

Notes on the genus *Eacles* HÜBNER, [1819] in Brazil with descriptions of the females of *Eacles bertrandi* LEMAIRE, 1981 and *Eacles mayi* SCHAUS, 1920 (Lepidoptera: Saturniidae, Ceratocampinae)

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Abstract: The differences in morphology, genetics and distribution between *Eacles mayi* SCHAUS, 1920 and *Eacles lauroi* OITICICA FILHO, 1938 are explained. The hitherto unknown females of *Eacles mayi* and *Eacles bertrandi* LEMAIRE, 1981 are described and figured for the first time. The female of *Eacles camposportoi* MENDES, 1937 is figured for the first time in colour. Geographical distributions in Brazil of the following species are updated: *Eacles mayi*, *Eacles lauroi*, *Eacles bertrandi*, *Eacles acuta* SCHAUS, 1905, *Eacles camposportoi* MENDES, 1937 and *Eacles manuelita* OITICICA FILHO, 1941.

Key words: Distribution, taxonomy, neotropical.

Bemerkungen zur Gattung *Eacles* HÜBNER, [1819] in Brasilien mit Beschreibung der Weibchen von *Eacles bertrandi* LEMAIRE, 1981 und *Eacles mayi* SCHAUS, 1920 (Lepidoptera: Saturniidae, Ceratocampinae)

Zusammenfassung: Die Unterschiede zwischen *Eacles mayi* SCHAUS, 1920 und *Eacles lauroi* OITICICA FILHO, 1938 bezüglich der Morphologie, Genetik und Verbreitung werden erläutert. Die bisher unbekanntes Weibchen von *Eacles mayi* und *Eacles bertrandi* LEMAIRE, 1981 werden beschrieben und erstmalig abgebildet. Das Weibchen von *Eacles camposportoi* MENDES, 1937 wird zum ersten Mal in Farbe abgebildet. Daten zur geografischen Verbreitung der folgenden Arten in Brasilien werden aktualisiert: *Eacles mayi*, *Eacles lauroi*, *Eacles bertrandi*, *Eacles acuta* SCHAUS, 1905, *Eacles camposportoi* MENDES, 1937 und *Eacles manuelita* OITICICA FILHO, 1941.

Introduction

According to LEMAIRE (1988, 1996), the genus *Eacles* HÜBNER, [1819] is known to consist of 17 species. BRECHLIN & MEISTER (2009, 2011a, 2011b) have since described four species plus seven subspecies and reinstated three additional species from previous synonymy or subspecies status. However, the validity of their taxa must be regarded with suspicion due to their dubious methodology, as voiced by the current community of Saturniidae taxonomists (R. A. ST. LAURENT pers. obs., NÄSSIG et al. 2010). In this current work we primarily follow the taxonomy in LEMAIRE.

SIEWERT et al. (2010) resurrected *E. lauroi* OITICICA FILHO, 1938 from synonymy with *E. mayi* SCHAUS, 1920 on morphological grounds. Since this resurrection, 15 species are known from Brazil.

Eacles mayi and *E. lauroi* are closely related and have been variously considered conspecific or separate species (LEMAIRE 1988). *Eacles lauroi* was described by OITICICA

FILHO (1938) based on 5 ♂♂; the ♀ was described three years later (OITICICA FILHO 1941). OITICICA FILHO (1938) mentioned that he was unsure as to the true validity of this new taxon, but regardless of uncertainty, he described it.

TRAVASSOS & NORONHA (1965) synonymized *E. lauroi* with *E. mayi* without further comment. This treatment was followed by LEMAIRE (1988) who figured both sexes of *E. lauroi* as *E. mayi*. LEMAIRE (1981) described *E. bertrandi*, another similar species, from three ♂♂.

In order to obtain additional evidence to support the morphological differences presented by OITICICA FILHO (1938), LEMAIRE (1988) and in the present article, partial mitochondrial COI sequences were obtained and analyzed in the context of the global DNA barcoding campaign for saturniid moths (see LEPIDOPTERA BARCODE OF LIFE 2009) as proposed in HEBERT et al. (2003).

Additionally, the ♀♀ of *E. mayi* and *E. bertrandi* are described and figured for the first time. The descriptions of *E. mayi* in LEMAIRE (1988) cannot be easily attributed to this species due to the author including both species in his examined material. And as such, we cannot consider the formal description of ♀ *E. mayi* as only pertaining to this species. The ♀ of *E. lauroi*, however, was formally described as mentioned before. Therefore, this paper aims to delineate the differences between the two species, offering descriptions and figures easily accredited to each.

Finally, geographic distributions of *E. mayi*, *E. lauroi*, *E. bertrandi* LEMAIRE, 1981, *E. acuta* SCHAUS, 1905, *E. camposportoi* MENDES, 1937 and *E. manuelita* OITICICA FILHO, 1941 within Brazil are updated; and the ♀ of *E. camposportoi* is figured for the first time in colour, previously figured by OITICICA FILHO & GAGARIN (1959) and LEMAIRE (1988) in black and white.

Material and methods

Dissections were performed as in LAFONTAINE (1987). Terminology follows FERGUSON (1971). Figures were manipulated with Adobe's Photoshop CS4 software from 2008. Maps were created with SimpleMapp (SHORTHOUSE 2010). When accurate GPS data was not given with examined material, coordinates were approximated with Google Earth based on collection data from locality labels.

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DNA barcoding analysis follows DECAËNS & ROUGERIE (2008). Distances and tree were prepared with MEGA5 (TAMURA et al. 2011), the first conducted using the Maximum Composite Likelihood method (TAMURA et al. 2004) and the second using the Neighbour-joining method (SAITOU & NEI 1997). All sequenced specimens are identified by the BC abbreviation (barcode) followed by the GenBank access number (starting with JX) when available, or by the sample ID in BOLD between brackets.

Lists of synonymies include LEMAIRE (1988) and subsequent literature. For synonymies prior to 1988, see LEMAIRE (1988).

Collections visited and their abbreviations

AMNH	American Museum of Natural History, New York, New York, USA.
CFP	Coll. Fritz PLAUMANN, Nova Teutônia, Seara, Santa Catarina, Brazil.
CGCM	Coll. Carlos G. C. MIELKE, Curitiba, Paraná, Brazil.
CNC	Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, Ontario, Canada.
COM	Coll. Olaf H. H. MIELKE, Curitiba, Paraná, Brazil.
CSNB	Coll. Stefan NAUMANN, Berlin, Germany; the collection is part of the Rainer SEEGERS Foundation stored later in ZMHU (Museum für Naturkunde), Berlin, Germany.
CTD	Coll. Thibaud DECAËNS, Rouen, France.
CUIC	Cornell University Insect Collection, Ithaca, NY, USA.
FIOCRUZ	Coll. Fundação Instituto Oswaldo Cruz, Rio de Janeiro, Rio de Janeiro, Brazil.
MNHN	Muséum nationale d'Histoire naturelle de Paris, France.
MNRJ	Museu Nacional do Rio do Janeiro, Rio de Janeiro, Rio de Janeiro, Brazil.
MZSP	Coll. Museu de Zoologia, Universidade de São Paulo, São Paulo, São Paulo, Brazil.
NHMUK	The Natural History Museum [formerly British Museum (Natural History) = BMNH], London, U.K.
UFPC (DZ)	Coll. Pe. Jesus S. MOURE, Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, Paraná, Brazil.
USNM	National Museum of Natural History [formerly United States National Museum], Washington D.C., USA.

Systematics

Eacles mayi SCHAUS, 1920

Figs. 1a, 1b, 2a, 2b, 9a, 9b, 9c, 12a, 12b, 14, Text-Fig. 1.

Eacles mayi SCHAUS (1920: 127).

Eacles mayi SCHAUS: LEMAIRE (1988: pl. 14, Figs. 2 ♂, 3 ♀ [*E. lauroi* figured]).

Eacles mayi SCHAUS: D'ABRERA (1995: 62–63 [true *E. mayi* ♂ figured]).

Eacles mayi SCHAUS: LEMAIRE (1996: 30).

Eacles mayi SCHAUS: MARINONI et al. (1997: 477).

