



## A study on Cestode Parasites of *Corvus* Species of Kashmir, India

Javid Ahmad Dar\*, Syed Tanveer, Javid Ahmad Kuchai and Shabir Ahmad Dar

Department of Zoology, University of Kashmir, Srinagar-190 006, India

\*Corresponding author's email: javid60@gmail.com

### ABSTRACT

During the present study, three species of birds belonging to the genus *Corvus* namely *Corvus monedula*, *C. splendens* and *C. macrorhynchos* were collected from different localities of Kashmir valley and investigated for the presence of cestode parasites. *Anomotaenia galbulae* (Gmelin, 1790) Furrhmann, 1932 was recovered from all the three host species. While, *Choanotaenia micracantha* was recovered only from *C. monedula* and no specimen of this cestode was obtained from *C. Splendens* and *C. macrorhynchos* during the present study. The specimens thus collected were identified as *Anomotaenia galbulae* and *Choanotaenia micracantha* on the basis of various morphological and morphometric characters when compared to the known species of genera *Anomotaenia* and *Choanotaenia* respectively. However, some intraspecific variations were observed.

**Key words:** Cestode, Crows, *Corvus*, *Anomotaenia*, *Choanotaenia*, Kashmir, Morphology.

### INTRODUCTION

The present study was a part of helminthological investigation carried on three *Corvus* species (*Corvus monedula*, *C. splendens* and *C. macrorhynchos*) of Kashmir. *Corvus monedula* Linnaeus, 1758 (Jackdaw) is a Black-plumaged passerine bird with distinctive white irises (Goodwin, 1983). It is omnivorous and feeds on plant material and invertebrates; Sexes and ages are alike (Lockie, 1956). *Corvus splendens* Vieillot, 1817 (House crow) is about 40 cm in length with lighter grey-brown neck and breast. The wings, tail and legs are black. It appears to be associated with humans and no populations are known to exist independently of humans (Nyari et al., 2006). *Corvus macrorhynchos* Wagler, 1827 (Jungle crow) is Large-billed Crow with black glossy wings, tail, face and throat. Systematic knowledge of parasites from birds of Kashmir including *Corvus* is represented through stray references as is obvious by tracing the historical review of parasites from aves of Kashmir (Gupta, 1967; Fotedar and Raina, 1965; Fotedar et al., 1972; Fotedar and Chishti, 1980; Chishti and Khan, 1982; Khan and Chishti, 1982). Thus a thorough study was undertaken to examine the composition of Helminth Parasites of *Corvus* species of Kashmir from November 2007 to May 2009.

### MATERIALS AND METHODS

#### Study Area

Kashmir valley is a temperate North West Himalayan region of Jammu and Kashmir State in India. It lies between 33°20' and 34°54'N latitudes and

73°55' and 75°35'E longitudes, covering an area of about 15,948 sq km. It is a deep bowl shaped valley bounded by lofty mountains of the Pir Panjal and the great Himalayan ranges. The floristic and faunal diversity of the valley is considerably rich owing to its unique topography, temperate climate and geographical isolation from the surrounding plains (Dar et al., 2002).

#### Collection and Processing of Cestodes

During the present study, 65 birds belonging to three species of *Corvus* viz., *Corvus monedula* Linnaeus, 1758; *C. splendens* Vieillot, 1817 and *C. macrorhynchos* Wagler, 1827 were caught alive with the help of nylon net traps, locally known as "Walwash" using suitable baits. The hosts were slaughtered and dissected for parasitological investigation and the cestode parasites thus collected were fixed in Cornoy's fixative, stained in Acetoalum carmine and transferred to Xylene for clearing before mounting them in DPX-Dextrine Plasticised Xylene-(Meyer and Olsen, 1975). The drawings of the specimens were made with the help of prism type camera lucida. Measurements were taken with objective and stage micrometers and expressed in mm. The specimens were identified on the basis of various taxonomic characters using Yamaguti (1961) and Chishti (1986). Photomicrography was conducted with the help of Digital Olympus Camera.

