

NEW DISTRIBUTIONAL RECORDS OF *COLOBOSAURA MODESTA* AND *MICRABLEPHARUS MAXIMILIANI* (REPTILIA: GYMNOPHTHALMIDAE) IN PARAGUAY

NUEVOS REGISTROS DE DISTRIBUCIÓN DE *COLOBOSAURA MODESTA* Y *MICRABLEPHARUS MAXIMILIANI* (REPTILIA: GYMNOPHTHALMIDAE) EN PARAGUAY

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Resumen. Gymnophthalmidae es una Familia diversa de lagartos Sudamericanos de tamaño pequeño a mediano. En Paraguay se conocen actualmente siete especies. Entre estas, *Colobosaura modesta* y *Micrablepharus maximiliani* son dos especies poco muestreadas en el país: *C. modesta* era solamente conocida en dos localidades en los Departamentos de Amambay y San Pedro, mientras que *M. maximiliani* se conoce de los departamentos Central, Cordillera, Paraguari y San Pedro. Durante dos estudios de campo en 2022, capturamos un individuo de *C. modesta* y tres de *M. maximiliani*. El registro de *C. modesta* se encuentra a 198 km al oeste de la localidad conocida más cercana y es la tercera localidad confirmada en el país, la primera en el Departamento de Concepción y la primera asociada al Chaco Húmedo. Los registros de *M. maximiliani* se encuentran a 81, 131 y 137 km al norte de la localidad conocida más cercana y son los primeros registros de los departamentos de Concepción y Amambay. Proveemos la caracterización del hábitat donde los encontramos y discutimos su estado de conservación en Paraguay.

Palabras clave.- novedad zoogeográfica, extensión de distribución, gymnophthalmido.

Abstract. Gymnophthalmidae is a highly diverse family of small to medium sized South American lizards. In Paraguay, seven species are currently known. Among these, *Colobosaura modesta* and *Micrablepharus maximiliani* are two poorly sampled species in the country: *C. modesta* was only recorded in two localities in Amambay and San Pedro Departments, whilst *M. maximiliani* was recorded in Central, Cordillera, Paraguari and San Pedro Departments. During two field surveys in 2022 we captured one *C. modesta* and three *M. maximiliani* individuals. The *C. modesta* record is 134.7 km west from the nearest known locality, and it is the third confirmed locality in the country, the first in the Concepción Department and the first associated with the Humid Chaco. The *M. maximiliani* records are 81, 131 and 137 km north from the nearest known locality and are the first records from Concepción and Amambay Departments. We provide habitat characterization for where the lizards were found and discuss their conservation status in Paraguay.

Key words.- zoogeographic novelty, distribution extension, gymnophthalmid

Gymnophthalmidae is a highly diverse family of small to medium sized lizards, distributed from southern Central America to southern South America, reaching mid Argentina and east of the Andes (Vitt & Caldwell, 2014). In Paraguay, five genera and seven species of this family are currently known: *Bachia bresslaui*, *Cercosaura ocellata*, *C. schreibersii*, *Colobosaura kraepelini*, *C. modesta*, *Micrablepharus maximiliani* and *Vanzosaura rubricauda* (Cacciali et al., 2016; Cacciali et al., 2017).

The Red-bellied gymnophthalmid *Colobosaura modesta* (Reinhardt & Lütken, 1862) is a small lizard previously known only for the Cerrado biome (Vanzolini & Ramos, 1977), now recorded in the Caatinga, Amazon, and Atlantic Forest in Brazil, as well as in Paraguay (*sensu* Olson et al., 2001; Cacciali et al., 2017; Freire et al., 2012; Martínez et al., 2020). In Paraguay, the species is only known from two localities within the Cerrado Biome, the Cerro Corá National Park in Amambay Department and Laguna Blanca Nature Reserve in San Pedro Department (Cacciali et

al., 2016; Smith et al., 2016). In turn, Maximillian’s Blue-Tailed gymnophthalmid *Micrablepharus maximiliani* (Reinhardt & Lütken, 1862) is a small lizard known from northern Brazil to central Paraguay (Cacciali et al., 2016; Moura et al., 2010), found in open habitats in the Caatinga, Cerrado, Dry Chaco, Humid Chaco and Pantanal biomes, as well as in forested habitats such as Amazon and Atlantic Forests (Moura et al., 2010). The species is known from Central, Cordillera, Paraguari and San Pedro Departments, associated with the Cerrado and with a transitional zone between the Atlantic Forest and the Humid Chaco biomes (Cacciali, 2010; Cacciali et al., 2016; Smith et al., 2016).

