First record of *Chrysomya albiceps* Wiedemann, 1819 (Diptera: Calliphoridae) maggots from a sambar deer (*Rusa unicolor*) in Kerala, South India

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Abstract Fully grown third stage larvae (LIII) of *Chrysomya albiceps* were recovered from aberrant sites viz. trachea and rumen during necropsy of a free-range sambar deer that had been observed to bear an inflamed tongue infested with maggots and subsequently died due to starvation. Five dead maggots of *C. bezziana* were also recovered from rumen. The aberrant locations of the recovery of the maggots indicated that they might have reached these sites accidentally. This is the first report of LIII of *C. albiceps* from a sambar deer from Kerala, South India.

Keywords *Chrysomya albiceps* · *C. bezziana* · Kerala · Sambar deer · South India

Introduction

Chrysomya albiceps Wiedemann, 1819 (Diptera: Calliphoridae) is a hemisynanthropic blow fly (Verves 2004), distributed in the Southern Palaearctic region, North Africa, eastwards to north-west India, throughout Africa, including Afro-tropical Islands of Aldabra, Cape Verde, Madagascar, Mauritius, Réunion, Rodriguez, St. Helena, Seychelles and Socotra, South America and United States (Zumt 1965; Baumgartner and Greenberg 1984; Smith 1986; Greenberg 1988; Wells 1991; Riback and Godoy 2008). The presence of *C. albiceps* is reported in the northwestern part of India (Zumt 1965). Adult female flies oviposit primarily in carrion, but also may act as secondary invaders of myiasis on live mammals (Taylor et al. 2007).

Sambar deer (*Rusa unicolor*) is the most widespread deer in Asia. It is distributed in Southern Nepal, India, Sri Lanka, Burma, Southern China and southeastern Asia to the Pacific Coast and to the islands of Borneo, Hainan and Taiwan (Leslie 2011). With a population of 10,665, they form the largest population of wild animals in the forests of Kerala second to wild boar (KFRI 1993). Sambar deer form a major prey base for tigers, and other carnivores such as leopards and wild dogs, and are highly vulnerable to attack by these predators (Leslie 2011).

The present communication reports the presence of *C. albiceps* in an aberrant visceral location of a sambar deer along with most common obligatory myiasis producer, the *C. bezziana* from Kerala, a southern state of India.

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Materials and methods

History

A solitary adult male sambar deer approximately 10–11 years old, was sighted by field staff frequenting the shore of Periyar Lake, in the Periyar Tiger Reserve, Thekkady, Kerala, India on 20th August, 2011. On observation through binoculars, a fleshy, pendulant mass of tissue was seen hanging from either side of the mouth, which was determined to be the inflamed tongue. The animal was seen spending long periods with its anterior muzzle and mouth submerged in the water of the lake. This was presumed to indicate irritation from maggots in the inflamed tissue. There was progressive loss of condition of the animal, and 4 days after being first sighted, the sambar deer was observed floating dead in the lake.

Necropsy was conducted within 48 h after death. The tongue was lacerated, with the anterior one-third portion absent. The horizontal ramus of the right mandible was fractured completely at two sites, at the level of the lower canines, with laceration and haemorrhages of the surrounding tissues. No fly larvae (maggots) were observed in the oral wounds. Several maggots were recovered from the trachea and rumen. These were collected in 70 % ethanol and transported to Department of Veterinary Parasitology, College of Veterinary and Animal Sciences, Pookode for identification. The gross morphology of the maggots was studied first followed by dehydration and clearing in cresote. They were identified based on morphological features (Sen and Fletcher 1962; Spradbery 2002; Taylor et al. 2007; OIE 2008).

Results

All the maggots recovered from the rumen possessed a pair of spiracular plates with three slits each, revealing that they were dead third stage larvae (LIII). Out of the ten maggots recovered, seven were hairy maggots and the remaining three were smooth larvae. Hairy maggots were identified as *C. albiceps* Wiedemann, 1819 and smooth larvae as *C. bezziana* Villeneuve, 1914. The characteristic morphological feature which differentiated maggots of *C. albiceps* flies from other *Chrysomya* species was the presence of a number of thorn-like projections on the body which became longer on the dorsal and lateral parts of the body (Fig. 1). Absence of spines on the stalks of projections distinguished it from *C. rufifacies*. The lengths of the larvae ranged between 14.5 and 17 mm.

