

First Report of *Dicrocoelium dendriticum* from Sheep of Ladakh (J & K) – India

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ABSTRACT

Dicrocoelium dendriticum is one of the most common trematode infecting the liver of ruminants throughout the world and poses a threat to livestock mostly by damaging the liver of the hosts especially in heavily infected animals. In the present study a large number of flukes were recovered from the livers of sheep of Ladakh. The morphological studies of these specimens revealed that they possess all the diagnostic characters of the species *Dicrocoelium dendriticum* (Rudolphi, 1819) Loos, 1899 as regards their shape and size of body, size of suckers, ovaries, and testes etc. However several minor intraspecific variations in size ratio of various body organs were observed as mentioned in table 1. Hence the present species were assigned to *Dicrocoelium dendriticum* (Rudolphi, 1819) Loos, 1899. The parasite has been reported for the first time from this region and hence it forms the first report. In addition some of the morphological parameters have been described for the first time which were not described by the previous authors these parameters could be of great taxonomic importance.

Keywords: *Dicrocoelium dendriticum*, Ladakh, Morphology, Sheep

INTRODUCTION

Dicrocoeliasis is one among the common trematode infections in ruminants throughout the world with varying prevalence and minor intraspecific changes in morphology of the parasite depending on the locality and season of the study area as well as age, species etc of the host (Kendell, 1965). The parasite inhabited the liver of the host and causes a serious problem in heavily parasitized and small animals. The parasite has been reported and described for the first time by Rudolphi (1819) and since then it has been redescribed by many other researchers (Ben Dawes, 1968; Soulsby, 1982; Fayaz, *et al.*, 2009). The parasites has been reported from the livers of ruminants from different parts of the world as well as from the other two regions (Jammu and Kashmir) of the state of Jammu and Kashmir but not from the Ladakh the third region of the same state with a different climatic condition as being the only cold desert of the world, (Bhalerao, 1935; Bali, 1976; Cobbold, 1889; Blaise, 2001; Aydenizoz, *et al.*, 2002; Al-Khafaji, *et al.*, 2003; Aysha and Khan, 2008).

Study area

Ladakh (the only cold desert of the world) constitutes one among the three main regions of the Jammu & Kashmir State which lies between 32.17 and 36.58 North latitudes and 73.26 and 80.26 East longitudes. This region falls under the districts of Kargil and Leh, the later lies at a comparatively higher level around 3800-5,900 meters from the sea level as compared to the former 2900-4500. The most striking feature of Ladakh region is the mountain ranges that stretch from the southeast to the northeast. Although most of Ladakh is mountainous, yet there are many valleys lying in the lap of the mountain ranges such as the Great Himalayan range, the Zanskar range, the Ladakh range and the Karakoram Range. As like all other high altitude mountainous region, Ladakh is sparsely populated (*ca.*1,50,000) *i.e.*, only two persons per square kilometer. Although life is difficult at high altitudes yet both man and other animals survive here comfortably as revealed by the diversity of animals (Majid Hussain, 1985).

MATERIAL AND METHODS

A systematic sampling procedure was followed for the collection of samples and the samples thus collected were processed following the standard methods of Boomker *et al.*, (1989). During the study a total of 313 samples

(including 218 livers and 95 faecal samples) of slaughtered and live host species were collected randomly from 10 slaughterhouses, 4 pastures, 20 local houses and 4 livestock farms. The bile ducts of livers were opened and visible parasites were removed and placed in normal saline. Some strips, each approximately 10mm thick were removed and placed in plastic jar containing normal saline for further processing, for the collection of microscopic parasites. The parasites were fixed in Carnoy's fixative and preserved in 70% alcohol, the preserved material was taken out of the preservative and was stained in aceto alum carmine. After staining the material was subjected to dehydration by passing it through various grades of alcohol viz., 30%, 50%, 70%, 90%, 100% I and 100% II. The time duration in each grade was 5-10 minutes. After complete dehydration the material was transferred to a clearing agent (xylene in this study). The dealcoholized material was mounted in canadabalsam or DPX on glass slides for a detailed morphological study. The drawings of the parasites or parts of parasites were made with the help of prism type camera lucida for morphometry. Faecal samples were collected in collection tubes containing 10% formalin and were examined by direct smear, flotation and sedimentation techniques for the presence of eggs (Urquhart *et al.*, 1988).

Identification of adult flukes as well as eggs was done on the basis of various morphological and morphometric characters (Soulsby, 1982; Yamaguti, 1959).

