An observation of *Neptis hylas* (Linnaeus, 1758) from Mithi Virdi, Gujarat: record from the western India and future range prospects

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Abstract

This study presents a report of the occurrence of *Neptis hylas* (Linnaeus, 1758) in Bhavnagar district of western India, specifically from Mithi Virdi, Bhavnagar along with a review of known distribution from Gujarat. It is historically known to inhabit primarily in South Gujarat, with sporadic sightings in the central and northern regions of the state. The observation of this species outside its documented range raises intriguing questions about its potential for range expansion. Furthermore, we suggest that leveraging citizen science initiatives could provide valuable insights into the distribution patterns and ecological preferences of the species, thereby advancing our understanding of butterfly ecology in the region.

Keywords: Bhavnagar, distribution, geographical range, lepidoptera, nymphalids

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Introduction

Neptis hylas (Linnaeus, 1758), often known as the Common Sailer or Indian Sailer, is a species of butterfly belonging to the Nymphalidae. It may be found throughout the Indian subcontinent and Southeast Asia, and prefers locations with moderate shade and moisture. This butterfly displays sexual dimorphism, with the dry season form having a black upper side with conspicuous white markings, while the wet-season form has a deeper brown hue with fewer white patterns. The underside varies in colour, ranging from brown to white and yellow patterns that imitate fallen leaves for camouflage (Varshney and Smetacek, 2015; Saji et al., 2024).

Observation:

On November 17, 2020, we observed an individual of *Neptis hylas* (Common Sailer) from Mithi Virdi (Fig. 1), one of the coastal villages of Bhavnagar district. The individual was found on harvested crop field, where it was basking on a mix vegetation constituting the hedgerow of the agricultural field. We observed and photographed with Nikon P900 camera. The surrounding area was also searched for the presence of more individuals, but found none.

Figure 1. Neptis hylas (Linnaeus, 1758) basking on the hedgerow in Mithi Virdi, Bhavnagar, Gujarat, India

Discussion:

Two species of genus *Neptis* have been recorded from Gujarat, i.e., *Neptis hylas* (Linnaeus, 1758) and *Neptis jumbah* (Moore, 1858). After reviewing the literature thoroughly regarding the distribution of the *Neptis hylas* in Gujarat, it is found that this was the western-most occurrence record of the species.

The species' historical data is primarily from South Gujarat (Shull, 1963, 1964; Bhalodia et al., 2002a; Suthar et al., 2019; Pillai and Dolly, 2020), with isolated occurrences in the central and northern parts (Parasharya and Jani, 2007). Shull's extensive observations in South Gujarat (Shull, 1963; 1964), where the species was present all year, with distinct wet and dry season morphs, are noteworthy. Aldrich expanded the species' known range by documenting its existence in the Kheda area (Aldrich, 1946), although under rare circumstances. His single observation in November 1943 with only seven individuals encountered and four specimens collected, offering information on the species' illusive behaviour in the region. Researchers also recorded the species in Vansda National Park in South Gujarat (Bhalodia et al., 2002a) and the Ratanmahal Wildlife Sanctuary in Dahod (Bhalodia et al., 2002b). One of the records of the species in Gujarat was from Jessore Sloth Bear Sanctuary (Suresh et al., 2002). One published sighting from Gandhinagar (Mali et al., 2014), the busy state capital, indicate the species' existence in the study area, necessitating more research into its ecological dynamics. There were no previous records of species inhabiting the Bhavnagar (Trivedi et al., 2022). Citizen science platforms like iNaturalist were also thoroughly reviewed for the distribution of the *Neptis hylas* in Gujarat, which comprises total twenty observations of the species inhabiting ten districts of the state as of February 2024 (Fig. 2, Table 1). These collective data highlight the species' complex distribution patterns and the necessity for ongoing research to understand its ecological relevance and protection.

