

The discovery, description and taxonomy of *Paysandisia archon* (Burmeister, 1880), a castniid species recently found in south-western Europe (Castniidae)

VÍCTOR SARTO I MONTEYS

Departament d'Agricultura, Ramaderia i Pesca-Fundació CReSA/Entomologia, Universitat Autònoma de Barcelona. Campus de Bellaterra, edifici V, 08193 Bellaterra, Barcelona, Spain. E-mail: victor.sarto@uab.es

Summary. *Paysandisia archon* (Burmeister, 1880) is an attractive castniid moth whose presence in Europe has been recently reported. Its larvae are endophagous (the first instar can be partly exophagous) and feed inside the trunks and branches of several species of Areaceae (palm trees), such as *Trachycarpus*, *Trithrinax*, *Phoenix*, *Chamaerops*, *Butia*, *Washingtonia*, *Brahea*, *Livistona* and *Syagrus*. The present paper deals with the historical aspects of its discovery in the Argentine province of Catamarca, becoming the first castniid species ever found in Argentina. Details concerning its description by Hermann Burmeister, based on probably only two specimens that he did not collect himself, and the subsequent taxonomy of this moth, which was originally included in the genus *Castnia* Fabricius, 1807, are reported. Widespread errors concerning the original date of publication of *archon* (which is 1880) as well as that of its synonym *josepha* Oberthür (which is 1914) are discussed and corrected. The only known paralectotype of *Castnia archon* Burmeister, 1880, a male, is figured (Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires).

Zusammenfassung. Seit kurzem ist die ursprünglich südamerikanische Art *Paysandisia archon* (Burmeister, 1880) (Castniidae) auch aus Spanien und S-Frankreich bekannt. Die Larven leben endophag (die des ersten Stadiums z.T. exophag) im Stamm von Palmen (Areaceae) wie *Trachycarpus*, *Trithrinax*, *Phoenix*, *Chamaerops*, *Butia*, *Washingtonia*, *Brahea*, *Livistona* und *Syagrus*. Hier wird die Entdeckungsgeschichte in der argentinischen Provinz Catamarca dargestellt. *P. archon* war die erste aus diesem Land bekannt gewordene Castniiden-Art. Einzelheiten zur Erstbeschreibung durch Hermann Burmeister und die taxonomische Beurteilung von *P. archon* (die zunächst der Gattung *Castnia* Fabricius, 1807 zugeordnet wurde) durch spätere Autoren werden berichtet. Irrtümer zum Jahr der Originalbeschreibung von *archon* (1880) und dem subjektiven Synonym *josepha* Oberthür (1914) werden diskutiert und berichtigt. Der einzig bekannte männliche Paralectotypus von *Castnia archon* Burmeister, 1880 wird abgebildet (aufbewahrt im Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires).

Résumé. *Paysandisia archon* (Burmeister, 1880) est un attirant castnidien dont la présence vient d'être récemment signalée en Europe. Ses larves sont endophages (le 1er. stade peut être partiellement exophage) et elles se nourrissent à l'intérieur des troncs et des branches de plusieurs espèces d'Areaceae (palmiers), telles que *Trachycarpus*, *Trithrinax*, *Phoenix*, *Chamaerops*, *Butia*, *Washingtonia*, *Brahea*, *Livistona* et *Syagrus*. Ce travail traite exclusivement de certains aspects historiques concernant sa découverte dans la province Argentine de Catamarca, devenant ainsi la 1ère espèce de castnidien trouvée en Argentine. Y sont ajoutés des détails de la description faite par Hermann Burmeister, basée très probablement sur uniquement deux exemplaires qui n'avaient même pas été capturés par lui, et de la taxonomie subséquente de cet insecte qui à l'origine avait été inclu dans le genre *Castnia* Fabricius, 1807. On y discute et corrige des erreurs largement répandues sur la date originale de publication d'*archon* (qui est 1880) ainsi que celui de son synonyme *josepha* Oberthür (qui est 1914). On y figure le seul paralectotype connu, un mâle, pour *Castnia archon* Burmeister, 1880 (Muséo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires).

