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Castniidae of the Museum of Natural History of the University of Wrocław: new findings from Friedrich Wilhelm Niepelt's collection with comments on Karl Adolf Georg Lauterbach and August Weberbauer

Jorge M. González[1], Paweł J. Domagała[2]

1 *Austin Achieve Public Schools, Austin, TX 78723, (Research Associate, McGuire Center for Lepidoptera and Biodiversity), USA; e-mail: gonzalez.jorge.m@gmail.com*

2 *University of Opole, Institute of Biology, ul. Oleska 22, 45-052 Opole, Poland; e-mail: pdomagala@uni.opole.pl*

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Abstract. Further results of our research into the Giant Butterfly-Moths (Castniidae) of the Museum of Natural History (University of Wrocław) are presented. Castniids of the Niepelt collection had previously been reviewed. However, while curating other sections of the Lepidoptera collection, we discovered 18 misplaced specimens belonging to nine taxa of Castniidae, several of them bearing typical labels by Niepelt. Among them, two are of particular interest, insofar as they are associated with the world-class botanists August Weberbauer (1871–1948) and Karl Adolf Georg Lauterbach (1864–1937).

Introduction

Examination of rich collections of Castniidae and other insect groups in several Polish museums (González et al. 2013a, b; Domagała et al. 2015, 2017a, b; Domagała and Dobosz 2019) led the authors to continue the exploration of such ever-surprising depositories. The role of museums as important repositories of biodiversity has been stressed on many occasions (e.g., Burrell et al. 2015; Domagała and Dobosz 2019). The information retained in natural history vouchers can shed light on aspects of genetic and climate changes, adaptations to evolving environments, inter- and intraspecific relationships, and even historical events (Suarez and Tsusui 2004; Winker 2004; Hartley et al. 2006; Bi et al. 2013; Domagała and Dobosz 2019).

Polish museums are sources of historically interesting entomological material (González et al. 2013a, b; Domagała et al. 2015, 2017a, b; Domagała and Dobosz 2019; Taszakowski et al. 2019). Silesia held the role of a major center for entomological research, with many highly recognized entomologists and skilled traders who worked in this region (Mencfel 2010; González et al. 2013b; Domagała and Dobosz 2019). Some dealt with exotic fauna and their material is still enhancing private and institutional collections, both locally and worldwide.

Friedrich Wilhelm Niepelt (1862–1936) was one such entomologist and dealer. Niepelt was born in Striegau (Strzegom), a town in the Lower Silesia province in the South West of today's Poland (Calliess 1932; Strand 1932, 1938; González et al. 2013b). He established a prosperous business manufacturing and selling entomological supplies and animals, mainly insects collected in expeditions or traded with collectors from other regions, principally South America (Calliess

1932; Strand 1932). He also became knowledgeable in Lepidoptera and published many works describing new taxa (Röber 1932). He typically sold specimens with pre-printed labels (often in black ink) bearing "Collection Niepelt." at the bottom and a black border framing the label to allow him to write the name of the taxon and its place of origin (Fig. 2a). Many insects (and other animals) sold by Niepelt are scattered around museums worldwide (González et al. 2013a, b). However, between 1932 and 1936, Niepelt donated about 13,000 specimens of Lepidoptera, originally obtained from South America, Asia and Africa, to the University of Wrocław, which were then deposited in the university museum while he was still alive (Strand 1932; Berner 1996; González et al. 2013b). For this reason, the University of Wrocław honoured him with some sort of distinction (González et al. 2013b). However, it seems that many other specimens were sold (or donated) either by him or via other collectors to the museum on different occasions, before and after his principal donation.

The Castniidae from the Niepelt collection of Lepidoptera at the Museum of Natural History of the University of Wrocław have been reviewed by González et al. (2013b). However, while curating other sections of the Lepidoptera collection, we became aware of several additional specimens bearing the typical Niepelt labels (Fig. 2a). The purpose of this note is to complement the previous work (González et al. 2013b) and provide comments and data on the newly found specimens.

