

Review of amphistomes (Trematoda: Paramphistomata) of Iranian domestic ruminants

Dr. Ottó SEY — Dr. Amin ESLAMI

Department of Zoology, Janus Pannonius University, Pécs, Hungary —
University of Tehran, Faculty of Veterinary Medicine, Tehran, Iran

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Sey, O. - Eslami, A. - Parasit. hung. 14: 61-65. 1981-82.

ABSTRACT. Histomorphological examinations revealed ten species of amphistomes of which Paramphistomum gracile, Gastrothylax compressus, Carmyerius spatiosus, Calicophoron papillosum and Orthocoelium scolicoelium proved to be new for Iran. Structure of the recovered species and their zoogeographical affinities have been discussed in full length.

Amphistome parasites of Iranian domestic ruminants have been reported by BAGHERI (1961), ARFAA (1962), SABBAGHIN et al. (1964), RAFYI et al. (1968) and ESLAMI and FAIZY (1975). The origin of cattle in BAGHERI's (1961) examinations as well as the species of parasites obtained were not determined. ARFAA (1962) discovered Paramphistomum microbothrium in the Khuzistan Province, by experimentally infecting lamb with metacercariae emerged from naturally infected snails, Bulinus truncatus. RAFYI et al. (1968) gave the following list of Iranian amphistomes: Paramphistomum cervi, P. gotoi, P. microbothrium, P. (now Orthocoelium) orthocoelium, Cotylophoron cotylophorum, Gigantocotyle explanatum, Gastrothylax crumenifer and Fischoederius sp. More recently P. cervi was repeatedly reported from goat by ESLAMI and FAIZY (1975).

Results of the present paper further contribute to our knowledge of amphistomes in Iranian ruminants and an analysis of their zoogeographical affinities is given.

MATERIALS and METHODS

The study material was collected by A. ESLAMI, the junior authors from 1979 to 1981 at slaughter houses of Tehran and in the southern and eastern parts of Iran. The majority of the samples were derived from cattle and one sample was obtained from sheep (Shiraz). A total of fourteen samples were available for examinations. Flukes, after having been removed from the rumen, were fixed in 10% formalin and median sagittal sections were prepared by the usual method.

RESULTS and DISCUSSION

In the samples available ten species were recovered, including some described by earlier authors. As the identification of the amphistomes has been reported from Iran so far, based on gross-morphological features, the histomorphological structure of the muscular organs of these species is also presented and illustrated.

Characterisation of the amphistomes recovered

Paramphistomum cervi (Zeder, 1790) (Figs. 1-3)

It was found only in one sample, thus it seems to be a rare fluke in Iran. It has a Liorchis-type of pharynx (Fig. 1), Gracile-type of genital opening (Fig. 2) and Paramphistomum-type of acetabulum (Fig. 3). These features are reliable characters to distinguish it from the closely related other species (P. gotoi, P. gracile) which are also found in this country. Intermediate hosts are various Planorbid snails throughout its distributional area (SEY, 1982a).

Paramphistomum gotoi Fukui, 1922 (Fig. 4)

Two out of the fourteen samples contained this species. Its pharynx is Liorchis- (Fig. 4), the genital opening Gracile-, the acetabulum Paramphistomum-type. This species is closely related to the preceding one but differs from it by having larger papillae found in the pharynx and by the position of the blind caeca; they usually meet dorso-medially (in P. cervi the caeca do not meet dorso-medially). It has an Asiatic distribution in the Palaearctic region and it has been found once in Europe (SEY, 1978). Its intermediate host is known neither in Asia nor in Europe.

Paramphistomum gracile Fiscoeder, 1901 (Fig. 5)

This species is very similar to P. cervi on the basis of gross morphology and these two species were often confused throughout their distributional area. It has Paramphistomum-type of pharynx and acetabulum and Gracile-type of genital opening. Structural differences of the pharynx of P. cervi (Fig. 1) and of P. gracile (Fig. 5) are reliable specific features. P. gracile is a new species for Iran and, at the same time, this country is in its westernmost distributional area. Otherwise it has Oriental distribution where it is very common species, i.e. in India (SEY, 1979). Its intermediate host is unknown.