Resumen. *Paysandisia archon* (Burmeister, 1880) es un atractivo cástnido cuya presencia en Europa se ha dado a conocer recientemente. Sus larvas son endófagas (el primer estadio puede ser parcialmente exófago), y se alimentan en el interior de troncos y ramas de varias especies de Areaceae (palmeras), tales como *Trachycarpus*, *Trithrinax*, *Phoenix*, *Chamaerops*, *Butia*, *Washingtonia*, *Brahea*, *Livistona* y *Syagrus*. El presente trabajo trata tan sólo de aspectos históricos relativos a su descubrimiento en la provincia Argentina de Catamarca, convirtiéndose en la primera especie de cástnido hallada en Argentina. Se aportan detalles de su descripción por Hermann Burmeister, basada probablemente en tan sólo dos ejemplares que no habían sido capturados por él mismo, y de la subsiguiente taxonomía de esta polilla, la cual había sido originalmente incluida en el género *Castnia* Fabricius, 1807. Se discuten y corrigen errores ampliamente extendidos sobre la fecha original de publicación de *archon* (que es 1880) así como el de su sinónimo *josepha* Oberthür (que es 1914). Se figura el único

paralectotipo conocido, un macho, de *Castnia archon* Burmeister, 1880 (Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires).

Key words. *Paysandisia, archon*, Castniidae, Europe, Arecaceae, pest status, history, taxonomy

Introduction

Paysandisia archon is an attractive castniid moth whose presence in Europe was recently indicated by Aguilar *et al.* (2001) as having a well established population in the north-eastern Spanish province of Girona, within Catalonia. In the following towns, arranged from north to south, larvae were found within palm trunks: Cornellà de Terri, Sant Feliu de Pallerols, Les Planes d'Hostoles, Bordils, La Cellera de Ter, Anglès. Towns in that province where typical damage on the palms has been detected (although trunks were not cut open to look for the larvae) are, at the time of writing, as follows: Vila-Sacra, Sant Pere Pescador, Pontós, Bàscara, L'Escala, Torroella de Montgrí, Cornellà del Terri, Sant Feliu de Pallerols, Les Planes d'Hostoles, Bordils, Jafre, Celrà, La Pera, Sant Gregori, Cervià, La Cellera de Ter, Anglès, Bescanó, Palafrugell, Vall-Llobrega, Vilobí d'Onyar, Santa Coloma de Farners, Caldes de Malavella, Llagostera, Santa Cristina d'Aro, Castell-Platja d'Aro, Arbúcies, Sant Feliu de Buixalleu, Breda. In September 2001, several adults were seen flying around palm trees at the locality of Cardedeu, the first record in the province of Barcelona. Later, its presence was also reported from south-eastern France (Sarto i Monteys & Aguilar 2001; Drescher & Dufay 2001), in the areas of Hyères and Toulon (Departement de Var).

The larvae of this moth are endophagous (the first instar can be partly exophagous) and feed mainly inside the trunk of several species of Arecaceae (palm trees), such as *Trachycarpus*, *Trithrinax*, *Phoenix*, *Chamaerops*, *Butia*, *Washingtonia*, *Brahea*, *Livistona* and *Syagrus*. Infected trunks may be severely damaged because of the galleries produced by the larvae as they bore into them, as well as by secondary infections by fungi and other micro-organisms that may result. Although this species is not considered to be a palm pest in its native habitat (north-western Argentina, Paraguayan Chaco, western Uruguay and the southernmost state of Brazil, Rio Grande do Sul, all located between 25–35° southern latitude), it certainly is so in Spain and France. Full details of its pest status will be given in a separate paper (Sarto i Monteys & Aguilar, in prep.).

The present paper deals with the discovery, description and taxonomy of this castniid moth. While conducting a thorough bibliographic search into the historical background of this species several inaccuracies were discovered that require correction.

First period: from Burmeister to Strand (1878–1913)

Paysandisia archon was described in 1880, as *Castnia archon*, by Dr. Hermann Carl Conrad Burmeister, then Director of the Museo Público de Buenos Aires (now the Museo Argentino de Ciencias Naturales "Bernardino Rivadavia"), where the types (actually two syntypes) are currently housed. However, if one checks the entry for *archon* in the checklist of Neotropical Castniidae (Miller 1995), the year of publication is given as 1879. The same year appears in Lamas' 1995 checklist in which he makes a very thorough and critical review of the previous checklist by Miller. This same

mistake is reproduced in all publications consulted where the year of description for *archon* is quoted (from Breyer 1931 to Drescher & Dufay 2001). The only exception to this is that of Miller (1986) in which the correct year, 1880, is given. It seems inexplicable, therefore, that Miller reverted to 1879 in her 1995 checklist.

