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# A NEW LOCALITY OF *DULITICOLA HOISENI* WONG IN SINGAPORE

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## INTRODUCTION

There are two *Duliticola* species (trilobite larva, Coleoptera: Lycidae) in Singapore, with the more elongate and worm-like of the two species yet to be described (Fig. 1) and the other which is more leaf-like, had been described by Wong (1996) as *Duliticola hoiseni* Wong, Hoisen's trilobite larva (Figs. 2–4). *Duliticola* species occur throughout Southeast Asia. In Singapore, they are found in the Bukit Timah Nature and the Central Catchment Reserves. Both *Duliticola* species (trilobite larva) are nationally endangered because of the threat of loss of forests and over collection by beetle hobbyists (Ng & Wee, 1994). These beetles derive their name from their superficial resemblance to the extinct fossil arthophods, the trilobites. The family Lycidae (net-winged beetle) is interesting in that, for many species in the family, the adult males and females are morphologically very different. The males resemble the typical lycid beetle and are less than 5 mm long, while the females are neotenous—remaining larviform throughout their lives and are approximately 4–6 cm long (Ng & Wee, 1994).

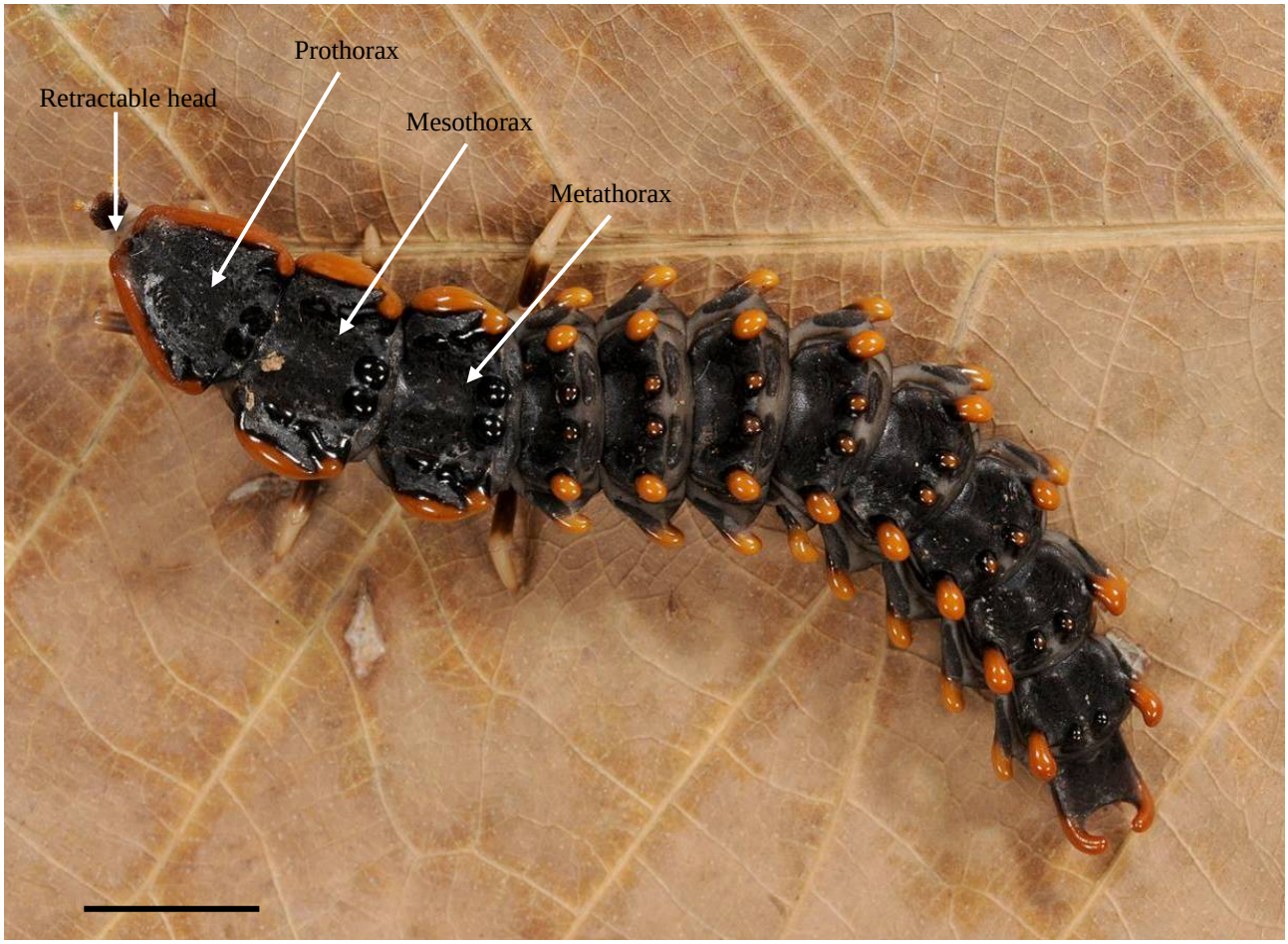


Fig. 1. Dorsal view of the still undescribed *Duliticola* species collected from the Sime Road swamp forest. Scale bar = 5 mm. (Photo by: Tan Heok Hui).

