A new subspecies of *Mechanitis lysimnia* from southern Amazonia (Nymphalidae: Danainae: Ithomiini)

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Abstract: A new ithomiine butterfly, *Mechanitis lysimnia tapajona* Freitas & Mota **ssp. nov.**, is described from four localities in southern Amazonia. This taxon is very similar to the subspecies *Mechanitis lysimnia nesaea*, but can be distinguished by the orange hindwing discal cell (which is yellow in *M. l. nesaea*). The recognition of *Mechanitis lysimnia tapajona* **ssp. nov.** is significant since it represents a subspecies of *Mechanitis lysimnia* occupying the 'Tapajós center of endemism', filling the largest distribution gap for this species in South America.

Key words: Amazon Forest, butterfly, Mechanitina, Solanaceae.

INTRODUCTION

The genus *Mechanitis* Fabricius, 1807 (Nymphalidae: Danainae: Ithomiini) includes five species and 48 described subspecies distributed in forest throughout the Neotropical region, from Mexico to northern Argentina (Fox, 1967; Brown, 1979; Brévignon, 2007; Hill *et al.*, 2012). Species of *Mechanitis* are in general associated with open and sunny habitats, such as forest edges, clearings and secondary vegetation, with some species commonly found in urban areas (Brown, 1992; Giraldo *et al.*, 2014, Carvalho *et al.*, 2019 and references therein). All known species in the genus lay clustered eggs and larvae are gregarious, feeding on several species of Solanaceae (Drummond & Brown, 1987; Willmott & Freitas, 2006; Hill *et al.*, 2012).

With 13 described subspecies, *Mechanitis lysimnia* (Fabricius, 1793) is the most widespread species, ranging from central Mexico to the province of Buenos Aires and the east Andean slopes of the Argentinian provinces of Jujuy to Mendoza (Brown, 1979). Although *M. lysimnia* is common and broadly distributed, a large gap with no records is present in northern Mato Grosso and southern Pará, in a region that partially overlaps the 'Tapajós center of endemism' (Brown, 1977a,b, 1979).

Recently, a specimen of *Mechanitis lysimnia* collected by LLM in Alta Floresta (northern Mato Grosso) showed a color pattern different from any described subspecies. Subsequently, three additional specimens from "Igarapé XV de Novembro" collected by K. S. Brown Jr. and three from Alvorada da Amazônia collected by LRV (both in southwestern Pará, about 114 km northwest and 240 km north of Alta Floresta, respectively), a photograph of a live adult in Alta Floresta and a photograph of a live adult from Parauapebas (Pará, about 800 km northeast of Alta Floresta), confirmed that this is a well-defined, undescribed subspecies. Accordingly, the present paper describes this new subspecies of *Mechanitis lysimnia* from southern Amazonia.

MATERIALS AND METHODS

Adult specimens of the new taxon were examined in two collections in Brazil: **MNRJ**: Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Rio de Janeiro, Brazil; **ZUEC**: Zoological Collection, Museu de Diversidade Biológica da Universidade Estadual de Campinas, Campinas, São Paulo. Approximately 1400 specimens of *Mechanitis lysimnia* subspecies were also examined in multiple public and private collections in South America, USA and Europe. In addition, photographs of Neotropical butterfly type specimens taken by Gerardo Lamas and available in Warren *et al.* (2017) and the photographs of *Mechanitis lysimnia neukircheni* Neild, 2008 (Neild, 2008), *Mechanitis lysimnia bipuncta* W. Forbes, 1948 and *Mechanitis lysimnia solaria* W. Forbes, 1948 (Forbes, 1948, Brown 1977b) were also consulted and compared with the new taxon described here.