### RESULTS

The present paper redescribes a total of two cestode species viz., *Anomotaenia galbulae* and

*Choanotaenia micracantha* recovered from three species of crows, collected from Kashmir valley. A detailed morphological and morphometric study of both these species revealed some minor intraspecific variations. The cestode parasites are redescribed as below:

**1. *Anomotaenia galbulae*** (Gmelin, 1790; Furhrmann, 1932):

**Hosts:** *Corvus monedula*, *C. splendens* and *C. macrorhynchos*;

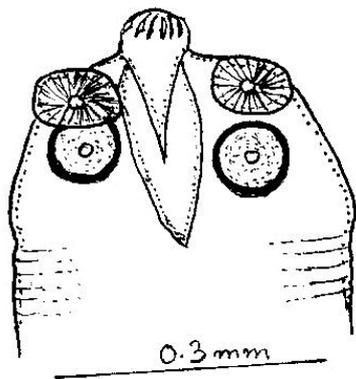
**Locality:** Kashmir;

**Location:** Intestine

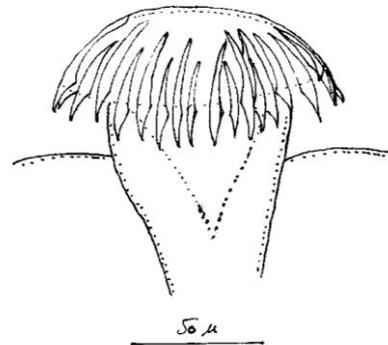
These parasite species are 56-75 mm in length and 0.88-1.4 mm in maximum breadth. The mature proglottids are 0.40-0.60 mm in length and 0.66-0.80 mm in breadth. Gravid proglottids measure 1.2 – 2.6 mm in length and 0.8 – 1.4 mm in breadth. The scolex measures 0.20-0.26 mm in length upto the base of suckers and 0.36 – 0.44 mm in width across suckers. Rostellum with sac measures 0.27 – 0.32 mm in length and 0.1- 0.14mm in breadth. It bears 22-24 slender hooks arranged in a double crown. The blade of the hooks is smaller than the handle and the guard is a

conical knob-like structure. The hooks measure 34- 40 $\mu$  and 32-36 $\mu$  in the outer and inner row respectively. The four suckers measures 0.08-0.13mm in diameter. The testes are rounded 45-54 in number and lie posterior to the ovary. They are bounded laterally by the longitudinal excretory ducts. The vas-deferens is coiled and present in the anterior half of the proglottid. The vesicular seminalis is absent. The cirrus pouch is oval to rounded, cortical in position and measures 0.1-0.16 mm in length and 0.04 -0.05 mm in width. The genital pores are irregularly alternate, may be deeply embedded and present in the anterior 1/4<sup>th</sup> to 1/3<sup>rd</sup> of the proglottid laterally. The ovary was slightly lobulated and measures 0.26-0.30  $\times$  0.12 -0.15 mm in dimensions. The oval receptaculum seminis is presented dorsal to the ovary. The vagina runs behind the cirrus pouch opening posterior to the male genital pore. The irregularly rounded, compact vitelline gland lies posterior to the ovary and measures 0.08-0.12  $\times$  0.06 – 0.08 mm.

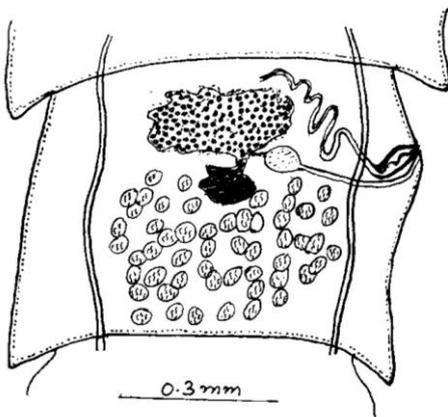
The eggs measure 47-49 $\mu$   $\times$  40-43 $\mu$  and oncospheres are 30 $\mu$   $\times$  21-23 $\mu$  in size. The embryonic hooks (oncosphre hooks) are 10-12  $\mu$  in size (Figures 1-4 and Photomicrographs 1-3).



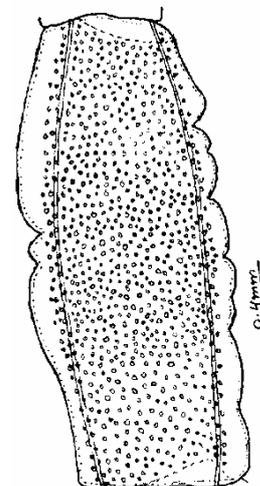
**Fig. 1:** Scolex showing suckers and rostellum with hooks.