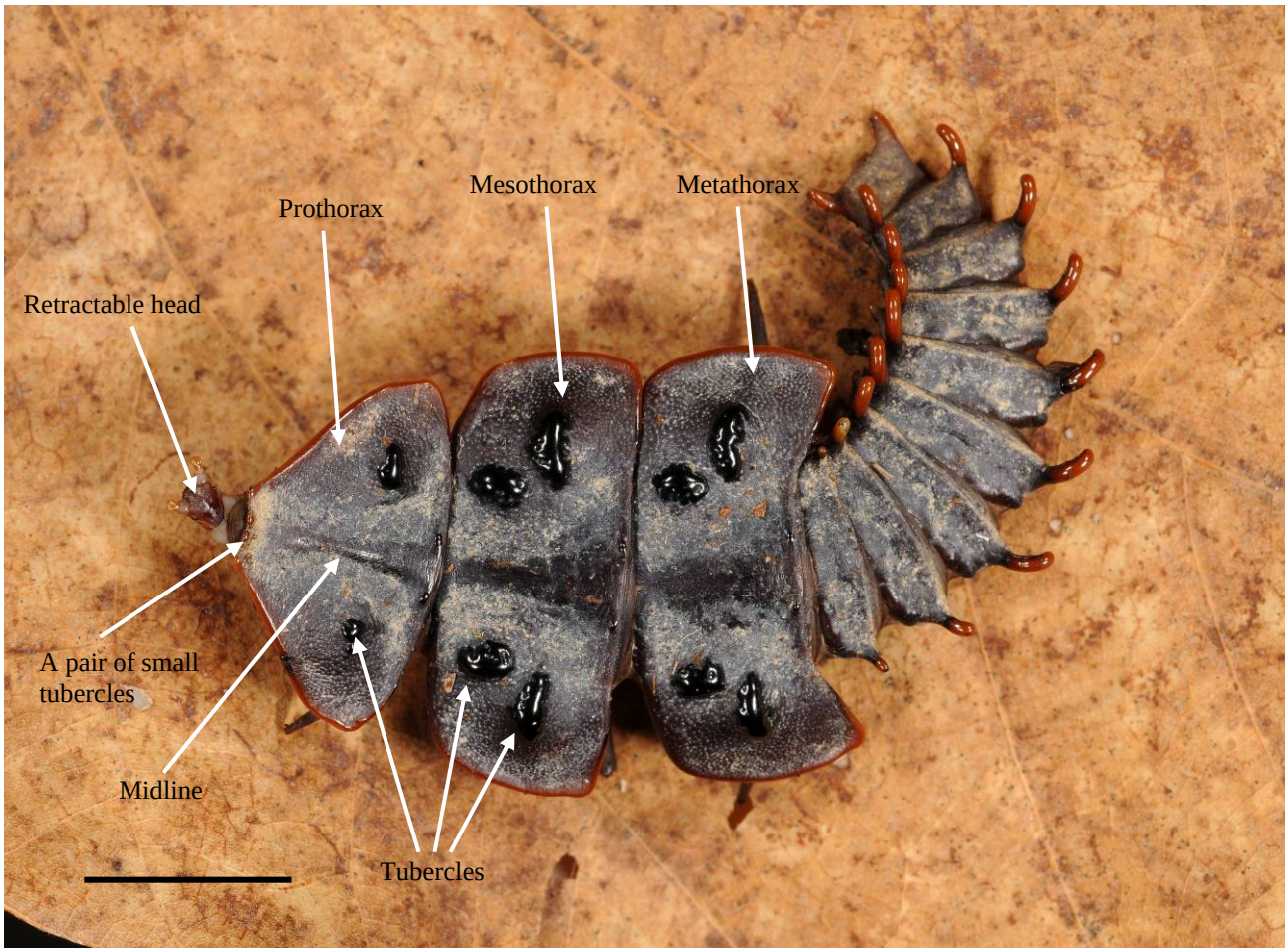


Fig. 2. Dorsal view of the *Duliticola hoiseni* specimen (ZRC.6.21028) collected from the Rifle Range Road and Sime Road junction in secondary forest. Scale bar = 1 cm. (Photo by: Tan Heok Hui).