Materials and methods

The Castniidae specimens listed here were found in the Museum of Natural History at the University of Wrocław (Poland) (MNHW) while curating the Lepidoptera collection from 2013 to 2020. With some exceptions, they seem to have come from Niepelt, having either been bought individually or as part of other collections obtained by the MNHW.

The systematic list provided herein follows Lamas (1995), Miller (1995), and Moraes and Duarte (2014), with minor changes.

Every taxon is briefly commented upon, from a historical perspective or from associated collecting data drawn from the label.

Results

Among the many Lepidoptera curated in the insect collection of the MNHW, 18 specimens belonging to nine taxa of Castniidae were found.

Synpalamides fabricii (Swainson, 1823)

Comments. Moraes and Duarte (2014) synonymized the genus *Hista* Oiticica, 1955 with *Synpalamides* Hübner, [1823], an arrangement that we follow for now. This species is almost exclusively found in south-southeast Brazil, where it is usually on the wing from December to February in areas of Atlantic Forest (Moraes et al. 2010; Penco 2011). Very little is known about its biology, but its larvae are known to feed on *Tillandsia aeronthos* (Loisel.) L.B. Sm. (Bromeliaceae) (Enslen 1920; Biezanko 1961).

Material examined. 1♂, *C. boisduvali*, S.[ão] Paulo, [Brazil], coll. ?; 1♀, *C. beskei*, Brasil, Collection Niepelt, (Fig. 1f).

Yagra fonscolombe (Godart, [1824])

Comments. A common species in Southern Brazil and northern Argentina, whose distribution might reach Paraguay (Moraes et al. 2011; Ríos and González 2011). Many collections worldwide have large series of this species, though almost nothing is known about its ecology and behavior (Moraes et al. 2011).

Material examined. 1♀, *Castnia fonscolombei* [sic], Brasil, Collection Niepelt, (Fig. 1i).

Imara pallasia (Eschscholtz, 1821)

Comments. This is a species restricted to southeastern Brazil where it is found together with *Imara satrapes* (Kollar, 1839)"…usually [in] primary forest or cloud forest." (Miller 1986; González and Stüning 2007; González et al. 2010; González and Domagała 2019). Almost nothing is known about its ecology and behavior (Miller 1986).

Material examined. 1♀, *C. pallasia*, Esch[scholtz], St.[Santa] Cathar[ina], [Brazil], Collection Niepelt, (Fig. 1c).

Synpalamides phalaris (Fabricius, 1793)

Comments. A highly variable species distributed from Southeastern Brazil, Argentina, Paraguay and Bolivia to French Guiana, Trinidad and Tobago, and Venezuela (González et al. 2010; Ríos and González 2011; González and Worthy 2017; González and Domagała 2019). This is probably a bivoltine species, and individuals have been observed laying eggs on bromeliads of the genera *Guzmania* Ruiz & Pav., 1802, and *Bromelia* L., 1753 (Bromeliaceae), but it is also associated with pineapple and banana crops (Bromeliaceae and Musaceae respectively) in its southernmost distribution (Jörgensen 1930; Miller 1986; Penco 2011; Ríos and González 2011; González and Worthy 2017).

Material examined. 1♂, Brasilien, [Coll.?] Lauterbach, 1547, coll.? *Synpalamides phalaris*, det. A. Wanat, (Figs 1b, 2d–g).

Castnia invaria trinitatis Lathy, 1925

Comments. This is a northern subspecies commonly found in the Orinoco River Basin and north of the Amazon River, from Colombia, throughout Venezuela, east to the Guianas and on the Island of Trinidad (González and Stünning 2007; González et al. 2010; Iorio and Zilli 2016; González and Domagała 2019).

Material examined. 1♀, Franz Guyana, 222, coll.?, *Castnia invaria volitans*, det. A. Wanat, (Fig. 1d).

