



# A Hookworm *Ancylostoma* (*Ancylostoma*) *caninum* from a canid *Canis aureus* in Himachal Pradesh

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**Abstract:** A hookworm belonging to the genus *Ancylostoma* (Dubini, 1843) isolated from the small intestine of a canid *Canis aureus* (Linnaeus) which was found dead from a new host locality, village Kandraur district Bilaspur Himachal Pradesh. The worm is bent dorsally, cuticle transversely striated; buccal capsule large with three pairs of ventro-lateral teeth and two lancets in the deep of the buccal capsule; dorsal ray forked distally each branch further trifurcates; genital cone oboid with two pairs of genital papillae; spicules equal, long filamentous, 0.650-0.765 mm long with tapering tips; gubernaculum 0.144-0.180 mm long; vulva in the posterior third of the body 3.240-3.510 mm from the tip of tail; tail conical with a spine at the tip 0.006 mm long. This zoonotic worm is transmitted orally or percutaneously, causing a disease ancylostomiasis in humans, domestic and wild animals. The main symptoms of ancylostomiasis are mucous haemorrhagic diarrhoea and anaemia.

**Index Terms -** Hookworm, *Ancylostoma caninum*, canid *Canis aureus*, Himachal Pradesh.

## I. INTRODUCTION

A hookworm of genus *Ancylostoma* (Dubini, 1843) occurs mostly in carnivore hosts (Thatcher, 1971 and Litchenfels, 2009). Infection with these nematodes in felids and canids causes a zoonotic disease ancylostomiasis, which leads to even death of animals (Brown et.al., 2010). The larvae of these hookworms are transmitted orally or percutaneously. The common hookworms of canid hosts are *Ancylostoma caninum*, *A. braziliense*, *A. ceylanicum* and *Uncinaria stenocephala* and felid hosts are *Ancylostoma tubaeforme*, *A. braziliense*, *A. ceylanicum* and *Uncinaria stenocephala* (Prociv, 1998), and *Ancylostoma duodenale* in humans. The canid *Canis aureus* inhabits in open woodlands and grasslands and also occur in the areas having extensive agricultural and ranching activities (Lucherini et.al., 2008). It is omnivorous predator. The hookworm *Ancylostoma* (A.) *caninum* (Ercolini, 1859) found in *Canis aureus* is the new host locality in district Bilaspur, Himachal Pradesh (India)

## Materials and Methods:

The accidentally dead host Canid *Canis aureus* collected from the rural area of Village Kandraur district Bilaspur, Himachal Pradesh in the month of November, 2010. The intestinal tract carefully removed from the carcass and isolated by ligatures. The nematodes collected were washed in normal saline solution in 3-4% formalin until morphological examination. The worms were cleared in lactophenol, examined microscopically and identified by consulting 'Systema Helminths' Vol.III (Yamguti, 1961); CIH Keys to nematode parasites of vertebrates (Vol 1-10); keys to the nematode parasites of vertebrates (Anderson et. al., 2009). The identification of specimens recovered was based on the morphological characteristics of 2 males and 3 females. The morphometric data were expressed in millimeters unless indicated otherwise.

**Result and Discussion:** (based on 2 males and 3 females) Body whitish when alive, anterior proximity bent dorsally; cuticle transversally striated; oral/buccal capsule large, with 3 pairs of ventro-lateral teeth; buccal capsule deep with two triangular lancets in its depth (Fig. 1,2 ).

**Male:** Body 6.885-7.155 long and 0.360 in maximum thickness; buccal capsule 0.198-0.225× 0.126-0.135 in size; oesophagus 0.990-1.035 long; oesophagus is muscular and glandular; nerve ring 0.360-0.405, cervical papillae 0.460-0.540 and excretory pore 0.450-0.495 from anterior extremity; caudal bursa well developed, symmetrical, supported by thick bursal rays, ventral rays arising from the common stem, not extending upto the bursal margin, ventro-lateral, medio-lateral and externo-lateral arising from the common stem and separated , the tip of each ray is blunt and not reaching the bursal margin (Fig. 3,4); externo-dorsal rays arising from the common stem with dorsal, curved and almost touches the bursal margin; dorsal ray forked distally, each branch of dorsal further tridigitate (Fig. 4,5); genital cone oboid with two pairs of genital papillae, one pair at the base and one pair small just before the of cloaca (Fig. 4,7); spicules equal, long, filamentous, 0.650-0.765 long with tapering tips (Fig. 3,4); gubernaculum 0.144-0.180, long (Fig.6,7).

