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A synopsis of the Castniidae (Lepidoptera) of Paraguay

SERGIO D. RÍOS[1,2] & JORGE M. GONZÁLEZ[3]

[1]*Museo Nacional de Historia Natural del Paraguay, Sucursal 1 Campus, Central XI, San Lorenzo, Paraguay. E-mail: sergiord40@gmail.com*

[2]*Departamento de Biología. Facultad de Ciencias Exactas y Naturales. Universidad Nacional de Asunción.*

[3]*Texas A & M University, Department of Entomology, College Station, Texas 77843-2475, USA (Research Associate, McGuire Center for Lepidoptera and Biodiversity). E-mail: gonzalez.jorge.m@gmail.com*

Abstract

A list with comments on status, natural history, biology, hosts and distribution are presented for all species of Castniidae known from Paraguay. All the presented information has been summarized based on literature, museum specimens, information gathered from researchers/collectors and personal observations. **New synonyms** are proposed: *Imara satrapes catharina* (Preiss) [= *Imara satrapes* (Kollar)] and *Castnia juturna paraguayensis* Strand (= *Castnia invaria penelope* Schaufuss), and synonymic lists are given in each case. Twelve species are recorded from Paraguay, four of them are relatively common and have been previously reported from the country [*Synpalamides phalaris* (Fabricius), *Synpalamides rubrophalaris* (Houlbert), *Castnia invaria penelope* Schaufuss, *Gazera heliconioides micha* (H. Druce)]. The other eight species are much less common in collections [*Imara satrapes*, *Castnia juturna* Hopffer, *Telchin licus laura* (H. Druce), *Ceretes marcelserres* (Godart), *Riechia acraeoides* (Guérin-Méneville), *Prometheus cochrus* (Fabricius), *Frostetola gramivora* (Schaus), *Paysandisia archon* (Burmeister)]. *Telchin licus laura* (H. Druce) and *Frostetola gramivora* (Schaus) are reported from this country for the first time. Four species not known from Paraguay, but suitable to be found within, are also mentioned [*Yagra fonscolombe* (Godart), *Castnia lecerfi* Dalla Torre, *Geyeria uruguayana* (Burmeister), *Ceretes thais* (Drury)].

Key words: Paraguayan Biodiversity, Giant Butterfly-moths, taxonomy, new synonym, Paraguay

Resumen

Se presenta una lista con comentarios sobre el estado, historia natural, biología, hospederos y distribución para todas las especies de Castniidae conocidas de Paraguay. Toda la información provista ha sido recopilada de la literatura, ejemplares de museos, información obtenida gracias a investigadores/colectores y observaciones personales. Se proponen dos **nuevos sinónimos**: *Imara satrapes catharina* (Preiss) [= *Imara satrapes* (Kollar)] y *Castnia juturna paraguayensis* Strand (= *Castnia invaria penelope* Schaufuss], y se incluye lista de sinónimos en ambos casos. Doce especies son reconocidas de Paraguay, cuatro de las cuales son relativamente comunes y han sido reportadas anteriormente en el país [*Synpalamides phalaris* (Fabricius), *Synpalamides rubrophalaris* (Houlbert), *Castnia invaria penelope* Schaufuss, *Gazera heliconioides micha* (H. Druce)]. Las restantes ocho especies [*Imara satrapes*, *Castnia juturna* Hopffer, *Telchin licus laura* (H. Druce), *Ceretes marcelserres* (Godart), *Riechia acraeoides* (Guérin-Méneville), *Prometheus cochrus* (Fabricius), *Frostetola gramivora* (Schaus), *Paysandisia archon* (Burmeister)] son menos comunes en colecciones. *Telchin licus laura* (H. Druce) y *Frostetola gramivora* (Schaus) se mencionan por vez primera para el país. Cuatro especies no conocidas de Paraguay, pero posibles de encontrarse, también son reportadas [*Yagra fonscolombe* (Godart), *Castnia lecerfi* Dalla Torre, *Geyeria uruguayana* (Burmeister), *Ceretes thais* (Drury)].

Palabras clave: Biodiversidad Paraguaya, Taladradores gigantes, taxonomía, nuevo sinónimo, Paraguay

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Introduction

Interest on the Neotropical Castniidae has increased over the last 20 years, due to several factors, including the introduction of a South American species, *Paysandisia archon* (Burmeister) into Europe, where it has become a pest of relevance on ornamental palms (González & Stünning 2007; Sarto 2002, 2003). The publication of two synonymic checklists, several regional lists and research notes containing information on the natural history, biology and systematics of the family have contributed largely to improve knowledge and have helped in solving some of the taxonomic uncertainties within the family (Espinoza & González 2005; González 1997, 2003, 2004; González & Salazar 2003; González & Stünning 2007; González *et al.* 2010; Lamas 2004; Moraes 2010, 2011; Sandoval *et al.* 2008).

It is well known that the giant butterfly-moths (Castniidae) are difficult to collect making them usually rare in insect collections worldwide (Miller 1972, 1976, 1986; González 1999, 2003; González & Fernández Yépez 1992, 1993; González *et al.* 2006). Besides, several species may be endangered or declining due to native habitat destruction (González 2004; Lamas 1993). The later appears to be a certain possibility for some of the Paraguayan species.

Paraguay is a landlocked South American country bounded by Brazil, Bolivia and Argentina. With a subtropical climate, it is divided in two large natural regions: The Occidental region, with the dry and arid Chaco ecoregion, in Boquerón and Alto Paraguay Departments, and the humid Chaco ecoregion, in Presidente Hayes Department; and the Oriental region, more humid, with a mixture of various biogeographical regions. This region has been dramatically deforested since the 1970s. The Atlantic Forest which once covered the Departments of Itapúa, Alto Paraná, Caaguazú, Caazapá, Guairá and Canindeyú, is now limited to a few patches, almost confined to National Parks and/or wildlife preserves. The Cerrado ecoregion, in San Pedro, Concepción and Amambay Departments, is being progressively destroyed, for the sake of agriculture and raising livestock.

There are very few works with detailed information on Paraguayan Castniidae, and the present contribution aims to summarize what is known on the several species recorded from the country as well as those we suspect might be present.

Material and methods

Selected institutional and private collections mainly from Paraguay but also from South-, North America and Europe containing specimens of Castniidae were examined. Their codens are as follows:

AMNH	American Museum of Natural History, New York, New York, USA.
ANSP	Academy of Natural Sciences, Natural History Museum, Philadelphia, Pennsylvania, USA.
BYU	Brigham Young University Insect Collection, Provo, Utah, USA.
CFP	Fernando Penco Collection, Morón, Argentina.
CUIC	Cornell University Insect Collection, Ithaca, New York, USA.
DZUP	Departamento de Zoología, Universidade Federal do Paraná, Curitiba, Paraná, Brasil.
FCA/DE	Facultad de Ciencias Agrarias, Departamento de Entomología, Universidad Nacional de Asunción, San Lorenzo, Paraguay.
FMNH	Field Museum of Natural History, Chicago, Illinois, USA.
FSCA	Florida State Collection of Arthropods, Gainesville, Florida, USA.
IBIS-UNP	Área de Entomología, Instituto de Bioecología e Investigación Subtropical, Universidad Nacional de Pilar, Ñeembucú, Paraguay.
MACN	Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”, Buenos Aires, Argentina.
MFS	Museo Francisco Schade, Facultad de Ciencias Agrarias, Universidad Nacional de Asunción, San Lorenzo, Paraguay.
MGCL	McGuire Center for Lepidoptera & Biodiversity, Gainesville, Florida, USA.
MHNP	Muséum National d’Histoire Naturelle, Paris, France.
MLP	Museo de La Plata, Buenos Aires, Argentina.
MNHNPY	Museo Nacional de Historia Natural de Paraguay - Inventario Biológico Nacional, San Lorenzo, Paraguay.
NHM	Natural History Museum, London, United Kingdom.

NHMUM	Natural History Museum of the University of Michigan, Ann Arbor, Michigan, USA.
RVC	Roberto Vinciguerra Collection, Palermo, Italy.
SMNH	Swedish Museum of Natural History (Naturhistoriska Riksmuseet), Stockholm, Sweden.
TPC	Thierry Porion Collection, Jaujac, France.