Telchin evalthe quadrata (Rothschild, 1919)

Comments. This subspecies was named from specimens collected in Peru and Ecuador and differs from other subspecies, mainly *T. evalthe evalthoides* (Strand 1913), by subtle differences in

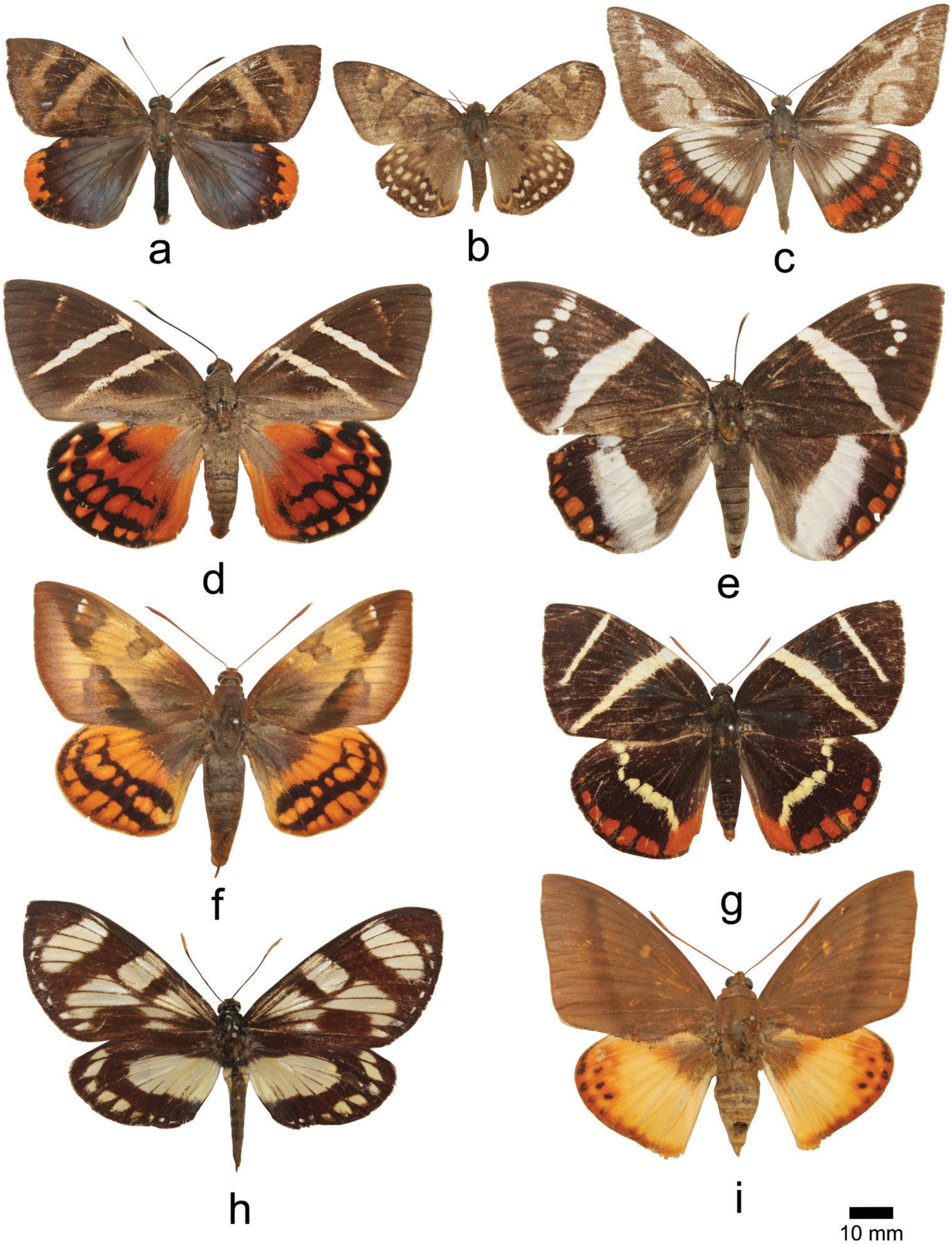

Figure 1. Butterfly-Moths (Lepidoptera: Castniidae) from the Insect collection of the Museum of Natural History, University of Wrocław, Poland. **a.** *Ceretes thais* male, [Brazil] Minas Gerais; **b.** *Synpalamides phalaris* male, Brazil, [Coll.?] Lauterbach, 1547; **c.** *Imara pallasia* female, [Brazil], Santa Catharina, Collection Niepelt; **d.** *Castnia invaria trinitatis* female, [French Guiana], 222; **e.** *Telchin licus* female, Brazil, Collection Niepelt, Peru Weberbauer, S.G.; **f.** *Synpalamides fabricii* Brazil, Collection Niepelt.; **g.** *Telchin evalthe quadrata* male, Ecuador, Macas, 1905-08; **h.** *Prometheus heliconioides* female, [Brazil], Tefé, Amazonas, Tijunin; **i.** *Yagra fonscolombe* female, Brazil, Collection Niepelt. Figures are to scale. Scale bar: 10 mm.

the external appearance (Rothschild 1919; Lamas 1995; González et al. 2013b). The species is a member of a group that deserves a full morphological and molecular study to clarify its taxonomic composition.

Material examined. 1♂, Macas, Ecuador, 1905-08, coll.? *Xanthocastnia evalthe* (F.), det. A. Wanat, (Fig. 1g).

Telchin licus (Drury, 1773)

Comments. This is perhaps the most common species in the family, it is highly variable and often associated with sugarcane (*Saccharum officinarum* L., Poaceae), and is also known as a secondary pest of plantains and bananas (*Musa* spp., Musaceae) (González and Fernández Yépez 1993; González and Stüning 2007; González et al. 2013b; González and Domagała 2019). Due to the confusing taxonomy of the few associated subspecies, we prefer to treat this species as monotypic until a more detailed work clears up its infraspecific structure.

