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Extended distribution range of tricolour pied flat (*Coladenia indrani*) butterfly to Western Gujarat, India

Vipul V Bamaniya, Jatin V Raval*
Department of Life Sciences, Bhakta Kavi Narsinh Mehta University, Junagadh, Gujarat, India

Abstract
The paper aims to document the sighting record of a butterfly from Western Gujarat based on research done from July 2019 to June 2020. The present findings were not reported in past by the researchers from Gujarat. The butterfly Tricolour Pied Flat (*Coladenia indrani*) and its larval host plants found in the region were described. This record will help in the addition of species in the current butterfly fauna of Gujarat.

Keywords: lepidoptera, host plants, range extension, hesperiidae

Introduction
Among all the groups of insects found, butterflies were considered as a good resource for the identification of a stable environment. The butterflies are very notable for their excellence as they bear excellent wings of different colors. They have slim bodies; the wings are held upward when they rest. They fly during the daytime, mostly in the morning hours they approach sites where they get enough sunlight for basking. Butterfly diversity depends upon the variety of flora found in the environment, they may be specific with their larval host plants or can be generalist. The presence of specific butterfly species in an area directly depends upon the presence of its larval host plant within that region. They use a variety of nectaring host plants for their nutritional requirements. Butterflies are often considered opportunistic foragers that visit a wide variety of available flowers (Sharma & Sharma, 2013) [20].Butterflies, being poikilotherms, respond to environmental changes with sharp declines in their diversity (Sidat and Bhatt, 2020) [22]. Butterflies and plants share a unique inter-relationship and hence possess specific host specificity (Kumar, 2015) [16]. Butterflies are capable of traveling long distances as adults (Chowdhury, *et al*., 2021) [21], although they often tend to restrict their activities to relatively small areas (e.g., Ehrlich 1965, Ehrlich and Gilbert 1973) [10, 11, 11].
Butterfly belongs to Order Lepidoptera of class Insecta, it is the second-largest order among insects. The total number of butterfly species recorded in the world is approximately 19000 (Heppner, 1998), in India diversity is about 1504 species (Tiple, 2011) [25] and in Gujarat, it is 193 species (Parasharya and Jani, 2007) [17].
The present record of the butterfly species was not documented in the previous studies of this region. Previous studies on butterflies in Western Gujarat was carried out by (Gandhi *et al*., 2018) [13], (Bhambhania & Vaghela, 2014) [4], (Dabhadkar & Prajapati, 2020) [8], (Bhatt & Nagar, 2017) [5], (Sharma & Sharma, 2013) [20], (Soni, 2005) [23], (Ahmed *et al*., 2016) [2], (Ahir & Parikh, 2010) [1], (Bhalodia *et al*., 2002) [3], (Gohel and Raval, 2019) [9], (Khodbhaya & Raval, 2020) [15], (Raval, *et al*., 2020) [15], (Shekahda, *et al*. 2021) [21], (Chauhan *et al*., 2022) and (Bamaniya *et al*., 2022. Varshney & Smetacek, (2015) [26] described the distribution of species in Eastern Gujarat, no records were found for its distribution in Western Gujarat.
The present record helps in the addition ofspecies to the current known fauna of butterflies from Gujarat.

Materials and Methods
Study area
The present record is part of the diversity and distribution study of the butterflies from the Junagadh region (Fig.1 & 2). The area comprises deciduous forest and mountain region of approximately 1069 m elevation. The vegetation of the area includes various types of large trees, shrubs, herbs and grasses. Joshi *et al* (1988) briefly defined the vegetation formation at Girnar: Technically the Girnar forest is described as “Type VII-A/c-1 Southern Tropical Dry Deciduous, Dry Teak Forest”. It is divided into three parts such as (a) the Teak forest, largely found on the foothills adjoining the plains and on the lower slopes of Girnar, covers more than half of the entire forest; (b) the miscellaneous forests found in the eastern outer periphery of Girnar and (c) scrub forest found in all the degradedpatches in the plain area as well as on the hilltops along the ridges of Girnar.

Fig 1: Map of Gujarat state

Fig 2: Site map showing location of species recorded

Results

Description of species

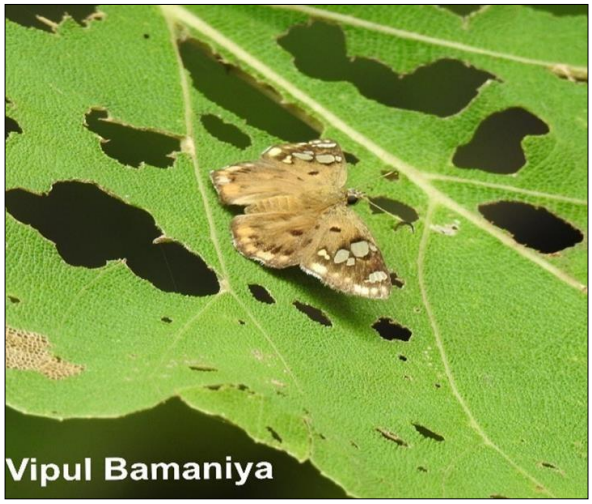

Fig 3: Photographic record of Tricolour Pied Flat (UP) from Willingdon Dam, Junagadh, Gujarat.

The Tricolour Pied Flat has four subspecies namely, *Coladenia indrani tissa* Moore, 1866, *C. indrani indra* Evans, 1926, *C. indrani indrani* Moore, 1866 and *C. indrani upasathra* Fruhstorfer, 1911. Of which, the subspecies *Coladenia indrani tissa* Moore, 1866 was distributed in Srilanka alone (Evans, 1932) [12]. The Morphological character of the *Coladenia indrani tissa* subspecies are as follows- Species is dark colour, markings small, cilia of hind wing is dark brown, upper forewing apical spots are small and irregular. Upper hind wing dark spots are diffused. The species *C. indrani indra* Evans, 1926 was reported to distribute in South India to Bengal (Evans, 1932) [12]. The morphological characters of the species *C. indrani indra* is as follows-Body color is dark brown, markings are large, above and below prominent tawny submarginal spots and upper forewing apical spots are coalesced. The species *C. indrani indrani* Moore, 1866 was reported to distribute from Mussoorie to Sikkim (Evans, 1932; Talbot, 1939) [12, 24]. The morphological characters are as follows-Body color is tawny brown, upper hind wing black spots are sharply marked; submarginal tawny spots are faint. Whereas, the species *C. indrani uposathra* Fruhstorfer, 1911 was reported to distribute from North Burma to Ataran, Siam, Singapur and Java (Evans, 1932) [12].

The morphological characters of the species are as follows- Above bright tawny ochreous, Upper hindwing black spots are sharply marked, upper forewing and below tawny spots are very large and prominent (Evans, 1932) [12]

Previous work does not describe its distribution in the Western part of Gujarat state. The species was observed at the Willingdon area of Junagadh, Gujarat. The butterfly was found resting on the leaf of *Butea monosperma*. The species was recorded on 10 September 2019 at 02:00 PM, photos taken by Vipul V. Bamaniya. (Nikkon Coolpix P900)

Larval host plants for the species found in the area are *Bixa orellana*, *Mallotus philippensis*, *Butea monosperma*, *Dalbergia latifolia*, *Thespesia populnea*, *Triumfetta rhomboidei*, *Bridelia retusa*, *Sterculia guttata* and *Grewia tiliifolia* (Saji et. al. 2021) [19]. (Source- Ifoundbutterflies and Digital Flora of Gujarat).

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