



# *Symmachia basilissa basilissa* Bates, 1868 (Riodinidae: Symmachiini) has been photographed while alive for the first time, uncovering a new record and shedding light on its conservation aspects

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**Abstract.** This work reports the first photographic record of the *Symmachia basilissa basilissa* Bates, 1868 subspecies, a butterfly originally described by Henry Walter Bates in 1868. This subspecies had only been recorded three before but had never been photographed alive in Brazil. The photograph was taken in the Chapada das Mesas National Park, located in the southern part of the state of Maranhão. This record was uploaded and georeferenced on the iNaturalist app/website. The taxon *Symmachia basilissa* comprises four subspecies, and the article provides information on the morphological differences between them. We also discuss the use of iNaturalist and similar tools to integrate academic and citizen science for a better understanding of biodiversity, especially in tropical regions and areas that are difficult to access. Overall, our work makes a valuable contribution to the knowledge of this data deficient butterfly species and highlights the importance of utilizing new technologies and collaborative approaches to advance scientific research.

**Keywords:** Citizen scientists; Conservation; Metalmark butterflies; Symmachiini; Taxonomic catalog.

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## Article Full Open Access

The species *Symmachia basilissa* was described by the naturalist Henry Walter Bates in 1868 (BATES 1868) as belonging to the genus *Mesene*. Later, in 1996, Hall & Willmott relocated it to the genus *Symmachia* Hübner (1819). Bates described the species nine years after the end of his expedition through the Pará Amazon, where he spent 11 years collecting and studying diverse taxa. During the first months of this expedition (1848), Bates collected a single male specimen. Although the label of the type specimen indicates the locality only as 'Pará', according to Bates' own reports in the book, "The Naturalist on the River Amazons", the term 'Pará' or 'city of Pará' is now used to name what is currently the capital of the state, Belém (BATES 1944a; 1944b). The holotype of *S. basilissa* is now deposited at the Natural History Museum of London (NHMUK).

The present work describes a new occurrence of the subspecies *Symmachia basilissa basilissa* Bates, 1868, the sixth record known of this subspecies, which was documented through a photograph taken in the Chapada das Mesas National Park (CMNP), located in the municipality of Carolina, in the southern region of the state of Maranhão (-7.147701, -47.371967) (Figure 1A) (<https://www.inaturalist.org/observations/98477246>). The CMNP is an environmental protection area primarily covered by typical cerrado vegetation, in addition to patches of gallery forest and rupestrian Cerrado (Figure 1B, SARIVA *et al.* 2020). The specimen was observed on January 27, 2021, on an inflorescence of *Ichthyothere* sp. (Asteraceae) and was identified by experts and added to the "First Known Photographs of Living Specimens" project (<https://www.inaturalist.org/projects/first-known-photographs-of-living-specimens>), which aims to collect the first photographic records of described and undescribed taxa (MESAGLIO *et al.* 2021). Although there is an observation with the oldest date of the species on iNaturalist, our record was added first on the platform, so there were no prior records of this species on iNaturalist, and therefore it remains part of the project for the first record of the species in life.

According to MESAGLIO *et al.* (2021), the utilization of tools such as iNaturalist, in conjunction with data from professionals, has emerged as a promising strategy for recording and researching biodiversity. The integration of 'professional science' and 'citizen science' has proven valuable in enhancing our understanding of fauna, particularly in tropical regions and remote areas that are challenging to access. Photographic records were used for taxon identification and compared with descriptions of each subspecies by BATES (1868; 1944a; 1994b), CALLAGHAN (2001), GALLARD (2008) and JAUFFRET & MARTINS (2006), as well as with images of the type specimens found in butterfly catalogs like Butterflies of America (WARREN *et al.* 2023).

The taxon *S. basilissa* comprises four subspecies: *S. basilissa basilissa*; *Symmachia basilissa paracatuensis* Callaghan, 2001; *Symmachia basilissa pujarnii* Jauffret & Martins (2006) and

*Symphyla basilissa brevignoni* Gallard, 2008.

