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ON INDIAN AMPHISTOMES

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I. INTRODUCTION

A fairly large number of amphistomes have been recorded from this country, mostly from herbivorous mammals. Deaths due to amphistomiasis in domesticated ruminants have been reported by many workers. So far only a few forms have been recovered from fishes, amphibians and reptiles in this country. Further researches may reveal many new forms from these hosts and particularly from fishes.

A number of classifications have been proposed from time to time for this complicated group of parasites but none of the systems is fully satisfactory with the result that inspite of the great amount of work done on this group in the world, differentiation of some of the species is still difficult. Therefore, until systematic position of different species of these trematodes is clearly known, amphistomiasis will remain a problem.

An attempt has been made in the present paper to give a brief review of our present knowledge of amphistomes with regard to Indian region, particularly to help those workers who are actively engaged in the field. It is now necessary to re-examine the type specimens and to provide correct description, to interpret correctly the different structures and to classify them properly as some of the Indian species appear to have been wrongly classified. This group of parasites is important for the conservation of animal health.

Amphistomiasis in domesticated ruminants has been known from a very early date in India. In some parts it has been known as 'Pitto' and 'Gillar' Indian amphistome collected from horses and elephants was probably first recorded by Cobbold (1875). The amphistomes of horses have been long known in this country as 'Masuri' Cobbold (1875) described three new amphistomes, *Amphistoma collinsi, A. stanleyii* and *A. hawkesii* from *Equus cabllus*. The same author in the year 1882 added another species, *A. papillatum* from *Elephas indicus*. Later on, the first three species of Cobbold were transferred

to the genus *Pseudodiscus* Sonsino, 1895 and *Pseudodiscus stanleyii* was treated as synonym to *P collinsi*. The fourth species of Cobbold was transferred to the genus *Pfenderius* erected by Stiles and Goldberger (1910) as *P. papillatus*.

Lewis and McConnel (1876) discovered a new species of amphistome from man in India and described it as *Amphistomum hominis*. A new genus *Gastrodiscoides* was proposed by Leiper (1913) who transferred *A. hominis* in this genus and described it as *G. hominis*. Another species, *G. hominis var. suis*, was added into this genus by Verma (1954) which is now considered as synonym to type species. Looss (1907) described a new species *Gastrodiscus secundus* based on the materials collected from mules in Assam.

Stiles and Goldberger (1910) made a valuable contribution on Indian amphistomes and their study was based on a large number of these parasites collected by various workers from this country as well as other parts of the world. Based on the study of the collections made from India they have reported as many as five new species of these trematodes and described them as *Cotylophoron indicum, Paramphistomum cauliorchis, P. crassum, P. papillosum* and *P. indicum*. The first one was described by them from *Ovis aries* and the rest were from *Bos indicus*. The second, third and fourth species of the joint authors were later on transferred into the genus *Calicophoron* Näsmark, 1937 as *C. cauliorchis, C. crassum* and *C. papillosum*. The validity of the species *C. crassum* was doubted by Näsmark (1937) and later on this species was treated to be synonym of *C. calicophoron* (Fischoeder, 1901) Näsmark, 1937 and the last species *P. indicum* of the joint authors was merged with *P. cervi* (Schrank, 1790) Fischoeder, 1901. Fukui (1926) collected some amphistomes from an Indian elephant died in Japan and on study this proved to be a new species of a new genus *Tagumaea* and he named it as *T heterocaeca* but later on this genus was merged with *Pfenderius* Stiles and Goldberger, 1910.

