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Report on pupal parasitism of *Mocis undata* (Fabricius) (Lepidoptera: Erebidae) by *Brachymeria lasus* (Walker) from Kerala

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Abstract
Mocis undata (Fabricius), commonly called brown-striped semilooper, feeds on many economically important plants and crops such as longkong, citrus, pomelo, soybean, *Shorea*, *Hevea*, *Gossypium*, Nephelium, Solanum etc. Here, we report pupal parasitism by the parasitoid *Brachymeria lasus* with a detailed biology of *Mocis undata* from Kerala, India.

Keywords: pupal parasitism, *Mocis undata*, erebidae, *Brachymeria lasus*

Introduction
Mocis undata, moth species of the family Erebidae is distributed in the Afrotropical and Oriental regions (Holloway, 2005) [4] of the World. Moth commonly known as brown-striped semilooper is the pest of longkong, citrus, pomelo and soybean (Ngampongsai *et al*., 2005, Bhamare *et al.,* 2019 and Singh *et al*., 2013) [7, 2, 11]. The genus is represented by 40 species (Poole, 1989) [8]. Larval hostplants include mostly Leguminosae and *Shorea, Hevea, Gossypium, Nephelium* and *Solanum* (Robinson *et al*., 2001) [10]. *Brachymeria lasus* is a polyphagous solitary pupal parasitoid of the family Chalcididae with a host range of 104 species of Lepidoptera, Hymenoptera and Diptera (Mao *et al*., 1994; Narendran *et al*. 2006) [5, 6]. In this paper, we report the pupal parasitoid, *Brachymeria lasus* parasitizing pupa of *Mocis undata* from Kerala.

Materials and Methods
An adult female moth and three pupae of *Mocis undata* collected from the rubber plantation at Pachila, Idukki, Kerala, India (N09º58'22.9" E076º48'08.3") on 6th February 2022 were brought to the ETL (Entomo Taxonomy Lab), Christ College, Irinjalakuda. A female moth was transferred to a clean jar covered by a cotton cloth. After a day, the adult female laid patches of round pale eggs. After two days, the larvae were separated into four bottles (6cm height × 3cm diameter). The lid of the bottle was covered with muslin cloth. The larvae in the bottles were fed with *Pueraria phaseoloides* (Roxb.) Benth. leaves. The jar was cleaned every day in the morning. A parasitoid emerged from one of the pupae on 13th February 2022 and two live moths emerged from the remaining two pupae on 15th February 2022. The emerged adult moths were allowed to mate in the lab conditions. The complete life cycle of the moth, starting from egg (laid eggs on February 2022) to the transformation into the adult (adult emerged on March 2022) was also recorded. The specimens were then killed using ethyl acetate, dried, pinned and stored in an airtight insect box.
Moths were identified using the literature of Hampson G.F. (1894), Singh *et al*. (2017) [12] and Sivasankaran *et al*. (2017) [13]. The taxonomic arrangement of the moth followed Zahiri *et al*. (2010) [9] and Van Nieukerken *et al*. (2011) [1]. The morphological features of the immature stages of moths were studied using the Labomed Luxeo 4D model microscope.

Results and Discussion
Brachymeria lasus is a polyphagous pupal parasitoid attacking mainly lepidopteran species. Tegula black in colour with yellow. All coxae and trochanters are black. Mesosoma and all femora are black with the apices yellow. Yellow hind tibia with base and inner ventral marginal area black. All tarsi yellow and telotarsi are black in colour. Forewing hyaline with dark brown veins present. T_1 smooth and shiny with metasoma ovate. Hind femur with a row of several teeth on the outer ventral margin.

Adult
The head is dark brown with labial palpi upturned and the antennae ciliated. Tufts of dark brown hair are present in the collar and tegula region. Forewing is pale red-brown. Thorax is pale brown. Abdomen is also pale brown with the anal tuft ochreous and extending beyond the hindwings. Forewing with a dark brown subbasal line extending from the costa to the anal vein. An oblique antemedial dark brown band and two sinuous dark brown medial lines. The first medial line ends with a dark black spot above the inner margin. A small black spot is present after the basal area and just above the inner margin. A dark brown diffused postmedial band on which a sinuous dark brown line is present beyond the cell. The hindwing is ochreous fuscous with long hairs from basal to medial region. Diffused narrow fuscous medial and broad submarginal bands are present. Legs rufous and covered with hairs.

Egg
0.65mm in diameter. Female species deposited 60 semispherical eggs in a cluster on 6th February 2022. The flattened base of the egg is firmly attached to the surface of the bottle. The chorion of the eggs possessed numerous vertical ridges. Each of the vertical ridges extended from the micropylar area to the base of the egg. The colour of the eggs changed from light green to dark green and finally to black prior to hatching. The eggs hatched in the evening on 9th February 2022. It took 4 days to hatch.

