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A taxonomic review of the genus *Diptychophora* Zeller (Lepidoptera, Pyralidae *sensu lato*, Crambinae) in Brazil, with descriptions of three new species

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Abstract: The Brazilian fauna of *Diptychophora* Zeller, 1866 (Lepidoptera, Pyralidae *sensu lato*, Crambinae) is reviewed. Consisting of three species based on the literature (*D. diasticta* Gaskin, 1986, *D. kuhlweinii* Zeller, 1866 and *D. subazanalis* Błeszyński, 1967), this fauna is augmented with three new species (*Diptychophora galvani* sp. n. from Mato Grosso and Minas Gerais, *D. planaltina* sp. n. from the Federal District, and *D. ardalia* sp. n. from Bahia), that are described and illustrated. The female of *D. diasticta* is also described and illustrated for the first time. A partial CO1 barcode sequence is provided for *D. diasticta*.

Keywords: Pyraloidea - Crambidae - Diptychophorini - New World - checklist.

INTRODUCTION

Among Crambinae, the Diptychophorini include the smallest, and also many of the most colourful species. As shown by Léger *et al*. (2019), the tribe is at the base of the Crambinae phylogenetic tree. In the New World there are currently six recognized genera of Diptychophorini that include 25 species (see Nuss *et al.*, 2020). The New World fauna of Diptychophorini, except *Microcausta* Hampson, 1895 was revised by Gaskin (1986a, b; 1989) with additions by Landry (1990) and Solis (2009). The genus *Diptychophora* Zeller, 1866 includes nine New World species occurring from the United States of America in Arizona south to the southern State of Santa Catarina in Brazil. In Brazil there are three species of *Diptychophora* recorded. We list and illustrate these with photos of the habitus and describe three additional species. The three new species were found in the Cerrado, a major ecoregion of Brazil between the Amazonian rainforest and the Atlantic Forest. Seasonally dry, it consists of a variety of more or less wooded savanna types, as well as wetlands and gallery forests, on poor acidic soils.

MATERIAL AND METHODS

The specimens treated here were mostly collected by VB in glass vials with a mercury-vapour lamp in front of a white sheet. They were kept alive until the next day, when they were killed in jars with ethylic ether and pinned in plastic boxes with plastazote glued to the bottom. Static electricity, generated by rubbing the plastazote with curved forceps, was used to spread the wings. Ethylic ether works well for this manoeuver as the wing muscles are not too relaxed and remain open on the plastazote surface.

Specimens were dissected in 30% ethanol following maceration in KOH at 60 °C for one hour, or 14 hours or so at room temperature. Dissected parts were stored temporarily in lactic acid stained with Orange G to allow for the action of KOH to stop, for staining the sclerotized parts, and to allow their description in three dimensions, although in this study some specimens had been dissected and mounted on slides 12 years before description. Mounting included a short staining period in Chlorazol black. Euparal was used as a mounting medium.

Photos were taken with a Leica M205 and a Leica DFC425 camera and its associated imaging software. Some of the photographed specimens (Figs 1, 3-5, 8) had the wings bent down and thus, wingspan calculations based on the scales provided on the photos will give smaller values than those provided here in the descriptions and diagnoses. The photos were stacked using Zerene Stacker of Zerene Systems LLC and enhanced using Gimp and Adobe Photoshop.

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To help describe and compare the shape of the male valva of the three new species, two measurements were taken on the right valva from photos of mounted genitalia (Figs 11, 13-16): the length of the dorsal section measured from the lowest point of the basal concavity of the dorsal edge until the apex, and the width measured from that same point of the dorsal edge at base to the widest point on the ventral edge. The ratio of these two measurements is here called the length/width ratio of the valva.

DNA extractions were made on 12 specimens of *Diptychophora* following three different protocols, as follows. 1– DNA was extracted from two legs each of four specimens at the MHN, Geneva using the commercial kit EZNA Tissue DNA (Omega Bio-Tek) and following the manufacturer's instructions. Amplification of the COI barcode region was attempted using PCR protocols detailed in Landry & Andriollo (2020). 2 & 3 – DNA was extracted from one leg each of 12 specimens and from the abdomen of four of these same specimens by Théo Léger at the MfN using the Macherey-Nagel DNA extraction kit. The COI barcode region was amplified using the LCO/Nancy primer combination. Because the full CO1 barcode region amplifications consistently failed, two fragments, COI-1a (LCO/K699) and COI-1b (COIf220/Nancy), were amplified separately. The molecular procedure follows that of Léger *et al*. (2021). Sequencing was done in both directions by Macrogen (The Netherlands).

The following abbreviations are used: 'BL' for Bernard Landry, 'col.' for collector, 'm' for meter(s), 'NHMUK' for Natural History Museum, London, U.K., 'CUIC' for Cornell University Insect Collection, Ithaca, New York, U.S.A., 'MfN' for 'Museum für Naturkunde', Berlin, Germany, 'MHNG' for 'Muséum d'histoire naturelle', Geneva, Switzerland, 'USNM' for National Museum of Natural History, Washington, D.C., U.S.A., 'VB' for Vitor Becker, and VBC for Vitor O. Becker Collection, Camacan, Brazil.

SEQUENCING RESULTS

The DNA extractions from specimen legs at the MHNG and MfN failed to provide any product usable for sequencing. The DNA extractions from abdomens at the MfN were mostly unsuccessful except for one specimen of *D. diasticta* for which the terminal 333 base-pairs could be retrieved and is presented below.

TAXONOMIC SECTION

Diptychophora Zeller, 1866

The genus *Diptychophora* (type species *Diptychophora kuhlweinii* Zeller, 1866) is presently known to include 15 species from the Old and New Worlds (Nuss *et al.*, 2020), although the Old World species placed in *Diptychophora* probably belong in fact to *Glaucocharis* Meyrick, 1938.

The New World fauna of *Diptychophora* includes nine described species (Nuss *et al*., 2020) that occur from the southwestern United States of America (Arizona) south to the state of Santa Catarina in the south of Brazil. The Neotropical fauna was revised by Gaskin (1986a). Landry (1990) added two new species and Solis (2009) transferred an additional species from Cybalomiinae to *Diptychophora*. Although synapomorphies have not been presented for the genus yet, *D. powelli* Landry (1990) as well as the species transferred by Solis (2009), i.e. *D. lojanalis* (Dognin, 1905), do not exhibit the typical valva shape of *Diptychophora* and hence may require new genera or transfers to other existing genera. No larval host is presently known for the species of *Diptychophora*.

Diptychophora galvani sp. n.

Figs 8, 13, 17

Material examined

Holotype: female; VBC, without catalogue number; Brazil, Mato Grosso, Chapada dos Guimarães, 800 m; 7-8.04.1996; V.O. Becker collector; Collection Becker 106575.

Paratypes (2 males, 1 female): 1 male; MHNG-ENTO-84604 (dissected); same data as holotype; DNA voucher Lepidoptera B. Landry n°043. – 1 female; VBC, without catalogue number; Brazil, Minas Gerais, Unaí, 700 m; 03.11.1983; V.O. Becker, collector; Collection Becker 49809; genitalia slide BL 1880. – 1 male; VBC, without catalogue number; Brazil, Minas Gerais, Unaí, 700 m; 07.11.1982; V.O. Becker, collector; Collection Becker 49079.