RESULTS AND DISCUSSION

A large number of digenetic trematodes belonging to genus *Dicrocoelium* Dujardin, were recovered from the livers of sheep of Ladakh during the present study. On close examination the present specimens were found to agree with the known description of *D. dendriticum* (Rudolphi, 1819).

Loos, 1899 on the basis of various morphological and morphometric characters viz; colour, shape, length, width, size, shape and position of various internal organs. The eggs of this parasite species were also recovered from the feces of the host species. The parasite being recorded for the first time from this region is briefly described with some intraspecific variations as under.

Description: Comparative characteristics (measurements in mm) have been given in Table 1. The translucent, dorsoventrally flattened body measures from 5.2 to 9.5mm long by 1.2 to 3.4 mm wide. The oral sucker is subterminal and measures 0.30 to 0.42 mm; the slightly large ventral sucker (0.48-0.65 mm) is in the anterior quarter of body. The small, round pharynx lies next to the oral sucker; it is followed by the slender esophagus that extends about midway between the pharynx and the ventral sucker, and bifurcates, sending two long, slender intestinal caeca to the beginning of the last quarter of the body. The pharynx is about (0.13-0.19 mm). The common genital pore is just posterior to the intestinal bifurcation. The slender excretory bladder reaches anterior to the ovary.

The ovary lies beneath the posterior testis and measures 0.20-0.28 by 0.45-0.51mm. The slightly lobed testes are close together, obliquely arranged in the body with the anterior end near the posterior margin of the ventral sucker. The anterior testis measures about 0.40-0.48mm in length and 0.72-0.80 in breadth, while as the posterior testis measures 0.45-0.51 x 0.78-0.84mm. The vasa efferentia unite at the level of the ventral sucker to form a short vas deferens that enters the cirrus pouch, forming seminal vesicle. Eggs operculate, 0.024-0.051 x 0.029-0.058 mm in diameter.

The morphological studies of present specimens revealed that they possess all the diagnostic characters of the species *Dicrocoelium dendriticum* (Rudolphi, 1819) Loos, 1899 as regards their shape and size of body, size of suckers, ovaries, and testes etc. As described by various authors (Ben Dawes, 1968; Soulsby, 1982). However several minor intraspecific variations in size ratio of various body organs were observed as mentioned in Table 1.

These variations could be due to the difference in age of fluke, host species, intensity of infection (higher intensity, smaller flukes), methodology (fixation), environmental factors of the study area, body conditions of the host etc. Hence the present species were assigned to *Dicrocoelium dendriticum* (Rudolphi, 1819) Loos, 1899. This is the first report of this species from this region.

Location: Liver (bile ducts)
Host : Sheep
Locality : Ladakh

CONCLUSION

The present study revealed that irrespective of the cold environmental conditions existing in the Ladakh sheep are infected with *Dicrocoelium dendriticum*, however with some minor intraspecific morphological and morphometric variations. Therefore steps must be taken to carry out some more research on other aspects and other ruminants of this region so that a controlling strategy could be made for a better production.

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Table 1. Comparative characteristics (measurements in mm) of *Dicrocoelium dendriticum* (Rudolphi, 1819) Loos, 1899, in mm

Particulars	Ben Dawes (1968)	Soulsby (1982)	Aysha and Khan (2008)	Present Specimens
Body length	4-12	6-10	5-8	7.2 (5.2-9.5)
Maximum Width	1.5-2.5	1.5-2.5	1.5-2.4	2.5 (1.2-3.4)
Oral sucker	0.3-0.4	.....	0.2-0.4	0.36 (0.30-0.42)
Pharynx	.....	.....	.....	0.16 (0.13-0.19)
Ventral Sucker	0.6	.....	0.5	0.56 (0.48-0.65)
Anterior Testes	.....	.....	.....	0.44x0.76 (0.40-0.48x0.72-0.80)
Posterior Testes	.....	.....	.....	0.48x0.81 (0.45-0.51x0.78-0.84)
Ovary	.....	.....	.....	0.24x0.48 (0.20-0.28x0.45-0.51)
Egg Size	0.30-0.51 x 0.26- 0.56 μ	36-45x22-30 μ	0.028-0.040x0.020- 0.032	0.038x0.042 (0.024-0.051x0.029-0.058)
Host	Domestic animals	Sheep	Sheep
Locality	London	Jammu	Ladakh

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