

First Global Report on Mud-puddling by Pyraloidea from India (Insecta: Lepidoptera)

Avishek Talukdar & Soumyajit Chowdhury

Abstract

Mud-puddling though very common phenomenon in case of Rhopalocera (especially males) is not so common for Heterocera. The phenomenon was observed during one trapping night at Tippi village in Arunachal Pradesh, India. Here the authors present the first global report of Pyraloidea from India.

Keywords: Insecta, Lepidoptera, Pyraloidea, Arunachal Pradesh, Eastern Himalaya, India.

Primer informe global sobre los charcos de barro por los Pyraloidea de la India (Insecta: Lepidoptera)

Resumen

Los charcos de barro, aunque es un fenómeno muy común en el caso de los Lepidoptera (especialmente los machos), no lo es tanto en el de los Heterocera. El fenómeno se observó durante una noche de trampeo en el pueblo de Tippi en Arunachal Pradesh, India. Aquí los autores presentan el primer informe global de Pyraloidea de la India.

Palabras clave: Insecta, Lepidoptera, Pyraloidea, Arunachal Pradesh, Himalaya oriental, India.

Introduction

One of the most common behaviour documented in Lepidoptera where adults are attracted towards moist ground, perspiration, tears, excrements or animal carcasses for the purpose of sucking salts and dissolved nutrients (Adler, 1982; Adler & Pearson, 1982; Bänziger, 1973). The males usually display such behaviour as the dissolved nutrients and minerals are necessary for transferring them to their female counterpart as part of nuptial gifts (Drummond, 1984; Smedley & Eisner, 1995, 1996; Lai-Fook, 1991; Eisner & Meinwald, 1995; Boggs & Gilbert, 1979). Mudpuddling though very common in Rhopalocera, has rarely been reported in case of Heterocera. Previous records include belonging to family Notodontidae (Smedley & Eisner, 1995), Sesiidae (Volponi, 2020) and Noctuidae (Xiao et al. 2010). An Erebidae, *Hemiceratoides hieroglyphica* (Saalmüller, 1891) from Madagascar was reported by Hilgartner et al. (2007) to suck tears from sleeping bird's eyes (*Newtonia brunneicauda* (Newton, 1863) and *Copsychus albospecularis* (Eydoux & Gervais, 1835)). The current article presents first global report of mud-puddling behaviour by Pyraloidea from India.

Methodology

The unique mud-puddling behaviour by Heterocera was observed in Tippi, Arunachal Pradesh,

India (Coordinates: Lat. 27.022425, Long. 92.624201; Altitude, 233 m) on 14-IX-2022 during a month-long field visit for documentation of moth diversity in north-eastern India (Figure 1). Tippi is a small village situated on the west bank of Kameng River, adjoining the Pakke Tiger Reserve on the eastern bank of the river. The area falls under the biogeographic zone of ‘Himalayas’ under the Biogeographic Province of ‘East Himalayas (Zone 2D)’ (Rodgers & Panwar, 1988), characterized by a warm and moist tropical climate.



Figure 1. Location map of Tippi village, Arunachal Pradesh, India.

The behaviour was recorded during the nighttime (18.00 - 21.00 hrs) when the authors were returning from the light-trap site in Tippi, when several Heterocera were found puddling on a muddy patch by the side of motorable road. Moths were also recorded to gather on the freshly splashed mud patches on the vehicle surface and puddling from the same source. The entire event was videographed using mobile camera (Model: Samsung A 20) and all the images used in the article were extracted as JPEG format from the videos recorded in the mobile itself. Classification of Pyraloidea up to their “tribe” category has been followed after Nuss et al. (2003-2023).