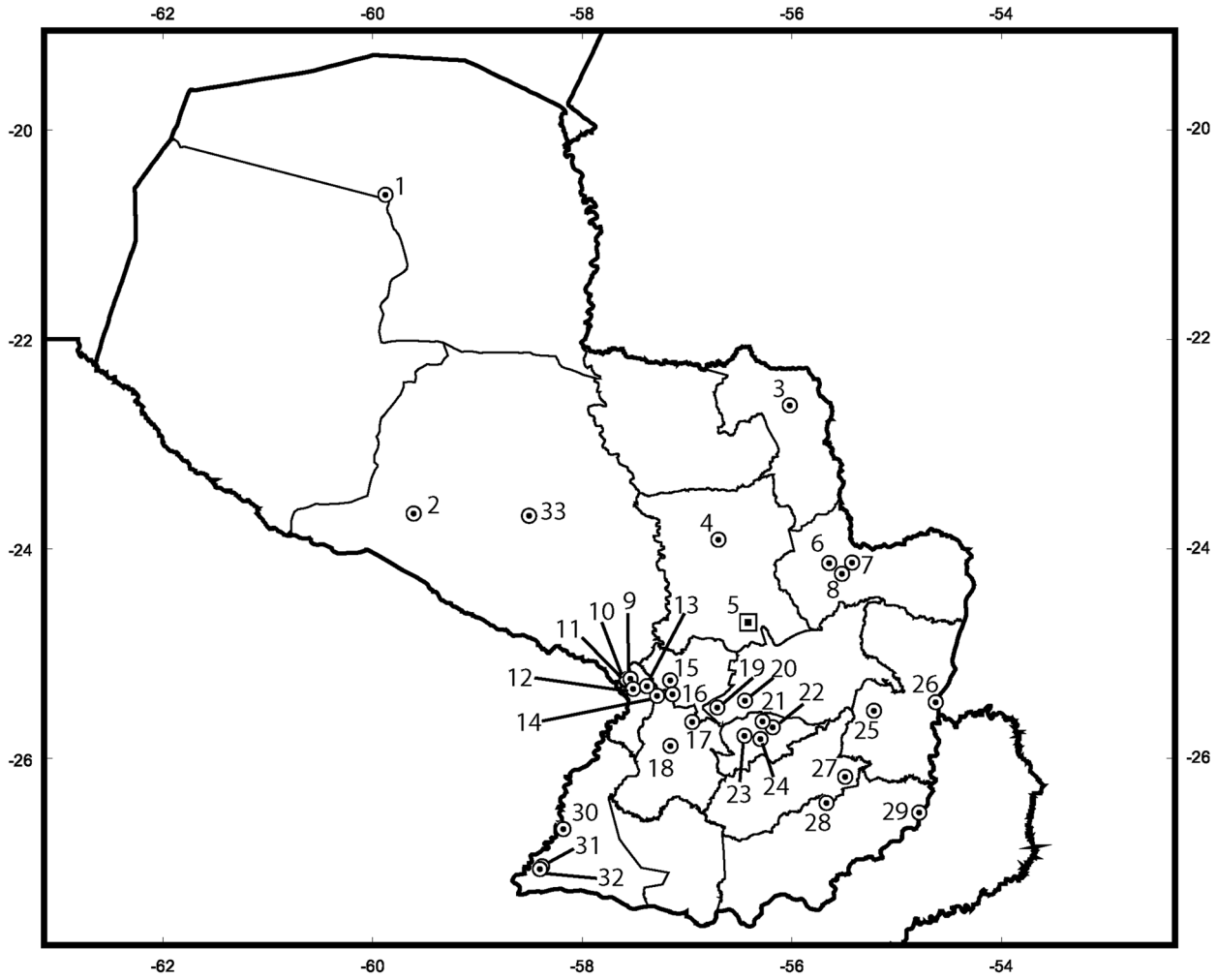


FIGURE 1. Map of Paraguay showing the Departments (in capital letters) and localities where Castniidae have been collected. ALTO PARAGUAY**:** 1. P. N. Defensores del Chaco: Madrejón; PRESIDENTE HAYES: 2. Fortín Nanawa; 33. Costa Esmeralda; AMAMBAY: 3. P. N. Cerro Corá; SAN PEDRO: 4. Nueva Germania; SAN PEDRO: 5. Molino Cué: 120 km N de Villarrica; CANINDEYÚ: 6. Villa Ygatimi: Rio Jejui-mi; 7) R.N. Mbaracayú: Lagunita; 8. R.N. Mbaracayú: La Morena; CENTRAL: 9. Asunción: Loma Pyta; 10. Asunción: Jardín Botánico; 11. Asunción: Barrio Trinidad; 12. San Lorenzo; 13. Areguá; 14. Ypacarai; CORDILLERA: 15. Atyrá; 16. Caacupé; PARAGUARÍ: 17. Sapucái (Sapucay); 18. Cerro Acahay; CAAGUAZÚ: 19. San José de los Arroyos; 20. Coronel Oviedo; GUAIRÁ: 21. Mbovevo 22. Colonia Independencia; 23. Villarrica; 24. Cerro Pelado; ALTO PARANÁ: 25. Alto Paraná, Estancia Dimes; 26. Hernandarias; CAAZAPÁ: 27. Tavai, 45 km E de San Juan Nepomuceno; ITAPÚA: 28. San Rafael, Estancia Nueva Gambach; 29. Puerto San Lorenzo; ÑEEMBUCÚ: 30. Arroyo Las Hermanas; 31. Paraje Itá Cajón; 32. Arroyo Franco Cué.

Results

The giant butterfly-moths are particularly rare in insect collections and the destruction of habitats in Paraguay is decreasing the possibility of recording species/specimens of the group in the country. We have been able to record twelve species in the country based on the literature and study of the insect collections cited above. At least four of the species [*Synpalamides phalaris* (Fabricius), *S. rubrophalaris* (Houlbert), *Castnia invaria penelope* Schaufuss, and *Gazera heliconioides micha* (H. Druce)] appear to be common, especially those with some sort of agricultural

pest status. We were unable to find specimens of at least two of the species cited [*Ceretes marcelserres* (Godart); *Prometheus cochrus* (Fabricius)] but we list them here because they have been previously collected in the country and reported by reputed entomologists. About nine of the species listed [*Imara satrapes* (Kollar), *Synpalamides phalaris* (Fabricius), *Synpalamides rubrophalaris* (Houlbert), *Castnia invaria penelope* Schaufuss, *Castnia juturna* Hopffer, *Telchin licus laura* (H. Druce), *Ceretes marcelserres* (Godart), *Riechia acraeoides* (Guérin-Méneville), *Prometheus cochrus* (Fabricius) and *Frostetola gramivora* (Schauss)] are from regions bordering Argentina and/or Brazil, and even though some of the specimens collected in Paraguay could be part of established Paraguayan populations we can not completely rule out the possibility that some might have been vagrants from those countries. Most species mentioned herein have been collected within the Paraguayan territory, indicating that they might have well established populations in the country (Figure 1). We also include herein some general comments on the natural history and biology of the species found or recorded, as well as some of probable occurrence in Paraguay. We did not provide descriptive notes on each species since they will be easily identified from figures 2–19.

***Imara satrapes* (Kollar, 1839)**
(Fig. 2)

Castnia satrapes Kollar, 1839
Castnia catharina Preiss, 1899
Castnia satrapes f. *aberrans* Strand, 1913
Castnia satrapes f. *rufimaculata* Strand, 1913
Castnia satrapes f. *sapucaya* Jörgensen, 1930
Castnia satrapes var. *pomposa* Niepelt, 1932
Castnia satrapes insolita Schweiser & Kay, 1941
Castnia sapuca J.Y.Miller, 1995, missp.
Imara satrapes catharina Lamas, 1995, **n. syn.**

Taxonomic history. Preiss (1899) described the subspecies *catharina* (as *Castnia catharina*) based on color differences with the nominate subspecies and illustrated a female with a band of red spots on the hind wings which are not present in the material later studied by Strand (1913). Strand (1913) states this particular subspecies differs from the nominate one in having a hindwing median band "light yellow instead of orange". He also mentions that the red spots could be a sexual difference present always in females but only occasionally in males (Strand 1913). Jörgensen (1930) reports that this is a rare subspecies but few specimens were collected by Höhn in the forests of Mbuvevo, Guairá Department. Breyer (1935) mentions that he collected *catharina* in Puerto Aguirre, Misiones, Argentina. Jörgensen (1930) described also the new form *sapucaya* based on a specimen collected by Heinrich in Sapucay, Paraguarí Department. Miller (1986, 1995) does not consider *sapucaya* [erroneously mentioned as *sapuca* in Miller (1995)] and *catharina* as valid subspecies placing them as synonyms. The topotype of *Castnia satrapes* is Brasil, Mato Grosso, [Vila Bela da Santíssima Trindade], [15º00'S, 59º57'W, 200m], west of Cuiabá and north of Pantanal, far from the locality from where f. *catharina* (Rio Grande do Sul) was described. Based on that premise (Lamas, pers. comm.), Lamas (1995) reinstated *catharina* as a valid subspecies while considering *sapucaya* a synonym of *I. satrapes*. The hindwing coloration of *Imara satrapes* is highly variable, and we do not see much sense in considering the Santa Catharina, Brazil and Paraguay specimens as a separate subspecies. Furthermore, Miller (1986; pers. comm.) studied large series of *I. satrapes* which allowed her to notice how variable the species is and also to include *catharina* as synonym, thus we prefer to follow Miller (1986, 1995) on this regard and consider *Imara satrapes catharina* as **new synonym** of *I. satrapes* until a more detailed study indicates otherwise.

