



**A NEW COUNTRY RECORD AND FIFTEEN NEW DEPARTMENTAL
RECORDS FOR PARAGUAYAN SPHINGIDAE (INSECTA:
LEPIDOPTERA)**

**UN NUEVO REGISTRO NACIONAL Y QUINCE NUEVOS REGISTROS
DEPARTAMENTALES PARA LA FAMILIA SPHINGIDAE EN PARAGUAY
(INSECTA: LEPIDOPTERA)**

Smith P. , Galeano S., Ortega C.

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ABSTRACT. A recent review of the Sphingidae fauna of Paraguay recorded 100 confirmed species, with three further species considered to be of hypothetical occurrence. However, they also highlighted gaps in our knowledge, especially in the Pantanal ecoregion of Alto Paraguay department and the Mesopotamian Grassland ecoregion of Misiones and western Itapúa departments. In this paper we document one new country record (*Aellopos ceculus* [Cramer, 1777]) and fifteen new departmental records from Alto Paraguay, Amambay, Itapúa and Misiones departments, representing the first reports of any species from the latter department.

Keywords: *Adhemarius*, *Aellopos*, *Agrius*, *Cocytius*, *Enyo*, *Erinnyis*, *Eumorpha*, *Manduca*, *Pachylioides*, *Xylophanes*.

Resumen. Una revisión reciente de la fauna de esfingidos de Paraguay registró 100 especies confirmadas, y tres especies más se consideraron de ocurrencia hipotética. Sin embargo, también se destacaron lagunas en nuestro conocimiento, especialmente en la ecorregión del Pantanal del departamento de Alto Paraguay y la ecorregión de pastizales mesopotámicos de los departamentos de Misiones e Itapúa occidental. En este artículo, documentamos un nuevo registro nacional: *Aellopos ceculus* (Cramer, 1777) y quince nuevos registros departamentales de los departamentos de Alto Paraguay, Amambay, Itapúa y Misiones, lo que representa los primeros registros de cualquier especie en este último departamento.

Palabras claves: *Adhemarius*, *Aellopos*, *Agrius*, *Cocytius*, *Enyo*, *Erinnyis*, *Eumorpha*, *Manduca*, *Pachylioides*, *Xylophanes*.

INTRODUCTION.

The hawkmoths (Lepidoptera: Sphingidae) are a charismatic and conspicuous family of nocturnal lepidopterans that play a significant role in the pollination of many species of native plants (Nilsson & Rabakonandrianina, 1988; Haber & Frankie, 1989; Miyake et al., 1998). Given their position as important bioindicators, studies of their diversity provide important data for monitoring levels of environmental stress (Kevan, 1999). With deforestation and land use change rates in Paraguay reaching unprecedented levels (Cardozo et al., 2013), the availability of reliable data on biodiversity in the country is imperative for the efficient development and employment of mitigation measures and management proposals (Smith et al., 2017; Smith, 2022).

METHODOLOGY.

The Sphingidae fauna of Paraguay was reviewed by Smith, Kitching, Ríos, & Haxaire (2022) and found to consist of 100 confirmed species, with three further species considered to be of hypothetical occurrence. Smith (2022) then carried out a preliminary conservation assessment of the species based on the available national data. These publications noted that though the Paraguayan Sphingid fauna is moderately well known in comparison with other Neotropical countries (Smith et al., 2022), there continue to be gaps in our knowledge and that the Pantanal ecoregion of Alto Paraguay department and the Mesopotamian Grassland ecoregion of Misiones and western Itapúa departments are particularly poorly known. With that in mind, we document one new country record and fifteen new departmental records from Alto Paraguay, Amambay, Itapúa and Misiones departments, representing the first reports of any species from the latter department, and further consolidating our understanding of Sphingid distribution in the country. These records are based on incidental observations and a review of the Sphingid collection in the Museum of the Entidad Binacional Yacyretá, Ayolas (Museum Code EBY) and contribute to a more complete knowledge of Sphingid distribution providing a firmer basis for future conservation assessments.

RESULTS.

NEW COUNTRY RECORD.

Subfamily Macroglossiinae.

Tribe Dilophonotini.

Subtribe Dilophonotina.

Aellopos ceculus (Cramer, 1777).