Results

All the Heterocera recorded during the puddling event in Tippi belonged to the family Crambidae under the superfamily Pyraloidea. A total of nine moth species were identified from the event (Table 1), namely *Herpetogramma basalis* (Walker 1866), *Conogethes punctiferalis* (Guenée 1854), *Endocrossis flavibasalis* (Moore 1868), *Glyphodes stolalis* Guenée 1854, *Omiodes milvinalis* (Swinhoe 1886), *Talanga sexpunctalis* (Moore 1877), *Cnaphalocrocis trebiusalis* Walker 1859, *Cydalima laticostalis* Guenée 1854, and *Crocidolomia* sp. Five species belonged to the tribe Margaronini, two to the tribe Spilomelini, and a single species to the tribe Herpetogrammatini - all under the subfamily Spilomelinae. The subfamily Glaphyriinae was represented by a single species, *Crocidolomia* sp. All species recorded in the present event were carrying out their puddling from the mud substrate. The individual moths were found extending their proboscis, and moving the uncoiled proboscis over the mud surface scattered on the vehicle to puddle for the necessary resources (Figure 2).

Table 1. Crambidae identified while puddling from the mud patches in Tippi, Arunachal Pradesh on 14-IX-2022

Sl. No.	Species	Family	Subfamily	Tribe	Individual Number
1	<i>Herpetogramma basalis</i> (Walker, [1866])	Crambidae	Spilomelinae	Herpetogrammatini	02
2	<i>Conogethes punctiferalis</i> (Guenée, 1854)	Crambidae	Spilomelinae	Margaroniini	01
3	<i>Endocrossis flavibasalis</i> (Moore, [1868])	Crambidae	Spilomelinae	Margaroniini	01
4	<i>Glyphodes stolalis</i> Guenée, 1854	Crambidae	Spilomelinae	Margaroniini	01
5	<i>Omiodes milvinalis</i> (Swinhoe, [1886])	Crambidae	Spilomelinae	Margaroniini	01
6	<i>Talanga sexpunctalis</i> (Moore, 1877)	Crambidae	Spilomelinae	Margaroniini	02
7	<i>Cnaphalocrocis trebiusalis</i> (Walker, 1859)	Crambidae	Spilomelinae	Spilomelini	04
8	<i>Cydalima laticostalis</i> (Guenée, 1854)	Crambidae	Spilomelinae	Spilomelini	03
9	<i>Crocidolomia</i> sp.	Crambidae	Glaphyriinae	-	02

Regarding their positioning of wings during puddling, a species-specific character for moths (Adler, 1982), all crambids were observed with wings spread flat over the substrate, with vigorous shaking of their antennae from side to side and continuously probing their proboscis over the mud patch. In terms of their activity, most individuals were found to remain stationary while feeding from their substrates and even when disturbed by neighbouring individuals for sharing the mud patches, except for *Cnaphalocrocis medinalis* (Guenée, 1854) and *Crocidolomia* sp. which showed unrest during the period of observation, with intermittent flights in search of best substrate or disturbed by some other moths. However, *Endocrossis flavibasalis* immediately extended its proboscis just at the moment of landing on or near the preferred substrate. All individuals seemed unaffected by the light or proximity of the observers.

Discussion

Pyraloidea show diverse host preferences with unique behavioural tendencies. Their larvae in particular are major pests of important crops like sugarcane, corn, rice etc. and stored products such as

seeds and grains (Clausen, 1978; Solis, 1997); with some living concealed in silken webs, within rolled leaves, boring inside stem, root, shoot or galls (Solis, 2007), while some others are scavengers, myrmecophilous and even insectivores (Munroe, 1972; Gumhalter, 2022). The feeding behaviour of adult Pyraloidea is not well-known but can be assumed to effectively feed from an aqueous environment. Bänziger (1973) reported Lachryphagy (feeding on tears and other salt-containing liquids) in Pyraustinae and Spilomelinae.

Taking salts and other nutritional benefits from mud substrate through mudpuddling is commonly reported in Rhopalocera. Alternatively, reports on mudpuddling by Heterocera are very rare may be due to the fact that they are mostly nocturnal and hence not encountered in the wild at night. Moreover, night-flying Lepidoptera avoid the intense competition for essential salt components in soil with day-flying Lepidoptera through such temporal partitioning of resources. The present report on such evidence of nocturnal mudpuddling among some Pyraloidea illustrates the resource utilisation through temporal shift in their feeding behaviour.