Checking the original publication by Burmeister one can understand how the mistake may have originated. In 1878 Burmeister published his “*Description physique de la République Argentine...*”. This book contained no plates; these were published later in a separate, but complementary work, the “*Atlas de la description physique de la République Argentine...*”, published in two installments, or “livraisons” in French, each clearly stating the year of publication on its title page. The first livraison was published in 1879 and the second one in 1880; the two together contained 64 text pages (the first (1879) pages 1–40 and the second (1880) pages 41–64) as well as 24 colour plates, plus one supplementary monochrome plate.

On page 54 of the second livraison (1880), Burmeister includes a section entitled “Additions et corrections du tome V” and it is on page 56 where he provides the description of *archon*: “1. **Castnia archon**. *C. fusco-testacea; alis anticis satis angustis, acutis, immaculatis; posticis aurantiacis, macula magna disci sinuosa nigra, cum maculis sex albidis, in fasciam transversam congestis. Exp. Alar. 4–4½ [10–11 cm.]*”.

It is worth noting that, although it is not the main subject of this paper, the date of publication of *Castnia uruguayana* (now *Geyeria uruguayana*) must also be 1880 and not 1879 as appears in some checklists, e.g. in that of Lamas (1995). Burmeister describes it on pages 56–57 of this second livraison.

It is historically interesting to note that in his 1878 book (mainly dealing with Argentine Lepidoptera) Burmeister deals with the family Castniidae (his “Dixième Famille”) on pages 298–301 and later (*Atlas* pl. IX, Fig. 13, 14) even figured the wing design and venation of two species. In his text, he seems very familiar with Neotropical castniids, giving quite accurate morphological and ethological observations, as well as narrating one particular encounter he had in Brazil with *Castnia decussata* (now *Geyeria decussata* (Godart [1824])).

However, in 1878, no castniids had yet been found in Argentina. Burmeister explains: “*Nous avons reçu dernièrement, dans l’ouvrage de Boisduval: Spec. génér. des Lépid. Hétéroc. tome 1, une synopsis des espèces connues, dont l’auteur en décrit 68 de l’Amérique tropicale et 10 de Nouvelle Hollande. Jusqu’à présent aucune n’a été trouvée dans notre territoire, mais comme des différentes Orchidées et Broméliacées sont indigènes dans les forêts vierges des Missions et du Grand Chaco du Nord, nous avons encore l’espérance de rencontrer une ou autre espèce de ce groupe particulier*”.

The wait was not long as just two years later, Burmeister mentions the first castniid species for Argentina, a new species from the northwestern Province of Catamarca, which he described as *Castnia archon*.

The type specimens of *archon* were given to Burmeister by a collector called Georg Ruscheweyh, who in turn had received them from an unknown collector as originating from the “Province of Catamarca” (as it is specified in the original description).

According to Dr. Bachmann (pers. comm.), curator of entomology at the Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”, there are only two specimens, one male and one female, of *archon* housed in this museum bearing a label handwritten by Burmeister; the labels read “*Archon* Burm.” and are accompanied by another typewritten pink label reading “Typus”. Because Burmeister did not designate a holotype in the original description, these two specimens must be considered syntypes; most likely they were the only ones received from Ruscheweyh. Unfortunately, no further labels can be found either pinned with these two specimens or within the drawer that contains them, so precise data on their origin is lacking.

Concerning the type locality for *archon*, “Province of Catamarca”, serious doubts arise about its validity. In fact, after Burmeister’s description in 1880, it has never been found there nor in the neighbouring Province of La Rioja, both in northwestern Argentina. Jörgensen (1930) explains that although he lived for three years in the Province of Catamarca and intensively looked for castniids there, he never saw it. Furthermore, according to Jörgensen, the moth was also never found by Dr. Giacomelli in La Rioja where the latter lived nearly all his life. Moreover, not a single modern record exists. According to Dr. Bachmann (pers. comm.) there are virtually no palm stands in these two provinces and this would account for the lack of *archon* populations, since its larvae are specialized palm feeders.

The specimens on which Burmeister based his description of *Castnia uruguayana*, just after *Castnia archon* in the same 1880 publication, were also received via Georg Ruscheweyh from an unknown collector. However, in *uruguayana* the exact type locality is given in the original description as Paysandú (Uruguay). My reckoning is that the two *archon* syntypes given by Ruscheweyh to Burmeister also came from the Uruguayan town of Paysandú, where *archon* was and is very abundant, and that they were mislabelled, possibly intentionally as there was an eagerness to find the first castniid species for Argentina. The truth will probably never be known.