Material examined. 3♂♂, no data, *Telchin licus* (Dr.), det. A Wanat, coll. ?; 1♀, *licoides* ♀, 5.xi. [no locality]; 1♂, Juanjuy [= Juanjui], Peru, 221, *Telchin licus*, det. A. Wanat, coll.?; 1♂, *C. lindella*[sic], Peru, "illegible", 19.7.[19]36, coll.?; 1♂, *Castnia licur*[sic], Colind. Thinp. 17.8.[19]35, coll.?; 1♂, *Castnia licuides* [sic], N. Brasilien, coll.?; 1♀, *C. licus* Drury, Brasil, Collection Niepelt, Peru Weberbauer, S.G. [head missing, but antennae attached; one of the antennae broken and glued back], (Figs 1e; 2a–c).

Ceretes thais (Drury, 1782)

Comments. This sexually dimorphic species is commonly found in southern Brazil, but its geographic range includes the northern Argentinian province of Misiones, and it could possibly be found in Paraguay (Ríos and González 2011; González et al. 2013b; González and Domagała 2019). There is a record from Bolivia that might be incorrect (Ríos and González 2011; González et al. 2013b). Unfortunately, almost nothing is known about the biology and ecology of this species (González and Domagała 2019).

Material examined. 1♂, Minas Gerais, [Brazil], 225, coll.?, Ceretes thais det. A. Wanat. (Fig. 1a).

Prometheus heliconioides (Herrich-Schäffer, [1853])

Comments. This species is easily recognized by its color pattern, which mimics *Lycorea* Doubleday, [1847], *Thyridia* Hübner, 1816, and *Methona* Doubleday, [1847] (Nymphalidae), and the moth *Notophyson heliconides* (Swainson, 1833) (Erebidae), which could all form part of a mimetic ring (Lamas 1973; Miller 1986; Ríos and González 2011; González and Domagała 2019). However, a morphological and/or molecular study of its several purported subspecies could clarify their taxonomic status. The specimen has a label identifying it as *Diamuna falcata* [now *Darceta falcata* (Druce, 1883)] an Erebidae to which *P. heliconioides* bears no resemblance. It was probably mislabeled.

