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SHORT COMMUNICATION

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SHORT COMMUNICATION

Descriptions of the early stages of *Vagrans egista sinha* (Lepidoptera: Nymphalidae) with notes on its host plant *Xylosma longifolia* Clos from the western Himalaya of India

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Abstract: Distribution, life history stages, and status of *Vagrans egista sinha* (Kollar, 1844) in western Himalaya are presented. It is for the first time that this butterfly is reported on X*ylosma longifolia* Clos from Dehradun, Uttarakhand (India).

Keywords: Life cycles, Vagrant butterfly, *Xylosma longifolia*

Vagrans egista (Cramer, 1780) (Lepidoptera: Nymphalidae) belonging to the monotypic genus *Vagrans* Hemming, 1934, is distributed from India to the South Pacific Islands (D'Abrera 1985; Corbet & Pendlebury 1992). The subspecies found in India, identified as *Vagrans egista sinha* (Kollar, 1844), is distributed from Uttarakhand to the eastern Himalaya, northeastern India, West Bengal, Odisha, and Assam (Bingham 1905; Evans 1932; Wynter-Blyth 1957; Sondhi & Kunte 2018). In the western Himalaya, *V. egista sinha* is known to be fairly common in the Garhwal part (Singh & Sondhi 2016). Recently, it has been found distributed westward and southward as far as Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, and Chhattisgarh (Kirti et al. 2016; Sisodia & Naidu 2019; Gokhale 2020; Kumar et al. 2020). It measures 64–70 mm in wing expanse; has tawny wings with characteristic brownish-black markings; forewing shaded with dusky brown near the base, costa, apex and outer margin while hindwing at the base, apex and outer margin; dull-yellow lunules border the outer margins of both wings and a short tail on the hindwing (Bingham 1905).

The early stages of *V. egista sinha* have been illustrated in part from Hong Kong and Malaysia (Johnston & Johnston 1980; Igarashi & Fukuda 1997; Bascombe et al. 1999), although these descriptions do not contain full details of its 1st and 5th instars. The immature stages *V. egista sinha* are reported to feed on *Dillenia* sp. (Dilleniaceae), *Flacourtia* sp., *Homalium* sp., *Xylosma* sp. (all Salicaceae) and *Maytenus* sp. (Celastraceae) (Johnston & Johnston 1980; Igarashi & Fukuda 1997; Bascombe et al. 1999; Vane-Wright & de Jong 2003; Robinson et al. 2010) although there are no specific reports on the early stages or the larval host plants of *V. egista sinha* in India. The early stages of *Vagrans egista propinqua* (Miskin, 1884) are briefly described from Australia (Orr & Kitching 2010; Sankowsky 2020), where it is known to lay eggs mostly on unoccupied spider webs, dead twigs, or dead leaves on and beneath a host

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plant, but not on the fresh foliage (Sankowsky 2014). Although *V. egista sinha* is a fairly common butterfly in its range of distribution, there is a paucity of information pertaining to the early stages and natural history of this subspecies from India. In this paper, attempts have been made to describe all the life history stages of *V. egista sinha* supplemented with images.

Materials and Methods

The eggs were field collected along with the leaves and reared in a closed container at room temperature (25–30 °C). Every day fresh leaves from the host plant were provided to the caterpillars. The larval frass and old remnants of leaves were taken out daily to keep the container clean. The egg, various instars, pupa, and freshly enclosed butterfly were photographed using a DSLR camera and macro lens. Natural history observations were also noted during butterfly watching in Dehradun, Uttarakhand, India.

Results and Observations

Field observations of butterfly behaviour: This butterfly is common in the Wildlife Institute of India Dehradun campus and the entire Dehradun valley. It is generally found to fly fast in open areas along trails, in gardens and forest edges visiting flowers of *Lantana camara* L. It is quite active rarely found resting except when feeding on flower nectar, bird droppings, and moist soil. Observations on the biology of this butterfly are given below.

Oviposition: The butterfly was observed laying eggs on the tender leaves of the host plant *Xylosma longifolia* Clos (Image 1) around the pond in a Sal *Shorea robusta* Gaertn. forest on the Wildlife Institute of India campus on 13 October 2019 at 1155 h (30.2862° N, 77.9744° E; 595 m above mean sea level). *X. longifolia* is an evergreen thorny tree when young; bark is grey-brown; leaves are simple, alternate and glabracent, and the margins are serrated. The eggs were laid singly on the tender leaves.

Eggs: The eggs were pale yellow in colour, dome shaped, and flat at the micropylar end, diameter 0.7–0.8 mm (Image 2). The surface of the eggs was marked with small numerous pits which are somewhat hexagonal around the micropyle and rectangular below.

