

New larval host plant records of Common Onyx *Horaga onyx onyx* (Moore, 1858) (Insecta: Lepidoptera: Lycaenidae) from Himachal Pradesh, India

Новые данные о кормовых растениях гусениц голубянки *Horaga onyx onyx* (Moore, 1858) (Insecta: Lepidoptera: Lycaenidae) в штате Химачал Прадеш Индии

N. Mujumdar*, V. Patel*, J. Coutinho**, P. Sathiyaselvam*
Н. Муджумдар*, В. Патель*, Дж. Коутиньо*, П. Сатьясельвам*

* Bombay Natural History Society, Hornbill House, Opposite Lion Gate, Shaheed Bhagat Singh Road, Colaba, Mumbai, Maharashtra 400001 India. E-mail: n.mujumdar@bnhs.org.

* Естественно-историческое общество Бомбея, Хорнбил Хаус напротив Лайон Гейтс, Мумбай, Махараштра 4000001 Индия.

** Hillview Towers, Suryanagar, Vikhroli, Mumbai 400083 India.

** Хиллвью Тауэрс, Сурьянагар, Мумбай, Вихроли 4000083 Индия.

Key words: *Horaga onyx*, new host plant, Lepidoptera, Himachal Pradesh.

Ключевые слова: *Horaga onyx*, новое кормовое растение, Lepidoptera, Химачал Прадеш, Индия.

Abstract. Observations on different life stages of *Horaga onyx onyx* (Moore, 1858) are recorded on *Litchi chinensis* Sonn. and on *Vachellia nilotica* (L.) P.J.H. Hurter & Mabb. from low elevation areas in Kangra, Himachal Pradesh. *L. chinensis* Sonn. is recorded as a new larval host plant and *V. nilotica* (L.) P.J.H. Hurter & Mabb as a potential larval host plant larva; host plant of the butterfly. These observations can be used as baseline information to study potential host plants, behaviour and seasonality of this butterfly.

Резюме. Впервые отмечено развитие разных стадий гусениц *Horaga onyx* (Moore, 1858) на личи *Litchi chinensis* Sonn. и вачеллии нильской *Vachellia nilotica* (L.) P.J.H. Hurter & Mabb. в низкогорьях района Кангра в индийском штате Химачал Прадеш. *L. chinensis* Sonn. приводится как новое кормовое растение, а *V. nilotica* (L.) P.J.H. Hurter & Mabb — как потенциально возможное для развития гусениц голубянки. Представленные данные могут быть использованы в качестве исходной информации для последующего изучения потенциальных кормовых растений и сезонной активности бабочки.

Introduction

Larval host plants impact survival, growth, distribution, and other ecological traits of insects such as flight and dispersal ability [Knops et al., 1999; Pocius et al., 2022]. In India, studies have documented larval host plants of butterflies from a long time [Davidson, Aitken, 1890; Wynter-Blyth, 1957] but still some species, especially from the Himalayan region, lacked information on the same, hence there has been an increase in similar studies in recent times [Karmarkar et al., 2018].

HORAGA ONYX (MOORE, 1858)

Tribe Horagini Eliot, 1973 is represented by two genera, viz. *Horaga* Moore, 1881 and *Rathinda* Moore, 1881. Within the genus *Horaga* Moore, four species are recorded in India, namely *H. albimacula* (Wood-Mason et de Niceville, 1881), *H. onyx* (Moore, 1858), *H. syrinx* (C. Felder, 1860), and *H. viola* Moore, 1882. *H. onyx* (Moore), commonly known as Common Onyx, is hitherto represented by three subspecies with their current distributions as following: *H. onyx cingalensis* Moore, 1884 (Maharashtra to Kerala); *H. onyx onyx* (Moore, 1858), (Himachal Pradesh to north-east India); and *H. onyx rana* de Niceville, 1889 (Andaman and Nicobar Islands). No subspecies is recorded under *H. viola* Moore, Brown Onyx, spanning distribution in southern India, and from Himachal Pradesh to north-east India [Cotton et al., 2015]. The species *H. onyx* (Moore) is uncommon and prefers forest habitat up to 2000 m frequently occupying the tree canopy [Kehimkar, 2016; Sondhi, Kunte, 2018].