References

- Adler, P. H. (1982). Soil-and puddle-visiting habits of moths. *Journal of the Lepidopterists' Society*, 36, 161-173.
- Adler, P. H., & Pearson, D. L. (1982). Why do male butterflies visit mud puddles? *Canadian Journal of Zoology*, 60(3), 322-325. <https://doi.org/10.1139/z82-043>
- Bänziger, H. (1973). Biologie der lachryphagen Lepidopteren in Thailand and Malaysia. *Revue suisse de zoologie*, 79(4), 1381-1469. <https://doi.org/10.5962/bhl.part.97166>
- Boggs, C. L., & Gilbert, L. E. (1979). Male contribution to egg production in butterflies: evidence for transfer of nutrients at mating. *Science*, 206(4414), 83-84. <https://doi.org/10.1126/science.206.4414.83>
- Clausen, C. P. (1978). *Introduced parasites and predators of arthropods pests and weeds: A World Review*. Agriculture Research Service, U. S. Dept. of Agriculture.
- Drummond, B. A. (1984). Multiple mating and sperm competition in the Lepidoptera. In R. L. Smith. *Sperm competition and the evolution of animal mating systems* (pp. 291-396). Academic Press. <https://doi.org/10.1016/B978-0-12-652570-0.50016-6>
- Eisner, T., & Meinwald, J. (1995). The chemistry of sexual selection. *Proceedings of the National Academy of Sciences*, 92(1), 50-55. <https://doi.org/10.1073/pnas.92.1.50> PMID:7816847 PMCid:PMC42815
- Gumhalter, D. (2022). New distribution records of *Aglossa signicostalis* (Lepidoptera: Pyralidae) in Europe: a new species for the fauna of Croatia. *Phegea*, 50(2), 59-63. <https://doi.org/10.57065/shilap.48>
- Hilgartner, R., Raoilison, M., Büttiker, W., Lees, D. C., & Krenn, H. W. (2007). Malagasy birds as hosts for eye-frequenting moths. *Biology Letters*, 3(2), 117-120. <https://doi.org/10.1098/rsbl.2006.0581> PMID:17251126 PMCid:PMC2375961
- Lai-Fook, J. (1991). Absorption of phosphorus from the spermatophore through the cuticle of the bursa copulatrix of the butterfly, *Calpodex ethlius*. *Tissue and Cell*, 23(2), 247-259. [https://doi.org/10.1016/0040-8166\(91\)90079-9](https://doi.org/10.1016/0040-8166(91)90079-9) PMID:18621160
- Munroe, E. (1972). Pyraloidea. Pyralidae (in part). In R. B. Dominick, D. C. Ferguson, J. G. Franclemont, R. W. Hodges & E. G. Munroe. *The Moths of America North of Mexico* (Fasc. 13.1B, pp. 137-250). E. W. Classey Ltd and the Wedge Entomological Research Foundation.
- Nuss, M., Landry, B., Mally, R., Vegliante, F., Tränkner, A., Bauer, F., Hayden, J., Segerer, A., Schouten, R., Li, H., Trofimova, T., Solis, M. A., De Prins, J., & Speidel, W. (2003-2023). *Global Information System on Pyraloidea*. <http://www.pyraloidea.org>
- Rodgers, W. A., & Panwar, H. S. (1988). *Planning a wildlife protected area network in India (Vol. 1): The Report*. Wildlife Institute of India.
- Skowron Volponi, M. (2020). A vivid orange new genus and species of Braconid-mimicking clearwing moth (Lepidoptera: Sesiidae) found puddling on Plecoptera exuviae. *Insects*, 11(7), 425. <https://doi.org/10.3390/insects11070425> PMID:32659949 PMCid:PMC7411731
- Smedley, S. R., & Eisner, T. (1995). Sodium uptake by puddling in a moth. *Science*, 270(5243), 1816-1818. <https://doi.org/10.1126/science.270.5243.1816> PMID:8525374
- Smedley, S. R., & Eisner, T. (1996). Sodium: a male moth's gift to its offspring. *Proceedings of the National*

