

The First Record of *Anax parthenope* (Selys, 1839) (Odonata: Aeshnidae) from the Outskirts of Jamshedpur, Jharkhand, India

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Abstract: Odonates are widely recognized as effective bioindicators of freshwater ecosystem health, yet their diversity and distribution remain inadequately documented in several parts of eastern India. *Anax parthenope* (Selys, 1839) (Odonata: Aeshnidae), a broadly distributed species across Asia, Europe, and Africa, has limited confirmed records from this region. The present study aims to document the first confirmed occurrence of *A. parthenope* from the outskirts of Jamshedpur, Jharkhand, India. An adult male was opportunistically observed and photographed near a semi-permanent freshwater body at Kudada village (22.7076° N, 86.2033° E) in October 2020. Species identification was achieved through comparative morphological analysis using standard taxonomic keys, focusing on diagnostic characters of the thorax, abdomen, and anal appendages. This record represents a new locality for the species in Jharkhand and extends its known distribution within eastern India. The finding underscores the ecological value of peri-urban wetlands as habitats for odonates and highlights the need for systematic, long-term surveys to improve baseline data on odonate diversity and support freshwater biodiversity conservation in the region.

Keywords: *Anax parthenope*; Distribution Extension; Dragonfly Diversity; New Locality Record; Peri-Urban Wetlands.

Introduction

Odonates (dragonflies and damselflies) are widely recognized as effective bioindicators of freshwater ecosystem health due to their close dependence on aquatic habitats and sensitivity to environmental changes [1], [2], [3]. Globally, the order Odonata comprises approximately 6,392 extant species belonging to 46 families and is distributed across all continents except the polar regions [4], [5]. India harbors a rich odonate fauna, with 504 species representing 157 genera, 17 families, three suborders, and three infraorders currently documented [6], [7]. The Western Ghats and the Western and Eastern Himalaya are recognized as major centers of species richness and endemism; however, state-wise diversity patterns remain unevenly studied across the country [8].

The genus *Anax* Leach, 1815 (family Aeshnidae) includes large, strong-flying dragonflies typically associated with lakes, ponds, reservoirs, and slow-flowing freshwater systems. Among them, *Anax parthenope* (Selys, 1839), commonly known as the Lesser Emperor, has a wide distribution across southern Europe, Africa, the Middle East, and much of Asia, including the Indian subcontinent [9]. Within India, the species has been reported from several western, southern, and northern states; however, recent literature indicates a notable scarcity of confirmed records from eastern India over the last five years, particularly from plateau regions such as Jharkhand [10], [11], [12].

Jharkhand is characterized by a heterogeneous landscape comprising forests, rivers, wetlands, reservoirs, agricultural lands, and rapidly expanding peri-urban areas.

Despite this ecological diversity and the presence of extensive freshwater habitats, systematic odonate surveys in the state remain limited, and several districts—including the Jamshedpur region—have received little attention in recent biodiversity assessments.

In this context, there is a clear need to document baseline odonate records from underexplored regions of eastern India. The present study addresses this gap by reporting the first confirmed occurrence of *Anax parthenope* from the outskirts of Jamshedpur, Jharkhand, based on field observation and photographic evidence. This record contributes to refining the species' distribution, enhances regional biodiversity data, and underscores the importance of targeted odonate surveys for freshwater ecosystem monitoring and conservation planning.

Research Methods

The study followed a descriptive observational design based on opportunistic field documentation conducted during routine outdoor activity in the outskirts of Jamshedpur, Jharkhand, India, without systematic odonate sampling. A single adult *Anax parthenope* was visually observed and photographed with a mobile phone, and no specimen was collected. The locality's geographical coordinates were recorded using a mobile GPS application.

Species identification was carried out through comparative morphological analysis using diagnostic external characters such as body size, thoracic and abdominal coloration, wing venation, and anal appendages, following standard taxonomic keys and authoritative

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literature [13], [14], [15], [16]. As the record is based on opportunistic sampling, the data represent presence-only information; however, such incidental records are valuable for documenting species distribution in underexplored regions.

Study Area

The record was obtained from Kudada village (22.7076° N, 86.2033° E), located on the outskirts of Jamshedpur city, within East Singhbhum district, Jharkhand, India. The area lies in the Chota Nagpur Plateau region and is characterized by a mosaic of rural settlements, agricultural fields, open scrub, and scattered freshwater bodies. The regional climate is tropical monsoonal, with hot summers, moderate winters, and a distinct monsoon season from June to September. The study site is situated close to semi-

permanent wetlands and seasonal ponds that provide suitable habitats for a variety of aquatic and semi-aquatic insects, including odonates.