Distribution. This species is known to be sympatric with *Imara pallasia* (Eschscholtz, 1821). They are both commonly found in the southeastern region of Brazil and even though the color pattern of their forewings are quite different, their hindwings are highly variable and in cases might be sligthly similar to each other (Miller 1986).

Even though we were able to examine just a few specimens from Paraguay, many have been collected and/or mentioned by a few authors in the past. Does this mean that the species used to be more common? Or is it just that collectors and entomologists have not been able to determine locations and/or times where adults emerge and fly?

Biology and behavior. Jörgensen (1930) mentions that it frequently flies in Paraguay around plants of "Caraguatá" (Bromeliaceae: *Bromelia* spp.?, *Caraguata* spp.?, *Pseudananas* spp.?). Miller (1986) mentions that she

found at the Museu Nacional-Rio de Janeiro, Brazil, a pupal skin with a label stating that it was found in *Bromelia simour* (an unknown plant species name, as far as we know. It might have been an erroneous translitteration) while an intact pupa had a label reading only "Bromeliaceae". Biezanko (1961b) mentions that the larva of this species feeds on *Bromelia fastuosa* Lindl. (Bromeliaceae). This species has been recorded flying high (over 10 m above ground) normally at mid-day (11:00–15:00) from November to February in Brazilian lowland and/or cloud forests (Miller 1986, Biezanko 1961a).

Material examined. GUAIRÁ: 1♀, "Paraguay. Villarica", A. Breyer Collection (MLP). **ITAPÚA**: 1♂, Estancia Nueva Gambach , 26°25´S, 55°40´W. 21.XII.2008 (MNHNPY). **ALTO PARANÁ**: 1♂, Estancia Dimes 25°33'S, 55°13'W. 19–23.XII.2005. Coll. U. Drechsel (MNHNPY);

Synpalamides phalaris (Fabricius, 1793)

(Fig. 3)

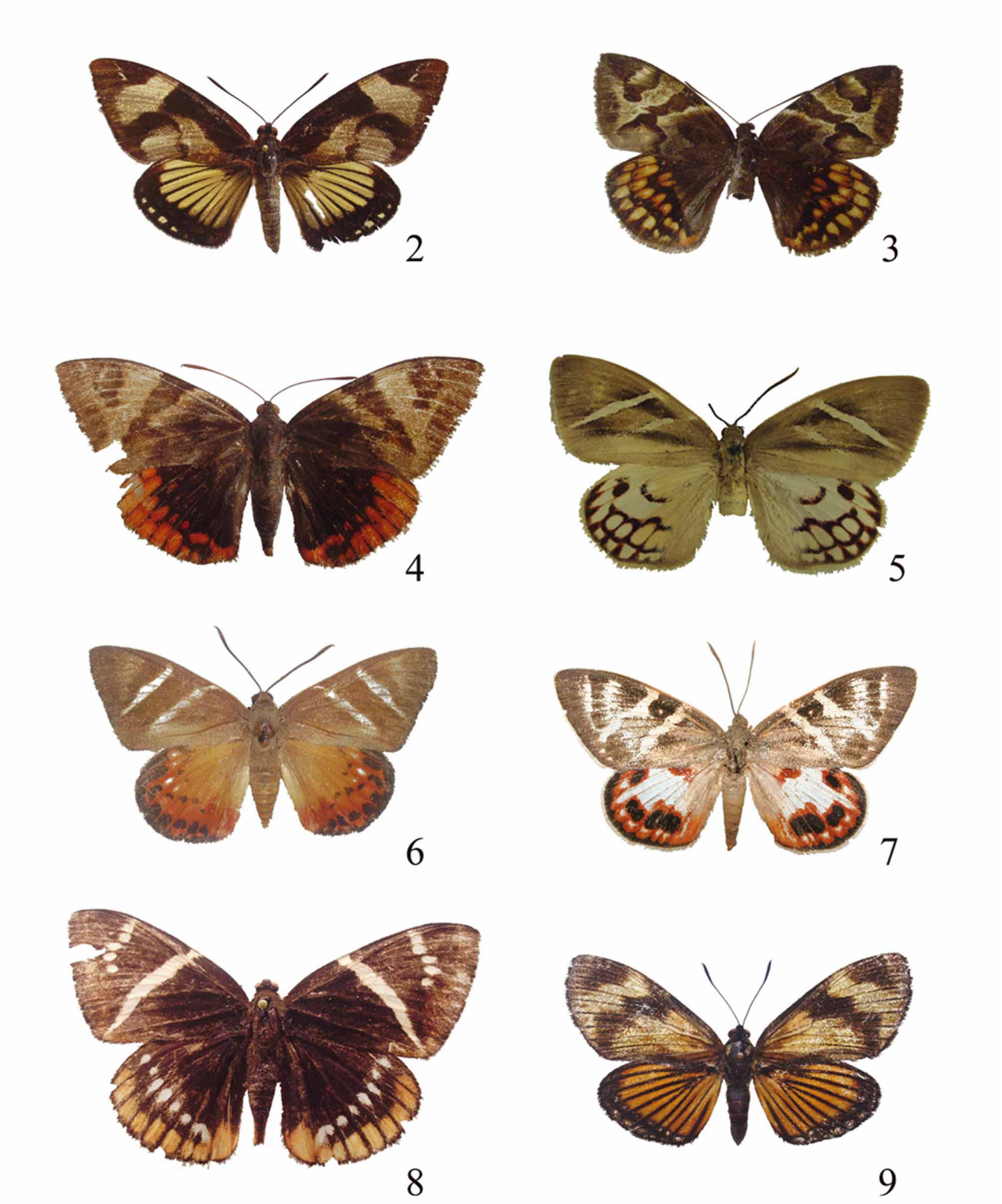
Papilio phalaris Fabricius, 1793

Taxonomic history. Druce (1896) described *Castnia sora* separating it from *Castnia mygdon* Dalman, 1824 (a junior subjective synonym of *phalaris*) basically by being darker. The description of the species is based on two specimens collected in San José, Caaguazú department, Paraguay. Strand (1913) clearly follows Druce (1896) and keeps the species as valid. Houlbert (1918) place *Castnia sora* in the genus *Sympalamide*s[sic]. Talbot (1919) mentions that the type of *Sympalamides*[sic] *sora* is "a red form of *mimon* Hübner". Lathy (1922) reports the species, as *Sympalamides*[sic] *phalaris sora* from Sapucay, Paraguay, in Fournier's collection. Jörgensen (1930) reports the rare presence of *Castnia* (*Sympalamides*)[sic] *phalaris sora* from Trinidad (Central Department), Sapucay (Paraguarí Department), Molino Cué, 120 km north of Villarrica (Guairá Department). He also mentions that the species was observed in large numbers by Schade (Jörgensen, 1930). Miller (1986, 1995) keeps the species as *Synpalamides sora* while Lamas (1995) placed *sora* as a synonym of *phalaris*. Benítez (1988, 2002) mentions the presence of the species, as *Castnia sara*[sic], in the Collection of the Department of Entomology at Universidad Nacional de Asunción. Back in November 2009, A. Contreras (pers. comm.) photographed a single specimen from Arroyo Las Hermanas, Ñeembucú Department, flying low and slowly alongside several *Castnia invaria penelope*, in an open area, densely covered with *Bromelia* spp. Even though Miller (1986) mentions that this is a highly variable species, she keeps several taxa as valid (Miller 1995) which were later synonymized by Lamas (1995). We suggest that *Synpalamides orestes* (Walker), *Synpalamides phalaris* (Fabricius) and *Synpalamides rubrophalaris* (Houlbert) could possibly represent stages of a morphological cline. Lamas (pers. comm.) agrees with us in this respect. However, only an in depth morphological study of large series of the many "forms" of those three species will allow to discern if there is a geographic correlation with the several known phenotypes.