All the five dead maggots (LIII) collected from trachea were smooth and identified as *C. bezziana*. The body surface of LIII of *C. bezziana* were smooth with spine bands

Fig. 1 Dorsal view of third instar of *C. albiceps* showing thorn-like projections

but no obvious body processes except on the last segment. Posterior spiracles were clearly exposed on the posterior ‘face’ of last segment with open peritreme. Dorsal tracheal trunks were not darkly pigmented except in the posterior half of 12th segment. The anterior spiracle had only 4–6 lobes.

Discussion

Myiasis is the infestation of live vertebrate animals with dipterous (fly) larvae, which, at least for a certain period, feed on the host’s dead or living tissue, liquid body substances, or ingested food (Zumpt 1965). Flies that cause myiasis are represented by a diversity of species. Some are rarely involved in myiasis, whereas for others it is the only way of life. Many of these same fly species also feed on carrion (Scholl et al. 2009). There is dearth of literature on larvae causing cutaneous myiasis in the wild animals of southern India. However, *C. bezziana*, *Lucilia cuprina* and *C. megacephala* were identified as the causative agents for cutaneous myiasis of domestic animals from the south Indian state of Kerala (Subramanian 1998).

In the present study, maggots were recovered from the rumen of a sambar deer. This is likely to have occurred as a result of accidental ingestion of maggots infesting the traumatic wound on the tongue and adjacent tissues of the fractured mandible, possibly caused by a predator attack. Constant irritation due to maggots in the wound would have driven the animal to submerge its mouth in the water of the lake, forcing the LIII to migrate towards the posterior aspect of the oral cavity, with subsequent ingestion. No wounds or ulcers were observed in the rumen, and maggots were found mixed with the rumen content, clearly indicating accidental ingestion. Migration of *C. bezziana* maggots to the trachea might have occurred after the death of the deer.

Morphologically, maggots showed three pairs of tubercles on the dorsal and ventral surfaces, with dorsal ones being more developed. However, only a single pair of tubercles was observed on the dorsal aspect of posterior part of maggots. Tubercles revealed a crown of strongly pigmented spines in the terminal portion which differentiated the LIII of *C. albiceps* from the cogeneric species (Queiroz et al. 1997). The absence of spines on the lateral aspect of elongated fleshy tubercle (Taylor et al. 2007; Spradbery 2002) on the body confirmed the species of maggot (LIII) as *C. albiceps*.

Even though *C. albiceps* mostly breeds on carrion, they can also act as facultative myiasis producers by ovipositing on wounds of animals, as a secondary invader (Taylor et al. 2007). They are also known to prey on other blow fly larvae. This might explain simultaneous infestation of the tongue and wounds in the facial region with larvae of *C. bezziana*, the most common obligatory myiasis producer in the state of Kerala.

Chrysomya bezziana is the predominant fly species involved in the majority of cases of cutaneous myiasis recorded from Africa, Arabia, India and South-East Asia (Narayan and Pillay 1936; Spradbery 2002; Subramanian 1998). Knowledge of the distribution, biology, ecology and behavior of forensically important flies like *C. albiceps* and *C. bezziana* found at a crime scene can define the post mortem interval in veterolegal cases especially of wildlife. There is a dearth of literature on the occurrence of *C. albiceps* from other parts of India. Taxonomic differentiation of *C. albiceps* from *C. rufifacies* was intricate (Patton 1922; Holdaway 1933; Senior-White et al. 1940; Sen and Fletcher 1962). However, Subramanian (1998) could not identify *C. albiceps* larvae in the myiasis of domestic animals of Kerala. Being of forensic importance, this first report of *C. albiceps* from Kerala, South India calls for further studies on its prevalence among wildlife of the state.

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