Material examined. 1♀, Teffé [= Tefé], Amazonas, [Brazil], *Diamuna falcata* ♀, Teffe [= Tefé], Amaz.[onas], [Brazil], Tijunin. 37, *Gazera heliconioides*, coll.?, (Fig. 1h).

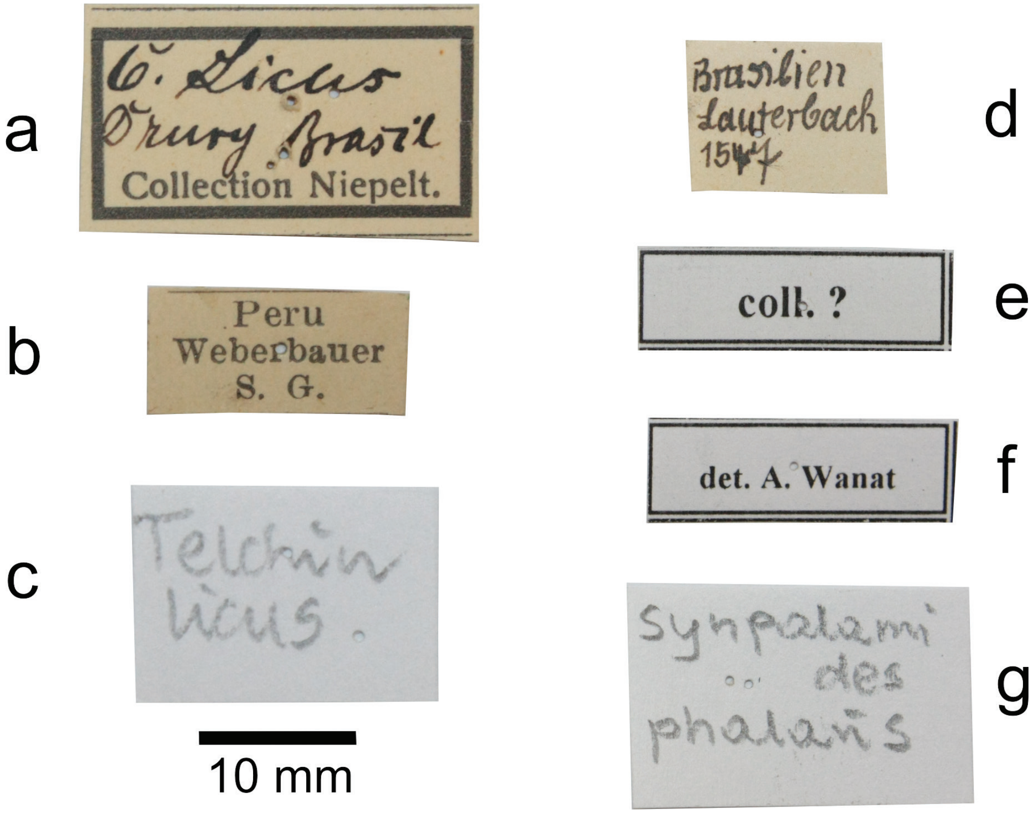

Figure 2. Labels attached to specimens in the collection of Giant Butterfly-moths (Lepidoptera: Castniidae) of the Museum of Natural History, University of Wrocław, Poland. **a–c.** labels attached to a specimen of *Telchin licus*; **d–g.** labels attached to a specimen of *Synpalamides phalaris*. Figures are to scale. Scale bar: 10 mm.