Diagnosis: No other species of *Diptychophora* have a forewing pattern in any way similar to that of this species in the large median grey section bordered by dark brown lines and preceded and followed by orange sections. In male genitalia the elongate uncus fused with the tegumen represents a distinctive feature and in female genitalia, the presence of two signa, one crescentic and the other crease-shaped, is unique among the New World members of *Diptychophora*.

Etymology: This new taxon is named in honour of Dr Ricardo Magnus Osório Galvão, professor of the Institute of Physics of the University of São Paulo, for his courage in the face of professional adversity. The orange colour of the moth's forewings are reminiscent of the devastating fires that had become more prevalent in the Amazon in 2019, compared to 2018, based on Dr Galvão and his team's scientific data that cost Dr Galvão his position of Director of the Brazilian National Institute for Space Research in August 2019.

Description: (Fig. 8). Head with frons slightly rounded, not projecting, with vestiture short scaled, white to pale yellow on ventral half, yellowish orange above and between antennae; posterior eye margin scales

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pale yellow to yellowish orange; vertex and occiput with undercover of short and thin white scales covered by posterolateral tuft of thin yellowish orange scales projecting medioanteriorly to medioposteriorly. Antenna dark brown dorsally and white ventrally on scape, pedicel and first 1-2 flagellomeres, light yellowish brown on subsequent flagellomeres. Maxillary palpus white at base, light yellowish orange toward apex. Labial palpus not reaching beyond yellowish orange apex of maxillary palpus, with vestiture mostly white to light yellow, with some pale greyish brown laterally at base. Haustellum white scaled. Thorax with patagia orange with pale dark brown at tip laterally; tegula orange with dark brown base; between tegulae orange with broad dark brown bars from base to middle; apex with orange medially and white laterally. Male forewing length: 4.5 mm, wingspan: 10.0 mm. Female forewing length: 5.0-5.5 (holotype: 5.0 mm), wingspan 11.0-12.0 mm (holotype: 11.0 mm). Female frenulum with 2 or 3 acanthae, not clearly visible on available specimens. Male with white hindwing with terminal margin at apex light brown and with white fringes except for grey brown tips of apical scales; female wings with colour and pattern as illustrated (Fig. 8). Prothoracic leg coxa and trochanter white and light yellowish brown; femur yellowish brown, darker blackish brown at tip, white medially at base; tibia orange at base, dark brown on second half, white at tip; first tarsomere light yellowish orange at base, subsequently dark brown and white at tip; second tarsomere white; third and fourth tarsomeres dark brown; fifth white. Mesothoracic leg coxa and trochanter white with some light yellow; femur light yellowish orange with greyish brown at apex; tibia and first tarsomere light yellowish orange; second and third tarsomeres white with dark brown base; fourth white; fifth dark brown with white tip. Metathoracic leg coxa, trochanter, femur, tibia, and first tarsomere pale dirty yellowish white, second to fifth tarsomeres as on mesothoracic leg. Male abdomen pale yellowish white all around. Female abdomen dorsally mostly greyish brown, with pale dirty yellowish white on first tergite apically and yellowish grey at apex; ventrally yellowish white. Female abdominal segment VII about twice as long as preceding segment, narrower, more thickly sclerotized and thickly scaled along apical margin.

Male genitalia (n=1) (Fig. 13). Uncus elongate, triangular in side view, without clearly visible line of demarcation from tegumen; distal section of medium girth, apically triangular and slightly upturned. Subscaphium distinctly sclerotized, forming thin band narrowing to apical point. Gnathos thin, with distal arm at right angle from shorter lateral arms, slightly curving upward at about 1/3 and apically, reaching tip of subscaphium. Tegumen with posterior lateral arms straight and narrow, anterior plates distinctly separated from posterior arms from mid-length, subtriangular, with broadly rounded posterior margin. Juxta shield like, with convex lateral margins, with apical margin V-shaped. Valva short, slightly longer than broad (length/width ratio: 1.17), with dorsal section about 3X as produced as ventral section and more abundantly setose along dorsal margin on apical third. Vinculum very narrow, with short, rounded median projection. Phallus slightly shorter than valva, straight, of medium girth, mostly membranous, ventrally with thin sclerotized band enlarging subapically to cover ventral wall and lateral walls partly; vesica adorned with numerous spinules on apical third in invaginated state.

Female genitalia (n=1) (Fig. 17). Papillae anales small, subtriangular, ventrally longer, narrowing to about half of ventral length dorsally, moderately setose and covered with setulae. Posterior apophysis connecting to sclerotized plate of base of papilla analis at its dorsal edge, short, about as long as width of papilla analis, straight, reaching about middle of segment VIII. Tergite VIII of medium length; anterior apophysis about as long as posterior apophysis but slightly sturdier and bent at about 1/3. Ostium bursae a wide membranous funnel adorned with several transverse rows of fine and short sclerotized striae. Ductus bursae of medium girth, bent subbasally, spinulate, and lightly sclerotized in bend ventrally, scobinated partly on median third and all around on distal third. Ductus seminalis connecting on right side of ductus bursae at about 1/3 from its base. Corpus bursae large, almost as long as ductus bursae, subcircular, with right margin nearly straight, scobinated all around, but more thickly so at base and around signa; with thin, boomerang-shaped signum at about 1/3 from base and smaller rounded signum forming crease on opposite side and slightly closer to base.

Biology: Unknown. The specimens were collected in the Cerrado Biome, at the edge of gallery forest.

Distribution: Presently known from Brazil only, specimens were collected in the states of Mato Grosso and Minas Gerais.

Remarks: Two more specimens in the NHMUK were unavailable during the time of the description and hence not included in the type series.