Field work was conducted by LLM and LRV in two forested regions in the Brazilian states of Mato Grosso and Pará (from 2015 to 2021), respectively, when adult habitats and behavior were studied. Photographs of live individuals available on the

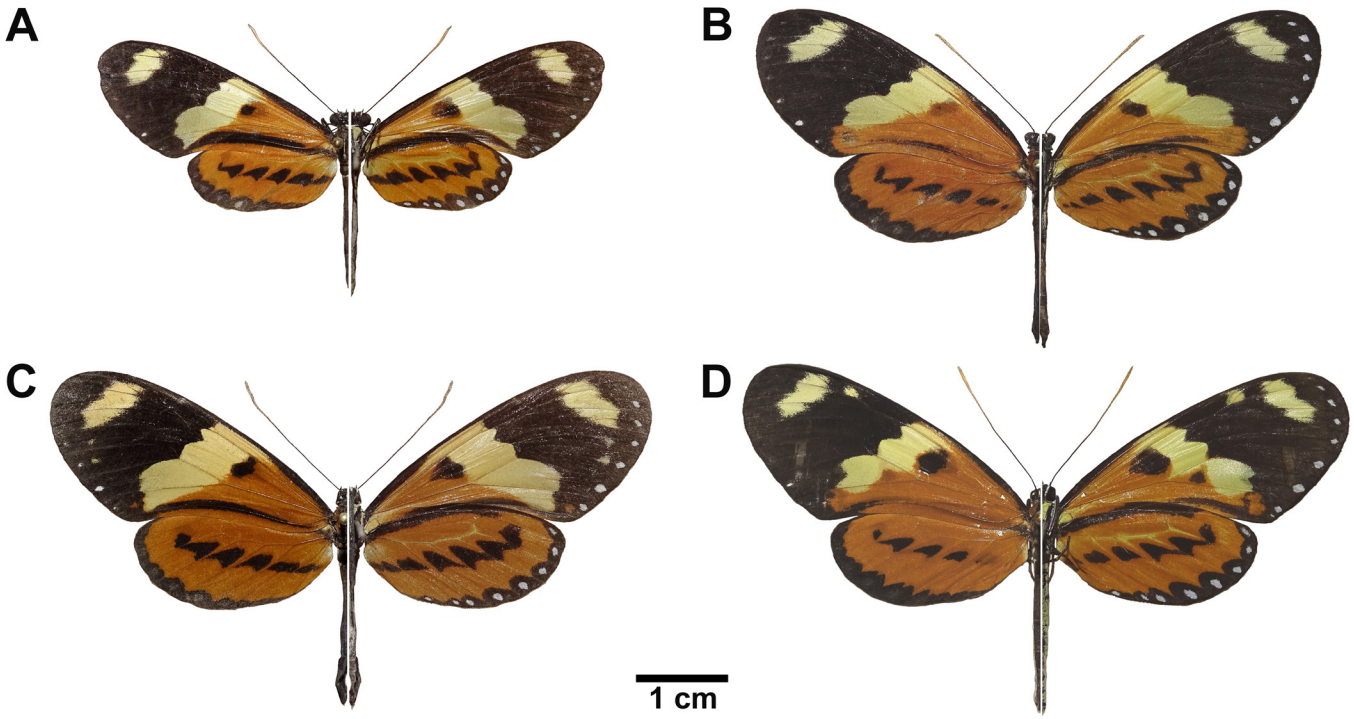

Figure. 1. *Mechanitis lysimnia tapajona* **ssp. nov.** A. Holotype male; B, C, D. Three female paratypes (MN-LEP 2741, MN-LEP 2742 and ZUEC-LEP 11198, respectively). Left= dorsal; Right = ventral. Scale bar = 1 cm.

internet were also examined from three websites (iNaturalist, Flickr and Facebook social media) using the name of the species "*Mechanitis lysimnia*" in an exhaustive search, and for Facebook this search was focused on groups related to insect photography.