Distribution. It has been reported from Brazil. Uruguay, and Paraguay, and specimens are known suposedly collected in Argentina (González & Cock 2004; González & Stünning 2007; González *et al.* 2010; Lamas 1995; Lathy 1922, 1923; Miller 1986, 1995).

Biology and behavior. Benítez (2002) mentions this species associated with pineapple (*Ananas* sp.? or *Pseudananas* sp.?) and bananas (*Musa* sp.). Jörgensen (1930) states that the species flies during November and December around plants of "Caraguatá" [*Bromelia balansae* Mez and *Pseudananas sagenarius* var. *macrodontes* (E. Morren) Camargo]. There is not much known about the life history of this species, however, females have been observed laying eggs on *Guzmania* sp. and *Bromelia* sp. (Bromeliaceae) (Miller 1986). It has been seen flying in forest clearings during January and February in certain areas of Brazil (Biezanko 1961b).

Material examined. PARAGUARÍ: 1♂, Cerro Acahay. 2.XI.1991. Coll. C. Aguilar [collected in lowland Forest] (MNHNPY); 1♂, "*Castnia sora* Druce", "*Sympalamides*[sic] *sora* Druce", "Paraguay, Sapucay, 2.XII.1903, W.Foster ,1903–138", "Collection Wm. Schaus" (MGCL). **CENTRAL**: 1♂, Asunción. Stma. Trinidad. 23.XII.1940 (FCA/DE); 1♀, [Asunción], Jardín Botánico, 28.XI.1955 (MFS). **CAAGUAZÚ**: 1♂, [Type of *Castnia sora*], "Type", "*Castnia sora* Druce", "*Castnia sora* ♂ type Druce", "San José, Paraguay, R. Perrens", "Ex. Coll. Herbert Druce 1913", "Joicey Bequest., Brit. Mus. 1934–120." (NHM, from a photograph provided by Dr. G. Lamas).



FIGURES 2–9. Adults of Castniidae. 2. *Imara satrapes* Kollar, ♂, Itapúa, Paraguay (MNHNPY); 3. *Synpalamides phalaris* (Fabricius), ♂, Asunción, Paraguay (FCA/DE); 4. *Synpalamides rubrophalaris* (Houlbert), ♂, Alto Paraná, Paraguay (MNHNPY); 5. *Castnia invaria penelope* Schaufuss (White morph), ♂, Sapucay, Paraguay (MGCL); 6. *Castnia invaria penelope* Schaufuss (red morph), ♂, Ypacaraí, Paraguay (FCA/DE); 7. *Castnia juturna* Hopffer, ♂, Argentina (MACN); 8. *Telchin licus laura* (H. Druce), ♂, Canindeyú, Paraguay (MNHNPY); 9. *Riechia acraeoides* (Guérin-Méneville), ♂, Asunción, Paraguay (MNHNPY).

***Synpalamides rubrophalaris* (Houlbert, 1917)**
(Fig. 4)

Castnia rubrophalaris Houlbert, 1917

Taxonomic history. Typical specimens of his species can be easily distinguished from typical *Synpalamides phalaris* based mainly in color differences. It was originally described by Houlbert (1917) from Brazil, Bahia as *Castnia rubrophalaris*. It was later placed in the genus *Sympalamides*[sic] (Houlbert 1918). Rothschild (1919) mentions the species [as *Castnia* (*Sympalamides*[sic]) *mygdon* form *rubrophalaris* Houlbert) collected in November, 1903, from Sapucay, Paraguay.

Distribution. The species is distributed in Southern Brazil, but reaches Paraguay, however there is a report of at least one specimen supposedly collected in Venezuela (Joicey & Talbot, 1925; Lamas 1995; Miller 1986, 1995)

Biology and behavior. It has been collected in Atlantic Forest in the areas of occurrence in Paraguay, where it is possible to find specimens perching on leaves of bushes or small size plants (Fig. 21). Ulf Drechsel (pers. comm.) mentions that *Synpalamides rubrophalaris* is relatively common in the Atlantic Forest of the Alto Paraná Department. The hosts are Unknown.

Material examined. 1♂, *Castnia sora*–Druce–(mpd.B.h (Paraguay) (Slide M-2557, Jacqueline Y. Miller) (MGCL). **PARAGUARÍ**: 1♂, (232), Sapucay, Paraguay, 10.11.04, (Slide M-2558, Jacqueline Y. Miller) (MGCL). **ALTO PARANÁ**: 1♂, Estancia Dimes, 25°33'S, 55°13'W. 19–23.XII.2005. Coll. U. Drechsel (MNHNPY). **CANINDEYÚ**: 1♀, Reserva de Mbaracayú, Puesto La Morena. 6–8.XI.1991. Coll. C. Aguilar & J. Kochalka [Collected inside Forested area] (MNHNPY); 1♂ Distrito Ygatimi: Río Jejui-mí, 7.XI.1998 (IBIS-UNP).

***Castnia invaria penelope* Schaufuss, 1870**
(Figs. 5–6)

Castnia penelope Schaufuss, 1870
Castnia endelechia H. Druce, 1893
Castnia juturna f. *paraguayensis* Strand, 1913, **n.syn.**
Castnia icaroides Houlbert, 1917
Castnia jordani Houlbert, 1917
Castnia (*Elina*) *icarus penelope* ab. *endelechiodes* Rothschild, 1919
Castnia minerva R. Krüger, 1926
Castnia icarus dividuus Röber, 1928
Castnia (*Elvina*[sic]) *icarus* f. *hoehni* Jörgensen, 1930
Castnia icarus patquiensis Breyer, 1943
Castnia endelechoides J.Y. Miller, 1995, missp.
Castnia icarioides J.Y.Miller, 1995, missp.

Taxonomic history. Jörgensen (1930) lists three subspecies under "*Castnia icarus*" which were later synonymized under *Castnia invaria penelope* by Lamas (1995). One of those is *endelechia* Druce, mentioned as abundant in Northern Argentina and in several locations in Paraguay (Jörgensen 1930). Breyer (1940) corroborates that *endelechia* is common in Paraguay. Krüger (1926) described specimens from Puerto San Lorenzo (Itapúa Department) as *Castnia minerva.* Krüger's new species was later synonymized under *C. invaria penelope* (Lamas 1995). Jörgensen (1930) also described the form *hoehni* (= *C. invaria penelope*) from Nueva Germania (San Pedro Department) where Höhn, in whose honor was named, "found it abundantly". Jörgensen (1930) also lists *invaria* Walker, as a rare find, collected in November and December in open fields in San Bernardino (Cordillera), Sapucay (Paraguarí) and Mbuvevo (Guairá). *Castnia invaria invaria* was originally described from, and appears to be restricted to Rio de Janeiro, in Southeast Brazil (Walker 1854; Houlbert 1918, Miller 1986, 1995, Lamas 1995). It also appears that the taxa described as *endelechia* Druce, *endelechoides* Rothschild, *patquiensis* Breyer, and *paraguayensis* Strand, might be phenotypes related to areas where the microclimates and potential hostplants are strikingly different from the areas where the "reddish" phenotypes of *C. invaria penelope* are found. *Castnia jordani* Houlbert, could be an intermediate phenotype between those found in both regions. *Castnia minerva* Krüger appears to represent a "connection" to *Castnia lecerfi* Dalla Torre, (fig. 17) so the latter might be considered as a synonym of *C. invaria pene-*

lope as well. It is quite clear that a large series of specimens of the different phenotypes from the entire recorded geographic distribution is required in order to assess the validity of the proposed names of most species/subspecies.

Distribution. This subspecies is widely distributed in Brazil, south of the Amazon River, and reaches Argentina, Bolivia and Paraguay (González & Stünning 2007).

Biology and behavior. It is a highly variable subspecies and several "color" morphs are known to occur together (Jordan 1906; González & Stünning 2007). Jörgensen (1930) collected several specimens in various locations in Paraguay including San Bernardino, Sapucay, Villarrica and Mbovevo which are in Cordillera, Paraguarí and Guairá Departments. He also mentions that this castniid could be found from November to January in any site where "caraguatás" (Bromeliaceae) were abundant.