Here we report new localities for *C. modesta* and *M. maximiliani* in Paraguay, extending their distribution ranges in the country. During two field surveys in 2022 as part of a herpetological monitoring, we captured one *C. modesta* and three *M. maximiliani* individuals using active searches along

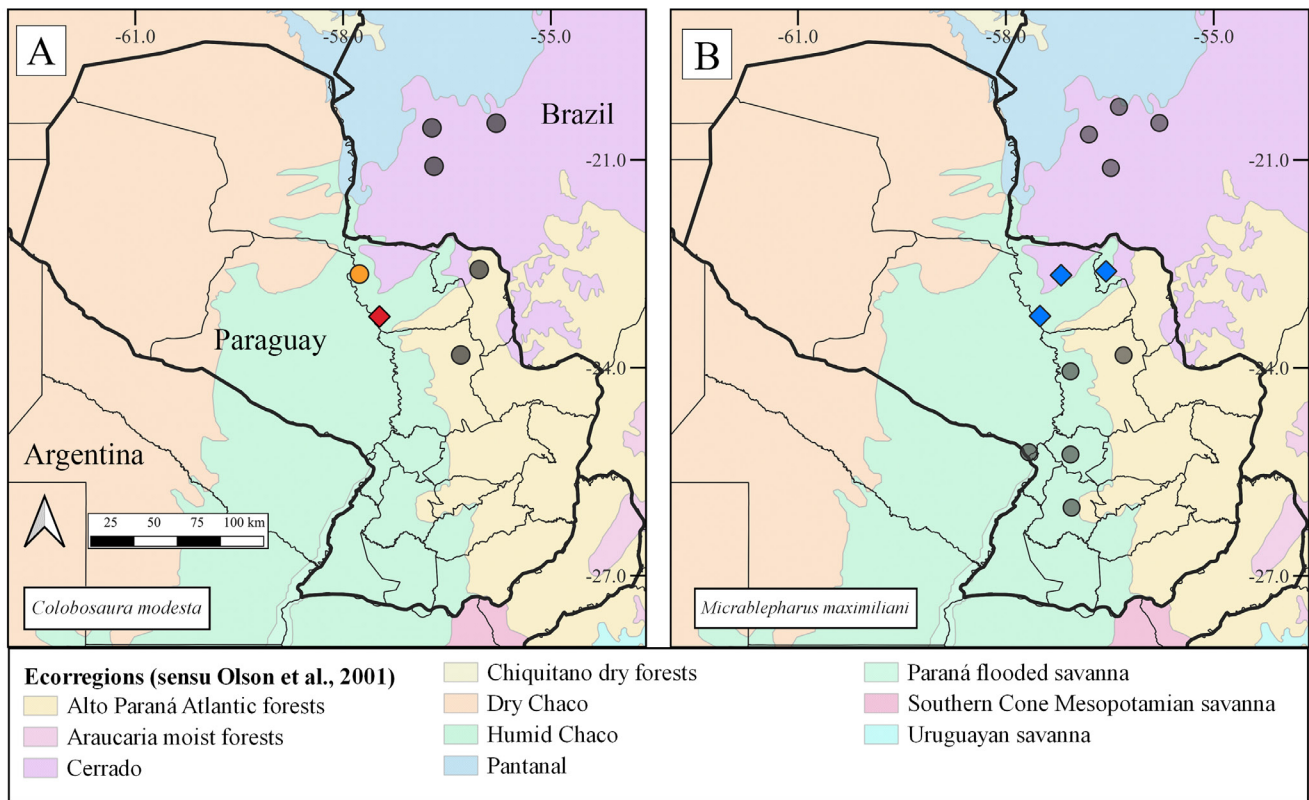


Figura 1. Registros geográficos de A) *Colobosaura modesta*, donde el rombo rojo es el nuevo registro y el círculo naranja es la localidad tipo y B) *Micrablepharus maximiliani*, donde los rombos azules son los nuevos registros. Los registros de literatura próximos están representados por círculos grises en ambos mapas.