**Fig. 2:** Rostellum showing hooks.



**Fig. 3:** Mature proglottids showing reproductive organs.

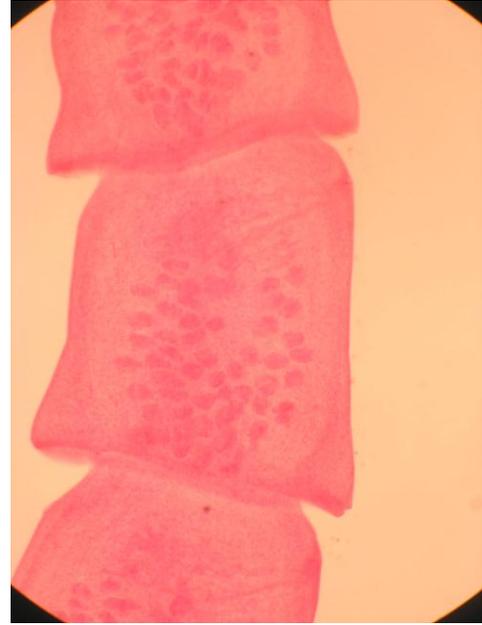


**Fig. 4:** Gravid proglottid

**Figs. 1-4:** *Anomotaenia galbulae* (Gmelin, 1790) Furhrmann, 1932.



**Pmg. 1:** Scolex showing suckers and rostellum with hooks.



**Pmg. 2:** Mature proglottid showing reproductive organs.



**Pmg. 3:** Gravid proglottid

**Pmg. 1-3:** *Anomotaenia galbulae* (Gmelin, 1790) Furhrmann, 1932.

**Table 1:** Comparative measurements of *Anomotaenia galbulae* (Gmelin, 1790; Furhrmann, 1932).

Particulars	Cohn (1901)	Skrjabin, (1914)	Meggitt, (1927)	Chishti (1974)	Present Author
Size of strobila	-	113 mm	17 × 0.4mm	52-65mm × 1.45mm	56 -75mm × 0.88-1.4mm
Number of Rostellar hooks	21	20	21	24	22-24
Size of Rostellar hooks	36-40μ	36μ	36-40μ	34-42μ(outer row) 30-35μ(inner row)	34-40μ(outer row) 36μ(inner row)
No. of testes	35-45	50	35-45	55-60	45-54

**Table 2:** Comparative measurements of *Choanotaenia micracantha* Chishti et al., 1986 with the present form (measurements in mm, unless stated otherwise)

Particulars	<i>Choanotaenia micracantha</i>	
	Chishti et al. (1986)	Present Specimens
Strobila	60-80 × 1.65	62-76 × 1.30
Scolex	0.24-0.28 × 0.42-0.52	0.26-0.28 × 0.38-0.44
Rostellum with sac	0.30-0.32 × 0.10-0.16	0.32-0.36 × 0.09-0.13
Rostellar hook no.	20	20
Hook size	40-45 μ	40-43 μ
Sucker diameter	0.12-0.18 × 0.09-0.12	0.12-0.15
Gravid proglottid	2.8-3.2 × 1.58-1.65	2.2-3.0 × 1.50-1.80
Testes number	55-60	56-64
Cirrus pouch extent	Cortical, oval	Cortical, oval
Cirrus pouch size	0.08-0.10 × 0.04	0.07-0.12 × 0.05
Position of genital pore	1/5 <sup>th</sup>	1/5 <sup>th</sup>
Ovary size	0.52-0.62 × 0.14-0.16	0.46-0.60 × 0.14-0.17
Vitelline gland size	0.15-0.20 × 0.07-0.09	0.12-0.20 × 0.07-0.10
Egg size	48-52 μ × 38-42 μ	49-50 μ × 40 μ
Embryo	30-32 μ × 25-30 μ	29-33 μ × 28-30 μ
Embryonic hook size	12 μ	12 μ