We were able to collect one specimen of this subspecies from Cerro Corá, Amambay Department, in late October; there the first author saw groups of at least 10 different individuals flying fast, from 11:00 to 14:00 hs., over open spaces in an area covered with *Bromelia balansae* Mez. Ulf Drechsel (pers. comm.) reports the same behavior in Costa Esmeralda, Presidente Hayes Department, where he saw "numerous females, all of the white morph, flying over dense stockings of *Bromelia serra*, *B. hieronymi* and *Aechmea distichantha* in the Chaco thornbush, but laying eggs only on the base of *B. hieronymi*".

Rothschild (1919) mentions that the Tring Museum (now at NHM) had 8 ♂♂, 2♀♀ from Sapucay nr. Villa Rica, Paraguay, collected between November and December during the years 1902 to 1904 by W. Foster, as well as 2 ♂♂?, 1♂, from Paraguay but no further details are given.

It has been found in Paraguay attacking *Bromelia balansae* Mez and *Ananas macrodontes* E. Morren (Jörgensen,1930). The species is also known as a minor pest of pineapples [*Ananas comosus* (L.) Merr.] in several regions of South America (González & Stünning 2007; Miller 1986) including Paraguay. Pastrana (2004) mentions *Aechmea sp*., as host for "*Castnia elina*", and *Bromelia serra* Griseb, as host for *Castnia endelechia* (and citing Jörgensen 1930), in Argentina.

Material examined. GUAIRÁ: 3♂♂, "Paraguay, Independencia" A. Breyer Collection (MLP). **PARAGUARÍ**: 1♂, Sapucay, Paraguay, 25.12.[19]04, (genitalia vial no. M-3750, Jacqueline Y. Miller) (MGCL); 1♂, Sapucay, Paraguay, Ex. Coll. Herbert Druce, 1913, (Slide No. M-3033, Jacqueline Y. Miller) (MGCL); 1♂, Sapucay, 16.12.04 (MGCL); 1♂, Sapucay, n. Villa Rica, Nov. 02 (Foster), R304/23, (Slide No. M-7103, Jacqueline Y. Miller) (MGCL); 1♂, [Type of *Castnia endelechia jordani* Houlbert, 1918], Sapucay, Paraguay, 20.XI.[19]03, W. Foster, "Nov. Zool. 1906. Pl. 10, Fig. 3", "*endelechia* f. *jordani* Houlbert" (NHM, from a photograph provided by Dr. G. Lamas). **CENTRAL**: 1♂, Ypacarai, 18.XI.1968 (FCA/DE); 1♂, [Asunción], Jardín Botánico, 28.XI.1955 (MFS); **ÑEEMBUCÚ**: 4♂♂, Distrito Tacuaras, Arroyo Las Hermanas. 26.XI.2009. Coll A. Contreras (IBIS-UNP). **CANINDEYÚ**: 1♂, Reserva de Mbaracayú, Puesto Lagunita. 9.XI.1991. Coll. A. Fleitas (MNHNPY) [Collected in a forest near the building of Puesto Lagunita]. **ALTO PARAGUAY**: 1♀, Parque Nacional Defensores del Chaco: Madrejón, 15–16.XII.1982. Coll. J. Kochalka (MNHNPY), the specimen was collected sleeping under a *Bromelia* sp. leaf.

Castnia juturna Hopffer, 1856

(Fig. 7)

Taxonomic history. The species was originally described from Brazil by Hopffer (1856). Preiss (1899) mentions the species (erroneously as *Castnia inturna* in the text, but correctly in the included plate) from Rio Grande do Sul, Brazil. Burmeister (1879) confirms the presence of the species in Paraguay, but says that it is smaller than the Argentinian specimens and that the black marginal band of the hindwings is interrupted by two rows of white red-edged spots which are parallel to the margin. This "Paraguayan form" was later named *paraguayensis* by Strand (1913). After carefully studying the available literature and information on this and similar species, as well as discussions with experts on the group, we now consider that *paraguayensis* should be regarded as a **new synonym** of *Castnia invaria penelope*, and not of *Castnia juturna*. Krüger (1928) described the variety *vesta* from Cerro Pelado in the Guairá Department, Paraguay. Jörgensen (1930) mentions that he never saw a specimen from Paraguay but he observed them in at least one site in Argentina. He also thought that he confused form *vesta* with *paraguayensis* ("… esta forma [*vesta*] que he tomado por *paraguayensis* …") around Cerro Pelado, Guairá Department, in the Cordillera of Villarrica (Jörgensen 1930).

Distribution. Known from Northern Argentina, South East Brazil and Eastern Paraguay (Miller 1986).

Biology and behavior. Specimens were seen flying around *Dyckia floribunda* Griseb. (Bromeliaceae) in the Colonia Bompland region of Misiones, Argentina, and around *Dyckia distachya* fa. *induta* Hassl. (mentioned as *Dyckia microcalyx*) in the Villarrica region of Paraguay (Jörgensen 1930).

Material examined. 1♂, Paraguai, 3.XII.1927, Ex-col. Gagarin.(DZUP). **GUAIRÁ**: 1♂, "Cerro Pelado", A. Breyer Collection (MLP).

Telchin licus laura (H. Druce, 1896)

(Fig. 8)

Castnia laura H. Druce , 1896

Taxonomic history. The ssp. was originally described (as *Castnia laura*) by Herbert Druce (1896). Miller (1995) considered it a synonym of *Leucocastnia licu*s (Drury) and Lamas (1995) placed it as a ssp. of *Telchin licus* (Drury) . Benítez (2002) mentions *Castnia sora* (= *Synpalamides phalaris*) and *Castnia licus* in his list of forest and agricultural pests of Paraguay based on specimens deposited at the FCA/DE. The first author visited this collection in 2009 and only saw specimens of *Synpalamides phalaris* (Fabricius), *Castnia invaria penelope* Schaufuss and *Gazera heliconioides micha* (H. Druce) deposited there. These facts allow us to conclude that the "*Castnia licus*" mention in Benitez (2002) is just a misspelling of "*Castnia linus*" (= *G. heliconioides*).

Distribution. The type described by Druce is from Chapada dos Guimarães (Mato Grosso, Brazil) (Druce 1896). In a broader sense, *Telchin licus* (Drury) is found primarily in the Amazon Basin, with subspecies ranging from Honduras to Bolivia (Lamas 1995; González 2003).

One specimen collected in 1984, and deposited at the MNHNPY (see below), appears to be the first valid Paraguayan record of the species. It was collected in a region with a mixture of Atlantic Forest and Cerrado vegetation.

Biology and behavior. Benítez (2002) reports that this species is a pest of pineapples [*Ananas comosus* (L.) Merr.; Bromeliaceae] and Bananas (*Musa* spp.; Musaceae), however we could not autenticate these data in Paraguay since it was part of a host plant literature related to *Telchin licus* (Drury).

Material examined. CANINDEYÚ: 1♂, 34 km SE of Catueté. 19.II.1984. Coll. T. Bonace (MNHNPY).

Ceretes marcelserres (Godart, [1824])

(Figs. 10–11)