25 April 2025 Parque Nacional Cerro Corá, Amambay department (CO) (Fig. 1).

The first country record documented photographically on a house light. The species could be confidently identified by the following list of characters: lack of a white band across the dorsal abdomen; lack of medial brown line on upperside of the head and thorax, and a yellow medial band on the hindwing upperside (Martin et al., 2011). The distinct dorsal pattern of the forewing also eliminates other potential confusion genera in Paraguay such as *Perigonia* and *Nyceryx*. This is the fifth member of the genus *Aellopos* to be documented in Paraguay and the 101st species. The conservation status of the species has not been assessed and cannot be assessed on the basis of a single record.



Figure 1. *Aellopos ceculus* (Cramer, 1777). Parque Nacional Cerro Corá, Amambay department. Photograph was provided by Carlos Ortega (@Carlos Ortega, 25 April 2025).

NEW DEPARTMENTAL RECORDS

Subfamily Smerinthinae.

Tribe Ambulycini.

Adhemarius daphne daphne (Boisduval, [1875]).

13 January 2019 Ayolas, Misiones department (SG) (Fig. 2).

An individual photographed on a palm leaf. The species was identified since the basal black band does not reach the costa, distinguishing it from other Paraguayan members of the genus (Martin et al. 2011). It has been previously reported from Alto Paraná, Caaguazú, Caazapá, Canindeyú, Concepción, Guairá, Itapúa, Ñeembucú, Paraguari, Presidente Hayes and San Pedro departments (Drechsel 2014a, Ríos Díaz 2014, Ríos Quintana 2015, Smith *et al.* 2017, Smith et al. 2022). It is of Least Concern in Paraguay and probably occurs throughout the Oriental region of the country and marginally into the Chaco (Smith 2022).



Figure 2. *Adhemarius daphne daphne* (Boisduval, 1875). Ayolas, Misiones department. Photograph was provided by Sergio Galeano (@Sergio Galeano, 13 January 2019).

Subfamily Sphinginae.
Tribe Sphingini.
Subtribe “*Xanthopan* genus-group”.

***Cocytius antaeus* (Drury, 1773).**

EBY February 2009, Ayolas, Misiones department, B. Aranda leg. (Fig. 3)

A specimen in the Museum of the Entidad Binacional Yacyretá, Ayolas. It was identified based on the very large size and transparent hindwing pattern with pointed (arrow-shaped) panel edges (Martin, et al., 2011). The species has been previously reported from Alto Paraguay, Boquerón, Central, Concepción, Cordillera, Guairá, Itapúa, Ñeembucú, Paraguari and San Pedro departments (Podtiaguin, 1941; Eitschberger, 2006; Ríos Díaz, 2014; Ríos Quintana, 2015; Smith, et al., 2017, 2022). It is considered to be of Least Concern in Paraguay (Smith, 2022).



Figure 3. *Cocytius antaeus* (Drury, 1773). EBY Ayolas, Misiones department. Photograph was provided by Sergio Galeano (@Sergio Galeano, February 2009).

Subtribe Sphingi

***Manduca paphus* (Cramer, 1779).**

16 January 2023 Ayolas, Misiones department (SG) (Fig. 4).

An individual photographed after being attracted to a house light. It was identified based on the yellow spots on the abdomen, largely uniform greyish forewing and brown (as opposed to white) speckling on the underside of the abdomen (Martin et al., 2011). This is an abundant species in Paraguay, and with this documentation from Misiones department, it has now been confirmed to occur in all departments except Cordillera (where it is undoubtedly present) (Podtiaguin, 1941; Drechsel, 2014a; Ríos Díaz, 2014; Ríos Quintana, 2015; Smith et al., 2017; Smith et al., 2022). It is of Least Concern in Paraguay (Smith, 2022).

***Manduca rustica* (Cramer, 1779)**

05 October 2024 Ayolas, Misiones department (SG) (Fig. 5).

An individual photographed after being attracted to a house light in Barrio Mil Viviendas, Ayolas (-27.3893790 -56.8574480). It was identified based on the white spots on the abdomen, largely black forewing and presence of a double zigzag-pattern crossing the discal area of the forewing (Martin et al., 2011). This is an abundant species in Paraguay, and with this documentation from Misiones department, it has now been confirmed to occur in all departments except Amambay and Paraguari (where it is undoubtedly present) (Podtiaguin, 1941; Drechsel, 2014a, 2014b; Ríos Díaz, 2014; Ríos Quintana, 2015; Smith et al., 2017; Smith et al., 2022). It is of Least Concern in Paraguay (Smith, 2022).



Figure 4. *Manduca paphus* (Cramer, 1779). Ayolas, Misiones department. Photograph was provided by Sergio Galeano (@Sergio Galeano, 16 January 2023).