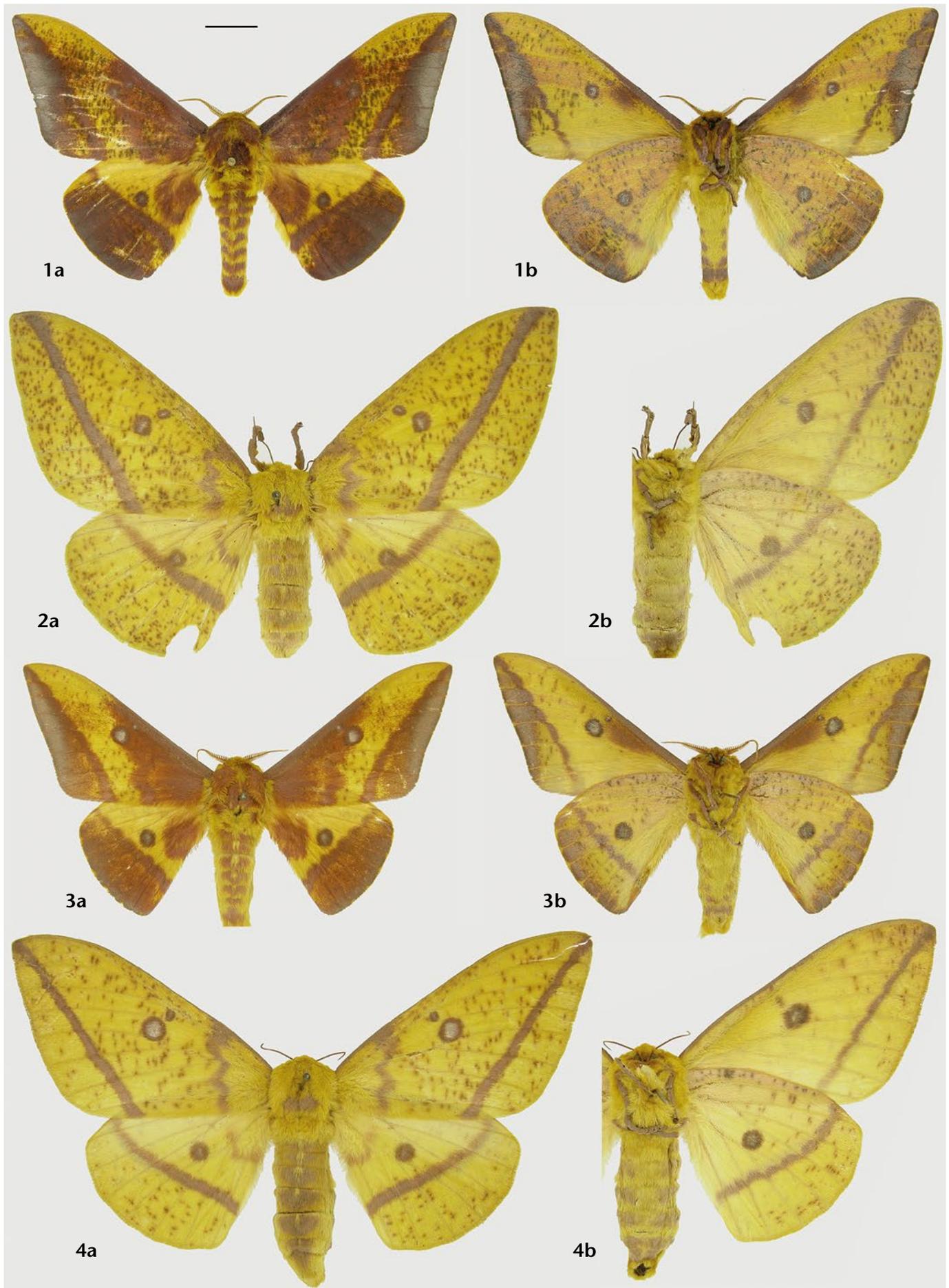
Eacles mayi SCHAUS: PRESTES et al. (2009, Fig. 18 ♂ [*E. lauroi* figured]).

Eacles mayi SCHAUS: SIEWERT et al. (2010: 216, 217).

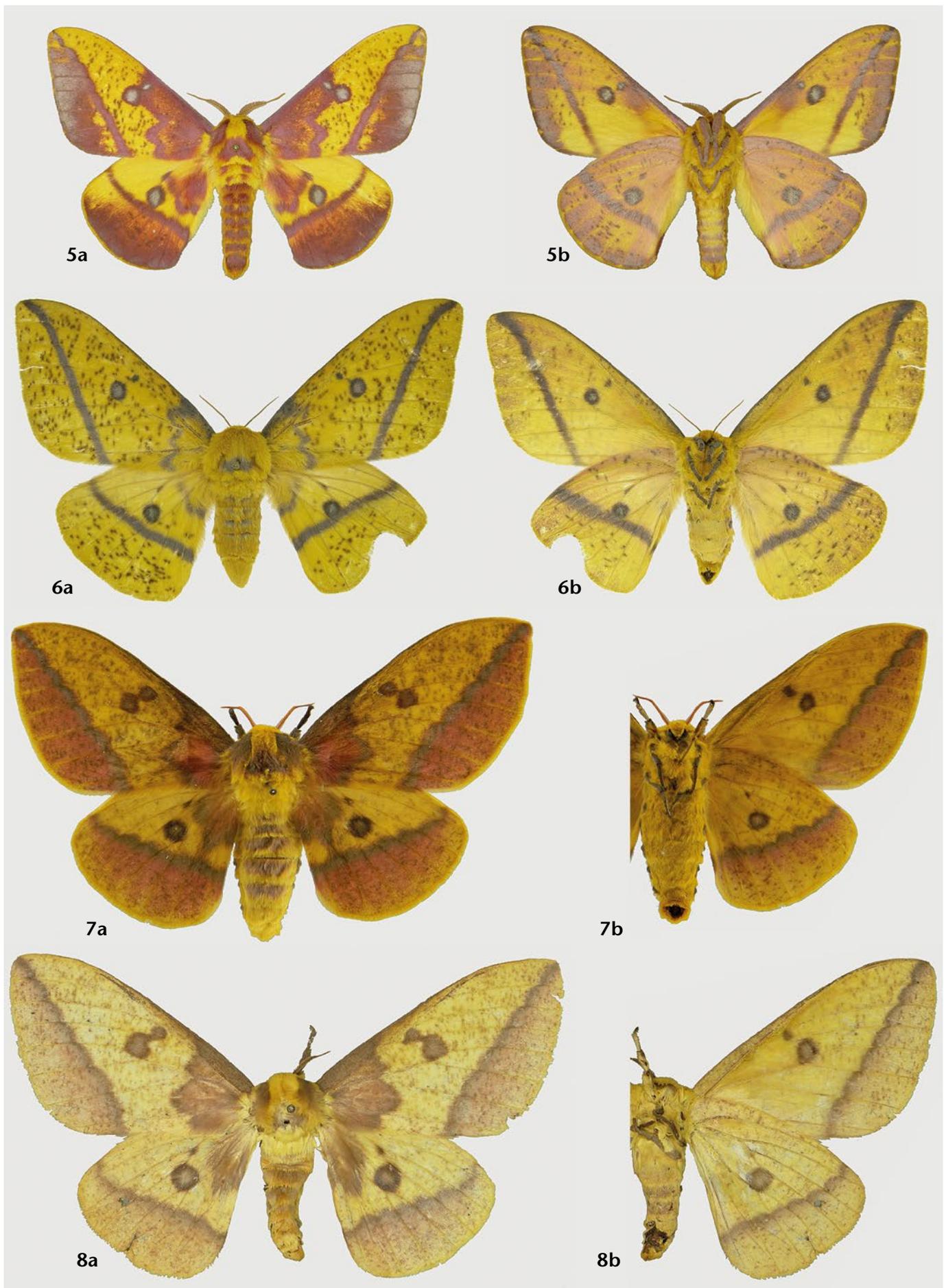
Eacles mayi SCHAUS: PIOVESAN et al. (2014: 9).

Lectotype ♂: Brazil, Rio de Janeiro, “Rio Janeiro”, genitalia prep. 4024, J. O. F. (USNM type No. 22445; examined).