Burmeister did not provide a figure of his *Castnia archon*, which possibly accounted for some confusion as to its identity among subsequent authors, as well as the redescription of the species in 1914 by Oberthür as *Castnia josepha* (see below). Jörgensen (1930) figured for the first time the female syntype housed at the present Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”, from a black-and-white photograph made by Dr Carlos Bruch (see below), although stating incorrectly that it was Burmeister’s type of *archon* and neglecting the male syntype. This female syntype must be considered the *archon* lectotype, as according to Article 74.5 of the Code (ICZN 1999), Jörgensen’s action constitutes a valid lectotype designation. Subsequently (see articles 73.2.2. and 74.1.3. of the Code), the male syntype becomes automatically a paralectotype; the latter is figured here (Fig.1) for the first time.

When Embrik Strand dealt with the Neotropical Castniidae, together with Adalbert Seitz, who wrote a fine introduction to this group and had considerable personal experience himself with Neotropical castniids (Seitz & Strand 1913), they included “*Castnia archon* Burm.” on page 13, but added nothing new to Burmeister’s notes, simply reproducing Burmeister’s original description of *archon*. They stated for example that *archon* is similar to the Brazilian *Castnia therapon*, though twice as big, more or

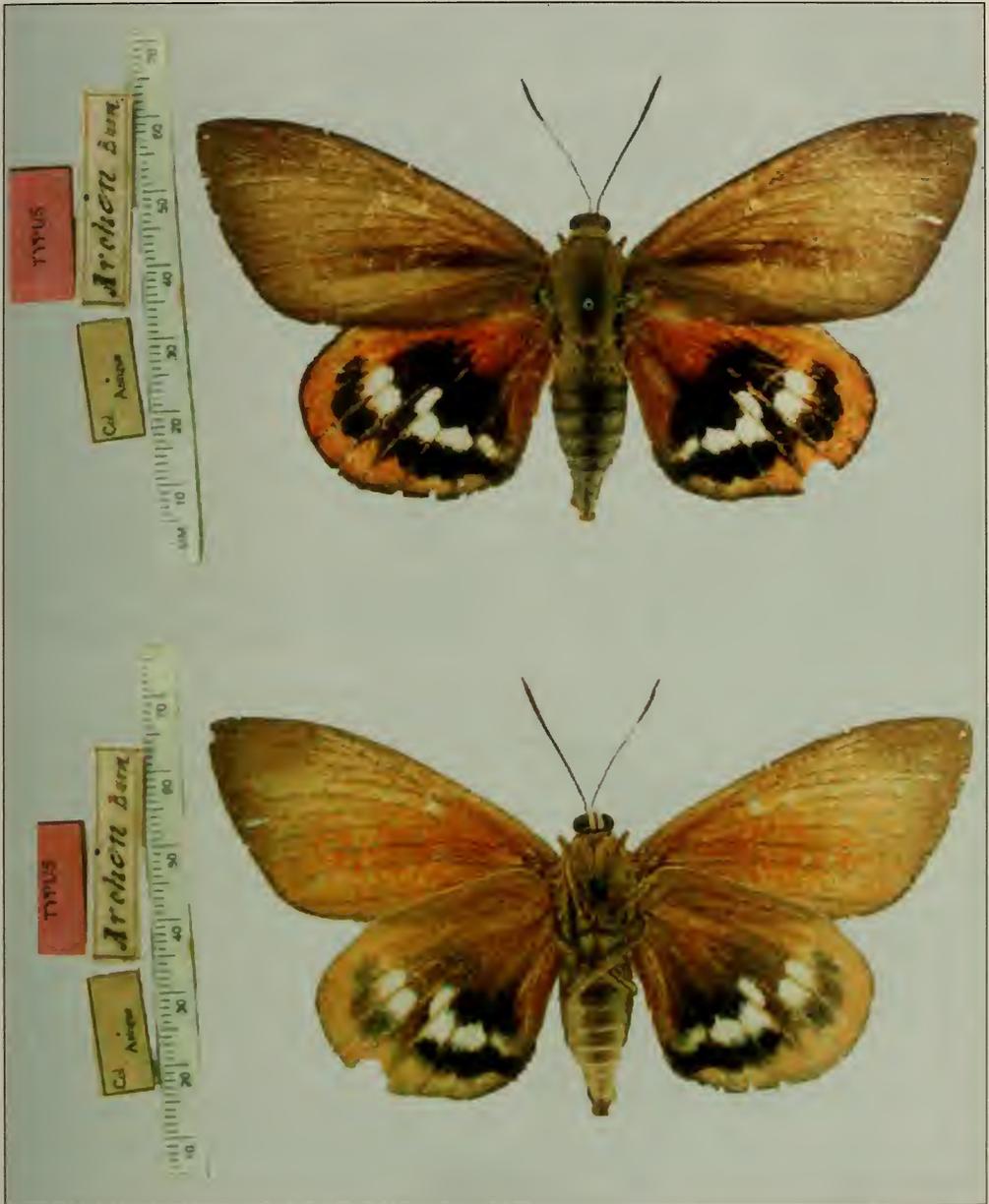


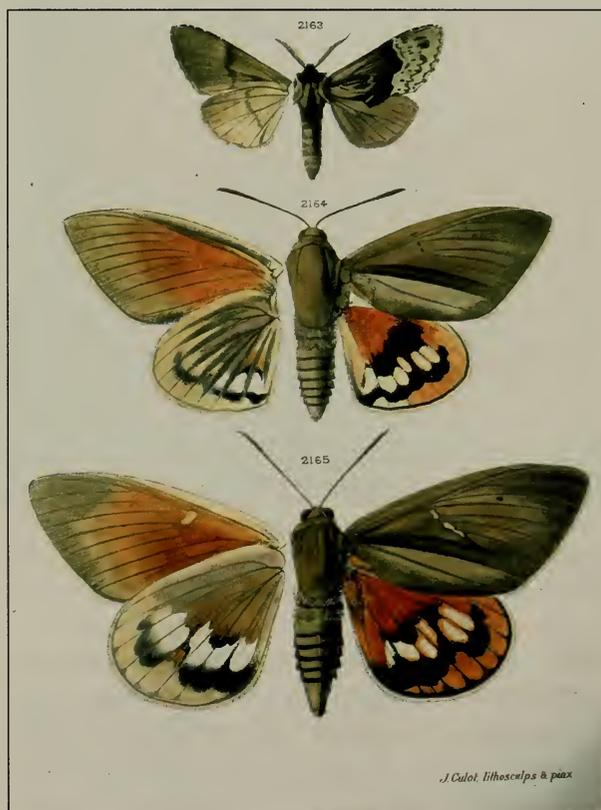
Fig. 1. Paralectotype of *Castnia archon* (Burmeister, 1880), male, upperside and underside, Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires. Photo: G. Lamas.

less the same what Burmeister wrote in 1880. Obviously, they never saw an *archon* specimen and had to rely upon Burmeister's description. In fact, *C. therapon*, now known as *Athis therapon* (Kollar, 1839), is not as similar to *archon* as Burmeister first stated. Not surprisingly, *Castnia archon* is not figured in the plates of Seitz & Strand (1913) while *Castnia therapon* appears on plate 7 of that work. By 1913, nothing was