Distribution and habitat

The individual of *Anax parthenope* was observed near a semi-permanent freshwater body surrounded by open grassland and agricultural fields. The water body was characterized by shallow margins, emergent aquatic vegetation, and slow-moving or stagnant water conditions. Such habitats are typical breeding and foraging sites for large aeshnid dragonflies. The surrounding landscape comprised sparsely wooded patches, shrubs, and human-modified areas, indicating that the species can utilize moderately disturbed habitats in peri-urban environments.

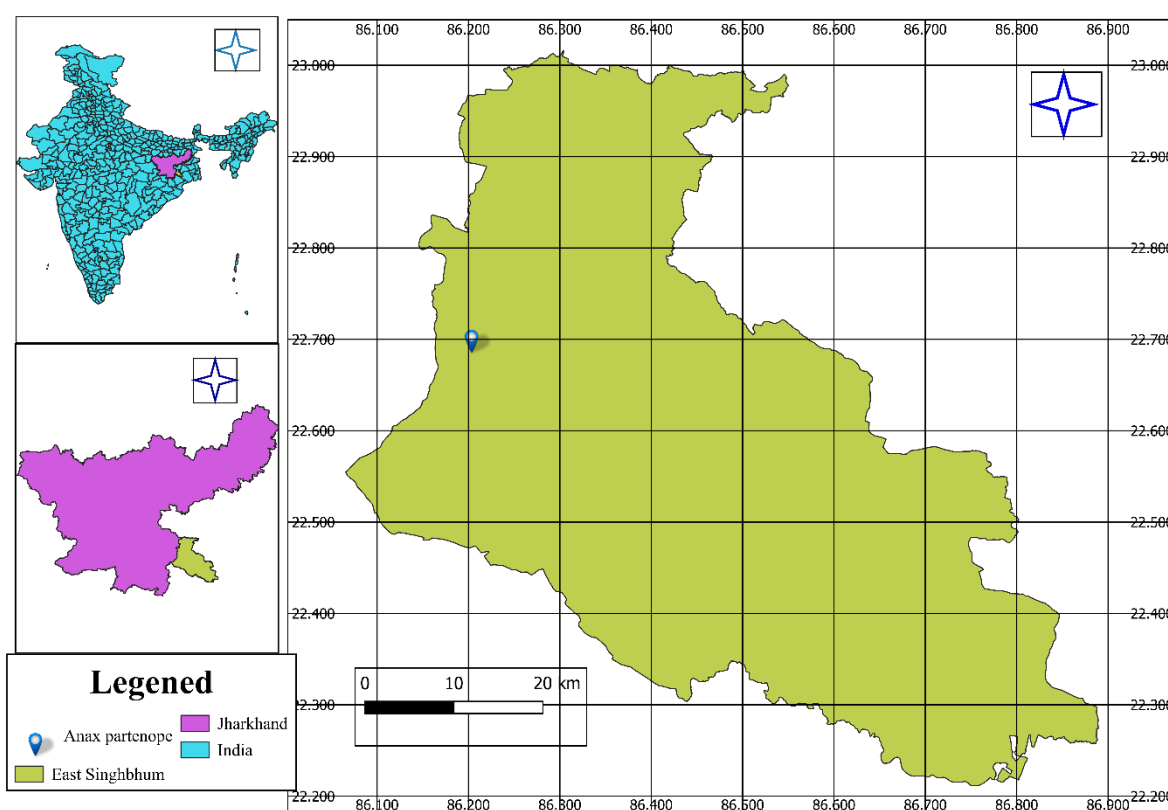


Figure 1. Map showing the location of the first record of *Anax parthenope* (Selys, 1839) from Kudada village in the outskirts of Jamshedpur, East Singhbhum district, Jharkhand, India.

Result and Discussion

A single adult male of *Anax parthenope* (Selys, 1839) was opportunistically observed and photographed at Kudada village (22.7076° N, 86.2033° E), located on the outskirts of Jamshedpur, East Singhbhum district, Jharkhand, India. The individual was recorded in October 2020 while perched on a man-made structure adjacent to a semi-permanent freshwater body. The surrounding habitat comprised open peri-urban land interspersed with agricultural fields and shallow aquatic vegetation.

The species was identified based on a combination of diagnostic external morphological characters observed in the field and from photographic documentation. The individual exhibited typical crepuscular behavior, being active during dusk hours. The labium and labrum were golden yellow,

while the face and frons were greenish yellow with a distinctly multicoloured upper frons. The eyes were bright green, showing a bluish tint consistent with age-related coloration changes.