Examined material (in total 112 ♂♂, 4 ♀♀, all **Brazil**): **Espírito Santo**: 1 ♂, Campinho: 8. x. 1961, ex coll. GAGARIN (DZ 10.213). — **Rio de Janeiro**: 1 ♂, Nova Friburgo, 1000 m: 19. ix. 1959, GAGARIN leg., ex coll. GAGARIN (DZ 8666). 3 ♂♂, Cachoeiras de Macacu, Boca do Mato, 400 m: viii. 1994, x. 1996, 18. x. 2004, N. TANGERINI leg. (CGCM 21.155 [BC-JX 216111], 21.163, 21.581). 6 ♂♂, Teresópolis: ex coll. L. TRAVASSOS (IOC 16.021-16.023). Parada Barreira, 380 m: 16. x. 1940, GAGARIN leg., ex coll. GAGARIN (DZ 10.370). 400 m: 20.–24. ix. 1957, H. & G. PEARSON leg., Brit. Mus. 1977-32 (NHMUK). Soberbo: 21. viii. 1944, TRAVASSOS & OITICICA leg., ex coll. L. TRAVASSOS (IOC 18.546). 35 ♂♂, 1 ♀, Petrópolis: 20. vii. 1959, 29. ix. 1959, 1.–3. x. 1959, 3. xi. 1961, 2. x. 1962, x. 1963, GAGARIN leg., ex coll. GAGARIN (DZ 8673, 10.006, 10.078, 10.143, 10.170, 10.175, 10.219, 10.337, 10.357, 10.428). 16. viii. 1958, D'ALMEIDA leg. (COM 2190). 14. ix. 1958, D'ALMEIDA, NYSIO & CÉSAR leg., ex coll. D'ALMEIDA (DZ 10.085, 10.101, 10.374). 25. ix. 1954, D'ALMEIDA, NYSIO & NELSON leg., ex coll. D'ALMEIDA (DZ 10.087). 1300–1500 m: 14.–16. ix. 1958, LEMAIRE collection, LEMAIRE genitalia prep. No. 1513 (MNHN). ix. 1934 (NHMUK). Independência, 900 m: 29. xi. 1936, 18. x. 1938, 13. x. 1939, GAGARIN leg., ex coll. GAGARIN (DZ 10.078, 10.155, 10.262). 7. ix. 1928, ex coll. D'ALMEIDA (DZ 10.217). 1. viii. 1933, L. TRAVASSOS leg., ex coll. L. TRAVASSOS (IOC). ix. 1932, L. TRAVASSOS leg., ex coll. L. TRAVASSOS (IOC 14.785–14.789, 19.399, 19.400). 8. x. 1931, GAGARIN leg., ex coll. L. TRAVASSOS (IOC 19.869). Parque São Vicente, 920 m: 16. ix. 1960, 23. ix. 1959, x. 1964, 19. x. 1965, GAGARIN leg., ex coll. GAGARIN (DZ 10.053, 10.253, COM 7223, 7450). 7 ♂♂, 3 ♀♀, Rio de Janeiro Paineiras, 500 m: 17. ix. 1963, 15. x. 1964, 23. ix. 1971, 23. x. 1971, GAGARIN leg., ex coll. GAGARIN (DZ 8.634, 10.076, 10.123, 10.295, 10.458). 17. ix. 1928, J. M. BEDOC Det. (MNHN). 21. ix. 1967, 27. ix. 1969, P. GAGARIN leg., LEMAIRE collection (MNHN). Corcovado: viii. 1932, L. TRAVASSOS leg., ex coll. L. TRAVASSOS (IOC 14.308). Tijuca: ROTHSCHILD bequest B.M. 1939-I (NHMUK). 2 ♂♂, Hwy. Angra dos Reis: Km 38, x. 1952, ex coll. F. JUSTUS JOR. (DZ 8.643). — Km 33, 600 m: 18.–21. x. 1952, Col. PEARSON, ROTHSCHILD bequest B.M. 1939-I (NHMUK). 3 ♂♂, Angra-Jussara: 6.–10. ix. 1934, D'ALMEIDA leg., ex coll. D'ALMEIDA (DZ 8658). ix. 1934, TRAVASSOS & OITICICA leg., ex coll. L. TRAVASSOS (IOC 19.867, 19.868). 1 ♂, “2069 Rio”: Cornell Univ. Lot 727 Sub. 2691, W. F. H. ROSENBERG, St. LAURENT diss.: 2-8-15:1 (CUIC). 1 ♂, “Rio de Janeiro”: 1919, Cornell U. Lot 627 Sub 1081, Det. FORBES, St. LAURENT diss.: 2-5-15:1 (CUIC). 12 ♂♂, no additional data: Collection Frank JOHNSON (AMNH). Collection W. SCHAUS (USNM). (USNM). 1928, E. L. BOUVIER Det. (MNHN). JOICEY bequest B.M. 1934-120 (NHMUK). J. ARP leg., ROTHSCHILD bequest B.M. 1939-I (NHMUK). no collector, ROTHSCHILD bequest B.M. 1939-I (NHMUK). — **São Paulo**: 4 ♂♂, Salesópolis, Boracéia: 30. viii. 1946, 24. ix. 1946, TRAVASSOS & VANSOLINI leg., ex coll. L. TRAVASSOS (IOC 1292, 1295). 13. ix. 1947, TRAVASSOS, VENDEL, J. LANE & RABELLO leg., ex coll. L. TRAVASSOS (IOC 9139). 26. viii. 1949, L. & L. TRAVASSOS, PEARSON & RABELLO leg., ex coll. L. TRAVASSOS (IOC 9135). 2 ♂♂, 47 km NE Miracatu, 550 m: 5. ix. 2005, O. MIELKE & CASAGRANDE leg. (DZ 8682, 9957 [BC-JX 216110]). 1 ♂, no additional data: Collection Frank JOHNSON, Gen. Prep. 1524 (AMNH). — **Paraná**: 5 ♂♂, Morretes, Marumbi, 500 m: 14. viii. 1966, 21. viii. 1966, 14. viii. 1967, O. MIELKE & LAROCA leg. (DZ 8651, 10.005, 10.052, 10.122, CGCM 10.267). 8 ♂♂, São José dos Pinhais, 500 m: 23. viii. 2005, C. MIELKE leg. (CGCM 24.111, 24.223, 24.687, 28.817, 28.840, 30.285, 30.340, 30.372). — **Santa Catarina**: 1 ♂, Anitápolis: ROTHSCHILD bequest B.M. 1939-I (NHMUK). 4 ♂♂, Joinville: viii. 1969, VIII, Collection SCHMITT, Cornell Univ. Lot No. 1030, St. LAURENT diss.: 2-5-15:2 (CUIC). vii. 1960, LEMAIRE collection (MNHN). J. ARP leg. (USNM). ROTHSCHILD bequest B.M. 1939-I (NHMUK). 2 ♂♂, Yaragua [Jaraguá do Sul]: Collection Frank JOHNSON, Gen. Prep. 189 (AMNH). (USNM). 3 ♂♂, “Saint Catherines”: Collection Frank JOHNSON, St. LAURENT diss.: 3-24-15:2 (AMNH). 1 ♂, “Sta. Catharina”: E. L. BOUVIER Det. (MNHN). 4 ♂♂, no further data: LEMAIRE collection (MNHN). Brit. Mus. 1922-486 (NHMUK). — No locality: 4 ♂♂, (IOC). Collection W. SCHAUS/Collection Frank



Figs. 1–8: *Eacles* specimens, all from Brazil; a = dorsal, b = ventral views. — **Figs. 1–2:** *Eacles mayi*; 1a, b ♂, São Paulo, Miracatu (DZUP); 2a, b ♀, Rio de Janeiro, Rio de Janeiro (DZUP). — **Figs. 3–4:** *Eacles lauroi*; 3a, b ♂, Rio de Janeiro, Petrópolis (DZUP); 4a, b ♀, São Paulo, Campos do Jordão (DZUP). — Scale bar 1 cm (= approx. natural size, all specimens approx. to the same size).



Figs. 5–6: *Eacles bertrandi*; **5a, b** ♂, Rio Grande do Sul, Cambará do Sul (CGCM); **6a, b** ♀, same data. — **Figs. 7–8:** *Eacles camposportoi*; **7a, b** ♀, São Paulo, Campos do Jordão (ex larva) (MZSP); **8a, b** ♀ paratype [“allotype”], São Paulo, Campos do Jordão (DZUP). — Scale bar 1 cm (= approx. natural size, all specimens approx. to the same size).

JOHNSON, ST. LAURENT diss.: 3-24-15:1 (AMNH). (USNM). 1 ♂, "Guatemala," obviously mislabelled: LEMAIRE collection, LEMAIRE genitalia prep. No. 1514 (MNHN).

♂ (Figs. 1a, 1b): Forewing length (fwl.): 40–50 mm, wingspan (wsp.): 82–97 mm, with the inner margin perpendicular to the body. Head: antennae dark yellow, frons yellow, third segment of labial palpi well-defined. Thorax: ground colour yellow, dorsally heavily blotched with reddish brown with prominent patches anteriorly and centrally located, ventrally yellow. Legs light purple-brown. Forewing (fw.) dorsum: Triangular, r-m vein straight, apices not sharply falcate, outer margin straight to slightly concave. Ground colour yellow, heavily speckled throughout with black, postmedial and antemedial regions heavily suffused with deep brown, undulating antemedial and weakly curved postmedial lines present but heavily obscured by brown suffusions. Marginal area with grey region thickening medially, reaching postmedial line, fading inwards. Discal spots present, paired, relatively reduced, greyish brown, indistinct due to surrounding brown suffusions, weak light grey center. Fw. venter: similar to dorsum, though brown suffusions and black speckling heavily reduced, antemedial line absent, postmedial line present more contrasting than on dorsum with slight undulations. Discal marks more prominent. A circular subcostal patch proximal to the discal spot present or completely absent. Hindwing (hw.) dorsum: Same coloration as in fw. dorsum, brown antemedial patch present varying in size, from well removed from postmedial line to touching. Postmedial area heavily suffused with brown with little yellow present. Small discal cell usually not touching postmedial line. Hw. venter: Follows same pattern as fw. venter, though lightly suffused with reddish brown. Abdomen: dorsally yellow, purplish brown patches over each segment, ventrally yellow with greyish brown patches only terminally.

♀ (Figs. 2a, 2b): Fwl.: 55–62 mm, wsp.: 105–115 mm, with the inner margin perpendicular to the body. Head: antennae dark yellow, frons yellow, third segment of labial palpi well-defined. Thorax: yellow with two purplish spots dorsally, legs light purple. Fw. dorsum: moderately elongated, outer margin slightly convex; ground colour yellow, sprinkled with purplish brown, antemedial line undulating, postmedial line straight, slightly pre-apical, both lines broad and purple; discal spot double, purple with white center. Fw. venter: as in dorsum but paler yellow, less speckling, all markings less pronounced, smaller accessory discal spot hardly visible. Hw. dorsum: as in fw. dorsum, discal spot with reduced to absent white markings, either touching or separate from postmedial line. Hw. venter: as in fw. venter. Abdomen: dorsally dark yellow with purplish brown patches over each segment, ventrally light yellow.