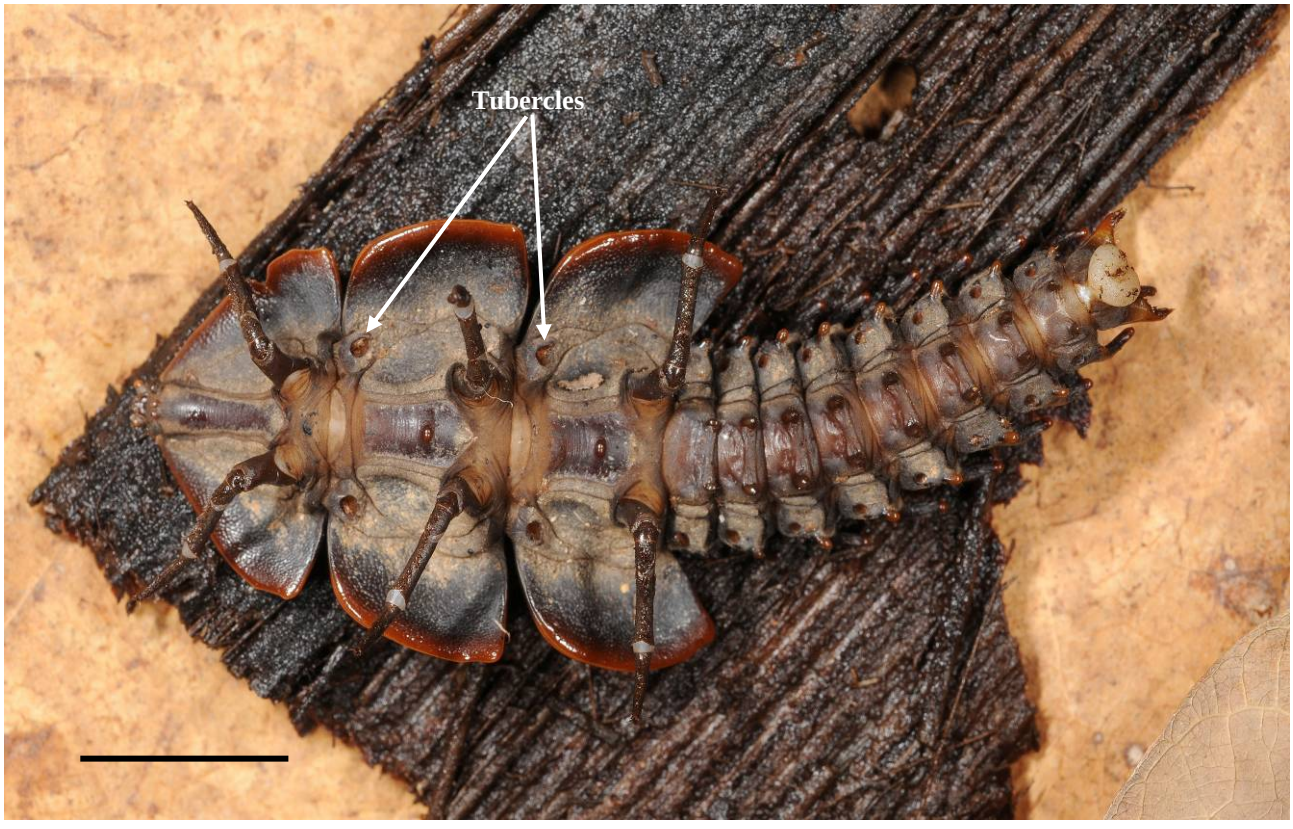


Fig. 3. Ventral view of the *Duliticola hoiseni* specimen (ZRC.6.21028). Scale bar = 1 cm. (Photo by: Tan Heok Hui).