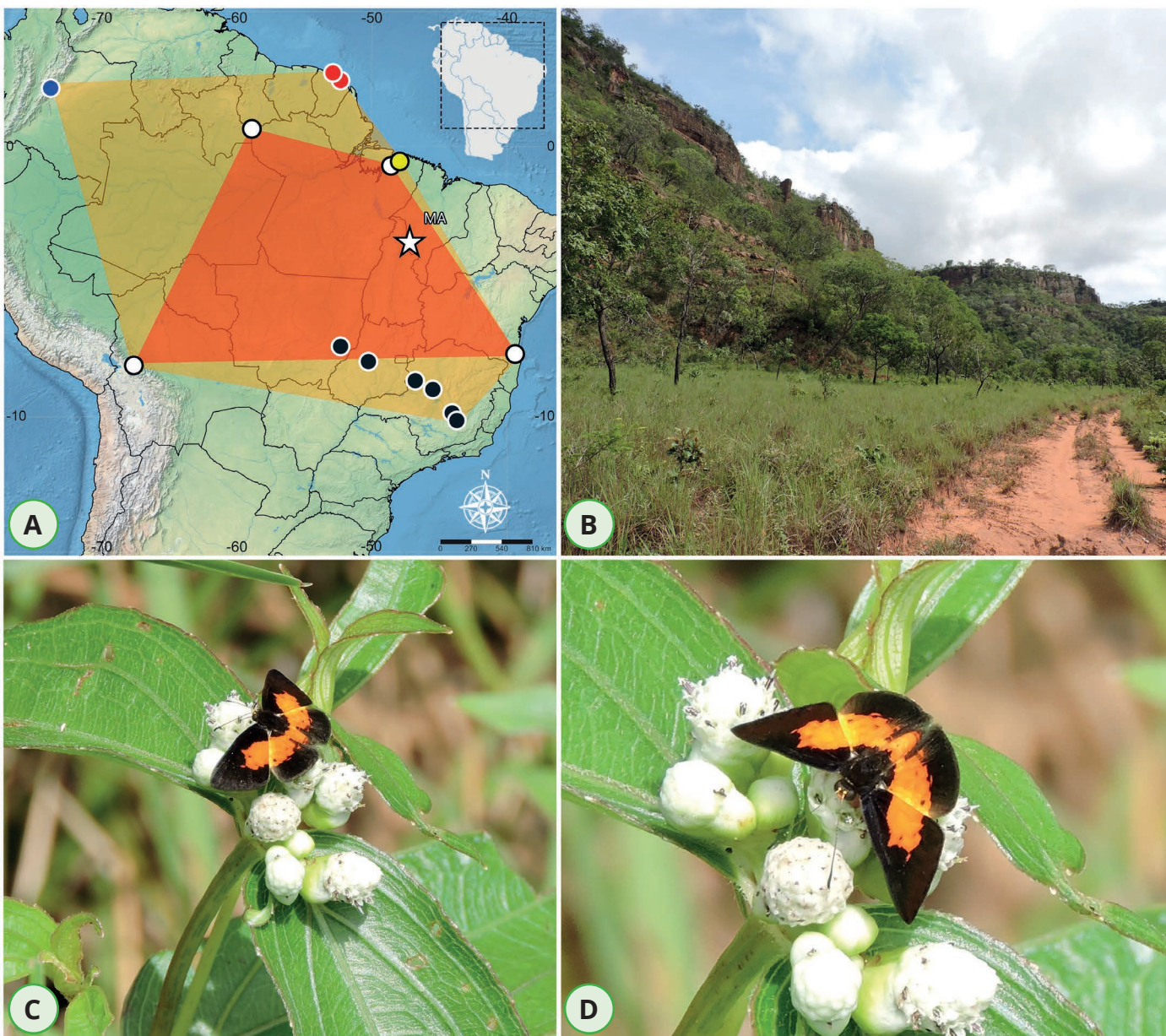
*Symphyla basilissa paracatuensis*, whose holotype was collected near the city of Paracatu, Minas Gerais. Additionally, another 19 specimens were collected in the region of Paracatu (n=3), metropolitan area of Belo Horizonte (n=14), Nova Xavantina, state of Mato Grosso (n=1), and in the Parque Estadual da Serra Dourada, municipality of Goiás Velho, state of Goiás (n=1), between 1967 and 1986 (CALLAGHAN 2001) (Figure 1A).

*Symphyla basilissa brevignoni*, whose holotype was collected in Montagne des Chevaux, French Guiana in 1990 by C. Brévignon (Figure 1A). Seventeen years later, another specimen of this subspecies was collected by Gallard in Kourou, French Guiana, designated by him as a paratype (GALLARD 2008). *Symphyla basilissa pujarnii*, the type specimen correspond a single male also collected in the state of Pará, in the municipality of Santo Antônio do Tauá, 63 km from the capital (JAUFFRET & MARTINS 2006). Furthermore, according to GALLARD (2008): "The subspecies *S. basilissa brevignoni* resembles the *pujarnii* form (Pará, Brazil)".

The subspecies *S. basilissa basilissa* features a red-orange band that covers a significant portion of both fore and hindwings, bordered by black edges. Additionally, the band exhibits uniformity with a subtle tonal difference between the dorsal and ventral surfaces. It possesses a black thorax, an orange abdomen, and grayish legs, along with a dark-colored head and orange palps (Figure 1C-D).