known about the biology and distribution of *Castnia archon*, apart from its supposed type locality in the Argentine Province of Catamarca.

Second period: from Oberthür to Houlbert (1914–1918)

In 1914, the famous French lepidopterist Charles Oberthür reported what he believed was a new *Castnia* species (Oberthür 1914). He named it *Castnia josepha* after his fellow countryman Monsieur Joseph Petit, who presented to him four specimens, obtained from cocoons he had found on palms, and three cocoons. These had been obtained in Paysandú, a town located in western Uruguay, near the border with the Argentine province of Entre Ríos and about 1000 km from the Argentine Province of Catamarca. As usual, Oberthür figured in colour (plate CCLVII) (Fig. 2) one male and one female of his new species *josepha* (superbly and accurately rendered by Jules Culot), although he did not use for the illustrations those first four specimens but others that M. Petit presented to him later (see below). He accurately described the moths and, concerning the cocoons (which were not figured) only stated: “Ces cocons sont grands et formés d’un tissu végétal très serré de fibres fines et dures, ayant une apparence de chiendent”. Oberthür provided no information about the hostplant or biology of this species. The type series of *josepha* is currently housed in the collection of The Natural History Museum, London (Fig. 3).



The correct year of description for *josepha* is 1914, not 1913 as it appears many times in the literature (e.g. Houlbert 1918, Miller 1995). Oberthür’s Fascicle IX of his *Études de Lépidoptérologie comparée* was published in two parts, the first in 1913 and the second, in which *josepha* is described, in 1914; those years are clearly stated on the title pages of each part. Many subsequent authors (including Aguilar *et al.* 2001) cite 1913 when referring to *josepha*. Lamas (1995) correctly cites 1914 in his checklist.