Bhalerao (1931) recovered amphistomes from freshwater turtles and on study he created a new genus *Stunkardia* with *S. dilymphosa* as type species. Srivastava (1934) collected amphistomes from frogs and described a new variety as *Diplodiscus amphichrus magnus*. Harshey (1934) reported three species, *Cotylophoron oyatum, C. orientalis* and *C. elongatum*. Later on his first species was merged with *Ceylonocotyle*

scoliocoelium (Fischoeder, 1904) Näsmark, 1937 and the last two with *Cotylophoron indicum* Stiles and Goldberger, 1910. A new species, *Pfenderius birmanicus,* from elephant was added by Bhalerao (1935). The same author in the year 1937 created a new genus *Neocladorchis* to accommodate his new species *N. poonaensis* collected from fish and added three more species, *Helostomatis sakrei* from fish, *Paramphistomum cuonum* from *Cuon dukhunensis* and *P. maplestoni* from *Hyelaphus porcinus.* Pande (1937) described a new species of amphistome, *Diplodiscus mehrai* from frog but this species and the variety described by Srivastava (1934) are now considered to be synonym of *D. amphichrus* Tubangui, 1933. Srivastava (1938) reported a new species, *Gyliauchen ozakii* from fish and proposed two new genera, *Orientodicus* and *Nicollodiscus.* The parasites of both these genera were collected from fishes. He included two species, *O. lobatum* and *O. jumnai* in his first genus and described his second genus with one species, *N gangeticus.* Johnson (1939) recovered a new amphistome from an Indian cow and described it as *Paramphistomum magnum* but Yamaguti (1958) erected a new genus *Johnsonitrema* for this species and named it as *J. magnum.*

Thapar and Sinha (1945) created a new genus *Olveria* with *O. indica* as type species. Tandon (1951) added one more species to this genus, *O. bosi.* Gupta (1951) reported *Paramphistomum bathycotyle* Fischoeder, 1901 but this species is now considered to be synonyum of *Gigantocotyle explanatum* (Creplin, 1847) Näsmark, 1937 All these species were recorded from domesticated ruminants. Gupta (1958) described two new species, *Cotylophoron madrasensis* and *Ceylonocotyle dawesi* both from domesticated ruminants. Thapar (1960) proposed a new genus *Caballeroia* with *C. indica* as type species and the parasites were collected from fish but neither he has indicated its systematic position nor has given the generic diagnosis. The present authors in their earlier communication gave the generic diagnosis. Out of all the genera compared by Thapar (1960) this genus shows closer affinity with that of *Neocladorchis* Bhalerao, 1937 As such this genus has been classified with the subfamily Clemptodiscinae Skrjabin, 1949 in this paper. Mukherjee (1963) reported two new species from domesticated ruminants and described them as *Cotylophoron bareilliensis* (Mukherjee, 1963) Mukherjee and Chauhan, 1967 and *Ceylonocotyle nasmarki.* Gupta (1963) described *Paramphisto-*

mum epiclitum Fischoeder, 1904 from farm animals but from the description it appears that he was dealing with *Cotylophoron indicum* Stiles and Goldberger, 1910 as was also pointed out in our earlier communication.

Siddiqi (1965) added three new species to the genus *Orientodiscus* Srivastava, 1938 and described them as *O. linguiformis, O. buckleyi* and *O. constrictus* but Mukherjee and Chauhan (1967) considered *O. constrictus* as only valid species and the other two were considered as synonym to *O. lobatum* Srivastava, 1938. All these species were collected from fresh-water turtles by Siddiqi. As pointed out by him his two species, *O. linguiformis* and *O. buckleyi* differ from the known species on the basis of body size, size of oral sucker, sucker ratio, number of lymhatic channel, size of pharyngeal bulb, nature of testes, genital pore at bifurcal zone or slightly posterior to it and size of eggs. These characters are so variable in nature that the slight differences in these characters alone should not be considered as sufficient enough to differentiate the species. Baer (1950) and Dollfus (1950) considered the ratio of pharynx and acetabulum to body length as of no specific value. Rhode (1963) expressed the doubts on number of lymphatic vessels in Srivastava's specimens. Manter and Pritchard (1964) reported that the size of eggs varies considerably in amphistomes. Mukherjee (1966) described a new species, *Calicophoron orientalis* from domesticated ruminants. Dwivedi (1967) described a new genus *Kachugotrema* with a new species *K. amboinensis*. His new genus agrees in all respect with the *Orientodiscus* Srivastava, 1938, so the present authors considered it as synonym to latter genus. The species *K. amboinensis* is also considered synonym to *O. lobatum* Srivastava, 1938 as in their major characters they are identical. Gupta and Gupta (1969) reported two new species, *Cotylophoron chauhani* and *Ceylonocotyle narayani* and erected a new genus *Cochinocotyle* with *C. bovini* as type species. These species are neither included in the present list nor it is possible to study their validity as they are not yet fully described.