Paramphistomum microbothrium Fiscoeder, 1901 (Figs. 5-6)

Papers dealing with studies of amphistomes of Iran have also reported its occurrence in the south western part of this country. This species was found in the sample derived from sheep in the south of Iran. It has Calicophoron-type of pharynx (Fig. 5), Paramphistomum-type of acetabulum and Microbothrium-type of genital opening (Fig. 6). The distributional area of this species in Iran coincides with that of its intermediate host, *Bulinus truncatus* (ARFAA et al. 1973).

Gastrothylax crumenifer (Creplin, 1847) (Figs. 7-9)

This species seems to be the most common rumen fluke in Iran; nine samples of the fourteen contained specimens. It has Gastrothylax-type of pharynx (Fig. 7) and acetabulum (Fig. 8) and Gracile-

Legend to Figures

Figs. 1-15: Median sagittal sections of muscular organs

Fig. 1-3: Pharynx, genital opening and acetabulum of *Paramphistomum cervi*

Fig. 4: Pharynx of *Paramphistomum gotoi*

Fig. 5: Pharynx of *Paramphistomum gracile*

Fig. 6: Genital opening of *Paramphistomum microbothrium*

Figs. 7-9: Pharynx, genital opening and acetabulum of *Gastrothylax crumenifer*

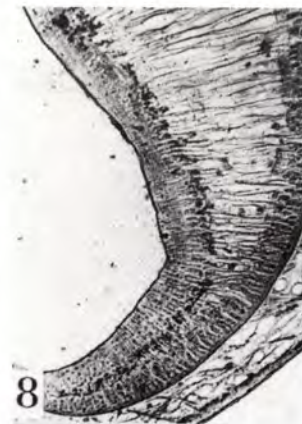
Fig. 10: Acetabulum of *Gastrothylax compressus*

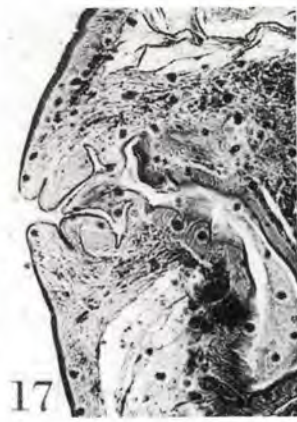
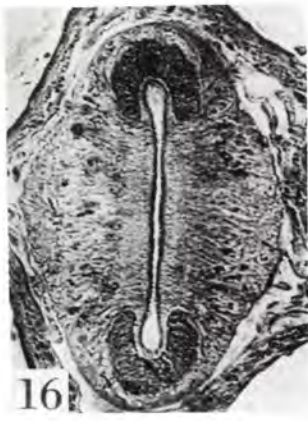
Figs. 11-12: Acetabulum and genital opening of *Calicophoron papillosum*

Figs. 13-15: Pharynx, genital opening and acetabulum of *Gigantocotyle explanatum*

Fig. 16: Transverse section of pharynx of *Orthocotyle scolicoelium*

Figs. 17-18: Median sagittal sections of genital opening (Fig. 17) and acetabulum (Fig. 18) of *Orthocotyle scolicoelium* (Photo by O. SEY)





type of genital opening (Fig. 9). Ventral pouch is triangular with dorsally directed apex. Intermediate hosts are Planorbid snails (*Indoplanorbis exustus* and *Gyraulus convexiusculus* in India; *Gyraulus albus* in the USSR).

Gastrothylax compressus Brandes, 1898 (Fig. 10)

It was found once in the samples; it has *Gastrothylax*-type of pharynx, *Gracile*-type of genital opening and *Carmyerius*-type of acetabulum (Fig. 10). Ventral pouch triangular with dorsally directed apex. This species has been regarded to be synonymous with *G. crumenifer* for a long time but the histomorphological structure of the acetabulum differs from that species. It is a new species for Iran. Its intermediate host is unknown.

Carmyerius spatiosus (Brandes, 1898)

It was found in the sample collected in the south of Iran from sheep. This material contributed to the clarification of its specific features (SEY, 1982b). Examinations showed that it has *Gastrothylax*-type of pharynx, *Gracile*-type of genital opening and *Carmyerius*-type of acetabulum. Ventral pouch is either triangular with blunt angles or circular. It is a new species for Iran. Intermediate host is unknown.

