

Necrophagous Scarab Beetles (Coleoptera, Scarabaeidae, *Onthophagus*) Attracted to a Diplopod Copulating Pair (Diplopoda) in Thailand¹⁾

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Abstract The two necrophagous scarab beetles, *Onthophagus rudis* and *O. penicillatus*, were observed to be attracted to a diplopod copulating pair in Sakaerat, Thailand. The attractants for these beetles were suggested to be defensive secretions of diplopods as reported for some African necrophagous *Onthophagus* species which feed on diplopod carcasses.

It has been known that some scarab beetles of the genus *Onthophagus* (Coleoptera, Scarabaeidae) feed on carcasses of Diplopoda (CAMBEFORT, 1980; KRELL *et al.*, 1997; OCHI & ARAYA, 1998). Further, KRELL *et al.* (1997) revealed that the three African species, *Onthophagus latigibber* D'ORBIGNY, *O. bartosi* BALTHASAR and *O. mankonoensis* BALTHASAR, were attracted by defensive secretions of diplopods (Sperobolida) in the Ivory Coast, and they suggested that such a habit is advantageous for these necrophagous species because they can firstly and exclusively use freshly dead

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diplopods prior to the other necrophagous species using the scent of putrefaction as an olfactory cue for resource tracing.

During the Kyoto University Expeditions to Thailand in 1997, we had an opportunity to observe the two Oriental scarab beetles, *Onthophagus rudis* SHARP and *O. penicillatus* OLSOUFIEFF, attracted to a copulating pair of diplopods. We herewith report our observation.

Two of the authors (ARAYA and NABHITABATA) found a copulating pair of a diplopod species belonging to Sperobolida (species is unidentified) on the forest floor of the Sakaerat Environmental Research Station at 15:00 on the 2nd of September, 1997. The diplopods were entangled and frequently biting each other. Large portions of their cuticle were soaked with stinking liquids which appeared to be secreted by themselves. Within 30 minutes of the observation period after the finding of the diplopod pair, 1 male and 2 females of *Onthophagus rudis* and 1 male and 1 female of *O. penicillatus* flew one after another to the vicinity of the diplopod pair and approached to it on foot (Fig. 1). Thereafter, they hid underground near the diplopod pair as they usually do so on a carcass. It was never observed that the beetles attacked the diplopods. This is the first record of the scarab beetles attracted to alive diplopods.

Both *Onthophagus rudis* and *O. penicillatus* are known to be carrion specialists (KIKUTA *et al.*, 1997) and belong to the same subgenus *Parascatonomus* as the East Asian species, *O. miyakei* OCHI *et al.* ARAYA and *O. murasakianus* NOMURA, which were reported to feed on a diplopod carcass (OCHI & ARAYA, 1998). Thus, it is possible that the two Oriental necrophagous species, *O. rudis* and *O. penicillatus*, may also use diplopod carcasses as food. However, these beetles do not seem able to prey on alive diplopods since they appear to have no weapon for breaking the hard cuticle of



Fig. 1. A diplopod copulating pair and *Onthophagus penicillatus* (pointed by an arrow) approaching to the pair.

diplopods. It is therefore puzzling why these beetles were attracted to the alive diplopods.

Some diplopod species are known to use their defensive secretions as sexual signals during copulation (HAACKER, 1974). This suggests that the stinking liquids on the cuticle of the diplopod copulating pair observed in the present study were also defensive secretions. If so, it can be surmised that the two Oriental necrophagous species also use diplopod defensive secretions as olfactory cues for tracing diplopod carcasses as reported for the African necrophagous species, and sometimes are wrongly attracted to diplopod copulating pairs soaked with defensive secretions as sexual pheromones.

In order to confirm this hypothesis, experimental studies should be made on the Oriental species.

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要 約

近 雅博・越智輝雄・Jarujin NABHITABATA・荒谷邦雄・松井正文：タイにおいてヤスデの交尾中のペアに誘引された腐肉食性のエンマコガネ。—— タイのサケラートにおいて、ヤスデの交尾中のペアに2種の腐肉食性のエンマコガネ *Onthophagus rudis* と *O. penicillatus* が誘引されてくるのが観察された。これらのエンマコガネの誘引物質は、アフリカの腐肉食性のエンマコガネについて報告されているのと同様に、ヤスデの防御物質であることが示唆された。

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