Mechanitis lysimnia tapajona Freitas & Mota, **ssp. nov.**
Figs. 1-3

Description and diagnosis. Male (Fig. 1A, 2C). Antennae basal half black and apical half yellow, 13-14 mm in length (n=2), with 34 antennomeres; club with 11 antennomeres, not conspicuously developed (n=1). Thorax black with a thin white dorsal line; patagium orange. Forewing length 26-28 mm (n=3); hindwing length 16-17 mm (n=3). Forewing pattern similar on both surfaces: basal third orange with a central black spot (triangular in some individuals) in discal cell, middle section yellow, last third black with a large apical yellow spot; a series of small marginal white dots in intervenal spaces from apex to CuA_1-CuA_2 on ventral side. Hindwing ground color orange, including discal cell (an additional smaller black spot at stalk of CuA_2 near discal cell is present in one individual); on ventral surface, discal veins are covered by yellow scales; a costal black bar from anal margin to apex, merging to a broad marginal scalloped black border from M_1 to 3A, these with marginal white dots in intervenal spaces on ventral surface; a series of postdiscal black trapezoidal spots extend from basal inner margin to end of discal section; a single beige hair pencil typical of species at dorsal costal region. **Female** (Figs. 1B-D, 2D). Very similar to male, with more rounded forewings. On forewing, smaller yellow postmedian and/or marginal spots, in addition to a large apical spot, are present in two out of three examined individuals. Antennal length 15-16 mm (n=4), with 37-39 antennomeres; club with 13-14 antennomeres, not conspicuously developed (n=3). Forewing length 32-34 mm (n=4); hindwing length 20-22 mm (n=4).

Mechanitis lysimnia tapajona **ssp. nov.** is very similar to *Mechanitis lysimnia nesaea* Hübner, [1820], particularly individuals resembling the form *sulphurescens* Haensch, 1905, which has a single subapical yellow spot, lacking the yellow postmedian spots. The main difference is the predominantly orange hindwing discal cell of *M. lysimnia tapajona* **ssp. nov.**, which is completely yellow in *M. lysimnia nesaea*.

Type material. Holotype (Fig. 1A): Male, deposited in the Zoological Collection of the Museu de Diversidade Biológica da Universidade Estadual de Campinas (ZUEC), Campinas, São Paulo, Brazil. Labels on the holotype (Five labels separated by transverse bars): /HOLOTYPUS / Brazil, Pará, Novo Progresso, Alvorada da Amazônia, Córrego rio Quico/ Arco-íris, -7.291835° -55.311290°, 20.VII.2021, L[ucius]. R[abello]. Vasconcellos *leg*. / LBR1923/ AHBR 427/ Holotypus *Mechanitis lysimnia tapajona* Freitas & Mota *det*. 2021 / ZUEC LEP 11197/. **Paratypes** (all from Brazil) (Figs. 1B-D): *Mato Grosso*: Alta Floresta, Cristalino Lodge, 9.VI.2016, 1 female, L[uísa]. L[ima]. Mota *leg*., LLM720, plot7, 15:51, ZUEC-LEP 11198 (ZUEC). *Pará*: Novo Progresso, Alvorada da Amazônia, Córrego rio Quico/Arco-íris, -7.291835° -55.311290°, 21.VII.2021, 1 female (LBR 1924, AHBR 428, MN-LEP 2742), 23.VII.2021, 1 female, L[ucius]. R[abello]. Vasconcellos *leg*., (LBR1925, AHBR 429, MN-LEP 2741) (MNRJ); Novo Progresso, Região XV de Novembro, Serra do

