FOLIA PARASITOLOGICA (PRAHA) 23: 201–206, 1976.

ON TWO ACANTHOSTOMATID TREMATODES, ACANTHOSTOMUM SPINICEPS (LOOSS, 1896) AND A. ABSCONDITUM (LOOSS, 1901), FROM AFRICAN BAGRID FISHES

F. MORAVEC

Institute of Parasitology, Czechoslovak Academy of Sciences, Prague

Abstract. Two species of acanthostomatid digeneans, *Acanthostomum spiniceps* (Looss, 1896) and *A. absconditum* (Looss, 1901) are redescribed on specimens obtained from fishes *Bagrus bayad* and *B. docmac* from Egypt. Both trematode species distinctly differ from one another in the number of peribuccal spines (27—32 in *A. spiniceps* and 18—23 in *A. absconditum*) and shape and size of eggs. Therefore they cannot be considered to be conspecific. The author concludes that *A. spiniceps* and *A. absconditum* are not synonyms of *A. imbutiforme* (Molin, 1859), but two independent species differing both in morphology and ecology.

In 1971 and 1972 the author had an opportunity to examine for helminths a small number of Egyptian freshwater fishes, including the members of the genus *Bagrus*, namely 12 specimens of *B. bayad* (Forsk.) and 1 specimen of *B. docmac* (Forsk.).* The fishes were bought at the fish-market in Cairo (Gíza) and originated apparently from the Nile. Numerous trematodes of the genus *Acanthostomum* Looss, 1899 representing two independent species of distinctly different morphology, *A. spiniceps* and *A. absconditum*, were recovered from the intestine of fishes at autopsy. Since these species have not been known sufficiently and are listed by Nasir (1974) as synonyms of *A. imbutiforme* (Molin, 1859), I am giving here their redescription based on mounted stained specimens. All specimens are deposited in the collections of the Institute of Parasitology, Czechoslovak Academy of Sciences, Prague.

1. *Acanthostomum spiniceps* (Looss, 1896) Figs. 1a, 2a—e

Hosts: *Bagrus docmac* (Forsk.) and *B. bayad* (Forsk.). Location: intestine. Locality: Cairo. Dates of finding: 8 November 1971, 29 December 1971, 1 February 1972.

Description (based on 41 specimens): The body of adult worms containing mature eggs in the uterus measures 1.63—1.42 mm in length and 0.639—0.816 mm in width. The surface of body is covered with fine spines, which are most numerous on the anterior portion of body and become more scarce toward the posterior end. Approximately the last fourth of the body is without these spines. The oral sucker is funnel-shaped, measuring 0.367—0.517 mm in length and 0.394—0.476 mm in maximum width. The outer surface of this sucker is armed with a row of large simple spines, measuring 0.045—0.063 mm in length and 0.009—0.015 mm in maximum width. The number of these peribuccal spines is variable, ranging from 27 to 32 (most frequently 28 or 29), rarely one of these spines is doubled. The ventral sucker is almost rounded, measuring 0.190—0.299 × 0.190—0.272 mm. The length of the prepharynx is rather variable (0.030—0.408 mm), according to the state of the worm during fixation; the prepharynx seems to be lacking in some specimens. The pharynx is strongly muscular, oval or slightly pyriform, measuring 0.114—0.165 × 0.090—0.144 mm. The oesophagus is relatively short, 0.021—0.081 mm in length. The intestinal caeca are relatively narrow and run along the body

*) The fishes were redetermined by Dr. S. Frank, C.Sc. of the Faculty of Science, Charles University, Prague, to whom my thanks are due.

approximately up to the level of the posterior margin of second testis, rarely somewhat lower, where they open to the body surface by distinct lateral anal openings. The seminal vesicle is situated below the ventral sucker. It is rather long and forms folds. The testes are tandem or slightly diagonal (in young specimens), located near posterior end of body and with a smooth outline. They are of irregular shape in young specimens and almost rounded in older specimens. Size of anterior testis 0.114 — 0.210 × 0.216—0.300 mm, posterior testis 0.129—0.246 × 0.243—0.285 mm. The ovary is almost spherical, submedian, a short distance in front of the first testis. It measures 0.135 to 0.258 × 0.204—0.270 mm. The seminal receptacle lies near the posterior margin of the ovary. The uterus fills the space limited by the ovary, ventral sucker and vitellaria. The genital pore lies immediately in front of the ventral sucker. The mature eggs are yellow-brown, of oval shape and measure 0.027—0.033 × 0.015—0.018 (most often 0.030 × 0.015 mm). The vitellaria are follicular, situated on sides of body in its posterior half. They lie outside the caeca, partly overlapping them. The vitellaria start a short distance below the end of seminal vesicle (in young specimens almost immediately behind ventral sucker) and extend posteriorly approximately to the level of posterior margin of anterior testis. The arms of the excretory vesicle reach to anterior margin of pharynx.