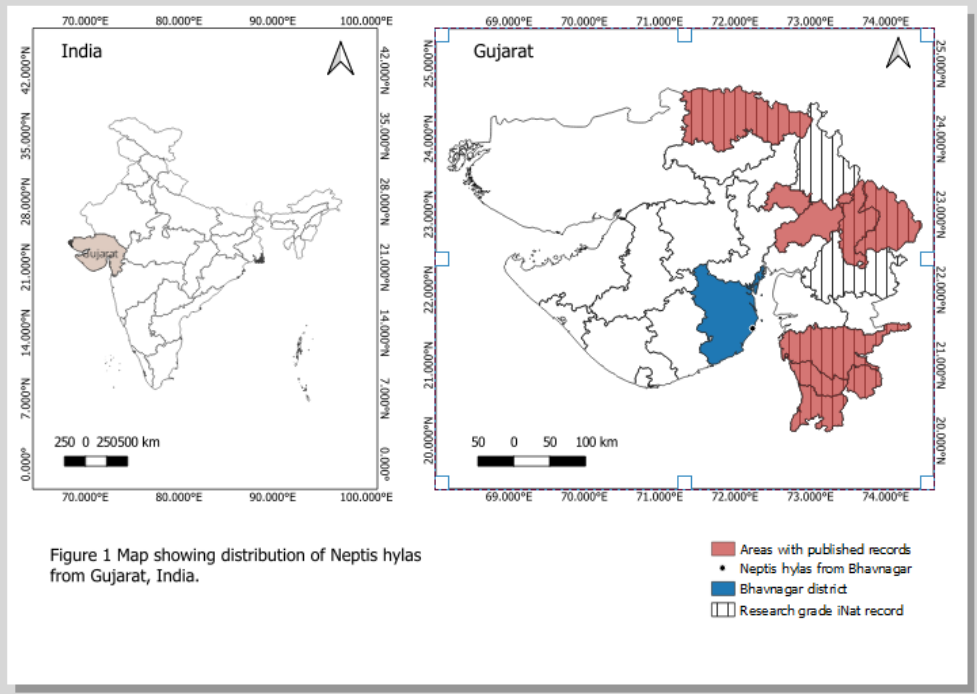

Figure 2. Map showing the known distribution of Neptis hylas (Linnaeus, 1758) from different districts of Gujarat, India

Table 1. Historical records of Neptis hylas (Linnaeus, 1758) from Gujarat, India

Sr. No.	District	Previously published records	No. of observations on iNaturalist
1	Banaskantha	Suresh et al., 2002; Parasharya and Jani 2007	1
2	Chhota Udaipur	None	1
3	Dahod	Bhalodia et al., 2002b; Parasharya and Jani 2007	1
4	Dang	Shull, 1963; 1964; Suthar et al., 2019; Parasharya and Jani 2007	5

5	Gandhinagar	Mali et al., 2014	0
6	Kheda	Aldrich, 1946; Parasharya and Jani 2007	0
7	Navsari	Shull, 1963; 1964; Bhalodia et al., 2002a; Parasharya and Jani 2007	2
8	Panch Mahal	Pillai and Dolly 2020	2
9	Sabar Kantha	None	4
10	Surat	None	1
11	Tapi	Shull, 1963; 1964; Parasharya and Jani 2007	2
12	Valsad	Shull, 1963; 1964; Parasharya and Jani 2007	1

The possible range extension of the species from both the southern and northern areas of the state to the coastal regions of Bhavnagar is an intriguing prospect. Given the species' recorded appearances in various parts of the state, it is plausible to hypothesise on the presence of migratory channels that facilitate its movement across the Arabian Sea. This movement, in theory, might allow the species to colonise new habitats and exploit previously unoccupied niches along the coastal region of Saurashtra. However, the specifics of such a migration remain hypothetical and open-ended, necessitating more research and empirical validation. Climate, seasonal fluctuations, and ecological dynamics can all have an impact on the feasibility and frequency of such movements. Understanding the probable processes that drive range extension over geographical barriers has important implications for our understanding of regional species dispersion patterns and ecosystem connectivity. Further study and monitoring are required to understand the complexity of this hypothetical range expansion and its ecological implications.

The ambiguity surrounding butterfly records in the state is due to a mix of scientific oversight and a lack of public knowledge. Inadequate resources, attention, and trained workers hamper comprehensive research on butterfly populations and ecological dynamics, which are exacerbated by poor public awareness of butterflies' ecological value and conservation needs. Addressing these difficulties will need joint initiatives, such as investment in capacity building,

interdisciplinary collaboration, and focused educational campaigns to increase awareness. Furthermore, citizen science initiatives support institutional efforts by involving volunteers in butterfly observation and data collection. Citizen science initiatives leverage the enthusiasm and regional knowledge of participants to collect observations on a wider spatial and temporal scale than traditional research methods alone. Empowering citizens to participate in scientific research promotes community ownership of biodiversity protection while increasing the quantity and quality of data accessible for evaluation (Phillips et al., 2021). Citizen science provides a way to expand monitoring efforts, identify new distribution records, and track population trends for butterflies in the state, eventually leading to more effective conservation strategies and promoting collaborative approaches towards environmental stewardship.

Conclusion:

Neptis hylas (Linnaeus, 1758) was recorded for the first time from Bhavnagar district of Gujarat, suggesting its range extension in western India. The possible range extension of the species from both the southern and northern areas of the state to the coastal regions of Bhavnagar is an intriguing prospect emphasizing further investigation and monitoring efforts.

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Ethical approval

The ethical guidelines for observing and identifying wild fauna were followed for this study.

Informed consent

Not applicable.

Conflicts of interests

The authors declare that there are no conflicts of interests.

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Data and materials availability

All data associated with this study are present in the paper.

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