Figure 1. Geographical records of A) *Colobosaura modesta*, where the red diamond is the new record and the orange circle is the type locality and B) *Micrablepharus maximiliani* where blue diamonds are the new records in. Proximate literature records are represented by grey circles in both maps.

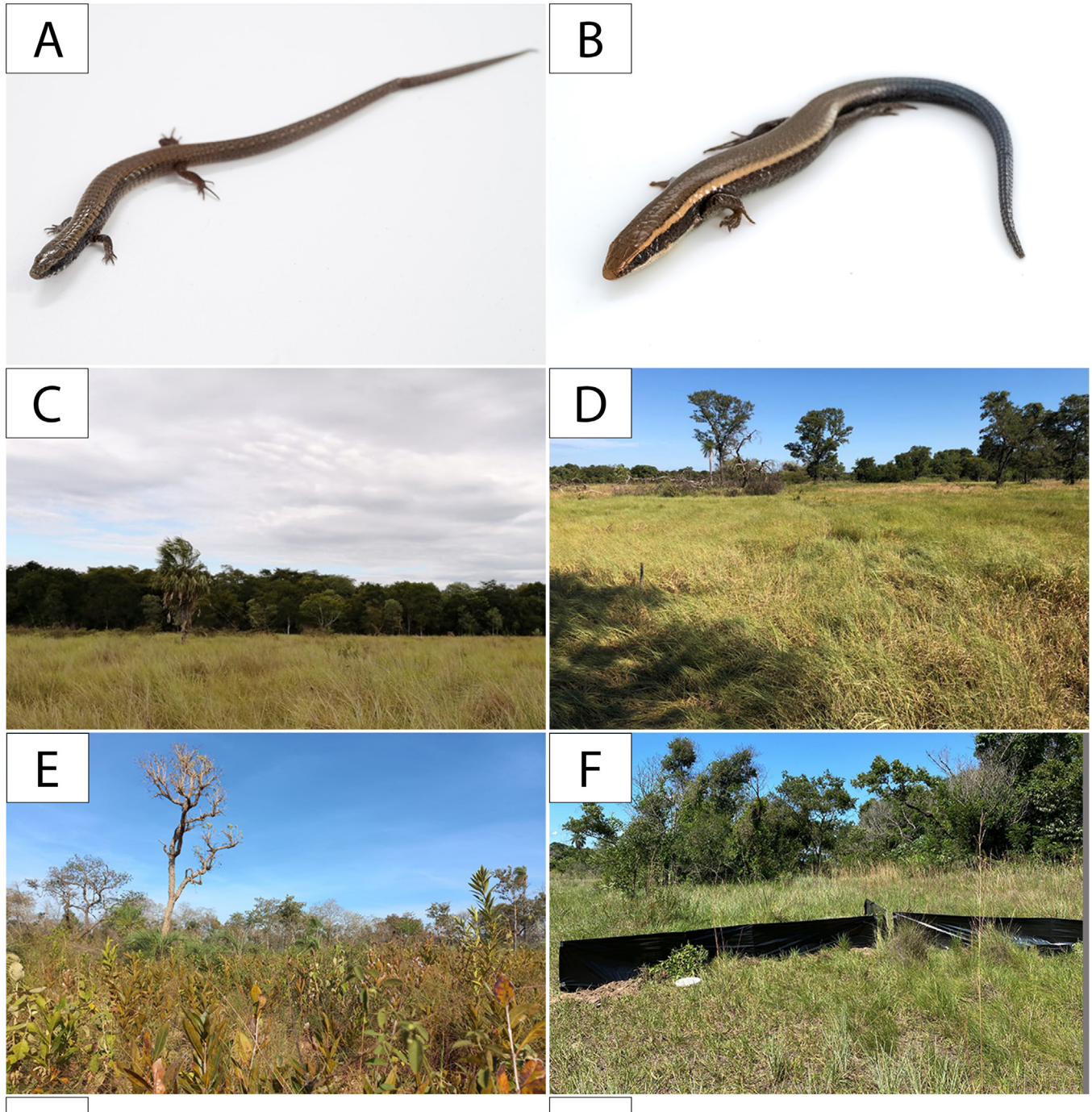


Figura 2. Individuos de A) *Colobosaura modesta* (IIBPH 6211) y B) *Micrablepharus maximiliani* (IIBPH 6283). Formaciones donde se realizaron hallazgos: C) Bosque semideciduofolio en contacto con una sabana. D) Pastizal modificado de *Urochloa decumbens* y *U. humidicola* (Poaceae), E) "Campo Cerrado" y F) Sabana abierta inundable, con trampa de caída.

Figure 2. Individuals of A) *Colobosaura modesta* (IIBPH 6211) and B) *Micrablepharus maximiliani* (IIBPH 6283). Formations where findings were made: C) Semideciduous forest in contact with a savannah. D) Modified grassland of *Urochloa decumbens* and *U. humidicola* (Poaceae), E) "Campo Cerrado" and F) Floodable open savannah, with a pit fall trap arrangement.

transects and pitfall traps. We photographed, euthanized and deposited them into the herpetological collection of Instituto de Investigación Biológica del Paraguay (IIBP).

Colobosaura modesta. The individual (IIBPH 6211; snout-vent length = 5.95 cm) was found in Concepción Department on July 8, 2022, during the dry season, in the PARACEL future Industrial Plant (Figure 1) located 15 km north to Concepción City. We differentiated it from its congener *C. kraepelini* following the key provided by Cacciali et al. (2017): immaculate ventral scales, and dark mottling only on external parts of the gular shields. The lizard was found under a log in a semideciduous forest (23.262212° S, -57.473980° W; elevation 80 m a. s. l.; WGS 84) of approximately 25 meters high with three strata: the highest stratum composed mainly of *Schinopsis balansae*, *Anadenanthera colubrina* var. *cebil*, *Myracrodruon urundeuva*, *Peltophorum dubium*. The medium stratum (10-16 meters) composed