Fig. 2. *Castnia josepha* Oberthür, 1914, male and female, reproduced from Oberthür’s original description. As indicated in the text, *josepha* Oberthür, 1914 is a synonym of *archon* Burmeister, 1880. Photo: V. Sarto i Monteys.



Fig. 3. *Paysandisia archon* (Burmeister, 1880) specimens (two right columns) along with other castniids (two left columns) belonging to the Oberthür collection deposited in drawer “*Castnia* 16” at The NHM London. Included are the “*Castnia josepha*” Oberthür lectotype (a male, fourth on the right column) and the paralectotype (a female, fifth on the same column) selected by J. Y. Miller in 1977, the lectotype only bears a label that reads “Uruguay, Jos. Petit, 1902”. [Wing spans of Spanish bred specimens average 7.82 cm (males; $n=10$) and 9.22 cm (females; $n=12$)] Photo: V. Sarto i Monteys.

A milestone in the study of Neotropical Castniidae was undoubtedly the massive work by Constant Houlbert, a professor at the University of Rennes, which was published in 1918 in Oberthür’s *Études de Lépidoptérologie comparée*. To undertake this immense work Prof. Houlbert had access to the extensive Neotropical Castniid collection of Oberthür (approximately 425 specimens, “qui renferme 105 espèces ou variétés réparties en 33 genres”, to use his own words). In addition, he also incorporated data on all castniids deposited at that time in the Muséum National d’Histoire naturelle, Paris, assisted by the lepidopterist Ferdinand Louis Le Cerf.

In that work Houlbert described several new genera of Neotropical Castniinae, including *Paysandisia* (see below). Miller (1995) accepted the genera established by Houlbert, and further refined by Rothschild (1919), Oiticica (1955) and Miller (1976, 1980), “with some reservation”. Lamas (1995) also follows Miller’s arrangement although stating clearly that “Even though the generic arrangement adopted in Miller’s list is completely unsatisfactory to me, for the sake of simplicity I have followed it, recognizing the same genera as her”.

Houlbert had never seen the type of *archon*, so placed it in his revision with *therapon* in the genus *Orthia** Herrich-Schäffer [1853], no doubt because, according to Burmeister, and then repeated by Seitz & Strand (1913), who also had not seen the type, *archon* was said to be “similar” to *therapon*.

Houlbert was unaware that Burmeister's *archon* was the same species as Oberthür's *josepha*. He created a new monotypic genus to include *josepha*, which he named *Paysandisia* after the Uruguayan town of Paysandú, where Joseph Petit had obtained all the specimens. Houlbert's original description of *Paysandisia* is as follows:

“Ailes antérieures d'un gris rosé uniforme dans toute leur étendue, avec quelques points noirs (mâles) ou deux taches claires discontinues (femelles) partant de la cellule discoïdale et se dirigeant transversalement vers l'angle interne (Fig. 96). Ailes inférieures d'un rouge orangé, portant dans leur milieu une grande tache noire de forme irrégulière marquée centralement de macules blanchâtres. Le corps, en dessous, est d'un gris un peu jaunâtre; les antennes sont d'un gris brun. La lamelle libre des plantules (Fig. 97) est ovale et nous a paru fortement bombée en avant.”

Figure 96 is a drawing that shows the wing design and maculation patterns of the right upperside of a female *josepha*. Figure 97 is a drawing of morphological features of the post-tarsus, including the arolium.

Certainly, such a generic description, based almost exclusively on wing colour and maculation patterns, would not be valid by today's standards. *Paysandisia* is maintained today as a valid monotypic genus by J.Y. Miller (1986; 1995) and Lamas (1995), although my opinion is that a modern revision of the Castniini (i.e. the Neotropical Castniinae) is badly needed and might change the present placement.