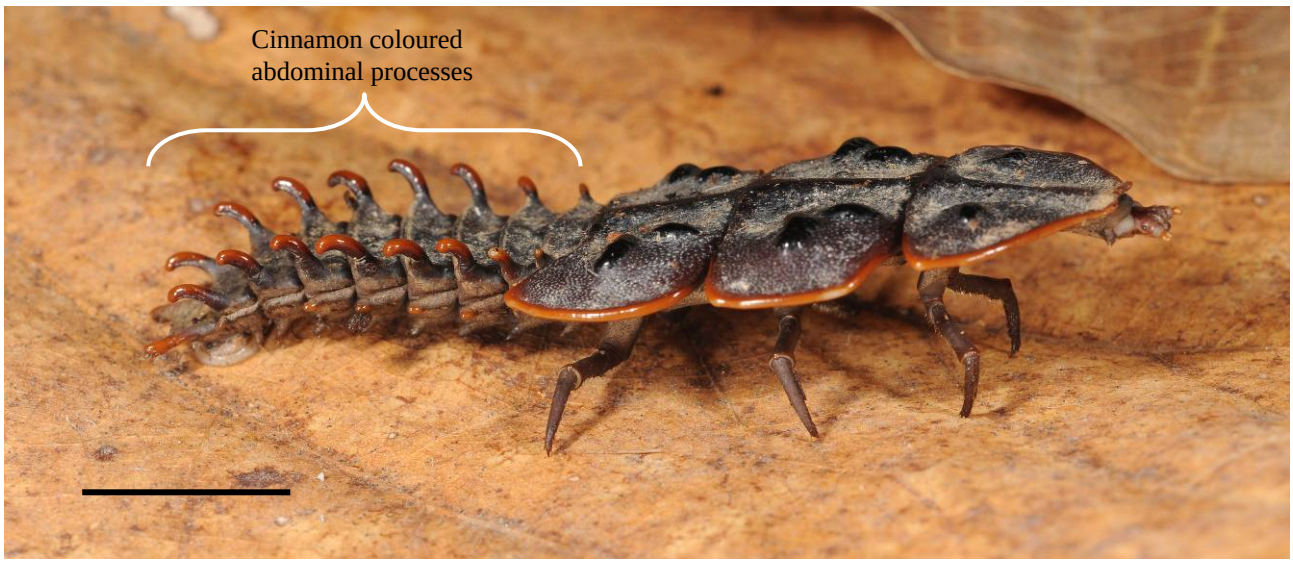


Fig. 4. Lateral view of the *Duliticola hoiseni* specimen (ZRC.6.21028). Scale bar = 1 cm. (Photo by: Tan Heok Hui).