Figure 5. *Manduca rustica* (Cramer, 1779). Ayolas, Misiones department. Photograph was provided by Sergio Galeano (@Sergio Galeano, 05 October 2024).

Subtribe Acherontiina.

***Agrius cingulata* (Fabricius, 1775).**

9 September 2024 Aguadulce, Alto Paraguay department (PS) (Fig. 6).

Multiple individuals attracted to lights, jointly with at least seven individuals of *Eumorpha vitis* (Fig. 7) and a single female *Erinnyis ello*. It is easily identified based on its distinctive pink-spotted abdomen in combination with the pink underwing (Martin et al., 2011). The species has been previously reported from Alto Paraná, Boquerón, Canindeyú, Central, Concepción, Guairá, Itapúa, Ñeembucú, Presidente Hayes and San Pedro departments (Podtiaguin, 1941; Drechsel, 2014a; Ríos Díaz, 2014; Ríos Quintana, 2015; Smith et al., 2017; Smith et al., 2022). It is of Least Concern in Paraguay (Smith, 2022).



Figure 6. *Agrius cingulata* (Fabricius, 1775). Aguadulce, Alto Paraguay department. Photograph was provided by Paul Smith (@Paul Smith, 09 September 2024).



Figure 7. *Eumoprha vitis* (Linnaeus, 1758). Aguadulce, Alto Paraguay department. Photograph was provided by Paul Smith (©Paul Smith, 09 September 2024).

Subfamily Macroglossiinae.

Tribe Dilophonotini.

Subtribe Dilophonotina.

Aellopos titan (Cramer, 1777).

26 June 2024 Ayolas, Misiones department (SG) (Fig. 8).

Adult photographed after being attracted to house lights. The species was identified by the presence of a discal spot and an outer row of single white spots on the forewing (Martin et al., 2011). It had been previously documented only from Alto Paraná, Central, Itapúa, Ñeembucú, Paraguari and San Pedro departments (Rothschild & Jordan, 1903; Podtiaguin, 1941; Benítez Díaz, 1988; Drechsel, 2014a; Ríos Díaz, 2014; Ríos Quintana, 2015; Smith et al., 2017; Smith et al., 2022). It is Least Concern in Paraguay (Smith, 2022).



Figure 8. *Aellopos titan* (Cramer, 1777). Ayolas, Misiones department. Photograph was provided by Sergio Galeano (©Sergio Galeano, 26 June 2024).

***Aellopos tantalus* (Linnaeus, 1758).**

01 December 2024 San Juan del Paraná, Barrio Azotea, Itapúa department (PS) (Fig. 9).

A male photographed after being attracted to house lights. The species was identified based on the beige inner surface of the last tarsomeres which were not clubbed in lateral view, the wing chord length of 25 mm, absence of white lunules on the forewing underside posterior to the discal cell and clear yellow median band on the upperside of the hindwing (Martin et al., 2011).

Undated Patiño Cué, Itauguá, Central department. A male specimen from this locality, presumably from the Natural History Museum, London, is illustrated in:

<https://web.archive.org/web/20121108220313/http://www.catesphingidae.org/taxonomy/Aellopos/tantalus.html>. This species has now been documented from Canindeyú, Central, Concepción, Itapúa and San Pedro departments (Drechsel, 1994; Drechsel, 2014b; Ríos Díaz, 2014). It was considered Vulnerable in Paraguay (Smith, 2022) but under the criteria used in that publication, these additional records downgrade the species to Least Concern, as it is present in three distinct ecoregions: Atlantic Forest, Cerrado and Humid Chaco.



Figure 9. *Aellopos tantalus* (Linnaeus, 1758). San Juan del Paraná, Barrio Azotea, Itapúa department. Photograph was provided by Paul Smith (@Paul Smith, 01 December 2024).

***Erinnyis oenotrus* (Cramer, 1780).**

13 January 2019 Ayolas, Misiones department (SG) (Fig. 10).

A female photographed after being attracted to lights. It was identified based on the unstriped abdomen and largely pale forewing with a series of dark markings along the costa (Martin et al., 2011). This widespread species has now been documented from all Paraguayan departments except Cordillera, where it undoubtedly occurs (Podtiaguin, 1941; Drechsel, 2014a; Ríos Díaz, 2014; Ríos Quintana, 2015; Smith et al., 2017; Smith et al., 2022; Smith, 2022). It is of Least Concern in Paraguay (Smith, 2022).



Figure 10. *Erinnyis oenotrus* (Cramer, 1780). Ayolas, Misiones department. Photograph was provided by Sergio Galeano (@Sergio Galeano, 13 January 2019).