Larva

The first instar larva was slender and fed its first meal, an egg shell. It was provided with fresh *Pueraria phaseoloides* (Roxb.) Benth. leaves. The larva is reddish-brown in colour with numerous setae on the body. The larvae continued feeding and changed to the next instar with numerous red-brown longitudinal bands all over the body from head to abdomen. There is a central broad white band. Numerous black setae all over the body and two prominent black spots, one on each side of the A1 segment below the central broad white band. Later, the larvae changed to light greenish grey in colour with a dark green black broad central band containing numerous longitudinal lines and the A_1 segment with two white spots with a black patch in the centre. A pale yellow and black lateral bands present. The fully grown larva was broad and elongated with several longitudinal lines over the body. The central longitudinal lines were light green and black with two spots, one on each side of the A_1 segment. The lateral sides of the larva are marked with several yellow and black longitudinal bands. The ventral side of the larva was dark brown in colour. The larva stopped feeding and enclosed itself in a leaf. The larval period was 22.5±1.8 days.

Pupa

Pupa was obtect and enclosed in a cell formed from a rolled leaf lined thinly with white silk. The pupa was dark brown with a powdery white bloom. The pupal period was 8±0.7 days.

The lifecycle was completed within 34.5±0.8 days. The adult longevity was about 17±1.2 days. The lifecycle of *Mocis undata* and the emergence of pupal parasitoid *Brachymeria lasus* is depicted below (Fig.1-6).