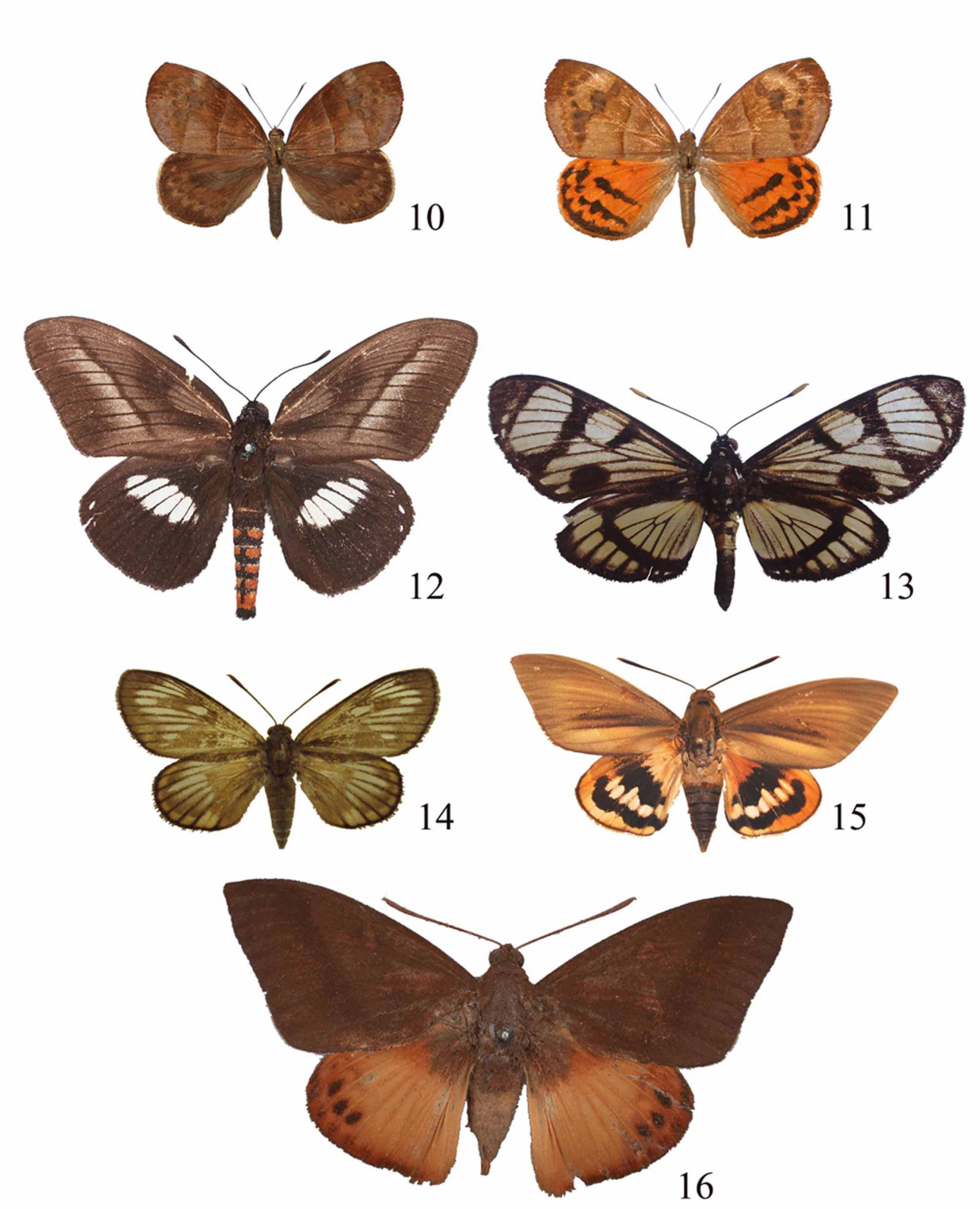
Castnia marcelserres Godart, [1824]

Taxonomic history. Jörgensen (1930) cited the species as *Castnia inornata* Walker [a junior subjective synonym of *marcelserres* (Lamas 1995)] and redescribed it after mentioning that the description given by Strand (1913), translated from Walker (1869) was erroneous. He also collected several specimens in the forest of Tapytá, some 45 km from San Juan Nepomuceno (Caazapá Department) and Mbuvevo (Guairá Department), Paraguay (Jörgensen 1930).

Distribution. It is distributed from South East Brazil to Paraguay and Bolivia (Miller 1986; Strand 1913). Breyer (1943) also mentions the presence of this species (as *Castnia marcelserres inornata*) in Paraguay, suspecting that it could also be in the region of Misiones, Argentina The species flies in Paraguay during November and December and they hide in small plants as do species of *Dysschema* Hübner (Erebidae, Arctiinae, Pericopini) (Jörgensen 1930). We could not find recent records of this species in Paraguay, but a few specimens have been collected in Misiones province, Argentina (Miller 1986; F. Penco, pers. comm.).

Biology and behavior. It appears that the larvae live in *Miltonia flavescens* Lindl. (Orchidaceae) which is very abundant in the region where this castniid flies in Paraguay (Jörgensen 1930).

Material examined. GUAIRÁ: 1♂, "Paraguay, Colonia Independencia", A. Breyer Collection (MLP).



FIGURES 10–16. Adults of Castniidae. 10. *Ceretes marcelserres* (Godart), ♂, Misiones, Argentina (CFP); 11, *Ceretes marcelserres* (Godart), ♀, Misiones, Argentina (CFP); 12. *Prometheus cochrus* (Fabricius), ♂, Brazil (FMNH); 13. *Gazera heliconioides micha* (Druce), ♂, Sapucay, Paraguay (MNHNPY); 14. *Frostetola gramivora* (Schaus), ♂, Alto Paraná, Paraguay (DZUP); 15. *Paysandisia archon* (Burmeister), ♂, Spain (RVC); 16. *Yagra fonscolombe* (Godart), ♂, Brazil (FMNH).

***Riechia acraeoides* (Guérin-Méneville, [1832])**
(Fig. 9)

Castnia acraeoides Guérin-Méneville, [1832]

Taxonomic history. The genus was discerned thanks to its resemblance to certain species in the genus *Actinote* (Nymphalidae: Acraeinae) (Miller 1986). The species was described by Guérin-Méneville in the genus *Castnia*, and was eventually placed in the genus *Herrichia* (Buchecker, [1880]). Since this proposed genus was found to be preoccupied, Oiticica (1955) replaced it for *Riechia*.

Distribution. Widely distributed in South East Brazil, this species can be also found in Northern Argentina and Paraguay (Miller 1986; Jörgensen 1930). It resembles some species of *Actinote* Hübner (Nymphalidae: Acraeinae) (Miller 1986; Jörgensen 1930). Jörgensen (1930) cites it from San Bernardino, Cordillera Department, Paraguay.

Biology and behavior. Two males were collected by the first author on two different dates in a disturbed forest in Asunción. Both were resting under an Yvapurú tree, *Myrciaria cauliflora* (Mart.) O. Berg, Myrtaceae, at midday. *Tillandsia* sp., a possible hostplant, was observed to be quite common in this forest. The species has been detected flying during the day in December and January in some locations in Brazil (Biezanko 1961a).
The larvae have been found feeding on *Tillandsia meridionalis* Baker and *T. didisticha* (E. Morren) Baker (Bromeliaceae) (Miller 1986). They have been reared in Argentina under laboratory conditions using pseudobulbs of *Miltonia flavescens* Lindl. (Orchidaceae) (A. Tricio, pers. comm.). A female was observed ovipositing on *Oncidium jonesianum* Rchb. f. (Orchidaceae) (Jörgensen 1930). Biezanko (1961a) mentions that the larvae feed on *Tillandsia aeranthos* (Loisel) L.B. Smith (Bromeliaceae) and a few Orchidaceae (*Cattleya intermedia* (Graham), *C. loddigesii* Lindl. and *Laelia purpurata* (Lindl. & Paxton).

Material examined. CENTRAL: 1♂, Asunción, 25°14´ S, 57°32´ W. 28. III. 2009, Coll. S.Ríos (MNHNPY); 1♂, Asunción, 25°14´ S, 57°32´ W. 3. IV. 2009, Coll. S.Ríos (MNHNPY).

***Prometheus cochrus* (Fabricius, 1787)**
(Fig. 12)

Papilio cochrus Fabricius, 1787

Taxonomic history. Miller (1995) recognizes three species [*cochrus* (Fabricius), *garbei* Foetterle, and *houlberti* Rothschild] in the genus and two subspecies for *cochrus* [*cochrus* (Fabricius) and *intermedia* Raymundo), however the enormous variation within the species [mentioned also by Miller (1986)] led Lamas (1995) to synonymize them all under *cochrus*.

Distribution. Distributed in South East Brazil, this highly variable species also reaches Paraguay (Miller 1986; Jörgensen 1930). The species (cited as *Castnia* (*Prometheus*) *garbei*) has been collected in Mbuvevo, Guairá Department, Paraguay, during the months of November and December (Jörgensen 1930).

Biology and behavior. This species has been seen in Brazil flying from 11:00 to 15:00 during December and January in clear areas close to creeks (Biezanko 1961a). According to Jörgensen (1930) they possibly attack plants in the genera *Bromelia* and *Ananas* (Bromeliaceae) because he collected specimens flying around them in Mbuvevo. Biezanko (1961a) mentions that the larvae feed on several Bromeliaceae (*Ananas comosus* (L.) Merr., *Bromelia antiacantha* Bertol and *Tillandsia aeranthos* (Loisel) L.B. Smith).

Material examined. CAAGUAZÚ: 1♂, "Caa-Guazú, Paraguay", A. Breyer Collection (MLP). **GUAIRÁ**: 1♀, "Paraguay. Independencia", A. Breyer Collection (MLP).

***Gazera heliconioides micha* (H. Druce, 1896)**
(Fig. 13)

Castnia micha (H. Druce, 1896)

Taxonomic history. Described in the genus *Castnia* by Druce (1896) but later included in the genus *Cabirus* by Houlbert (1918). Talbot (1919) mentions that *micha* "can only be considered as a race and not as a distinct species".