Academy of Sciences, 93(2), 809-813. <https://doi.org/10.1073/pnas.93.2.809> PMID:11607627
PMCID:PMC40138

- Solis, M. (2007). Phylogenetic studies and modern classification of the Pyraloidea (Lepidoptera). *Revista Colombiana de Entomología*, 33(1), 1-8. <https://doi.org/10.25100/socolen.v33i1.9306>
- Solis, M. A. (1997). Snout moths: Unraveling the taxonomic diversity of a speciose group in the Neotropics. (pp. 231-242). In M. L. Reaka-Kudla, D. Wilson & E. O. Wilson. *Biodiversity II: Understanding and Protecting our Biological Resources*. Joseph Henry Press.
- Xiao, K., Shen, K., Zhong, J. F., & Li, G. Q. (2010). Effects of dietary sodium on performance, flight and compensation strategies in the cotton bollworm, *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae). *Frontiers in Zoology*, 7, 1-8. <https://doi.org/10.1186/1742-9994-7-11> PMID:20385025 PMCID:PMC2859862

*Avishek Talukdar
Lepidoptera Section
Zoological Survey of India
Department of Zoology
University of Calcutta
Kolkata
INDIA / INDIA
E-mail: askdar94@gmail.com
<https://orcid.org/0000-0002-4808-2901>

Soumyajit Chowdhury
Department of Zoology
MUC Women's College
Burdwan, West Bengal
INDIA / INDIA
E-mail: wildlifesc@gmail.com
<https://orcid.org/0000-0003-0940-9809>

*Autor para la correspondencia / *Corresponding author*

(Recibido para la publicación / *Received for publication* 9-V-2023)

(Revisado y aceptado / *Revised and accepted* 20-VIII-2023)

(Publicado / *Published* 30-VI-2024)

Derechos de autor: El autor(es). Este es un artículo de acceso abierto distribuido bajo los términos de la Licencia de Reconocimiento 4.0 Internacional de Creative Commons (CC BY 4.0), que permite el uso, distribución y reproducción sin restricciones en cualquier medio, siempre que se cite al autor original y la fuente. / **Copyright:** The author(s). This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