Calicophoron papillosum (Stiles et Goldberger, 1910) (Figs. 11-12)

This species was obtained in one sample of the available material. It has *Calicophoron*-type of pharynx and acetabulum (Fig. 11). The genital opening represents a new type of which the *Papillosum* name is proposed (Fig. 12). At the histomorphological examinations of this species, done by NASMARK (1937) the test material seemingly was not available for him; GUPTA (1965), who examined it histomorphologically, did not typify the genital opening. It is a new species for Iran. Intermediate host is unknown.

Gigantocotyle explanatum (Creplin, 1847) (Figs. 13-15)

This fluke is a parasite of the bile vessels of the liver. It has *Explanatum*-type of pharynx (Fig. 13), genital opening (Fig. 14) and acetabulum (Fig. 15). Our study material was collected from cattle imported from Afghanistan, Pakistan or India. At the same time, it was not found in the local stock of that area. In spite of this fact, it may be regarded to be a species of Iranian distribution because it may be found both in the eastern (Afghanistan, KOTRLA et al. 1976) and western (Iraq, KADHIM et al. 1970) neighbouring countries. Intermediate hosts are *Indoplanorbis exustus* and *Gyraulus convexiusculus* in India.

Orthocoelium scolicoelium (Fischoeder, 1904) (Figs. 16-18)

It was found in two samples of the study material; it is a new species for Iran. It has *Dicranocoelium*-type of pharynx (Fig. 16), *Scolicoelium*-type of genital opening (Fig. 17) and *Streptocoelium*-type of acetabulum (Fig. 18). The intermediate hosts are Planorbid snails (*Anisus natalensis* in Africa; *Bithynia pulchella* in India).

Zoogeographical affinities of the Iranian amphistomes

The territory of Iran, in a zoogeographical sense, is situated in the Palaearctic region and in the south-eastern part of the Mediterranean area; close to the Oriental and not too distant from the Ethiopian regions. This position of the country is reflected by the species composition of the amphistomes recovered by earlier and the present authors.

Our examinations revealed five new species for the country (*Paramphistomum gracile*, *Gastrothylax compressus*, *Carmyerius spatiosus*, *Calicophoron papillosum*, *Orthocoelium scolicoelium*), RAFYI

et al. (1968) reported Cotylophoron cotylophorum and species of the genus Fischoederius, but were not found by us. Thus, altogether eight species of amphistomes have been recorded in Iran so far.

Paramphistomum cervi, P. gotoi are Palaearctic species with wide distributional areas and Iran is in the most southernly part of their distribution. Calicophoron papillosum is a species characteristic for the Oriental region and this is the first report on its occurrence outside this region. The rest are either Oriental (P. gracile, O. orthocoelium, G. crumenifer, G. compressus, Fischoederius sp.) or Oriental-Ethiopian (C. spatiosus, G. explanatum, C. cotylophorum, O. scolicoelium) or Ethiopian-Palaearctic (P. microbothrium) elements. Extending from the centre of their origin nowadays Iran is the most western distributional area for the species P. gracile, C. papillosum, O. orthocoelium, G. compressus and Fischoederius sp. (although GOHAR (1934) mentioned F. elongatus in an other part of the Mediterranean area (Egypt) but this finding needs further confirmation) and the most eastern area of the species, P. microbothrium.

Thus, the amphistome fauna of Iran is strongly influenced by Oriental and to a lesser extent by Ethiopian elements. Species of fresh water snails, belonging to the Bulinid (ARFAA et al. 1973), Lymnaeid (GHADIRIAN and HOGHOOGHAI, 1973) and Planorbis (Planorbis planorbis, Gyraulus convexiusculus, G. euphraticus, G. intermixtus) groups and the favourable climate of the country preserve the natural circulation of the host-parasite system.