Diptychophora planaltina **sp. n.**

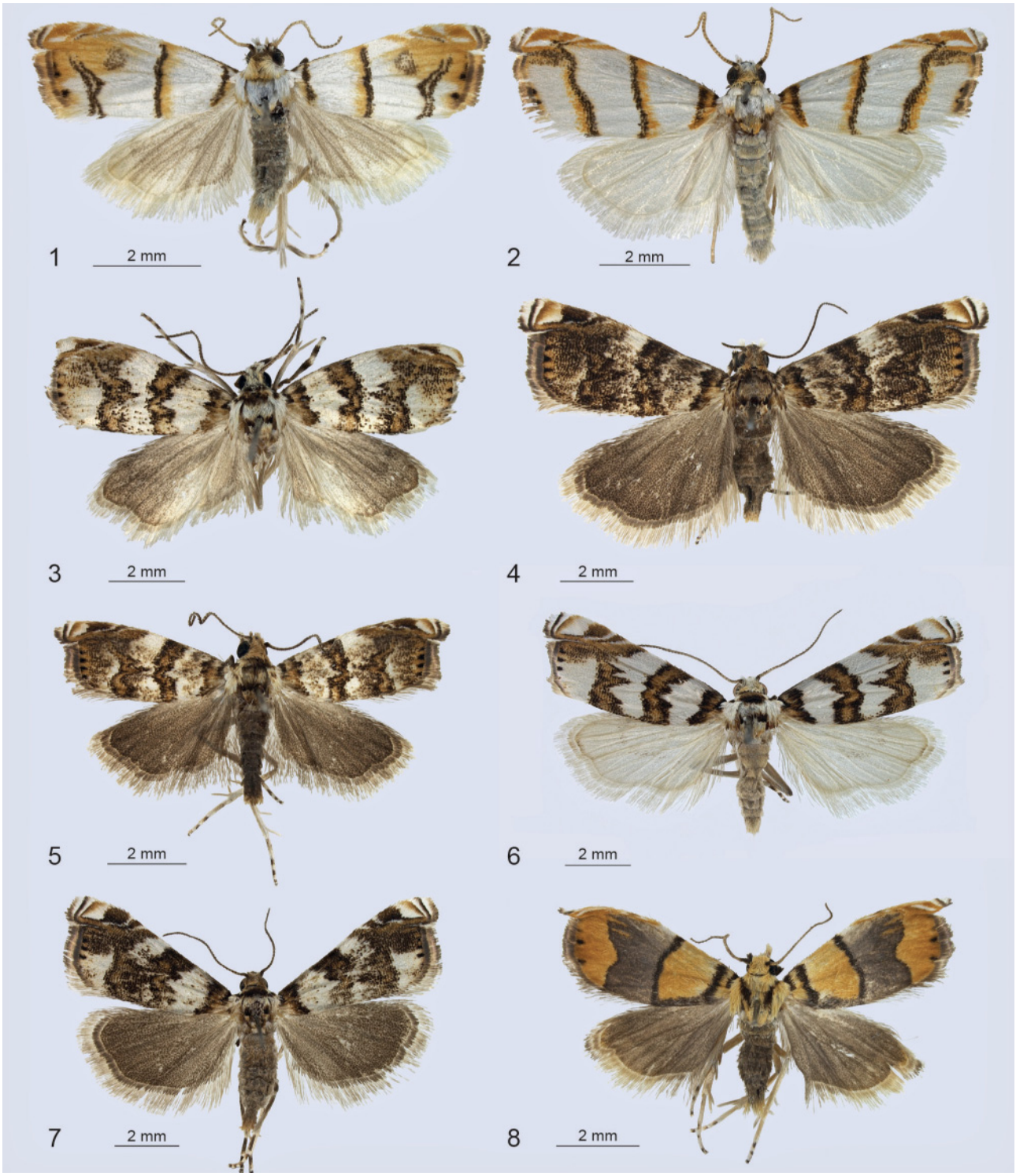
Figs 6, 7, 15, 19

Material examined

Holotype: male; VBC, without catalogue number; Brazil, Federal District, Planaltina, 1100 m; 15.02.1990; V.O. Becker collector; Collection Becker 96721.

Paratypes (8 males, 2 females): – 1 male; VBC, without catalogue number; same data as holotype. – 1 female; MHNG-ENTO-85386 (dissected); same data as holotype; DNA voucher Lepidoptera B. Landry n°048. – 2 males; VBC, without catalogue numbers; Brazil, Federal District, Planaltina, 1100 m; 16.10.1990; V.O. Becker

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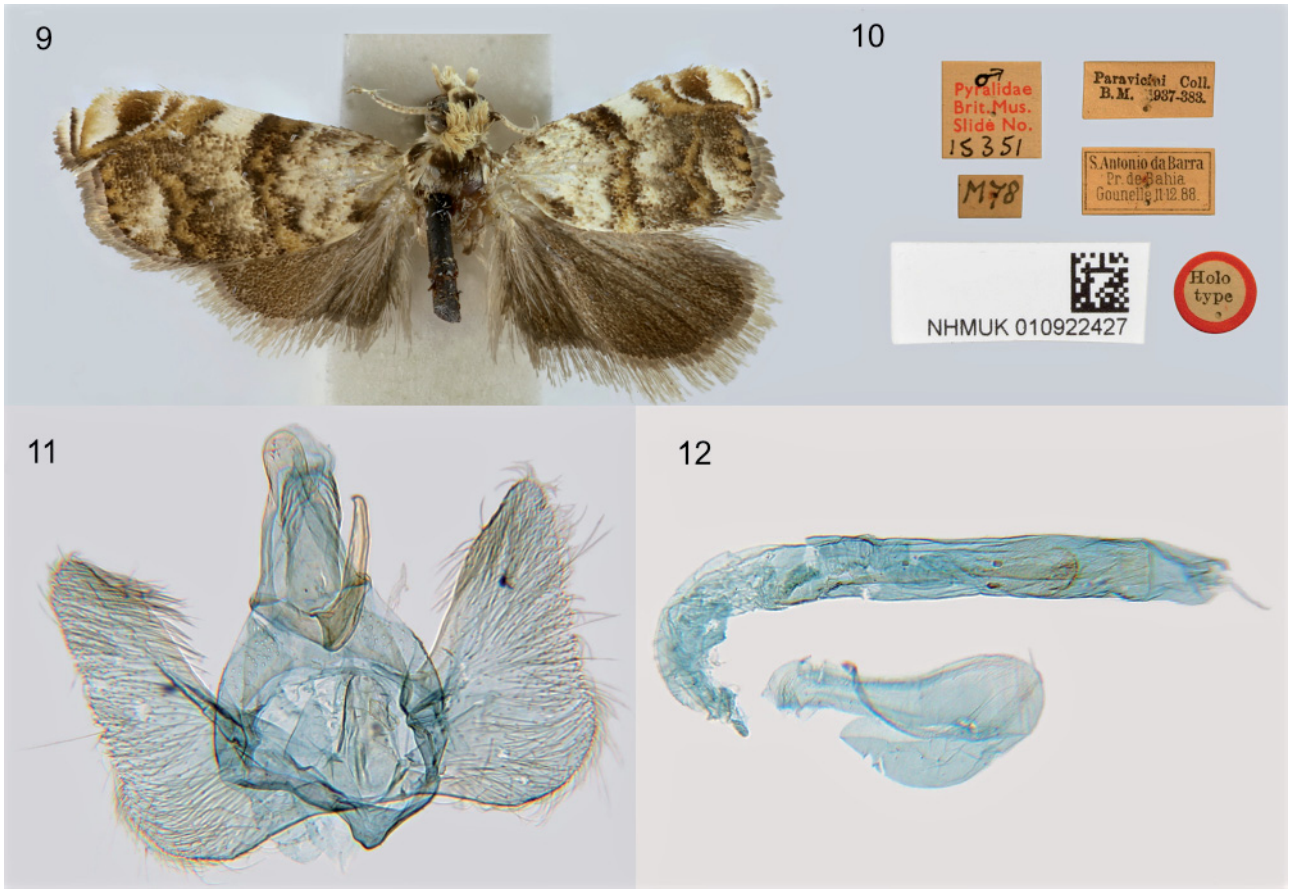


Figs 1-8. Habiti of *Diptychophora* species. (1) *D. subazanalis* female, Brazil, Rondonia (VBC). (2) *D. kuhlweinii* male, Brazil, Bahia (MHNG). (3) *D. diasticta*, male, Brazil, Minas Gerais (VBC). (4) *D. diasticta*, female, Brazil, Minas Gerais (VBC). (5) *D. ardalia*, holotype (VBC). (6) *D. planaltina*, holotype (VBC). (7) *D. planaltina*, paratype female, Brazil, Federal District (VBC). (8) *D. galvani*, holotype (VBC).