Distribution. This subspecies is known from Bolivia, Paraguay and South East Brazil (Miller 1986; Lamas 1995; Rothschild 1919). Jörgensen (1930) states that it is common in all the Eastern region of Paraguay. It is, apparently, together with *Castnia invaria penelope*, the commonest castniid species in Paraguay. Jörgensen (1930) mentions that it flies in forested areas, near bromeliads (*Bromelia* sp. and *Ananas* sp.). It is frequently found perching close to the ground at the base of leaves or grasses and the way the moth rests and its wing and body coloration (Fig. 20b) allows it to "disappear" in the surroundings. The first author observed individuals flying in urban places of Asunción, the capital city of Paraguay. He also observed them flying in Sapucay, Paraguarí Department and in Cerro Corá, Amambay Department. Ulf Drechsel (pers. comm.) collected and observed specimens in Sapucay, Paraguarí Department, and in Areguá, Central Department; while Contreras (2009) collected them in Ñeembucú Department.

Biology and behavior. Like all taxa in the genus, they have a close resemblance to members of *Lycorea* Doubleday (Nymphalidae: Danainae), *Thyridia* Hübner and *Methona* Doubleday (Nymphalidae: Danainae, Ithomiini), and to *Notophyson heliconides* (Swainson) (Erebidae: Arctiinae, Pericopini) (Miller 1986; Lamas 1973).

Two males were observed by the first author in Paraguarí and Amambay Departments, while flying low and slowly, along paths surrounded with *Bromelia balansae* Mez, which allowed for easy collection. They also perched close to the ground (Fig. 21). These observations clearly contrast with those made by Contreras (2009) in more disturbed habitats, where specimens were found flying fast, strongly and very high (7–8 m above ground).The host plant is unknown, but we suspect that the larvae feed on *Bromelia* spp. and/or *Ananas* spp. Contreras (2009) mentions that Orchidaceae could also be hosts of this species.

Material examined. 1♂, *Castnia micha* Druce, 494, Paraguay (SMNH). **CORDILLERA**: Caacupé, 22.IX.1969 (FCA/DE); 1♀, Atyrá, X.2002, Coll. C.Aguilar (MNHNPY). **GUAIRÁ**: 2♂♂,1♀, "Paraguay, Independencia", A. Breyer Collection (MLP); 1♂, 1♀, Carlos Pfannl, Paraguay, no date (TPC). **CAAGUAZÚ**: Coronel Oviedo, 25.X.1972 (FCA/DE); 1♂, "Paraguay, Caa-Guazú", XII-1948, Coll. F.H. Schade, A. Breyer Collection (MLP);. **PARAGUARÍ**: 1♂, Sapucay. 8. X. 2008. Coll. S.Ríos (MNHNPY); 1♂, Sapucay, Paraguay 8.XI. 1997. Coll. U. Drechsel (MNHNPY); 1♂, Sapucay, Oct. 24, [1]900 (NHMUM). **CENTRAL**: San Lorenzo, 23.X.1985 Coll. J.Estigarribia (FCA/DE). **ÑEEMBUCÚ**: 1♂, Distrito Humaitá, Arroyo Franco Cué, 15.XI.2006 (IBIS, 1719) (IBIS-UNP); 1♂, Distrito Isla Umbú, Arroyo Hondo, paraje Itá Cajón, 13.XII.2006 (IBIS, 2109) (IBIS-UNP). **AMAMBAY**: 1♂, Parque Nacional Cerro Corá, 25.X.2009 Coll. S.Ríos (MNHNPY).

Frostetola gramivora (Schaus, 1896)

(Fig. 14)

Castnia gramivora Schaus, 1896

Taxonomic history. Originally described in the genus *Castnia* by Schaus (1896). It was later placed in the genus *Tephrostola* by Houlbert (1918). However, since it was a preoccupied name, Oiticica (1955) replaced it with the new name *Frostetola*. The misleading original descriptions given by Schaus (1896), of the form *parana* by Strand (1913), and of the putative species *Castnia fenestrata* by Houlbert (1918) complicated the taxonomic treatment of this taxon.

Distribution. Although Miller (1986) mentions that this species is restricted to the states of São Paulo and Paraná in southeastern Brazil, several individuals have been collected and seen flying in the region of Hernandarias, Alto Paraná, Paraguay (O. Mielke, pers. comm.). As far as we know, this is the first published mention of *Frostetola gramivora* for Paraguay.

Biology and behavior. Adults are active from late December to mid January, flying during noon hours along grassy marshes (Miller 1986). Some adults were seen perching on grasses in Brazil (Miller 1986). Hosts are unknown.

Material examined. ALTO PARANÁ: 1♂, 21-I-1980, 10Km N de Hernandarias, Paraguai, 250m, Coll. O.C. Mielke & Miers leg. (MGCL); 3♂, 1♀, eggs, 21.I.1980, 10 km N de Hernandarias, Paraguai. 250m, Coll. O. Mie-

lke & Miers leg. (DZUP). Regarding these specimens collected by Mielke, he wrote that the species is "… muito comum em Hernandarias, uns 10 km ao norte de Cidade de Leste". Thus, they were found in Hernandarias proper and not "10 km N" of it as written in the label (O. Mielke, pers. comm.).

Paysandisia archon (Burmeister, 1880)

(Fig. 15)

Castnia archon Burmeister, 1880

Taxonomic history. Originally described in 1880 from Argentina in the genus *Castnia*, it was later described as *Castnia josepha* by Oberthür (1914). Houlbert (1918) had not seen the *archon* specimens described by Burmeister and placed the species in the now invalid genus *Orthia*. He also placed *josepha* in the genus *Paysandisia* (Houlbert 1918; Sarto 2002). The first images of the species were published by Jörgensen (1930). Some authors like Bourquin (1930, 1933) and Breyer (1931) noticed that *archon* and *josepha* were actually the same species (Sarto 2002). Miller (1995) treated the populations of Argentina and Uruguay as separate subspecies, as *archon archon* and *archon josepha* respectively. But Lamas (1995) did not see any purpose in keeping them as two different taxa and considered *josepha* just a synonym. A detailed account of these historic remarks can be found in Sarto (2002).

Distribution. The species appears to be restricted to South East Brazil, Northern Argentina, Western Uruguay and Paraguay (Miller 1986, Montagud 2004, Sarto 2002, González & Stünning 2004). The species was introduced from Argentina to Europe apparently between 1985 and 1995 and became well established as a pest of several palm species (Aguilar *et al*. 2001; González & Stünning 2004; Sarto 2002, 2003; Montagud 2004). The presence of the species in Paraguay has been confirmed to us by G. Lamas and V. Sarto (pers. comm.) and was reported by Montagud (2004) and Sarto (2002). Sarto (2002) mentions that the Paraguayan Chaco is part of the range of the native habitat for the species. It is highly possible that *Prometheus archon* could be found along the south eastern region of the country (Misiones and Itapúa Departments), because there are some vegetation patches, known as "Sabanas de la Mesopotamia" (Guyra Paraguay 2005) which have a striking similarity to the Pampas, Argentina, where the species is frequently found.

Biology and behaviour: It has been reported attacking several palm species (Arecaceae) in the genera *Latania*, *Chamaerops* and *Phoenix* (Miller 1986). It has also been detected attacking other Arecaceae, such as *Trachycarpus*, *Trithrinax*, *Phoenix*, *Chamaerops*, *Butia*, *Washingtonia*, *Brahea*, *Livistona* and *Syagrus* (Sarto 2002).

Material examined. PRESIDENTE HAYES: The only Paraguayan specimen known to the authors is from Fortín Nanawa, and is deposited at the NHM, its label reads "S. America: Paraguayan Chaco, Nanahua[sic], III.1928, Coll.G.S.Carter" (V. Sarto, pers. comm.).

Species that probably occur in Paraguay

As far as we know, the following species have not been reported from Paraguay. However, they have been collected not only in neighboring countries, but most especially in areas close to the borders of Paraguay. We believe that they could also occur here and our suspicion has been also corroborated by G. Lamas (pers. comm.).

Yagra fonscolombe (Godart, [1824])

(Fig. 16)

Castnia fonscolombe Godart, [1824]

Taxonomic history. Described originally in the genus *Castnia*, it was later placed in the genus *Graya* by Buchecker ([1880]). Since *Graya* was preoccupied, Oiticica (1955) proposed *Yagra* as replacement. According to Miller (1986) the similarity between *Yagra* and *Hista* "called into question the maintenance of *Yagra* as a separate taxonomic entity" but she found enough diagnostic morphological and behavioral differences to keep *Yagra* as a

separate genus. Moraes *et al.* (2011) have recently corroborated that morphological features in the genus are not shared with other Neotropical Castniidae and their genitalia are quite distinct and diagnostic.