When Houlbert dealt with *josepha*, there already named as “*Paysandisia josepha* Obthr.”, he reproduced the text of Oberthür's 1914 original work, adding that, apart from the four specimens already quoted in Oberthür's work, he was able to study eight more, also from Paysandú and collected again by Joseph Petit. Houlbert explains that one male and one female of these last eight specimens were used by Culot for making the beautiful colour figures reproduced in Oberthür's original work. Also important is the fact that for the first time some data on the hostplant and other biological details were published by Houlbert, thanks to the information given to him by M. Petit. These were as follows: *“Le P. josepha vole très rapidement, à la façon des Sphinx, mais en plein midi, autour des Palmiers à feuilles épineuses à l'intérieur desquels vit la chenille qui est blanchâtre et à tête brune. L'éducation de la chenille est difficile à réaliser, mais la recherche des cocons, presque toujours fixés à l'aisselle des pétioles, fournit aux chasseurs le moyen d'obtenir rapidement un grand nombre de Papillons vivants. Les oeufs sont pondus sous les feuilles; à l'éclosion, les petites chenilles gagnent l'intérieur des troncs où elles creusent, dans la moelle, de larges galeries, qui s'entrecroisent dans tous le sens et qui ne sont pas sans causer quelque préjudice aux Palmiers.”*

* Today, *therapon* is placed in the genus *Athis* Hübner, [1819], so one would expect *Orthia* Herrich-Schäffer [1853] to be a synonym of *Athis*; however Fletcher and Nye (1982: 114) clearly stated the generic name *Orthia* belongs in the Agaristidae (currently a subfamily of the Noctuidae). Lamas (1995) followed Fletcher & Nye and accordingly eliminated in his checklist *Orthia* as a synonym of *Athis*. The placement of *Orthia* in the Castniidae, as a synonym of *Athis*, by Miller (1995) is most likely due to a misinterpretation.

It is in this short paragraph where we learn for the first time that palm trees (with “spiny leaves”) are the hostplants of *archon* and the first indication that the larvae might cause damage to palm trees. The palm tree referred to by Petit must have been *Phoenix canariensis* (see below).

Houlbert also complemented the description already given by Oberthür (1914) of the three cocoons of *archon* by figuring them life size in an excellent photograph (Fig. 97-bis of his revision). He also comments on the absence of pupal exuviae inside the three empty cocoons: “Les parois chitineuses des chrysalides ont probablement été extraites après l’éclosion; en tout cas nous n’en avons trouvé aucune trace à l’intérieur des cocons.” This observation by Houlbert has a significant biological meaning, though he was at the time unaware of this (Sarto i Monteys & Aguilar, *in prep.*).

Third period: Bourquin and Jörgensen (1930–1944)

In September 1930, the Argentine Fernando Bourquin visited Paysandú (Uruguay) and by chance (Bourquin 1933, 1944) reached the property of Joseph de Boismenu, a nephew of Joseph Petit. de Boismenu had collaborated with his uncle by sending specimens of *josepha* and information to Charles Oberthür in France.

Whilst in Paysandú, undoubtedly following the information given to him by de Boismenu, Bourquin carried out a thorough search of palm trees over a period of several days. He only managed to find two live cocoons on the frond leaf axils of two palm species, *Phoenix canariensis* (the spiny-leaved palm that Petit had indicated to Houlbert) and *Trithrinax campestris* (the Spanish “Palmera Caranday” or English “Campestre palm”).

He also obtained some eggs which were figured (a photograph with three eggs) and described quite accurately (Bourquin 1930). These were probably given to him by de Boismenu as he makes no mention of having found them himself on the palms. This is reinforced by the fact that what he states about where the female lays the eggs on the palms (“within a small hole”) was obviously communicated to him by someone else (probably again by de Boismenu) and it is not correct (Sarto i Monteys & Aguilar, *in prep.*). In addition, he briefly mentions some morphological details of the pupa such as its brown colour and the rows of teeth present on the abdominal segments that help it move outside the cocoon prior to emergence.

So far, all biological information about this castniid came from the population at Paysandú (i.e. *josepha*). Nothing was known about the population found in the Argentine Province of Catamarca (i.e. *archon*).

In his 1930 paper, Bourquin did not mention that he had found two live cocoons on the palms at Paysandú as explained above (he only mentioned this in his 1933 and 1944 publications). Also he told nothing about Joseph de Boismenu and the help he received from him (again he only did so in those two latter publications) and, most surprisingly, he referred directly to *Castnia archon* Burm. as the species he was dealing with! Not a single reference to Oberthür’s *josepha* appeared in his 1930 paper, which furthermore had a rather ambiguous title “Algunas observaciones sobre Castniidae”, i.e. “Some observations on Castniidae” when the paper was dealing solely with *archon*. No doubt, Bourquin had become aware by September 1930 that *josepha* and *archon* were the same species.