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collector; Collection Becker 96857. – 1 male; MHNG-ENTO-85387 (dissected); Brazil, Federal District, Planaltina, 15°35'S, 47°42'W, 1000 m; 10.10.1983; V.O. Becker collector; Collection Becker 41534. – 2 males; VBC, without catalogue numbers; Brazil, Federal District, Planaltina, 15°35'S, 47°42'W, 1000 m; 05.11.1988; V.O. Becker collector; Collection Becker 58960. – 1 male; VBC, without catalogue number; Brazil, Federal District, Planaltina, 15°35'S, 47°42'W, 1000 m; 15.02.1982; V.O. Becker collector; Collection Becker 39741. – 1 male; VBC, without catalogue number; Brazil, Federal District, Planaltina, 15°35'S, 47°42'W, 1000 m; 22.02.1985; V.O. Becker collector; Collection Becker 57204. – 1 female; VBC, without catalogue number; Brazil, Federal District, Planaltina, 15°35'S, 47°42'W, 1000 m; 15.04.1985; V.O. Becker collector; Collection Becker 57399.

Diagnosis: The male of this species is distinctive in the wide orange and dark brown basal, submedian, and postmedian jagged fasciae on a satiny white background. Other species of Diptychophorini have orange brown and/or dark brown fasciae on a satiny white background [*Diptychophora kuhlweinii* Zeller (Fig. 2), *D. subazanalis* Błeszyński (Fig. 1), *Steneromene azanalis* (Walker)], but their fasciae are thin and usually straight, especially the submedian fascia. This species is more similar in forewing pattern and colour to some species of the Crambinae genus *Microcrambus* Błeszyński formerly placed in *Tortriculladia* Błeszyński (see Léger *et al.,* 2019), except for the obvious notch on the forewing terminal margin that all New World Diptychophorini possess, except *Microcausta* Hampson. The male genitalia (Fig. 15) are similar to those of *D. ardalia* (Fig. 16), but differ conspicuously in the more elongate dorsal section of the valva, which has a ratio of length/width of 1.2 whereas that ratio only reaches 1.0 in the more squarish valva of *D. ardalia*. That ratio is 1.2 also in *D. diasticta* (Fig. 14), but this species differs from *D. planaltina* in its longer uncus and gnathos that do not reach the tip of the valva, and the wider uncus in side view, with a ratio of length over width of 3.7 in *D. diasticta* vs 4.24 in *D. planaltina*. In *D. planaltina* the 7.5 ratio of the length of the sclerotized section of the phallus shaft over its width is the longest of the three species as it is only 4.6 for *D. diasticta* and 6.2 for *D. ardalia*. In female genitalia this species (Fig. 19) is most similar to *D. diasticta* (Fig. 18), but its papillae anales are larger,



Figs 9-12. Holotype male of *Diptychophora diasticta* Gaskin in NHMUK. (9) Habitus. (10) Habitus labels. (11) Genitalia without phallus. (12) Phallus. Photos by David Lees, © Courtesy of the Trustees of the Natural History Museum, London, U.K.

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its anterior apophyses are straight instead of sinuous, and the distal half of the corpus bursae is narrower that the proximal half whereas only the distal quarter is narrower in *D. diasticta*.

Etymology: The name refers to the type locality and is treated as a noun in apposition.

Description: Male (n=8) (Fig. 6). Head with frons rounded, slightly bulging; vestiture on frons short scaled with brown spot in middle, on vertex and occiput with thinner and longer scales mostly white, with light yellowish to greyish brown laterally on posterior fan of scales projecting medioanteriorly between antennae to medioposteriorly. Antennal scape and pedicel dark brown dorsally and white ventrally; flagellomeres with dark brown to greyish brown and lighter greyish brown scales. Maxillary palpus dark brown at base, white on longer projecting scales of distal half. Labial palpus porrect, reaching slightly beyond maxillary palpus, with scales appressed, white at base and apically, greyish brown laterally at base, light yellowish to light greyish brown elsewhere. Haustellum light yellowish brown. Thorax with patagium laterally white, medially yellowish brown at base and dark brown at apex of scales; tegula white with patch of blackish brown at base and light yellowish brown to brown at apex; between tegulae blackish brown at base, followed by white, medially blackish brown followed by white scales tipped yellowish brown, apically white with brown laterally. Male forewing length: 5.5-6.5 mm (holotype 6.0 mm); wingspan: 11.5-13.0 mm (holotype: 12.0 mm). Female forewing length: 5.5-6.5 mm; wingspan 12.0-12.5 mm. Female frenulum with 2 or 3 acanthae. Male wings with pattern and colours as illustrated (Fig. 6), with purplish shine in forewing fringe at level of terminal black dots. Female generally with darker wings than male, as shown (Fig. 7), with darker frons, labial palpus, and legs to a lesser extent. Prothoracic leg coxa laterally white, medially greyish brown with white apex; trochanter white; femur dark greyish brown with white ventral edge; tibia greyish brown at base, dirty white near middle, mostly blackish brown on distal half, with white apically; first tarsomere white at base and apex, blackish brown in middle; second tarsomere white; third and fourth tarsomeres blackish brown; distitarsus white. Meso- and metathoracic leg coxa and trochanter white to light yellowish brown; femur white with greyish brown apex; tibia white with greyish brown dorsally and on spurs; first tarsomere greyish brown with white at base and apex; tarsomeres II-V blackish brown on basal half or more, white at apex. Abdomen dorsally light yellowish brown on first three tergites and at apex, light greyish brown in between; ventrally uniformly yellowish brown. Female abdominal segment VII about twice as long as preceding segment, narrower, slightly more thickly sclerotized and thickly scaled along apical margin.

Male genitalia (n=2) (Fig. 15). Uncus + subscaphium + gnathos short, not reaching apex of valva. Uncus elongate, narrow in side view, with ratio of length over width of 4.24, unevenly narrowing towards apex, with distal 1/5 narrowing more conspicuously until flat apex; with clear demarcation from tegumen at base; apically upturned slightly. Subscaphium distinctly sclerotized, with wrinkles on distal half and with distal third slightly bent upward. Gnathos with base of distal arm ventrally forming distinctly obtuse angle with proximal arms and subsequent conspicuously pronounced curve; apically curved upward and not reaching tip of subscaphium. Tegumen medium-sized, with lateral arms about as wide as dorsal connection, separated in two. Juxta about twice as long as wide, with more thickly sclerotized base, mediolongitudinal strut, and slightly concave apical edge medially. Valva medium-sized, slightly longer than broad (length/width ratio: 1.2); longer dorsal section more abundantly setose especially along dorsal margin on apical third and with short, flat triangular projection along edge slightly beyond middle; ventral section barely produced, with broadly rounded ventroapical margin. Vinculum very narrow, with tiny rounded median projection. Phallus a long narrow tube, twice as long as valva, with sclerotized shaft about 7.5 times longer than wide, slightly bent, with thickly sclerotized ventral strut only slightly enlarging apically; vesica with at least two elongate sections covered with spinules.