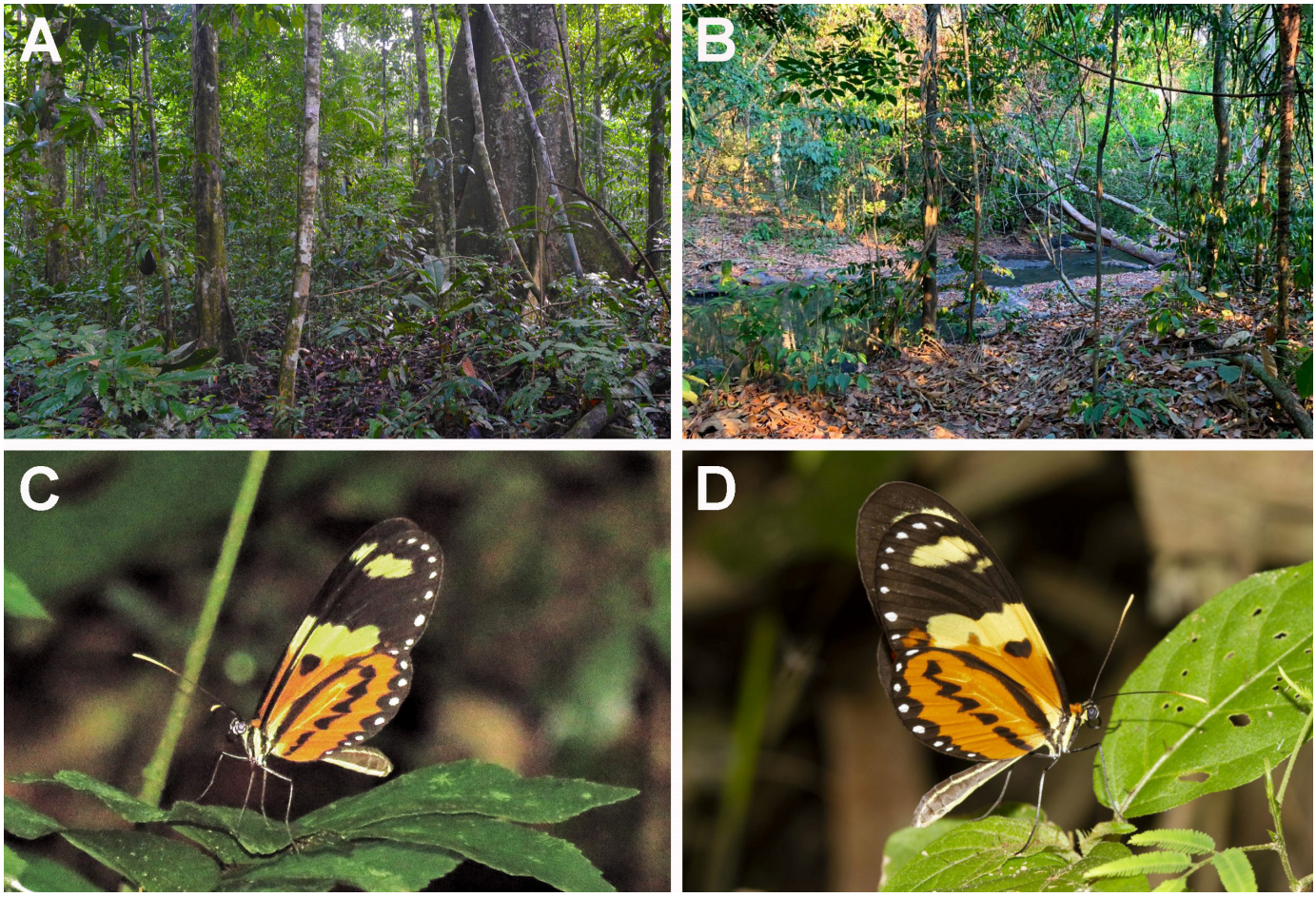

Figure. 2. Habitats and adults of *Mechanitis lysimnia tapajona* **spp. nov**. A. View of the interior of "Terra firme" Forest at Cristalino Lodge, Mato Grosso; B. Riparian Forest in the region of Alvoradada Amazônia, Novo Progresso, Pará (photograph by Clair Royer). C. Adult male from Cristalino, Mato Grosso (photograph by Sidnei Dantas); D. adult female from Parauapebas, Pará (photograph by Filho "Manfredini").

Cachimbo, 9°27'41.7"S 54°51'30.2"W, 22.X.1977, 2 males and one female, K[eith]. S[palding]. Brown Jr. *leg*., (ZUEC LEP 11273, 11274, 11275) (ZUEC).

Etymology. This subspecies name is treated as a noun in apposition and refers to the association of this taxon with the 'Tapajós center of endemism' (*sensu* Brown 1977a, 1979).