Other workers who studied and recorded the known amphistomes, mostly from domesticated animals, from various parts of India and made valuable contributions to our knowledge on the group are Fischoeder (1901-1903), Gaiger (1910 and 1915), Railliet, Henry and Bauch (1914), Maplestone

(1923), Baylis (1929), Bhalerao (1935), Näsmark (1937), Moghe (1945) and Thapar (1956)

It is evident from the above review that most of the amphistomes in India have been recorded from mammals and only a few from fishes, amphibians and reptiles and none from birds.

A list of amphistomes so far recorded from Indian region with their systematic position, their hosts, location and locality is given below.

II. LIST OF SPECIES RECORDED FROM INDIAN REGION

Order 1. DIGENEA Van Beneden, 1858
Suborder 1. *PROSOSTOMATA* Odhner, 1905

Family 1. GYLIAUCHENIDAE Ozaki, 1933
Subfamily 1. *GYLIAUCHENINAE* Yamaguti, 1958

1. **Gyliauchen ozakii** Srivastava, 1938

1938. *Gyliauchen ozakii* Srivastava, *Indian J. Vet. Sci. Anim. Husb.*, **8**: 367.

Host.—*Harpodon nehereus* (Hamilton)

Location.—Intestine.

Locality.—Karachi.

Family 2. PARAMPHISTOMIDAE Fischoeder, 1901
Subfamily 2. *CLADORCHINAE* Luhe, 1909

2. **Olveria indica** Thapar and Sinha, 1945

1945. *Olveria indica* Thapar and Sinha, *Indian J. Vet. Sci. Ani. Husb.*, **15**: 219.

Host.—Cattle, buffalo, goat, sheep.

Location.—Rumen.

Locality.—Lucknow, Bareilly and other places.

This is the type species of the genus *Olveria* Thapar and Sinha, 1945.

3. **Olveria bosi** Tandon, 1951

1951. *Olveria bosi* Tandon, *Indian J. Helm.*, **3**: 93.

Host.—*Bos bubalis* Linnaeus, sheep, goat.

Location.—Rumen.

Locality.—Lucknow and other places.

Mukherjee (1960) collected it from the rumen of sheep and goat at Bareilly (U.P.)

4. **Pfenderius birmanicus** Bhalerao, 1935

1935. *Pfenderius birmanicus* Bhalerao, *Indian J. Vet. Sci. Anim. Husb.*, **5**: 1.

Host.—Elephant.

Location.—Intestine.

Locality.—India and Burma.

5. **Pfenderius heterocaeca** (Fukui, 1926)

1926. *Tugumaca heterocaeca* Fukui *Dobutsu-gaku Zasshi*, **38**: 79.

1958. *Pjanderius heterocaeca*: Yamaguti, *Systema Helminthum*, **1**: 967.

Host.—Elephant.

Location.—Intestine.

Locality.—Andamans and Burma.

6. **Pfenderius papillatus** (Cobbold, 1882) Stiles and Goldberger, 1910

1882. *Amphistoma papillatus* Cobbold, *Trans. Linn. Soc.*, **2**: 223.

1910. *Pfenderius papillatus*: Stiles and Goldberger, *Hyg. Lab. Bull.*, No. 6: 1.

Host.—Elephant.

Location.—Colon.

Locality.—Andamans.

This is the type species of the genus *Pfendorius* Stiles and Goldberger, 1910.

Subfamily 3. *CLEPTODISCINAE* Skrjabin, 1949

7 **Caballeroia indica** Thapar, 1960

1960. *Caballeroia indica* Thapar, *Libro Homonaje al Dr. Eduardo Caballero Y Caballero*: 315.

Host.—Cirrhina fulungee (Sykes)

Location.—Intestine.

Locality.—Tungabhadra Dam, Hospet, Madras.

This is the only known species of the genus *Caballeroia* Thapar, 1960.