Horaga spp. use a variety of larval host plants belonging to different families, viz. Anacardiaceae, Bombacaceae, Coriariaceae, and Euphorbiaceae in the oriental region [Robinson et al., 2023]. In India, the species *H. onyx* (Moore) and *H. viola* Moore are reported to breed on *Coriaria nepalensis* Wall. in the Himalayas according to previous studies [MacKinnon, de Nicéville, 1898; Wynter-Blyth, 1957]. Recently, Singh et al. [2019] reported *Quercus leucotrichophora* A. Camus (family Fagaceae) as a host plant of *H. onyx onyx* (Moore) from western Himalayas where the instars were bred on leaves in the laboratory; Nitin et al. [2018] added *Mangifera indica* L. as larval host plant of *H. onyx cingalensis* Moore and *H. viola* Moore; while Kasambe [2016] suggested

Crassocephalum crepioides (Benth.) S. Moore, 1912 (family Asteraceae) as a possible host plant of *H. onyx* (Moore) from the southern Western Ghats. The very first record of egg-laying by *H. onyx cingalensis* Moore was recorded on *Macaranga indica* Wight (family Euphorbiaceae) by Herath et al. [2020] from Sri Lanka. In this study, we present our observations of different life stages of *H. onyx onyx* (Moore) on *Litchi chinensis* Sonn. and *Vachellia nilotica* (L.) P.J.H. Hurter et Mabb. and record *L. chinensis* Sonn. as its new larval host plant.

LITCHI CHINENSIS SONN.

Litchi chinensis Sonn., commonly known as Litchi or Lychee, is an evergreen tree belonging to the family Sapindaceae. It is originally distributed from South China to peninsular Malaysia, Borneo, Philippines [POWO, 2023a; WFO, 2023a]. Apart from its native range, it is widely cultivated in south and south-east Asia as an important fruit crop. In India, it is majorly cultivated in the northern states for commercial purposes including Kangra district of Himachal Pradesh [Kumar et al., 2017]. The tree has round dense canopy bearing compound leaves with alternate leaflets. The young leaflets are smooth, shiny, reddish, or light green in colour which turn dark green and somewhat leathery as mature (Fig. 1).

BABOOL VACHELLIA NILOTICA (L.) P. J. H. HURTER ET MABB.

Vachellia nilotica (L.) P.J.H. Hurter et Mabb., formerly *Acacia nilotica* L., commonly known as Babool, is a medium to large tree of family Fabaceae native to the dry parts of Africa, Arabian Peninsula, Indian Subcontinent to Myanmar [POWO, 2023b; WFO, 2023b]. It is commonly found in drier parts of India and cultivated sometimes for its wood. It has greyish-brownish bark and bipinnately compound leaves with tiny leaflets with a pair of thorns at the base (Fig. 7).

Materials and Methods

Opportunistic observations were taken during the documentation of insect diversity around Pong dam lake wildlife sanctuary, Kangra district, Himachal Pradesh under a project studying Himalayan wetlands from November 2022 to February 2023. Pong dam reservoir is situated at the foothills of the Dhauladhar mountain ranges on Beas river at an elevation of 436 m a.s.l. The mixed deciduous and Himalayan subtropical pine forests surrounding the reservoir support a variety of insects. Observations on *L. chinensis* Sonn. were taken

at Bombay Natural History Society (BNHS) field station in Saknara, Nagrota surian (32°3.12' N, 76°4.56' E) surrounded by cultivated, ornamental plants and agricultural fields, whereas those on *V. nilotica* were recorded in Bhatoli Phakoriyan (31°57.96' N, 76°8.04' E) having deciduous, scrub vegetation and grasses along the dam. All life stages were observed on the host plants itself. Observations were taken intermittently using Nikon B600 and Nikon P900 digital cameras whenever possible considering a fixed insect survey schedule around the dam. No caterpillar was reared as the species was legally protected under schedule II of WPA, 1972 then.

Abbreviations used in the text: A.M. — Ante Meridiem, P.M. — Post Meridiem.

The present work is registered in ZooBank (www.zoobank.org) under LSID urn:lsid:zoobank.org:pub:2F978C38-6EDD-4F5E-AAD7-CB273B-B581AC.