***Pachylioides resumens* (Walker, 1856).**

EBY February 2009, Ayolas, Misiones department, B. Aranda leg. (Fig. 11).

A specimen in the Museum of the Entidad Binacional Yacyretá, Ayolas. It was identified based on the relatively uniform brown forewings and dark hindwings with a greenish-blue base (Martin et al., 2011). This widespread and common species has now been documented to occur in every Paraguayan department (Podtiaguin, 1941; Drechsel, 2014a; Ríos Díaz, 2014; Ríos Quintana, 2015; Smith et al., 2017; Smith et al., 2022; Smith, 2022). It is of Least Concern in Paraguay (Smith, 2022).



Figure 11. *Pachylioides resumens* (Walker, 1856). EBY Ayolas, Misiones department. Photograph was provided by Sergio Galeano (@Sergio Galeano, February 2009).

Subtribe Philampelina.

***Enyo ocypete* (Linnaeus, 1758).**

05 May 2025 Ayolas, Misiones department (SG) (Fig. 12).

A male photographed after being attracted to lights. Within the genus, this species can be easily identified based on the shape of the outer margin of the forewing, the pale transverse line across the forewing and the white patches on the basal area of the hindwing (Martin et al., 2011). The species has been previously reported from all departments except Caazapá (Drechsel, 1994, 2014a, 2014b, 2014c; Ríos Díaz, 2014; Ríos Quintana, 2015; Smith et al., 2017; Smith et al., 2022; Smith, 2022). It is of Least Concern in Paraguay (Smith, 2022).



Figure 12. *Enyo ocypete* (Linnaeus, 1758), Ayolas, Misiones department. Photograph was provided by Sergio Galeano (@Sergio Galeano, 05 May 2025).

***Eumorpha analis* (Rothschild & Jordan, 1903).**

EBY February 2009, Ayolas, Misiones department, B. Aranda leg. (Fig. 13).

A specimen in the Museum of the Entidad Binacional Yacyretá, Ayolas, identified based on the clear, almost square patch on the inner margin of the discal area of the forewing and the black medial line on the head and thorax (Martin et al., 2011). This widespread species has now been documented from all Paraguayan departments except Cordillera, where it undoubtedly occurs (Podtiaguin, 1941; Drechsel, 2014a; Ríos Díaz, 2014; Ríos Quintana, 2015; Smith et al., 2017; Smith et al., 2022; Smith, 2022). It is of Least Concern in Paraguay (Smith, 2022).



Figure 13. *Eumorpha analis* (Rothschild & Jordan, 1903). EBY Ayolas, Misiones department. Photograph was provided by Sergio Galeano (@Sergio Galeano, February 2009).

***Eumorpha vitis* (Linnaeus, 1758).**

30 December 2024 Parque Nacional Cerro Corá, Amambay department. (CO) (Fig. 14).

An individual photographed after being attracted to lights. Identified based on the striped forewing pattern and the large median triangular dark patch in the discal region (Martin et al., 2011). This widespread species has now been reported from all Paraguayan departments except Alto Paraná and Caazapá (Podtiaguin, 1941; Benítez Díaz, 1988; Drechsel, 2014b; Ríos Díaz, 2014; Ríos Quintana, 2015; Smith et al., 2017; Smith et al., 2022; Smith, 2022). It is of Least Concern in Paraguay (Smith, 2022).



Figure 14. *Eumorpha vitis* (Linnaeus, 1758). Parque Nacional Cerro Corá, Amambay department. Photograph was provided by Carlos Ortega (@Carlos Ortega, 30 December 2024).

Tribe Macroglossini.
Subtribe Choerocampina.

***Xylophanes chiron nechus* (Cramer, 1777).**

26 January 2020 Ayolas, Misiones department (SG) (Fig. 15).

A female photographed after being attracted to lights. Within the genus, this species can be easily identified based on the green forewings and pale patches at the apex and tornus (Martin et al., 2011). The species has been previously reported from Alto Paraná, Amambay, Caaguazú, Caazapá, Canindeyú, Concepción, Guairá, Itapúa, Paraguari, Presidente Hayes and San Pedro (Podtiaguin, 1941; Drechsel, 2014a; Ríos Díaz, 2014; Ríos Quintana, 2015; Smith et al., 2017; Smith et al., 2022; Smith, 2022). It is of Least Concern in Paraguay (Smith, 2022).



Figure 15. *Xylophanes chiron nechus* (Cramer, 1777). Ayolas, Misiones department. Photograph was provided by Sergio Galeano (@Sergio Galeano, 26 January 2020).

