

The eggshell morphology of *Rallicola unguiculatus* Piaget, 1880 (Ischnocera: Phthiraptera)

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Abstract The egg chorion of the greater coucal louse, *Rallicola unguiculatus* bears hexagonal ridges. The hat shaped opercular disc also shows hexagonal marks. Twenty to twenty-three button shaped micropyles occur along the opercular rim. The stigma remained obscured under the cementing material.

Keywords Biting lice · Egg shell morphology · Mallophaga · Phthiraptera

Introduction

The egg shells of avian lice exhibit certain distinctive features. Balter (1968a, b) pointed out the role of egg morphology as a guide to louse taxonomy and further advocated the use of SEM for this purpose. Since then few workers have made attempt to record the microtopography of the eggs of selected avian lice (Bilinski and Jankowska 1987; Castro et al. 1991; Kumar et al. 2003, 2004, 2007; Saxena et al. 1993, 1994, 2000, 2012; Beg et al. 2004; Gupta et al. 2009; Tyagi et al. 2009; Rajput et al. 2010; Ahmad et al. 2010, 2013; Agarwal et al. 2011). Zawadzka et al. (1997) has provided a schematic representation of generalized phthirapteran egg shell. According to them, phthirapteran egg shell comprises of three basic components e.g. Operculum, Main egg shell and Stigma. Minute apertures found generally along the rim of operculum are termed as micropyles. The apical end of an opercular disc

often leads to a tapering rod like filaments termed polar thread/opercular projection. The main eggshell of certain phthirapteran species is generally equipped with variously shaped bristles, called apophyses meant for the attachment. The stigma/hydropyle occurring at the rear end of the egg shell are ment stands for the uptake of water or for the attachment. In present contribution, an attempt has been made to record the external features of the eggshell of an ischnoceran species, *Rallicola unguiculatus* occurring on greater coucal, *Centropus sinensis*.

Materials and methods

Feathers bearing eggs of *Rallicola unguiculatus* were gently cut from host body. Since, the greater coucal is known to harbor four phthirapteran species, the adult females of *Rallicola unguiculatus* were dissected in insect Ringer's solution to take out fully developed ova, for matching purpose. For SEM studies, eggs were fixed in 2.5 % glutaraldehyde and passed through 0.2 M phosphate buffer, dehydrated, arranged on aluminium stubs (covered with double sided cello tape), gold coated and examined under SEM (Mode Leo 435 VP SEM) at Indian Institute of Technology, Roorkee.

Results

The eggshell of *R. unguiculatus* is a miniature rice-grain like structure (measuring 0.90–1.00 mm in length) in appearance (Fig. 1a). The anterior end of the egg bears very elongated hexagonal ridges. However, the middle and posterior portion of the egg shell is quite smooth and free from any sculpturing or apophyses. The egg mouth is

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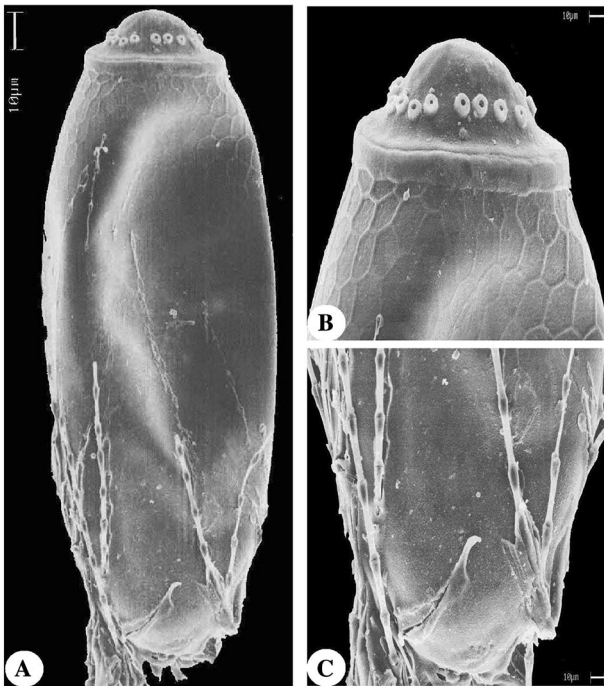


Fig. 1 SEM photograph of eggs of *Rallicola unguiculatus*. **a** SEM photograph of the egg shell of *R. unguiculatus*. **b** SEM photograph of the anterior end of *R. unguiculatus*. **c** SEM photograph of the posterior end of *R. unguiculatus*

covered with a cap like operculum. The operculum is hat shaped and bears twenty to twenty-three button shaped micropyles, arranged along the operculum rim. The opercular disc does not bear any polar thread (Fig. 1b). The nature of stigma (occurring at the posterior end of the eggshell) remained obscured as it is concealed under cementing material used by the lice to glue the egg (Fig. 1c).

Discussion

The egg shells of avian Phthiraptera are known to exhibit markings/sculpturing which are often species specific (Balter 1968a, b). The differences appear to be more distinct in case of amblyceran lice. Certain species belonging to genus *Menacanthus* have been extensively studied. For instance, poultry shaft louse, *M. stramineus* (Balter 1968b; Bilinski and Jankowska 1987; Rajput et al. 2010), *M. pallidus* (Zawadzka et al. 1997), *M. cornutus* (Kumar et al. 2007), *M. gonophaeus* (Beg et al. 2004), and *M. kalatitar* as well *M. abdominalis* (Gupta et al. 2009). Likewise, the differences between chorionic sculpturing of another amblyceran, *Myrsidea* have also been noted (*M. amandavae*, Gupta et al. 2004; *M. baktitar*, Beg et al. 2004; *M. invadens*, Gupta et al. 2009).

However, the differences in chorionic sculpturing of ischnoceran avian lice are less marked. Three species of Genus *Lipeurus* (*L. tropicalis*, *L. caponis* and *L. heterographus*) two species of genus *Goniocotes* (*G. gallinane* and *G. jirutfi*) and three species of genus *Brueelia* (*B. cyclothorax*, *B. amandavae*, *B. saliemi*) have been studied from this point of view (Kumar et al. 2004, 2007; Beg et al. 2004; Gupta et al. 2009). The present report furnishes further information on the nature of egg shell of an ischnoceran louse, *Rallicola unguiculatus* infesting greater coucal. Faint hexagonal marks on egg chorion and also hat shaped opercular disc and the number and nature of micropyles of *R. unguiculatus* can help in the identification of species. Further studies on nature of egg shells of other species of genus *Rallicola* may provide more fruitful results.

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