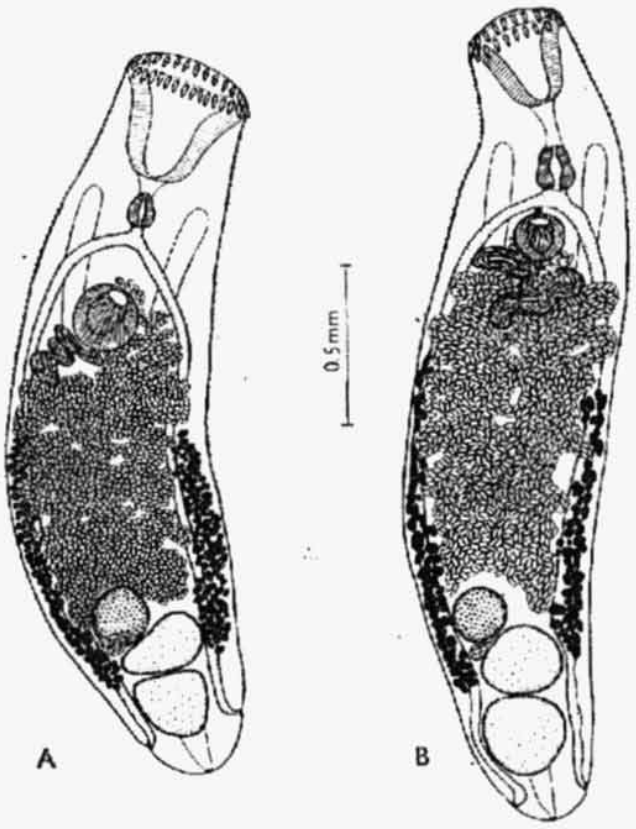

Fig. 1. A — *Acanthostomum spiniceps* (Looss, 1896); B — *Acanthostomum absconditum* (Looss, 1901).

A. spiniceps is the type species of the genus *Acanthostomum* Looss, 1899. It has been recorded from African bagrids *Bagrus bayad* and *B. docmac* from Egypt (Looss 1896, 1901, Fischthal and Kuntz 1963) and the Sudan (Khalil 1963, 1969, 1971) and *Bagrus filamentosus* and *Chrysichthys furcatus* from Mali (Dollfus 1932). Pogoreltseva (1952) reported this species from *Mullus barbatus ponticus* from the Black Sea, but this record should be verified.

2. *Acanthostomum absconditum* (Looss, 1901) Figs. 1b, 2f—j

Syn.: *A. bagri* Thomas, 1958
Host: *Bagrus bayad* (Forsk.). Location: intestine. Locality: Cairo. Dates of finding: 8 November 1971, 29 December 1971, 5 January 1972, 1 February 1972.

Description (based on 76 specimens): The body of worms containing mature eggs in the uterus measures 1.84—4.04 mm in length and 0.517—0.625 mm in maximum width. The cuticle on the anterior half of body is covered with fine spines. The oral sucker is funnel-shaped and measures 0.286—0.408 mm in length and 0.326—0.408 mm in maximum width. The oral sucker is armed with 18—23 (most often 19) large simple peribuccal spines, measuring 0.054—0.063 mm in length and 0.012—0.015 mm in maximum width; rarely one of the spines may be doubled. The ventral sucker is almost rounded and measures 0.144—0.177 × 0.144—0.177 mm. The prepharynx is 0.078—0.240 mm long. The pharynx is strongly muscular, oval or pyriform and measures 0.132—0.180 × 0.150—0.186 mm. The oesophagus is very short, measuring 0.030—0.051 mm in length. The intestinal caeca extend far toward posterior extremity and open a short distance in front of the end of body (about midway between the posterior margin of posterior testis and posterior end of worm body) by distinct lateral anal pores. The seminal vesicle lies below the ventral sucker; it is rather long and forming folds. The testes are tandem, near the posterior end of body, with a smooth outline and of irregularly oval to rounded shape. The anterior testis measures 0.177—0.276 × 0.180—0.286 mm, posterior testis 0.177—0.326 × 0.189—0.326 mm. The ovary is almost spherical and submedian, immediately in front of the first testis. It measures 0.156—0.244 × 0.138—0.204 mm. The seminal receptacle lies