Results

OBSERVATIONS ON LITCHI CHINENSIS SONN.

On November 21st 2022, we observed a *Horaga* sp. butterfly fluttering continuously near the canopy of a Litchi tree around 2 P.M. On closer observation, it was seen that the butterfly settled and curled its abdomen on one of the young leaf buds. The butterfly was identified as *H. onyx* (Moore) based on the broad diffused white discal band on the ferruginous-brown underside of fore and hind wing (Fig. 2). A round golf ball-shaped white coloured egg was seen on the bud (Fig. 3). After laying the egg, the butterfly flew away and perched with wings partly open for basking in the sunlit area of a nearby tree. On further observation, a small caterpillar, probably a third instar, was found at the base of young leaflets. The eggs were laid on or near the tender leaflets or at the base of young leaves similar to the description as in Bhakare, Ogale [2018] for *H. onyx cingalensis* Moore. A few more singly laid eggs were seen on the tender leaf buds and leaf stalks.

Alternate activities of egg-laying and basking were recorded around 3 P.M. on the same tree the following day. Upon searching around young leaves and leaf buds for the presence of other life stages, two caterpillars were found. One was very tiny (≈ 2 mm; Fig. 4), probably first instar, while the other was bigger (≈ 7 mm; Fig. 5), probably a third instar. The smaller caterpillar was hairy, pale coloured. It rested on the middle vein on the upper surface of the leaflet. The bigger instar was also hairy, pale greenish with reddish-brown spots on the mid-dorsal part of the body, a pattern very similar to the green mid-rib with red dots on the ventral side of the young

Figs 1–6. Observations of *H. onyx onyx* (Moore) life stages on *Litchi chinensis* Sonn. in India: Plant habit (1) and *H. onyx onyx* (Moore) (2–6). 2 — female laying eggs on leaf buds; 3 — egg; 4 — first instar larva; 5 — third instar larva; 6 — fourth instar larva. Photo by N. Mujumdar (Figs 1–3) and J. Coutinho (Figs 4–6).

Рис. 1–6. Развитие разных стадий гусениц *H. onyx onyx* (Moore) на *Litchi chinensis* Sonn. в Индии: внешний вид растения (1) и стадии развития *H. onyx onyx* (Moore) (2–6). 2 — самка, откладывающая яйца на лист растения; 3 — яйцо; 4 — гусеница первой стадии развития; 5 — гусеница третьей стадии развития; 6 — гусеница четвертой стадии развития. Фото Н. Муджумдар (рис. 1–3) и Дж. Коутиньо (рис. 4–6).



leaflets. Both instars were camouflaged very well with the surroundings and hence difficult to locate. Bigger instar was seen feeding on the superficial layer of leaflet creating small holes with veins still visible. At least two females were seen laying eggs on the buds and leaflets. The female laid eggs while intermittently basking in the sun with open wings for a few minutes. Multiple single eggs were seen on leaf buds, some of them were hatched and eaten. We counted at least 33 eggs on the tree. No pupa was observed. During late December 2022 and early January 2023, we observed instars of first, second, third and fourth stage (Fig. 6) feeding on soft leaflets. Second instar was ≈ 4 mm, whitish in colour, while the fourth instar was ≈ 11 mm in size, greenish-brownish in colour with 11 tentacular processes.

During February 2023, the tree was blooming with terminal inflorescences bearing several small floral buds. No adult *H. onyx* (Moore) was seen near the tree. Few white round eggs were seen at the base of the inflorescences but we did not see any female *H. onyx* (Moore) around. In a single incidence on 23rd February, a female *Rapala* sp., Himalayan Red Flash, was seen curling its abdomen on the flower buds, but we could not confirm the presence of egg as the inflorescence was inaccessible. We state the identification as *Rapala* cf. *selira* (Moore, 1874) based on the key, orange band along UPH outer edge, rest of the area brown as observed [Kehimkar, 2016] but the identification remains unconfirmed as the species is known to inhabit above 1000 m.

OBSERVATIONS ON *VACHELLIA NILOTICA* (L.)