of *Balfourodendron riedelianum*, *Aspidosperma pyriforme*, *Sarcomphalus mistol*, and the lowest stratum (5-9 meters) of *Trichilia catigua*, and a dominant species *Gymnanthes discolor*. The undergrowth was sparse, with few lianas and epiphytes, covered by abundant leaf litter and fallen branches. The habitat had a relatively profound soil, with a light slope to the central nearest stream (called "Arroyo Seco").

Micrablepharus maximiliani. Two individuals were recorded in Concepción Department during the dry season, one on July 8 and the second on July 26, 2022. The first (IIBPH 6198; snout-vent length = 3.65) was found in the PARACEL future Industrial Plant, 15 km north of the Concepción city. This specimen fell into a pitfall located in a modified grassland of *Urochloa decumbens* and *U. humidicola* (Poaceae) previously used as a livestock grazing area (23.253400° S, 57.506400° W; elevation 72 m a. s. l.; WGS 84). The second individual (IIBPH 6283; SVL = 3.70 cm) was recorded in Soledad cattle ranch. This individual also fell into a pitfall trap in a "Campo Cerrado" habitat type (22.662972° S, 57.203111° W; elevation 201 m a. s. l.; WGS 84), a savannah like formation characterized by a dominance of subshrubs with developed xylopodium system, with periodic burnings. In this area, some dominant plant species were *Campomanesia adamantium*, *Angelonia integerrima*, *Bidens chodatii*, *Butia* sp., *Croton glandulosus*, *Rhynchospora setigera*, *Arachis pflugeae*, *Calliandra brevicaulis* Micheli var. *brevicaulis*, *Tephrosia marginata* Hassl and *Galphimia australis* Chodat. The area is dominated by sandy soils, with rocky areas (granite) on the hills. The third individual (IIBPH 6189; SVL = 3.65 cm) was found in Amambay Department on February 22, 2022. This individual fell into a pitfall trap in a floodable open savannah next to a degraded high forest (-22.606545° S, -56.553326° W; elevation 175 m a. s. l.; WGS 84). The area occupies the lowest part of the land and was dominated by an herbaceous

