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## Monograph

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# Revision of *Distictus* Townes, 1966 (Hymenoptera, Ichneumonidae, Cryptinae), with descriptions of ten new species

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**Abstract.** The Neotropical *Distictus* Townes, 1966 is diagnosed, redescribed and its species revised. A neotype is designated for the type species, *D. tibialis* (Brullé, 1846). The genus is characterized mainly by having the body subcylindric; clypeal margin with median tooth; areolet medium-sized, pentagonal, with crossvein 3r-m distinct; first metasomal tergite short and stout, with anterolateral tooth. *Distictus aurantium* Santos & Aguiar, 2008 is shown to lack some of these character states and is transferred to *Mallochia* Viereck, 1912. A total of 12 valid species are recognized, ten of which are new: *D. apaensis* sp. nov., *D. ardens* sp. nov., *D. asterios* sp. nov., *D. ateles* sp. nov., *D. caligaris* sp. nov., *D. commatus* sp. nov., *D. daelus* sp. nov., *D. notabilis* sp. nov., *D. paratibialis* sp. nov. and *D. terrosus* sp. nov. Other valid species are *D. tibialis* and *D. mexicanus* Kasparyan & Ruíz-Cancino, 2005. All species are described and illustrated. New distribution records, maps and separate keys for females and males of the species are provided.

**Keywords.** Cryptini, Gabuniina, Phygadeuontinae, *Mallochia*, Neotropical.

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## Introduction

*Distictus* Townes, 1966 was proposed by Townes (1966) as a new Neotropical genus of Cryptini Kirby, 1837 (= Mesostenini of Townes, 1970), with a single named species, *D. tibialis* (Brullé, 1846). The genus was originally placed in the subtribe Mesostenina Ashmead, 1900, but later transferred to Cryptina Kirby, 1837 (= Ischnina Townes, 1970) (Townes 1970). Kasparyan & Ruíz-Cancino (2005) described a second species from Mexico, *D. mexicanus*.

Meanwhile, the genus *Fenixia* Aguiar, 2005 was described and placed in the subtribe Gabuniina Townes, 1970, based on a phylogenetic analysis of morphological characters (Aguiar 2005a). The genus included a single species, *F. curta* Aguiar, 2005, which later proved to be a junior synonym of *D. tibialis* (see Santos & Aguiar 2008). Therefore, *Fenixia* was synonymized with *Distictus*, and the latter genus transferred from Cryptina to Gabuniina (Santos & Aguiar 2008). The same paper described a new species, *D. aurantium* Santos & Aguiar, 2008, and discussed the taxonomic limits of the genus. The authors highlighted the fact that the new species showed relevant differences compared to *D. tibialis*, and tested the relationship between the two species in a new phylogenetic analysis with 19 outgroup taxa and 60 morphological characters. The two species were recovered as sister groups and supported the placement of the new species within *Distictus*.

The most recent and extensive phylogenetic analyses for Cryptinae Kirby, 1837 (Santos 2017) showed, however, little support for Townes' subtribal classification and suggested instead that the generic diversity of the group should be better treated in terms of informal genus groups. In those analyses, *Distictus* was not recovered with the former Gabuniina ("Gabunia group" sensu Santos 2017), but rather in a mostly Neotropical assemblage of morphologically heterogeneous genera ("Lymeon group" sensu Santos 2017). *Distictus*, as well as several other genera, such as *Digonocryptus* Viereck, 1913, seem to have convergently evolved a number of morphological similarities with members of the *Gabunia* group. These similarities include the subcylindrical shape of the mesosoma; subspherical head, with inflated gena; swollen fore tibia; and stout ovipositor, traits that are likely adaptations to the use of hosts concealed under hard substrates (Santos & Perrard 2018; Santos *et al.* 2019).

This work aims to provide a taxonomic reassessment of *Distictus*, with new taxonomic limits, new species descriptions, new distribution records and the first host record for the genus.

## Material and methods

Over 60 000 specimens of Neotropical Cryptinae from 25 institutions throughout the World were sorted for specimens of *Distictus*.

The specimens studied here belong to the following repositories, with the respective contact in parentheses:

- AMNH = American Museum of Natural History, New York, USA (J. Carpenter)
- AVHI = Alexander von Humboldt Institute, Bogotá, Colombia (M. Sharkey)
- BMNH = The Natural History Museum, London, U.K. (G. Broad)
- CNCI = Canadian National Collection of Insects, Ottawa, Canada (A. Bennett)
- DZUP = Universidade Federal do Paraná, Curitiba, Brazil (G.A.R. Melo)
- EMEC = University of California at Berkeley, Essig Museum of Entomology, Berkeley, USA (R. Zuparko)
- FSCA = Florida State Collection of Arthropods, Gainesville, USA (J. Wiley)
- IBRP = Instituto Biológico de Ribeirão Preto, São Paulo, Brazil (L.C. Rocha Filho)
- MPEG = Museu Paraense Emílio Goeldi, Belém, Brazil (O.T. Silveira)
- UFES = Universidade Federal do Espírito Santo, Vitória, Brazil
- UFMG = Universidade Federal de Minas Gerais, Belo Horizonte, Brazil (R.P. Martins)
- USUC = Utah State University, Logan, USA (D. Wahl)

All methods and conventions generally follow Santos & Aguiar (2013). The first and subsequent flagellomeres are referred to as f1, f2, f3, etc., the tarsomeres of each leg are referred to, from base to apex, as t1, t2, t3, etc. and the first and subsequent metasomal tergites are referred to as T1, T2, T3, etc. Biometric ratios used in descriptions and Table 1 are as follows. In the 'Material examined' sections: (1)

the term ‘*ibid.*’ is used only once within each section (text between two bullets) of material citation, and indicates that all of the information of the previous citation is exactly the same for the present, except for, or in addition to, the shown data; (2) the number in curly brackets, at the end of each section of label information, refers to the index of the respective list of measurements of that specimen (or specimens) in the n-dimensional lists provided in the Appendix; (3) the numbers in square brackets refer to the index of the respective measurements in the lists provided in the Appendix.

AAW	=	areolet minimum width <sup>[2]</sup> /areolet maximum length (i.e., anterior to posterior) <sup>[3]</sup>
APH	=	areolet maximum length (i.e., anterior to posterior) <sup>[3]</sup> /pterostigma maximum width <sup>[28]</sup>
AWH	=	areolet maximum width <sup>[4]</sup> /areolet maximum length (i.e., anterior to posterior) <sup>[3]</sup>
CHW	=	clypeus maximum height <sup>[5]</sup> /maximum width <sup>[6]</sup>
HW1C	=	hind wing vein Cua length <sup>[13]</sup> /hind wing crossvein cu-a length <sup>[14]</sup>
MELW	=	mesoscutum length <sup>[20]</sup> /width <sup>[21]</sup>
MLW	=	mandible maximum length <sup>[16]</sup> /maximum width <sup>[17]</sup>
MWW	=	mandible minimum width <sup>[17]</sup> /maximum width <sup>[18]</sup>
MSM	=	malar space maximum width <sup>[19]</sup> /mandible maximum width <sup>[18]</sup>
NLML	=	notaulus length <sup>[22]</sup> /mesoscutum length <sup>[20]</sup>
OST	=	(ovipositor maximum length <sup>[24]</sup> - pre-sheath ovipositor length <sup>[26]</sup> )/hind tibia length <sup>[12]</sup>
RCUA	=	fore wing vein 2Cua length <sup>[9]</sup> /fore wing crossvein 2cu-a length <sup>[8]</sup>
SPR	=	petiole, distance from base to spiracle, in lateral view <sup>[29]</sup> /( <i>ibid.</i> <sup>[29]</sup> + petiole, distance from spiracle to apex, in lateral view <sup>[36]</sup> )
SWL	=	propodeal spiracle maximum width <sup>[27]</sup> /maximum length <sup>[25]</sup>
T1LW	=	T1 (petiole) maximum length <sup>[32]</sup> /T1 maximum width, dorsal view <sup>[35]</sup>
T1WW	=	T1 maximum width <sup>[32]</sup> /T1 minimum width, dorsal view <sup>[34]</sup>
T2LW	=	T2 maximum length, dorsal view <sup>[30]</sup> /T2 maximum width, dorsal view <sup>[33]</sup>
T2WW	=	T2 maximum width, dorsal view <sup>[33]</sup> /T2 minimum width, dorsal view <sup>[31]</sup>

Characters, except colour patterns, were initially coded with DELTA (Dallwitz 1974, 1980; Dallwitz *et al.* 1993), but the resulting directives were incorporated into an original software system, under development by one of us (APA). The system was used to update and standardize the descriptions; to generate integrated (morphological and morphometric) comparisons between species, used in the ‘Comments’ section; to generate all morphometric data used in the text, including Table 1; and to generate a standardized text for the ‘Material examined’ section, according to the format of this journal. Distribution maps and plates of illustrations were also produced or assembled with the mentioned system.

The detailed species comparisons in the ‘Comments’ sections aim to provide a robust and objective style of defense for each taxon, by showing explicitly what the differences are, instead of leaving the strenuous (and, in practice, overtly averted) task of comparing descriptions to the user. The comparative differences are carefully ordered in decreasing order of perceived relevance. The number of characters which differ between any two species were also computed, and are presented as the number of structural (qualitative) differences between the respective descriptions.

When potentially ambiguous, colour names are followed by an equivalent RGB formula, as determined from digital pictures of the studied specimens, according to procedures described by Aguiar (2005b).

According to Pecci-Maddalena & Lopes-Andrade (2018), the common but elusive denomination “Reprêsa Rio Grande” (Brazil), here found on the labels of some *D. ateles* sp. nov. (including the holotype), was given to only one of several streams dammed at the time, and currently is part of the set of reservoirs of the ‘Ribeirão das Lajes’ dam, and its whole area is an ecological reserve. The reservoir comprises areas in Piraí and Rio Claro, both in the state of RJ.

## Results

Order Hymenoptera Linnaeus, 1758  
Family Ichneumonidae Latreille, 1802  
Subfamily Cryptinae Kirby, 1837

Genus *Distictus* Townes, 1966

*Distictus* Townes in Townes & Townes, 1966: 325. Description, keyed. Type species: *Mesostenus tibialis* Brullé, 1846, by monotypy and original designation.

*Fenixia* Aguiar, 2005a: 126–127. Description, figure, phylogenetic assessment, keyed. Type species: *Fenixia curta* Aguiar, 2005, by monotypy and original designation.

*Distictus* – Santos & Aguiar 2008: 30–39. Phylogeny, transferred to Gabuniina. — Santos 2017: 19–20. Phylogeny, transferred to “*Lymeon* group” sensu Santos.

### Diagnosis

*Distictus* can be differentiated from all other cryptine genera by the following combination of features: ventral tooth of mandible as long as dorsal tooth; apical margin of clypeus with median tooth or tubercle (Figs 6A, 7A, 8A), also laterally projected (Fig. 13C); fore tibia moderately swollen, inflated (Figs 9C, 10D, 14E); areolet medium-sized (Figs 2–3), pentagonal (Figs 1A, 7B); crossvein 3r-m distinct, distinctly convergent with 2r-m (Fig. 7B); first metasomal tergite short and stout, with anterolateral tooth (Fig. 13B), its spiracle placed at midlength (Fig. 13D); mesoscutum posteriorly flattened (Figs 4B–4C); sternaulus distinctly sinuous (Fig. 14E); occipital carina stout, meeting hypostomal carina far from mandible base.

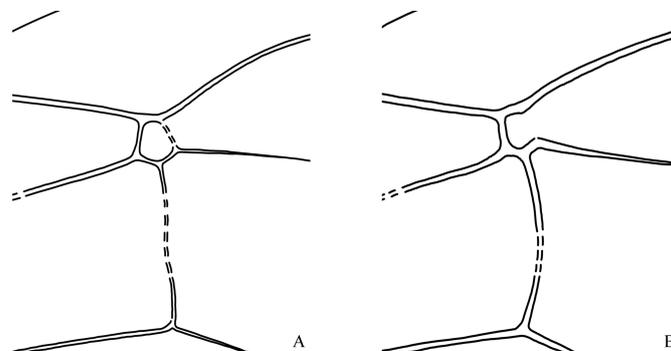
### Redescription

#### Females

SIZE. Fore wing 5.12–17.08 mm long.

BODY. Subcylindric, head subspherical.

HEAD. Mandible short to moderately long, MLW 1.17–1.70, apex distinctly narrower than base, MWW 0.42–0.75; ventral tooth as long as dorsal tooth, rarely ventral tooth slightly shorter than dorsal tooth. Palpi densely pilose. Malar space moderately long, MSM 0.53–0.88. Clypeus of moderate size, CHW 0.30–0.50, basally slightly to moderately convex, more projected ventrally, sometimes distinctly



**Fig. 1.** Detail of areolet (fore wing). **A.** *Distictus tibialis* (Brullé, 1846). **B.** *Mallochia* sp. Redrawn after Townes (1970: figs 146 and 243b, respectively).

emarginate at midlength, apex truncate, with median tooth; apical margin laterally projected. Antenna with 24–31 flagellomeres; flagellum gradually tapered apically; apical flagellomere blunt, with narrow apical truncation. Supra-antennal area ventrally slightly to distinctly concave, usually with distinct median line. Occipital carina strong, sharp, sometimes dorsally weakened, meeting hypostomal carina far from mandible base. Temple and gena in lateral view moderately wide.

MESOSOMA. Dorsal margin of pronotum regular, not swollen; epomia delicate or stout, usually ending far from margin of pronotum. Mesoscutum subcircular to ovoid, 0.89–1.26 × as long as wide, anteriorly moderately convex, posteriorly flattened, shiny or matte, almost always densely covered with short



**Fig. 2.** *Distictus paratibialis* sp. nov., holotype (LAPIS5907), ♀, habitus. Photo by Berthil B. Longo.

hairs, usually with weak to distinct longitudinal wrinkles on area enclosed by end of notauli; notaulus moderately impressed, weakly to distinctly convergent, reaching 0.43–0.84 of mesoscutum length, bearing weak to distinct striae. Epicnemial carina complete to reaching only 0.7 of distance to subalar ridge, irregular or sinuous or approximately uniformly curved. Sternaulus distinctly sinuous, complete, even if posterior 0.4 almost indistinct; usually moderately deep (except deeply impressed in *D. daelus* sp. nov.), bearing weak to distinct vertical wrinkles. Mesopleural suture weakly to distinctly carinulate inside. Median portion of postpectal carina absent. Posterior margin of metanotum without teeth-like projections. Propodeal furrow moderately deep, narrow, forming a polished smooth trough. Juxtacoxal carina vestigial or represented by short ridge. Pleural carina absent. Fore tibia moderately swollen. On all legs, fourth tarsomere apically bilobed, with strong apical group of bristles.

PROPODEUM. Usually longer than wide. Anterior margin medially concave or very slightly concave. Spiracle oval to elongate, SWL 1.11–2.05. Longitudinal carinae absent. Anterior transverse carina complete, distinct, slightly to distinctly arched forwards. Posterior area of propodeum with distinct,



**Fig. 3.** *Distictus paratibialis* sp. nov., holotype (LAPIS5907), ♀, dorsal view. Photo by Berthil B. Longo.

closely spaced transverse wrinkles. Posterior transverse carina represented only by wide, low, sublateral crests.

**WINGS.** Fore wing usually hyaline, apex light infusate (except fully infusate in *D. ardens* sp. nov., Fig. 5C). Fore wing vein 1-Rs+M with bulla placed near basal 0.3–0.4 or centrally; ramellus absent; crossvein 1cu-a arising a little or distinctly basad of 1M+Rs; vein 2Cua 0.65–1.52 × as long as crossvein 2cu-a; crossvein 2m-cu with bulla moderately short, usually placed a little anteriorly to the middle; cell 1+2Rs pentagonal, medium sized, 0.26–0.45 × as long as vein 2m-cu, APH 0.67–1.50, AWH 0.76–1.34; crossvein 3r-m strong, spectral or nebulous; crossveins 2r-m and 3r-m distinctly convergent, both veins usually about the same length, sometimes 3r-m distinctly shorter than 2r-m; vein 3-M usually about as long as 2-M; vein 4-M tubular or nebulous. Hind wing with 6–12 hamuli; vein M+Cu usually apically moderately convex; vein M forming straight or obtuse angle with vein Cua; vein Cua almost the same length to distinctly longer than crossvein cu-a, HW1C 0.99–2.27; vein Cub straight to distinctly convex at apical half, forming straight or distinctly obtuse angle with Cua; vein 2-1A reaching at least 0.6 of distance to wing margin.

**METASOMA.** T1 short and stout, T1LW 1.13–1.86, apex distinctly wider than base, T1WW 1.97–3.00, with conspicuous anterolateral tooth that is rounded or angular in dorsal view, sparsely pilose; spiracle of T1 usually placed at its midlength, rarely a little before or after the middle, SPR 0.33–0.61, not or slightly prominent; dorsolateral carina represented by blunt ridge, complete or incomplete; ventrolateral carina sharp and complete, rarely incomplete; lateral depression of T1 from very shallow to distinct; median depression of T1 from absent to distinct. T2 usually short, rarely moderately long, T2LW 0.71–1.15, usually distinctly triangular, T2WW 1.39–2.11. T2–8 pilosity almost always progressively more dense on posterior tergites, dorsally as dense as laterally or laterally denser than dorsally. Ovipositor moderately long, OST 0.49–1.00, stout, compressed, usually straight, sometimes slightly downcurved, scarcely to moderately punctate; apex of ovipositor blunt, without nodus, notch faint; dorsal valve without ridges or teeth; ventral valve apically dilated, slightly to distinctly overlapping dorsal valve, with 5–9 distinct teeth.

### Males

Generally similar to the respective females. Morphological secondary sexual differences are usually more or less uniform within Cryptini, as noted by Santos & Aguiar (2013), and apply to the males of *Distictus* as follows. General body size usually smaller than that of females. Antenna with 27–32 flagellomeres, each flagellomere usually shorter and wider than in females, tip of apical flagellomere not modified into hammer-like structure. Propodeum smaller, less strongly convex. Fore tibia not inflated. First metasomal segment more slender than in female, with T1LW 2.62–3.71, and less widened apically, with T1WW 1.42–2.13 (compare Fig. 14D vs 14E). Tergites 2–7 much more slender than in females (compare Fig. 10D vs 10F).

### Comments

Among Neotropical Cryptinae, species of *Distictus* are most similar to species of *Agonocryptus* Cushman, 1929, *Cyclaulus* Townes, 1970 and *Mallochia* Viereck, 1912. All of these genera are characterized by a somewhat elongate and subcylindric body; subspherical head with the gena slightly to strongly inflated; the apical margin of clypeus has a median tooth (sometimes indistinct in *Agonocryptus*). In addition, *Mallochia* also has the posterior transverse carina of propodeum absent or very weak. *Distictus* can be differentiated from *Agonocryptus* by having the veins 2r-m and 3r-m of the areolet distinctly convergent (Fig. 7B) (vs parallel to subparallel); HW1C > 0.99, almost always > 1.30 (vs < 1.0); and ventral tooth about as long as dorsal tooth (vs distinctly longer). *Distictus* can also be readily separated from *Cyclaulus* by the presence of an anterolateral tooth on the T1 (as in Fig. 13B) (vs tooth absent).

The similarity between *Distictus* and *Mallochia* had been noticed by Kasparyan & Ruíz-Cancino (2005: 109), who went as far as to name a species of the latter genus as *M. distictus* (Kasparyan & Ruíz-Cancino, 2008). In fact, examination of additional comparative material showed that the species described as *Distictus aurantium* by Santos & Aguiar (2008) is likely to be part of *Mallochia* (see below). Following the generic delimitation presented in this paper, *Distictus* can be objectively separated from *Mallochia* (including *D. aurantium*) based on the following differences:

1. First tergite with conspicuous anterolateral tooth that is rounded or angular in dorsal view (Fig. 13B); areolet medium-sized, at least slightly longer or slightly shorter than the section of crossvein 2m-cu above the bulla (Figs 1A, 3); crossvein 3r-m strong (Figs 3, 7B), spectral or nebulous; vein 2Cua > 0.65 × as long as crossvein 2cu-a ..... *Distictus* Townes, 1970
- First tergite without anterolateral tooth; areolet small, distinctly shorter than the section of crossvein 2m-cu above the bulla (Fig. 1B); crossvein 3r-m absent (Fig. 1B); vein 2Cua < 0.60 × as long as crossvein 2cu-a ..... *Mallochia* Viereck, 1912

### Distribution

Neotropical (Fig. 17). Known records span the following countries: Mexico, Guatemala, Costa Rica, Colombia, Venezuela, Ecuador, Peru, Brazil, Bolivia and Argentina.

Genus *Mallochia* Viereck, 1912

*Mallochia aurantia* (Santos & Aguiar, 2008) comb. nov.

*Distictus aurantium* Santos & Aguiar, 2008: 36–39. Original description, figure, phylogenetic assessment.

*Distictus aurantius* – Yu *et al.* 2012. Listed, specific epithet changed.

### Comments

The considerable differences between the type species *Distictus tibialis* and *D. aurantium* Santos & Aguiar have already been stressed in Santos & Aguiar (2008: 32, 38). Those differences prompted the authors to include both species in a phylogenetic analysis based on 65 morphological characters, including 19 outgroup taxa, mostly from the group the genus was supposed to belong to, the subtribe Gabuniina (*Gabunia* genus group sensu Santos 2017). The two species were recovered as sister groups and hence classified within the same genus. However, examination of further comparative material of *Distictus* and *Mallochia* shows that several species of the latter genus show character states similar to species of *Distictus* (see ‘Comments’ section for the genus above). The characters that consistently separate the two genera are precisely those that set *D. aurantium* apart from the other species of the genus, such as T1 without anterolateral tooth, fore wing crossvein 3r-m absent and vein 2Cua < 0.60 × as long as crossvein 2cu-a. In fact, the species is quite similar to specimens of the Nearctic *Mallochia strigosa* (Cresson, 1872). Hence, *Distictus aurantium* is hereby transferred to *Mallochia*.

### Nomenclature

Yu *et al.* (2012) changed the neutral specific epithet *aurantium* to the masculine *aurantius*, to match *Distictus*, which is masculine. The ICZN (1999) states, in Article 34.2.1, that “*If a species-group name is a noun in apposition its ending need not agree in gender with the generic name with which it is combined and must not be changed to agree in gender with the generic name*”. The epithet was originally intended as a name in apposition, but this was not stated, making the emendation to *aurantius* acceptable. In an equivalent action, the epithet is now changed to *aurantia* to match *Mallochia*, which is feminine.

**Material examined**

Total of 13 specimens, 4 ♀♀ and 9 ♂♂.

**Holotype**

BRAZIL – **Espírito Santo State** • ♀; Santa Maria de Jetibá, Fazenda Clarindo Krüger; 29 Nov.–6 Dec. 2002; MTTavares, C.O. Azevedo exped.; Malaise trap; Pt. B6; UFES.

**Paratypes**

BRAZIL – **Espírito Santo State** • 1 ♀; Fazenda Paulo Seick, Área 1; 3–10 Dec. 2004; M.T. Tavares exped.; Pt. B3; UFES • 1 ♂; Domingos Martins, Mata Pico do Eldorado; 3–10 Dec. 2004; M.T. Tavares exped.; Malaise trap; Pt. T4; UFES • 1 ♂; Santa Teresa, Estação Biológica Santa Lúcia; 9–13 May 2006; M.T. Tavares exped.; Malaise trap; Pt. B1; UFES • 2 ♂♂; Conceição do Castelo, Ribeirão do Meio; 17–24 Mar. 2007; A.P. Aguiar exped.; near lagoon; Malaise trap; UFES • 2 ♂♂; Domingos Martins, Mata Pico do Eldorado; 3–10 Dec. 2004; M.T. Tavares exped.; Pt. T6; UFES.