Distribution. Distributed in southeastern Brazil and northeastern Argentina. We suspect that the species could appear in eastern Paraguay, next to the Brazil and Argentina borders, in the regions of Amambay, Canindeyú and Alto Paraná Departments.

Biology and behavior. This species with warm-brown colored forewings has been observed flying from 10:30 to 13:00 at 7–12 m above ground in tropical forests (Miller 1986). They have a flying pattern similar to that of *Caligo* Hübner (Nymphalidae: Morphinae, Brassolini). The hosts are unknown. However, species in the genus have been recorded feeding on "Bromeliaceae" in Brazil (Miller 1986, Zikán & Zikán 1968).

Material examined. 1 ♂, Brazil, J.Doll. Ac. 24352 (AMNH); 1 ♂, Brazil, F.E. Watson; 1 male Brazil, Coll. ? (AMNH); 1 ♂, Brazil, South America (ANSP); 1 ♀, Joinville, S.C. [Brazil], IV-1976, Coll. ? (BYU); 1 ♂, Joinville, Santa Catarina, Brasil, 6. 01. 1990, Local coll. leg. (RVC); 1 ♂, Brazil, Cornell U. Lot 283, sub. 12. G. Francke (CUIC); 1 ♂, Rio de janeiro, Brasil, Br. Pohl, i-1931, Cornell U. Lot 819, sub. 121 (CUIC); 1 ♂, Brazil, 1932, B.K. Smith Coll., Cornell U. lot. 814, sub. 2337 (CUIC); 1 ♂, Joinville, Sta. catarina, S. Brazil, III-1972, J. Kasselring, Joao Pessoa, Paraiba, Brazil, August Scmitt Collection, C.U. lot 1030 (CUIC); 1 ♂, Joinville, Sta. catarina, S. Brazil, 1-II-1973, J. Kasselring, Joao Pessoa, Paraiba, Brazil, August Scmitt Collection, C.U. lot 1030 (CUIC); 1 ♀, Brazil, lot 283, sub. 12, cosl. ay. (CUIC); 1 ♂, Brazil, Rio Iguazu, 1920, Ex Coll. Brabant (MGCL); 1 ♀, Brazil, I, 218, Lectotype, Ancienne Collection (MHNP, from a photograph provided by Dr. G. Lamas); 2 ♂♂, Misiones, Argentina, Coll. A. Breyer (MLP); 1 ♂ Joinville, Santa Catarina, Brasil, 16.06.1989, Local coll leg. (RVC)

Castnia lecerfi Dalla Torre, 1913

(Fig. 17)

Taxonomic history. This species was originally described as *Castnia wagneri* by Le Cerf (1911) but since that name was unavailable by reason of being a junior homonym, it was replaced by the name *lecerfi* (Dalla Torre 1913, Houlbert 1918, Lamas 1995).

Castnia minerva Krüger, appears to be an intermediate form between *Castnia invaria penelope* Schaufuss and *Castnia lecerfi* Dalla Torre, which might eventually mean that the later species would become a synonym of *penelope*. Only a detailed study of a large series of specimens will help us clarify the status of these taxa.

Distribution. The material studied by Le Cerf was collected by E.G. Wagner in Villa Lutecia, near San Ignacio, Misiones (Argentina), near the Paraná River. This is less than 5–10 km away from Itapúa Department (Paraguay), and for this reason we believe that *Castnia lecerfi* may fly in the remaining patches of Atlantic Forest or in natural grasslands, from Itapúa and other nearby regions in Paraguay.

Biology and behavior. Nothing is known on the possible hosts of this species.

Material examined. Only pictures (provided by G. Lamas and F. Penco) of the male holotype deposited at the MHNP, and two specimens from Argentina [1♂, Mogotes, La Rioja, Argentina; 1♀, Santiago del Estero, with the "Allotipus" label (Breyer 1931, 1943)] in the Alberto Breyer Collection at MLP, are known to the authors.

Geyeria uruguayana (Burmeister, 1879)

(Fig. 18)

Castnia uruguayana Burmeister, 1879

Taxonomic history. Originally described in the genus *Castnia* it was later placed in the genus *Geyeria* (Buchecker [1880]). Even though three subspecies were recognized by Miller (1986, 1995), they were all synonymyzed under *uruguayana* by Lamas (1995).

Distribution. The species is distributed in Argentina, Uruguay and Southeastern Brazil where it flies from November through February–March (Miller 1986).

Biology and behavior. The flight pattern is slow and hovering, atypical of most Castniidae. While individuals can be observed flying during mid-day, they occasionally fly at different times if disturbed (Miller 1986). Biezanko (1961a) states that the larvae feed on *Eryngium paniculatum* Cav. & Dombey ex F. Delaroche (Apiaceae).

Material examined. 1 ♂, *Castnia uruguaiana*[sic] Bium.[sic], Col. F. Bourquin, Rep. Argentina, Paysandu. Slide N° M-7135, ♂ append. Jacqueline Y. Miller (MGCL); 1 ♀, *Castnia uruguayana* Burm., Col. F. Bourquin, Rep. Argentina, Paysandu, I-30; 1 ♀, *Castnia uruguayana champaquiensis*, Córdoba, Argentina, Cerro Champaquí, Sierras de Cordoba, 2.400 m. I-1929, Coll. A. Breyer, Typus (MLP) [this specimen is the one illustrated by Breyer (1929)]; 1 ♂, Tibagi PR, Boa Vista, Brazil, 1000 m., 12.05.2005 (RVC).

FIGURES 17–19. Adults of Castniidae. 17. *Castnia lecerfi* Dalla-Torre, ♂, Argentina (MHNP); 18. *Geyeria uruguayana* (Burmeister), ♂, Argentina (MGCL); 19. *Ceretes thais* (Drury), ♂, Brazil (FMNH).

Ceretes thais (Drury, 1782)

(Figs. 19)

Papilio thais Drury, 1782

Taxonómic history. The genus *Ceretes* was proposed by Schaufuss (1870) to include the species "Nicon H[übner].", "Thais D[rury]" and "Marcel-Serres God[ar]t". Miller (1986) and Lamas (1995) recognize only two species (*thais* and *marcelserres*) in the genus and *nicon* is considered a synonym of *thais*.

Distribution. Since this species is distributed from southeastern Brazil to Bolivia, and there are records of the species collected in Misiones, Argentina (Miller 1986) [even though Lamas (pers. comm.) considers the Bolivian citations as possibly incorrect] it will not be surprising that it could also be found in Paraguay.

Biology and behavior. This genus is the only markedly sexually dimorphic in the family (Miller 1986). Very little information is known about the species, except that adults can be seen flying during January and February mainly (Miller 1986). Hosts are unknown.

FIGURES 20–21. Adults of Castniidae are seeing here while perching in the typical stegopterous position. 20. *Synpalamides rubrophalaris* (Houlbert) on an unidentified Arum (Araceae) leaf (Alto Paraná, Estancia Dimes) (Picture: Ulf Drechsel). 21. *Gazera heliconioides micha* (H. Druce) on a twig, close to the soil surface (Amambay, Cerro Corá) (Picture: Sergio Ríos).

Material examined. 1 ♂, Corupá, Brazil, Jan-1959 (CUIC); 1 ♀, Corupá, Brazil, XII-1945, A. Mäller (CUIC); 1 ♀, Corupá, Brazil, July 1965, FMNH-INS 0000 041 483 (FMNH); 1 ♂, Petropolis, Brazil, Jones, Brazil, Strecker Coll. 25652, FMNH-INS 0000 041 484 (FMNH); 1 ♀, Rio de Janeiro, Brazil, Strecker Colln 25653, FMNH-INS 0000 041 485 (FMNH); 1 ♀, Brazil, December, Blumenthal (FSCA); 1 ♀, Brazil, Coll. Dr. Frank Hedges (FSCA); 1 ♀, Iguazú, Misiones, Argentina, Coll. A. Breyer (MLP): 1 ♂, Brazil, Joinville, XII, 1958, local coll.leg. (RVC); 1 ♀ Brazil, Boca do Mato, xii.2001, Cachotiras de Macacù (RVC); 2 ♀♀, Brazil, Boca do Mato, Cachotiras de Macacù, m.500, 21.01.1996 (RVC).

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