**Female:** Body 8.910-9.900 long, 0.495-0.54 in maximum thickness; buccal capsule 0.243-0.252 in length and 0.126-0.135 in width; oesophagus 1.062-1.080 long; nerve ring 0.450-0.495, cervical papillae 0.603-0.630 and excretory pore 0.522-0.540 from anterior extremity (Fig. 1); vulva in the posterior third of the body 3.240-3.510 from the tip of tail (Fig. 8); tail conical 0.180-0.225 with a spine at the tip 0.006 long (Fig. 9); eggs in the uterus oval in shape, 0.063-0.072 × 0.036-0.045 in size (Fig. 8)

**Taxonomic Summary:** Host Type: Jackal *Canis aureus* Linnae

Site of Infection: Small intestine

Type of Locality: Kandraur, District Bilaspur (H.P.)

Specimens: Holotype (1Male), Allotype (1 Female) and Paratype (3 male and Female)

**Remarks:** The observations of *Ancylostoma (Ancylostoma) caninum* (Ercolini, 1859) species as given by Lane (1916) and Burrow (1962) in the table, excepting the intraspecific variations in the measurements of the body organs. The species is worldwide in distribution as a parasite of carnivore hosts.

**Table: Measurement in (mm) of *Ancylostoma (Ancylostoma) caninum* (Ercolani, 1859)**

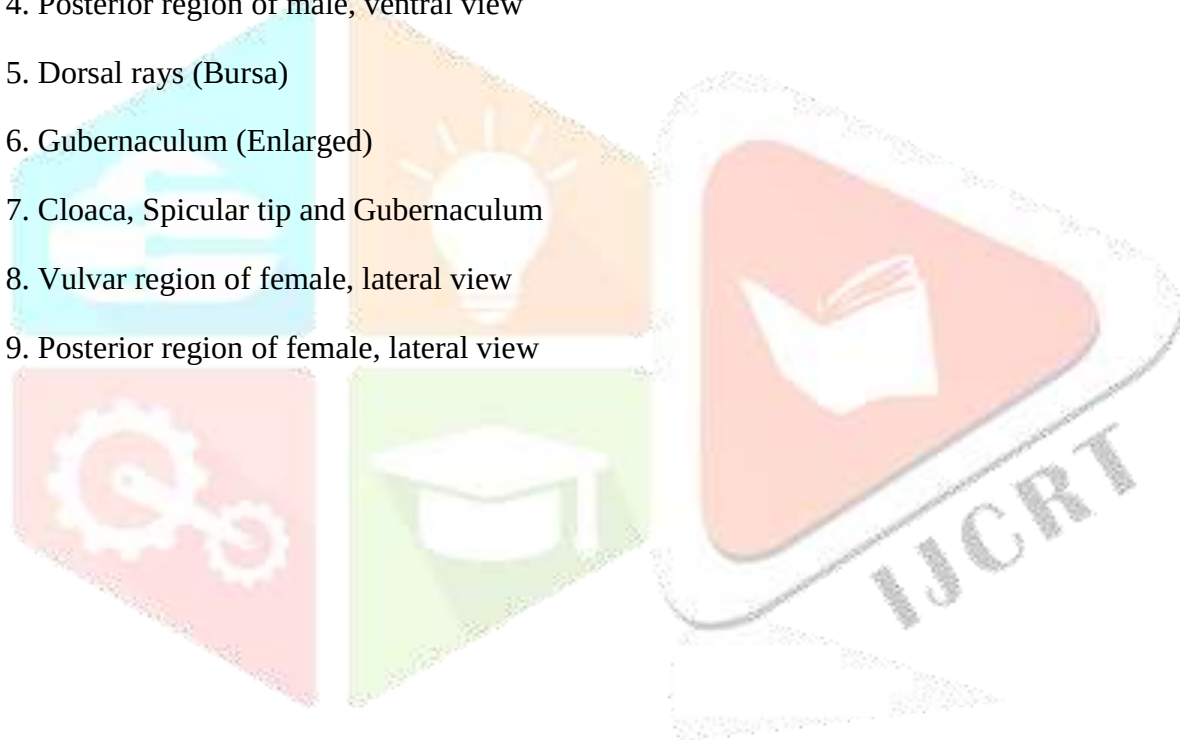
| Characters                           | According to Lane, 1916 |                                    | According to Burrow, 1962 |                                     | Author's Observations            |                                 |
|--------------------------------------|-------------------------|------------------------------------|---------------------------|-------------------------------------|----------------------------------|---------------------------------|
|                                      | Male                    | Female                             | Male                      | Female                              | Male                             | Female                          |
| Body length                          | 10.0                    | 14.0                               | 11.0-13.0                 | 14.0-20.5                           | 6.885-7.151                      | 8.910-0.495                     |
| Body width                           | 0.4                     | 0.6                                | -----                     | -----                               | 0.360                            | 0.495-0.540                     |
| Buccal capsule                       | 0.25×0.25               | -----                              | -----                     | -----                               | 0.198-0.225<br>× 0.126-<br>0.135 | 0.243-<br>0.252×<br>0.126-0.135 |
| Oesophagus                           | 1.1                     | 1.13-1.26                          | 1.13-1.26                 | -----                               | 0.990-1.035                      | 1.062-1.080                     |
| Nerve ring<br>(From anterior<br>end) | 0.72                    | -----                              | -----                     | -----                               | 0.360-0.495                      | 0.450-0.495                     |
| Excretory pore                       | -----                   | -----                              | -----                     | -----                               | 0.450-0.495                      | 0.522-0.540                     |
| Cervical<br>papillae                 | 0.75                    | -----                              | -----                     | -----                               | 0.460-0.540                      | 0.603-0.630                     |
| Spicule length                       | 0.9                     | -----                              | 0.73-0.96                 | -----                               | 0.650-0.765                      | -----                           |
| Gubernaculum                         | 0.16                    | -----                              | -----                     | -----                               | 0.144-0.180                      | -----                           |
| Tail of female                       | -----                   | 0.2                                | -----                     | -----                               | -----                            | 0.180-0.225                     |
| Vulva (From<br>post. End)            | ----                    | In the<br>posterior end<br>of body | -----                     | -----                               | -----                            | 3.240-3.510                     |
| Eggs                                 | -----                   | 0.06-0.064×<br>0.03-0.04           | -----                     | 0.055-<br>0.072×<br>0.034-<br>0.044 | -----                            | 0.063-<br>0.072×<br>0.036-0.045 |
| Caudal spine                         | -----                   | -----                              | -----                     | -----                               | -----                            | 0.006                           |