approximately near the posterior margin of the ovary. The uterus fills the space limited by the ventral sucker, ovary and vitellaria. The genital pore is median, immediately in front of the ventral sucker. Mature eggs are yellow-brown, rather large (0.042—0.045 × 0.015—0.018 mm) and elongate; they seem to be provided with a large operculum on one side. Follicular vitellaria lie on the sides of posterior half of body; they start below the posterior end of seminal vesicle and reach approximately to the middle of the posterior testis. The arms of the excretory vesicle reach to anterior margin of the pharynx.

This species has been reported only from *Bagrus bayad* and *B. docmac* from Egypt (Looss 1901, Fischthal and Kuntz 1963), the Sudan (Khalil 1963, 1969, 1971) and Ghana (Thomas 1958).

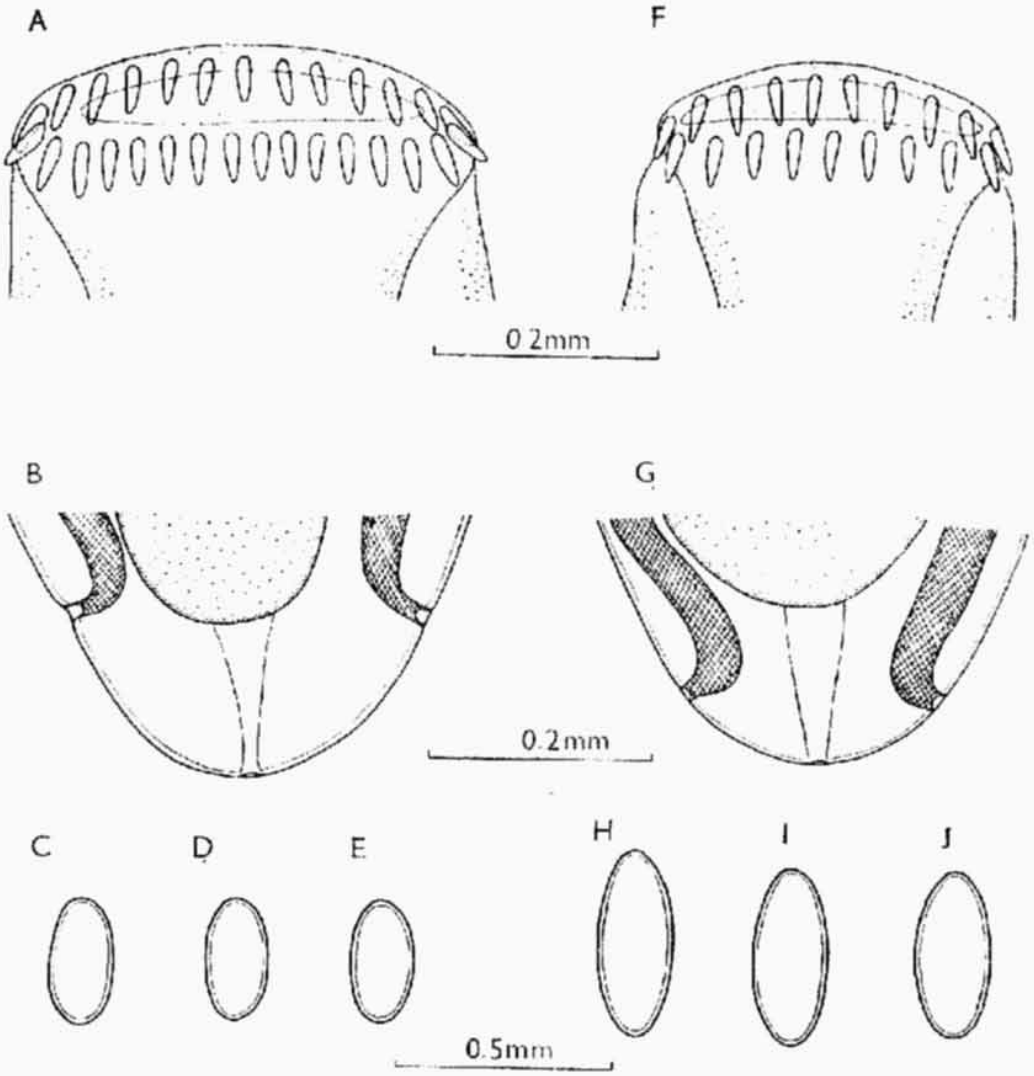

Fig. 2. A — Arrangement of peribuccal spines in *A. spiniceps;* B — posterior extremity of *A. spiniceps;* C—E — *A. spiniceps* eggs; F — arrangement of peribuccal spines in *A. absconditum;* G — posterior extremity of *A. absconditum;* H—J — *A. absconditum* eggs.