**2. *Choanotaenia micracantha*** (Chishti et al., 1986)

**Hosts:** *Corvus monedula*

**Locality:** Kashmir

**Location:** Intestine

The parasites measures 62-76mm in length, and 1.30mm in their maximum breadth. In most of the proglottids especially mature and gravid, the posterior margin is broader. Mature proglottids measure 0.84-1.2mm × 0.95-1.12mm in size. Gravid proglottids are much longer than broad measuring 2.2-3.0mm in length and 1.5-1.8mm in maximum length. The scolex is more or less rectangular in outline, 0.26-0.28mm in length up to the base of suckers (with rostellum) and 0.38-0.45mm in breadth across suckers. The rostellum with sac is 0.32-0.36 mm in length and 0.1-0.15mm breadth and bears a single crown of 20 slender hooks each measuring 40-43 μ in length. The suckers measure 0.12-0.15mm in diameter. Testes 55-62 in number, located mostly in post-ovarian field but some may extend to the postero-lateral fields of the ovary. They are rounded and measure 0.06-0.08mm in diameter. The vas-deferens forms a number of tight coils in the anterior region of the proglottid before entering the cirrus pouch. The ductus ejaculatorius is rather slender and shows usually one or two coils. Cirrus pouch is elongated oval in outline and restricted to the cortical region. It measures 0.07-0.1mm in length and 0.04mm in breadth. The vesiculae seminales are absent. Fine hair like bristles protrude out from the genital atrium. The genital pores are irregularly alternate and are located in the anterior 1/5<sup>th</sup> of lateral margin of mature proglottid. The ovary is well developed, lies in the anterior half of the proglottid and is bounded by the longitudinal excretory ducts. It is bilobed and is connected by an isthmus. It measures 0.46-0.60mm x 0.14-0.17mm in size. The vagina arises as a simple tube but soon enlarges into an oval or fusiform receptaculum seminis. It runs parallel to the cirrus pouch to open just posterior to the male genital pore. Vitelline gland is compact, lies posterior to the ovary and measures 0.12-

0.20mm × 0.07-0.10mm in size. The gravid proglottids are compactly filled with eggs which measure 48-52 μ × 38-42 μ and their embryo are 30-32 μ × 25-30 μ in size with hooks 12 μ in length (Figs. 5-7 and Pmg.4-6).

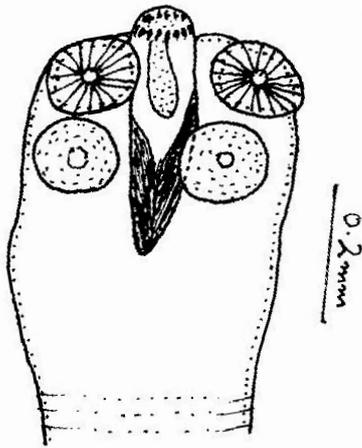
**DISCUSSION**

The differentiating characters of the present *Anomotaenia* specimens are: 22-24 rostellar hooks arranged in a double crown; the hooks measuring 34-40 μ and 32-36 μ in the outer and inner row respectively; testes 45-54 in number; cirrus pouch cortical in position; genital pores irregularly alternate situated in the anterior one fourth to one third on the lateral margin of mature proglottids. When compared with the known species of genus *Anomotaenia* described from different avian hosts, the present specimens show a large similarity of all morphological features with *A. galbulae*. This species has been redescribed by several authors giving variations in the size of strobila, rostellar hook size and number, and the number of testes (Table 1). This species was recorded earlier by Chishti (1974) in *Corvus monedula* and *C. macrorhynchos* from Kashmir. It is evident from the Table 1 that the present measurements also come in the range of those described by various authors. In view of these measurements and other similarities as described above, the present cestode specimens are assigned to *Anomotaenia galbulae* (Gmelin, 1790; Furhrmann, 1932).

A fairly good number of species of the genus *Choanotaenia* Railliet, 1896 have been described from avian hosts (Yamaguti, 1961). The present cestode specimens collected from *Corvus monedula* possess characteristics like single crown of rostellar hooks; craspedote proglottides; testes numerous, posterior to female gonads in intervascular field ; genital pores alternating irregularly; ovary pre-equatorial, with compact vitelline gland behind; vagina posterior to cirrus pouch and seminal receptacle present. All these characteristics are in conformity with the description of the genus *Choanotaenia* Railliet (Chishti et al., 1896).