| Location | -----                                                 | ----- | -----  | -----  | Intestine                              | Intestine                              |
|----------|-------------------------------------------------------|-------|--------|--------|----------------------------------------|----------------------------------------|
| Locality | India                                                 | India | Ceylon | Ceylon | Kandraur district<br>Bilaspur<br>(H.P) | Kandraur district<br>Bilaspur<br>(H.P) |
| Host     | Dog, wolf<br>Jackal, fox,<br>Tiger, Bear,<br>Cat etc. |       | Dog    |        | Jackal                                 |                                        |

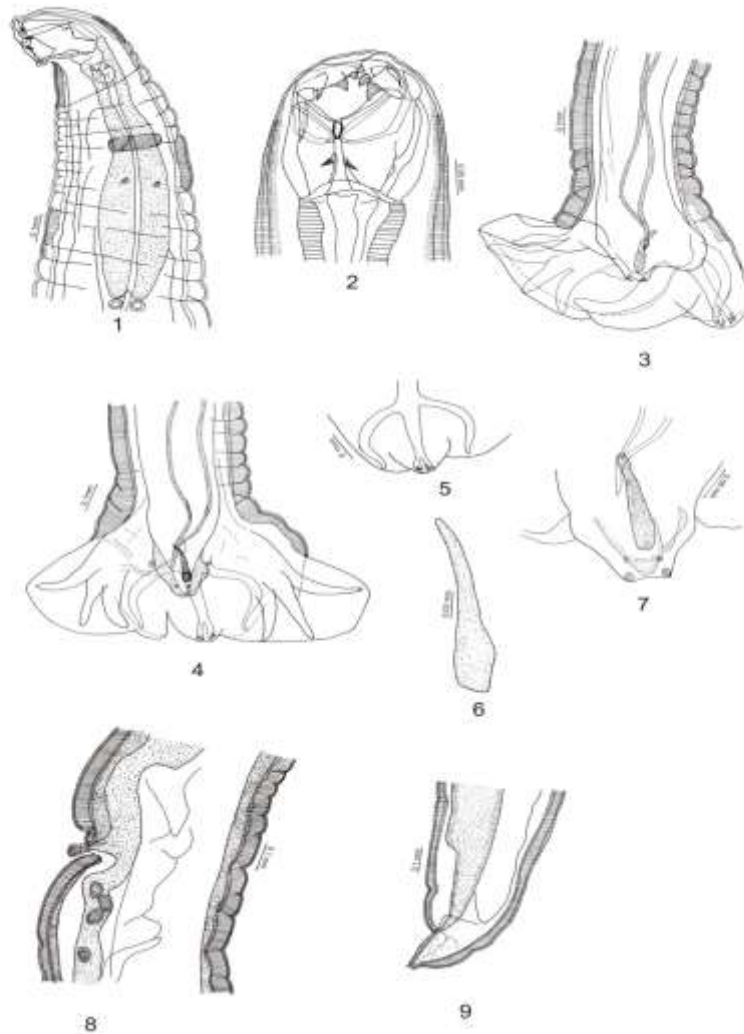
***Ancylostoma (Ancylostoma) caninum* (Ercolani,1859)**

Fig.1. Anterior region, lateral view

2. Anterior region (Enlarged), dorsal view
3. Posterior region of male, lateral view
4. Posterior region of male, ventral view
5. Dorsal rays (Bursa)
6. Gubernaculum (Enlarged)
7. Cloaca, Spicular tip and Gubernaculum
8. Vulvar region of female, lateral view
9. Posterior region of female, lateral view



Figure



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