***Xylophanes tyndarus* (Boisduval, 1875).**

24 February 2025 Parque Nacional Cerro Corá, Amambay department. (CO) (Fig. 16).

An adult photographed after being attracted to lights. This individual was distinguished from the similar *X. marginatus* Clark, 1917 by the presence of the apical dash (Kitching & Cadiou, 2000). The species has been previously reported from Alto Paraná, Canindeyú, Central, Concepción, Cordillera, Guairá and San Pedro (Benítez Díaz, 1988; Ríos Díaz, 2014; Smith et al., 2017; Smith, 2022). It is of Least Concern in Paraguay (Smith, 2022).



Figure 16. *Xylophanes tyndarus* (Boisduval, 1875). Parque Nacional Cerro Corá, Amambay department. Photograph was provided by Carlos Ortega (@Carlos Ortega, 24 February 2025).

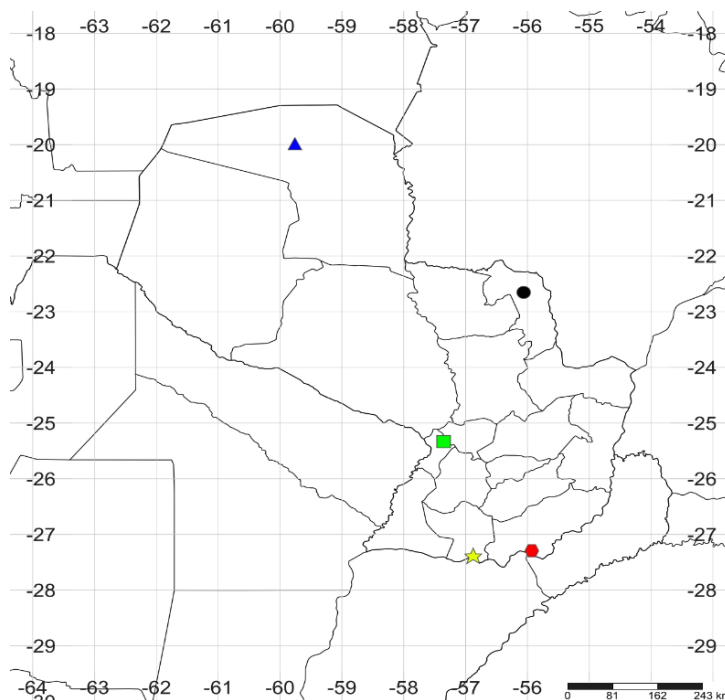


Figure 17. Map of Sphingid record localities mentioned in this paper. North is situated at the top of the image, south at the bottom. Black circle: Parque Nacional Cerro Corá, Amambay department (-22.6534918 -56.0603583); Blue triangle: Aguadulce, Alto Paraguay department (-19.983516 -59.7598240); Green square: Patiño Cué, Itauguá, Central department (-25.3342345 -57.3546888); Red hexagon: San Juan del Paraná, Barrio Azotea, Itapúa department (-27.293100 -55.928824); Yellow star: Ayolas, Misiones department (-27.3840877 -56.8760177). Map was provided by Paul Smith (@Paul Smith, 2025).

DISCUSSION.

The addition of *Aellopos ceculus* to the Paraguayan Sphingofauna indicates that the national inventory is still not complete, and fieldworkers should be aware of the possibility of additional species, especially in border areas with Brazil and Bolivia, which should be a priority for future studies. The ten Misiones records reported herein represent the first documented reports for that department and correspond largely to widespread and common species with a broad distribution in Paraguay. Nonetheless, the fact that they have not been previously reported for the department demonstrates that areas of Paraguay continue to be under-sampled even for abundant species.

The mean number of species reported for the other 16 Paraguayan departments (including others which are clearly under-sampled) is 49.6, suggesting that even at a conservative estimate less than 20% of the Misiones departmental fauna of this conspicuous and charismatic Lepidopteran family has been documented to date.

CONCLUSIONS.

The total number of Sphingidae known to occur in Paraguay is now 101 species. Based on Smith (2022), the new departmental species totals for the departments included here (increase in brackets) are: Alto Paraguay 33 (+1), Amambay 36 (+3), Central 54 (+1), Itapúa 51 (+1) and Misiones 10 (+10). Continued, collaborative efforts in biodiversity monitoring, coupled with publication of the results, are thus essential for a clear understanding of faunal distribution in the country and the first step towards being able to propose effective conservation plans.

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