layer with predominance of grasses in extensive clumps. The area also bears marshy aquatic plants and some isolated trees, as well as individuals of wax palm *Copernicia alba*, isolated or in small islets. This plant formation is subject to flooding and periodic burning, as seen during the surveys. The three individuals were determined as *M. maximiliani* and can be distinguished from its congener *M. atticolus* (endemic to the Brazilian mid Cerrado) for lacking a white dorsolateral stripe from anterior superciliary to the anterior third of the tail (for more details see Rodrigues et al., 1996).

The *C. modesta* record is the third confirmed locality in Paraguay, the first in the Concepción Department and the first associated to the Humid Chaco. The new locality is 134.7 km west from the nearest known locality and also near (~70 km) to the former type locality of *Colobosaura kraepelini*, Puerto Max (Concepción), which was associated to the drainage system of the Paraguay River (Cacciali et al., 2017). Our record also aligns with what it is known from the ecology of the species; studies from Chapada do Araripe Cantão State Park and Jalapão (States of Ceará, Pernambuco Piauí and Tocantins States, Brazil) found that the species uses almost only non-floodable forests, suggesting a high degree of niche conservatism (Mesquita et al., 2006; Mesquita et al., 2015). The populations in Paraguay are at the limits of the species distributional range, in transitional zones between biomes, and in possible sympatry *C. kraepelini*, which could make their population ecology distinct from those of central and northeastern Brazil (Ledo et al., 2020). Regarding the conservation status of *Colobosaura modesta*, the IUCN red list categorized it as Least Concern (LC) (Silveira et al., 2021). At national level, however, it is considered "Endangered of Extinction" (national categorization, Resolution N° 206), due to its limited records and worrisome land-use changes in its habitats (Martínez et al., 2020).

The three new localities reported for *M. maximiliani* in Paraguay are distant 81 (first record), 131 (second) and 132 (third) km from the nearest localities previously known for the species. These fill a distributional gap between the southernmost records located in the Humid Chaco and Atlantic Forest in Paraguay as well as its wide distribution through Brazil, from which the new localities are distant at least 163 kilometers from the nearest localities in Bonito, Mato Grosso do Sul. All our records are consistent with previous observations (Dal Vechio et al., 2014; Mesquita et al., 2015), with the species associated to savannah like habitats. Despite its secretive habits (primarily semifossorial) and difficulty of sampling (mainly by pitfalls), *M. maximiliani* seems not to be rare, at least in Caatinga (e.g., Passos et al., 2016) and Cerrado (e.g. Dal Vechio et al., 2014). The

species' conservation status is Least Concern (LC) according to the IUCN (Scott et al., 2019) and at national level its "Endangered of Extinction" (Resolution N° 206), due to its limited records and worrisome land-use changes in its habitats (Martínez et al., 2020).

The main limitations for conservation assessments of several reptile species in Paraguay are the few records and the lack of life history knowledge; this includes almost all gymnophthalmid species, including that one's discussed here (Cacciali et al., 2015; Martínez et al., 2020). Thus, long term biodiversity inventories and monitoring are needed in Paraguay which could be developed using diverse passive and active methods. This is evidenced, for example, with the Laguna Blanca Nature Reserve case, which harbors one of the highest richness and unique records for reptiles in the country (Cacciali et al., 2015) through a sustained multi-method inventory program (Smith et al., 2016).

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