DISCUSSION

The genus *Acanthostomum*, which comprises the intestinal parasites of fishes and reptiles (mainly crocodiles), was created by Looss (1899) for the species *A. spiniceps* (Looss, 1896) and *A. coronarium* (Cobbold, 1861). According to the generic diagnosis, the intestinal branches of these trematodes are bluntly ended. In 1940, Bhalerao established for his species *A. burminis* a new genus, *Atrophecaecum*, characterized by

the presence of anal pores and strong reduction of one of the intestinal branches. Later, on the basis of the presence of anal pores Morozov (1955) and Groschaft and Baruš (1970) transferred some other species from the genus *Acanthostomum* to this new genus. However, many authors (e.g. Dollfus 1950, Yamaguti 1958, 1971, Khalil 1963, Fischthal and Kuntz 1963, Karyakarte 1967, Nasir 1974) do not recognize *Atrophaecaecum* as a valid genus and consider it a synononym of *Acanthostomum*, as well as later described genera *Gymnatrema* Morozov, 1955, *Proctocaecum* Baugh, 1957 and *Haplocaecum* Simha, 1958. This view was confirmed by the finding of anal pores in *A. spiniceps* (see Khalil 1963, Fischthal and Kuntz 1963 and our observations), a type species of the genus *Acanthostomum*. The anal pores at the posterior extremity of these trematodes were overlooked by Looss (1899) and it is possible that the presence of these intestinal pores is a generic feature of the genus *Acanthostomum*. In 1971 Yamaguti placed in the genus *Acanthostomum* a total of 35 species; 11 of them are parasites of fishes and 24 parasites of reptiles.

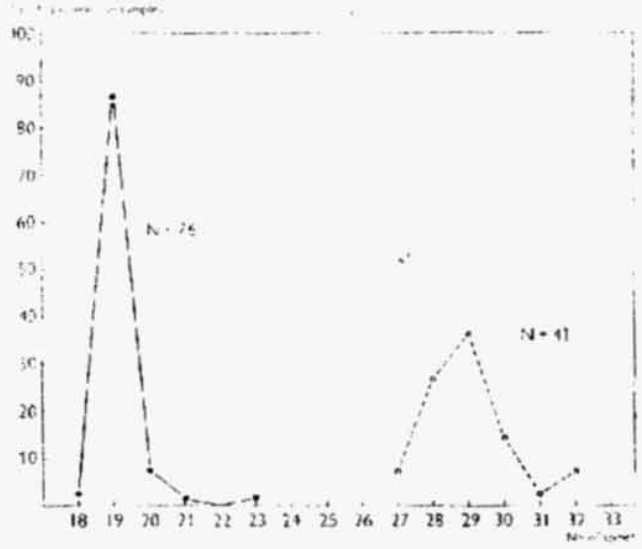

Fig. 3. Variation of numbers of peribuccal spines in specimens of *A. absconditum* (– – – –) and *A. spiniceps* (— · — · —).

Nasir (1974) has recently published a revision of the genus *Acanthostomum* Looss, 1899, based only on the material collected by the author from South-American reptiles and on the literature. The author arrived at the conclusion that the characters used hitherto in the taxonomy of acanthostomatid trematodes (number of peribuccal spines, atrophied caecum, presence of anal pores, length of oesophagus, presence of gonotyl etc.) are unstable. Consequently he appended also *Caimanicola* Freitas et Lent, 1938 as a synonym of the genus *Acanthostomum*, which he divided into subgenera *Acanthostomum* and *Gymnatrema*. Within the subgenus *Acanthostomum* he recognized only two species differing from one another in the geographical distribution: *Acanthostomum scyphocephalum* (Braun, 1899) in the New World and *A. imbutiforme* (Molin, 1859) in the Old World. He also admitted that *Acanthostomum* might be a monotypic genus. All the remaining species of the subgenus *Acanthostomum* are included in the lists of synonyms of *A. scyphocephalum* or *A. imbutiforme*. In this paper, Nasir (1974) considered many species of the genus *Acanthostomum*, including *A. spiniceps* (Looss, 1896) and *A. absconditum* (Looss, 1901) to be synonyms of *A. imbutiforme*. In his opinion, this species parasitizes various species of freshwater and marine fishes and crocodiles in Africa and in the regions of the Adriatic and Black Seas. According to our results, however, the species *A. spiniceps* and *A. absconditum* cannot be regarded either as conspecific or as identical with *A. imbutiforme*.