URUGUAY • 2 ♂♂; 40 km NW of Tacuarembó; 2–9 Feb. 1963; J.K. Bouseman leg.; AMNH.

**Other material**

ARGENTINA • 1 ♀; Misiones, Mado, Puerto Magdalena; 22 Oct. 1964; A. Kovac leg.; AMNH • 1 ♀; Salta, El Alisal, 45 km W of Salta; alt. 1950 m; 1–29 Dec. 1987; S. Peck and J. Peck leg.; USUC.

BRAZIL – **Bahia State** • 1 ♂; Ilhéus, Fazenda São José; 9 Dec. 2003; J. Cardoso and J. Maia leg.; Malaise trap; Pt. 2; UFES.

**Distribution records**

Brazil (BA, ES), Argentina, Uruguay.

**Keys to species of *Distictus* Townes, 1966**

**Females**

1. Metasoma mostly orange (RGB 226,93,5), reddish (200,52,5) or reddish-brown (175,53,8), T2–8 mostly without posterior yellow stripes (Figs 7D, 9C, 14E), at most T2–3 with incomplete stripe (Fig. 6D) ..... 2
  - Metasoma black (23,5,2) or dark brown (31,11,2), at least T2–3 with posterior yellow stripes (Figs 4C, 10D, 11C) ..... 9
2. Supra-clypeal area entirely pale yellow (Fig. 13A, C), rarely with blackish marks (Fig. 15A–B); orbital band on malar space complete, rarely ventrally briefly interrupted (Fig. 15A–B) ..... 3
  - Supra-clypeal area with blackish or reddish-brown marks (Figs 7A, 9A); orbital band on malar space interrupted ..... 4
3. Metapleuron entirely black (Fig. 15C); mesosternum entirely black; fore and mid coxae pale yellow, without dorso-apical brown spot (Fig. 15G); central yellow mark on mesopleuron extending to sternaulus (Fig. 15G); posterior area of propodeum rugulose (Fig. 15F); anterior margin of propodeum medially distinctly concave (Fig. 15F) ..... *Distictus tibialis* (Brullé, 1846)
  - Metapleuron with distinct yellow mark (Fig. 13D); mesosternum with large yellow marks; fore and mid coxae pale yellow, usually with dorso-apical brown spot (Fig. 13D); central yellow mark on mesopleuron extending beyond sternaulus (Fig. 13D); posterior area of propodeum strigate-rugulose (Fig. 13B); anterior margin of propodeum medially slightly concave (Fig. 13B) ..... *Distictus paratibialis* sp. nov.

4. Propodeum with sublateral elongate yellow marks (Figs 7C, 14B); mesosoma black or reddish-brown with distinct yellow marks (Figs 9C, 14E); mesoscutum centrally with yellow spot; wings hyaline; epomia distinct only after diverging from pronotal collar ..... 5
- Propodeum without sublateral elongate yellow marks, only with propodeal crests bright yellow (Fig. 5B); mesosoma almost entirely black, with a few, tiny yellow spots (Fig. 5C); mesoscutum centrally without yellow spot; wings infusate (Fig. 5C); epomia complete ..... *Distictus ardens* sp. nov.
5. Orbital band continuous on temple (Fig. 9C); mesosoma black with yellow marks; malar space blackish; scutellar carina black (Fig. 12B) ..... 6
- Orbital band interrupted on temple (Fig. 14E); mesosoma reddish-brown with yellow marks; malar space reddish-brown; scutellar carina mostly yellow (Fig. 14B) ..... *Distictus terrosus* sp. nov.
6. Anterior transverse carina of propodeum medially broadly arched forwards (Figs 6B, 9B); sublateral yellow marks of propodeum comma-shaped (Figs 6B, 9B); T2 with posterior yellow stripe; hind femur blackish and dark brown; epicnemial carina irregular or distinctly sinuous ..... 7
- Anterior transverse carina of propodeum medially weakly bent (Fig. 7C); sublateral yellow marks of propodeum not comma-shaped (Figs 7C, 12F); T2 without posterior yellow stripe; hind femur mostly reddish or light orange; epicnemial carina more or less uniformly curved ..... 8
7. Posterior area of propodeum strigate (Fig. 6B); small yellow marks on collar and mesopleuron (Fig. 6D); T3 with blackish marks and narrow posterior yellow stripe (Fig. 6D); hind tibia blackish, except base, orange; spiracle of T1 not prominent; clypeus black, centrally with small yellow spot (Fig. 6A); thyridium about as wide as long ..... *Distictus asterios* sp. nov.
- Posterior area of propodeum strigate-rugulose (Fig. 9B); extensive yellow marks on collar and mesopleuron (Fig. 9C); T3 entirely reddish (Fig. 9C); hind tibia deep yellow, except apical 0.1 blackish; spiracle of T1 slightly prominent; clypeus almost entirely yellow (Fig. 9A); thyridium distinctly wider than long (Fig. 9B) ..... *Distictus commatus* sp. nov.
8. Hind femur reddish, apically blackish (Fig. 7D); supra-clypeal area with three blackish marks that are almost connected centrally to form an inverted Y (Fig. 7A); median tubercle of clypeus large; orbital band widely interrupted on malar space, broadly disconnected at eye margin (Fig. 7A); spiracle of T1 not prominent; propodeum sublaterally with small yellow dot basad transverse carina (Fig. 7C) ..... *Distictus ateles* sp. nov.
- Hind femur fully bright orange (Fig. 12D); supra-clypeal area without three blackish marks that are almost connected centrally to form an inverted Y, only with two oblique blackish marks on ventral 0.3 (Fig. 12A); median tubercle of clypeus small; orbital band shortly interrupted on malar space, nearly fused at eye margin (Fig. 12A); spiracle of T1 slightly prominent; propodeum sublaterally with distinct yellow spot basad transverse carina (Fig. 7C) ..... *Distictus notabilis* sp. nov.
9. T4–8 blackish or dark brown, with wide posterior yellow stripes (Figs 4C, 11C); scutellar carina yellow; hind coxa mostly yellow, dorso-apically with large dark brown mark (Figs 4C, 11C); sternaulus moderately deep; epicnemial carina irregular; propleuron yellow; S2–5 bright or pale yellow ..... 10
- T4–8 blackish, without posterior yellow stripes (Fig. 10D); scutellar carina black; hind coxa black, dorso-basally with large yellow mark (Fig. 10D); sternaulus deeply impressed; epicnemial carina clearly sinuous; propleuron black; S2–5 brownish, with narrow posterior pale yellow stripes ..... *Distictus daelus* sp. nov.

10. Hind tibia blackish (Fig. 4C); mesoscutum coriarius, matte and with lateral yellow marks; pale yellow marks on mesosoma (Fig. 4B–C); fore wing vein 3-M distinctly longer than 2-M; metapleuron rugulose; supra-clypeal area pale yellow, centrally with small blackish marks (Fig. 4A); fore and mid coxa pale yellow, with small dorso-apical brown spots; hind t1–4 whitish ..... *Distictus apaensis* sp. nov.
- Hind tibia bright yellow (Fig. 11C); mesoscutum densely punctate, shiny and without lateral yellow marks (Fig. 11B–C); bright yellow marks on mesosoma; fore wing vein 3-M about as long as 2-M; metapleuron lineate; supra-clypeal area bright yellow, without blackish marks (Fig. 11A); fore and mid coxa dorsally bright yellow, without dorso-apical brown spots; hind t1–4 bright yellow ..... *Distictus mexicanus* Kasparyan & Ruíz-Cancino, 2005

### Males

1. Metasoma mostly orange (RGB 226,93,5) (Fig. 15E), reddish (200,52,5) or reddish-brown (175,53,8) (Fig. 14D), rarely one or more of T2–4 with posterior yellow stripe (Figs 8D, 10F); hind tibia entirely yellow, or blackish only at apex ..... 2
- Metasoma blackish, all tergites with wide posterior yellow stripe (as in Fig. 11C); hind tibia deep yellow with basal 0.1 blackish ..... *Distictus mexicanus* Kasparyan & Ruíz-Cancino, 2005
2. Orbital band continuous on temple (Fig. 15E); scutellar carina black; mesosoma black or dark brown with extensive yellow marks (Fig. 10F) ..... 3
- Orbital band interrupted on temple (Fig. 14D); scutellar carina almost entirely yellow; mesosoma reddish-brown with extensive yellow marks (Fig. 14D) ..... *Distictus terrosus* sp. nov.
3. T2–3 without posterior yellow stripes, rarely T2 with posterior yellow stripe ..... 4
- T2–3 with posterior yellow stripes ..... 6
4. Metapleuron rugulose; propodeum posteriorly rugulose ou strigate-rugulose (as in Fig. 15F); propleuron entirely pale yellow; mid coxae entirely pale yellow; T1 mostly orange, sometimes blackish; malar space pale yellow ..... 5
- Metapleuron lineate; propodeum posteriorly distinctly striate (as in Fig. 7C); propleuron entirely black, sometimes with small posterior yellow spot; mid coxae ventrally blackish; T1 mostly black; malar space black ..... *Distictus ateles* sp. nov.
5. Metapleuron fully black (Fig. 15E), without yellow mark; mesosternum entirely black, rarely with small pale yellow marks; scape dorsally brown, sometimes apically with small yellow spot ..... *Distictus tibialis* sp. nov.
- Metapleuron black with distinct yellow mark (similar to Fig. 13D); mesosternum almost or entirely pale yellow; scape dorsally pale yellow, rarely light brown ..... *Distictus paratibialis* sp. nov.
6. Anterior transverse carina of propodeum almost straight (Fig. 8B); T4 with posterior pale yellow stripe (Fig. 8C–D); pronotum polished smooth along collar (Fig. 8C); propleuron mostly yellow; sternaulus moderately deep (Fig. 8C); mesopleuron shiny and weakly striate on dorsal area between hypopimeron and epicnemial carina ..... *Distictus caligaris* sp. nov.
- Anterior transverse carina of propodeum centrally distinctly arched forwards (Fig. 10G); T4 without posterior yellow stripe (Fig. 10F); pronotum distinctly striate along collar; propleuron entirely dark brown; sternaulus deeply impressed (as in Fig. 10D); mesopleuron matte and almost entirely lineate ..... *Distictus daelus* sp. nov.

## **Descriptions of species in *Distictus***

### ***Distictus apaensis* sp. nov.**

[urn:lsid:zoobank.org:act:B35A6AC1-880A-419D-91DB-A446C065F53F](https://doi.org/10.3897/ejt.542.16611)

Figs 4, 16E

### **Etymology**

The specific epithet is a reference to the Apa Apa Ecological Reserve, where the holotype was collected.

### **Material examined**

Total of 1 specimen.

### **Holotype**

BOLIVIA • ♀ (mounted on triangle point, in good condition); La Paz, Chulumani Apa-Apa; 16°22' S, 67°30' W; alt. 1800 m; 1–4 May 1997; L. Masner leg.; yellow pan traps; B9–11; CNCI {0}.

### **Description**

#### **Female** (holotype)

SIZE. Fore wing 9.88 mm long.

HEAD. Clypeus basally moderately convex, at midlength not distinctly emarginated, CHW 0.52; median tubercle small, blunt, placed mostly on apical area; apical area narrow. Mandible sparsely pilose, MLW 1.50, MWW 0.50. MSM 0.89. Supra-clypeal area densely pilose, minutely coriarius. Antenna with 28 flagellomeres. Supra-antennal area minutely but distinctly coriarius, medially coriarius, ventrally very slightly concave, dorsally with distinct median line, ventrally fading.

MESOSOMA. Pronotum moderately pilose, weakly striate along posterior margin and collar, elsewhere minutely coriarius; epomia delicate, distinct and approximately straight only after diverging from pronotal collar, moderately long, ending near dorsal margin of pronotum. Mesoscutum densely covered with short hairs, coriarius,  $1.16 \times$  as long as wide; notauli medially distinctly convergent,  $0.56 \times$  as long as mesoscutum; scuto-scutellar groove shallow, weakly carinulate. Mesopleuron almost entirely lineate, otherwise punctate; subalar ridge moderately wide, not keeled; epicnemial carina irregular, almost reaching subalar ridge; sternaulus moderately deep, posterior 0.4 almost indistinct, with weak vertical wrinkles; sulcus between sternaulus and scrobe distinct; mesopleural fovea a small pit, otherwise shallow; mesopleural suture weakly carinulate inside. Metapleuron rugulose, densely pilose; juxtacoxal carina vestigial. Hind coxa punctate-coriarius.

PROPODEUM. Densely pilose; anterior margin medially concave; spiracle oval, SWL 1.33; anterior area coriarius; posterior area strigate; anterior transverse carina laterally approximately straight, medially slightly arched forwards; posterior transverse carina represented by slight but distinct sublateral crests.

WINGS. Fore wing vein 1M+Rs more or less uniformly curved; crossvein 1cu-a weakly convex, arising opposite to 1M+Rs; crossvein 1m-cu irregular, about as long as vein 1-Rs+M; limit between veins 1m-cu and 1-Rs+M more or less traceable; vein 1-Rs+M with bulla placed near basal 0.4; vein 2Cua  $1.23 \times$  as long as crossvein 2cu-a; 3r-m nebulous, about as long as 2r-m; vein 3-M distinctly longer than 2-M; AWH 0.94, AAW 0.45; areolet  $0.31 \times$  as high as wide; APH 0.97; vein 4-M nebulous, approximately straight. Hind wing with 9 hamuli; vein M+Cu apically moderately convex; vein M forming straight angle with vein Cua; HW1C 1.64; vein Cub straight, forming straight angle with Cua; vein 2-Rs apically nebulous.

**METASOMA.** T1LW 1.32, T1WW 2.19; spiracle slightly prominent, at 0.50 of T1 length; median depression distinct; lateral depression distinct; dorsolateral carina represented by blunt ridge; ventrolateral carina sharp, complete. T2LW 0.85, T2WW 1.84; thyridium about as wide as long. Tergites 2–8 coriarius; pilosity progressively denser on posterior tergites, and dorsally as dense as laterally. Ovipositor slightly downcurved; OST 0.76; dorsal valve scarcely punctate; ventral valve slightly overlapping dorsal valve, its apex with 8 teeth.



**Fig. 4.** *Distictus apaensis* sp. nov., holotype (CNCI), ♀. **A.** Head, frontal view. **B.** Mesosoma, left view. **C.** Habitus. **D.** Apex of ovipositor, left side.

**COLOUR.** Head, mesosoma and metasoma black, dark brown and yellow. Head black; basal 0.5 of mandible, labrum, clypeus except lateral corners and area around median tooth, and most of supra-clypeal area yellow. Supra-clypeal area centrally with two small blackish marks. Palpi dark brown. Orbital band yellow, complete, covering almost entire width of gena on its ventral 0.3. Antenna mostly dark brown; scape ventrally with very small yellowish spot; f7–11 entirely white, f6 almost entirely white. Mesosoma black; pronotum (except median longitudinal stripe), propleuron, central spot on mesoscutum, tegula, scutellum, postscutellum, subalar ridge, part of epicnemion, most of ventral portion of mesopleuron, hypoepimeron, dorsal division of metapleuron, posterior mark covering 0.2 of metapleuron and sublateral marks on posterior area of propodeum yellow. Fore and mid coxae pale yellow, dorso-apically with small brown spots; fore first trochanter dorsally blackish, ventrally yellow; mid first trochanter marked with orange and blackish; fore and mid second trochanter orange; fore and mid femora orange, dorsally with longitudinal blackish marks; fore and mid tibia and tarsi brownish, tarsi blackish towards apex. Hind coxa mostly yellow, ventrally somewhat orange, laterally with longitudinal brownish stripe on basal 0.75, dorsally with brown mark on apical 0.6; hind trochanters and base of femur marked with orange and blackish; remainder of hind femur and tibia blackish, except extreme base of tibia brown; extreme base of hind t1 and t5 blackish; remainder of hind tarsus whitish. Wings hyaline. Metasoma mostly yellow; T1 dorsally dark brown on median 0.4; T2–8 dark brown on anterior 0.5–0.7.

#### **Male**

Unknown.

#### **Comments**

This species can be confused with a *Cyclaulus*, but it has a weak lateral expansion on T1 (vs absent in *Cyclaulus*), and the petiolar spiracle is placed basad to the midlength (vs apicad). Structurally, *D. apaensis* sp. nov. differs from all other species in the genus by having four exclusive features: 1m-cu about as long as vein 1Rs+M; fore wing vein 1M+Rs more or less uniformly curved; supra-antennal area dorsally with distinct median line, ventrally fading; and scuto-scutellar groove shallow. In colour, it can be isolated by having lateral yellow marks on the mesoscutum (Fig. 4B).

The new species is most similar in colour to *D. mexicanus*; these are the only two species in the genus having posterior and lateral yellow stripes on all tergites. It can be differentiated from *D. mexicanus* by having the body matte with pale yellow marks (vs shiny with bright yellow marks); hind tibia blackish (Fig. 4C) (vs deep yellow, Fig. 11C); hind t1–4 whitish (vs bright yellow); supra-clypeal area with blackish marks (vs entirely yellow); mesoscutum with lateral yellow marks (vs without lateral yellow marks); fore and mid coxae pale yellow with small dorso-apical brown spot (Fig. 4B) (vs dorsally bright yellow, Fig. 11C). Structurally, it differs from *D. mexicanus* in 59 features, of which the most important are the metapleuron rugulose (Fig. 4B) (vs distinctly lineate, Fig. 11B); anterior area of propodeum coriarius (vs coriarius-punctate); fore wing vein 3r-m about as long as 2r-m (vs distinctly shorter than 2r-m); fore wing vein 3-M distinctly longer than 2-M (vs about as long as 2-M); mesoscutum coriarius and matte (vs densely punctate and shiny); mesopleuron almost entirely lineate (vs mostly finely punctate, only on dorsal posterior corner distinctly lineate); anterior transverse carina laterally approximately straight, medially slightly arched forwards (vs slightly arched forwards, medially more distinctly curved); pronotum weakly striate along posterior margin and collar (vs distinctly striate along collar, weakly striate along posterior margin); scuto-scutellar groove shallow and weakly carinate (vs moderately deep, distinctly carinate); AWH 0.94 (vs 1.04–1.16); supra-antennal area medially coriarius (vs with some rugae); ventral valve slightly overlapping dorsal valve (vs distinctly overlapping dorsal valve); T1WW 2.19 (vs 2.43–2.86); CHW 0.52 (vs 0.44–0.48); T2WW 1.84 (vs 1.49–1.67).

The new species is also similar in colour to *D. daelus* sp. nov., from which it can be isolated by having T4–8 dark brown, with wide posterior yellow stripes (vs fully black); scutellar carina yellow (vs black); mesoscutum with lateral yellow marks (vs without lateral yellow marks); propleuron yellow (vs black); fore and mid femora orange, dorsally with longitudinal blackish marks (vs fore femur blackish with anterior face yellow on apical 0.7 and mid femur blackish); and hind tibia blackish (vs dark yellow, blackish on apical 0.2). Structurally, it differs from *D. daelus* sp. nov. in 62 features, of which the most important are the posterior area of propodeum strigate (vs strigate-rugulose); anterior transverse carina laterally approximately straight, medially slightly arched forwards (vs distinctly arched forwards, somewhat bell-shaped); fore wing vein 3r-m about as long as 2r-m (vs distinctly shorter than 2r-m); fore wing vein 3-M distinctly longer than 2-M (vs about as long as 2-M); APH 0.97 (vs 1.48); HW1C 1.64 (vs 2.27); sternaulus moderately deep, posterior 0.4 almost indistinct (vs deeply impressed, almost indistinct on posterior 0.25); median depression of T1 distinct (vs absent); ventral valve slightly overlapping dorsal valve (vs distinctly overlapping dorsal valve); MLW 1.50 (vs 1.19); anterior area of propodeum coriarius (vs coriarius-punctate); median tubercle of clypeus placed mostly on apical area (vs placed entirely on apical area); supra-antennal area medially coriarius (vs with some rugae); and scuto-scutellar groove weakly carinulate and shallow (vs distinctly carinulate, deep).

The new species is most similar in structure to *D. tibialis*, from which it differs in 49 features, of which the most important are as follows: posterior area of propodeum strigate (vs rugulose); apical area of clypeus narrow (vs moderately long); fore wing vein 3-M distinctly longer than 2-M (vs about as long as 2-M); crossvein 1cu-a weakly convex (vs convex); scuto-scutellar groove shallow and weakly carinulate (vs deep, distinctly carinulate); pronotum weakly striate along posterior margin and collar (vs distinctly striate along posterior margin and collar); sulcus between sternaulus and scrobe distinct (vs almost indistinct); sternaulus with weak vertical wrinkles (vs with distinct vertical wrinkles); ventral valve of ovipositor slightly overlapping dorsal valve (vs distinctly overlapping dorsal valve); ovipositor slightly downcurved (vs straight).

### Distribution records

Bolivia.

### *Distictus ardens* sp. nov.

[urn:lsid:zoobank.org:act:6934BC39-2745-4E36-A4C0-2AE74B0D2E1F](https://doi.org/10.3896/BI.2019.6934BC39-2745-4E36-A4C0-2AE74B0D2E1F)

Figs 5, 16E; Table 1

### Etymology

From the Latin ‘*ardens*’, meaning ‘burning, glowing’; in reference to the overall colour pattern of the body, which is somewhat reminiscent of a piece of amber.

### Material examined

Total of 2 specimens, 2 ♀♀.

#### Holotype

PERU • ♀ (pinned; apex of both antennae and right fore femur, tibia and tarsus missing; otherwise in good condition); Machu Picchu; 29 Nov. 1965; H. Townes and M. Townes leg.; USUC {0}.

#### Paratype

PERU • 1 ♀; Machu Picchu; alt. 1900 m; 4–18 Sep. 1964; C. Porter leg.; FSCA {1}.

**Table 1.** Morphometric ratios and measurements, compared for all species of all studied females of *Distictus* Townes, 1966. Number of measured specimens indicated by n. All the corresponding measurements are provided in the Appendix. Abbreviations as explained in Material and methods, plus the following: ARSZ = areolet maximum height (i.e., anterior to posterior length)<sup>[3]</sup> / fore wing vein 2m-cu, length<sup>[10]</sup>; FLGM = number of flagellomeres<sup>[7]</sup>; FWGL = fore wing maximum length<sup>[11]</sup>; HWHM = hind wing, number of hamuli<sup>[15]</sup>; OVT = number of teeth on the ventral valve of ovipositor<sup>[23]</sup>.