The thorax was pale olivaceous brown with clearly defined dark brown sutures. Abdominal segment 2 displayed a prominent turquoise-blue coloration, a key diagnostic feature of the species. Segment 3 bore large lateral blue patches on both sides. Segments 4–9 showed an irregular black middorsal stripe, while segment 10 was entirely black. The shape and relative proportions of the anal appendages were consistent with descriptions of *A. parthenope* provided in standard taxonomic keys.

The observed individual was distinguished from other congeners occurring in India, particularly *Anax guttatus*, by the presence of a turquoise-blue second abdominal segment,

multicoloured frons, and the specific structure of the anal appendages. Unlike *A. guttatus*, which exhibits more extensive blue markings along the abdomen, the present individual showed restricted blue coloration primarily on segments 2 and 3, supporting its identification as *A. parthenope*.

Globally, *Anax parthenope* is categorized as Least Concern (LC) on the IUCN Red List of Threatened Species. The species is known for its wide distribution and ecological adaptability, as evidenced by its occurrence in a peri-urban habitat in the present study.

This observation represents the first confirmed record of *Anax parthenope* from the Jamshedpur region and an important addition to the odonate fauna of Jharkhand (Figure 2). The record provides presence-only data but contributes valuable baseline information for an underexplored region.



Figure 2. Adult male of *Anax parthenope* (Selys, 1839) photographed at Kudada village, outskirts of Jamshedpur, East Singhbhum district, Jharkhand

The present record of *Anax parthenope* from the outskirts of Jamshedpur represents the first confirmed occurrence of the species from this region and extends its known distribution within Jharkhand and the Chota Nagpur Plateau. Although *A. parthenope* is widely distributed across the Palearctic, Afrotropical, and Oriental regions, recent studies indicate that its occurrence in eastern India remains sparsely documented when compared with the western and southern parts of the country. This spatial bias in records is largely attributable to limited survey effort rather than true absence, emphasizing the importance of localized documentation in filling regional knowledge gaps.

Comparable records of *A. parthenope* from adjacent eastern and central Indian landscapes have been largely restricted to isolated observations near reservoirs, irrigation tanks, and lowland wetlands, suggesting that the species may be expanding or reoccupying suitable habitats in human-modified environments. The present observation from a peri-urban freshwater body supports ecological theories of habitat plasticity, wherein large aeshnid dragonflies exploit a wide range of lentic and semi-lentic habitats, including moderately disturbed landscapes. Such plasticity enables *A. parthenope* to persist in rapidly changing environments and may facilitate gradual range expansion at local and regional scales.

The occurrence of the species in the outskirts of Jamshedpur further highlights the ecological significance of peri-urban wetlands as functional components of freshwater

biodiversity networks. These habitats often serve as stepping stones for mobile taxa such as dragonflies, facilitating movement across fragmented landscapes. From a freshwater ecosystem management perspective, the presence of a large predatory odonate, such as *A. parthenope*, indicates a relatively intact trophic structure and acceptable water quality, reinforcing the role of odonates as effective bioindicators.

Incidental and opportunistic observations, when supported by photographic evidence and reliable identification, play an increasingly important role in biodiversity documentation, particularly in underexplored regions. Such records contribute valuable baseline data for long-term monitoring programs and can help detect early signals of distributional shifts potentially driven by climate change, urban expansion, and alterations in hydrological regimes.

Given the rapid pace of urbanization and land-use transformation in and around Jamshedpur, systematic and seasonal surveys across diverse freshwater habitats are strongly recommended. Future studies should focus on population structure, breeding activity, phenology, and habitat associations of *A. parthenope* and other odonate species. Integrating these data into regional freshwater monitoring and conservation planning will enhance understanding of odonate biogeography in eastern India and support evidence-based management of urban and peri-urban wetland ecosystems.

Conclusions

The present study documents the first confirmed record of *Anax parthenope* from the outskirts of Jamshedpur, Jharkhand, thereby adding a new locality to the known distribution of the species in eastern India. This finding highlights the value of opportunistic observations and photographic documentation in improving baseline biodiversity data from underexplored regions. The record also underscores the importance of peri-urban freshwater habitats in supporting odonate diversity and provides a foundation for future systematic surveys and monitoring efforts in the region.

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Competing interests

The authors declare no competing interests.

Authors' Contributions

R.G. carried out fieldwork and photography, while M.A.I.M. was responsible for study design, data analysis, map creation, and drafting the original manuscript. M.A.I.M. and S.A.A. contributed to the review and editing of the manuscript.

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