Discussion

Our earlier studies of Castniidae in the MNHW collection included 37 specimens belonging to 22 species and subspecies (González et. al. 2013b). That list is now supplemented with these 18 newly found specimens. Therefore, the collection of Castniidae in MNHW now comprises 55 specimens of 24 species and subspecies.

Two of the newly located specimens, one of *T. licus* and another of *S. phalaris*, deserve special mention.

One of the *T. licus* specimens was found with the typical Niepelt label, but it also has an enigmatic label with the words “Peru Weberbauer S.G.” (see Fig. 2b). This is not the only specimen with this type of label we have found in the MNHW collection (see Domagała and González 2021). Even though the meaning of this label is difficult to assess, we suggest that the specimen might have been part of the botanist August Weberbauer’s (1871–1948) insect collection. Weberbauer was born in Breslau (Wrocław) and was a naturalist, biologist, and widely recognized botanist (Baca de García 1949; Mularczyk 2010; Domagała and González 2021). He made expeditions to Peru and returned to Wrocław, where his father Otto Weberbauer (1846–1881), also a naturalist and botanist, had established various collections, including one with insects. Eventually, August was invited by the Peruvian government to take a permanent job over there. He became a highly respected researcher and ended his days in Peru (Baca de García 1949). The “Weberbauer” label includes the letters “S.G.” which might mean either “Sammlung Gekauft” (bought collection) or “Sammlung Gespendet” (donated collection). August probably kept his father’s collection and before moving to Peru in 1908 sold it to Niepelt, who then donated it to the University of Wrocław (Domagała and González 2021).

A similar situation is found with a specimen of *S. phalaris*, which we attribute to Karl Adolf Georg Lauterbach. Lauterbach, born on April 21st, 1864, in Breslau (Wrocław), was an explorer and botanist. After his high school education at St. Mary Magdalene Gymnasium in Wrocław, he went to the University of Breslau (Wrocław) in 1885 (Syniawa 2006).

He continued his studies at the University of Heidelberg where, in 1889, he received his Ph.D. in Botany. After graduation, together with his friend, Russian biologist Vladimir Shevyakov (1859–1930), he started a journey around the world. During their travels, they visited the US, Hawaii, New Zealand, Australia, and Java. At this point, Shevyakov returned to Russia, but Lauterbach continued alone and went to the Solomon Islands and New Guinea. He returned to Germany in 1891. Later, in 1896 he undertook a new exploratory expedition to the Bismarck Mountains in New Guinea. During this expedition, he discovered and explored the previously unknown Ramu river. By 1899 he became the director of the Neu-Guinea Compagnie and started his next mission to the Ramu river valley. Expeditions and official duties allowed him to return to his estate in Stabelwitz (part of Breslau since 1928) in 1907, where he kept an impressive collection of exotic plants in his greenhouse; there he carried out scientific work based on material collected during his expeditions. After his 50th birthday, he was awarded the honorary title of professor at the University of Breslau (Wrocław). He died on August 1st, 1937 (Syniawa 2006) when, according to his last will, his collections became the property of the University of Wrocław. The most important part of Lauterbach’s collections was a huge herbarium of over 50,000 sheets (Rostański 1963; Wanat and Pokryszko 2014). However, the donated collection included shells, insects, and birds (Syniawa 2006).

Based on our data and the fact that Lauterbach never traveled to South America, we infer that this specimen was not caught by him. As a devoted naturalist and collector, he was able to buy specimens for his private collection or acquire them through exchanges with other collectors. Unfortunately, information about the type and number of species donated to MNHW has not survived. In our opinion, the number 1547 attached to the specimen is probably an inventory number, by which we can conclude that there were more than 1,500 lepidoptera specimens donated.

Our research sheds new light on the origin of some specimens of butterflies and moths in this museum and shows that interesting collections of Lepidoptera were established by two world-class botanists. Unfortunately, we do not know how large their collections were and which species they contained. Certainly, they are valuable and interesting, and further research at MNHW or other museums could hopefully lead to these pieces of information being unveiled.

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