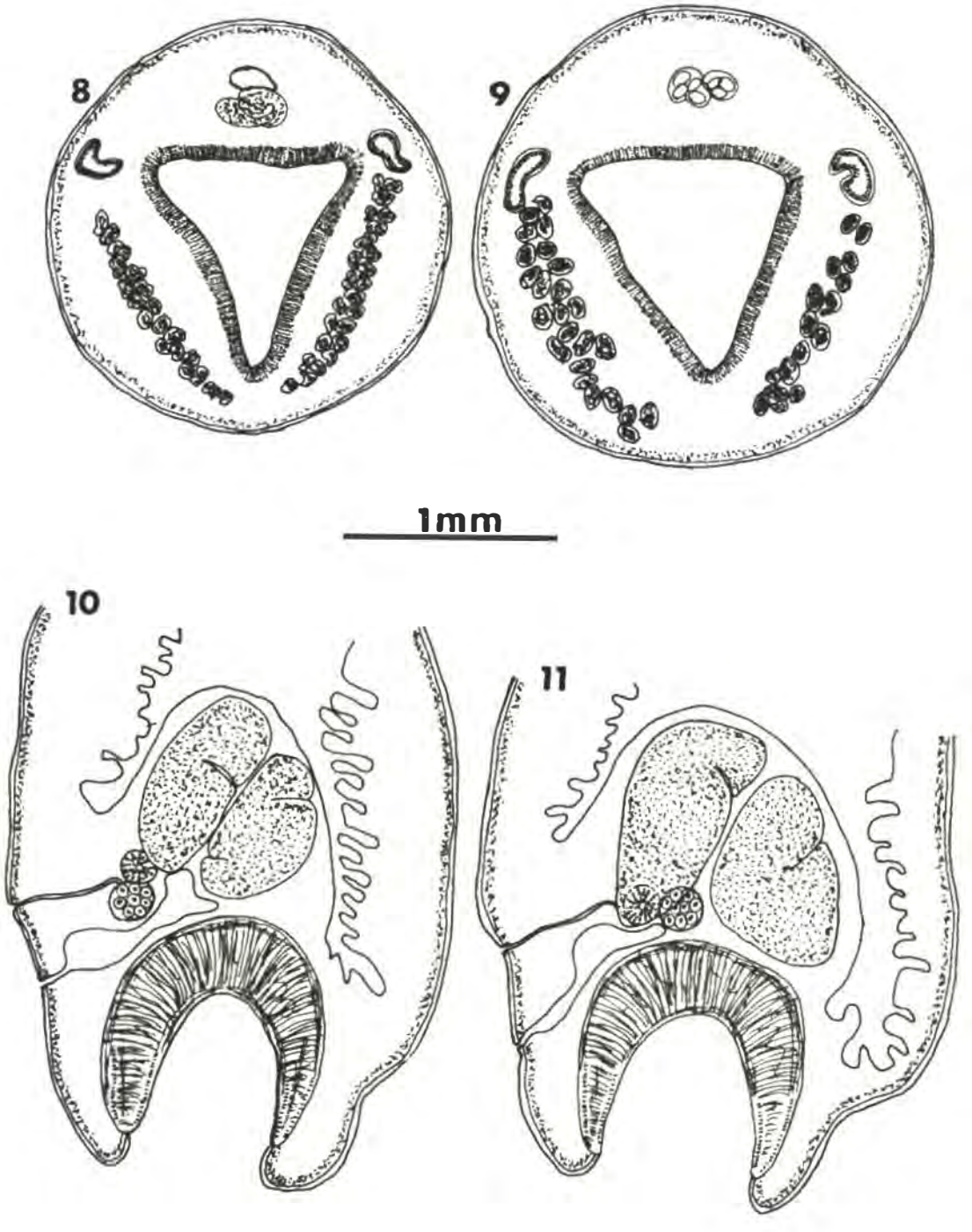
The genital pore opens ventrally into the ventral pouch at the level of the oesophagus. Terminal genitalium is of the microbothrium type (*sensu* Nasmark, 1937) (Figures 6 & 7) and is found in the median sagitall section.

The excretory vesicle lies dorsal and anterior to the acetabulum (Figures 10 & 11), and the excretory pore opens on the dorsal surface posteriorly to the Laurer's canal opening.

The ventral pouch (Figure 2) opens subterminally at the anterior end and extends posteriorly to the level of the testes; with its outline in cross section roughly triangular (Figures 8 & 9) with the apex directed ventrally; bottom forms a hemispherical bulge due to the location of the testes.