Female genitalia (n=1) (Fig. 19). Papillae anales medium sized, abundantly setose and spinulate, subtriangular in lateral aspect, with setose surface about half as long ventrally as dorsally, with apical margin slightly concave medially. Posterior apophysis straight, long, about 2X as long as width of papilla analis, reaching apical margin of segment VII in extension. Tergite VIII of medium length, about as long as width of papilla analis; anterior apophysis of medium length, about 40% shorter than posterior apophysis, with slight bend subbasally. Ostium bursae a spinulate, membranous conical funnel nearly as wide as segment and as long as wide, with lamella postvaginalis also lightly spinulate. Ductus bursae with short basal section devoid of sclerotization or scobination, followed by sharp bend and longer scobinated section reaching median connection of ductus seminalis on right side, with distal half about twice as wide, slightly enlarging and scobinated. Corpus bursae narrow, elongate, with longer and narrower distal half, reaching abdominal segment III, lightly scobinated at base and even more lightly toward distal end, with pair of small circular signa laterally at base, with right signum closer to base than left signum.

Biology: Unknown. The type locality is in the Cerrado Biome, the savanna biome of Central Brazil.

Distribution: Presently known only from Planaltina, a locality situated within the Federal District of Brazil.

Remarks: The holotype's left prothoracic leg is

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broken beyond the trochanter; otherwise it is in perfect condition (Fig. 6).

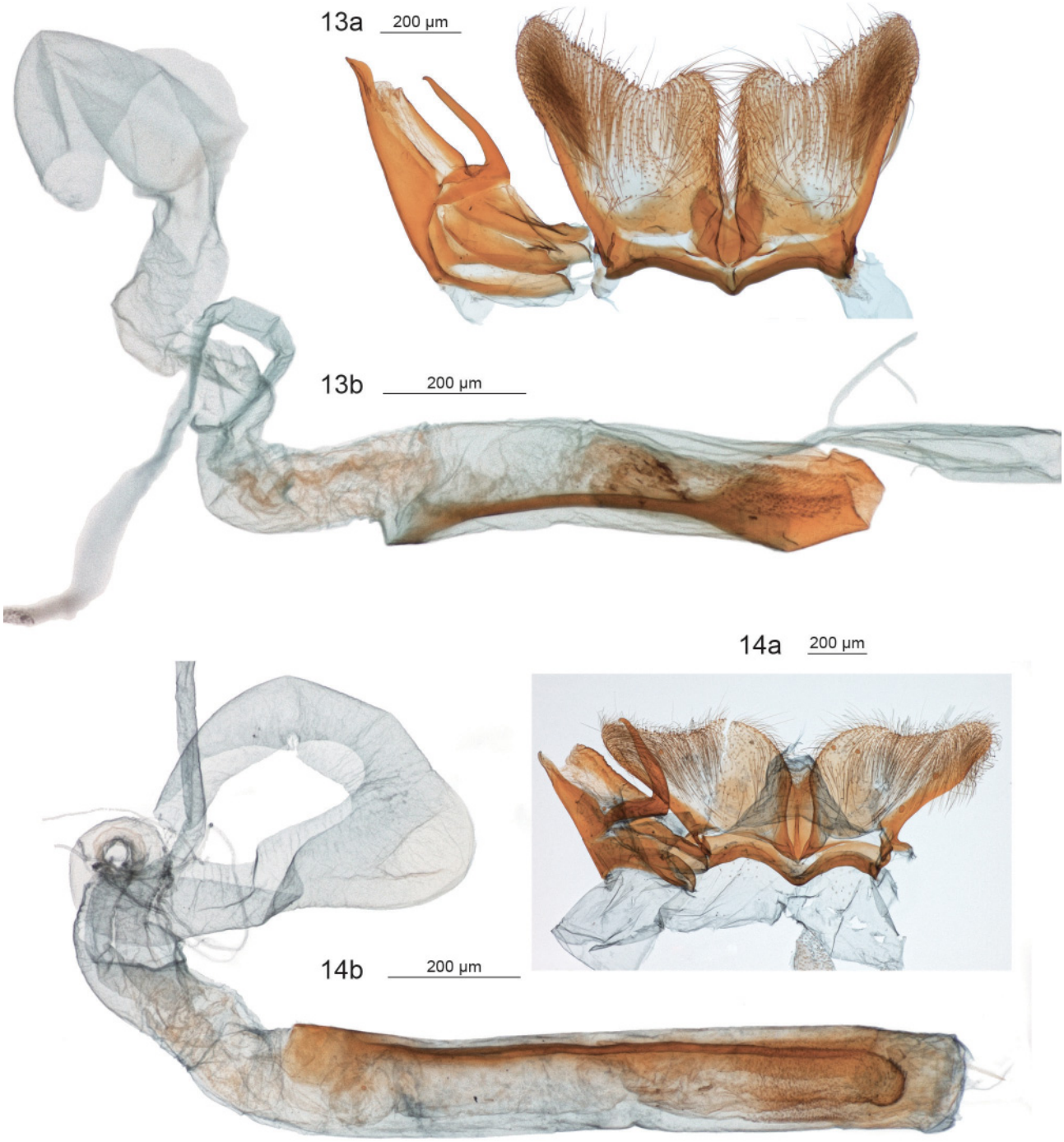
Diptychophora diasticta Gaskin, 1986

Figs 3, 4, 9-12, 14, 18

Material examined

Holotype: male; NHMUK 010922427; Brazil, Bahia, Santo Antônio de Barra; 11.12.1888; P.-E. Gounelle; NHMUK; slide n° Pyralidae Brit. Mus. 15351 (NHMUK 010316677_15351).

Additional material (2 males, 3 females): 1 female; VBC, without catalogue number; Brazil, Minas Gerais, Caraça, 1300 m; 04.03.1993; V. O. Becker, collector; Collection Becker 85332; genitalia slide BL 1876; DNA voucher Lepidoptera B. Landry n° 049. – 1 male; VBC, without catalogue number; Brazil, Minas Gerais, Caraça, 1300 m; 01-02.04.1992; V. O. Becker, collector;



Figs 13-14. Male genitalia of *Diptychophora* species, (a) without phallus, (b) phallus. (13) *D. galvani*. (14) *D. diasticta*.

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Collection Becker 85090; genitalia slide BL 1880. – 1 female; VBC, without catalogue number; Brazil, Minas Gerais, Caraça, 1300 m; 14-15.04.1998; V. O. Becker, collector; Collection Becker 114619. – 1 male; VBC, without catalogue number; Brazil, Minas Gerais, Caraça, 1300 m; 07-10.05.1996; V. O. Becker, collector; Collection Becker 108099; DNA voucher Lepidoptera B. Landry n° 046. – 1 female; VBC, without catalogue number; Brazil, Minas Gerais, Serra do Cipó; 17-19.04.1991; V. O. Becker, collector; Collection Becker 78017.