♂ genitalia (Figs. 9a, 9b, 9c) (n = 8): Uncus simple, vaguely bilobed, with central ridge, base heavily sclerotized, transtilla upturned and more heavily sclerotized

medially. Lateral processes of transtilla extend distally three quarters of the length of the uncus. Valvae wide, thick, apically sharp, heavily sclerotized and hooked, slightly curving or relatively straight apically. Shape of saccus variable, rounded or squared distally. Juxta free, ring-like, phallus simple, thin, elongate, smoothly curved, roughly S-shaped, either sharply or weakly toothed apically by one to a few sharp points or a row of increasingly large teeth appearing saw-like, when removed, phallus sleeved in membrane originating from anellus, vesica bag-like with numerous small cornuti.

♀ genitalia (Figs. 12a, 12b) (n = 1): tergite VIII rectangular with rounded edges, anterior edge projected to form the anterior apophysis, posterior edge barely indented mesally; lamella antevaginalis simple and narrow; lamella postvaginalis wider and longer than antevaginalis, projecting mesally as well-developed rounded lobe. Ductus bursae sclerotized at its base (as an extension of both lamella), short, but 1,5 times longer than the diameter of the bursa copulatrix, the latter rounded without signus.

Immature stages. Unknown.

Geographical distribution (Fig. 14): *Eacles mayi* occurs along the Atlantic coast of Brazil, from the state of Espírito Santo south to Santa Catarina, always encountered at less than 1000 m in elevation. There are however, some exceptions to this rule presented by questionable records, which are outlined in the discussion of *E. lauroi*.

Ethology. ♂♂ are attracted to light in the early morning after midnight.

Diagnosis. The ♂ of *E. mayi* is distinguished from that of *E. lauroi* by the yellow patch on the fw., which is more heavily speckled with black dots; the light gray medio-marginal suffusion is much more expanded inwards, almost completely covering the region from the postmedial line to the wing margin; in *E. lauroi*, the light gray medio-marginal suffusion is thin and parallels the wing margin. Additionally, the discal spots on the fw. of *E. mayi* are reduced, with or without a light gray trace at the center. In *E. lauroi*, the discal spots are larger on both dorsal and ventral faces of the wings; the spots bear distinct light gray round centers. The third segment of the labial palpi in *E. mayi* is well defined; in *E. lauroi* the third segment is underdeveloped and almost indistinguishable, except by a tiny mark ventrally. In most *E. lauroi* specimens, the subcostal patch on the ventral side of the fw. is expanded from the wing base until the discal spot, in *E. mayi* it is not present or reduced to a circular mark proximal to the discal spot.

The ♀ of *E. mayi* is distinguished from the ♀ of *E. lauroi* by the larger size, the slightly pre-apical postmedial line, which is apical in the latter, and the smaller discal spots on all wings. The reduced segmentation of the labial palpi in ♀♀ is even more evident than in ♂♂.

The r-m vein is straight in *E. mayi*, but curves toward the discal base in *E. lauroi*. Sternite VIII and the ♂ genitalia

are very similar in both species with individual variation within each species. It is difficult to generalize about the appearance of the genitalia as contributable to either species due to this variation; therefore, the two species do not appear separable based on ♂ genitalia characters alone. See the discussion for an explanation as to the distinct differences in the figured ♂ genitalia (Figs. 9, 10). However, there appears to be at least one differentiating character in the ♀ genitalia. There is a mesal indentation on the posterior edge of tergite VIII in both species, but this indentation is very pronounced and deep only in *E. lauroi*. In *E. mayi*, this character is hardly recognizable. The deep indentation was seen in each of the four examined ♀ *E. lauroi* genitalia, but not in the single examined *E. mayi*. This character may or may not be useful in separating these two species; more female material is necessary to make a strong conclusion.

Discussion. The ♀ of *E. mayi* is described and figured here for the first time. In LEMAIRE (1988), both the ♂ and ♀ specimens depicted as *E. mayi* are in fact *E. lauroi*. Consequently, the descriptions and genitalia drawings for *E. mayi* in LEMAIRE's revision cannot be easily attributed to only this species. Upon reviewing the LEMAIRE collection at the MNHN, it was determined that he included both sexes of both species in his examined material. Due to the fact that the only dissected ♀ of either *E. mayi* or *E. lauroi* in LEMAIRE's collection is a single specimen of *E. lauroi*, it can be inferred that the ♀ genitalia drawing in LEMAIRE (1988) is based upon *E. lauroi* (R. A. ST. LAURENT, pers. obs.). Furthermore, the drawing agrees exactly with this genitalia preparation (LEMAIRE genitalia prep. No. 3896). The ♂ genitalia drawing on the other hand, seems to have been based on the genitalia of both *E. mayi* and *E. lauroi* due to both species having been dissected by LEMAIRE. Therefore, we provide separate descriptions and figures of both sexes of each species based upon true *E. mayi* and *E. lauroi* to avoid further confusion.

While external differences and DNA evidence (see Tab. 1 and Text-Fig. 1) supports the valid separation of *E. mayi* and *E. lauroi* as distinct species (see the discussion of *E. lauroi*), the genitalia characters do not. The genitalia vary considerably from specimen to specimen in each of these

two species; though they always share the same general appearance, which allow them to be differentiable from other *Eacles* species (R. A. ST. LAURENT, pers. obs.). Interestingly, OTTICICA FILHO & MICHENER (1949) showed similar considerable variation among various dissections of *E. manuelita*. The genitalia of *E. lauroi* and *E. mayi* appeared to differ in much of the same characters shown by these authors, including, and most notably, the valve shape and apical structure of the phallus. Additionally, in the original description of *E. lauroi*, OTTICICA FILHO (1938) mentioned the variable nature of the genitalia but said that the harps, while also variable, seemed to differ between *E. lauroi* and *E. mayi*. The first author found this character wholly unreliable and too variable to provide distinguishing characters of the two species. The figured ♂ genitalia (Figs. 9, 10) differ markedly, and despite the fact that these genitalia preparations are associated with two different species, the characters that appear to be unique to each figure, were found in dissections of both species. Valve structure is perhaps the most striking difference between the figured genitalia. The valvae are smoothly curving in the figured *E. lauroi* and hooked in the *E. mayi*, but the opposite was also found (*E. mayi* ST. LAURENT diss.: 2-8-15:1, CUIC and *E. mayi* ST. LAURENT diss.: 3-24-15:2, AMNH). After dissecting a number of each species, it was found that it is not possible to assign specific characters to differentiate the two species considering the strong interspecific variation.

Eacles lauroi OTTICICA FILHO, 1938

Figs. 3a, 3b, 4a, 4b, 10a, 10b, 10c, 13a, 13b, 14, Text-Fig. 1.

Eacles lauroi: OTTICICA FILHO (1938: 281-290, pl. 9).

Eacles mayi SCHAUS: LEMAIRE (1988: pl. 14, Figs. 2 ♂, 3 ♀).

Eacles mayi SCHAUS: LEMAIRE (1996: 30).

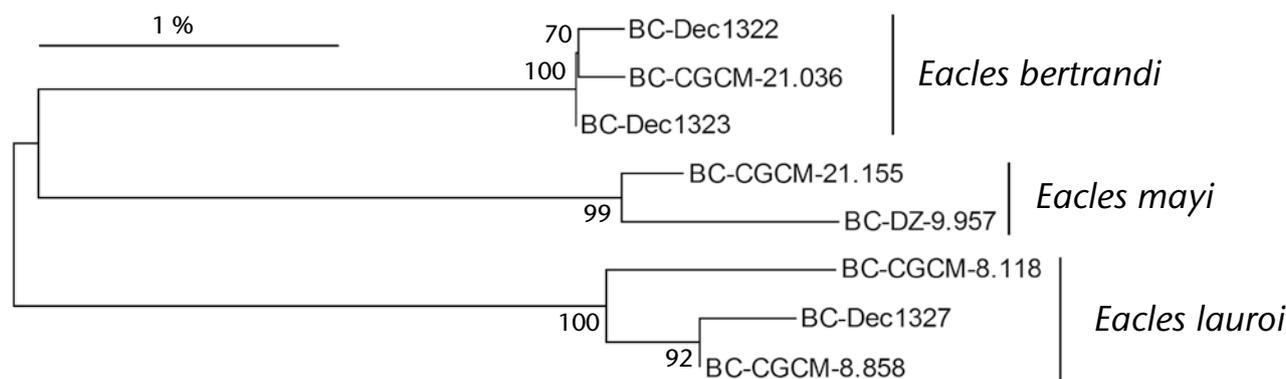
Eacles mayi SCHAUS: PRESTES et al. (2009: Fig. 18 ♂).

Eacles lauroi OTTICICA: SIEWERT et al. (2010: 215-217).