Species	AAW	n	APH	n	ARSZ	n	AWH	n	CHW	n	HW1C	n	MELW	n	MLW	n	MSM	n	MWW	n	NLML	n	OST	n		
<i>D. ardens</i>	0.43–1.08	2	1.00–1.29	2	0.35	1	0.95–1.34	2	0.41–0.46	2	1.49–1.91	2	1.17–1.24	2	1.38–1.57	2	0.76–0.81	2	0.49–0.52	2	0.73	1	0.98	1		
<i>D. ateles</i>	0.30–0.58	3	0.87–1.19	3	0.45	1	0.76–1.00	3	0.40–0.44	3	1.40–1.53	3	1.09–1.26	3	1.36–1.43	3	0.61–0.72	3	0.51–0.75	3	0.56–0.72	2	0.66	1		
<i>D. mexicanus</i>	0.29–0.51	3	0.81–1.20	3	0.4	1	1.04–1.16	3	0.44–0.48	3	1.32–1.83	3	1.12–1.17	3	1.45–1.59	3	0.71–0.80	3	0.53–0.58	3	0.62–0.84	3	0.66	1		
<i>D. paratibialis</i>	0.43–0.53	5	0.93–1.15	5	0.26–0.37	5	0.87–1.22	5	0.33–0.50	5	1.13–1.52	5	1.07–1.20	5	1.33–1.55	5	0.61–0.71	5	0.42–0.55	5	0.52–0.69	5	0.65–0.70	4		
<i>D. terrosus</i>	0.39–0.58	11	1.09–1.47	11	0.31–0.44	6	1.00–1.20	11	0.37–0.48	11	1.23–1.67	11	1.02–1.23	11	1.17–1.45	11	0.56–0.84	11	0.43–0.56	11	0.43–0.67	10	0.59–0.74	6		
<i>D. tibialis</i>	0.31–0.61	39	0.74–1.50	39	0.31–0.38	9	0.88–1.32	39	0.30–0.50	40	0.99–1.93	39	0.89–1.24	40	1.25–1.70	40	0.53–0.88	40	0.43–0.71	40	0.44–0.72	34	0.49–0.74	8		
Species	RCUA	n	SPR	n	SWL	n	T1LW	n	T1WW	n	T2LW	n	T2WW	n					FLGM	n	FWLG	n	HWHM	n	OVT	n
<i>D. ardens</i>	1.05–1.22	2	0.51–0.51	2	1.27–1.85	2	1.50–1.86	2	2.38–2.60	2	0.92–0.94	2	1.83–1.86	2					30	1	11.60–15.74	2	10	1	7–8	2
<i>D. ateles</i>	1.03–1.30	3	0.49–0.52	3	1.25–2.05	3	1.53–1.64	3	2.18–2.77	3	0.77–0.91	3	1.86–1.94	3					30	1	13.00–14.60	3	10	1	7	3
<i>D. mexicanus</i>	0.92–1.10	3	0.49–0.61	3	1.54–1.67	3	1.19–1.47	2	2.43–2.86	3	0.75–0.92	2	1.49–1.67	2					28–29	2	10.48–17.08	3	8	1	6–7	3
<i>D. paratibialis</i>	1.07–1.31	5	0.49–0.53	5	1.20–1.57	5	1.34–1.47	5	2.44–2.77	5	0.77–0.84	5	1.69–2.11	5					26–27	5	6.88–10.04	5	7–9	5	6–8	5
<i>D. terrosus</i>	1.14–1.33	11	0.50–0.55	11	1.44–1.75	11	1.13–1.29	10	2.66–3.00	10	0.71–0.85	11	1.65–1.78	10					29–31	8	12.10–15.07	11	10–12	6	5–8	9
<i>D. tibialis</i>	0.65–1.52	39	0.33–0.52	32	1.11–1.55	39	1.25–1.59	31	1.97–2.87	35	0.71–1.15	38	1.39–2.09	36					24–29	34	5.12–12.19	40	6–9	8	6–8	37

## Description

### Female (holotype)

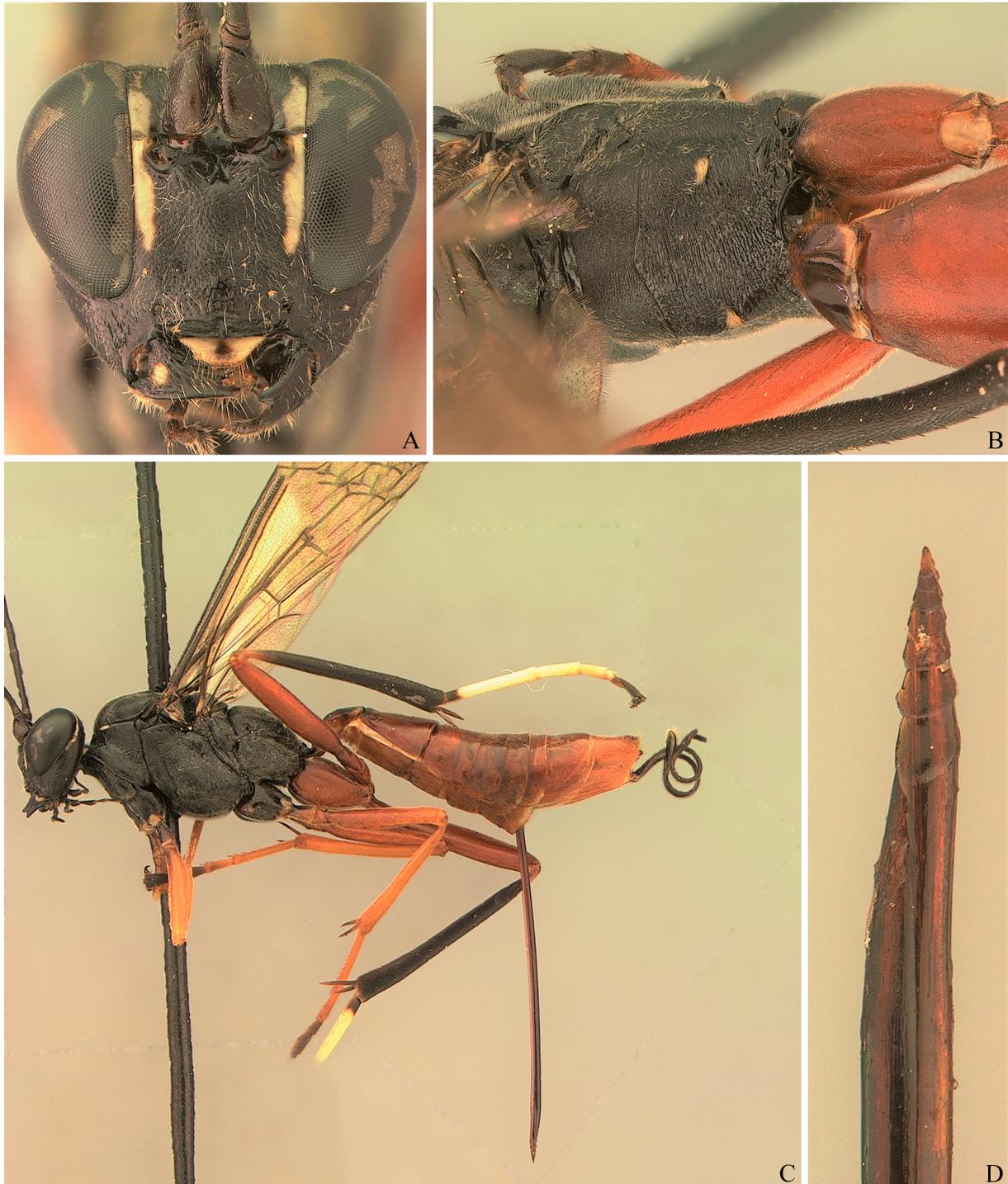
SIZE. Fore wing 11.60 mm long.

HEAD. Clypeus basally moderately convex, at midlength not distinctly emarginate, CHW 0.41; median tubercle small, pointed, placed entirely on apical area; apical area very narrow. Mandible densely pilose, MLW 1.38, MWW 0.49. MSM 0.76. Supra-clypeal area densely pilose, minutely coriarius. Antenna missing. Supra-antennal area minutely but distinctly coriarius, medially and near ocelli rugulose, ventrally very slightly concave, with distinct median line.

MESOSOMA. Pronotum moderately pilose, weakly striate along posterior margin and collar, elsewhere minutely rugulose; epomia delicate, complete, short, ending far from dorsal margin of pronotum, after diverging from pronotal collar approximately straight. Mesoscutum densely covered with short hairs, coriarius, 1.17 × as long as wide; notauli medially distinctly convergent, apex destroyed by pin; scuto-scutellar groove deep, distinctly carinulate. Mesopleuron coriarius-lineate, otherwise punctate; subalar ridge narrow, elongate, somewhat keeled; epicnemial carina irregular, reaching about 0.85 of distance to subalar ridge; sternaulus moderately deep, posterior 0.4 almost indistinct, with distinct vertical wrinkles; sulcus between sternaulus and scrobe distinct; mesopleural fovea a small pit, otherwise shallow; mesopleural suture weakly carinulate inside. Metapleuron rugulose, densely pilose; juxtacoxal carina vestigial. Hind coxa coriarius-rugulose.

PROPODEUM. Densely pilose; anterior margin medially concave; spiracle oval, SWL 1.27; anterior area coriarius; posterior area strigate-rugulose; anterior transverse carina laterally approximately straight, medially distinctly arched forwards; posterior transverse carina represented by slight but distinct sublateral crests.

WINGS. Fore wing vein 1M+Rs anteriorly straight, posteriorly curved; crossvein 1cu-a convex, arising slightly basad of 1M+Rs; crossvein 1m-cu irregular, distinctly longer than vein 1-Rs+M; limit between veins 1m-cu and 1-Rs+M more or less traceable; vein 1-Rs+M with bulla placed near basal 0.4; vein 2Cua 1.22 × as long as crossvein 2cu-a; 3r-m nebulous, about as long as 2r-m; vein 3-M about as long as 2-M; AWH 0.95, AAW 0.43; areolet 0.35 × as high as wide; APH 1.29; vein 4-M nebulous, approximately straight. Hind wing with 10 hamuli, vein M+Cu apically moderately convex; vein M



**Fig. 5.** *Distictus ardens* sp. nov., holotype (USUC), ♀. **A.** Head, frontal view. **B.** Propodeum + first two tergites, dorso-lateral view. **C.** Habitus. **D.** Apex of ovipositor, left side.

forming distinctly obtuse angle with Cua; HW1C 1.49; vein Cub almost straight, very slightly convex, forming straight angle with Cua; vein 2-Rs apically nebulous.

**METASOMA.** T1LW 1.50, T1WW 2.60; spiracle not prominent, at 0.51 of T1 length; median depression distinct; lateral depression distinct; dorsolateral carina represented by blunt ridge; ventrolateral carina sharp, anteriorly indistinct. T2LW 0.92, T2WW 1.86; thyridium about as wide as long. Tergites 2–8 coriarius; pilosity dense and more or less uniform, and dorsally as dense as laterally. Ovipositor slightly downcurved; OST 0.98; dorsal valve scarcely punctate; ventral valve distinctly overlapping dorsal valve, its apex with 7 teeth.

**COLOUR.** Head and mesosoma mostly black, metasoma reddish-orange. Head black; small spot on base of mandible and labrum except central mark bright yellow. Palpi dark brown. Orbital band narrow, distinct only on about 0.5 of supra-clypeal and supra-antennal areas and on dorsal 0.4 of gena; f7–9 entirely white, f6 and f10 mostly white, f11 with small white mark. Mesosoma black; anterior apex of pronotal collar, small marks on dorsal margin of pronotum, tegula, scutellum and over propodeal crests bright yellow. Fore and mid coxae black with small yellowish and orange marks; fore and mid first trochanters marked with blackish and orange; fore and mid second trochanters, femora, tibiae and t1–2 orange; fore and mid t3–5 blackish. Hind coxa trochanters and femur reddish-orange; hind tibia basal 0.1 orange, remainder of it black; basal 0.15 of t1, apex of t4 and t5 blackish; apical 0.85 of t1, t2–3 and base of t4 whitish. Wings moderately infusate. Metasoma reddish-orange; T1 dorsally infusate with blackish, posteriorly with very narrow yellow stripe; T5–7 and S6 with sparse, small yellowish marks.

#### **Male**

Unknown.

#### **Comments**

This is the most distinctive species of the genus, at least in terms of colour pattern (Fig. 5A–C). It can be readily recognized by having head and mesosoma almost entirely black, without the extensive yellow marks on the collar, dorsal margin of pronotum, mesoscutum, scutellum, postscutellum, meso- and metapleuron which are found in all other species of the genus. It is also the only species of *Distictus* with infusate wings and the supra-clypeal area almost entirely black. Structurally, *D. ardens* sp. nov. differs from all other species in the genus by having four exclusive features: ventrolateral carina of T1 anteriorly indistinct; epomia complete; hind coxa coriarius-rugulose; and T2–8 with pilosity somewhat dense and more or less uniform. In spite of being a very distinctive species, its general morphology agrees quite well with the definition of the genus.

Although distinctive in colour, *D. ardens* sp. nov. is similar in structure to *D. tibialis*, from which it differs in 47 features, the most important of which are as follows: posterior area of propodeum strigate-rugulose (vs rugulose in *D. tibialis*); apical area of clypeus very narrow (vs moderately long); ventrolateral carina anteriorly indistinct (vs complete); epomia delicate (vs moderately stout); mesoscutum coriarius (vs punctate-coriarius); hind coxa coriarius-rugulose (vs densely punctate); pronotum weakly striate along posterior margin and collar (vs distinctly striate along posterior margin and collar); epicnemial carina reaching about 0.85 of distance to subalar ridge (vs reaching subalar ridge); fore wing crossvein 1m-cu distinctly longer than vein 1Rs+M (vs not distinctly longer than 1-Rs+M); ovipositor slightly downcurved (vs straight).

#### **Distribution records**

Peru.

*Distictus asterios* sp. nov.

[urn:lsid:zoobank.org:act:4C90E0D6-C812-4E6D-ACC7-C1321C000D62](https://doi.org/10.3896/urn:lsid:zoobank.org:act:4C90E0D6-C812-4E6D-ACC7-C1321C000D62)

Figs 6, 16E

**Etymology**

From the Latin ‘*asterios*’, meaning ‘starry’, in reference to the multiple small yellow spots on a black background.

**Material examined**

Total of 1 specimen.

**Holotype**

ECUADOR • ♀ (pinned; left flagellum and apical half of right antenna missing; dirty; otherwise in good condition); Baños, Runtun; Oct. 1968; L. Peña leg.; USUC {0}.

**Description**

**Female** (holotype)

SIZE. Fore wing 10.80 mm long.

HEAD. Clypeus basally moderately convex, at midlength distinctly emarginated, CHW 0.44; median tubercle small, pointed, placed entirely on apical area; apical area very narrow. Mandible densely pilose, MLW 1.43, MWW 0.50. MSM 0.86. Supra-clypeal area densely pilose, minutely coriarius. Antenna missing. Supra-antennal area minutely but distinctly coriarius, medially coriarius, ventrally and around ocelli distinctly concave, with distinct median line.

MESOSOMA. Pronotum densely pilose, weakly striate along posterior margin and collar, elsewhere minutely coriarius; epomia delicate, distinct and slightly curved only after diverging from pronotal collar, short, ending far from dorsal margin of pronotum. Mesoscutum densely covered with short hairs, coriarius,  $1.19 \times$  as long as wide; notauli medially distinctly convergent, apex destroyed by pin; scuto-scutellar groove moderately deep, distinctly carinate. Mesopleuron coriarius-lineate, otherwise coriarius; subalar ridge narrow, elongate, not keeled; epicnemial carina irregular, almost reaching subalar ridge; sternaulus moderately deep, posterior 0.25 shallow, with distinct vertical wrinkles; sulcus between sternaulus and scrobe almost indistinct; mesopleural fovea a small pit, otherwise shallow; mesopleural suture distinctly carinate inside. Metapleuron lineate-rugulose, densely pilose; juxtacoxal carina vestigial. Hind coxa coriarius.

PROPODEUM. Densely pilose; anterior margin medially very slightly concave; spiracle oval, SWL 1.40; anterior area coriarius; posterior area strigate; anterior transverse carina slightly arched forwards, medially more distinctly curved; posterior transverse carina represented by slight but distinct sublateral crests.

WINGS. Fore wing vein 1M+Rs anteriorly straight, posteriorly curved; crossvein 1cu-a weakly convex, arising slightly basad of 1M+Rs; crossvein 1m-cu irregular, continuous with 1-Rs+M; vein 1-Rs+M with bulla placed near its midlength; vein 2Cua  $1.33 \times$  as long as crossvein 2cu-a; 3r-m partially spectral, about as long as 2r-m; vein 3-M distinctly longer than 2-M; AWH 1.01, AAW 0.28; areolet  $0.36 \times$  as high as wide; APH 1.29; vein 4-M nebulous, approximately straight. Hind wing with 8 hamuli; vein M+Cu apically moderately convex; vein M forming distinctly obtuse angle with Cua; HW1C 1.67; vein Cub straight, forming straight angle with Cua, vein 2-Rs apically nebulous.

**METASOMA.** T1LW 1.48, T1WW 2.36, spiracle not prominent, at 0.51 of T1 length; median depression distinct; lateral depression distinct; dorsolateral carina represented by blunt ridge; ventrolateral carina sharp, complete. T2LW 0.87, T2WW 1.96; thyridium about as wide as long. Tergites 2–8 coriarius; pilosity progressively denser on posterior tergites and laterally denser than dorsally. Ovipositor straight; OST 0.78; dorsal valve moderately punctate; ventral valve slightly overlapping dorsal valve, its apex with 8 teeth.

**COLOUR.** Head and mesosoma black with yellow marks; metasoma orange with black and yellow marks. Head black; small spots on base of mandible and center of clypeus, light yellow. Mouthparts dark brown. Orbital band briefly interrupted on malar space, distinctly wider on supra-clypeal area and ventral portion of gena, but never covering entire width of gena. White band on flagellum starting with small apical mark on f4. Mesosoma black; small marks on dorsal and ventral portions of collar, narrow mark on dorsal margin of pronotum, central spot on mesoscutum, part of tegula, scutellum, part of postscutellum, subalar ridge, small central mark on mesopleuron, dorsal portion of hypopleuron, most of dorsal division of metapleuron, and small sublateral marks on posterior area of propodeum light yellow. All coxae black with small yellow spots, on mid coxa proportionally larger, on hind coxa placed dorso-basally; all first trochanters marked with orange and blackish; all second trochanters orange; fore and mid femora orange with dorsal dark marks, on mid femora a distinct blackish stripe; fore and mid tibiae deep yellow; fore and mid tarsi basally yellow, blackish towards apex; hind femur and tibia blackish, except apex of femur and base of tibia orange; basal 0.4 of t1, most of t4 and t5 blackish; apical 0.6 of t1, t2–3 and part of t4 white. Wings hyaline. Metasoma T1 dark brown, laterally partially light brown, posterior 0.2 yellow; T2 blackish, dorsally with posterior yellow stripe; T3–8 orange, T3 slightly infuscate with blackish marks and with narrow posterior yellow mark. Sternites orange.

#### **Male**

Unknown.

#### **Comments**

Structurally, *D. asterios* sp. nov. differs from all other species in the genus by having three exclusive features: hind coxa coriarius; fore wing vein 3r-m partially spectral; supra-antennal area ventrally and around ocelli distinctly concave. In colour, it is unique by having very small yellow marks on the collar and mesopleuron (Fig. 6D).

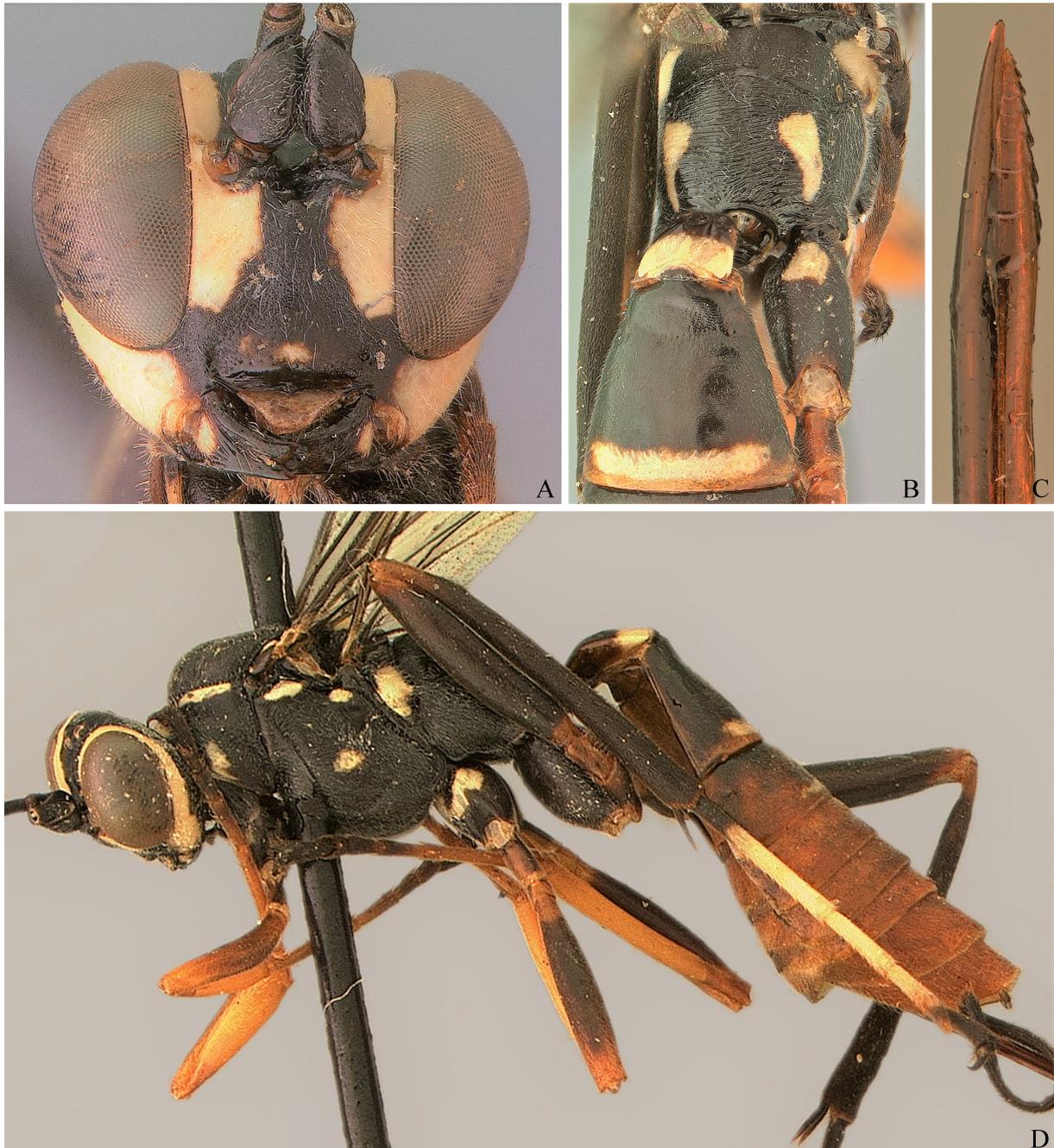
The new species is most similar in colour to *D. commatus* sp. nov., from which it can be readily differentiated by having very small yellow marks on the mesosoma (vs extensive yellow marks); metapleuron entirely black (vs with distinct yellow mark); hind tibia blackish (vs almost entirely deep yellow); T3 orange, slightly infuscate with blackish marks and with narrow posterior yellow stripe (vs fully orange and without posterior yellow stripe); hind t1 whitish, basally blackish (vs entirely yellow). Structurally, it differs in 54 features, of which the most important are as follows: posterior area of propodeum strigate (vs strigate-rugulose); fore wing crossvein 1cu-a weakly convex (vs straight but inclivous); mesopleuron coriarius-lineate (vs almost entirely lineate, otherwise punctate); epicnemial carina irregular, almost reaching subalar ridge (vs distinctly sinuous, reaching about 0.85 of distance to subalar ridge); hind coxa coriarius (vs punctate-coriarius); ventrolateral carina complete (vs complete but medially almost indistinct); thyridium about as wide as long (vs distinctly wider than long); spiracle of T1 not prominent (vs slightly prominent); T1WW 2.38–2.60 (vs 2.94); T2WW 1.83–1.86 (vs 1.49); ventral valve slightly overlapping dorsal valve (vs distinctly overlapping dorsal valve); T1LW 1.50–1.86 (vs 1.28).