The morphology of *Acanthostomum spiniceps* and *A. absconditum* is so different that there is no doubt that two independent species are concerned. One of the main differences is the number of peribuccal spines. Although a great variability in the number of these spines has been observed in both species (24—32 in *A. spiniceps* and 17—22 in *A. absconditum*) (see Looss 1896, 1901, Dollfus 1950, Khalil 1963 and Fischthal and Kuntz 1963), our studies of a large number of specimens reveal that the numbers of spines do not coincide in the two species. A majority of *A. spiniceps* have 28 or 29 spines, whereas in *A. absconditum* mostly 19 spines occur; the deviations from these

numbers concern only small portions of the populations (Fig. 3). Another reliable taxonomic character, which separates *A. spiniceps* from *A. absconditum*, is the size and shape of mature eggs. While the width of eggs is almost the same in both species (0.015 to 0.018 mm), the length of eggs in *A. spiniceps* is 0.027—0.033 (most frequently 0.030) mm, whereas in *A. absconditum* it is 0.042—0.045 (most frequently 0.045) mm. Hence, the eggs of *A. absconditum* are much longer (Fig. 2c—e, h—j) and both species can be easily distinguished on the basis of the shape of eggs without measuring. However, only mature eggs should be considered. In addition to these two differentiating features there are some others, less marked characters, as relatively wider body and larger size of ventral sucker in *A. spiniceps*, distance of anal pores from posterior margin of the second testis, extent of spination of the cuticle etc. Khalil (1963) separated these species also on the basis of their size of body, but our results show that this size is almost the same both in *A. spiniceps* and *A. absconditum*. Our findings suggest that *A. spiniceps* occurs mainly in *Bagrus docmac*, whereas in *B. bayad* the species *A. absconditum* is dominant.

As to the relationship between *A. spiniceps* and *A. imbutiforme*, it is obvious that they represent two independent species differing from one another primarily in the number of peribuccal spines. According to the description of *A. imbutiforme* by Morozov (1955), this species has 16—19 peribuccal spines, whereas in *A. spiniceps* the number of these spines is much higher, 24—32 (most frequently 28—30). The number of peribuccal spines in *A. absconditum* (17—23) is similar to that in *A. imbutiforme* (16—19), but these species markedly differ in the size of eggs; *A. imbutiforme*, similarly as *A. spiniceps*, has much smaller eggs (0.024—0.029×0.012 mm) than *A. absconditum* (0.042 to 0.045×0.015—0.018 mm). It should be also considered that *A. imbutiforme* occurs only in marine fishes, whereas *A. spiniceps* and *A. absconditum* are parasites of freshwater fishes. The record of *A. spiniceps* from *Mullus barbatus* from the Black Sea (Pogoreltseva 1952) seems little probable and should be verified; according to the figures (see Morozov 1955) these trematodes resemble *A. imbutiforme* in the number of peribuccal spines.

The author of this paper agrees to the opinion that many nominal species of the genus *Acanthostomum* are apparently synonyms of the species described earlier. He assumes, however, that the solution of these questions and a revision of this genus must be based on an extensive study of type and topotypic materials, otherwise the results may lead to wrong conclusions.

О ДВУХ ТРЕМАТОДАХ, *ACANTHOSTOMUM SPINICEPS* (LOOSS, 1896) И *A. ABSCONDITUM* (LOOSS, 1901) ОТ РЫБ РОДА *BAGRUS* ИЗ АФРИКИ

Ф. Моравец

Резюме. Дано переописание двух видов дигеней, *Acanthostomum spiniceps* (Looss, 1896) и *A. absconditum* (Looss, 1901) по экземплярам полученным автором от рыб *Bagrus bayad* и *B. docmac* из Египета. Обе формы отличаются друг от друга прежде всего числом перибуккальных шипов (27—32 у *A. spiniceps* и 18—23 у *A. absconditum*) и формой и размером яиц и поэтому нельзя их считать конспецифическими. Автор приходит к заключению, что *A. spiniceps* и *A. absconditum* не синонимы вида *A. imbutiforme* (Molin, 1859), но два самостоятельных вида, отличающиеся морфологией и экологией.