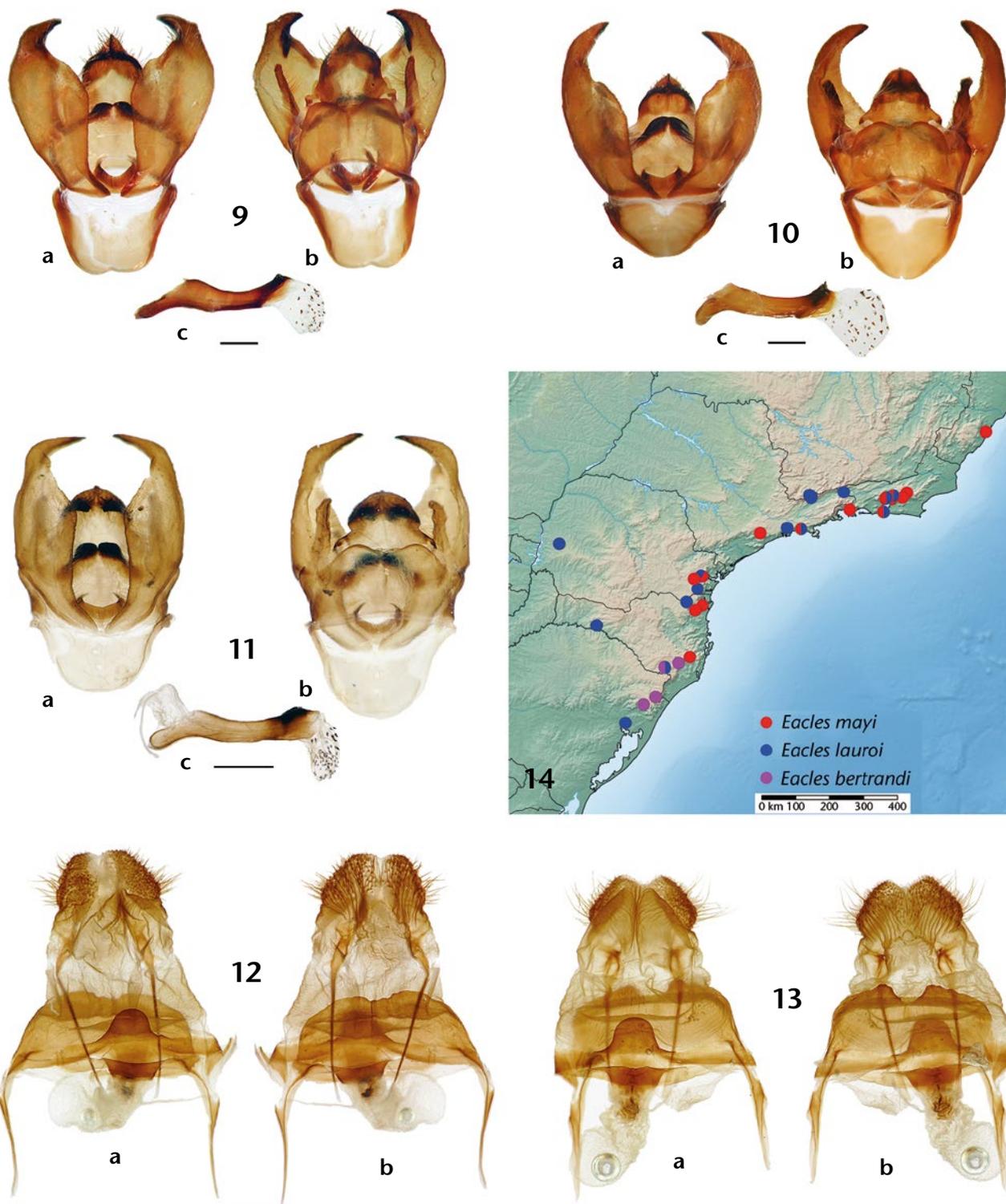
Eacles lauroi OTTICICA: PIOVESAN et al. (2014: 9).

Eacles lauroi OTTICICA: SANTOS et al. (2015: 849, 853).

Holotype ♂: Brazil, São Paulo, Campos do Jordão: Umua-rama [1800 m], 2. XI. 1937, TRAVASSOS, OTTICICA F., No. 132, Coleção José OTTICICA FILHO (MNRJ) (examined). — **Note:** In the original description, OTTICICA FILHO reported the collecting year of the holotype as 1933, but the label on the actual specimen reads 1937. LEMAIRE (1988) repeated this mistake.



Text-Fig. 1: Unrooted bestscore Neighbour-joining method tree for *Eacles bertrandi*, *E. lauroi*, and *E. mayi*. Evolutionary distances calculated using Maximum Composite Likelihood method; bootstrap values are given at each node, and terminals are identified by their sample-ID code referring to the records in the Barcode of Life Datasystems (BOLD 2015).



Figs. 9–13: *Eacles* genitalia, all from Brazil; a = dorsal, b = ventral views, c = phallus lateral view. — **Figs. 9–11:** ♂ genitalia. **Figs. 9a–c:** *Eacles mayi*; Rio de Janeiro, ST. LAURENT diss.: 2-5-15:1. **Figs. 10a–c:** *Eacles lauroi*; Santa Catarina, São Bento do Sul, ST. LAURENT diss.: 3-24-15:4. **Figs. 11a–c:** *Eacles bertrandi*; Rio Grande do Sul, São Francisco de Paula, C. MIELKE diss.: CGCM 24.060. — **Figs. 12–13:** ♀ genitalia. **Figs. 12a–b:** *Eacles mayi*; Rio de Janeiro, Paineiras, C. MIELKE diss.: DZ 10.123. **Figs. 13a–b:** *Eacles lauroi*; São Paulo, Campos do Jordão, Umuarama, C. MIELKE diss.: DZ 8.714. — Scale bars 1 mm (i.e., not all to the same scale). — **Map, Fig. 14:** Geographical distribution of *Eacles mayi*, *E. lauroi*, and *E. bertrandi* within SE/S Brazil.

Examined material (in total 112 ♂♂, 23 ♀♀, all Brazil): **Rio de Janeiro:** 6 ♂♂, Teresópolis: viii. 1965, LEMAIRE coll. (MNHN). Parada Barreira, 380 m: 15. x. 1941, GAGARIN leg., ex coll. GAGARIN (DZ 10.466). Soberbo: 21. viii. 1944, TRAVASSOS & OITICICA leg., ex coll. TRAVASSOS (IOC 18542-18.545). 7 ♂♂, 3 ♀♀, Petrópolis: 16. viii. 1958, D'ALMEIDA, NYSIO & CÉSAR leg., ex coll. D'ALMEIDA (DZ 8698, 10.334). 16. viii. 1958, D'ALMEIDA leg. (COM 2191). 29. x. 1952, 23. ix. 1962, 24. x. 1962, GAGARIN leg., ex coll. GAGARIN (DZ 8650, 10.037, 10.477). 1300–1500 m: 16. viii. 1958, R. F. D'ALMEIDA leg., LEMAIRE collection (MNHN). Independência, 900 m: 15. x. 1939,

GAGARIN leg., ex coll. GAGARIN (DZ 10.405). Parque São Vicente, 920 m: 8. vii. 1959, 17. vii. 1960, GAGARIN leg., ex coll. GAGARIN (DZ 8674, 10.443). 1 ♂, Paineiras: x. 1933, ex coll. TRAVASSOS (IOC 14.790). 6 ♂♂, Itatiaia 1100 m: i. 1961, H. EBERT leg., ex coll. GAGARIN (DZ 10.382). 800 m: 10. viii. 1953, TRAVASSOS & PEARSON leg., ex coll. TRAVASSOS (IOC 19.394, 19.395). 1300 m: 6.–10. xii. 1950, L. & H. TRAVASSOS leg., ex coll. TRAVASSOS (IOC 19.396). Maromba: 17. viii. 1952, PEARSON leg., Brit. Mus. 1977-32 (NHMUK). [Itatiaia], Agulhas Negras, 2400 m: 19. ii. 1949, PEARSON leg., Brit. Mus. 1978-58 (NHMUK). “Campo Bello” [Itatiaia]: 1. ix. 1929, J. F. ZIKÁN leg.,