The new species is structurally most similar to *D. tibialis*, from which can be separated by 43 features, of which the most important are as follows: posterior area of propodeum strigate (vs rugulose); anterior

transverse carina distinctly arched forwards (vs slightly and uniformly arched forwards); pronotum weakly striate along posterior margin and collar (vs distinctly striate); mesoscutum coriarius (vs punctate-coriarius); apical area of clypeus very narrow (vs moderately long); fore wing crossvein 1cu-a weakly convex (vs convex); subalar ridge narrow, elongate (vs moderately wide).

#### Distribution records

Ecuador.



**Fig. 6.** *Distictus asterios* sp. nov., holotype (USUC), ♀. **A.** Head, frontal view. **B.** Propodeum + first two tergites, dorso-lateral view. **C.** Apex of ovipositor, left side. **D.** Habitus.

*Distictus ateles* sp. nov.

[urn:lsid:zoobank.org:act:084CDFB1-94E7-46C9-BCDA-0B6E8E6359E8](http://urn:lsid:zoobank.org:act:084CDFB1-94E7-46C9-BCDA-0B6E8E6359E8)

Figs 7, 16B; Table 1

### Etymology

From the Greek ‘ateles’, meaning ‘imperfect, unfulfilled’, in reference to the short epicnemial carina.

### Material examined

Total of 23 specimens, 6 ♀♀ and 17 ♂♂.

### Holotype

BRAZIL – **Rio de Janeiro State** • ♀ (pinned, in good condition); Guanabara, Represa Rio Grande; Dec. 1969; M. Alvarenga leg.; USUC {0}.

### Paratypes

BRAZIL – **Mato Grosso** • 1 ♀; 12°50' S, 51°47' W; 10 Oct. 1968; O.W. Richards, R.S. and R.G.S. exped.; gallery forest; BMNH, B.M.1968-260 {2} • 1 ♂; Sinop; 12°31' S, 55°37' W; Oct. 1976; M. Alvarenga leg.; USUC. – **Minas Gerais** • 1 ♂; Parque Estadual do Rio Doce, Área da Tereza 1; 3–10 Nov. 2004; J.C.R. Fontenelle leg.; mata primária; Malaise; UFES • 1 ♂; *ibid.*; Área da Tereza 3; 12–19 Oct. 2000; J.C.R. Fontenelle leg.; mata primária; Malaise; UFES • 1 ♂; *ibid.*; 20–27 Oct. 2004; J.C.R. Fontenelle leg.; mata Primária; Malaise; UFMG • 1 ♂; *ibid.*; 24–31 Oct. 2002; J.C.R. Fontenelle leg.; mata primária; Malaise; UFES • 1 ♂; Parque Estadual do Rio Doce, Trilha do Vinhático 1; 3–10 Nov. 2004; J.C.R. Fontenelle leg.; Malaise; UFMG • 1 ♂; *ibid.*; 31 Jul.–7 Aug. 2002; J.C.R. Fontenelle leg.; mata secundária alta; Malaise; UFES. – **Pará** • 1 ♀; Óbidos; Jun. 1955; J. Brasilino leg.; USUC • 1 ♂; Serra Norte, Pedreira; 17 Jun. 1985; P. Tadeu leg.; MPEG. – **Rio de Janeiro State** • 1 ♀; Guanabara (currently Rio de Janeiro), Represa Rio Grande; Aug. 1966; M. Alvarenga leg.; FSCA {1} • 1 ♀; Mangaratiba, Muriqui; Jul. 1969; M. Alvarenga leg.; USUC • 1 ♀; Represa Rio Grande; Aug. 1969; M. Alvarenga leg.; USUC • 1 ♂; Guanabara (currently Rio de Janeiro), Represa Rio Grande; Jul. 1972; M. Alvarenga leg.; FSCA • 1 ♂; Represa Rio Grande; Aug. 1969; M. Alvarenga leg.; USUC • 1 ♂; *ibid.*; Sep. 1969; USUC. – **Espírito Santo State** • 1 ♂; Cariacica, Reserva Biológica de Duas Bocas, Pau Amarelo; 20–28 Oct. 2005; A.P. Aguiar exped.; Malaise; Pt2; UFES42227, LAPIS3934 • 1 ♂; *ibid.*; 21–30 Oct. 2005; A.P. Aguiar exped.; Malaise; Pt12; UFES42225, LAPIS3933 • 1 ♂; *ibid.*; 28 Oct.–5 Nov. 2005; A.P. Aguiar exped.; Malaise; Pt3; UFES42226, LAPIS3932 • 1 ♂; Cariacica, Reserva Biológica de Duas Bocas, Sede; 20°15'29.8" S, 40°29'31.3" W; alt. 172 m; 7–21 Oct. 2016; A.P. Aguiar exped.; mata secundária; Malaise; Pt6; UFES FAS1581 • 1 ♂; *ibid.*; 20°15'33.0" S, 40°29'21.8" W; alt. 185 m; 7–21 Oct. 2016; A.P. Aguiar exped.; mata secundária; Malaise; Pt5; UFES FAS2399 • 1 ♂; Linhares; Sep. 1972; M. Alvarenga leg.; FSCA.

### Description

#### Female (holotype)

SIZE. Fore wing 13.00 mm long.

HEAD. Clypeus basally slightly convex, at midlength not distinctly emarginated, CHW 0.44; median tubercle large, blunt, placed mostly on apical area; apical area moderately long. Mandible moderately pilose, MLW 1.36, MWW 0.51. MSM 0.61. Supra-clypeal area moderately pilose, minutely coriarius and sparsely punctate. Antenna with 30 flagellomeres. Supra-antennal area minutely, faintly coriarius, medially and near ocelli rugulose, ventrally striate, ventrally and around ocelli slightly concave, with distinct median line.

**MESOSOMA.** Pronotum sparsely pilose, distinctly striate along collar, weakly striate along posterior margin, elsewhere sparsely punctate; epomia moderately stout, distinct and slightly curved only after diverging from pronotal collar, short, ending far from dorsal margin of pronotum. Mesoscutum densely covered with short hairs, densely punctate,  $1.09 \times$  as long as wide; notauli medially weakly convergent,  $0.56 \times$  as long as mesoscutum; scuto-scutellar groove moderately deep, distinctly carinulate. Mesopleuron almost entirely lineate, otherwise punctate; subalar ridge wide, oval, not keeled; epicnemial carina more or less uniformly curved, reaching about 0.70 of distance to subalar ridge; sternaulus moderately deep, posterior 0.4 almost indistinct, with distinct vertical wrinkles; sulcus between sternaulus and scrobe almost indistinct; mesopleural fovea shallow, not forming a central pit; mesopleural suture distinctly carinulate inside. Metapleuron lineate, densely pilose; juxtacoxal carina vestigial. Hind coxa, dorsally sparsely, otherwise densely punctate.

**PROPODEUM.** Sparsely pilose; anterior margin medially very slightly concave; spiracle elongate, SWL 1.25; anterior area coriarius-punctate; posterior area strigate; anterior transverse carina slightly arched forwards, medially more distinctly curved; posterior transverse carina represented only by very slight sublateral crests.

**WINGS.** Fore wing vein 1M+Rs anteriorly straight, posteriorly curved; crossvein 1cu-a convex, arising distinctly basad of 1M+Rs; crossvein 1m-cu irregular, distinctly longer than vein 1-Rs+M; limit between veins 1m-cu and 1-Rs+M more or less traceable; fore wing vein 1-Rs+M with bulla placed near its midlength; vein 2Cua  $1.30 \times$  as long as crossvein 2cu-a; 3r-m nebulous, about as long as 2r-m; vein 3-M about as long as 2-M; AWH 0.91, AAW 0.42; areolet  $0.45 \times$  as high as wide; APH 1.19; vein 4-M tubular, approximately straight. Hind wing with 10 hamuli, vein M+Cu apically moderately convex, vein M forming straight angle with vein Cua; HW1C 1.40; vein Cub almost straight, very slightly convex, forming distinctly obtuse angle with Cua (not curved), vein 2-Rs entirely tubular, though weaker apically.

**METASOMA.** T1LW 1.53, T1WW 2.18, spiracle not prominent, on 0.52 of T1 length; median depression very shallow; lateral depression very shallow; dorsolateral carina represented by blunt and incomplete ridge; ventrolateral carina sharp, complete. T2LW 0.77, T2WW 1.86; thyridium distinctly wider than long. Tergites 2–8 coriarius; pilosity progressively denser on posterior tergites and laterally denser than dorsally. Ovipositor straight; OST 0.66; dorsal valve moderately punctate; ventral valve distinctly overlapping dorsal valve, its apex with 7 teeth.

**COLOUR.** Head and mesosoma black with yellow marks; metasoma mostly reddish. Head black; basal spot on mandible, clypeus and most of supra-clypeal area bright yellow. Supra-clypeal area with three blackish marks that are almost connected centrally to form an inverted Y. Mouthparts mostly yellow; apical two segments on maxillary palpus and three on labial palpus brownish. Orbital band shortly interrupted near torulus and on malar space, never covering entire width of gena; f6–9 entirely white, f5 and f10 almost entirely white, f4 with small white mark; f11–30 ventrally dark brown. Mesosoma black; collar, narrow mark on dorsal margin of pronotum, central spot on mesoscutum, tegula, scutellum, postscutellum, subalar ridge, central mark on mesopleuron, dorsal portion of hypoepimeron, dorsal division of metapleuron, oval mark covering 0.25 of metapleuron, elongate sublateral marks over propodeal apodeme and very small spot dorsad of spiracle of propodeum bright yellow. Fore and mid coxae mesally black, laterally mostly yellow; fore first trochanter dorsally blackish, ventrally yellow; mid first trochanter blackish; fore and mid second trochanters marked with ferruginous and blackish; fore and mid femora dorsally blackish, ventrally yellow; all tibiae deep yellow; fore and mid tarsi basally yellow, blackish towards apex. Hind coxa, trochanters and femur reddish; coxa with dorso-basal yellow spot encircled by blackish ring; hind femur apically blackish; tarsus light yellow. Wings hyaline.

Metasoma reddish, lighter towards posterior segments, T7–8 bright orange; T1 mostly blackish with basal 0.15 and apical 0.2 bright yellow; T2 with very narrow anterior blackish stripe.

VARIATION. Morphometric ranges can be seen in Table 1. Anterior transverse carina of propodeum sometimes laterally weak; face without distinct black marks; mandible mostly black (~70%), at most with as much as 50% yellow; malar space extensively black; ventral portion of fore tarsus apex yellow to as blackish as dorsal side; hind coxa sometimes marked with black around posterior yellow spot; apex of hind femur sometimes blackish. Shape and extension of yellow marks at mesopleuron and metapleuron slightly variable, with southernmost populations usually more extensively black. Specimen from Mangaratiba with propodeum anterolaterally almost impunctate; propodeal crest absent, not even indicated by a carina; hind wing vein Cub slightly sinuous (vs evenly arched in other specimens). Specimen from Óbidos with black marks on fore and mid coxa less extensive, no blackish marks on hind coxa, two ovoid yellow marks on anterior region of propodeum (faintly suggested in a few other specimens).

### Male

Similar to female, most important differences as follows. Smaller, fore wing 8.5–12 mm long. Supra-clypeal area bright yellow, without blackish marks; pronotum polished smooth; spiracle of T1 prominent; clypeus margin yellow, except black near tooth; differences in metasoma tonality that include variations from orange brownish (154,66,002) to bright orange (249,178, 004).

VARIATION. Antenna with 30–32 flagellomeres; T1LW 2.98–3.35; T1WW 1.63–2.06. Southern specimens with more extensive black marks at malar space, smaller spot on mesopleuron, mid first trochantellus and hind trochanters marked with black, hind femur dorsally and ventrally blackish (laterally orange; in one specimen femur entirely orange) and yellow spots at propodeum smaller and elongate; specimen from Sinop with fore femur dark mark partially orange (not entirely black), hind coxa apically reddish-brown (black in southern specimens), yellow posterior spot more extensive, reaching almost to coxa apex, basal yellow spots at propodeum faintly suggested; apex of T2 as a distinct yellow stripe; epicnemial carina sometimes almost reaching subalar ridge; scape rarely ventrally with yellow spot; crossvein 1cu-a sometimes arising a little basad of 1M+Rs; one specimen from Represa Rio Grande with yellow spot on metapleuron small (about half as large as in other specimens) and apex of T2 with more or less distinct yellow stripe; both specimens from this locality with T2 basally blackish, T3 basally fuscous. Specimen from Linhares with hind coxa entirely blackish under yellow mark, while in one specimen from RJ (FSCA), the coxa is black adjacent to a yellow mark and ventrally orange. In Brazil, specimens from MT and PA differ from those from the southeastern states (MG and ES) by having the metasoma in bright orange (249,178,004) (vs brownish orange to orange), T2 with a distinct posterior yellow stripe (vs absent) and yellow stripes on mesosoma in a distinctly brighter tone of yellow.

### Comments

Structurally, *D. ateles* sp. nov. differs from all other species in the genus by having three exclusive features: epicnemial carina reaching only about 0.70 of distance to subalar ridge; median tubercle of clypeus large; and vein 2-Rs entirely tubular, though weaker apically. In colour, it can be isolated by having the supra-clypeal area with three blackish marks that are almost connected centrally to form an inverted Y (Fig. 7A) and the hind femur reddish, apically blackish.

The new species is most similar in colour and structure to *D. notabilis* sp. nov., from which it can be differentiated by having the supra-clypeal area with three blackish marks that are almost connected centrally to form an inverted Y (vs two short, oblique blackish marks ventrally); orbital band widely interrupted on malar space, broadly disconnected at eye margin (vs shortly interrupted, almost meeting at eye margin); very small yellow spot dorsad of spiracle of propodeum (vs large yellow marks dorsad

of spiracle); hind coxa with baso-dorsal yellow spot encircled by blackish ring (Fig. 7C–D) (vs yellow spot not encircled by blackish ring, Fig. 12D); and hind femur reddish, apically blackish (vs fully bright orange). Structurally, it differs from *D. notabilis* sp. nov. by 34 features, of which the most important are as follows: epicnemial carina reaching about 0.70 of distance to subalar ridge (vs 0.85); pronotum distinctly striate along collar (vs weakly striate); median tubercle of clypeus large and placed mostly on apical area (vs small, placed entirely on apical area); fore wing crossvein 1cu-a arising distinctly basad of 1M+Rs (vs a little basad of 1M+Rs); spiracle of T1 not prominent (vs slightly prominent); ovipositor straight (Fig. 7D) (vs slightly downcurved, Fig. 12D); apical area of clypeus moderately wide (Fig. 7A)



**Fig. 7.** *Distictus ateles* sp. nov., holotype (USUC), ♀. **A.** Head, frontal view. **B.** Areolet of fore right wing. **C.** Propodeum + first two tergites, dorsal view. **D.** Habitus. **E.** Apex of ovipositor, left side.

(vs narrow, Fig. 12A); clypeus basally nearly flat (Fig. 7D) (vs moderately convex, Fig. 12C); areolet  $0.45 \times$  as high as wide (vs 0.28).

The new species is similar in colour to *D. tibialis*, from which can be isolated by having the metapleuron with a distinct yellow mark (vs black); T1 mostly black (Fig. 7D) (vs orange, Fig. 15F); hind femur apically blackish (vs entirely reddish). Structurally, it differs in 50 features, of which the most important are as follows: posterior area of propodeum strigate and shiny (Fig. 7C) (vs rugulose, matte, Fig. 15F); metapleuron lineate (vs rugulose); mesoscutum densely punctate (vs punctate-coriarius); anterior transverse carina slightly arched forwards, medially more distinctly curved (vs slightly and uniformly arched forwards); median tubercle of clypeus large (vs small); epicnemial carina reaching about 0.70 of distance to subalar ridge, and more or less uniformly curved (vs reaching subalar ridge, irregular); areolet  $0.45 \times$  as high as wide (vs 0.31–0.38); anterior margin of propodeum medially very slightly concave (vs medially concave); spiracle of propodeum elongate (vs oval); SWL 1.25–2.05 (vs 1.11–1.55); propodeum sparsely pilose (vs moderately pilose).

The new species is also similar in colour to *D. commatus* sp. nov., from which it can be isolated by having the T2 reddish, with a very narrow anterior blackish stripe (Fig. 7C) (vs blackish, with posterior yellow stripe, Fig. 9B); hind tibia entirely deep yellow (vs apically blackish); hind femur mostly reddish (vs blackish and dark brown); and extensive bright yellow marks on mesosoma (vs matte yellow marks). Structurally, it differs in 55 features, of which the most important are as follows: posterior area of propodeum strigate (Fig. 7C) (vs strigate-rugulose, Fig. 9B); anterior transverse carina of propodeum slightly arched forwards (vs distinctly arched, somewhat bell-shaped); posterior transverse carina of propodeum represented only by very slight sublateral crests (vs represented by distinct sublateral crests); metapleuron lineate (vs lineate-rugulose); median tubercle of clypeus large, blunt, placed mostly on apical area (vs very small, pointed and placed entirely on apical area); supra-antennal area medially, near ocelli, rugulose (vs medially coriarius); hind coxa punctate, dorsally sparsely, otherwise densely (vs punctate-coriarius); mesoscutum densely punctate (vs densely punctate-coriarius); epicnemial carina more or less uniformly curved, reaching about 0.70 of distance to subalar ridge (vs distinctly sinuous and reaching about 0.85 of distance to subalar ridge); propodeum sparsely pilose (vs densely pilose).

### Distribution records

Brazil (PA, MT, MG, RJ, ES).

### *Distictus caligaris* sp. nov.

[urn:lsid:zoobank.org:act:62DFB390-DCE7-4552-9DA9-37DFC094E52B](https://doi.org/10.21203/rs.3.rs-2611111/v1)

Figs 8, 16E

### Etymology

From the Latin ‘*caliga*’, meaning ‘soldier’s shoe or boot’, in reference to the black apex of the posterior tibia and base of basitarsus.

### Material examined

Total of 1 specimen.

### Holotype

PERU • ♂ (pinned; right fore tarsomeres 2–5 missing; otherwise in good condition); Avispas, near Marcapata; alt. 30 m; Sep. 1962; L. Peña leg.; USUC {0}.

## Description

### Male (holotype)

SIZE. Fore wing 6.40 mm long.

HEAD. Clypeus basally moderately convex, at midlength not distinctly emarginated, CHW 0.44; median tubercle small, pointed, placed entirely on apical area; apical area moderately long. Mandible moderately pilose, MLW 1.55, MWW 0.55. MSM 0.73. Supra-clypeal area moderately pilose, minutely coriarius-punctate. Antenna with 28 flagellomeres. Supra-antennal area minutely, faintly coriarius and sparsely punctate, medially coriarius, ventrally and around ocelli slightly concave, with delicate median line.

MESOSOMA. Pronotum glabrate, weakly striate along posterior margin, elsewhere faintly coriarius; epomia delicate, distinct and approximately straight only after diverging from pronotal collar, short, ending far from dorsal margin of pronotum. Mesoscutum densely covered with short hairs, densely punctate,  $1.13 \times$  as long as wide; notauli medially distinctly convergent,  $0.48 \times$  as long as mesoscutum; scuto-scutellar groove moderately deep, weakly carinate. Mesopleuron mostly finely punctate, on dorsal area between hypoepimeron and epicnemial carina weakly lineate; subalar ridge moderately wide, not keeled; epicnemial carina irregular, reaching about 0.85 of distance to subalar ridge; sternaulus moderately deep, posterior 0.4 almost indistinct, with distinct vertical wrinkles; sulcus between sternaulus and scrobe absent; mesopleural fovea represented only by moderately deep pit; mesopleural suture distinctly carinate inside. Metapleuron rugulose, densely pilose; juxtacoxal carina represented by short ridge. Hind coxa densely punctate.

PROPODEUM. Sparsely pilose; anterior margin medially concave; spiracle oval, SWL 1.05; anterior area coriarius-punctate; posterior area strigate-rugulose; anterior transverse carina almost straight; posterior transverse carina entirely absent.

WINGS. Fore wing vein 1M+Rs anteriorly straight, posteriorly curved; crossvein 1cu-a weakly convex, arising slightly basad of 1M+Rs; crossvein 1m-cu more or less uniformly curved, not distinct from 1-Rs+M; 1m-cu continuous with 1-Rs+M; vein 1-Rs+M with bulla placed near basal 0.3; vein 2Cua  $1.18 \times$  as long as crossvein 2cu-a; 3r-m nebulous, about as long as 2r-m; vein 3-M about as long as 2-M; AWH 1.00, AAW 0.50; areolet  $0.44 \times$  as high as wide; APH 0.84; vein 4-M nebulous, slightly sinuous. Hind wing with 6 hamuli; vein M+Cu apically moderately convex; vein M forming distinctly obtuse angle with Cua; HW1C 1.71; vein Cub almost straight, basally slightly curved, forming distinctly obtuse angle with Cua; vein 2-Rs apically nebulous.

METASOMA. T1LW 3.41, T1WW 2.12; spiracle distinctly prominent, at 0.46 of T1 length; median depression very shallow; lateral depression absent; dorsolateral carina represented by blunt ridge; ventrolateral carina delicate but complete. T2LW 2.19, T2WW 1.89; thyridium about as wide as long. Tergites 2–8 coriarius-punctate; pilosity progressively denser on posterior tergites, also laterally denser than dorsally.

COLOUR. Head and mesosoma black and yellow; metasoma mostly orange. Head mostly light yellow; apical 0.5 of mandible, supra-antennal area medially, vertex, occiput and posterior 0.2–0.5 of gena on its dorsal 0.4 black. Orbital band covering almost entire width of gena on its ventral 0.6. Antenna mostly dark brown; scape ventrally mostly bright yellow; f10–21 entirely white, f9 and f22 mostly white. Mesosoma black; collar, dorsal margin of pronotum, propleuron, central spot on mesoscutum, tegula, scutellum, postscutellum, subalar ridge, central mark on mesopleuron, hypoepimeron, dorsal division of metapleuron and sublateral marks covering most of posterior area of propodeum light yellow. Fore and mid coxae and first trochanters light yellow; fore and mid second trochanters and femora ventrally yellowish, dorsally light fuscous on fore leg, orange on mid one; fore and mid tibia yellowish; fore

tarsus basally yellowish, brownish towards apex; mid tarsus brownish. Hind coxa orange, with dorso-basal yellow spot and sparse blackish marks; hind first trochanter marked with orange, blackish and yellow; second trochanter and femur orange, extreme apex of femur blackish; basal 0.7 of hind tibia deep yellow, apical 0.3 blackish; basal 0.3 of hind t1 and apex of t5 blackish; remainder of tarsus whitish. Wings hyaline. Metasoma mostly bright orange, T2–3 somewhat darker anteriorly; T1 mostly light yellow, median 0.5 blackish; T2–4 with posterior yellow stripes.

**Female**

Unknown.



**Fig. 8.** *Distictus caligaris* sp. nov., holotype (USUC), ♂. **A.** Head, frontal view. **B.** Propodeum + hind coxa + first tergite, dorsal view. **C.** Habitus. **D.** Dorsal view.

### Comments

The examined specimen is very similar to males of *D. tibialis*, from which the present species can be differentiated by having T2–4 with posterior yellow stripes (Figs 8C–8D) (vs fully orange, Fig. 15E); anterior transverse carina of propodeum almost straight (Fig. 8B) (vs distinctly arched forwards in the center, Fig. 15F); white band formed by 14 flagellomeres (vs 5–9); scape dorsally pale yellow (vs dark brown, rarely with apical yellow spot); sublateral yellow marks covering most of posterior area of propodeum, the marks close to each other (vs not covering most of posterior area of propodeum, the marks well separated). Also similar to males of *D. paratibialis* sp. nov., from which it can be readily differentiated by having the metapleuron entirely black (vs with distinct yellow mark); mesosternum black (vs yellow); and crossvein 1cu-a arising slightly basad of 1M+Rs (vs distinctly basad of 1M+Rs).