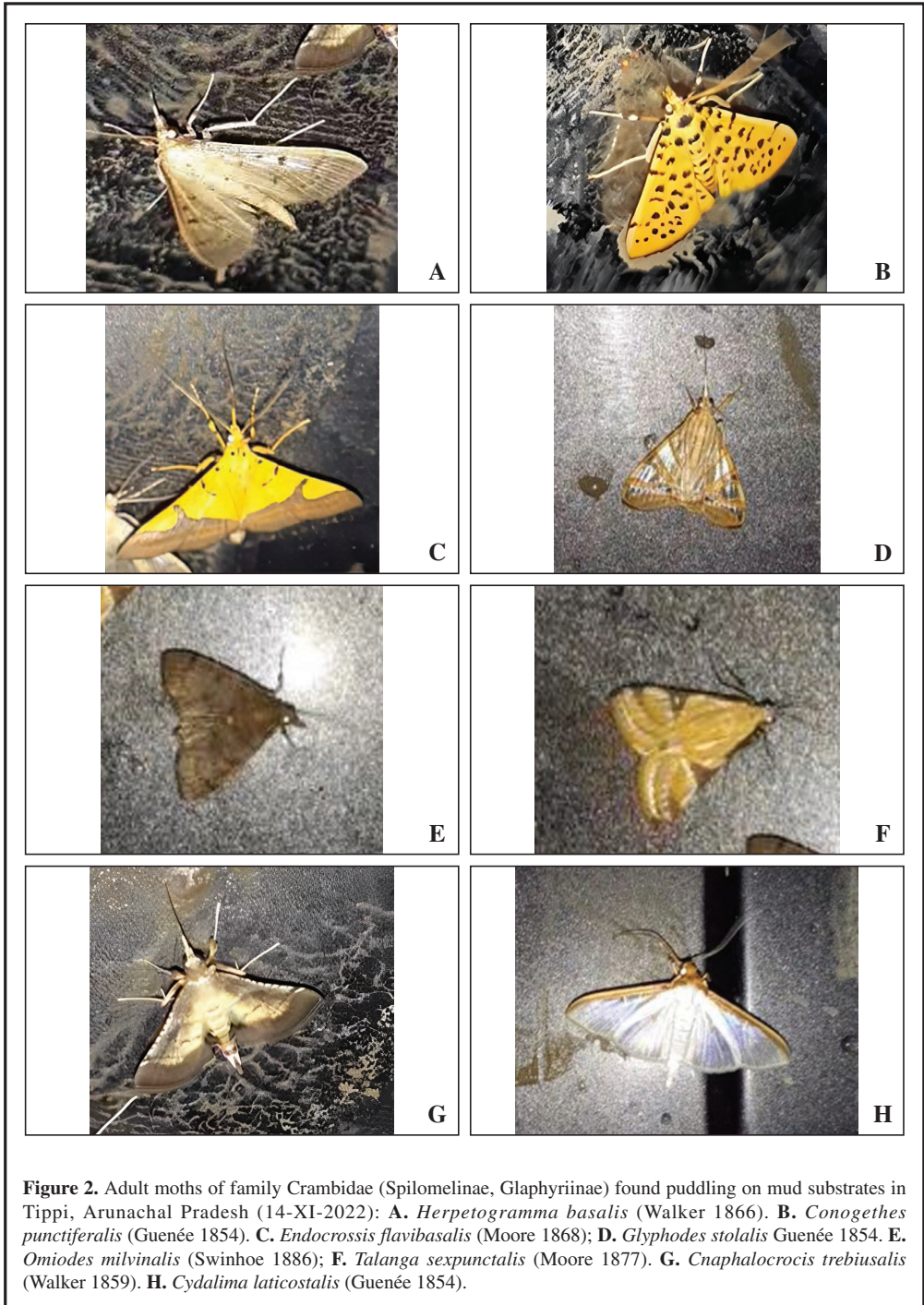


Figure 2. Adult moths of family Crambidae (Spilomelinae, Glaphyriinae) found puddling on mud substrates in Tippi, Arunachal Pradesh (14-XI-2022): **A.** *Herpetogramma basalis* (Walker 1866). **B.** *Conogethes punctiferalis* (Guenée 1854). **C.** *Endocrossis flavibasalis* (Moore 1868); **D.** *Glyphodes stolalis* Guenée 1854. **E.** *Omiodes milvinalis* (Swinhoe 1886); **F.** *Talanga sexpunctalis* (Moore 1877). **G.** *Cnaphalocrocis trebiasalis* (Walker 1859). **H.** *Cydalima laticostalis* (Guenée 1854).



Available in:

<https://www.redalyc.org/articulo.oa?id=45579522022>

How to cite

Complete issue

More information about this article

Journal's webpage in redalyc.org

Scientific Information System Redalyc
Diamond Open Access scientific journal network
Non-commercial open infrastructure owned by academia

Avishek Talukdar, Soumyajit Chowdhury

First Global Report on Mud-puddling by Pyraloidea from India (Insecta: Lepidoptera)

Primer informe global sobre los charcos de barro por los Pyraloidea de la India (Insecta: Lepidoptera)

Shilap Revista de Lepidopterología

vol. 52, no. 206, p. 349 - 354, 2024

Sociedad Hispano-Luso-Americana de Lepidopterología,

ISSN: 0300-5267

ISSN-E: 2340-4078

DOI: <https://doi.org/10.57065/shilap.914>