ROTHSCHILD bequest B.M. 1939-I (NHMUK). 1 ♂, No further data, J. C. HOFFINGER Collection 1962 (USNM). — São Paulo: 32 ♂♂, 13 ♀♀, Campos do Jordão, 1600 m: 23.-27. I. 2001, V. O. BECKER leg. (CGCM 10.385). 25. XI. 1950, 23. XII. 1950, ex coll. Richard FREY (DZ 8722, 8730). 1800 m: 2. II. 1969, P. GAGARIN leg., LEMAIRE collection (MNHN). 1850 m: 15. XII. 1969, P. GAGARIN leg., LEMAIRE collection, LEMAIRE genitalia prep. No. 3896 (MNHN). Umuarama, 1800 m: 3.-15. II. 1937, 8.-15. III. 1937, GAGARIN leg, ex coll. GAGARIN (DZ 8642, 8690, 8714, 10.023, 10.026, 10.040, 10.072, 10.148, 10.212, 10.240, 10.271, 10.275, 10.331, 10.335, 10.343, 10.409. CGCM 21.122). I. 1943, ex col. D'ALMEIDA (DZ 10.426). 19. I. 1943, ex col. D'ALMEIDA (DZ 10.198). Ex coll. TRAVASSOS (IOC 16.024). 8.-15. IV. 1937, GAGARIN leg., LEMAIRE collection (MNHN). 1700 m: 3. X. 1937, 3. XII. 1937, 3. I. 1938, L. & L. TRAVASSOS & OTTICICA leg., ex coll. TRAVASSOS (IOC 14.309, 14.310, 14.796-14.800). Toriba, 1750 m: 13. XI. 1952, D'ALMEIDA & L. TRAVASSOS F. leg., ex coll. D'ALMEIDA (DZ 10.247, 10.439). 1800 m: 13.-15. II. 1953, L. & L. TRAVASSOS, ex coll. TRAVASSOS (IOC 19.398). 1900 m: 19. XII. 1967, P. GAGARIN leg., LEMAIRE collection (MNHN). Itapeva, 1800 m: 17. XII. 1952, D'ALMEIDA & L. TRAVASSOS F. leg, ex coll. D'ALMEIDA (DZ 10.157, 10.282). D'ALMEIDA leg., LEMAIRE collection, LEMAIRE genitalia prep. No. 1512 (MNHN). Lagoinha, 1500 m: 14. II. 1953, L. & L. TRAVASSOS, ex coll. TRAVASSOS (IOC 19.397). Santa Maria, 1900 m: 15. II. 2007, T. DECAËNS & C. MIELKE leg. (CTD [BC-Dec 1327]). 2 ♂♂, São Bento do Sapucaí, Pedra do Baú, 1810 m: 20.-22. I. 2004, G. P. ALMEIDA NETO leg. (CGCM 8858 [BC-JX 216108]). 15 ♂♂, 1 ♀, Salesópolis, Boracéia, 850 m: 5. VIII. 1948, D'ALMEIDA & TRAVASSOS FILHO leg., ex coll. D'ALMEIDA (DZ 10.138). 28. VII. 1946, L. & L. TRAVASSOS leg., ex coll. TRAVASSOS (IOC 1294). 30. VIII. 1946, TRAVASSOS & VANSOLINI leg., ex coll. TRAVASSOS (IOC 1296-1298). 25. VI. 1947, L. & L. TRAVASSOS leg., ex coll. TRAVASSOS (IOC 1299, 1300). 22. VII. 1947, L. TRAVASSOS F., E. RABELLO & E. DENTE leg., ex coll. TRAVASSOS (IOC 9133). 26. VIII. 1949, L. & L. TRAVASSOS, E. RABELLO & PEARSON leg., ex coll. TRAVASSOS (IOC 9134 & NHMUK: Brit. Mus. 1978-58). 14. VIII. 1947, L. TRAVASSOS F., E. RABELLO & J. LANE leg., ex coll. TRAVASSOS (IOC 9136-9138). 13. IX. 1947, TRAVASSOS, VENDEL, J. LANE, RABELLO leg., ex coll. TRAVASSOS (IOC 9132). X.1950, J. OTTICICA, L. TRAVASSOS F., PEARSON & RABELLO, Brit. Mus. 1977-32 (NHMUK). 4 ♂♂, 1 ♀, Alto da Serra: IX.1923, R. SPITZ leg., ROTHSCCHILD bequest B.M. 1939-I, LEMAIRE collection (MNHN). IX. 1923, VI. 1926, VII. 1926, IX. 1933, R. SPITZ leg., ROTHSCCHILD bequest B.M. 1939-I (NHMUK). 1 ♀, Serra do Mar, VII. 1935, LEMAIRE collection (MNHN). — Paraná: 1 ♂, Tijucas do Sul, Vossoroca, 850 m: 7. VII. 1977, O. MIELKE leg. (DZ 8665). 1 ♂, Quatro Barras, banhado: 24. VII. 1971, LAROCA leg. (DZ 10.348). 1 ♀, Toledo: VIII.-IX. 1959, MOHR leg. (DZ 10.074). 1 ♂, Curitiba: 1913, P. LOMBARD, E. L. BOUVIER Det. (MNHN). — Santa Catarina: 20 ♂♂, 1 ♀, São Bento do Sul, 850 m: 6. III. 1971, 21. IX. 1971, 21. X. 1979, João WEISS leg., ex coll. GAGARIN (DZ 8635, 10.115, 10.417). São Bento [do Sul]: VIII. 1985 (CSNB). Rio Natal, 400-550 m: 6. VIII. 1996, 22. VII. 1998, VIII. 1998, 17. VI. 1999, 24. VII. 1999, 13. VIII. 2000, 14. VII. 2003, 2. VIII. 2004, VIII. 2004, A. RANK leg. (CGCM 8118 [BC-JX 216107], 9733, 9777, 9818, 9875, 9982, 10.357, 16.374, CSNB [barcode SNB 1151]). Rio Vermelho: Collection Frank JOHNSON, Gen. Prep. 1522, St. LAURENT diss.: 3-24-15:4 (AMNH). VI. 1946, VII. 1946, A. MALLER leg., Frank JOHNSON Donor (AMNH). X. 1985 (CSNB). 2. XI. 2004, 17. VI. 2005, I. RANK leg. (CTD [BC-Dec 0453, BC-Dec 0154]). 2 ♂♂, Seara, Nova Teutônia, 300-500 m: Fritz PLAUMANN leg. (CFP). 1 ♀, São Joaquim, 1400 m: 3. I. 1962, ex coll. GAGARIN (DZ 9113). 3 ♂♂, "Saint Catherines": Collection Frank JOHNSON, Gen. Prep. 1523, St. LAURENT diss.: 3-24-15:3 (AMNH). Collection Frank JOHNSON, (USNM). 8 ♂♂, "Sta Catharina": 13. IX. 1961, 6. V. 1967, 28. IX. 1967, 1.-3. X. 1967, LEMAIRE collection (MNHN). — Rio Grande do Sul: 1 ♀, Porto Alegre: 14. XI. 1960, A. BAUMANN leg, ex coll. GAGARIN (DZ 10.094). — No locality: 1 ♂, ex coll. GAGARIN (DZ 10.163). Illegible locality: 1 ♂, St. LAURENT diss.: 3-25-15:5 (CNC).

Tab. 1: The estimated divergences (in %) conducted using Maximum Composite Likelihood model between DNA barcodes of the three studied species; the maximum intraspecific variation and the minimum interspecific are given in the diagonal (the number of records within parentheses). All nucleotide sequences are with 658 positions (= base pairs).

% Eacles species	<i>Eacles</i>		
	<i>bertrandi</i>	<i>mayi</i>	<i>lauroi</i>
<i>bertrandi</i>	0,3 (5)	—	—
<i>mayi</i>	4,2	0,9 (2)	—
<i>lauroi</i>	3,9	4,4	1,4 (5)

♂ (Figs. 3a, 3b): Fw. length: 38–48 mm, wsp. 76–98 mm. As in *E. mayi* except for: head: third segment of labial palpi almost indistinguishable, except by a tiny mark ventrally. Fw. dorsum: r-m vein curves toward the discal base; ground colour yellow, lightly to moderately speckled throughout with black, antemedial regions heavily suffused with moderately light to deep brown, marginal area with thin grey region essentially parallel with border, only reaching postmedial line apically. Round discal spots present, paired, moderately large, bright light-grey center. Fw. venter: discal marks large and prominent as in dorsum. Subcostal patch expanded from the wing base until the discal spot. Hw. dorsum: coloration as in fw. dorsum, brown antemedial patch present, varying in size, from well removed from postmedial line to nearly touching. Discal cell only slightly smaller than on fw., not touching postmedial line. Hw. venter: follows same pattern as fw. venter.

♀ (Figs. 4a, 4b): Fw. length: 51–58 mm, wsp. 100–113 mm. As in *E. mayi* ♀ except for: head: third segment of labial palpi extremely reduced. Fw. dorsum: ground colour yellow, generally lightly sprinkled with purplish brown, straight or slightly curving postmedial line apical, round discal spots present, paired, large with bright light-grey center. Fw. venter: as in dorsum but paler yellow, less speckling, markings less pronounced, light-grey center of discal spots greatly reduced. Hw. dorsum: as in fw. dorsum, discal spot with reduced white markings, spot not touching postmedial line. Hw. venter: as in fw. venter. Abdomen: ventrally light yellow with sublateral purplish grey markings.

♂ genitalia (Figs. 10a, 10b, 10c) (n = 3): As in *E. mayi*, individual variation in both *E. mayi* and *E. lauroi* make it difficult to generalize about distinctions between the genitalia of each species. See the discussion of *E. mayi* for an explanation of interspecific genitalia variation of *Eacles*.

♀ genitalia (Figs. 13a, 13b) (n = 4): As in *E. mayi*, except for: the posterior edge of tergite VIII is well indented mesally. The shape of posterior projection of the lamella postvaginalis varies from rounded to subtriangular.

Immature stages. Unknown.

Geographical distribution (Fig. 14): *Eacles lauroi* occurs from Rio de Janeiro to Rio Grande do Sul state. This species is most commonly collected at over 900 m in elevation, with exceptions noted in the discussion below.

There is one specimen at the NHMUK from Agulhas Negras, Itatiaia, in the state of Rio de Janeiro collected at 2400 m. Assuming this specimen's data are correct, this elevation represents the high extreme for this species, and potentially for the entire genus. In Santa Catarina, this species can be collected from July to August; while in Campos do Jordão, from November to March. PRESTES et al. (2009) figure this species as *E. mayi* and report it from Porto Alegre and São Francisco de Paula, Rio Grande do Sul. We did not examine all of these specimens to determine if they definitely represent *E. lauroi*, but due to our failure to locate specimens of *E. mayi* from Rio Grande do Sul, *E. lauroi* is likely the species represented in this state.