P. J. H. HURTER ET MABB.

During the opportunistic surveys in February 2023, first author witnessed three life stages of *H. onyx* (Moore) on *V. indica* (L.) P. J. H. Hurter & Mabb. around 11.30 A.M. There was a single greenish-brown caterpillar on the stem, probably the fifth instar (≈ 13 mm) having 11 brownish tentacular processes (Fig. 8). Author counted at least 35 pupae including empty (Fig. 9) and the ones which were still green attached by the tail end to the stalk of the tree, hanging freely (Fig. 10) and some were attached to the dried leaf mass (Fig. 11). A single adult was resting on the stem among leaves (Fig. 12). It might have been either freshly eclosed or a female having eggs as seen from the swollen abdomen. Not a single egg was seen after searching for almost an hour. We did not find another *V. nilotica* (L.) P. J. H. Hurter & Mabb. individual in the immediate vicinity.

Discussion

Our observations provide sufficient evidence for *L. chinensis* Sonn. as a new larval host plant record

for *H. onyx* (Moore) butterfly. We recorded multiple egg-laying events and feeding of different stages of instars on the plant though pupa was not observed. We could have recorded the pupa if the larvae were reared which was not possible in our case. Present observation establishes additional new larval host plant record from Himalayan biogeographic zone after Singh et al. [2019], suggesting polyphagous nature of *H. onyx onyx* (Moore) in India. The larvae showed excellent camouflage within the foliage on the Litchi tree. Smaller larvae showed resemblance with the dotted stem pattern while the latter stages could be mistaken as the twisted and damaged leaflets. The larvae were seen feeding on leaves only and no other plant part. Although there was little damage to the foliage, our observations do not support any potential threat to this important fruit crop. Further detailed studies can confirm so or otherwise. As for the records on *V. nilotica* (L.) P. J. H. Hurter & Mabb., we could not establish it as a new host plant due to dearth of observations like egg-laying and feeding of larvae on plant parts, which further studies can confirm. Nevertheless, we note the plant as a potential new record of host from the said observations. It would be noteworthy to check how larvae use camouflage within the leaves of this plant or any protection gained because of paired spines etc.

Our observations can be used as a baseline to study the complete life cycle of *H. onyx onyx* (Moore) and its voltinism, i.e., number of generations in a year in the Himalayas, and could be compared with the subspecies across India. Unlike the habitat noted in the literature [Kehimkar, 2016; Bhakare, Ogale 2018; Sondhi, Kunte, 2018] that it is a forest species, we observed it on the plains near human settlements possibly due to cultivation of its larval host plant. It is also suggested that *L. chinensis* Sonn. should be checked to confirm as a larval host plant of *Rapala* sp.

Acknowledgements

We would like to thank the Ministry of Environment, Forest and Climate Change (MoEFCC) for funding the project 'Conservation and Wise Use of Five Wetlands in three Himalayan States to secure Habitats of Birds Migrating within the Central Asian Flyway' under National Mission on Himalayan Studies (NMHS) under which this work was completed. We thank Mr. Kireet Kumar, Nodal Officer, NMHS PMU for his constant support. We are grateful to the forest department of Himachal Pradesh for providing necessary permissions and support to carry out the project. We are thankful to Mr. Reginald Royston, DFO Hamirpur for his support. We thank our colleagues and support staff for the help and support during the project. We are thankful to the then director of BNHS Dr Bivash Pandav for his continued support and encouragement.

Figs 7–12. Observations of *H. onyx onyx* (Moore) life stages on *Vachellia nilotica* (L.) P.J.H. Hurter et Mabb. in India: Plant habit (7) and *H. onyx onyx* (Moore) (8–12). 8 — fifth instar larva; 9 — free-hanging green live pupa; 10 — empty pupa; 11 — live pupa attached to dry leaf mass; 12 — adult butterfly. Photo by N. Mujumdar.

Figs 7–12. Развитие разных стадий голубянки *H. onyx onyx* (Moore) на *Vachellia nilotica* (L.) P. J. H. Hurter & Mabb. в Индии: внешний вид растения (7) и стадии развития *H. onyx onyx* (Moore) (8–12). 8 — гусеница пятой стадии развития; 9 — свободно-висящая зелёная куколка; 10 — пустая куколка; 11 — живая куколка, прикрепленная к сухим листьям; 12 — взрослая бабочка. Фото Н. Муджумдар.



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Поступила в редакцию 28.10. 2023