Terminal 333 base-pairs of CO1 (DNA voucher Lepidoptera B. Landry n° 046)

RTGGAGCAKGAACTGGATGAACGGTATAC-CCCCCCCTTTCATCTAATATTGCTCATGGTG-GTAGATCGGTAGATTTAGCTATTTTTTCCTTA-CATTTAGCTGGAATTTCTTCAATTTTAGGTG-CAATTAATTTTATTACAACAATTATTAATATA-AAAATTAATGGATTATCATTTGATCAAATACCAT-TATTTGTTTGAGCTGTAGGAATTACAGCCTTAT-TACTATTGTTATCTTTACCTGTTTTAGCGGGAGC-TATTACTATACTGCTAACTGATCGAAATTTA-AATACTTCATTTTTTGACCCAGCTGGGGGGAG-GAGATCCTATTTTATAT

Diagnosis: The wingspan of the holotype is 12 mm (Gaskin, 1986a) and as shown on Fig. 9, the hind wings are dark and the forewing has three white patches and ochre yellow in the fasciae. Males can be darker than the holotype or paler (Fig. 3), but all available males have the same wingspan of 12.0 mm and a similar valva with a longer dorsal section and a ratio of valva length/width of 1.17 (holotype's right valva; the left one being distorted) and 1.20 (one male from Caraça). The males of *Diptychophora ardalia* sp. n. (Fig. 5) can be as dark or darker than the holotype of *D. diasticta*, but they have a shorter wingspan of 11.0 mm at the most and the tip of their maxillary and labial palpi are greyish brown to greyish ochre yellow whereas the tip of the palpi of *D. diasticta* are white. The male genitalia of *D. ardalia* differ most strikingly in the squarish shape of the valva (Fig. 16), which has a ratio of length/width of 1.0. The male genitalia of *D. diasticta* (Figs 11, 12, 14) also have a slightly longer uncus + subscaphium + gnathos complex, especially with respect to *D. planaltina* (Fig. 15), and the uncus in side view differs from that of *D. ardalia* and *D. planaltina* in being wide at base with parallel dorsal and ventral margins until about 1/3, from where it becomes narrower until the apex that is not as flat as in *D. planaltina* and not as thick as in *D. ardalia*. The basal margin of the vinculum medially also differs in the three species with that of *D. diasticta* being broadly rounded, that of *D. planaltina* with only a tiny rounded knob, and that of *D. ardalia* produced and pyramid shaped. Finally, the ratio of the length of the sclerotized section of the phallus shaft over its width (which remains equal from base to apex in the three species) is 4.6 for *D. diasticta*, 6.2 for *D. ardalia*, and 7.5 for *D. planaltina*. In female genitalia this species (Fig. 18) is most similar to *D. planaltina* (Fig. 19), but its papillae anales are smaller, its anterior apophyses are sinuous instead of straight, and only the distal quarter of its corpus bursae is narrower whereas the whole distal half is narrower in *D. planaltina*.

Description of the female: Female (n=3) (Fig. 4). Moths entirely darker than male (Fig. 3), as shown. Forewing length: 6.0 mm; wingspan 13.0 mm. Frenulum with 3 acanthae. Abdominal segment VII about twice as long as preceding segment, narrower, distinctly more thickly sclerotized and thickly scaled along apical margin, with the latter medially concave on sternite, straight on tergite.

Female genitalia (n=1) (Fig. 18). Papillae anales very short, abundantly setose and spinulate, subtriangular in lateral aspect, with setose surface about as long dorsally and ventrally, without apparent apicomedian concavity. Posterior apophysis straight, long, about 2X as long as width of papilla analis, reaching middle of intersegmental membrane VII-VIII in extension. Tergite VIII of medium length, dorsal edge about 20% shorter than width of papilla analis; anterior apophysis of medium length, about 40% shorter than posterior apophysis, distinctly sinuous. Ostium bursae membranous, spinulate, bowl-shaped, slightly wider than long, without sclerotization of sterigma, but lamella postvaginalis lightly spinulate. Ductus bursae without sclerotization or scobination at base and following junction of ductus seminalis, just before mid-length, otherwise scobinate, more thickly so upon reaching corpus bursae, width median, slightly wider beyond mid length. Corpus bursae narrow and elongate, with distal quarter distinctly narrower, reaching abdominal segment I, scobinate at base and slightly beyond signa, otherwise not; with pair of circular signa near base laterally (here shown dorsoventrally).

Remarks: Gaskin (1986a) described this species from the holotype only and provided a right forewing and male genitalia drawings. Photographs are provided here of the habitus, labels, and male genitalia (Figs 9-12). Although the two available males from Caraça (Fig. 3) are paler, they are associated here with *D. diasticta* on the basis of the similar size and male genitalia shape of the valva. Gaskin (1986a) cited the type locality of this species as "Sao Antonio de Barra" in the Province of Bahía. The proper locality name is "Santo Antônio de Barra" (see Fig. 10), now located within the municipality of Salvador de Bahía, the present capital of the state of Bahia and the former capital of Brazil, between 1549 and 1763. The collector of the holotype, Pierre-Emile Gounelle (1850-1914), was a French naturalist who collected insects and plants and published on the Cerambycidae of Brazil (e.g. Gounelle, 1911). A BLAST analysis of the partial CO1 sequence obtained for this species was performed on BOLD

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(www.boldsystems.org) by T. Léger on October 24, 2020. It returned a 93.4% similarity with a specimen of an undetermined Crambidae (part of Pyralidae *sensu lato*), followed by a 93.2% similarity with a specimen of *Spilomela personalis* Herrich-Schäffer (Pyralidae *sensu lato*, Spilomelinae), followed by similarities between 92.98% and 93.1% with five specimens of undetermined Gelechiidae. There are no Crambinae in the top 20 matches retrieved, except perhaps the unknown Crambidae, for which the collecting data and image are recorded as 'private,' meaning unpublished, in BOLD.