Diagnosis. *Eacles lauroi* is diagnosed together with *E. mayi* above.

Discussion. *Eacles lauroi* was described by OTTICICA FILHO (1938) from Campos do Jordão, 1800 m, São Paulo state, from 5 ♂♂. At that time, the author pointed out some morphological and habitat (elevation) differences between *E. mayi* and *E. lauroi*, although he was not sure about the true validity of this taxon. Later in OTTICICA FILHO (1941), the ♀ was described based on a single specimen. TRAVASSOS & NORONHA (1965) synonymized *E. lauroi* with *E. mayi* without further comment. Therefore, the validity of this taxon has always been questioned, and only recently was this species reinstated from synonymy with *E. mayi* (SIEWERT et al. 2010)

BOUVIER (1924) was planning to describe a new species of *Eacles*, which he was to name *E. lombardi* after the collector of his specimen. However, before he formally published the description of this new taxon, he became aware of the species *E. mayi*, which had already been described by SCHAUS (1920). BOUVIER thus abandoned describing *E. lombardi* as new, though he chose to redescribe *E. mayi* anyway, merely mentioning what he would have called the species if he had the chance to formally name it. By Article 8.3 of the ICZN (1999), BOUVIER originally published and disclaimed, within the same publication, the name *lombardi* as invalid; and as such, the name is unavailable. To further complicate the issue, the specimen to which BOUVIER referred as *E. lombardi* is actually *E. lauroi*, which was determined after careful examination of the BOUVIER collection at the MNHN. Due to the aforementioned unavailability of this name, it cannot be assigned to *E. lauroi* sensu stricto despite its seniority.

While examining large series of these two taxa deposited in collections in Brazil, the United States, and Europe, we can conclude that they are different species, and no intermediate forms exist. To further substantiate external morphological differences, DNA barcoding evidence supports the valid separation of *E. mayi* and *E. lauroi* (see Tab. 1). There is a 4.4% difference between these two taxa (see Text-Fig. 1 and Tab. 1).

Concerning the variation in ♂♂ of *E. lauroi* mentioned by OTTICICA FILHO (1938), some variations were verified.

The yellow fw. patch is, in some specimens of *E. lauroi*, as speckled as in *E. mayi*, but the opposite is never true. The discal markings of *E. lauroi* vary in size, but are always larger than those of *E. mayi*. An important character that can be used to differentiate these two species is the terminal segmentation of the labial palpi. In *E. lauroi*, it is consistently atrophied when compared with *E. mayi*.

The two species seem to be mostly allopatric in habitat, due to the fact that most specimens from higher altitudes (over 1100 m) are *E. lauroi* and the absence of this taxon at altitudes lower than 800 m in Rio de Janeiro state. The exceptional records from Teresópolis, Parada Barreira, 380 m, are somewhat dubious due to the collector, GAGARIN, who inconsistently reported accurate collecting data (C. MIELKE pers. obs.); therefore this may explain such a particularly low elevation for this species. Similarly, in the LEMAIRE collection at the MNHN, there are three *E. mayi* specimens from a relatively high altitude (1300–1500 m) at Petrópolis, also collected by GAGARIN. Interestingly, there are GAGARIN specimens of both *E. mayi* and *E. lauroi* from Teresópolis, 380 m, and Petrópolis, 900 m, and are apparently sympatric at these localities if GAGARIN's data are accurate.

Eacles bertrandi LEMAIRE, 1981

Figs. 5a, 5b, 6a, 6b, 11a, 11b, 11c, 14, Text-Fig. 1.

Eacles bertrandi: LEMAIRE (1981: 92).

Eacles bertrandi LEMAIRE: LEMAIRE (1988: pl. 13, Fig. 5 ♂).

Eacles bertrandi LEMAIRE: D'ABRERA (1995: 62 [not figured]).

Eacles bertrandi LEMAIRE: LEMAIRE (1996: 30).

Eacles bertrandi LEMAIRE: C. MIELKE & MIERS (1998: 17, 18).

Eacles bertrandi LEMAIRE: PRESTES et al. (2009, Fig. 19 ♂).

Eacles bertrandi LEMAIRE: SIEWERT et al. (2010: 217).

Eacles bertrandi LEMAIRE: PIOVESAN et al. (2014: 9).

Holotype ♂: Brazil, Santa Catarina, rte. de Lajes à São Joaquim, km 65, 1300 m, 29. XII. 1980, D. BERTRAND (MNHN) (examined).

Examined material (in total 45 ♂♂, 1 ♀, all Brazil): **Santa Catarina:** 2 ♂♂, Paratypes, Road Lages–São Joaquim, Km 65, 1300 m: 30. XII. 1980, D. BERTRAND leg. (DZ 2499). LEMAIRE collection, LEMAIRE genitalia prep. No. 4160, (MNHN). 9 ♂♂, Urubici, Morro da Igreja, 1250 m: 27.–29. XII. 1997, 23. XII. 1998, 29. XII. 1999, 18.–22. XII. 2000, MIERS & C. MIELKE leg. (CGCM 1102, 9970, 10.014, 10.035, 10.064. COM 49.652). 26.–31. XII. 2008, C. MIELKE leg. (CGCM 21.364). – **Rio Grande do Sul:** 32 ♂♂, 1 ♀, Cambará do Sul, Estância Cambará, 1040 m: 1.–4. I. 2006, C. MIELKE leg. (CGCM 20.988, 21.004, 21.005, 21.020, 21.036 [BC-JX 216104], 21.052, 21.068, 21.084, 21.100, 21.117, 21.277, 21.356, 21.372, 21.388, 21.420, 21.436, 21.500, 22.531; CTD [BC-Dec 1320–1323]; CSNB [barcode SNB 1152]). 2 ♂♂, São Francisco de Paula, 900 m: 19.–21. I. 2010, PRESTES & MOSER leg. (CGCM 24.060, 24.490).

♂ (Figs. 5a, 5b): Fw. length: 32–39 mm, wsp. 65–79 mm, with the inner margin perpendicular to the body. Head: antennae dark yellow, frons yellow, labial palpi nearly extend to edge of frons, purple, legs purplish grey. Thorax: ground colour yellow, with three large patches of reddish brown, yellow ventrally. Fw. dorsum: triangular, rounded, margin straight, ground colour yellow, moderately speckled throughout with black, antemedial line wavy, apical postmedial line mostly straight, ante-

medial regions heavily suffused with reddish brown, marginal area with grey region reaching from tornus to apex, widening to meet antemedial line roughly half-way to apex; pair of round discal spots present, one large and one much smaller, each with a light-grey center. Fw. venter: similar to dorsum, though brown suffusions and black speckling heavily reduced. Antemedial line absent, postmedial line present, more contrasting than in dorsum, discal marks prominent as in dorsum. Subcostal patch rounded as in *E. mayi* venter. Hw. dorsum: coloration as in fw. dorsum, brown antemedial patch present. Discal cell about same size as on fw., barely touching postmedial line, small grey accessory slash-like mark above discal cell. Hw. venter: follows same pattern as fw. venter. Abdomen: dorsally yellow, purplish brown patches over each segment, ventrally yellow with brown patches on terminal segments only.

♀ (Figs. 6a, 6b): Fw. length: 54 mm, wsp. 101 mm, with the inner margin perpendicular to the body. Head: antennae dark yellow, frons yellow, third segment of labial palpi fully developed. Thorax: yellow with two purple spots dorsally, legs light purple. Fw. dorsum: moderately elongated, outer margin slightly convex; ground colour deep yellow, sprinkled with purple. Antemedial line undulating, broad and purple, slightly pre-apical postmedial line mostly straight but curving towards apex. Purple discal spot double, with white markings at center of primary spot. Fw. venter: as in dorsum but lighter, darker scales towards apex and outer margins. Hw. dorsum: same pattern as fw. dorsum, discal spot with reduced white markings, antemedial line reduced. Hw. venter: as in fw. venter but with reddish cast, especially at wing bases. Abdomen: dorsally dark yellow with purple patches on each segment, ventrally light yellow.

♂ genitalia (Figs. 11a, 11b, 11c) (n = 2): Uncus simple, enlarged posteriorly, helmet-shaped, central ridge antero-ventrally. Transtilla upturned and more heavily sclerotized medially; lateral processes extend distally $\frac{3}{4}$ of the length of the uncus. Valvae wide, thick, and hooked, roughly curved inward distally and apically sharp. Saccus rounded, slightly projected. Juxta free, ring-like. Phallus smoothly curved, toothed apically on the right side, vesica bag-like with numerous small cornuti.

Immature stages. Unknown.

Geographical distribution. This species is known only from the Serra Geral in the states of Santa Catarina and Rio Grande do Sul, from 1040 to 1300 m elevation.

Ethology. ♂♂ are attracted to light from 21:00 h until midnight and then again in the early morning.

Diagnosis. The ♂ is easily distinguished from both *E. mayi* and *E. lauroi* by the smaller size, more rounded fw., and the usually larger size of fw. and hw. discal spots, especially those of the hw. when compared with the two other species.