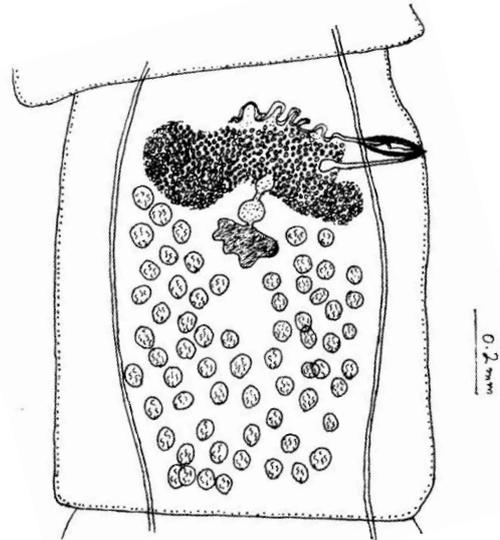
While comparing with the known species of the genus *Choanotaenia* Railliet, 1896 the present form shows a large similarity of characters with those of *C. micracantha* Chishti et al. (1986) as regards the size and shape of scolex, number and size of rostellar hooks, extent of cirrus pouch, number of testes etc. However, some intraspecific variations were recorded in different structures as indicated in Table 2. The reason for which could be the age of parasite, host species, intensity of

infection (higher intensity, smaller parasites), methodology (fixation), environmental factors of the study area, body conditions of the host, etc. (Ternopolskaya, 1984; Kuchai et al., 2012). Since these variations are of minor significance, therefore the present specimens, in view of above similarities are assigned to *Choanotaenia micracantha* (Chishti et al., 1986).

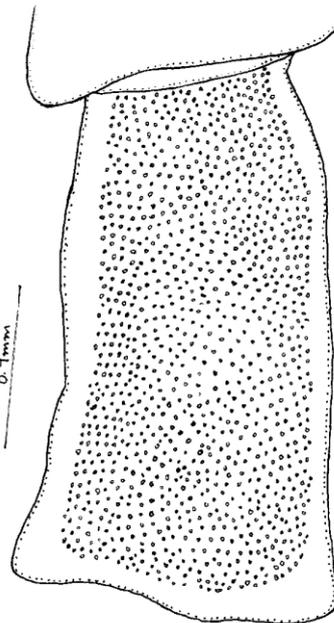


**Fig. 5:** Scolex showing suckers and rostellum with hooks.

**Pmg. 1.** Scolex showing suckers and rostellum with hooks.



**Fig.6:** Mature proglottid showing reproductive organs.

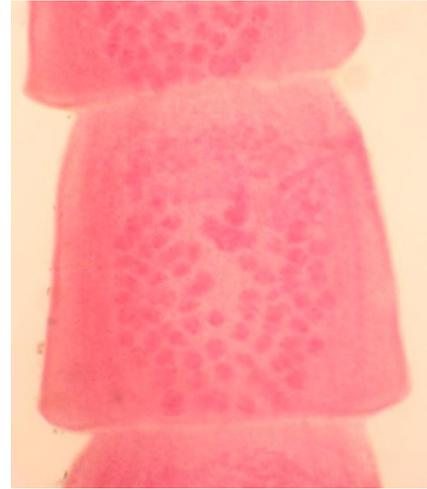


**Fig. 7:** Gravid proglottid

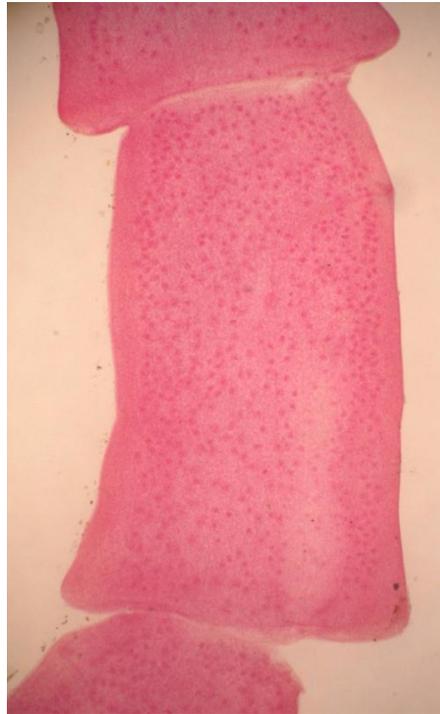
**Figs. 5-7:** *Choanotaenia micracantha* Chishti et al., (1986)



**Pmg. 4:** Scolex showing suckers and rostellum with hooks.



**Pmg. 5:** Mature proglottid showing reproductive organs.



**Pmg. 6.** Gravid proglottid

**Pmg. 4-6:** *Choanotaenia micracantha* Chishti et al., 1986

## CONCLUSION

The present paper redescibes only two species of cestode parasites viz., *Anomotaenia galbulae* and *Choanotaenia micracantha* recovered from three species of the genus *Corvus*. This work adds to the parasite species diversity infecting these avian hosts. In addition, the present study showed that *Choanotaenia micracantha* was recovered only from *Corvus*

*monedula*, hence the parasite may be host specific in nature.