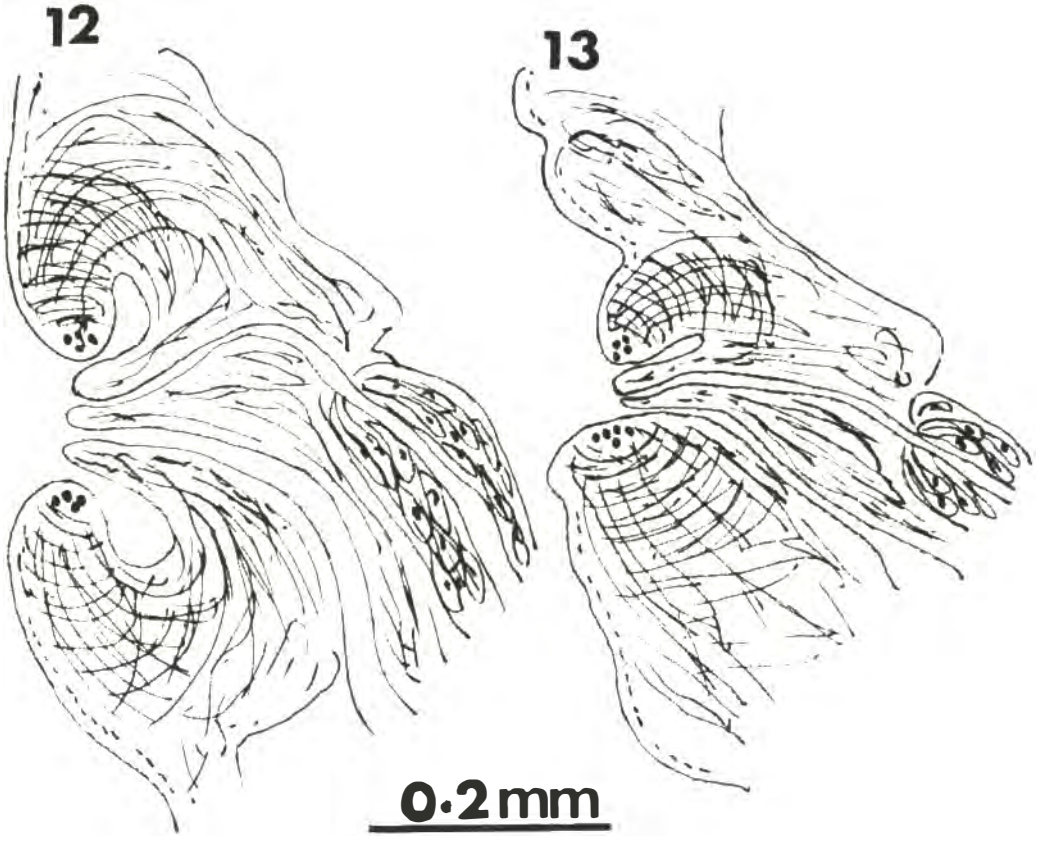


Figures 4-7. *Fischoederius philippinensis* n. sp. 4. Acetabulum (gastrothylax type), median sagittal section; 5. Pharynx (calicophoron type) and oesophagus, median sagittal section; 6 & 7. Terminal genitalium (microbothrium type), median sagittal section.



Figures 8-11. *Fischoederius philippenensis* n. sp. 8. Cross section at level of terminal ducts; 9. Cross section at level of the middle of body; 10 & 11. Posterior region showing relationship of testes, ovary, excretory vesicle, Laurer's canal and acetabulum (sagittal view).

Other information on the species include: hosts: *Bubalus bubalis, Bos taurus, Capra hircus* from the localities of: Molo, Iloilo; Urdaneta, Pangasinan and Batangas (Philippines). The Habitat is rumen; and consists of the following type specimens: *Holotype* – British Museum (Natural History) Reg. No. 1985.7.29.1; and *Paratypes* – British Museum (Natural History) Reg. No. 1985.7.29.2; Naturhistoriska riksmuseet, Stockholm Reg. No. 3353; Museum d' Histoire Naturelle de Geneve, Reg. No. 985.270; United States National Parasite Collection, Beltsville, Maryland, USNM Helminth. Coll. No. 78850.



Figures 12 & 13. Terminal genitalium (cobboldi type, new type) of *Fischoederius cobboldi*, median sagittal section.

Discussion

Since the genus *Fischoederius* was established by Stiles and Goldberger (1910), several species have been described and assigned to it. To date, 10 species have been assigned to the genus namely: *Fischoederius elongatus* (Poirier, 1883) Stiles and Goldberger, 1910; *F. cobboldi* (Poirier, 1883) Stiles and Goldberger, 1910; *F. fischoederi* Stiles and Goldberger, 1910; *F. siamensis* Stiles and Goldberger,

1910; *F. japonicus* (Fukui, 1922) Yamaguti, 1939; *F. skrjabini* Kadenatsii, 1963; *F. boyangensis* Wang, 1979; and *F. brevisaccus* Eduardo, 1981. The validity of some species, however, has been questioned.