The ♀ of *E. bertrandi* differs from the ♀♀ of *E. mayi* and *E. lauroi* by the smaller size and by the slightly pre-apical postmedial line of the fw., which curves towards the apex. The coloration of the maculation, including speckling and ante- and postmedial lines on all wings, is more purple gray than brown, as in the ♀♀ of *E. mayi* and *E. lauroi*.

Discussion. LEMAIRE (1981) described this taxon based on three ♂♂ from Santa Catarina. Since then, only C. MIELKE & MIERS (1998) reported new collecting data, but at the time the authors were only aware of the ♂. The ♀ became known some years later, and now it is described.

Eacles camposportoi MENDES, 1937

Figs. 7a, 7b, 8a, 8b.

Eacles camposportoi: MENDES (1937a: 48, figs 1, 2; 1937b: 207, pl. 1, 2).

Eacles camposportoi MENDES: LEMAIRE (1988: pl. 15, fig. 1 ♂ & pl. 57, fig. 2 ♀).

Eacles camposportoi MENDES: D'ABRERA (1995: 62 [not figured]).

Eacles camposportoi MENDES: LEMAIRE (1996: 30).

Examined material (in total 1 ♂, 3 ♀♀; all Brazil): **São Paulo:** 1 ♀, Campos do Jordão, Fazenda da Guarda, 1800 m: Ex larva, 28. x. 1963, L. TRAVASSOS F. col. det. (MZSP). 1 ♀, paratype ["Allotype"], Umuarama, 1800 m: 17. i. 1944, GAGARIN leg., OITICICA & GAGARIN det. 1958 (DZ 616). 1 ♂, 1 ♀, São José do Barreiro, Bocaina, 1692 m: 9.-10. x. 2015, C. MIELKE leg. (CGCM 30.557, 30.566).

The "allotype" and a reared ♀ are figured for the first time in colour (Figs. 7a, 7b, 8a, 8b). The "allotype" was previously figured in LEMAIRE (1988) and OITICICA FILHO & GAGARIN (1959). In the latter publication, OITICICA FILHO & GAGARIN figured two additional ♀♀, but all previously published figures of ♀ *E. camposportoi* are black and white. We also report a new collecting locality for *E. camposportoi* from very near to the Brazilian state of Rio de Janeiro.

Eacles manuelita OITICICA FILHO, 1941

Eacles manuelita: OITICICA FILHO (1941a: 129-137, figs. 1-4, 6, 7, 9).

Eacles manuelita OITICICA: LEMAIRE (1988: pl. 11, figs. 1 ♂, 2 ♀).

Eacles manuelita OITICICA: D'ABRERA (1995: 62 [not figured]).

Eacles manuelita OITICICA: LEMAIRE (1996: 30).

Examined material (in total 29 ♂♂, 6 ♀♀; all Brazil): **Ceará:** 2 ♂♂, Ubajara, Serra da Ibiapaba, 900 m: 13. ii. 2005, A. PESSOA leg. (CGCM 17.081, 17.339). 1 ♂, 1 ♀, São Benedito, Serra da Ibiapaba, 950 m: 3. ii. 2006, 19. ii. 2006, A. PESSOA leg. (CGCM 20.138, 20.154). 1 ♂, Guaramiranga, Serra do Baturité, 850 m: 15. ii. 2006, A. PESSOA leg. (CGCM 20.586). — **Pernambuco:** 6 ♂♂, 4 ♀♀, Canhotinho: 18. v. 1989, 18. viii. 1990, 13. iv. 1991, 24. vii. 1991, 2. ix. 1991, 22. viii. 1992, 5. iv. 1992, 30. v. 1993, A. CARDOSO leg., ex col. CARDOSO (DZ 8912, 8920, 8928, 8936, 8943, 8960, 8976, 9016, 9024, 9951). 4 ♂♂, Caruaru: iv. 1972, ALVARENGA leg. (DZ 8944, 8952, 8968, 8984). 1 ♂, 1 ♀, Arredones: 21. x. 1936, LEMAIRE collection (MNHN). — **Alagoas:** 1 ♂, "Serra d'Alim": CARDOSO leg., ex Col. CARDOSO (DZ 8992). 1 ♂, São José da Lage: 6. vii. 1966, Luiz C. NETO leg., ex Col. D'ALMEIDA (DZ 10.168). 2 ♂♂, Maceió: 14. iv. 1945, v. 1950, A. CARDOSO leg., ex col. CARDOSO (DZ 8911, 9008). 1 ♂, Pau Brasil: v. 1959, A. CARDOSO leg., ex col. CARDOSO (DZ 8919). 1 ♂, Penedo: A. CARDOSO leg., ex col. CARDOSO (DZ 8935). — **Sergipe:** 1 ♂, Carinópolis: xi. 1971, A. CARDOSO leg., ex col. CARDOSO (DZ 8927). — **Bahia:** 6 ♂♂, Km 34 Br 116, Encruzilhada,

600 m: 2. III. 1997, T. PORION leg. (CGCM 18.847); genitalia no. 1322/05 SNB (CSNB [barcode SNB 1149]). — **Minas Gerais**: 1 ♂, Maristela de Minas, ca. 900 m: XI. 2014, leg. P. WAGNER (CSNB).

Geographical distribution. Some recent collecting efforts in the Ibiapaba Mountains of the state of Ceará in extreme northeastern Brazil, and in C-SE Bahia and NE Minas Gerais, revealed the occurrence of *E. manuelita*. This species was only known until now from the coasts of Alagoas, Pernambuco and Sergipe states. These new records increase the geographical distribution of this poorly known and rare species. It should be noted, however, that barcoding data reveal some uncertainties as to the true identity of the specimens from Bahia. These uncertainties must be resolved in order to determine the presence of *E. manuelita* in this state, and in nearby Minas Gerais.

Eacles acuta SCHAUS, 1905

Eacles acuta: SCHAUS (1905: 182).

Eacles acuta SCHAUS: LEMAIRE (1988: pl. 4, Fig. 13 ♂).

Eacles acuta SCHAUS: D'ABRERA (1995: 60–61).

Eacles acuta SCHAUS: LEMAIRE (1996: 30).

Eacles acuta SCHAUS: RACHELI & RACHELI (2005: Fig. 1 ♀).

Eacles acuta SCHAUS: METZGER (2012: pl. 5, Figs. 18 ♂, 19 ♀ & pl. 6, Figs. 5, 8).

Examined material (in total 18 ♂♂, 3 ♀♀): **Guyana**: 1 ♂, Omai [British Guiana]: Collection Wm. SCHAUS (USNM). — **French Guiana**: 5 ♂♂, Belizón: VIII. 2002 (CGCM 1783, 2047, 13.877). VII. 2002, XII. 2002, GIUGLARIS leg. (CSNB [barcode SNB 1150]). 1 ♀, RN2 Mt. Boufoquim: GIUGLARIS leg. (CGCM 16.070). 1 ♀, Boufoquim, RN2, Le Galion: 10. V. 1999, CARLOT leg. (CGCM 18.825). 3 ♂♂, Route de Cayenne á St. Laurent K.209: 10.–12. VI. 1980, DUBIEF leg., LEMAIRE collection (MNHN). 2 ♂♂, Territ. de Guyane, Route de L'Est, km 63,7: 23. XII. 1978, DUBIEF leg., LEMAIRE collection, LEMAIRE genitalia prep. No. 6066 (MNHN). 1 ♂, Mana: illegible name and date, LEMAIRE collection (MNHN). 3 ♂♂, St. Jean du Maroni: II. 1978, PORION leg., LEMAIRE collection (MNHN). 1 ♂, St. Jean: II. 1978, Coll. Th. PORION, LEMAIRE collection (MNHN). 1 ♂, probably Oyapock: VIII. 2014 (CUIC). 1 ♂, Piste de Kaw, PK 20: XII. 1993, PHILIPPI leg. (CSNB). — **Brazil, Amapá**: 1 ♀, Serra do Navio, Icomi: 12. IX. 1963, D'ALMEIDA & BERLA leg. (DZ 8959).

Geographical distribution. RACHELI & RACHELI (2005) and LEMAIRE (1988) report *E. acuta* only from French Guiana and Guyana. In the DZUP, there is one ♀ from Brazil, which represents the first record for this country.

Species list

List of the 16 *Eacles* species recorded from Brazil. An asterisk * denotes a new country record.

Note: *E. masoni* SCHAUS, 1896 is represented as *E. fulvaster* W. ROTHSCHILD, 1907 and *E. guinlei* OITICICA FILHO, 1941 in Brazil according to BRECHLIN & MEISTER (2011).

Eacles sp.

Eacles acuta SCHAUS, 1905*

Eacles adoxa JORDAN, 1910

Eacles barnesi SCHAUS, 1905

Eacles bertrandi LEMAIRE, 1981

Eacles camposportoi MENDES, 1937

Eacles ducalis (WALKER, 1855)

Eacles fairchildi MAY & OITICICA FILHO, 1941

Eacles guianensis SCHAUS, 1905

Eacles imperialis (DRURY, 1773)

Eacles lauroi OITICICA FILHO, 1938

Eacles lemairei RÊGO-BARROS & TANGERINI, 1973

Eacles manuelita OITICICA FILHO, 1941

Eacles masoni SCHAUS, 1896

Eacles mayi SCHAUS, 1920

Eacles ormondei SCHAUS, 1889

Eacles penelope (CRAMER, 1775)

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