

# *Schistosoma indicum*, A RARELY REPORTED FINDING IN A DROMEDARY - A CASE REPORT

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## ABSTRACT

A carcass of an emaciated female dromedary imported from Pakistan to the United Arab Emirates was sent for necropsy. The main pathological alterations were liver amyloidosis and thickening of the stomachal wall (compartment 3). Two pairs of schistosomes were discovered in the mesenteric veins of the small and large intestines. Morphological features matched those of *Schistosoma indicum*.

**Key words:** *Camelus dromedarius*, dromedary, Pakistan, *Schistosoma indicum*, United Arab Emirates

Members of the Family Schistosomatidae occur on all continents, except Antarctica. The range of species infecting mammals and human species, however, is restricted to tropical and subtropical latitudes. It was believed that *Schistosoma mansoni*, *S. haematobium* and *S. japonicum* infect humans and primates, and a wider species variety can be found in farm animals as well as in wild mammals. Recent molecular research showed that human and mammalian schistosome species may crossbreed. All schistosomes are biohelminthes with water snails as intermediate hosts, and transcutaneous infection occurs when final hosts have contact to cercariae of the parasite while wading or swimming in infested waters; final hosts can also be infected via drinking. While textbooks (Skrjabin, 1951; Eckert *et al*, 2005; Taylor *et al*, 2008) or review papers (Dakkak and Ouheli, 1987; Farhati *et al*, 1995; Erdenebileg, 2001; Parasani *et al*, 2008; Sazmand *et al*, 2019) mention camels as final hosts for schistosomes, original reports on camel schistosomosis are rare. We report here findings of *Schistosoma indicum* in a dromedary camel imported from Pakistan.

## Case report

A recently imported adult female dromedary from Pakistan was sent for necropsy to the Central Veterinary Research Laboratory, in Dubai, in October 2020. The animal came to Dubai in March 2020 and displayed a poor general condition at necropsy with a history of chronic emaciation with progressive inappetence, recumbency and CNS signs. The sender suspected of camel paratuberculosis. The main pathological alterations of the 260 kg

chronically emaciated carcass were seen in the liver and the stomach. The compartment 1 of the stomach showed severe calcification of the folds and massive thickened greyish, firm wall (2-4 cm thick layer). Histopathology of C3 showed massive pyogranulative inflammation with severe fibrosis, many necrosis with bacteria-colonies surrounded by eosinophilic Splendore-Hoeppli material. Histology of the swollen, firm liver revealed severe amyloidosis with 80% of the tissue occupied by amyloid-deposits as well as marked interlobular fibrosis.

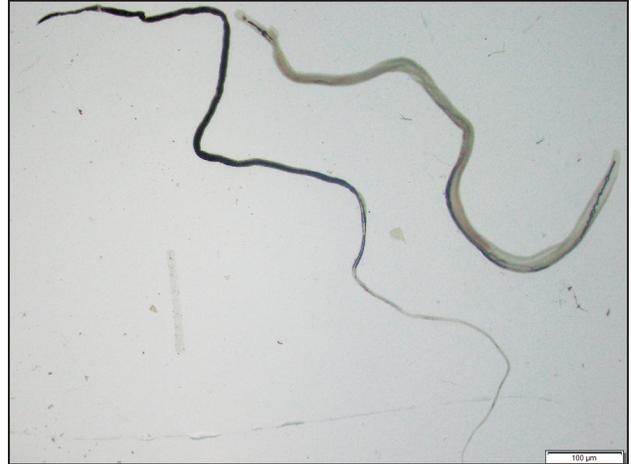
In a histological section, a strange parasite like structure in a mesentery vein of the ileum consisting of several fragments with a diameter between 130 to 460 µm caught our interest. The largest fragment was 2080 µm long and consisted of an oval shaped smaller portion trapped in a bigger part (Fig 1). The outer surface was covered with tubercles and spines (Fig 2). A careful inspection of the remaining mesentery revealed a white worm like structure in a vein of the proximal colon (Fig 3). A closer look on the flushed out content revealed two morphologically different structures (Fig 4). The shorter (17 mm) and broader (0.43 mm) helminth with oral and ventral suckers at the anterior end and a long gynaecophoric canal commencing prior to the ventral sucker was a male. The subterminal oral and pedunculated ventral suckers measured 330 and 360 µm in diameter, respectively. There were eight testes posterior to the ventral sucker.

The longer (24.5 mm) and thinner (0.25 mm) with uterine eggs in the filiform anterior half and with a dark coloured posterior end turned out to be

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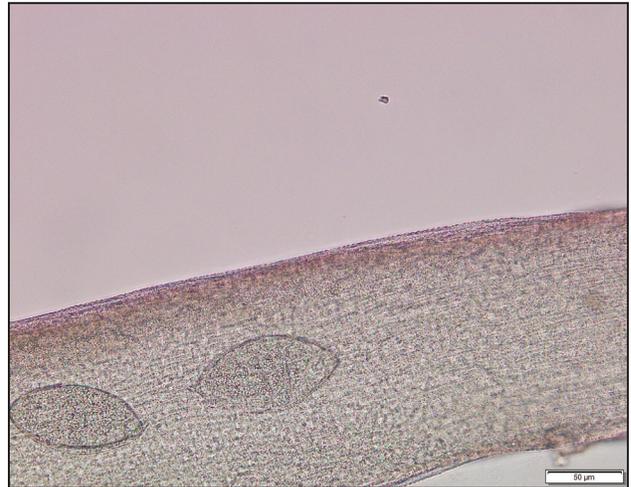
**Fig 1.** A pair of *S. indicum* in a histological section of a mesenteric vein. A: female in the gynaecophoric canal of the male, cut at the level of the ovary. B: male. a, b: intestinal branches.