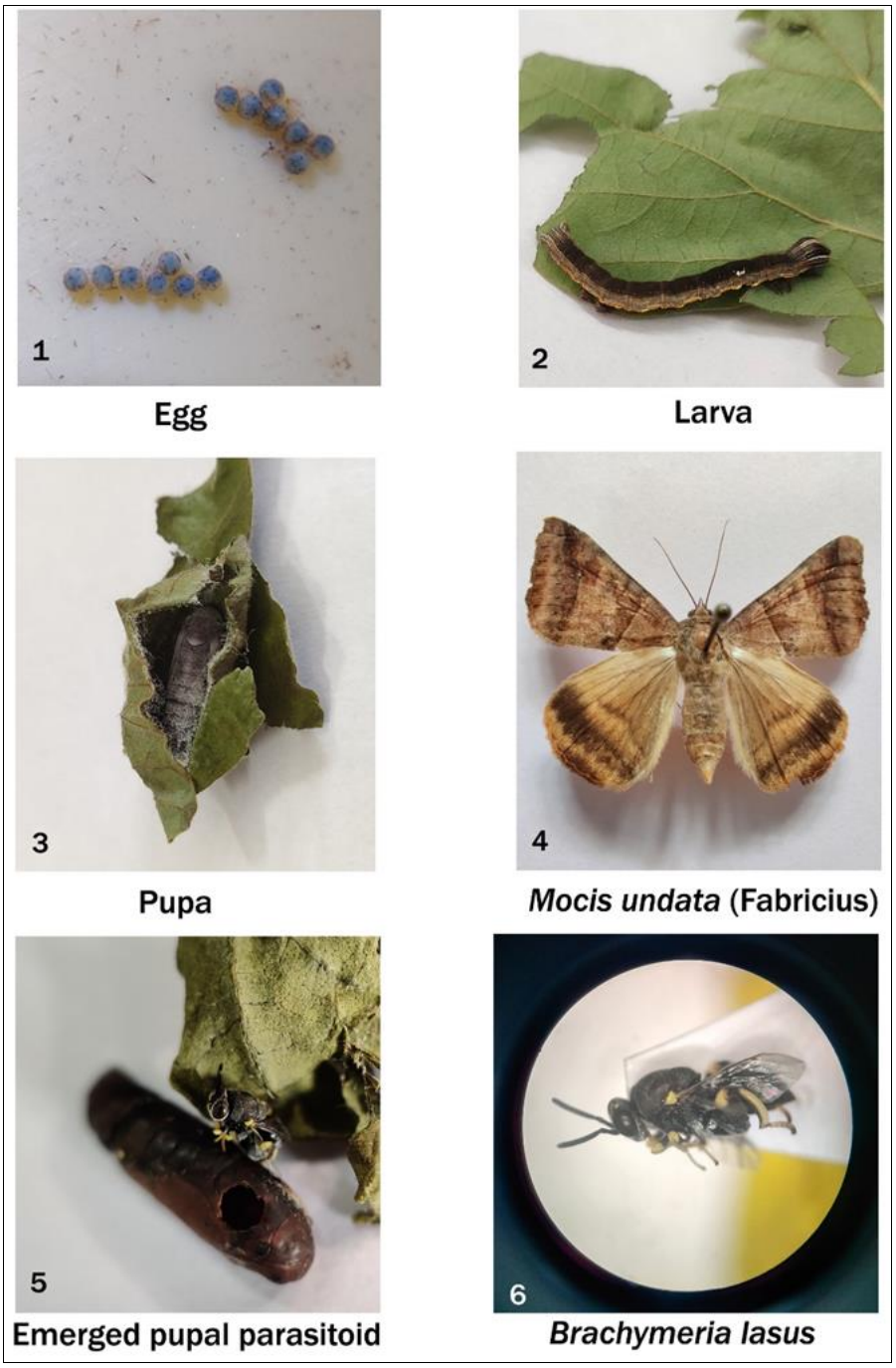

Fig 1: Parasitoid *Brachymeria iasus* (Walkar) emerging from the pupa of *Mocis undata* (Fabricius)

Conclusion

The pupal parasitoid *Brachymeria lasus* is a potential natural enemy of several Lepidopteran moth pests. It can be utilised as a biological control agent against moth pest *Mocis undata* in near future.

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References

1. Erik J. van Nieukerken, Lauri Kaila, Ian J. Kitching, Niels P. Kristensen, David C. Lees, Joël Minet, Charles Mitter, *et al*. 1758. In: Zhang, Z.-Q.(Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. Zootaxa, 3148.1, 2011, 212-221.
2. Bhamare, VK, Dhembare RD, Ingale AS, Deshmukh KV, Shelke SH. Impact of abiotic factors on population dynamics of *Thysanoplusia orichalcea* (Fabricius) and *Mocis undata* (Fabricius) infesting sole sunflower and sunflower intercropped with pigeonpea. Journal of Entomology and Zoology Studies, 7.5, 2019, 706-710.
3. Hampson G F. The Fauna of British India including Ceylon and Burma. Moths, 2, 1984, 526.
4. Holloway J D. The moths of Borneo parts 15 & 16: family Noctuidae, subfamily Catocalinae. Malay. Nat. J. 58.1, 2005, 84-86. Accessed on 13.07.2022. https://www.mothsofborneo.com/part-15-16/ophiusini/ophiusini_14_1.php.
5. Mao, Hongxin, Yasuhisa Kunimi. Effects of temperature on the development and parasitism of *Brachymeria lasus*, a pupal parasitoid of *Homona magnanima*. Entomologia experimentalis et applicata 71.1, 1994, 87-90.
6. Narendran TC and Cornelis van Achterberg. Revision of the family Chalcididae (Hymenoptera, Chalcidoidea) from Vietnam, with the description of 13 new species. ZooKeys 576: 1, 2016.
7. Ngampongsai, Aran, Bruce Barrett, Surakrai Permkam, Niramon Suthapradit and Ratchanee Nilla-or. A preliminary study on some ecological aspects of the fruit piercing moths in Songkhla Province of Southern Thailand. Songklanakarin Journal of Science and Technology 27.6, 2005,1135-1145.
8. Poole R W. Noctuidae. In Heppner J.B. (ed.): Lepidopterorum catalogus (n.s.) 118. Brill-Flora & Fauna Publ., Leiden, 1989, 1314.
9. Reza Zahiri, Ian J. Kitching, J. Donald Lafontaine, Marko Mutanen, Lauri Kaila, Jeremy D. Holloway and Niklas Wahlberg. A new molecular phylogeny offers hope for a stable family level classification of the Noctuoidea (Lepidoptera). Zoologica Scripta 40.2, 2010, 158-173.
10. Robinson, GS, Ackery PR, Kitching IJ, Beccaloni GW and Hernández LM. Host plants of the moth and butterfly caterpillars of the Oriental Region. Kuala Lumpur: Southdene and The Natural History Museum, 2001.
11. Singh, Swati, Avinash Singh Tomar and Ansar Nadaf. Seasonal incidence of major insect-pests of soybean in malwa region of Madhya Pradesh. BIOINFOLET-A Quarterly Journal of Life Sciences 10.4c, 2013, 1520-1527.
12. Singh, Navneet, Jalil Ahmad and Rahul Joshi. Diversity of moths (Lepidoptera) with new faunistic records from North East Jharkhand, India. Records of the Zoological Survey of India 117.4, 2017, 326-340.
13. Sivasankaran, Kuppusamy, Sekar Anand, Pratheesh Mathew and Savarimuthu Ignacimuthu. Checklist of the superfamily Noctuoidea (Insecta, Lepidoptera) from Tamil Nadu, Western Ghats, India. Check List 13.6, 2017, 1101.