8. **Neocladorchis poonaensis** Bhalerao, 1937

1937. *Neocladorchis poonaensis* Bhalerao, *J. Helm.*, **15**: 97.

Host.—Barbus dobsoni (Day)

Location.—Intestine.

Locality.—Poona.

Bhalerao (1937) proposed a new genus *Neocladorchis* as mentioned earlier in this paper to accommodate this species. Yamaguti (1958), however, considers this genus as synonym to *Cleptodiscus* Linton, 1910. The two genera differ in the size of oral diverticula, presence and absence of the oesophageal bulb, structure of the terminal part of caeca, etc., so the validity of the genus *Neocladorchis* can be established only by further study.

Subfamily 4. *DADAYTREMATINAE* Yamaguti, 1958

9. **Orientodiscus constrictus** Siddiqi, 1965

1965. *Orientodiscus constrictus* Siddiqi, *J. Helm.*, **39**: 377.

Host.—*Trionyx formosus* Gray

Location.—Small intestine.

Locality.—Aligarh.

10. **Orientodiscus lobatum** Srivastava, 1938

1938. *Orientodiscus lobatum* Srivastava, *Indian J. Vet. Sci. Anim. Husb.*, **8**: 367.

Host.—*Silundia gangetica* Hamilton

Location.—Rectum.

Locality.—Ganges.

Yamaguti (1958) considered this species as type. Srivastava (1938) reported another species *O. jumnai* and the parasites were recovered from the same host, *Silundia gangetica* and it was collected from the river Jamuna. This species was separated from the previous species on the basis of the nature of testes.

Subfamily 5. *DIPLODISCINAE* Cohn, 1904

11 **Diplodiscus amphichrus** Tubangui, 1933

1933. *Diplodiscus amphichrus* Tubangui, *Philippine J. Sci.*, **52**: 167.

Host.—Frog.

Location.—Rectum, small intestine.

Locality.—Widely distributed.

Subfamily 6. *GASTRODISCINAE* Monticelli, 1892

12. **Gastrodiscus aegyptiacus** (Cobbold, 1876) Railliet, 1893

1876. *Diplostoma aegyptiacus* Cobbold, *Veterinarian*, **48**: 733.

Host.—Horse.
Location.—Intestine.
Locality.—Assam and Bengal.

13. **Gastrodiscoides hominis** (Lewis and McConnell, 1876) Leiper, 1913

1876. *Amphistoma hominis* Lewis and McConnell, *Proc. Asiat. Soc. Bengal*: 182.
1913. *Gastrodiscoides hominis*: Leiper, *Trans. roy. Soc. trop. Med. Hyg.*, **6**: 265.

Host.—Man, pig.
Location.—Intestine.
Locality.—Widely distributed.

14. **Gastrodiscus secundus** Looss, 1907

1907. *Gastrodiscus secundus* Looss, *Ann. trop. Med. Parasit.*, **1**: 123.

Host.—Horse, Mule, Ass, Elephant.
Location.—Caecum.
Locality.—Widely distributed.

15. **Homalogaster paloniae** Poirier, 1883

1883. *Homalogaster paloniae* Poirier, *Bull. Soc. philom. Paris*, 7th. Ser., p. 73.

Host.—Sheep, cattle.
Location.—Caeca, bile duct.
Locality.—Assam, U.P.

This is the type species of the genus *Homalogaster* Poirier, 1883.

Subfamily 7. *GASTROTHYLAECINAE* Stiles and Goldberger, 1910

16. **Carmyerius spatiosus** (Brandes, 1898) Stiles and Goldberger, 1910

1898. *Gastrothylax spatiosus* Brandes, *Abh. naturf. Ges. Halle*, **26**: 1.
1910. *Carmyerius spatiosus*: Stiles and Goldberger, *Hyg. Lab. Bull.*, No. 6: 1.

Host.—Cattle.
Location.—Rumen.
Locality.—Widely distributed.

17 **Fischoederius cobboldi** (Poirier, 1883) Stiles and Goldberger, 1910

1883. *Gastrothylax cobboldi* Poirier, *Bull. Soc. philom. Paris,* 7th. Ser : 73.