SEY, O. — ESLAMI A.: Az iráni házasított kérődzők bendőméltelyeinek vizsgálata (Trematoda: Paramphistomata)

Iráni házasított kérődzők bendőméltelyeinek vizsgálata alapján a szerzők tíz faj hisztomorfológiai leírását adják. Öt ezek közül új az iráni faunában: Paramphistomum gracile, Gastrothylax compressus, Carmyerius spatiosus, Calicophoron papillosum, Orthocoelium scolicoelium. Állatföldrajzi elemzésük szerint két palaearktikus- (Paramphistomum cervi és P. gotoi), hat orientális- (Calicophoron papillosum, Paramphistomum gracile, Orthocoelium orthocoelium, Gastrothylax crumenifer, G. compressus és Fischoederius sp.), négy orientális-ethiopiai- (Carmyerius spatiosus, Gigantocotyle explanatum, Cotylophoron cotylophorum, Orthocoelium scolicoelium) és egy ethiopiai-palaearktikus-faj (Paramphistomum microbothrium) fordul elő az iráni kérődzőkben.

REFERENCES

- ARFAA, F. (1962): A study on Paramphistomum microbothrium in Khuzistan S.W. Iran. - Ann. Parasit. hum. comp., 37: 549-555.
- ARFAA, F. - SAHBA, G.H. - MASSOUD, J. (1973): The susceptibility of some Iranian snails to various local and foreign species of trematodes. - Iranian J. Publ. Health., 2: 54-58.
- BAGHARI, H. (1961): A study on the species of Paramphistomum of cattle in the slaughter-house of Tehran. - Thesis, Tehran, 1-45.
- ESLAMI, A. - FAIZY, A. (1975): Gastro-intestinal helminths of goats in Iran. - J. Vet. Fac. Univ. Tehran, 31: 3-4.
- GHADIRIAN, E. - HOGHOOGHI, N. (1973): The presence of snails of veterinary importance in Isfahan, Iran. - Br. vet. J., 129: 1-3.
- GOHAR, N. (1934): Liste des trématodes parasites et de leurs hotes vertébrés signalés dans la vallée du Nil. - Anns Parasit. hum. comp., 12: 322-331.

- GUPTA, N.K. (1965): On two amphistomid parasites of the genus *Calicophoron* from ungulates of economic importance in India. - Res. Bull. Panjab Univ., 16: 283-289.
- KADHIM, J.K. - ALTAIF, K.K. - HAWA, N.J. (1970): The occurrence of paramphistomes in ruminants in Iraq with a description of *Gigantocotyle explanatum* in cattle and buffaloes. - Bull. End. Dis., 12: 109-111.
- KOTRLA, B. - BLAZEK, K. - AMIN, A. (1976): Trematodes of domestic ruminants of Afghanistan and their role in pathology. - Folia Parasit. (Praha), 23: 217-220.
- NÄSMARK, K.E. (1937): A revision of the trematode family Paramphistomidae. - Zool. Bidr. Upps., 16: 301-565.
- RAFYI, A. - ALAVI, A. - MAGHAMI, G. (1968): Etat actuel de nos connaissances sur les Maladies parasitaires les plus importantes en Iran et Lutte contre ces Maladies. - Bull. Off. int. Epiz., 69: 195-201.
- SABBAGHIAN, H. - BIJAN, H. - ARFAA, F. (1964): A contribution about animal diseases due to trematodes in Khuzistan Province. - Tehran Coll. Vet. Med., 2: 22-25.
- SEY, O. (1978): Examination of rumen flukes (Trematoda: Paramphistomata) of cattle in Rumania. - Parasit. hung., 11: 23-25.
- SEY, O. (1979): Examination of the validity and systematic position of some paramphistomids of Indian ruminants. - Parasit. hung., 12: 31-36.
- SEY, O. (1982a): Morphology, life-cycle and geographical distribution of *Paramphistomum cervi* (Zeder, 1790) (Trematoda: Paramphistomata). - Miscenea zool. hung., 1: 11-24.
- SEY, O. (1982b): Revision of the family Gastrothylacidae Stiles et Goldberger, 1910 (Trematoda: Paramphistomata). - Acta Zool. Acad. Sci. Hung. (in press).

Received: 11 April, 1982.

Dr. SEY, O.
Department of Zoology
Janus Pannonius University
H-7604 Pécs, Ifjuság u. 6.
HUNGARY

Dr. ESLAMI, A.
University of Tehran
Faculty of Veterinary Medicine
P.o. Box: 3262 Tehran
IRAN