Taxonomy and variation. Based on the few known individuals (seven specimens and two images), variation in the forewing includes the size of the yellow apical spot, the presence of additional small yellow postmedian and/or marginal spots, the size and shape of the black discal spot in the orange basal area, and the presence of an additional black spot at the base of vein CuA_2 near the discal cell. In one of the paratypes the black discal spot is present only on the ventral surface (Fig. 1B); in the anal angle, a spot of variable size may be present or absent. On the hindwing, the size of the postdiscal black trapezoidal spots varies, and in some individuals, these are loosely connected, almost forming a continuous postdiscal black bar.

Distribution. This subspecies is known from only four localities in southern and southeastern Amazonia: 1) the region of "Cristalino Lodge" (9°35'51"S, 55°55'52"W), located near the west banks of the Cristalino River, Alta Floresta, northern Mato Grosso State (near the border with Pará State); 2) the riparian forests of the stream "Córrego rio Quico/Arco-íris" (7°17'30.6"S, 55°18'40.6"W), Alvorada da Amazônia, Novo Progresso, southern Pará State; 3) the riparian forests near the "Igarapé XV de Novembro", near the Mato Grosso/Pará border (9°27'41.7"S 54°51'30.2"W), Novo Progresso, southern Pará State; and 4) Carajás National Forest, Parauapebas, Pará State (6°04'02.8"S, 49°55'00.4"W) (https://www.inaturalist.org/observations/50786492) (Fig. 3).

Habitat and behavior. The few known individuals were captured in forest habitats not far from water bodies (Fig. 2A, B). The host plant and immatures are unknown, although it is expected that larvae will be gregarious and feed on Solanaceae, as with other species of *Mechanitis*, including several other subspecies of *M. lysimnia* (Drummond & Brown, 1987; Willmott & Freitas, 2006; Hill *et al.*, 2012).

DISCUSSION

The discovery of this new subspecies of *Mechanitis lysimia* within the area known as the 'Tapajós center of endemism' is an important finding, since this was one of the