In contrast to *S. basilissa basilissa*, the subspecies *S. basilissa paracatuensis* displays bands on the fore and hindwings with diffuse and discontinuous color patterns. Although it covers the area almost uniformly, both the fore and the hindwings feature some 'flaws' and orange-red markings surrounded by the dark wing background. This subspecies has a brown thorax, slightly yellowish legs, a brown head, and a "brown abdomen, ventrally light yellow; with orange dorsal bands between the segments" (CALLAGHAN 2001).

The subspecies *S. basilissa brevignoni*, found in French Guiana, exhibits a color pattern similar to the *S. basilissa basilissa* subspecies and lacks the diffuse color pattern between black and orange observed in *S. basilissa paracatuensis*. Additionally, it possesses a predominantly black abdomen,



**Figure 1.** A) Subspecies distribution map. Black dots: *S. basilissa paracatuensis*; Blue dot: *S. basilissa* (Villavicencio, Colômbia); White dots: *S. basilissa basilissa*; Red dots: *S. basilissa brevignoni*; Yellow dot: *S. basilissa pujarnii*; White star: the new record of *S. basilissa basilissa*. The reddish polygon outlines the extent of occurrence of *S. basilissa basilissa*, and the orangish polygon outlines the extent of occurrence of *S. basilissa paracatuensis*. B) Landscape of Chapada das Mesas National Park where the specimen was photographed. C and D) Images of the new record of *S. basilissa basilissa* on inflorescences of *Ichthyothere* sp. (Asteraceae).

distinguishing it from the *S. basilissa basilissa* (GALLARD 2008).

The subspecies *S. basilissa pujarnii* shares a morphology and color pattern very similar to that of *S. basilissa basilissa*. It features a red-orange band that occupies a significant portion of both fore and hindwings, with a slight difference in red tone between the dorsal and ventral sides. *S. basilissa pujarnii* also has a black thorax on both the dorsal and ventral sides, black legs, thin and elongated antennae with a smooth white ring at the base, and a slightly flattened tip with a tiny orange dot. However, in contrast to *S. basilissa basilissa*, *S. basilissa pujarnii* possesses white labial palps and an orange-red abdomen on the dorsal side, appearing grayish-white on the ventral side (JAUFFRET & MARTINS 2006).

**Conservation status.** The conservation status of the taxon was determined using the Geospatial Conservation Assessment Tool (GeoCAT) platform (BACHMAN *et al.* 2011) and IUCN (2012) criteria and categories. We determined that the species has an area of occupancy (AOO) of 60 km<sup>2</sup>, while the subspecies *S. basilissa basilissa* occupies an area of only 20 km<sup>2</sup>. According to the methodology of the GeoCAT platform and the available data, the species would be classified as Endangered (EN). However, due to sampling difficulties and a lack of data regarding geographic distribution, abundance, and range, and considering that several species of Riodinidae are spatially scarce, we propose classifying the conservation status of the taxon as Data Deficient (DD). This designation is appropriate since only taxa with a well-defined and well-known population can be categorized using the IUCN methodology. It's important to note that the extent of occurrence, in this case, does not necessarily imply that the taxon is present throughout the entire territorial extent, by the same reasons explained above.

Additionally, this is a relatively rare species, with only one known record of *S. basilissa pujarnii* (1♂: MPEG), two records of subsp. *brevignoni* (1♂: Coll. L. & C. Brévignon; 1♂: Coll. J.-Y. G.), six of subsp. *basilissa* (1♂: NHMUK; 1♂: USNM; 2♂: DZUP; 2♂: iNaturalist), and 20 records of subsp. *paracatuensis*, which is more commonly found in southeastern Brazil [1♂: MNRJ; 4♂: DZUP; 15♂: unknown, not reported by CALLAGAN (2001)]. There is a record of *S. basilissa*, without specifying which subspecies, from Villavicencio, Meta, Colombia (NIELSEN & SALAZAR-E 2014). We emphasize that only was possible to propose a conservation status for the subspecies with the addition of this new record. Furthermore, this marks the first record within a conservation unit.

In this study, we confirmed the first known occurrence of *S. basilissa basilissa* in the state of Maranhão, the fourth in Brazil and the fifth in the world. This discovery expands the known distribution area and contributes to the understanding of this sparsely documented taxon. We emphasize the importance of citizen platforms like iNaturalist, which, in conjunction with traditional methods of species monitoring, can aid in conservation practices and research, particularly in challenging-to-access regions.

Regarding *Symmachia*, we also highlight the necessity for further studies, encompassing not only its distribution, extent of occurrence, and conservation status but also its ecology, host plants, and behavior. This is particularly significant given the shortage of specialists and research on Riodinidae in Maranhão.

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