1910. *Fischoederius cobboldi* : Stiles and Goldberger, *Hyg. Lab. Bull.,* No. 6 : 1.

Host.—Cattle.

Location.—Rumen.

Location.—Widely distributed.

18. **Fischoederius elongatus** (Poirier, 1883) Stiles and Goldberger, 1910

1883. *Gastrothylax elongatus* Poirier, *Bull. Soc. philom. Paris,* 7th. Ser : 73.

1910. *Fischoederius elongatus* : Stiles and Goldberger, *Hyg. Lab. Bull.,* No. 6 : 1.

Host.—Cattle.

Location.—Rumen.

Locality.—Widely distributed.

This is the type species of the genus *Fischoederius* Stiles and Goldberger, 1910.

19. **Gastrothylax crumenifer** (Creplin, 1847) Poirier, 1883

1847. *Amphistomum crumenifer* Creplin, *Arch. Naturg.,* **13** : 30.

1883. *Gastrothylax crumenifer* : Poirier, *Bull. Soc. philom. Paris, Ser* : **7** : 73.

Host.—Ruminants.

Location.—Rumen.

Locality.—Widely distributed.

This is the type species of the genus *Gastrothylax* Poirier, 1883.

Subfamily 8. *HELOSTOMATINAE* Skrjabin, 1949.

20. **Helostomatis sakrei** Bhalerao, 1937

1937. *Helostomatis sakrei* Bhalerao, *J. Helm., London,* **15** : 97.

Host.—Labeo calbasu (Hamilton).

Location.—Intestine.

Locality.—Poona.

Subfamily 9. *JOHNSONITREMATINAE* Yamaguti, 1958.

21 **Johnsonitrema magnum** (Johnson, 1939) Yamaguti, 1958

1939. *Paramphistomum magnum*, Johnson, *Proc. Pennsylvia Acad Sci.*, **13**: 68.
1958. *Johusonitrema magnum*: Yamaguti, *Systema Helminthum*, **1**: 975.

Host.—Cow.
Location.—Stomach.
Locality.—India.

This parasite was described as *Paramphistomum magnum* by Johnson (1939) based on the materials collected from the stomach of a cow from India. Yamaguti (1958) created a new genus *Johnsonitrema* and transferred this species into his new genus. Further study of this parasite is necessary to establish the validity of this species and the genus.

Subfamily 10. *NICOLLODISCUSAE* Skrjabin, 1949

22. **Nicollodiscus gangeticus** Srivastava, 1938

1938. *Nicollodiscus gangeticus* Srivastava, *Indian J. Vet. Sci. Anim. Husb.*, **8**: 367.

Host.—*Silundia gangetica* Hamilton
Location.—Large intestine.
Locality.—Ganges and Jamuna.

This is the type species of the genus *Nicollodiscus* Srivastava, 1938.

Subfamily 11. *PARAMPHISTOMINAE* Fishoeder, 1901

23. **Calicophoron calicophorum** (Fischoeder, 1901) Näsmark, 1937

1901. *Paramphistomum calicophorum* Fischoeder, *Zool. Anz.*, **24**: 367.
1937. *Calicophoron calicophorum*: Näsmark, *Zool. Bid. Fron. Uppsala*, **16**: 1.

Host.—Cattle, sheep, goat.
Location.—Reticulum, Rumen.
Locality.—Widely distributed.

This is the type species of the genus *Calicophoron* Näsmark, 1937

24. **Calicophoron cauliorchis** (Stiles and Goldberger, 1910) Näsmark, 1937

1910. *Paramphistomum cauliorchis* Stiles and Goldberger, *Hyg. Lab.*, No. 6 : 1.

1937. *Calicophoron cauliorchis* : Näsmark, *Zool. Bid. Fron. Uppsala*, **16** : 1.

Host.—Cattle, buffalo.

Location.—Rumen.

Locality.—Punjab, U.P.

25. **Calicophoron orientalis** Mukherjee, 1966

1966. *Calicophoron orientalis* Mukherjee, *Indian J. Helm.*, **18** : 94.