REFERENCES

BHALERAO G. D., Observations on the anatomy of *Acanthostomum burminis* (Bhalerao, 1926). Indian J. Vet. Sci. Anim. Husb. 10: 95—97, 1940.

DOLLFUS R. P., Mission Saharienne Augiéras - Draper, 1927—1928. Trématodes de mammifères, oiseaux et poissons. Bull. Mus. Nat. Hist., Paris, Sér. 2, 4: 555—563, 1932.

—, Trématodes récoltés au Congo Belge par le Professeur Paul Brien (mai-août 1937). Ann. Mus. Congo belge, C-Zool., Sér. 5, 1: 1–136, 1950.

FISCHTHAL J. H., KUNTZ R. E., Trematode parasites of fishes from Egypt. Part V. Annotated record of some previously described forms. J. Parasitol. 49.: 91—98, 1963.

GROSCHAFT J., BARUŠ V., Studies on the helminth fauna of crocodiles in Cuba. Věst. Čs. spol. zool. 34: 289—303, 1970.

KARYAKARTE P. P., *Acanthostomum* (*Atrophecaecum*) *allii* sp. n. (Trematoda: Acanthostomidae) from the snake, *Elaphe helena*, in India. J. Parasitol. 53: 587—588, 1967.

KHALIL L. F., On *Acanthostomum gymnarchi* (Dollfus, 1950), with notes on the genera *Acanthostomum* Looss, 1899, *Atrophocaecum* Bhalerao, 1940, *Gymnatotrema* Morosov, 1955 and *Haplocaecum* Simha, 1958. J. Helminthol. 37: 207–214, 1963.

—, Studies on the helminth parasites of freshwater fishes of the Sudan. J. Zool., Lond., 158: 143—170, 1969.

—, Check list of the helminth parasites of African freshwater fishes. Techn. Comm. No. 42, Commonwealth Institute of Helminthology, St. Albans, pp. 1—80, 1971.

LOOSS A., Recherches sur la faune parasitaire de l'Egypte. Première partie. Mém. Inst. Egypte 3: 1–252, 1896.

—, Weitere Beiträge zur Kenntniss der Trematoden-Fauna Aegyptens, zugleich Versuch einer natürlichen Gliederung des Genus *Distomum* Retzius. Zool. Jahrb. (Syst.) 12: 521—784, 1899.

—, Ueber die Fasciolidengenera *Stephanochasmus*, *Acanthochasmus* und einige andere. Centrbl. Bakt., Abt. 1, 29: 595—606, 628—634, 654—661, 1901.

MOROZOV F. N., Heterophyata Morosov, 1955. In Skrjabin K. I.: Trematodes of animals and man. Vol. X Moscow. pp. 241—335, 1955. (In Russian.)

NASIR P., Revision of genera *Acanthostomum* Looss, 1899 and *Telorchis* Luehe, 1899 (Trematoda: Digenea) with redescription of *Acanthostomum* (*Acanthostomum*) *scyphocephalum* (Braun, 1899) and *Telorchis aculeatus* (von Linstow, 1879) Braun, 1901. Riv. parassitol. 35: 1–22, 1974.

POGORELTSEVA T. P., New trematodes of Black Sea fish. Trudy Karadagsk. biol. stantsii AN Ukr. SSR 12: 34–35, 1952. (In Russian.)

THOMAS J. D., Two new digenetic trematodes, *Heterorchis protopteri* n. sp. (Fellodistominae) and *Acanthostomum bagri* n. sp. (Acanthostomidae: Acanthostominae) from West Africa. Proc. Helm. Soc. Wash. 25: 8—14, 1958.

YAMAGUTI S., Systema Helminthum Vol. I. The digenetic trematodes of vertebrates. Part I, II. New York—London, 1575 pp., 1958.

—, Synopsis of digenetic trematodes of vertebrates. Vol. I, II. Tokyo, 1074 pp., 1971.

Received 9 October 1975.

F. M., Parasitologický ústav ČSAV,
Flemingovo n. 2, 166 32 Praha 6,
ČSSR