## ACKNOWLEDGEMENT

The authors would like to thank all the members of the Department of Zoology, University of Kashmir who helped during the study.

REFERENCES

- Chishti MZ, (1974). Cestode and nematode parasites of some aves in Kashmir. *Ph.D Thesis*, Faculty of Science. University of Kashmir (India).
- Chishti MZ, Mir AA and Rasool A, (1986). *Choanotaenia micracantha* sp. nov. (Dilepoidea: Cestoda) from *Corvus monedula* in Kashmir. *Indian Journal of Helminthology.*, 38(2): 107-111.
- Chishti MZ and Khan AR, (1982). *Mayhewia kavini* sp. nov. (Hymenolepididae Railliet et Henry, 1909: Cestoda) from *Corvus monedula* in Kashmir. *Indian Journal of Helminthology.*, 34(2): 139-142.
- Cohn L, (1901). Zur Anatomie und systematic der vogelcestoden. *Nova acta Leop. Carol.*, 79: 263-450.
- Dar GH, Bhagat RC and Khan MA, (2002). *Biodiversity of the Kashmir Himalaya*, 1st Edn. Valley Book House, Kashmir University Road, Srinagar-190006 (India). ISBN 81-86592-12-1.
- Fotedar DN and Chishti MZ, (1980). *Streptocara indica* n. sp. (Acuariodea, Sobolev, 1949: Nematoda) from *Gallus domesticus* in Kashmir, India. *Ind. J. Helm.*, 32(1): 4-7.
- Fotedar DN and Raina MK, (1965). On a new species of the trematode genus *Lyperosomum* Looss, 1899 from *Corvus monedula soemmerringii*, common Jackdaw in Kashmir. *Ind. J. Helm.*, 17(1): 54-62.
- Fotedar DN, Raina MK, Mahajan R and Dhar RL, (1972). Redescription of *Contracaecum milivi* Yamaguti 1940 from *Milvus migrans lineatus* from Kashmir. *Ind. J. Helm.*, 24(1&2): 1-4.
- Goodwin D, 1983. *Crows of the World*. Queensland University Press, St Lucia, Qld.
- Gupta SP, (1967). Helminthic-fauna of Kashmir. *Kmr. Sci.*, 4(12): 56-61.
- Khan AR and Chishti MZ, (1982). On *Echinostoma revolutum* (Froelich) Looss, 1899 and synonymy of *Neoechinostoma spinosa* Agarwal, 1963. *Kashmir Univ Research Journal.*, 2: 22-24.
- Kuchai JA, Fayaz A, Chishti MZ, Tak H, Javid AD, Dar SA and Muzaffar R, (2012). A study on morphology and morphometry of *Haemonchus contortus*. *Pakistan J. Zool.*, 44 (6): 1737-1741.
- Lockie JD, (1956). The Food and Feeding Behavior of the Jackdaw, Rook and Carrion Crow. *The Journal of Animal Ecology.*, 25(2): 421-428.
- Meggitt, FJ, (1927). Report on a collection of Cestoda mainly from Egypt, Part 2 Cyclophyllidea Family Hymnolipididae. *Parasitology.*, 19: 420-450.
- Meyer CM and Olsen WO, (1975). *Essentials of Parasitology*. W.M. C. Brown Company Publishers, Dubuque, Iowa (USA).
- Nyari A, Ryall C and Peterson AT, (2006). Global invasive potential of the house crow *Corvus splendens* based on ecological niche modeling. *J. Avian Biol.*, 37: 306-311.
- Skrjabin KI, (1914). Bectraj Zur kennetis einiger vogelcestoden centralbl. *Bkt. Abt. 1 Org.*, 75: 59-83.
- Ternopolskaya LD, (1984). Variability of *Fasciola hepatica* L., 1785 in different hosts. *Bulletin Vsesoyuznogo Instituta Gel. Mintologil Im. K. I. Skrybin.*, 38: 47-51.
- Yamaguti S, (1961). *Systema Helminthum*. Vol. 2. The Cestodes of Vertebrates. *Interscience Publisher, John Wiley & Sons, New York*.