Emergence of caterpillar: The young caterpillar emerged by eating away part of the eggshell at the micropylar end. This empty eggshell then became the first meal of the newly hatched caterpillar.

1st instar caterpillar: The 1st instar was 2–3 mm in length, pale yellow in colour covered in numerous fine-grey-coloured hairlike bristles (setae) emerging from tubercles over the entire body (Image 3). The thoracic and last abdominal segments turned grey as the caterpillar grew. The head capsule was brown in colour. The caterpillars fed along the margins of the tender leaves, which are typically reddish brown in colour.

2nd instar caterpillar: After moulting, the caterpillar became 4–5 mm long (Image 4a,b). The head capsule was pale yellow in colour with two black spots in the front. The thoracic and abdominal segments were grey except the last few abdominal segments which were reddish in colour. The tubercles were enlarged at the base of the setae and gave rise to three rows of branched processes on each side of the body: one dorso-laterally, one super-spiracularly and one that runs sub-spiracularly. The central axis of these processes was translucent grey in colour with 10–12 small black coloured projections attached at the nodes. A prominent white line runs between the super-spiracular and sub-spiracular processes on both sides.

3rd instar caterpillar: The caterpillar reached a length of 8–10 mm (Image 5). The head capsule and last 1-2 abdominal segments were yellow in colour while other body segments were brown. The dorso-lateral and super-spiracular processes were black in colour while the sub-spiracular process was translucent grey in colour. The processes were branched with 20–22 small black coloured projections at the nodes. The white line became much broader than in the 2nd instar.

4th instar caterpillar: The caterpillar was 18–20 mm in length (Image 6a,b,c). The head capsule was yellow in colour and the last few abdominal segments were pale brown in colour. The processes were longer than in the 3rd instar and much branched. The sub-spiracular processes turned black in colour. The appearance of small white spots was seen over the caterpillar's entire body.

5th instar caterpillar: The 5th instar was similar to the 4th instar but 30–32 mm in length (Image 7a,b) with only the white spots becoming more prominent. All body segments were brown in colour. In the late stage of the 5th instar, the body turned pale green in colour. The tubercles giving rise to the processes were sky blue in colour.

Prepupa: The caterpillar slowly stopped feeding and started wandering around. The length of caterpillar reduced to 25 mm (Image 8a,b). It then stopped on a twig of the host plant kept in the container where it started spinning a silk pad to hang vertically. The immobile prepupa suspended itself upside down from a silk pad. Caterpillars were also seen several times later in the field to pupate on nearby Sal trees.

Pupa: The pupa was 25 mm in length; pale green

Image 1—Female laying eggs on *Xylosma longifolia*. © M.A. Yathumon | Image 2–6—Early stages of *Vagrans egista sinha*: 2—Egg | 3—1st instar caterpillar | 4(a–b)—2nd instar caterpillar | 5—3rd instar caterpillar | 6(a–c)—4th instar caterpillar. © Pranav Gokhale.

in colour with five pairs of red, black-tipped processes running dorso-laterally (Image 9a,b). The second pair of processes from the anterior end was reduced. The base of each process was silver and sky blue coloured. In the late stage, the pupa turned orange in colour, and one day before eclosion (Image 11), the pupal skin turned translucent and the forewing of the pharate butterfly became visible (Image 10a,b).

Conclusion

This paper reports all the early stages of *V. e. sinha* from Dehradun, India. Most of the available published literature on this subspecies' larval host plants traces back to the original work done outside India (Corbet & Pendlebury 1992; Vane-Wright & de Jong 2003; Smetacek 2012; Kirti et al. 2016). The firm evidence of this subspecies using *Xylosma longifolia* as a local host plant in Dehradun, Uttarakhand has been reported in this paper. More work is needed to explore plants from the same or related families to know more about the

Image 7–11—Early stages of Vagrans egista Sinha | 7(a–b)—Early 5th instar caterpillar | 8(a–b)—Prepupa caterpillar | 9(a–b)—Pupa | 10(a–b)—Pupa before eclosion | 11—Eclosed butterfly drying its wings. © Pranav Gokhale.

caterpillars' food preferences. Unlike *V. e. propinqua* from Australia, *V. e. sinha* does not lay eggs on spider webs or off a host plant, but rather uses tender leaves of the host plant. The difference in the egg-laying behaviour (Sankowsky 2014) as well as the morphology of the early stages (Orr & Kitching 2010; Sankowsky 2020) highlights the variation/disparity between these subspecies. The study of a butterfly's juvenile biology across its full distribution range is essential in understanding the current scientific placement of the species.

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