The explanation to these puzzling facts came to me later when I encountered a paper by Alberto Breyer (1931), published in the same journal as that of the Bourquin paper. There, Breyer added two more Argentine localities for *archon* (Concordia, Province of Entre Ríos; Córdoba, Province of Córdoba) and, most importantly, established the synonymy between *archon* Burmeister and *josepha* Oberthür as follows:

"<...> Considerando que la descripción de Oberthür para la *Castnia josepha* nos pinta la *Castnia archon* de Burmeister en todos sus detalles, que los ejemplares de Oberthür son de Paysandú como algunos de los revisados por nosotros y como los observados por el señor Bourquin, y que las observaciones biológicas son idénticas, como también la planta alimenticia (palmeras), no titubeamos en declarar la sinonimia entre ambas denominaciones. Habiendo publicado Burmeister en el año 1879, y Oberthür en 1913, la prioridad queda a favor de la denominación de Burmeister como *Castnia archon* Burm."

No doubt Breyer had discovered, some time before September 1930, that *archon* and *josepha* were synonyms and had communicated this to Bourquin. However this was not published by Breyer until 1931. This is why Bourquin was so sparing in his 1930 paper: (1) because he was going to have his paper on the castniid published a bit earlier than that of Breyer establishing the synonymy, (2) because he did not want to take the priority about the synonymy out of Breyer's hands and, (3) because at the same time he disliked the fact of using the name *josepha* for what he knew would soon become a synonymic name. So he just referred to *Castnia archon* in his 1930 paper and eliminated any reference to Joseph de Boismenu, Joseph Petit and everything that might link this castniid to Oberthür's *josepha*. Later, in his 1933 and 1944 publications, he gave proper credits to all people at Paysandú that had helped him.

In an interesting paper by Pedro Jörgensen (1930) dealing with all known Castniidae of Argentina and Paraguay, he gives valuable information about the distribution and biology of these moths, mainly from his own experience. For *Castnia archon* Burm., he only quotes what was already known from Burmeister's work with the comment (translated from Spanish) "It must be extremely rare or very local, as I have never seen it during my three year stay in that province. And I believe Mr. Giacomelli has neither seen it in the neighbouring province (Rioja)".

The most important thing about this paper is that on plate X he figures, for the first time, a black-and-white photograph of a female he says is Burmeister's type of *archon* (actually it was one of the two syntypes and must be considered the valid lectotype, as explained above). So, 50 years after it was described by Burmeister, "*Castnia archon*" was first shown in an illustration to the scientific community.

Later, Bourquin (1933, 1944) described quite accurately the *archon* larva and pupa, figured the final larva and all other life stages (Fig. 4) and gave very useful biological data, mentioning that it had the potential to become a serious pest of palms.

Fourth period: from Miller to present (1986–2001)

Another milestone in the study of Neotropical Castniidae is J. Y. Miller's 1986 work on this group. Miller retained *archon* Burmeister, 1880 in the monotypic genus *Paysandisia* Houlbert, 1918, and provided an accurate diagnosis of the genus. It is distinguished by the following apomorphic characters: "origins of R₁, R₂, and R₃ equi-



Fig. 4. Plate XXXII reproduced from Bourquin (1933), depicting the life history of *Paysandisia archon* (Burmeister, 1880). Photo: M. R. Honey.

distant, with R_3 , R_4 , and R_5 connate; distinctive setal-scale patch along cubital veins on basal two-thirds of forewing, subcostal retinaculum absent; female genitalia, ductus bursae membranous, undulate, corpus bursae membranous without signae.” She also gave details of many adult morphological characters (both male and female), figuring for the first time the labial palpus, the complete wing venation and the male and female genitalia. However, concerning the early stages, larval foodplants, flight period and distribution, reference is only made to Bourquin’s 1933 paper, including some inaccuracies and omitting some published data (e.g. Breyer 1931, Biezanko 1961; cf. Sarto i Monteys & Aguilar, *in prep.*).

Later (Miller 1995) treats the Uruguayan population of *archon* (i.e. that used by Oberthür to describe *josepha*) as a good subspecies of *archon*, i.e. as *Paysandisia*

archon josepha (Oberthür). The Argentine population would thereby become the nominal subspecies, i.e. *Paysandisia archon archon* (Burmeister). This appears to have been done without any justification of the characters used to separate both supposed subspecies and is based only on their extremely partially known distribution. Lamas (1995) relegated *archon josepha* (Oberthür, 1914) as synonym of *archon* (Burmeister, 1880). Very recently, then, the species was also discovered in Spain and France (see Introduction) where it has been accidentally introduced.

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Autor(en)/Author(s): Sarto i Monteys Victor

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