### Distribution records

Peru.

*Distictus commatus* sp. nov.

[urn:lsid:zoobank.org:act:CDB95920-47FE-4898-BEF8-B3C5F1166C34](http://urn:lsid:zoobank.org:act:CDB95920-47FE-4898-BEF8-B3C5F1166C34)

Figs 9, 16E

### Etymology

From the Greek ‘*komma*’, in reference to the sublateral comma-shaped yellow marks on the propodeum.

### Material examined

Total of 1 specimen.

#### Holotype

COLOMBIA • ♀ (pinned, in good condition); Magdalena, PNN Santa Marta, El Ramo; 10°48'40" N, 73°39'32" W; alt. 2500 m; 11–25 May 2000; I. Uribe leg.; USUC, M.197 {0}.

### Description

#### Female (holotype)

SIZE. Fore wing 12.62 mm long.

HEAD. Clypeus basally moderately convex, at midlength distinctly emarginated, CHW 0.50; median tubercle very small, pointed, placed entirely on apical area; apical area narrow. Mandible densely pilose, MLW 1.52, MWW 0.52. MSM 0.76. Supra-clypeal area densely pilose, minutely coriarius. Antenna with 30 flagellomeres. Supra-antennal area minutely, faintly coriarius, medially coriarius, ventrally distinctly concave, with delicate median line.

MESOSOMA. Pronotum densely pilose, weakly striate along posterior margin and collar, elsewhere minutely rugulose; epomia moderately stout, distinct and slightly sinuous only after diverging from pronotal collar, short, ending far from dorsal margin of pronotum. Mesoscutum densely covered with short hairs, densely punctate-coriarius, 1.22 × as long as wide; notauli medially distinctly convergent, 0.66 × as long as mesoscutum; scuto-scutellar groove moderately deep, distinctly carinulate. Mesopleuron almost entirely lineate, otherwise punctate; subalar ridge moderately wide, not keeled; epicnemial carina distinctly sinuous, reaching about 0.85 of distance to subalar ridge; sternaulus moderately deep, posterior 0.25 shallow, with distinct vertical wrinkles; sulcus between sternaulus and scrobe distinct; mesopleural fovea a small pit, otherwise shallow; mesopleural suture distinctly carinulate inside. Metapleuron lineate-rugulose, densely pilose; juxtacoxal carina vestigial. Hind coxa punctate-coriarius.

**PROPODEUM.** Densely pilose; anterior margin medially concave; spiracle elongate, SWL 1.58; anterior area coriarius-punctate; posterior area strigate-rugulose; anterior transverse carina distinctly arched forwards, somewhat bell-shaped; posterior transverse carina represented by slight but distinct sublateral crests.

**WINGS.** Fore wing vein 1M+Rs anteriorly straight, posteriorly curved; crossvein 1cu-a straight but inclivous, arising slightly basad of 1M+Rs; crossvein 1m-cu irregular, distinctly longer than vein 1-Rs+M; limit between veins 1m-cu and 1-Rs+M clearly traceable; vein 1-Rs+M with bulla placed near its midlength; vein 2Cua  $1.07 \times$  as long as crossvein 2cu-a; 3r-m spectral, about as long as 2r-m; vein 3-M about as long as 2-M; AWH 0.88, AAW 0.53; areolet  $0.37 \times$  as high as wide; APH 1.38; vein 4-M nebulous, approximately straight. Hind wing with 10 hamuli; vein M+Cu apically moderately convex; vein M forming distinctly obtuse angle with Cua; HW1C 1.63; vein Cub distinctly convex at apical half, forming straight angle with Cua; vein 2-Rs apically nebulous.

**METASOMA.** T1LW 1.28, T1WW 2.94; spiracle slightly prominent, at 0.52 of T1 length; median depression absent; lateral depression very shallow; dorsolateral carina represented by blunt and incomplete ridge; ventrolateral carina complete but medially almost indistinct. T2LW 0.90. T2WW 1.49; thyridium distinctly wider than long. Tergites 2–8 coriarius; pilosity progressively denser on posterior tergites, laterally denser than dorsally. Ovipositor straight; OST 1.00; dorsal valve moderately punctate; ventral valve distinctly overlapping dorsal valve, apex with 8 teeth.

**COLOUR.** Head and mesosoma black with yellow marks; metasoma mostly reddish. Head black; basal spot on mandible, clypeus and most of supra-clypeal area, yellow. Supra-clypeal area with central triangular blackish mark. Labrum yellow, palpi dark brown. Orbital band shortly interrupted on malar space, covering entire width of gena on its ventral 0.2; f6–10 entirely white, f5 and f11 mostly white; f11–30 ventrally dark brown. Mesosoma black; collar, dorsal margin of pronotum, central spot on mesoscutum, tegula, scutellum, postscutellum, subalar ridge, central mark on mesopleuron, dorsal portion of hypopleuron, dorsal division of metapleuron, oval mark covering 0.2 of metapleuron and elongate sublateral marks over propodeal apodeme yellow. Fore and mid coxae mesally black, laterally yellow; fore first trochanter dorsally blackish, ventrally yellow; mid first trochanter blackish; fore and mid second trochanters marked with ferruginous and blackish; fore and mid femora mostly blackish, posterior face yellow; fore and mid tibiae deep yellow; fore and mid tarsi basally yellow, blackish towards apex. Hind coxa reddish-brown, with dorso-basal yellow spot surrounded by blackish area; hind trochanters marked with brownish and blackish; hind femur brown, dorsally blackish; hind tibia deep yellow, apical 0.1 blackish; hind t1–3 deep yellow, t4–5 blackish. Wings hyaline. Metasoma reddish; T1 mostly blackish with basal and apical 0.25 yellow; T2 dorsally black, posteriorly with narrow yellow stripe. Sternites lighter than tergites.

#### **Male**

Unknown.

#### **Comments**

Structurally, *D. commatus* sp. nov. differs from all other species in the genus by having two exclusive features: T1 ventrolateral carina complete but medially almost indistinct; and fore wing crossvein 1cu-a straight but inclivous.

The new species is similar in colour to *D. ateles* sp. nov., but differs in having T2 blackish with posterior yellow stripe (Fig. 9B) (vs reddish, with very narrow anterior blackish stripe, Fig. 7C); hind femur blackish and dark brown (vs mostly reddish); hind tibia deep yellow, apically blackish (vs fully deep yellow), extensive yellow marks on mesosoma, matte (vs bright). Structurally, it differs in 55 features,

of which the most important are as follows: posterior area of propodeum strigate-rugulose (Fig. 9B) (vs distinctly strigate, Fig. 7C); anterior transverse carina distinctly arched forwards, somewhat bell-shaped (Fig. 25) (vs slightly arched forwards, medially more distinctly curved, Fig. 7C); posterior transverse carina represented by slight but distinct sublateral crests (vs represented by only very slight sublateral crests); metapleuron lineate-rugulose (vs lineate); median tubercle of clypeus very small, pointed and placed entirely on apical area (vs large, blunt, reaching but not entirely on apical area); supra-antennal area medially coriarius (vs near ocelli rugulose, ventrally striate); hind coxa punctate-coriarius (vs punctate, dorsally sparsely, otherwise densely); mesoscutum densely punctate-coriarius (vs densely punctate); epicnemial carina distinctly sinuous, reaching about 0.85 of distance to subalar ridge (vs more or less uniformly curved and reaching about 0.70 of distance to subalar ridge); propodeum densely pilose (vs sparsely pilose).

The new species is also similar in colour to *D. asterios* sp. nov., from which it can be readily differentiated by having extensive yellow marks on collar and mesopleuron (Fig. 9C) (vs very small yellow marks, Fig. 6D); metapleuron with distinct yellow mark (Fig. 9C) (vs entirely black, Fig. 6D); hind tibia almost



**Fig. 9.** *Distictus commatus* sp. nov., holotype (USUC) ♀. **A.** Head, frontal view. **B.** Propodeum + first two tergites, dorsal view. **C.** Habitus **D.** Apex of ovipositor, left side.

entirely deep yellow (vs blackish); T3 fully orange (vs with blackish marks, posteriorly with narrow yellow stripe), hind t1 entirely yellow (vs whitish, basally blackish). Structurally, it differs in 54 features, of which the most important are as follows: posterior area of propodeum strigate-rugulose (vs strigate); fore wing crossvein 1cu-a straight but inclivous (vs weakly convex); mesopleuron almost entirely lineate, otherwise punctate (vs coriarius-lineate); epicnemial carina distinctly sinuous and reaching about 0.85 of distance to subalar ridge (vs irregular, almost reaching subalar ridge); hind coxa punctate-coriarius (vs coriarius); ventrolateral carina medially almost indistinct (vs complete); thyridium distinctly wider than long (vs about as wide as long); spiracle of T1 slightly prominent (vs not prominent); T1WW 2.94 (vs 2.36); T2WW 1.49 (vs 1.96); ventral valve of ovipositor distinctly overlapping dorsal valve (vs slightly overlapping dorsal valve); T1LW 1.28 (vs 1.48).

The new species is not similar in colour but similar in structure to *D. terrosus* sp. nov., from which it differs in 43 structural features, of which the most important are as follows: posterior area of propodeum strigate-rugulose (vs distinctly strigate); metapleuron lineate-rugulose (vs lineate); anterior transverse carina of propodeum distinctly arched forwards, somewhat bell-shaped (vs laterally approximately straight, medially distinctly arched forwards); supra-antennal area medially coriarius (vs medially with some rugae); mesoscutum densely punctate-coriarius (vs densely punctate); supra-antennal area with delicate median line (vs with distinct median line); fore wing crossvein 1cu-a straight but inclivous (vs weakly convex); limit between fore wing crossvein 1m-cu and 1-Rs+M clearly traceable (vs 1m-cu continuous with 1-Rs+M); epicnemial carina distinctly sinuous (vs irregular); ovipositor straight (vs slightly downcurved); OST 1.00 (vs 0.59–0.74); vein 2Cua 1.07 × as long as crossvein 2cu-a (vs 1.14–1.33); MLW 1.52 (vs 1.17–1.45); T2WW 1.49 (vs 1.65–1.78).

#### Distribution records

Colombia.

#### *Distictus daelus* sp. nov.

[urn:lsid:zoobank.org:act:16BAE813-3F17-4DC7-B2C1-20DBAC3041DD](http://urn:lsid:zoobank.org:act:16BAE813-3F17-4DC7-B2C1-20DBAC3041DD)

Figs 10, 16E

#### Etymology

From the Anglo-Saxon ‘*dael*’, meaning ‘valley’; in reference to the deep sternaulus.

#### Material examined

Total of 2 specimens, 1 ♀ and 1 ♂.

##### Holotype

VENEZUELA • ♀ (pinned; in good condition); Tabay; alt. 2200 m; 30 Apr. 1981; H. Townes leg.; USUC {0}.

##### Paratype

VENEZUELA • 1 ♂; Yacambú; alt. 1200 m; 10 May 1981; H. Townes leg.; USUC.

#### Description

##### Female (holotype)

SIZE. Fore wing 12.25 mm long.

HEAD. Clypeus basally moderately convex, at midlength distinctly emarginated, CHW 0.46; median tubercle small, blunt, placed entirely on apical area; apical area very narrow. Mandible moderately

pilose, MLW 1.19, MWW 0.46. MSM 0.73. Supra-clypeal area moderately pilose, minutely coriarius. Antenna with 30 flagellomeres. Supra-antennal area minutely but distinctly coriarius, medially with some rugae, ventrally very slightly concave, with distinct median line.

MESOSOMA. Pronotum moderately pilose, weakly striate along posterior margin and part of collar, elsewhere rugulose; epomia delicate, distinct and slightly sinuous only after diverging from pronotal collar, short, ending far from dorsal margin of pronotum; mesoscutum densely covered with short hairs, densely punctate-coriarius, mesoscutum  $1.15 \times$  as long as wide; notauli medially distinctly convergent, notaulus  $0.45 \times$  as long as mesoscutum; scuto-scutellar groove deep, distinctly carinate. Mesopleuron anteriorly coriarius, posteriorly distinctly lineate; subalar ridge moderately wide, somewhat keeled; epicnemial carina distinctly sinuous, almost reaching subalar ridge; sternaulus deeply impressed, posterior  $0.25$  almost indistinct, with distinct vertical wrinkles; sulcus between sternaulus and scrobe distinct; mesopleural fovea a small pit, otherwise shallow; mesopleural suture weakly carinate inside. Metapleuron rugulose, densely pilose; juxtacoxal carina vestigial. Hind coxa punctate-coriarius.

PROPODEUM. Moderately pilose; anterior margin medially very slightly concave; spiracle oval, SWL 1.46; anterior area coriarius-punctate; posterior area strigate-rugulose; anterior transverse carina distinctly arched forwards, somewhat bell-shaped; posterior transverse carina represented by slight but distinct sublateral crests.

WINGS. Fore wing vein 1M+Rs anteriorly straight, posteriorly curved; crossvein 1cu-a convex, arising slightly basad of 1M+Rs; crossvein 1m-cu more or less uniformly curved, distinctly longer than vein 1-Rs+M; limit between veins 1m-cu and 1-Rs+M more or less traceable; fore wing vein 1-Rs+M with bulla placed near basal  $0.4$ ; vein 2Cua  $1.22 \times$  as long as crossvein 2cu-a; 3r-m spectral, distinctly shorter than 2r-m; vein 3-M about as long as 2-M; AWH 1.05, AAW 0.50; areolet  $0.43 \times$  as high as wide; APH 1.48; vein 4-M nebulous, approximately straight. Hind wing with 10 hamuli; vein M+Cu apically moderately convex; vein M forming distinctly obtuse angle with Cua; HW1C 2.27; vein Cub distinctly convex on apical half, forming straight angle with Cua; vein 2-Rs apically nebulous.

METASOMA. T1LW 1.52, T1WW 2.33; spiracle not prominent, at  $0.53$  of T1 length; median depression absent; lateral depression distinct; dorsolateral carina represented by blunt ridge; ventrolateral carina sharp, complete. T2LW 0.87, T2WW 1.64; thyridium about as wide as long. Tergites 2–8 coriarius; pilosity progressively denser on posterior tergites and dorsally as dense as laterally. Ovipositor straight; OST 0.87; dorsal valve scarcely punctate; ventral valve distinctly overlapping dorsal valve, its apex with 9 teeth.

COLOUR. Head, mesosoma and metasoma black and bright yellow. Head bright yellow; mandible except basal mark, malar space, supra-antennal area medially, vertex, occiput and narrow posterior portion of gena black. Mouthparts dark brown. Orbital band covering almost entire width of gena on its ventral  $0.6$ . Antenna black; f8–9 entirely white, f7 almost entirely white, f6 and f10 dorsally mostly white; f11–30 ventrally dark brown. Mesosoma black; collar, dorsal margin of pronotum, central spot on mesoscutum, tegula, scutellum, postscutellum, subalar ridge, large central mark on mesopleuron, dorsal portion of hypopimeron, dorsal division of metapleuron, dorsal mark covering  $0.25$  of metapleuron and ovoid sublateral marks on posterior area of propodeum bright yellow. Fore and mid coxae mesally black, laterally yellow; fore first trochanter dorsally blackish, ventrally yellow; mid first trochanter blackish; fore and mid trochanters, mid femur and most of fore one blackish; fore femur with anterior face yellow on apical  $0.7$ ; fore and mid tibiae deep yellow; fore and mid tarsi basally brown, blackish towards apex. Hind coxa black with moderately large dorso-basal yellow spot; hind trochanters and femur blackish; hind tibia basally dark yellow, blackish on apical  $0.2$ ; basal  $0.6$  of t1 brownish; apical  $0.4$  of t1, t2–3 and most of t4 whitish; apex of t4 and t5 blackish. Wings hyaline. Metasoma black; T1 yellow on basal  $0.3$  and apical  $0.3$ ; T2–3 with posterior yellow stripes, much narrower and shorter on T3; S1–6 brownish, S2–5 with narrow posterior pale yellow stripes.

### Male

The only known male specimen is structurally similar to the female, but the colour pattern differs considerably. Smaller, fore wing 9.2 mm long; antennae missing; T1LW 3.21; T1WW 1.73. Metasoma mostly orange; all femora orange; metapleuron with very small and weak dorso-posterior yellow mark; mesosoma dark brown; hind tibia bright yellow, apically blackish; basal 0.6 of hind t1 orange, apical 0.4 of t1 and t2–5 whitish.

### Comments

Structurally, *D. daelus* sp. nov. differs from all other species in the genus by having two exclusive features: sternaulus deeply impressed, except posterior 0.25 almost indistinct (Fig. 10B–D), and pronotum weakly striate along posterior margin and part of collar, elsewhere rugulose.

The new species is most similar in colour to *D. apaensis* sp. nov. from which it can be differentiated by having the scutellar carina black (vs yellow); mesoscutum without lateral yellow marks (Fig. 10B) (vs with lateral yellow marks, Fig. 4B); propleuron black (Fig. 10B–D) (vs yellow, Fig. 4B); fore femur blackish with anterior face yellow on apical 0.7 and mid femur blackish (vs fore and mid femur orange, dorsally with longitudinal blackish marks); hind tibia basally dark yellow, blackish on apical 0.2 (Fig. 10D) (vs blackish, Fig. 4C). Structurally, it differs in 62 features, of which the most important are as follows: posterior area of propodeum strigate-rugulose (vs strigate); anterior transverse carina distinctly arched forwards, somewhat bell-shaped (vs laterally approximately straight, medially slightly arched forwards); fore wing vein 3r-m distinctly shorter than 2r-m (vs about as long as 2r-m); fore wing vein 3-M about as long as 2-M (vs distinctly longer than 2-M); APH 1.48 (vs 0.97); HW1C 2.27 (vs 1.64); sternaulus deeply impressed, except posterior 0.25 almost indistinct (vs moderately deep, except posterior 0.4 almost indistinct); median depression of T1 absent (vs distinct); ventral valve of ovipositor distinctly overlapping dorsal valve (vs slightly overlapping); MLW 1.19 (vs 1.50); anterior area of propodeum coriarius-punctate (vs coriarius); median tubercle of clypeus placed entirely on apical area (vs mostly on apical area); supra-antennal area medially with some rugae (vs coriarius); scuto-scutellar groove distinctly carinulate and deep (vs weakly carinulate, shallow).

The new species is also similar in colour to *D. mexicanus*, from which it can be differentiated by having T4–8 entirely blackish (vs with wide posterior yellow stripes); S2–5 brownish with narrow posterior pale yellow stripes (Fig. 10D) (vs bright yellow, Fig. 11C); hind coxa black with large baso-dorsal yellow spot (Fig. 10D) (vs mostly yellow with large baso-ventral and apico-dorsal blackish marks, Fig. 11C). Structurally, it differs in 49 features, of which the most important are as follows: anterior transverse carina of propodeum distinctly arched forwards, somewhat bell-shaped (vs slightly arched forwards, medially more distinctly curved); metapleuron rugulose (vs lineate); mesoscutum and scutellum densely punctate-coriarius, matte (vs densely punctate, shiny); pronotum weakly striate along posterior margin and part of collar, elsewhere rugulose (vs distinctly striate along collar, weakly striate along posterior margin, elsewhere sparsely punctate); APH 1.48 (vs 0.81–1.20); HW1C 2.27 (vs 1.32–1.83); hind coxa punctate-coriarius (vs moderately punctate); MLW 1.19 (vs 1.45–1.59); limit between fore wing crossvein 1m-cu and 1-Rs+M more or less traceable (vs clearly traceable); epicnemial carina distinctly sinuous (vs irregular); sternaulus deeply impressed, except posterior 0.25 almost indistinct (vs moderately deep, posterior 0.4 almost indistinct); mesopleuron anteriorly coriarius (vs mostly finely punctate); OST 0.87 (vs 0.66); mandible moderately pilose (vs sparsely pilose).

Structurally, it is most similar to *D. tibialis*, from which it differs by 44 features, of which the most important are as follows: anterior transverse carina of propodeum distinctly arched forwards, somewhat bell-shaped (vs slightly and uniformly arched forwards); posterior area of propodeum strigate-rugulose (vs rugulose); HW1C 2.27 (vs 1.07–1.93); fore wing vein 3r-m distinctly shorter than 2r-m and spectral (vs about as long as 2r-m, nebulous); apical area of clypeus very narrow (vs moderately long); anterior

margin of propodeum medially very slightly concave (Fig. 10E) (vs medially concave, Fig. 15F); hind coxa punctate-coriarius (vs densely punctate); MLW 1.19 (vs 1.25–1.70); sternaulus deeply impressed, except posterior 0.25 almost indistinct (Fig. 10D) (vs moderately deep, posterior 0.25 shallow, Fig. 15G).

### Distribution records

Venezuela.



**Fig. 10.** *Distictus daelus* sp. nov. A–E. Holotype (USUC), ♀. A. Head, frontal view. B. Mesosoma, left side. C. Apex of ovipositor, left side. D. Habitus. E. Propodeum + hind coxae + first tergite, dorsal view. F. ♂, dorsal view. G. ♂, close-up of propodeum and basal tergites.

*Distictus mexicanus* Kasparyan & Ruíz-Cancino, 2005  
Figs 11, 16A; Table 1

*Distictus mexicanus* Kasparyan & Ruíz-Cancino, 2005: 109–111, figs 66–68. Original description, figure. Type ♀ (Universidad Autónoma de Tamaulipas, Victoria, Mexico; not examined). Type data: México, Tamaulipas, Victoria, 23 Nov. 1985, E. Ruíz Cancino leg.

**Material examined**

Total of 22 specimens, 12 ♀♀ and 10 ♂♂.

**Paratype**

MEXICO • 1 ♀ (pinned; in good condition); Oaxaca, Metate, 85.5 km. SW of Tuxtepec; alt. 900 m; 18 Oct. 1962; H. and M. Townes leg.; USUC {0}.

**Other material**

COSTA RICA • 1 ♀; Cartago, Braulio Carrillo National Park; alt. 400 m; 10–11 Apr. 1985; H. Goulet leg.; USUC • 1 ♀; Monteverde; 5–6 Feb. 1968; Chas. Palmer leg.; USUC • 2 ♀♀, 2 ♂♂; Escazú; 23 May 1987; H. and M. Townes leg.; USUC • 2 ♀♀; *ibid.*; 22 and 25 May 1987; USUC • 2 ♂♂; *ibid.*; 27 May 1987; USUC • 1 ♀; Puntarenas, Monte Verde; alt. ca 1500 m; 4–11 Feb. 1989; D. Grimaldi leg.; lower montane wet forest; AMNH {1}.

GUATEMALA • 1 ♀; Moca, Guatalon; alt. 1000 m; Mar.-Apr. 1931; J. Bequaert leg.; USUC • 1 ♀; Solola, 13.5 km S of Godinez; 31 Dec. 1988; J. la Salle leg.; USUC.

MEXICO • 1 ♀; Veracruz, Orizaba; alt. 1245 m; 27 Jun. 1972; B. Dasch and C. Dasch leg.; USUC • 1 ♀; Veracruz, Rio Metlec, Frotín de las Flores; 16 Jul. 1974; J. Powell leg.; EMEC 731708 {2} • 1 ♂; Chiapas, 3 km NE of San Cristóbal de las Casas; 8 Jun. 1969; B.V. Petersen leg.; USUC • 1 ♂; Chiapas, San Cristóbal de las Casas; alt. 7087 ft; 11 Jun. 1969; B.V. Peterson leg.; CNCI • 4 ♂♂; *ibid.*; alt. 7200 ft; 24 Jun. 1969; Malaise; CNCI.