Host.—Capra hircus Linnaeus

Location.—Rumen.

Locality.—Bareilly.

26. **Calicophoron papillosum** (Stiles and Goldberger, 1910) Näsmark, 1937

1910. *Paramphistomum papillosum* Stiles and Goldberger, *Hyg. Lab. Bull.*, No. 6 : 1.

1937. *Calicophoron papillosum* : Näsmark, K. I., *Zool. Bid. Fron. Uppsala*, Stockolm, **16** : 1.

Host.—Bos indicus Linnaeus

Location.—Rumen.

Locality.—Sanawar.

27 **Ceylonocotyle cuonum** (Bhalerao, 1937) Mukherjee and Chauhan, 1967

1937. *Paramphistomum cuonum* Bhalerao, *J. Helm.*, **15** : 97.

1967. *Ceylonocotyle cuonum* : Mukherjee and Chauhan, *J. zool Soc. India*, (1965), **17** (1/2) : 150.

Host.—Cuon dukhunensis Sykes

Location.—Stomach, small intestine.

Locality.—Calcutta Zoo.

28. **Ceylonocotyle dawesi** Gupta, 1958

1958. *Ceylonocotyle dawesi* Gupta, *Res. Bull. Panjab Univ. Zool.*, **140** : 67.

Host.—Bos indicus Linnaeus

Location.—Rumen.

Locality.—Madras.

29. **Ceylonocotyle maplestoni** (Bhalerao, 1937) Mukherjee and Chauhan, 1967

1937. *Paramphistomum maplestoni* Bhalerao, *J. Helm.*, **15**: 97.
1967. *Ceylonocotyle maplestoni* Mukherjee and Chauhan, *J. zool. Soc. India*, (1965), **17** (1/2): 150.

Host.—*Hyelaphus porcinus* Schveber
Location.—Large intestine.
Locality.—Calcutta Zoo.

30. **Ceylonocotyle nasmarki** Mukherjee, 1963

1963. *Ceylonocotyle nasmarki* Mukherjee, *Indian J. Helm.*, **15**: 70.

Host.—*Ovis aries* Blyth
Location.—Rumen.
Locality.—Bareilly.

31 **Ceylonocotyle orthocoelium** (Fischoeder, 1901) Näsmark, 1937

1901. *Paramphistomum orthocoelium* Fischoeder, *Zool. Anz.*, **24**: 367.
1937. *Ceylonocotyle orthocoelium* Näsmark, *Zool. Bid. Fron. Uppsala*, **16**: 1.

Host.—Ruminants.
Location.—Rumen.
Locality.—Widely distributed.

32. **Ceylonocotyle scoliocoelium** (Fischoeder, 1904) Näsmark, 1937

1904. *Paramphiolomum scoliocoelium* Fischoeder, *Zool. Jahrb. Syst.*, **20**: 453.
1937. *Ceylonocotyle scoliocoelium* Näsmark, *Zool. Bid. Fron. Uppsala*, **16**: 1.

Host.—Cattle, buffalo, sheep, goat.
Location.—Rumen.
Locality.—Widely distributed.

This is the type species of the genus *Ceylonocotyle* Näsmark, 1937

33. **Ceylonocotyle spinicephalus** (Tandon, 1955) Mukherjee, 1960

1955. *Paramphistomum spinicephalus* Tandon, *Indian J. Helm.*, **7**: 35.

1960. *Ceylonocotyle spinicephalus*: Mukherjee, (*Thesis submitted for Ph.D. degree of the University of Agra*: 107).

Host.—*Bos bubalis* Linnaeus

Location.—Rumen.

Locality.—Lucknow.

34. **Cotylophoron bareilliensis** (Mukherjee, 1963) Mukherjee and Chauhan, 1967

1963. *Cotylophoron skrjabini* Mukherjee, *Indian J. Helm.*, **15**: 70.

1967. *Cotylophoron bareilliensis* Mukherjee and Chauhan, *J. zool. Soc. India*, (1965), **17** (1/2): 150.

Host.—Goat.

Location.—Rumen.

Locality.—Bareilly.