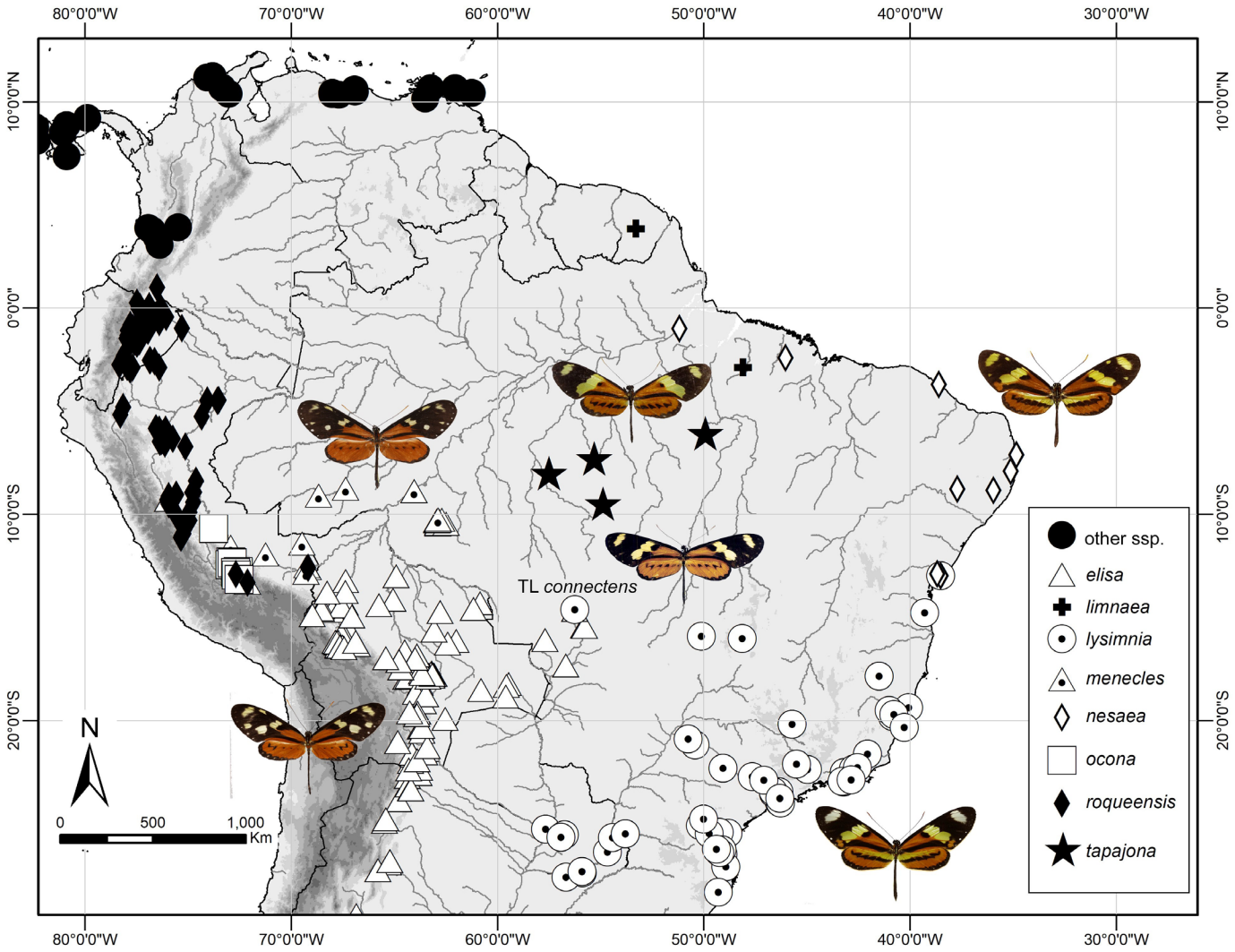

Figure 3. Distribution map showing the geographic distribution of *M. lysimnia tapajona* **ssp. nov.** in relation to other known subspecies of *M. lysimnia*. The image of "*connectens*" is of its holotype, illustrated in the website "Butterflies of America" (Warren *et al.,* 2017).

few centers of butterfly endemism where a local form of *M. lysimnia* was unknown, representing the largest distribution gap for this species in South America. The fact that this subspecies was unknown until now may relate to it being an uncommon butterfly in the region; a single individual was collected in the region of the Cristalino River after more than 700 hours of field work (LLM and AVLF), including a whole year of sampling by the first author. Therefore, although *M. lysimnia tapajona* **ssp. nov.** is known from only four localities in southern and southeastern Amazonia, it could potentially occur at similarly low density throughout the large area defined by the upper courses of the rivers Tapajós and Araguaia, in the Brazilian states of Pará and northern Mato Grosso.

Some phenotypes similar to *M. lysimnia tapajona* **ssp. nov.** have been previously reported, but they were considered to be part of the variation in the hybrid populations previously known as *M. elisa connectens* Talbot, 1928 (= *Mechanitis lysimnia elisa* (Guérin-Méneville, [1844])). In his revision of "Mechanitini" (now Mechanitina), Fox (1967) stated that: "As the name suggests, *connectens* links *elisa* [including populations currently named as *Mechanitis lysimnia menecles* Hewitson, 1860] with *nesaea* and *lysimnia*; dark individuals are quite similar to *elisa* and light individuals are very close to *nesaea*" (see all subspecies in Fig. 3). However, the present results show that, in spite of the low number of known individuals, *M. lysimnia tapajona* **ssp. nov.** represents a relatively stable phenotype ranging from northern Mato Grosso to east Pará, and the lighter phenotypes mentioned by Fox (1967) likely represent intergrades with the new subspecies here described.

In this study we show that the apparent Brazilian gap in the distribution of the widespread species *M. lysimnia* may be a sampling artifact, as suggested for several putative rare butterfly species that have been described or reported in new Brazilian localities in recent years (e.g., Greve *et al.*, 2013; Rosa *et al.*, 2017, 2021; Barbosa *et al.*, 2020 and references therein), including a Satyrini described from individuals also collected at Cristalino Lodge (Freitas *et al.*, 2019). As such, this study shows the importance of continuous sampling of butterflies in the Neotropical region, including both well sampled and poorly known regions, to better document the distribution of both relatively common as well as rarely observed species.

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