**Redescription**

**Female** (paratype)

SIZE. Fore wing 10.48 mm long.

HEAD. Clypeus basally moderately convex, at midlength distinctly emarginated, CHW 0.46; median tubercle small, pointed, placed entirely on apical area; apical area narrow. Mandible sparsely pilose, MLW 1.45, MWW 0.55. MSM 0.80. Supra-clypeal area sparsely pilose, almost impunctate. Antenna missing. Supra-antennal area minutely, faintly coriarius, medially with some rugae, ventrally very slightly concave, with distinct median line.

MESOSOMA. Pronotum sparsely pilose, distinctly striate along collar, weakly striate along posterior margin, elsewhere sparsely punctate; epomia moderately stout, distinct and approximately straight only after diverging from pronotal collar, moderately long, ending near dorsal margin of pronotum. Mesoscutum sparsely pilose, densely punctate, mesoscutum 1.12 × as long as wide; notauli medially distinctly convergent, notaulus 0.62 × as long as mesoscutum; scuto-scutellar groove moderately deep, distinctly carinulate. Mesopleuron mostly finely punctate, on dorsal posterior corner distinctly lineate; subalar ridge wide, oval, not keeled; epicnemial carina irregular, almost reaching subalar ridge; sternaulus moderately deep, posterior 0.4 almost indistinct, with distinct vertical wrinkles; sulcus between sternaulus and scrobe distinct; mesopleural fovea represented only by moderately deep pit;

mesopleural suture weakly carinulate inside. Metapleuron lineate, moderately pilose; juxtacoxal carina vestigial. Hind coxa moderately punctate.

PROPODEUM. Moderately pilose; anterior margin medially concave; spiracle elongate, SWL 1.67; anterior area coriarius-punctate; posterior area strigate; anterior transverse carina arched slightly forwards, medially more distinctly curved; posterior transverse carina represented by slight, but distinct sublateral crests.

WINGS. Fore wing vein 1M+Rs anteriorly straight, posteriorly curved; crossvein 1cu-a convex, arising a little basad of 1M+Rs; crossvein 1m-cu irregular, distinctly longer than vein 1-Rs+M; limit between veins 1m-cu and 1-Rs+M clearly traceable; vein 1-Rs+M with bulla placed near its midlength; vein 2Cua  $1.10 \times$  as long as crossvein 2cu-a; vein 3r-m spectral, distinctly shorter than 2r-m; vein 3-M about as long as 2-M; AWH 1.16, AAW 0.29; areolet  $0.40 \times$  as high as wide; APH 1.20; vein 4-M tubular, approximately straight. Hind wing with 8 hamuli; vein M+Cu apically moderately convex; vein M forming distinctly obtuse angle with Cua; HW1C 1.32; vein Cub almost straight, very slightly convex, forming straight angle with Cua; vein 2-Rs apically nebulous.

METASOMA. T1LW 1.19, T1WW 2.84; spiracle not prominent, at 0.49 of T1 length; median depression absent; lateral depression very shallow; dorsolateral carina represented by blunt ridge; ventrolateral carina sharp, complete. T2LW 0.92, T2WW 1.49; thyridium about as wide as long. Tergites 2–8 coriarius; pilosity progressively denser on posterior tergites and dorsally as dense as laterally. Ovipositor straight; OST 0.66; dorsal valve scarcely punctate; ventral valve distinctly overlapping dorsal valve, its apex with 7 teeth.

COLOUR. Head, mesosoma and metasoma black and bright yellow. Head bright yellow; apical 0.6, malar space, supra-antennal area and vertex medially, occiput and posterior 0.5 of gena along its dorsal 0.5 black. Antenna mostly black; scape ventrally with small yellow spot; f6–10 entirely white, f11 partially white; f12–28 ventrally dark brown. Mesosoma black; collar, narrow stripe on dorsal margin of pronotum, propleuron, central spot on mesoscutum, tegula, scutellum, postscutellum, subalar ridge, large central spot on mesopleuron, hypoepimeron, dorsal division of metapleuron, 0.85 of surface of metapleuron and elongate, subtriangular sublateral spots on propodeum bright yellow. All coxae bright yellow, hind one with baso-ventral and apico-dorsal blackish marks; fore and mid first trochanters bright yellow with small basal blackish mark; fore and mid second trochanters dark brown; fore and mid femora yellow with longitudinal dorsal dark brown stripe; all tibiae deep yellow; fore and mid tarsi basally brownish, blackish towards apex. Hind trochanters blackish, femur blackish with ventral face bright yellow; hind t1–4 bright yellow, t5 blackish. Wings hyaline. Metasoma T1 mostly yellow, dorsally with large blackish mark on midlength; T2–8 anteriorly blackish, with posterior and lateral bright yellow stripes, towards posterior segments occupying most of tergite's surface. S1 mostly blackish; S2–6 bright yellow, except S2–3 laterally with small blackish marks.

VARIATION. Morphometric ranges for this species can be seen in Table 1. Scape sometimes with a small ventral yellow spot; wrinkling/rugae on pronotum sometimes very weak; pilosity at mesoscutum sometimes scarce at anterior lateral lobes, sometimes dense and uniform; specimen from Guatemala generally more pilose; yellow dash on dorsal margin of pronotum from very short, restricted to anterior region, to almost reaching posterior margin of pronotum; yellow mark at hypoepimeron sometimes connected to main mark at mesopleuron; specimen from Costa Rica with head in a brighter tone of yellow. One specimen from Costa Rica (smallest examined) more pilose than all others, with dark marks on legs and metasoma dark brown instead of black, and marks on T1 less extensive.

### Male

Similar to female, most important differences as follows. Fore wing 7.5–9.7 mm; sublateral crests on propodeum weak; wrinkling/rugae on pronotum and mesopleuron weak; anterior transverse carina of propodeum medially very weakly arched forwards; crossvein 1cu-a arising distinctly basad of 1M+Rs. Scape dorsally yellow; mesosternum entirely yellow.

VARIATION. Antenna with 29–31 flagellomeres; T1LW 2.80–3.22; T1WW 1.42–2.08. One specimen from Chiapas, Mexico, with crossvein 1cu-a clearly opposite to 1M+Rs; spiracle of T1 sometimes prominent; one specimen from Escazú, Costa Rica, with dark yellow stripes on tergites.

### Comments

Structurally, *D. mexicanus* differs from all other species in the genus by having six exclusive features: mesopleuron mostly finely punctate; supra-clypeal area sparsely pilose and almost impunctate; metapleuron moderately pilose; mesopleural fovea represented only by moderately deep pit; mesoscutum sparsely pilose. Regarding colour, this is the only species in the genus showing a hind femur blackish with ventral face bright yellow (Fig. 11C).

The new species is similar in colour to *D. apaensis* sp. nov., being the only two species of the genus with posterior and lateral yellow stripes on all tergites (Figs 4C, 11C). *Distictus mexicanus* can be differentiated from *D. apaensis* sp. nov. mostly by having the following: body shiny with bright yellow marks (vs matte with pale yellow marks in *D. apaensis* sp. nov.); hind tibia deep yellow (Fig. 11C) (vs blackish, Fig. 4C); supra-clypeal area entirely yellow (vs with blackish marks); mesoscutum without lateral yellow marks (vs with lateral yellow marks); fore and mid coxae dorsally bright yellow (Fig. 11C) (vs pale yellow with small dorso-apical brown spot, Fig. 4B). Structurally, it differs in 59 features, of which the most important are as follows: metapleuron lineate (Fig. 11B) (vs rugulose); anterior area of propodeum coriarius-punctate (vs coriarius); fore wing vein 3r-m distinctly shorter than 2r-m (vs about as long as 2r-m); vein 3-M about as long as 2-M (vs distinctly longer than 2-M); mesoscutum densely punctate and shiny (vs coriarius, matte); mesopleuron mostly finely punctate, only on dorsal posterior corner distinctly lineate (vs almost entirely lineate); anterior transverse carina slightly arched forwards, medially more distinctly curved (vs laterally approximately straight, medially slightly arched forwards); pronotum distinctly striate along collar, weakly striate along posterior margin (vs weakly striate along posterior margin and collar); scuto-scutellar groove moderately deep and distinctly carinulate (vs shallow, weakly carinulate); AWH 1.04–1.16 (vs 0.94); supra-antennal area medially with some rugae (vs medially coriarius); ventral valve distinctly overlapping dorsal valve (vs slightly overlapping dorsal valve); T1WW 2.43–2.86 (vs 2.19); CHW 0.44–0.48 (vs 0.52); T2WW 1.49–1.67 (vs 1.84).

The new species is also similar in colour to *D. daelus* sp. nov., from which it can be differentiated by having T4–8 with wide posterior yellow stripes (vs entirely blackish); S2–5 bright yellow (Fig. 11C) (vs brownish with narrow posterior pale yellow stripes, Fig. 10D); hind coxa mostly yellow with large baso-ventral and apico-dorsal blackish marks (Fig. 11C) (vs black with large baso-dorsal yellow spot, Fig. 10D). Structurally, it differs in 49 features, of which the most important are as follows: anterior transverse carina of propodeum slightly arched forwards, medially more distinctly curved (vs distinctly arched forwards, somewhat bell-shaped, Fig. 10E); metapleuron lineate (vs rugulose); mesoscutum and scutellum densely punctate, shiny (vs densely punctate-coriarius, matte); pronotum distinctly striate along collar, weakly striate along posterior margin, elsewhere sparsely punctate (vs weakly striate along posterior margin and part of collar, elsewhere rugulose); APH 0.81–1.20 (vs 1.48); HWIC 1.32–1.83 (vs 2.27); hind coxa moderately punctate (vs punctate-coriarius); MLW 1.45–1.59 (vs 1.19); limit between fore wing crossvein 1m-cu and 1-Rs+M clearly traceable (vs hardly traceable); epicnemial carina irregular (vs distinctly sinuous); sternaulus moderately deep, except posterior 0.4 almost indistinct (vs deeply impressed, posterior 0.25 almost indistinct); mesopleuron mostly finely punctate (vs anteriorly coriarius); OST 0.66 (vs 0.87); mandible sparsely pilose (vs moderately pilose).

The new species is most similar in structure to *D. terrosus* sp. nov., but differs in 49 features, of which the most important are as follows: limit between 1m-cu and 1-Rs+M clearly traceable (vs 1m-cu continuous with 1-Rs+M); 3r-m distinctly shorter than 2r-m (vs about as long as 2r-m); epomia moderately long, ending near dorsal margin of pronotum (vs short, ending far from dorsal margin of pronotum); tergites 2–8 coriarius (vs coriarius-punctate); mandible sparsely pilose (vs densely pilose); metapleuron moderately pilose (vs densely pilose); median depression of T1 absent (vs very shallow); anterior margin of propodeum medially concave (vs medially very slightly concave).

#### Distribution records

Mexico, Guatemala, Costa Rica.



**Fig. 11.** *Distictus mexicanus* Kasparyan & Ruíz, 2005, paratype (USUC), ♀. **A.** Head, frontal view. **B.** Mesosoma, dorso-lateral view. **C.** Habitus. **D.** Apex of ovipositor, left side.

*Distictus notabilis* sp. nov.

[urn:lsid:zoobank.org:act:68AEC6E7-A939-4D0B-8288-2EC74110ACFE](https://doi.org/10.3896/eb.2019.542.1)

Figs 12, 16E

**Etymology**

From the Latin ‘*notabilis*’, meaning ‘notable’, in reference to the large size, rich colour pattern and the overall beauty of the species, which draws attention.

**Material examined**

Total of 1 specimen.

**Holotype**

PERU • 1 ♀ (pinned; last seven apical flagellomeres missing, left hind wing perforated by pin; otherwise in good condition); Tingo Maria, Huan; alt. 2200 ft; 3 Nov. 1946; J.C. Pallister leg., donor Frank Johnson; AMNH {0}.

**Description**

**Female** (holotype)

SIZE. Fore wing 14.00 mm long.

HEAD. Clypeus basally moderately convex, at midlength distinctly emarginated, CHW 0.40; median tubercle small, blunt, placed entirely on apical area; apical area narrow. Mandible moderately pilose, MLW 1.31, MWW 0.55. MSM 0.83. Supra-clypeal area moderately pilose, minutely coriarius and sparsely punctate. Antenna with 30 flagellomeres. Supra-antennal area minutely, faintly coriarius, medially near ocelli rugulose, ventrally striate and distinctly concave, with distinct median line.

MESOSOMA. Pronotum sparsely pilose, weakly striate along posterior margin and collar, elsewhere impunctate; epomia delicate, distinct and slightly curved only after diverging from pronotal collar, short, ending far from dorsal margin of pronotum. Mesoscutum densely covered with short hairs, densely punctate, mesoscutum  $1.02 \times$  as long as wide; notauli medially weakly convergent, notaulus  $0.54 \times$  as long as mesoscutum; scuto-scutellar groove moderately deep, distinctly carinate. Mesopleuron almost entirely lineate, otherwise punctate; subalar ridge wide, oval, not keeled; epicnemial carina more or less uniformly curved, reaching about 0.85 of distance to subalar ridge; sternaulus moderately deep, posterior 0.4 almost indistinct, with weak vertical wrinkles; sulcus between sternaulus and scrobe almost indistinct; mesopleural fovea shallow, not forming a central pit; mesopleural suture weakly carinate inside. Metapleuron lineate-rugulose, densely pilose; juxtacoxal carina vestigial. Hind coxa, dorsally sparsely, otherwise densely punctate.

PROPODEUM. Sparsely pilose; anterior margin medially concave; spiracle elongate, SWL 1.67; anterior area coriarius-punctate; posterior area strigate; anterior transverse carina laterally approximately straight, medially slightly arched forwards; posterior transverse carina represented only by very slight sublateral crests.

WINGS. Fore wing vein 1M+Rs anteriorly straight, posteriorly curved; crossvein 1cu-a convex, arising a little basad of 1M+Rs; crossvein 1m-cu irregular, distinctly longer than vein 1-Rs+M; limit between veins 1m-cu and 1-Rs+M clearly traceable; fore wing vein 1-Rs+M with bulla placed near its midlength; vein 2Cua  $1.20 \times$  as long as crossvein 2cu-a; 3r-m nebulous, about as long as 2r-m; vein 3-M about as long as 2-M; AWH 0.92, AAW 0.51; areolet  $0.28 \times$  as high as wide; APH 1.08; vein 4-M nebulous, slightly sinuous. Hind wing with 9 hamuli; vein M+Cu apically moderately convex; vein M forming

distinctly obtuse angle with Cua; HW1C 1.57; vein Cub almost straight, very slightly convex, forming distinctly obtuse angle with Cua (not curved); vein 2-Rs apically nebulous.

**METASOMA.** T1LW 1.43, T1WW 2.30; spiracle slightly prominent, on 0.51 of T1 length; median depression distinct; lateral depression very shallow; dorsolateral carina represented by blunt ridge; ventrolateral carina sharp, complete. T2LW 0.80, T2WW 1.83; thyridium about as wide as long. Tergites 2–8 coriarius; pilosity progressively denser on posterior tergites and laterally denser than dorsally. Ovipositor slightly downcurved; OST 0.64; dorsal valve moderately punctate; ventral valve distinctly overlapping dorsal valve, its apex with 6 teeth.

**COLOUR.** Head and mesosoma black with yellow marks; metasoma mostly orange. Head black; basal spot on mandible, clypeus except lateral borders and area around median tooth, mouthparts and most of supra-clypeal area light yellow. Supra-clypeal area with oblique blackish marks on ventral 0.3. Orbital band shortly interrupted on malar space, never covering entire width of gena; f6–12 entirely white, f5 and f13 partially white; f13–30 ventrally dark brown. Mesosoma black; collar, dorsal margin of pronotum, central spot on mesoscutum, tegula, scutellum, postscutellum, subalar ridge, central mark on mesopleuron, hypopleuron, dorsal division of metapleuron, oval mark covering 0.5 of metapleuron and elongate sublateral marks extending from anterior area of propodeum to its posterior apex light yellow. Fore and mid coxae mesally black, laterally yellow; fore and mid first trochanters marked with light yellow and blackish; fore and mid second trochanters marked with light yellow, orange and blackish; fore and mid femur mostly light yellow; fore femur marked with brown and blackish on dorsal and posterior faces; mid femur blackish on anterior and posterior faces; all tibiae deep yellow; fore and mid tarsi basally yellow, blackish towards apex. Hind coxa, trochanters and femur bright orange, coxa with dorso-basal yellow spot and blackish marks on its extreme base; hind tarsus deep yellow. Wings hyaline. Metasoma bright orange; T1 mostly blackish with basal 0.2 and apical 0.25 yellow. Sternites slightly lighter than tergites.

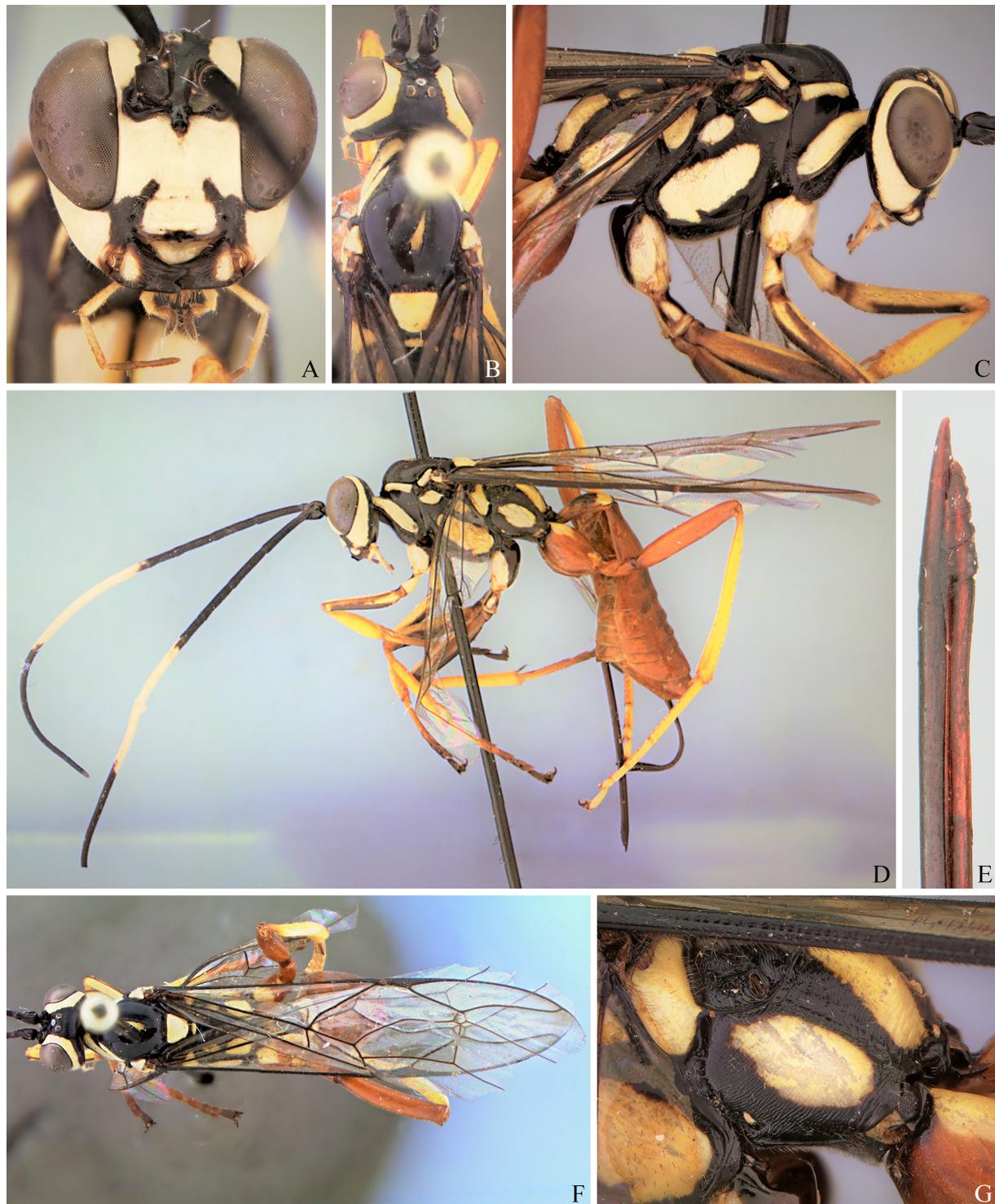
#### Male

Unknown.

#### Comments

Structurally, *D. notabilis* sp. nov. differs from all other species in the genus by having one exclusive feature: pronotum weakly striate along posterior margin and collar, except impunctate elsewhere.

The new species is very similar in colour to *D. ateles* sp. nov., for which it can be easily mistaken. *Distictus notabilis* sp. nov. can be differentiated by having the supra-clypeal area ventrally with two oblique blackish marks (vs three blackish marks that almost connect centrally to form an inverted Y in *D. ateles* sp. nov.); orbital band shortly interrupted, almost meeting at eye margin (Fig. 12A) (vs widely interrupted on malar space, broadly disconnected at eye margin, Fig. 7A); large yellow mark dorsad of spiracle of propodeum (Fig. 12F) (vs very small yellow spot dorsad of spiracle, Fig. 7C); hind coxa with basal dorsal yellow spot not encircled by blackish ring (Fig. 12D) (vs encircled by blackish ring, Fig. 7D); hind femur fully bright orange (vs reddish, apically blackish). The new species is also most similar in structure to *D. ateles* sp. nov., but differs in 34 features, of which the most important are as follows: epicnemial carina reaching about 0.85 of distance to subalar ridge (vs reaching about 0.70 of distance to subalar ridge); pronotum weakly striate along collar (vs distinctly striate); median tubercle of clypeus small, placed entirely on apical area (vs large, placed mostly on apical area); fore wing crossvein 1cu-a arising a little basad of 1M+Rs (vs distinctly basad of 1M+Rs); spiracle of T1 slightly prominent (vs not prominent); ovipositor slightly downcurved (Fig. 12D) (vs straight, Fig. 7D); apical area of clypeus narrow (vs moderately wide); clypeus basally moderately convex (Fig. 12C) (vs basally nearly flat, Fig. 7D); areolet 0.28 × as high as wide (vs 0.45).



**Fig. 12.** *Distictus notabilis* sp. nov., holotype (AMNH), ♀. **A.** Head, frontal view. **B.** Head + mesosoma, dorsal view. **C.** Head + mesosoma, right side. **D.** Habitus. **E.** Apex of ovipositor, left side. **F.** Dorsal view. **G.** Propodeum and metapleuron, left side.

The new species is also similar in structure and colour to *D. tibialis*, but differs by having metapleuron with large yellow mark (Fig. 12D, G) (vs entirely black in *D. tibialis*, Fig. 15C, G) and anterior area of propodeum with yellow marks (Fig. 12C, F) (vs black, Fig. 15F). Structurally, it differs in 44 features, of which the most important are as follows: posterior area of propodeum strigate (as in Fig. 7C) (vs rugulose, Fig. 15F); mesoscutum densely punctate (vs punctate-coriarius); metapleuron lineate-rugulose (vs rugulose); pronotum weakly striate (vs distinctly striate); epicnemial carina reaching about 0.85 of distance to subalar ridge and more or less uniformly curved (vs reaching subalar ridge, irregular); supra-antennal area ventrally distinctly concave (vs ventrally and around ocelli slightly concave); areolet 0.28 × as high as wide (vs 0.31–0.38).