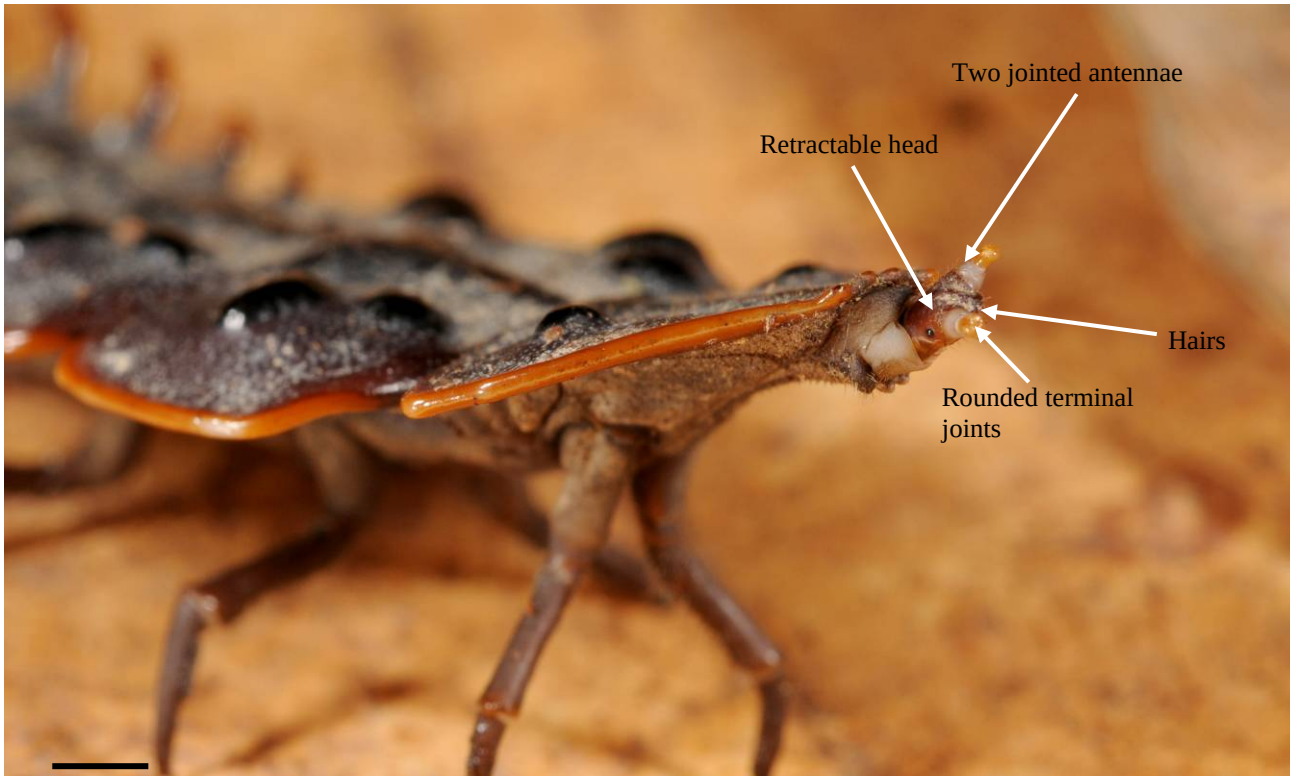


Fig. 5. Close up of the *Duliticola hoiseni* larva's head (ZRC.6.21028). Scale bar = 1 mm. (Photo by: Tan Heok Hui).

## SPECIMEN DETAILS

*Duliticola hoiseni* occurs throughout Peninsular Malaysia and Singapore and is restricted to more pristine forest. In Malaysia it has been found in Batang Padang (Perak), Endau Rompin, Kuala Tahan and Krau Forest Reserve (Pahang), Bukit Sedagong and Kajang foothills (Pulau Tioman) and Selangor (Wong, 1998). In Singapore it has only been recorded from primary forest areas of the Bukit Timah Nature Reserve (BTNR) (Wong, 1996). Previous collections of *Duliticola hoiseni* in BTNR were made by D. H. Murphy in 1973 (female specimen, ZRC.6.18601) and by A. T. C. Wong in 1993 (female specimen, ZRC.6.8634). On 5 Nov.2008 two female larval specimens of this species were collected near the Rifle Range Trail beside the Singapore Technologies Engineering (ST Engineering; formerly Chartered Industries) site. The two specimens were found in a small valley lined with numerous rattan plants close to the Public Utilities Board (PUB) cascade. The two *Duliticola hoiseni* specimens (smaller, 35.0 mm; ZRC.6.21027 and larger, 45.0 mm; ZRC.6.21028) have been deposited in the Zoological Reference Collection (ZRC), Raffles Museum of Biodiversity Research, National University of Singapore.