35. **Cotylophoron cotylophorum** (Fischoeder, 1901) Stiles and Goldberger, 1910

1901. *Paramphistomum cotylophorum* Fischoeder, *Zool. Anz.*, **24**: 367.

1910. *Cotylophoron cotylophorum*: Stiles and Goldberger, *Hyg. Lab. Bull.*, No. 6: 1.

Host.—Ruminants.

Location.—Rumen.

Locality.—Widely distributed.

Many workers from India have reported this parasite from the rumen of domesticated ruminants and is belived to be widely distributed and a common species in this country. A large number of cases of amphistomiasis were reported due to the infection of this parasite. The present authors, however, are of the opinion that the distribution of this species in this country is doubtful and it is not so common as is supposed to be.

36. **Cotylophoron indicum** Stiles and Goldberger, 1910

1910. *Cotylophoron indicum* Stiles and Goldberger, *Hyg. Lab. Bull.*, No. 6: 1.

Host.—Ruminants.

Location.—Rumen.

Locality.—Widely distributed.

37 **Cotylophoron madrasensis** Gupta, 1958

1958. *Cotylophoron madrasensis* Gupta, *Res. Bull. Panjab Univ. Zool.*, **14**: 307.

Host.—*Ovis aries* Blyth
Location.—Stomach.
Locality.—Madras.

38. **Gigantocotyle explanatum** (Creplin, 1847) Näsmark, 1937

1847. *Amphistomum explanatum* Creplin, *Arch. Naturg.*, **13**: 30.
1937. *Gigantocotyle explanatum*: Näsmark, *Zool. Bid. Fron. Uppsala*, **16**: 1.

Host.—Cattle, buffalo, sheep, goat.
Location.—Bile duct.
Locality.—Widely distributed.

This is the type species of the genus *Gigantocotyle* Näsmark, 1937

39. **Paramphistomum cervi** (Schrank, 1970) Fischoeder, 1901

1790. *Fasciola cervi* Schrank, *Kgl. svensk. Vetensk. Acad. nye for L L Stockholm*: 118.
1901. *Paramphistomum cervi*: Fischoeder, *Zool. Anz.*, **24**: 367.

Host.—Ruminants.
Location.—Rumen, bile duct.
Locality.—Widely distributed.

This is the type species of the genus *Paramphistomum* Fischoeder, 1901 and has been reported from different parts of this country. The present authors have doubts in its distribution in this country and if at all found it is not so common parasite as was described by others.

40. **Paramphistomum gotoi** Fukui, 1922

1922. *Paramphistomum* goti Fukui, *Dobutsn-gaku. Zass.*, **34**: 19.

Host.—*Bos bubalis* Linnaeus
Location.—Stomach.
Locality.—Lucknow.

Subfamily 12. *PSEUDODISCINAE* Nasmark, 1937.

41 **Pseudodiscus collinsi** (Cobbold, 1875) Sonsino, 1895.

1875. *Amphistomum collinsi* Cobbold, *Veter.*, **48**: 733.

Host.—Horse, ass, elephant, Cattle.
Location.—Caecum, colon,

Locality.—Widely distributed.

This is the type species of the genus *Pseudodiscus* Sonsino, 1895.

42. **Pseudodiscus hawkesii** (Cobbold, 1875) Sonsino, 1895

1875. *Amphistomum hawkesii* Cobbold, *Veter.*, **48**: 733.

Host.—Elephant.

Location.—Intestine.

Locality.—Widely distributed.

Subgamily 13. *ZYGOCOTYLINAE* Ward, 1917

43. **Stunkardia dilymphosa** Bhalerao, 1931

1931. *Stunkardia dilymphosa* Bhalerao, *Parasit.*, **23**: 99.

Host.—*Batagur baska* (Gray), *Morenia ocellata* (Dunb. & Bib.)

Location.—Rectum.

Locality.—India, Rangoon.

III. SUMMARY

The paper deals with a critical study of the present position of amphistomes recorded so far from the Indian region. A short history of different species and amphistomiasis in India have also been incorporated. The Indian amphistomes have been listed along with their hosts, localities and locations in this paper.

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