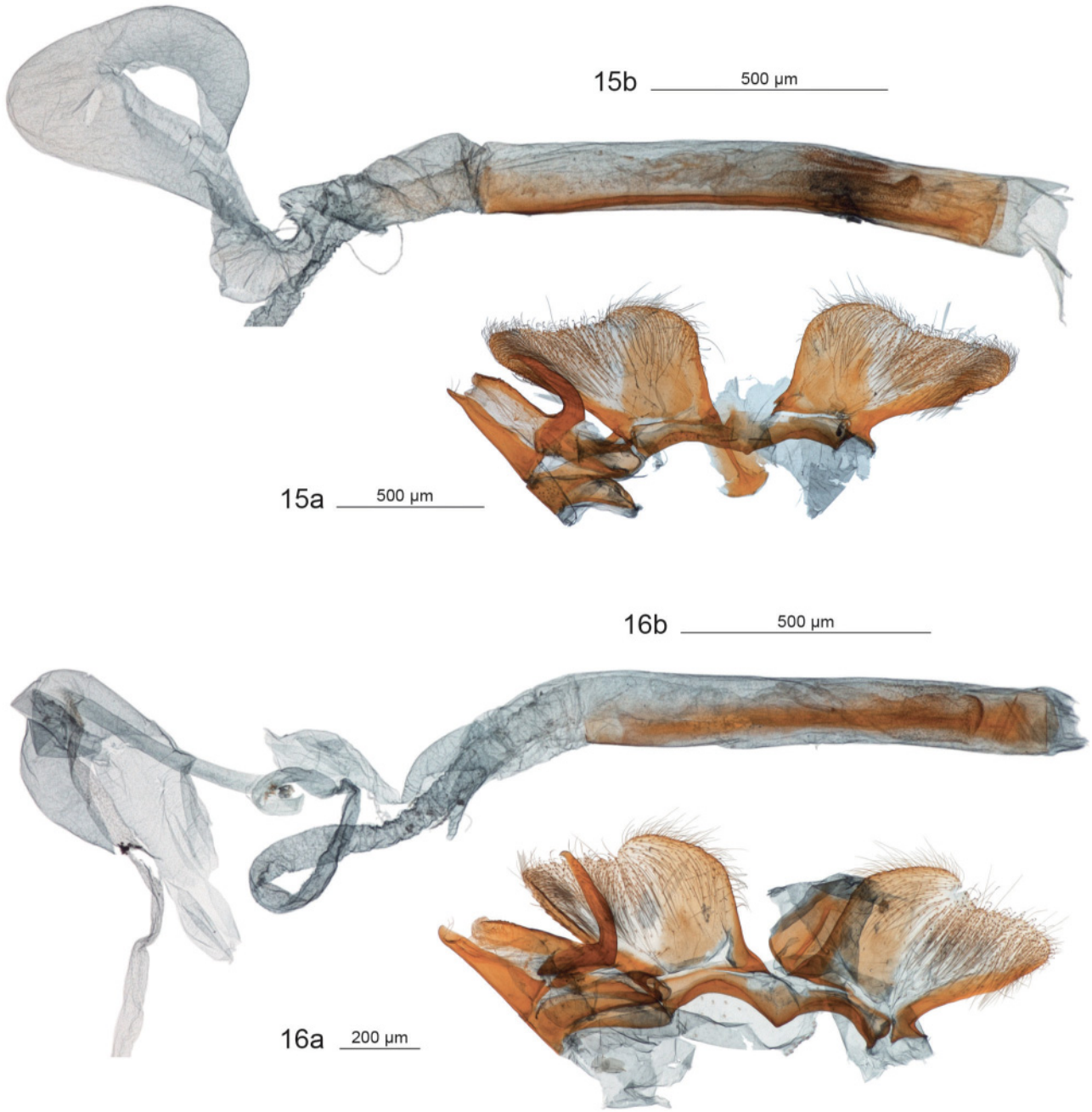
***Diptychophora ardalia* sp. n.**

Figs 5, 16

Material examined

Holotype: male; VBC, without catalogue number; Brazil, Bahia, Morro do Chapéu, 1400 m; 22-23.04.1991; V.O. Becker collector; Collection Becker 78261.

Paratypes (7 males): 3 males; VBC, without catalogue number; same data as holotype. – 1 male; MHNG-ENTO-85388 (dissected); same data as holotype; DNA voucher Lepidoptera B. Landry n° 052. – 1 male; VBC, without catalogue number; Brazil, Bahia, Jequié, 600-750 m; 11-22.11.1995; Collection Becker 105724. – 2



Figs 15-16. Male genitalia of *Diptychophora* species, (a) without phallus, (b) phallus. (15) *D. planaltina*. (16) *D. ardalia*.

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males; VBC, without catalogue number; Brazil, Bahia, Jequié, 500 m; 16.02.1998; Collection Becker 114384; one with DNA voucher Lepidoptera B. Landry n° 045.

Diagnosis: The males are small, reaching a wingspan of 11.0 mm at the most. In that respect they differ externally from the males of *D. diasticta*, which reach a wingspan of 12 mm. In addition, the tip of the maxillary and labial palpi are greyish brown to light ochre yellow whereas the tip of the palpi is white in *D. diasticta*. In male genitalia, this species conspicuously differs from its congeners in the squarish shape of the valva that reach a ratio of length/width of 1.0 whereas the males of *D. diasticta* have the dorsal section of the valva extended and thus have a ratio of length/width of 1.17-1.20. More diagnostic characters of the male genitalia are given above under the diagnosis of *D. diasticta*.

Etymology: The name refers to the apparent uncleanliness of the moths, "*ardalos*" meaning "dirty" in Greek.

Description: Male (n=7) (Fig. 5). Head with frons rounded, slightly bulging; vestiture on frons short scaled, white and light ochre yellow with large blackish brown spot dorsomedially; vestiture on vertex and occiput with thinner and longer scales ochre yellow. Antennal scape and pedicel blackish brown; flagellomeres with paler, greyish brown scales. Maxillary palpus greyish brown, lighter at base and apex. Labial palpus porrect, reaching slightly beyond maxillary palpus, with scales appressed, basal palpomere white, 2nd and 3rd palpomeres light dirty ochre yellow to greyish brown. Haustellum white. Thorax with patagium laterally white to light ochre yellow to blackish brown toward middle; tegula with patch of blackish brown at base, otherwise white with light yellowish brown to brown; thorax between tegulae greyish brown, then banded dirty white with light ochre yellow, blackish brown, ochre brown, and blackish brown (at apex). Forewing length: 4.4-5.0 mm (holotype: 4.7 mm); wingspan: 10.0-11.0 mm (holotype: 10.5 mm). Wings with pattern and colours as illustrated, with purplish shine in forewing fringe at level of terminal black dots. Prothoracic leg coxa white along base and inner margin, light greyish ochre elsewhere; trochanter light greyish ochre; femur light greyish brown except for white ventral edge; tibia with light greyish brown on basal 2/3 followed by tuft of blackish brown, apically with row of dirty white scales; first tarsomere with basal half dirty white, distal half blackish brown; second tarsomere white; third tarsomere blackish brown with white at base; fourth tarsomere blackish brown; distitarsus blackish brown with dirty white apically. Mesothoracic leg coxa and trochanter white to light yellowish cream; femur white with light greyish brown at tip; tibia greyish brown dorsally on basal half, white to light dirty white elsewhere, with external tibial spur about half as long as internal; first tarsomere mostly dark greyish brown except for dirty white base and white tip; tarsomeres II to V blackish brown at base and white apically. Metathoracic leg coxa, trochanter and femur as mesothoracic leg; tibia white to dirty white, with spurs concolorous and subequal in length; first tarsomere mostly dark greyish brown except for dirty white base and white tip; tarsomeres II to V blackish brown on basal half, white on distal half. Abdomen dorsally dark greyish brown except for patch of ochre brown medially at base and around genitalia; ventrally light greyish brown at base, dark greyish brown on distal 3-4 sternites.