Fischoederius fischoederi, F. ceylonensis and *F. siamensis* were considered by Fukui (1922), Maplestone (1923), Travassos (1934), Skrjabin (1949) and Van Strydonck (1970) as synonyms of *F. elongatus.* Yamaguti (1958, 1971) and Lee and Lowe (1971) also regarded *F. fischoederi* as junior synonym of *F. elongatus.* Yamaguti (1958), without giving any reason, listed *F. ceylonensis* and *F. siamensis* as separate species. Mukherjee and Chauhan (1965) also considered *F. siamensis* synonymous with *F. elongatus.* Sey (1983) regarded *F. fischoederi, F. ceylonensis, F.* siamensis and *F. japonicus* as junior synonyms of *F. elongatus.*

The type specimens of *F. fischoederi, F. ceylonensis* and *F. Siamensis* were re-examined (loaned from the United States National Parasite Collection, Bethesda, Maryland, USNM Coll. Nos. 15308, 15358 and 9956 respectively) and were found to be identical with *F. elongatus* examined in this work. Furthermore, *F. fishchoederi* and *F. siamensis* were established based only on one specimen each and therefore variations were not considered. It is also possible that Stiles and Golberger (1910) had no material of *F. elongatus* to compare with as this species was not mentioned in their paper. The present study confirms the view expressed by earlier authors that *F. fishcoederi, F. ceylonensis* and *F. siamensis* are all junior synonyms of *F. elongatus.* However, contrary to Sey's (1983) opinion, *F. japonicus* is considered here valid and this is shown in the key to the species of the genus. Detailed discussion of its validity is given in a separate paper dealing with revision of the group.

A request for the loan of the type specimens of *F. boyangensis* and *F. compressus* for re-examination was sent to the author (Dr. Wang) since the deposition of the types was not indicated in his paper and was unsuccessful as regulations do not permit scientific materials to be sent outside the Peoples' Republic of China. However, from the description and illustration given in which these were apparently based on flattened specimens, it is clear from these that the species in question are identical to *F. cobboldi* and *F. elongatus,* respectively and therefore fall as junior synomys of the latter names.

Fischoederius brevisaccus has recently been moved to a new genus as *Velasquezotrema brevisaccus* (Eduardo, 1981) in new combination by Eduardo and Javellana (1987). Reasons for the transfer is detailed in their paper.

Sey (1983) claimed that the terminal genitalium of *F. cobboldi* together with *Carmyerius diplopharyngialis* and *C. exoporus* belong to the microbothrium type. However, specimens of *F. cobboldi* and *F. skrjabini* from various hosts examined in this study as comparative materials revealed that their terminal genitalia belong to a type hiterto undescribed and is designated here as the cobboldi type (new type). This type is characterized by a well defined and well developed genital fold with genital sphincter; well developed radial fibres; a small genital papilla without sphincter (Figures 12 & 13). The microbothrium type is characterized by the presence of sphincter papilla which is absent in the cobboldi type.

The new species is assigned to the genus *Fischoederius* because of the extensive ventral pouch reaching the posterior portion of the body, the uterus median in its entire course and the testes median in their position in the posterior region of the body. *Fischoederius philippinensis* differs from *F. elongatus, F. japonicus* and *F. skrjabini* by the lateral location of the cacca and the different type of acetabulum which is of the gastrothylax type. It differs from *F. cobboldi* by the different lining of the lumen of oesophagus which is hyaline layer throughout its length and from all above mentioned species by the different type of terminal genitalium which is of the microbothrium type. It differs further from *F. elongatus* and *F. colbboldi* by its smaller size and from both species and *F. skrjabini* by the position of the testes which are in the same plane in the dorso-ventral direction forming a hemispherical bulge on the floor of the ventral pouch. The new species is named *Fischoederius philippinensis* after the country of origin.

To separate the species of the genus *Fischoederius,* a key is given below.

Key to the species of the genus *Fischoederius* Stiles and Goldberger, 1910

1. Caeca in lateral sides of the body; acetabulum of the gastrothylax type (*sensu* Nasmark, 1937) 2

   Caeca in median area of the body; acetabulum of the *Fischoederius* type (*sensu* Sey, 1983) 3

2. Oesophageal lumen lined in its anterior part by hyaline layer and the rest by ciliated epithelial cells; terminal genitalium of the cobboldi type (new type); testes not in the same plane in the dorso-ventral direction but rather one anterior and the other posterior; body large, not less than 8.00 mm long; caeca form deep dorso-ventral bends . . . . . *F. cobboldi*

   Oesophageal luman lined in its entire length by hyaline layer; terminal genitalium of the microbothrium type (*sensu* Nasmark, 1973); testes in the same plane in the dorso-ventral direction; body small not more than 5.00 mm long; caeca form shallow irregular dorso-ventral bends . . . . *F. philippinensis* n. sp.

3. Body large, not less than 12.00 mm long; vitellaria do not reach level of testes . . . . . *F. elongatus*

   Body small to medium, not more than 8.00 mm long; vitellaria reach level of testes 4

4. Genital sphincter present; bottom of ventral pouch with dome-shaped bulge; testes obliquely tandem . . . . . *F. skrjabini*

   Genital sphincter absent; bottom of ventral pouch without dome-shaped bulge; testes in the same plane in the dorso-ventral direction . . . . *F. japnicus*

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