

Article

Morphological Study of First Instar Elephant Stomach Bot Fly Larvae (Oestridae: Gasterophilinae: *Cobboldia elephantis*)

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Simple Summary

In the obligate parasitic Oestridae family, morphological studies of larvae are relatively scarce, limiting our understanding of their parasitic lifestyles. This study employed scanning electron microscopy and confocal laser scanning microscopy to document and analyze the three-dimensional configurations and ultrastructures of first instar larvae of *Cobboldia elephantis* (Steel, 1878), providing detailed descriptions of their mouthhooks, spine distribution, sensory receptor types, and posterior spiracles. Notably, this species is the first in Oestridae to exhibit peristigmatic tufts. By comparing with species of the three other genera of stomach Gasterophilinae, we confirmed their phylogenetic relationships. This research fills several gaps in morphological studies of first instar larvae of *C. elephantis* and offers new insights into the adaptive evolution of stomach bot flies with their hosts.



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Abstract

Cobboldia elephantis (Oestridae: Gasterophilinae) is an obligate parasite of the alimentary tract of the Asian elephant, causing gastric myiasis. Current knowledge of its first instar larval morphology has been limited to observations under light microscopy, significantly constraining our understanding of morphological evolution within the genus *Cobboldia* and the broader subfamily Gasterophilinae. In this study, we provided ultrastructural and three-dimensional characterizations of *C. elephantis* using scanning electron microscopy (SEM) and confocal laser scanning microscopy (CLSM) based on newly hatched first instar larvae. Features of the first instar larva of *C. elephantis*, which are either unique or shared with *C. loxodontis* Brauer, 1896, include (i) three pairs of mouthhooks, (ii) posterior spiracles bearing peristigmatic tufts, (iii) anal division with two spine-clusters and a row of elongated spines, and (iv) a planed, button-like sensilla and a sensillum placodeum. We also compared the first instar larval morphology of *C. elephantis* with that of *Cobboldia loxodontis*, *Gyrostigma rhinocerontis* (Owen, 1830), *Gasterophilus pecorum* (Fabricius, 1794), *Portschinskia magnifica* Pleske, 1926, and *Oestrus ovis* Linnaeus, 1758. Species of Gasterophilinae share several unique features of the first instar larva, including (i) an anal division composed of three subdivisions, (ii) spiracular slits on the posterior spiracles, and (iii) conserved positioning of thoracic sensilla. These findings fill a key gap in our knowledge of *C. elephantis* larval