Male genitalia (n=2) (Fig. 16). Uncus + subscaphium + gnathos medium-sized, reaching apex of valva. Uncus of medium width in side view, with ratio of length over width of 2.94, evenly thinning from base until apex; with clear demarcation from tegumen at base; apically thick, not flattened, with ventral concavity. Subscaphium thickly sclerotized, with transversal wrinkles ventrally on distal 3/8. Gnathos with base of distal arm ventrally forming angle slightly wider than 90° with proximal arms, and subsequent curve of ventral edge of distal arm gentle; apically curved upward and reaching tip of subscaphium. Tegumen medium-sized, with posterior lateral arms parallel-margined and about as wide as dorsal connection; anterior plates more than half as narrow as posterior arms, enlarging slightly to point of connection at mid length of lateral arms of gnathos. Valva short, as long as wide (length/width ratio: 1.0); slightly longer dorsal section more abundantly setose along apical third, with dorsal edge only slightly produced beyond middle; ventral section barely produced, with rounded ventroapical margin somewhat truncated. Vinculum very narrow, with basal margin medially distinctly produced, pyramid shaped. Phallus a long, straight, narrow tube, slightly more than twice as long as valva, with sclerotized shaft about 6.2 times longer than wide, with thickly sclerotized ventral strut of medium width, enlarging apically to twice its width; vesica with one spinulate section.

Female genitalia: unknown.

Biology: Unknown, except that the two localities are in the dry Caatinga Biome.

Distribution: The species is known from the eastern, coastal Brazilian state of Bahia only.

Remark: The holotype is missing the right mesothoracic leg.

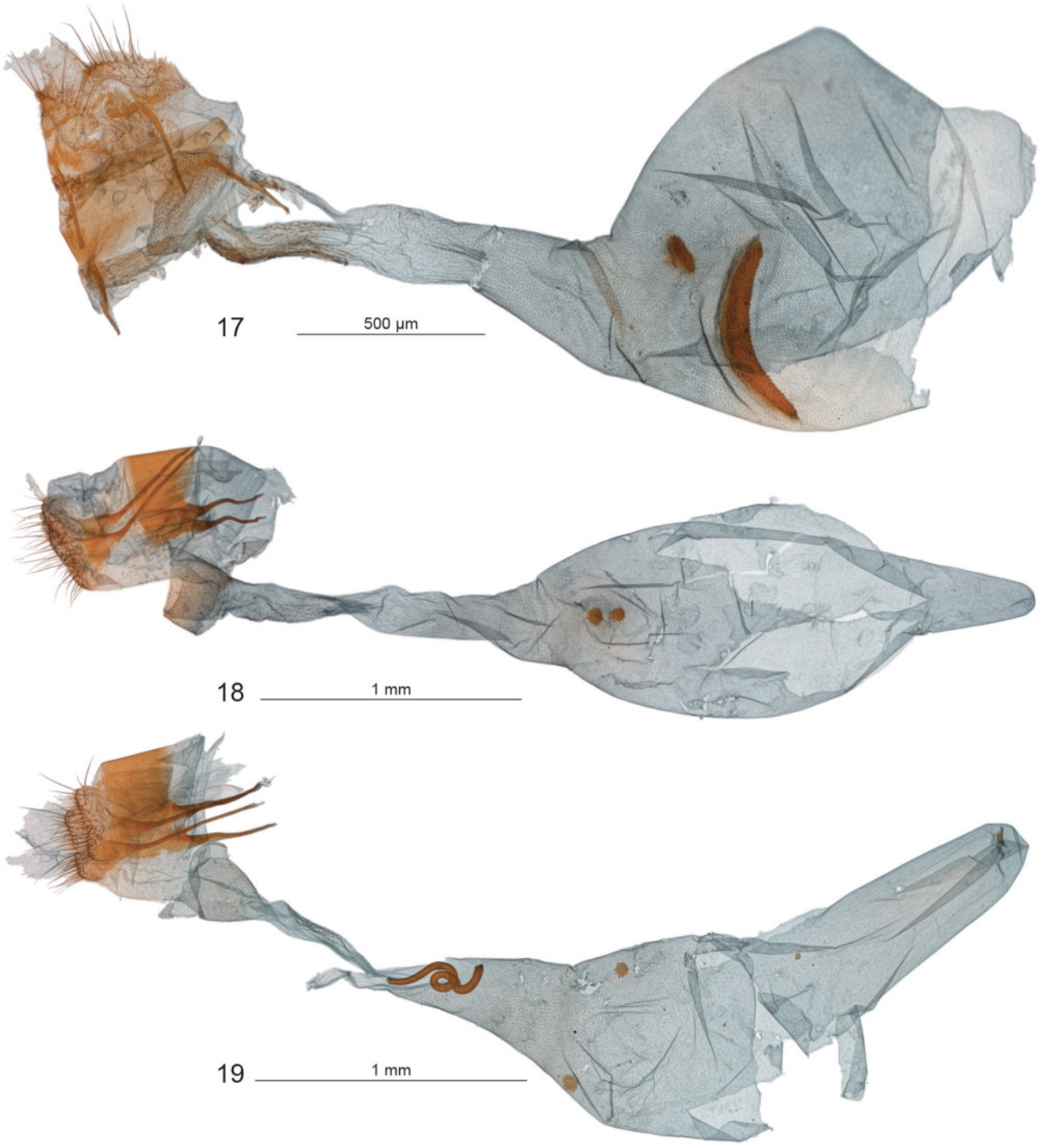
LIST OF THE BRAZILIAN *DIPTYCHOPHORA*

- *Diptychophora ardalia* sp. n. (Fig. 5). Described above from males collected in the state of Bahia.
- *Diptychophora diasticta* Gaskin, 1986 (Figs 3, 4). Described from a single male from the state of Bahia

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(NHMUK). The female genitalia are described above from additional material collected in the state of Minas Gerais.

- *Diptychophora galvani* sp. n. (Fig. 8). Described above from the states of Minas Gerais and Mato Grosso.
- *Diptychophora kuhlweinii* Zeller, 1866 (Fig. 2). (Misspelled '*kuhlweini*' by Gaskin (1986a). Described from Rio de Janeiro, the holotype could not be recovered as mentioned by Gaskin (1986a). Gaskin (1986a) mentions specimens examined from the states of Paraná, Rio de Janeiro, and Santa Catarina. We have examined additional material from Bahía (Reserva Serra Bonita) and Minas Gerais (Caraça).
- *Diptychophora planaltina* sp. n. (Figs 6, 7). Described above from the Federal District.
- *D. subazanalis* Błeszyński, 1967 (Fig. 1). Described as a subspecies of *Steneromene azanalis* (Walker, 1859), it was rightfully given species status by Gaskin



Figs 17-19. Female genitalia of *Diptychophora* species. (17) *D. galvani*. (18) *D. diasticta*. (19) *D. planaltina*.

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(1986a). Described from Surinam (holotype in CUIC), this species was reported from the Brazilian state of Pernambuco by Gaskin (1986a). We have examined additional material from the states of Goiás (Alto Paraíso, 1400 m), Minas Gerais (Unaí, 700 m), Pará (Capitao Poco), and Rondônia (Ariquemes, 180 m; Cacaulândia, 140 m; Porto Velho, 180 m), all in VBC. The species is also known from Bolivia (Santa Cruz, MHNG), Ecuador (Napo, VBC), French Guiana (MHNG), Guyana (Błeszyński, 1967; Gaskin, 1986a), and Peru (Gaskin, 1986a).

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