Fig. 6. Two *Duliticola hoiseni* female larvae found on a rotting rattan stem. (Photo by: Alvin Francis Siew Loon Lok).

Fig. 7. Habitat where the two *Duliticola hoiseni* female larvae were found. (Photo by: Alvin Francis Siew Loon Lok).

*Duliticola hoiseni* larvae have a small head, which it is able to retract into the prothorax (Fig. 5). The antennae are two-jointed with a rounded terminal joint with numerous hairs on the surface (Fig. 5); the tiny black eyes are situated behind these antennae. Thoracic segments are more robust with segments bent downwards. The prothorax is triangular, with two small tubercles on the front margin where the head protrudes (Fig. 2). The prothorax also has two large tubercles on either side of the midline (Fig. 2). The mesothorax is broader than the prothorax, with four large tear-drop shaped bulging tubercles in the middle of the segments and two small tubercles on the posterior margins (Fig. 3). The metathorax has a straight, swept-back posterior edge with the arrangement of the tubercles similar to that on the mesothorax (Fig. 2). The abdomen has nine segments, with the cylindrical abdominal processes pointing back and upwards and originating from the edge of the posterior margin of each segment (Fig. 2). The mature females are yellowish-white in colour, unlike the sclerotised larvae which are dark brown, with cinnamon-coloured processes (Fig. 2–4).

*Duliticola hoiseni* larvae are usually found on rotting logs and in the leaf litter in lowland primary forest. The stage of decomposition appears to matter and no larvae were found on logs in advanced decay, but instead, intact logs were preferred. Larvae were also found on the surface of logs and no evidence of burrowing was noted (Wong, 1996). What is interesting is that instead of being found on a rotting log on the forest floor or in leaf litter, the two specimens collected at Rifle Range, were found on a suspended, dead, rattan stem (Fig. 6) in preliminary stages of rot overhanging a small stream in secondary forest (Fig. 7).

The diet of *Duliticola hoiseni* larvae is highly controversial, and has been reported to include fungi, slime moulds, or juices from rotting plant matter such as logs and branches (Wong, 1996). Ng & Yong (1991) observed specimens grazing on Basidiomycetes fungi, growing on rotting wood. After examining a drop of liquid squeezed from a piece of wood collected with *Duliticola hoiseni* using a microscope, Wong (1996) speculated that trilobite larvae actually fed on micro-organisms within the juices of the rotting wood. Contents of the collected wood juices, revealed a wide spectrum of organisms including protozoa, rotifers, nematodes, copepods, nauplii larvae and mites, and the same organisms were isolated from the intestines of several *Duliticola hoiseni* specimens (Wong, 1996).

The life cycle of *Duliticola hoiseni* is very poorly understood. In his paper describing *Duliticola hoiseni*, Wong (1996) reported the larvae moulting after five months, with none undergoing a second moult, leading him to conclude that the time between moults could be more than five months. From his studies and observations, Wong (1996) was however not able to ascertain the number of instar stages the *Duliticola hoiseni* larva undergoes before the terminal moult, and so assumed the life span to be a year or longer. He was however able to trap a male *Duliticola hoiseni* specimen using a female specimen as bait at the Gombak Field Station in Peninsular Malaysia, where a male beetle was found tightly attached to the female's gonopore via its long curved genitalia for five hours before releasing the female. The male died 3–4 hours later. The female later laid a batch of 200 eggs the following day, before dying a week later (Wong, 1996). Wong (1996) also observed a female *Duliticola hoiseni* specimen attracting males by raising its abdomen above its thorax exposing its gonopore, presumably dispersing pheromone(s).

## CONCLUSIONS

Prior to the latest collection of *Duliticola hoiseni* from secondary forest at the Rifle Range Trail, it was thought that *Duliticola hoiseni* only occurred in pristine primary forest areas in the BTNR, allowing us to conclude that this species is not as fastidious with respect to habitat requirements, as was previously believed. This new locality is approximately 2.6 km away from the BTNR, and separated from it by the Bukit Timah Expressway. Because the females of this species are neotenous and are unable to fly, we conclude that these specimens belong to an isolated portion of their distribution stretching from the BTNR.

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