The new species is also similar in colour and structure to *D. paratibialis* sp. nov., from which it can be isolated by having T1 mostly black (Fig. 12D) (vs orange, Fig. 13B); supra-clypeal area with blackish marks (vs entirely yellow); fore and mid coxae pale yellow, with small dorso-apical brown spots (Fig. 13D) (vs dorsally yellow, Fig. 12C–D). Structurally, it differs in 52 features, of which the most important are as follows: posterior area of propodeum distinctly strigate (vs strigate-rugulose); metapleuron lineate-rugulose (vs rugulose); FLGM 30.00 (vs 26.00–27.00); mesoscutum densely punctate (vs punctate-coriarius); spiracle slightly prominent (vs not prominent); epicnemial carina more or less uniformly curved (vs irregular); supra-antennal area with distinct median line (vs with delicate median line).

#### Distribution records

Peru.

#### *Distictus paratibialis* sp. nov.

[urn:lsid:zoobank.org:act:8380CFFA-6C63-45D5-A5A7-311B0638A12D](https://zoobank.org/urn:lsid:zoobank.org:act:8380CFFA-6C63-45D5-A5A7-311B0638A12D)

Figs 2–3, 13, 16C; Table 1

#### Etymology

The specific epithet is a direct reference to, and a warning of, the great structural and colour similarity between this species and *D. tibialis*.

#### Material examined

Total of 25 specimens, 5 ♀♀ and 20 ♂♂.

#### Holotype

BRAZIL – **Goiás State** • ♀ (pinned; in good condition); Parque Nacional Chapada dos Veadeiros, 10–22 Sep. 2005; A.P. Aguiar exped.; Malaise; Pt25; UFES LAPIS5907 {0}.

#### Paratypes

ARGENTINA • 1 ♂; La Rioja, Santa Cruz, 15–31 Jan. 2000; P. Fidalgo leg.; humid ravine; Malaise; FSCA.

BOLIVIA • 1 ♂; Santa Cruz, General Saavedra; Oct. 1974; C. Porter leg.; Malaise; FSCA.

BRAZIL – **Bahia State** • 1 ♀; Ibicaraí, Fazenda Nova Patioba; 14°50'29" S, 39°35'34" W; 23 Nov. 2002; J. Cardoso and J. Maia leg.; Malaise; Pt3; UFES49061 {2} • 1 ♂; Ubaitaba, Fazenda Casa de Pedra; 14°18'81" S, 39°19'47" W; 20 Nov. 2002; J. Cardoso and J. Maia leg.; Malaise; Pt8; UFES, UFES45476. – **São Paulo State** • 1 ♀; Luiz Antônio, Estação Ecológica de Jataí; 21°37'26.1" S, 47°48'24.5" W; 29 Apr. 2009; N.W. Perioto exped.; mata ciliar; Malaise; Pt2; IBRP {4} • 1 ♀; *ibid.*; 5 Dec. 2007; IBRP {1} • 1 ♀; *ibid.*; 29 Oct. 2008; YPT; Pt1; IBRP {3} • 1 ♂; SP, Luiz Antônio, Estação Ecológica de Jataí; 21°37'26.1" S, 47°48'24.5" W; 1 Oct. 2008; N.W. Perioto exped.; mata ciliar; Malaise; Pt1; IBRP • 1 ♂;

ibid.; 13 Jan. 2009; IBRP • 1 ♂; ibid.; mata ciliar; Malaise; Pt2; IBRP • 1 ♂; ibid.; 12 Nov. 2008; IBRP • 1 ♂; ibid.; 15 Oct. 2008; IBRP • 1 ♂; ibid.; 3 Sep. 2008; IBRP • 2 ♂♂; ibid.; 17 Sep. 2008; IBRP • 2 ♂♂; ibid.; 24 Oct. 2007; IBRP • 2 ♂♂; ibid.; 29 Oct. 2008; IBRP • 4 ♂♂; ibid.; 27 Sep. 2007; IBRP. – **Espírito Santo State** • 1 ♂; São Roque do Canaã, Alto Misterioso; 19°48'11.8" S, 40°46'12.6" W; 2–11 Nov. 2007; C. Waichert exped.; Malaise; Pt18; UFES, UFES48993.

## Description

### Female (holotype)

SIZE. Fore wing 6.88–10.04 mm long.

HEAD. Clypeus basally slightly convex, at midlength slightly but distinctly emarginated, CHW 0.38; median tubercle very small, blunt, placed entirely on apical area; apical area moderately long. Mandible moderately pilose, MLW 1.38, MWW 0.52. MSM 0.67. Supra-clypeal area moderately pilose, minutely coriarius. Antenna with 27 flagellomeres. Supra-antennal area minutely but distinctly coriarius, medially and near ocelli rugulose, ventrally and around ocelli slightly concave, with delicate median line.

MESOSOMA. Pronotum sparsely pilose, weakly striate along posterior margin, elsewhere sparsely punctate; epomia delicate, distinct and slightly curved only after diverging from pronotal collar, short, ending far from dorsal margin of pronotum. Mesoscutum densely covered with short hairs, punctate-coriarius, mesoscutum 1.13 × as long as wide; notauli medially distinctly convergent, notaulus 0.52 × as long as mesoscutum; scuto-scutellar groove moderately deep, weakly carinulate. Mesopleuron anteriorly punctate, posteriorly distinctly lineate; subalar ridge wide, oval, not keeled; epicnemial carina irregular, reaching about 0.85 of distance to subalar ridge; sternaulus moderately deep, posterior 0.4 almost indistinct, with distinct vertical wrinkles; sulcus between sternaulus and scrobe absent; mesopleural fovea moderately deep, centrally a deep pit; mesopleural suture distinctly carinulate inside. Metapleuron rugulose, densely pilose; juxtacoxal carina represented by short ridge. Hind coxa densely punctate.

PROPODEUM. Moderately pilose; anterior margin medially very slightly concave; spiracle oval, SWL 1.20; anterior area coriarius-punctate; posterior area strigate-rugulose; anterior transverse carina slightly and uniformly arched forwards; posterior transverse carina represented by slight but distinct sublateral crests.

WINGS. Fore wing vein 1M+Rs anteriorly straight, posteriorly curved; crossvein 1cu-a convex, arising distinctly basad of 1M+Rs; crossvein 1m-cu irregular, continuous with 1-Rs+M; vein 1-Rs+M with bulla placed near basal 0.3; vein 2Cua 1.31 × as long as crossvein 2cu-a; 3r-m nebulous, about as long as 2r-m; vein 3-M about as long as 2-M; AWH 1.07, AAW 0.53; areolet 0.26 × as high as wide; APH 1.15; vein 4-M nebulous, slightly sinuous. Hind wing with 9 hamuli; vein M+Cu apically slightly convex; vein M forming distinctly obtuse angle with Cua; HW1C 1.13; vein Cub almost straight, very slightly convex, forming straight angle with Cua; vein 2-Rs apically nebulous.

METASOMA. T1LW 1.44, T1WW 2.50; spiracle not prominent, on 0.49 of T1 length; median depression absent; lateral depression very shallow; dorsolateral carina represented by blunt and incomplete ridge; ventrolateral carina sharp, complete. T2LW 0.81, T2WW 1.69; thyridium about as wide as long. Tergites 2–8 coriarius; pilosity progressively denser on posterior tergites and dorsally as dense as laterally. Ovipositor straight; OST 0.65; dorsal valve moderately punctate; ventral valve distinctly overlapping dorsal valve, its apex with 8 teeth.

COLOUR. Head and mesosoma black with yellow marks; metasoma orange. Head mostly pale yellow; apical 0.5 of mandible, small mark near base of mandible, supra-antennal area medially, vertex, occiput and posterior 0.2–0.5 of gena on its dorsal 0.4 black. Orbital band covering entire width of gena on its ventral 0.3; gradually narrowing dorsally to 0.5 of its width. Antenna mostly black; f5–9 entirely white,

f10 partially white; f11–27 dark brown. Mesosoma black; collar, dorsal margin of pronotum, 0.5 of propleuron, central spot on mesoscutum, tegula, scutellum, postscutellum, subalar ridge, central mark on mesopleuron, small dorsal mark on hypopimeron, dorsal division of metapleuron, central mark covering 0.3 of metapleuron and sublateral spots on posterior area of propodeum pale yellow. Fore and mid coxae pale yellow, with dorso-apical, small, brown spots; fore trochanters, femur and tibia ventrally yellowish, dorsally brownish; fore and mid tarsi basally light fuscous, blackish towards apex; mid trochanters and femur light orange, first trochanter with dorsal brown mark; mid and hind tibiae light yellow. Hind coxa, trochanters and femur reddish-orange, coxa with dorso-basal yellow spot; hind t1–3 and base of t4 whitish, apex of t4 and t5 blackish. Wings hyaline. Metasoma orange, lighter towards posterior segments; T1 with lateral yellow marks and narrow posterior yellow stripe.

### Variation

Morphometric ranges for this species are shown in Table 1. Fore and mid coxae sometimes without dorso-apical brown spots; yellow mark at metapleuron varying a little in size and shape; yellow spot at hypopimeron varying in size, sometimes covering it almost entirely, sometimes only about half or so; scape dorsally sometimes light brown with yellow spot; vein 3-M sometimes distinctly shorter than 2-M. Two specimens from São Paulo with Cub distinctly convex at apical half; median depression of T1 sometimes very shallow; smaller specimens with supra-clypeal area medially weakly rugulose.

### Male

Similar to female, most important differences as follows. Smaller, fore wing 5.7–7.5 mmlong; pronotum polished smooth. Scape dorsally yellow; mesosternum entirely pale yellow; small black mark near base of mandible absent; metasoma with lighter colour than in female; fore and mid coxae pale yellow, without dorso-apical small brown spots.

VARIATION. Antenna with 28–30 flagellomeres; T1LW 3.01–3.21; T1WW 1.71–1.93. T1 sometimes dorsally dark brown after middle until posterior yellow stripe; yellow mark at metapleuron sometimes small (about half as large as in other specimens); sometimes hind t1 almost entirely blackish; sometimes hind t5 entirely blackish (vs basally whitish and apically blackish in most specimens); sometimes 3-M distinctly shorter or longer than 2-M; rarely scape almost entirely brownish with a very small yellow spot dorso-apically; colour pattern of metasoma varying from orange to light orange; specimen from La Rioja (Argentina) with sublateral yellow marks on posterior area of propodeum connected; two specimens from São Paulo (Brazil) with mesosoma brown (vs black in most specimens).

### Comments

Structurally, *D. paratibialis* sp. nov. differs from all other species in the genus by having four exclusive features: fore wing vein 1-Rs+M with bulla placed near basal 0.3; clypeus at midlength slightly but distinctly emarginate; hind wing vein M+Cu apically slightly convex; sulcus between sternaulus and scrobe absent.

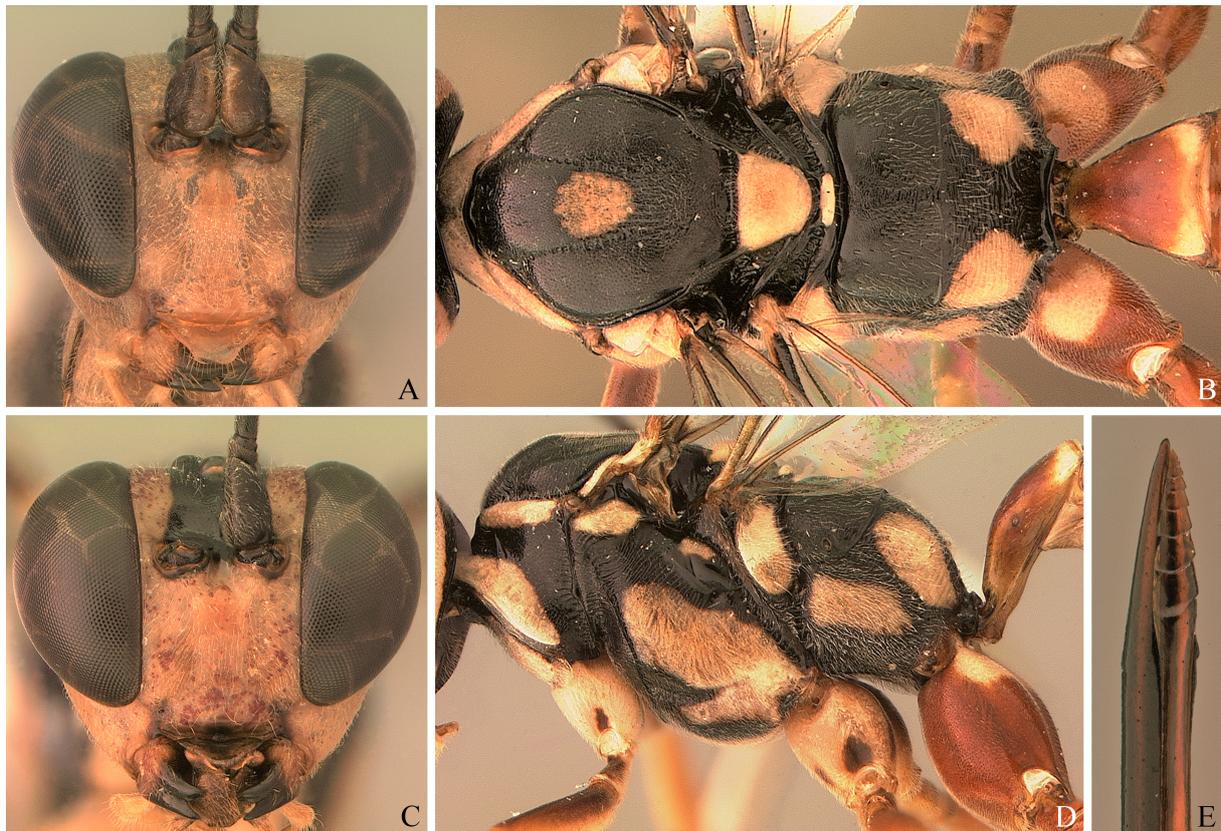
This species shares several structural and colour features with *D. tibialis*. These are the most closely related species of the genus and can be easily confused, but extensive comparisons suggest they are indeed distinct species. They are structurally distinct by 36 features, of which the most important are as follows: posterior area of propodeum strigate-rugulose (Fig. 13B) (vs rugulose in *D. tibialis*, Fig. 15F); anterior margin of propodeum medially very slightly concave (Fig. 13B) (vs distinctly concave, Fig. 15F); and pronotum weakly striate along posterior margin (vs distinctly striate). The following colour pattern is also distinctive: metapleuron with distinct yellow mark (Fig. 13D) (vs entirely black, Fig. 15C, G); fore and mid coxae with small dorso-apical brown spot (Fig. 13D) (vs fully pale yellow, Fig. 15G); mesosternum with large yellow marks (vs black); large central mark on mesopleuron extending beyond the sternaulus (Fig. 13D) (vs extending to sternaulus, Fig. 15G).

The new species is also similar to *D. ateles* sp. nov., but differs in 49 structural features, of which the most important are as follows: posterior area of propodeum strigate-rugulose (Fig. 13B) (vs strigate, Fig. 7C); metapleuron rugulose (vs lineate); mesoscutum punctate-coriarius (vs densely punctate); epicnemial carina irregular and reaching about 0.85 of distance to subalar ridge (vs more or less uniformly curved, reaching about 0.70 of distance to subalar ridge); median tubercle of clypeus very small (vs large); areolet  $0.26\text{--}0.37 \times$  as high as wide (vs 0.45); FLGM  $26.00\text{--}27.00$  (vs  $30.00$ ); thyridium about as wide as long (vs distinctly wider than long); propodeum moderately pilose (Fig. 13B) (vs sparsely pilose, Fig. 7C). The new species is also similar in colour pattern, from which it can be isolated by having supra-clypeal area entirely yellow (vs with blackish marks); T1 mostly orange (vs black); hind femur fully reddish-orange (vs reddish, apically blackish); propleuron yellow (vs black).

The new species is also similar to *D. notabilis* sp. nov., but differs in 52 structural features, of which the most important are as follows: posterior area of propodeum strigate-rugulose (vs distinctly strigate); metapleuron rugulose (vs lineate-rugulose); mesoscutum punctate-coriarius (vs densely punctate); spiracle of T1 not prominent (vs slightly prominent); epicnemial carina irregular (vs more or less uniformly curved); spiracle of propodeum oval (vs elongate); supra-antennal area with delicate median line (vs distinct median line). The colour pattern is distinct by having the fore and mid coxae with small dorso-apical brown spots (Fig. 13D) (vs without dorso-apical brown spots, Fig. 12C); supra-clypeal area entirely yellow (vs with blackish marks); T1 orange (Fig. 13B) (vs mostly blackish, Fig. 12D).

#### Distribution records

Brazil (BA, GO, ES, SP), Bolivia, Argentina.



**Fig. 13.** *Distictus paratibialis* sp. nov. **A.** Head, frontal view; paratype (IBRP). **B.** Mesosoma + first tergite, dorsal view; holotype (LAPIS5907). **C.** Head, frontal view; holotype (LAPIS5907). **D.** Mesosoma, left side; holotype (LAPIS5907). **E.** Apex of ovipositor, left side, holotype (LAPIS5907).

*Distictus terrosus* sp. nov.

[urn:lsid:zoobank.org:act:2DDBF7C0-F7BD-49C0-995C-9254C18A37E5](http://urn:lsid:zoobank.org:act:2DDBF7C0-F7BD-49C0-995C-9254C18A37E5)

Figs 14, 16F; Table 1

**Etymology**

From the Latin ‘*terra*’, meaning ‘earth’ or ‘dirt’, in reference to the general colour of the body.

**Material examined**

Total of 19 specimens, 12 ♀♀ and 7 ♂♂.

**Holotype**

BRAZIL • ♀ (mounted on triangle point; apical half of left antenna missing; otherwise in good condition); RS, Pelotas; 31°44'39" S, 52°13'22" W; alt. 16 m; 5 Dec. 2003; R.F. Krüger leg.; Malaise; UFES, UFES45302 {0}.

**Paratypes**

ARGENTINA • 1 ♂; Misiones, San Javier; 12 Nov. 1971; C. Porter [label “*Distictus* – Gupta 19\_”] leg.; FSCA.

BRAZIL – **Paraná State** • 1 ♀; Ponta Grossa, Pedreira; 6 Jan. 1944; Coleção F. Justus Jr. leg.; DZUP 3848 [handwritten] {1}. – **Santa Catarina State** • 1 ♀; Nova Teutônia; 14 Nov. 1952; F. Plaumann leg.; USUC • 1 ♂; *ibid.*; 28 Nov. 1952; USUC • 1 ♂; *ibid.*; Nov. 1967; DZUP • 1 ♀; *ibid.*; Dec. 1967; DZUP {9} • 1 ♀; Nova Teutônia; 27°11' S, 52°23' W; 19 Mar. 1947; F. Plaumann leg.; USUC {8} • 1 ♀; *ibid.*; 14 Mar. 1966; Malaise; CNCI {7} • 1 ♀; *ibid.*; Jan. 1966; CNCI {2} • 1 ♂; Nova Teutônia; 27°11' S, 52°23' W; alt. 300–500 m; 16 Sep. 1937; F. Plaumann leg.; BMNH • 1 ♂; *ibid.*; 14 Nov. 1958; CNCI • 1 ♀; *ibid.*; Mar. 1965; CNCI {6} • 3 ♀♀; *ibid.*; Dec. 1968; CNCI {3, 4, 5} • 1 ♂; *ibid.*; Dec. 1968; UFES. – **São Paulo State** • 1 ♀; São Paulo; 1912; Barbiellini leg.; DZUP 18.714 {10}. – **Rio Grande do Sul State** • 1 ♂; Pelotas; 31°44'39" S, 52°13'22" W; alt. 16 m; 5 Dec. 2003; R.F. Krüger leg.; Malaise; UFES, UFES45297.

**Description**

**Female** (holotype)

SIZE. Fore wing 13.45 mm long.

HEAD. Clypeus basally moderately convex, at midlength distinctly emarginated, CHW 0.38; median tubercle small, pointed, placed entirely on apical area; apical area moderately long. Mandible densely pilose, MLW 1.23, MWW 0.50. MSM 0.63. Supra-clypeal area moderately pilose, minutely coriarius. Antenna with 30 flagellomeres. Supra-antennal area minutely, faintly coriarius, medially with some rugae, ventrally distinctly concave, with distinct median line.

MESOSOMA. Pronotum sparsely pilose, weakly striate along posterior margin and collar, elsewhere sparsely punctate; epomia moderately stout, distinct and approximately straight only after diverging from pronotal collar, short, ending far from dorsal margin of pronotum. Mesoscutum densely covered with short hairs, densely punctate, mesoscutum 1.20 × as long as wide; notauli medially distinctly convergent, notaulus 0.55 × as long as mesoscutum; scuto-scutellar groove moderately deep, distinctly carinulate. Mesopleuron anteriorly coriarius, posteriorly distinctly lineate; subalar ridge moderately wide, not keeled; epicnemial carina irregular, reaching about 0.85 of distance to subalar ridge; sternaulus moderately deep, posterior 0.4 almost indistinct, with distinct vertical wrinkles; sulcus between sternaulus and scrobe almost indistinct; mesopleural fovea a small pit, otherwise shallow; mesopleural

suture distinctly carinulate inside. Metapleuron lineate, densely pilose; juxtacoxal carina vestigial. Hind coxa densely punctate.

**PROPODEUM.** Sparsely pilose; anterior margin medially very slightly concave; spiracle elongate, SWL 1.69; anterior area anteriorly coriarius-punctate, posteriorly minutely rugulose; posterior area strigate; anterior transverse carina laterally approximately straight, medially distinctly arched forwards; posterior transverse carina represented by slight but distinct sublateral crests.

**WINGS.** Fore wing vein 1M+Rs anteriorly straight, posteriorly curved; crossvein 1cu-a weakly convex, arising slightly basad of 1M+Rs; crossvein 1m-cu more or less uniformly curved, continuous with 1-Rs+M; vein 1-Rs+M with bulla placed near basal 0.4; vein 2Cua 1.24 × as long as crossvein 2cu-a; 3r-m nebulous, about as long as 2r-m; vein 3-M about as long as 2-M; AWH 1.02, AAW 0.53; areolet not observed (wings folded at 2m-cu); APH 1.25; vein 4-M tubular, approximately straight. Hind wing with 10 hamuli, vein M+Cu apically moderately convex; vein M forming straight angle with vein Cua; HW1C 1.56; vein Cub distinctly convex at apical half, forming straight angle with Cua; vein 2-Rs apically nebulous.

**METASOMA.** T1LW 1.21, T1WW 3.00; spiracle not prominent, at 0.53 of T1 length; median depression very shallow; lateral depression very shallow; dorsolateral carina represented by blunt and incomplete ridge; ventrolateral carina sharp, complete. T2LW 0.77, T2WW 1.65; thyridium about as wide as long. Tergites 2–8 coriarius-punctate; pilosity progressively denser on posterior tergites and laterally denser than dorsally. Ovipositor slightly downcurved; OST 0.59; dorsal valve moderately punctate; ventral valve distinctly overlapping dorsal valve, its apex with 7 teeth.