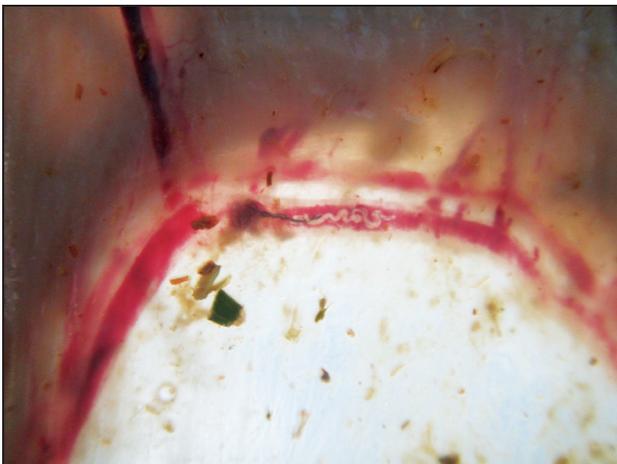
**Fig 4.** *S. indicum* isolated from the mesenteric vein. The shorter male can be recognised by the distinct presence of two suckers at the anterior end. The longer female has a filiform anterior end. The posterior end appears dark coloured due to the content of the intestine.



**Fig 2.** The tegument of the male is covered with tubercles and spines.



**Fig 5.** *S. indicum*. Uterine egg.



**Fig 3.** Schistosomes in the mesenteric vein of a camel.

a female schistosome. The fusiform eggs (97x50 µm) had a spike on one end (Fig 5).

Considering the morphometrical characteristics of male and female worms and the origin of the animal we concluded dealing with *Schistosoma indicum*.

### Discussion

*S. indicum* was first described by Montgomery (1906), in Uttarakhand, in North East India. It infects a wide range of farm animals, including buffalos, cattle, sheep, goats, horses and donkeys and the Ramshorn snail, *Indoplanorbis exustus*, serves as intermediate host. Predilection sites of *S. indicum* are venous blood vessels of the mesentery, pancreas and pelvis as well as the portal system of the liver.

Other mammalian blood fluke species occurring on the Indian subcontinent are *S. spindale*, *S. bomfordi*, *S. incognitum*, *S. nasale*, *S. nairi*, *Orientobilharzia dattai*, *O. turkestanicum* and *O. harinasutai* (Agrawal and Rao, 2011).

While schistosomiasis is well investigated in India (Kali, 2015), little is known about species that occur in Pakistan. Human cases were reported from travelers returning from Africa (Khalid and Mahmood, 2001; Subhani *et al*, 2014) whose clinical signs and the shape of the parasitic eggs suggested *S. haematobium* as the pathogen. Anwar and Gill (1990) identified *S. indicum* and *S. bovis* in cattle and buffaloes. However, *S. bovis* is an African species and requires bulinid snails as intermediate hosts, which were not found in the investigations.

Niaz *et al* (2010) established the prevalence of *Schistosoma* infection in cows and in water buffaloes at different sites in Punjab, Pakistan, and found an overall prevalence of 15.0 and 15.1%, respectively, with the highest prevalence of 19% in cows and the lowest of 10.33% in buffaloes in Sialkot. In another study, in four districts of Punjab, Arshad *et al* (2011) established the extensivity of *Schistosoma* in Buffaloes and found prevalences varying between 13.66 and 17.0%. Both studies were based on egg findings in coproscopical examinations and the *Schistosoma* species was not mentioned. Niaz *et al* (2013) collected more than 10,000 freshwater snails in Punjab and examined them for trematode development stages. Only *Indoplanorbis* species were found to excrete *Schistosoma cercariae*. Our finding proves that *S. indicum* is one of the species that occur in Pakistan.

Montgomery (1906) mentioned small bead like nodules in the enlarged liver of a horse from which he described *S. indicum* and Datta (1933) reported alterations in the liver, lungs, small and large colon and kidneys caused by *S. indicum* in detail. A recent paper by Singh *et al* (2012) from Rajasthan (India) described hepatic schistosomiasis based on egg findings in histological sections in two out of 137 examined dromedary livers.

In our case, a burden of only two pairs of *S. indicum* were found. Since there are no freshwater snails at the dairy farm in Dubai where the camel was kept, the infection must have happened in the place of origin of the animal, in Pakistan. The emaciation of the animal and liver alterations were attributed to amyloidosis of the liver.

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