**COLOUR.** Head, mesosoma and metasoma reddish-brown and yellow. Head mostly pale yellow; mandible except small basal mark, large spot on malar space and clypeal borders, supra-clypeal area near toruli and ventral portion of supra-antennal area reddish-brown. Dorsal portion of supra-antennal area, vertex, dorsal 0.25 of gena and occiput black. Orbital band covering almost entire width of gena on its ventral 0.7. Flagellum mostly black; f7–9 entirely black, f6 and 10 mostly black, f11 with small basal white mark; f12–30 ventrally dark brown. Mesosoma reddish-brown; small marks on dorsal and ventral portions of collar, dorsal margin of pronotum, central spot on mesoscutum, tegula, scutellum, postscutellum, subalar ridge, large central mark on mesopleuron, anterior portion of hypopimeron, dorsal division of metapleuron, dorsal mark covering 0.6 of metapleuron and elongate sublateral marks extending from anterior area of propodeum to its posterior apex pale yellow. Median portion of collar and posterior mark on mesoscutum blackish. Fore and mid tibiae mesally reddish, laterally yellow; fore and mid first trochanter dorsally blackish, fore one ventrally yellow; mid one ventrally orange; fore and mid second trochanters and base of femora orange, remainder of femora dorsally blackish, ventrally yellow; all tibiae and hind tarsus pale yellow; fore and mid tarsi basally pale yellow, blackish towards apex. Hind coxa, trochanters and femur reddish-brown, coxa with dorso-basal yellow spot. Wings hyaline. Metasoma reddish-brown, lighter towards posterior segments, T7–8 deep orange; T1 with small marks just dorsad of spiracle, posteriorly with wide yellow stripe. Sternites lighter than tergites.

**VARIATION.** Morphometric ranges are shown in Table 1. All examined specimens quite similar to each other, except by the following, slight variations: yellow mark on hypopimeron sometimes connected to main mesopleural mark, sometimes briefly separated; areolet sometimes distinctly higher than wide, sometimes about as wide as high; one specimen with wrinkling at pronotum and mesopleuron slightly weaker; pronotum sometimes distinctly striate along posterior margin and collar; elongate sublateral yellow marks of propodeum sometimes extending only from posterior margin to anterior transverse carina; sometimes vein 3-M distinctly shorter than 2-M, rarely longer; sometimes crossvein 1cu-a arising distinctly basad of 1M+Rs; specimen from Ponta Grossa with lateral yellow marks on mesoscutum; two



**Fig. 14.** *Distictus terrosus* sp. nov. **A.** Head, frontal view; holotype (UFES45302). **B.** Mesosoma + first tergite, dorsal view; holotype. **C.** Habitus of female paratype (CNCI). **D.** Habitus of male paratype (UFES45297). **E.** Habitus of holotype. **F.** Apex of ovipositor, left side, holotype.

specimens from Nova Teutônia with weak yellow stripe on T1 and with dark marks on tergites; small yellow marks just dorsad of spiracle on T1 in some cases absent or connected with posterior yellow stripe.

#### Male

Same overall structure and colour pattern as female, but with the following differences. Smaller, fore wing 8.5–11.5 mm long. Antenna with 32 flagellomeres. Supra-clypeal area entirely yellow, without oblique reddish-brown marks; elongate sublateral yellow marks of propodeum extending from posterior margin to anterior transverse carina; labial and maxillary palpus pale yellow, brownish towards apex; spiracle of T1 prominent; collar entirely yellow, without interruptions; anterior transverse carina of propodeum slightly arched forwards, in two cases practically straight; small yellow marks just dorsad of spiracle on T1 absent.

VARIATION. AS with the female, males show relatively stable structure and colour patterns. Small variations which might be of some interest are as follows: T1LW 2.62–2.94; T1WW 1.80–2.03. Specimen from Pelotas (RS) with areolet distinctly higher than wide; posterior yellow stripe on T1 sometimes almost indistinct; tergites sometimes with blackish marks; smaller specimen with pronotum polished smooth.

#### Comments

The new species differs from all other species in the genus by having the mesosoma reddish-brown with yellow marks (Fig. 14C, E) (vs mesosoma black with yellow marks, Figs 9C, 15G). It is also the only species of *Distictus* with the orbital band interrupted on the temple (Fig. 14E).

Although very different in colour, *D. terrosus* sp. nov. is most similar in structure to *D. mexicanus*, from which it differs in 49 features, of which the most important are as follows: fore wing crossvein 1m-cu continuous with vein 1-Rs+M (vs limit between these two veins clearly traceable); fore wing crossvein 1m-cu more or less uniformly curved (vs irregular); anterior transverse carina of propodeum laterally approximately straight, medially distinctly arched forwards (vs slightly arched forwards, medially more distinctly curved); mesopleuron posteriorly distinctly lineate (vs on dorsal posterior corner distinctly lineate); epicnemial carina reaching about 0.85 of distance to subalar ridge (vs almost reaching subalar ridge); fore wing vein 3r-m about as long as 2r-m (vs distinctly shorter than 2r-m); anterior margin of propodeum medially very slightly concave (vs concave); supra-antennal area ventrally distinctly concave (vs ventrally very slightly concave); apical area of clypeus moderately wide (vs narrow); median depression of T1 very shallow (vs absent); sulcus between sternaulus and scrobe almost indistinct (vs distinct); mandible densely pilose (vs sparsely pilose); metapleuron densely pilose (vs moderately pilose).

#### Distribution records

Brazil (SP, PR, SC, RS), Argentina.

#### *Distictus tibialis* (Brullé, 1846)

Figs 15A–H, 16A; Table 1

*Mesostenus tibialis* Brullé, 1846: 241–242 (original description; type ♀ (MNHN, lost); type data: Brazil, “prov. de Guaratuba”. **Neotype** ♀ (DZUP), present designation; type data: Brazil, Paraná State, Curitiba, Vinalto Graf leg.; no date).

*Fenixia curta* Aguiar, 2005a: 127–132, figs 8–12 (original description, figure, distribution, phylogeny; type ♀ (DZUP); type data: “N. Teutônia-S.C., Brasil-XI/1967, F. Plaumann leg.”)

*Distictus tibialis* – Townes in Townes & Townes, 1966: 325 (description, new status; 1970: 172, fig. 146; key to genus). — Kasparyan & Ruíz-Cancino 2005: 109 (listed, separation from *D. mexicanus*). — Santos & Aguiar 2008: 30–33, 35, 38 (phylogeny, synonymy, distribution records and map, separation from *Distictus* (= *Mallochia*) *aurantium*); 2012: 37–38, 40 (coded for phylogenetic analysis); 2013: 224, 227 (coded for phylogenetic analysis). — Santos *et al.* 2009: 31, 35–36 (coded for phylogenetic analysis). — Tedesco & Aguiar 2013: 84 (coded for phylogenetic analysis). — Santos 2017: 23 (appendix; coded for phylogenetic analysis).

### Material examined

Total of 191 specimens, 76 ♀♀ and 115 ♂♂.

#### Neotype (here designated)

BRAZIL – **Paraná State** • ♀ (pinned; in good condition); Curitiba; 1961; V. Graf leg. [Vinalto Graf]; [Note: there is one more female from the same collecting event as the neotype, also in DZUP, listed below]; DZUP {36}.

#### Other material

ARGENTINA • 1 ♀; Misiones, Dos de Mayo; Feb. 1967; CNCI {26} • 1 ♀; Punta Lara; 27 Jan. 1966; H. Townes and M. Townes leg.; CNCI • 1 ♂; Corrientes, Las Marias, ca Virasoro; 10–15 Nov. 1969; C. Porter leg.; FSCA • 1 ♂; Punta Lara; 31 Jan. 1966; H. Townes and M. Townes leg.; CNCI.

BOLIVIA • 1 ♀; Noryungas, Coraico, El Bagante; alt. 150 m; 18 Apr. 1997; L. Masner leg.; sweeping; CNCI B-03 {9}.

BRAZIL – **Ceará State** • 1 ♀; Serra do Araripe; alt. 850 m; 19 May 1969; M. Alvarenga leg.; USUC. – **Espírito Santo State** • 1 ♀; Alfredo Chaves, Picadão, Mata; 20°27'53" S, 40°42'35" W; alt. 714 m; 8–15 Oct. 2007; C.O. Azevedo exped.; Malaise; Pt4; UFES {23} • 1 ♀; Conceição do Castelo, Propriedade Ribeirão do Meio; 17–24 Mar. 2007; A.P. Aguiar exped.; coffee plantation; Malaise; UFES51229, LAPIS2906 {21} • 1 ♀; Domingos Martins, Mata Pico do Eldorado; 20°22'17" S, 40°39'29" W; 26 Nov.–3 Dec. 2004; M. Tavares exped.; Malaise; T8; UFES, LAPIS2911 {12} • 1 ♂; Alfredo Chaves, Picadão; alt. 710 m; 8–15 Oct. 2007; C.O. Azevedo exped.; Malaise; T4; UFES • 1 ♂; Cariacica, RES. Biol. Duas Bocas, Pau Amarelo; 21–30 Oct. 2005; A.P. Aguiar exped.; Malaise; Pt10; UFES, LAPIS2914 • 1 ♂; Conceição do Castelo, Propriedade Ribeirão do Meio, point near coffee plantation (sloped area); 17–24 Mar. 2007; A.P. Aguiar exped.; Malaise; UFES51228, LAPIS2912 • 1 ♂; Domingos Martins, Mata Pico do Eldorado; 20°22'17" S, 40°39'29" W; 26–3 Dec. 2004; M. Tavares exped.; Malaise; UFES, LAPIS2907 • 1 ♂; *ibid.*; 3–10 Dec. 2004; Malaise B5; UFES, LAPIS2913 • 1 ♂; *ibid.*; Malaise B6; UFES, LAPIS2909 • 1 ♂; *ibid.*; Malaise B8; UFES, LAPIS2910 • 1 ♂; *ibid.*; Malaise T4; UFES, LAPIS2908 • 1 ♂; Santa Teresa, Res. Biol. Augusto Ruschi, Trilha da Cachoeira; 19°55'16.4" S, 40°33'13.5" W; alt. 775 m; 8–24 Oct. 2016; A.P. Aguiar exped.; mata primária; Malaise; Pt3; UFES, FAS1583 • 1 ♂; Santa Teresa, Res. Biol. Augusto Ruschi, Trilha da Caixa d'Água; 19°54'37.7" S, 40°33'12.1" W; alt. 764 m; 8–24 Oct. 2016; A.P. Aguiar exped.; mata secundária; Malaise; Pt2; UFES, FAS1582 • 1 ♂; São Roque do Canaã, Alto Misterioso; 19°47'59" S, 40°46'31.5" W; 2–11 Nov. 2007; C. Waichert exped.; Malaise; UFES48992 • 1 ♂; *ibid.*; UFES • 3 ♂♂; São Roque do Canaã, Alto Misterioso; 2–11 Nov. 2007; C. Waichert exped.; Malaise; Pt14; UFES. – **Paraná State** • 1 ♀ (pinned; apical tarsomere of left hind leg missing; otherwise in good condition); collected together with neotype; Paraná State, Curitiba; 1961; V. Graf leg. [Vinalto Graf]; DZUP. 1 ♀; Campina Grande, near Curitiba; 20 Feb. 1966; H. Townes and M. Townes leg.; USUC • 1 ♀; Curitiba; 20–31 Jan. 1969; L. Stange and J. Stange leg.; USUC • 1 ♀; Curitiba; 6 Oct. 1976; F. Giacome leg.; DZUP {22} • 1 ♀; Guarapuava, Estação de Águas Santa Clara; 15 Nov. 1986; Lev. Ent. PROFAUPAR leg.; Malaise; DZUP {33} • 1 ♀; *ibid.*; 3 Nov. 1986; DZUP {38} • 1 ♀; Ponta Grossa, Vila Velha, Reserva IAPAR; 13

Apr. 1987; Lev. Ent. PROFAUPAR leg.; Br376; Malaise; DZUP {35} • 1 ♂; Colombo, Embrapa, BR476; 10 Nov. 1986; Lev. Ent. PROFAUPAR leg.; Km 20; Malaise; DZUP • 1 ♂; Curitiba, 20–31 Jan. 1969; L. Stange and J. Stange leg.; USUC • 1 ♂; Fênix, Reserva Estadual ITCF; 10 Nov. 1986; Lev. Ent. PROFAUPAR leg.; Malaise; DZUP • 1 ♂; Jundiá do Sul, Fazenda Monte Verde; 10 Nov. 1986; Lev. Ent. PROFAUPAR leg.; Malaise; DZUP • 1 ♂; *ibid.*; 6 Oct. 1986; DZUP • 1 ♂; Ponta Grossa, Vila Velha, Reserva IAPAR; 10 Nov. 1986; Lev. Ent. PROFAUPAR leg.; Br376; Malaise; DZUP • 1 ♂; *ibid.*; 15 Sep. 1986; DZUP • 1 ♂; *ibid.*; 24 Nov. 1986; DZUP • 1 ♂; Telêmaco Borba, Res. Samuel Klabin; 15 Dec. 1986; Lev. Ent. PROFAUPAR leg.; Malaise; DZUP • 1 ♂; *ibid.*; 5 Jan. 1987; DZUP • 2 ♂♂; Colombo, Embrapa, BR476; 24 Nov. 1986; Lev. Ent. PROFAUPAR leg.; Km 20; Malaise; DZUP • 2 ♂♂; Guarapuava, Estação Águas Santa Clara; 1 Sep. 1986; Lev. Ent. PROFAUPAR leg.; Malaise; DZUP • 2 ♂♂; *ibid.*; 3 Nov. 1986; DZUP – **Rio de Janeiro State** • 1 ♀; Mangaratiba, Muriqui; Jul. 1969; M. Alvarenga leg.; USUC • 3 ♂♂; Telêmaco Borba; 7 Oct. 1986; A.F. Kumagai coll. leg.; DZUP. – **Rio Grande do Sul State** • 1 ♀; Capão do Leão; 31°48'16" S, 52°24'13" W; alt. 7 m; 16 May 2003; R.F. Krüger leg.; Malaise; UFES {18} • 1 ♀; *ibid.*; 2 Jan. 2004; UFES {15} • 1 ♀; Morro Redondo; 31°40'22" S, 52°35'30" W; alt. 101 m; 14 Feb. 2003; R.F. Krüger leg.; Malaise; UFES45378 {24} • 1 ♀; *ibid.*; 16 May 2003; UFES {7} • 1 ♀; *ibid.*; 21 Mar. 2003; UFES {17} • 1 ♀; *ibid.*; 3 Jan. 2003; UFES45370 {8} • 1 ♀; Pelotas; 31°44'39" S, 52°13'22" W; alt. 16 m; 27 Sep. 2002; R.F. Krüger leg.; Malaise; UFES {14} • 1 ♀; *ibid.*; 29 Nov. 2002; UFES45326 {31} • 1 ♀; Santa Maria; 10 Nov. 1976; S. Carvalho leg.; DZUP {32} • 1 ♂; Capão do Leão; 31°48'16" S, 52°24'13" W; alt. 7 m; 26 Mar. 2004; R.F. Krüger leg.; Malaise; UFES • 1 ♂; *ibid.*; 29 Nov. 2002; UFES • 1 ♂; Pelotas; 31°44'39" S, 52°13'22" W; alt. 16 m; 16 Jan. 2004; R.F. Krüger leg.; Malaise; UFES • 2 ♀♀; Pelotas; 31°44'39" S, 52°13'22" W; alt. 16 m; 2 Apr. 2004; R.F. Krüger leg.; Malaise; UFES45337, UFES45339 {11, 27} • 3 ♂♂; Pelotas; 31°44'39" S, 52°13'22" W; alt. 16 m; 5 Dec. 2003; R.F. Krüger leg.; Malaise; UFES45304, UFES45305, UFES45306. – **Santa Catarina State** • 1 ♀; Nova Teutônia; 12 Mar. 1946; F. Plaumann leg.; USUC • 1 ♀; *ibid.*; 24 Mar. 1946; USUC • 2 ♀♀; *ibid.*; 14 Mar. 1947; USUC • 1 ♀; *ibid.*; 21 Mar. 1947; USUC • 2 ♀♀; *ibid.*; 24 Mar. 1947; USUC • 2 ♀♀; *ibid.*; 25 Mar. 1947; USUC • 1 ♀; *ibid.*; 1 Apr. 1948; USUC • 1 ♀; *ibid.*; 11 Apr. 1948; USUC • 1 ♀; *ibid.*; 10 May 1948; USUC • 1 ♀; *ibid.*; 19 Aug. 1952; USUC • 1 ♀; *ibid.*; 11 Oct. 1952; USUC • 2 ♀♀; *ibid.*; Sep. 1967; DZUP {0, 34} • 1 ♂; *ibid.*; 14 Mar. 1947; USUC • 1 ♂; *ibid.*; 5 May 1948; USUC • 1 ♂; *ibid.*; 7 Jun. 1948; USUC • 1 ♂; *ibid.*; 20 Apr. 1952; USUC • 2 ♂♂; *ibid.*; 26 Sep. 1952; USUC • 1 ♂; *ibid.*; 16 Oct. 1952; USUC • 3 ♂♂; *ibid.*; 22 Oct. 1952; USUC • 2 ♂♂; *ibid.*; 25 Oct. 1952; USUC • 2 ♂♂; *ibid.*; 27 Oct. 1952; USUC • 1 ♂; *ibid.*; 19 Nov. 1952; USUC • 2 ♂♂; *ibid.*; 4 Dec. 1952; USUC • 1 ♂; *ibid.*; 8 Dec. 1952; USUC • 1 ♂; *ibid.*; 9 Nov. 1953; USUC • 2 ♂♂; *ibid.*; Sep. 1959; USUC • 4 ♂♂; *ibid.*; Sep. 1967; DZUP • 9 ♂♂; *ibid.*; Oct. 1967; DZUP • 1 ♂; *ibid.*; Dec. 1967; USUC • 3 ♀♀; *ibid.*; Jan. 1968; USUC • 2 ♂♂; *ibid.*; Oct. 1968; USUC • 1 ♂; *ibid.*; Nov. 1968; USUC • 1 ♂; *ibid.*; Aug. 1970; USUC • 1 ♂; *ibid.*; Oct. 1970; DZUP • 2 ♂♂; *ibid.*; Oct. 1970; USUC • 7 ♂♂; *ibid.*; Nov. 1970; USUC • 1 ♀; Nova Teutônia; 27°11' S, 52°23' W; alt. 300–500 m; 6 Oct. 1960; F. Plaumann leg.; CNCI {29} • 1 ♀; *ibid.*; 8 Jan. 1948; CNCI {13} • 1 ♀; *ibid.*; Jan. 1965; CNCI {16} • 1 ♀; *ibid.*; Jul. 1967; CNCI {30} • 2 ♀♀; *ibid.*; Nov. 1968; CNCI {19, 20} • 1 ♂; *ibid.*; 13 Feb. 1937; F. Plaumann leg.; BMNH • 1 ♂; *ibid.*; 14 Feb. 1938; BMNH • 1 ♂; *ibid.*; 20 Sep. 1938; BMNH • 1 ♂; *ibid.*; 12 Oct. 1938; BMNH • 1 ♂; *ibid.*; 3 Nov. 1938; BMNH • 1 ♂; *ibid.*; 12 Nov. 1938; BMNH • 1 ♂; *ibid.*; 25 Nov. 1938; BMNH • 1 ♂; *ibid.*; 3 Dec. 1938; BMNH • 1 ♂; *ibid.*; 13 Dec. 1938; BMNH • 2 ♂♂; *ibid.*; Mar. 1947; CNCI • 1 ♂; *ibid.*; 9 Aug. 1948; CNCI • 1 ♂; *ibid.*; 1 Sep. 1948; CNCI • 1 ♂; *ibid.*; 2 Jan. 1965; CNCI • 1 ♂; *ibid.*; Jan. 1967; CNCI • 1 ♂; *ibid.*; Nov. 1968; CNCI • 1 ♀; Nova Teutônia; 27°11' S, 52°23' W; 23 Jun. 1967; F. Plaumann leg.; Malaise; CNCI {6} • 1 ♀; *ibid.*; 7 Apr. 1948; USUC • 1 ♀; *ibid.*; 5 May 1948; USUC • 1 ♀; *ibid.*; Apr. 1969; CNCI {5} • 1 ♀; *ibid.*; 29 Mar. 1952; USUC • 1 ♀; *ibid.*; 29 Oct. 1952; USUC • 1 ♀; *ibid.*; 4 Dec. 1953; USUC • 1 ♀; *ibid.*; 8 Apr. 1954; USUC • 1 ♀; *ibid.*; 8 Dec. 1952; USUC • 1 ♀; *ibid.*; 8 May 1954; USUC • 1 ♀; *ibid.*; 9 Apr. 1948; USUC • 1 ♀; *ibid.*; Apr. 1969; DZUP {39} • 1 ♀; *ibid.*; Aug. 1970; USUC • 1 ♀; *ibid.*; May 1953; USUC • 1 ♀; *ibid.*; Nov. 1970; USUC • 2 ♀♀; *ibid.*; Oct. 1967; CNCI {1, 2} • 1 ♀; *ibid.*; Oct. 1967; DZUP {37} • 2 ♀♀; *ibid.*; Feb. 1968; CNCI {3, 4} • 1 ♀; *ibid.*; Oct. 1968; USUC

• 1 ♂; *ibid.*; Sep. 1967; CNCI. – **São Paulo State** • 1 ♀; Águas Vermelhas; alt. 800 m; Dec. 1983; M. Alvarenga leg.; USUC • 1 ♀; Botucatu, Fazenda Jaciobá; 5–7 Feb. 2005; E.F. Santos and C.P. Scott-Santos leg.; YPT; UFES {25} • 1 ♀; Campos do Jordão; Feb. 1958; K. Lenko leg.; DZUP {28} • 1 ♀; SAPar Labo Montevideo; 5 Sep. [year unknown]; H.L. Parker leg.; parasite of *D. saccharalis*; USUC 143.2 • 1 ♀; Ypiranga; 17 Apr. 1936; Lange de Morretes leg.; DZUP {10} • 1 ♂; Parelheiros; 5 Aug. 1936; DZUP • 1 ♂; São José do Barreiro, Serra da Bocaina; alt. 1600 m; 4–7 Nov. 1967; Alvarenga and Seabra leg.; USUC • 1 ♂; *ibid.*; Nov. 1968; USUC • 1 ♂; São José do Barreiro, Serra da Bocaina; Mar. 1973; F.M. Oliveira leg.; USUC.

PERU • 1 ♂; Avispas, near Marcapata; alt. 30 m; Sep. 1962; LPeña leg.; USUC.

## Redescription

### Female (neotype)

SIZE. Fore wing 10.76 mm long.

HEAD. Clypeus basally moderately convex, at midlength not distinctly emarginated, CHW 0.39; median tubercle small, blunt, placed entirely on apical area; apical area moderately long. Mandible moderately pilose, MLW 1.51, MWW 0.49. MSM 0.80. Supra-clypeal area densely pilose, minutely coriarius. Antenna with 29 flagellomeres. Supra-antennal area minutely but distinctly coriarius, medially coriarius, ventrally and around ocelli slightly concave, with distinct median line.

MESOSOMA. Pronotum sparsely pilose, distinctly striate along posterior margin and collar, elsewhere minutely coriarius; epomia moderately stout, distinct and slightly sinuous only after diverging from pronotal collar, short, ending far from dorsal margin of pronotum. Mesoscutum densely covered with short hairs, punctate-coriarius, mesoscutum  $1.09 \times$  as long as wide; notauli medially distinctly convergent, notaulus  $0.68 \times$  as long as mesoscutum; scuto-scutellar groove deep, distinctly carinate. Mesopleuron anteriorly coriarius, posteriorly distinctly lineate; subalar ridge moderately wide, somewhat keeled; epicnemial carina irregular, reaching subalar ridge; sternaulus moderately deep, posterior 0.25 shallow, with distinct vertical wrinkles; sulcus between sternaulus and scrobe almost indistinct; mesopleural fovea moderately deep, centrally a deep pit; mesopleural suture distinctly carinate inside. Metapleuron rugulose, densely pilose; juxtacoxal carina represented by short ridge. Hind coxa densely punctate.

PROPODEUM. Moderately pilose; anterior margin medially concave; spiracle oval, SWL 1.33; anterior area coriarius-punctate; posterior area rugulose; anterior transverse carina slightly and uniformly arched forwards; posterior transverse carina represented only by very slight sublateral crests.

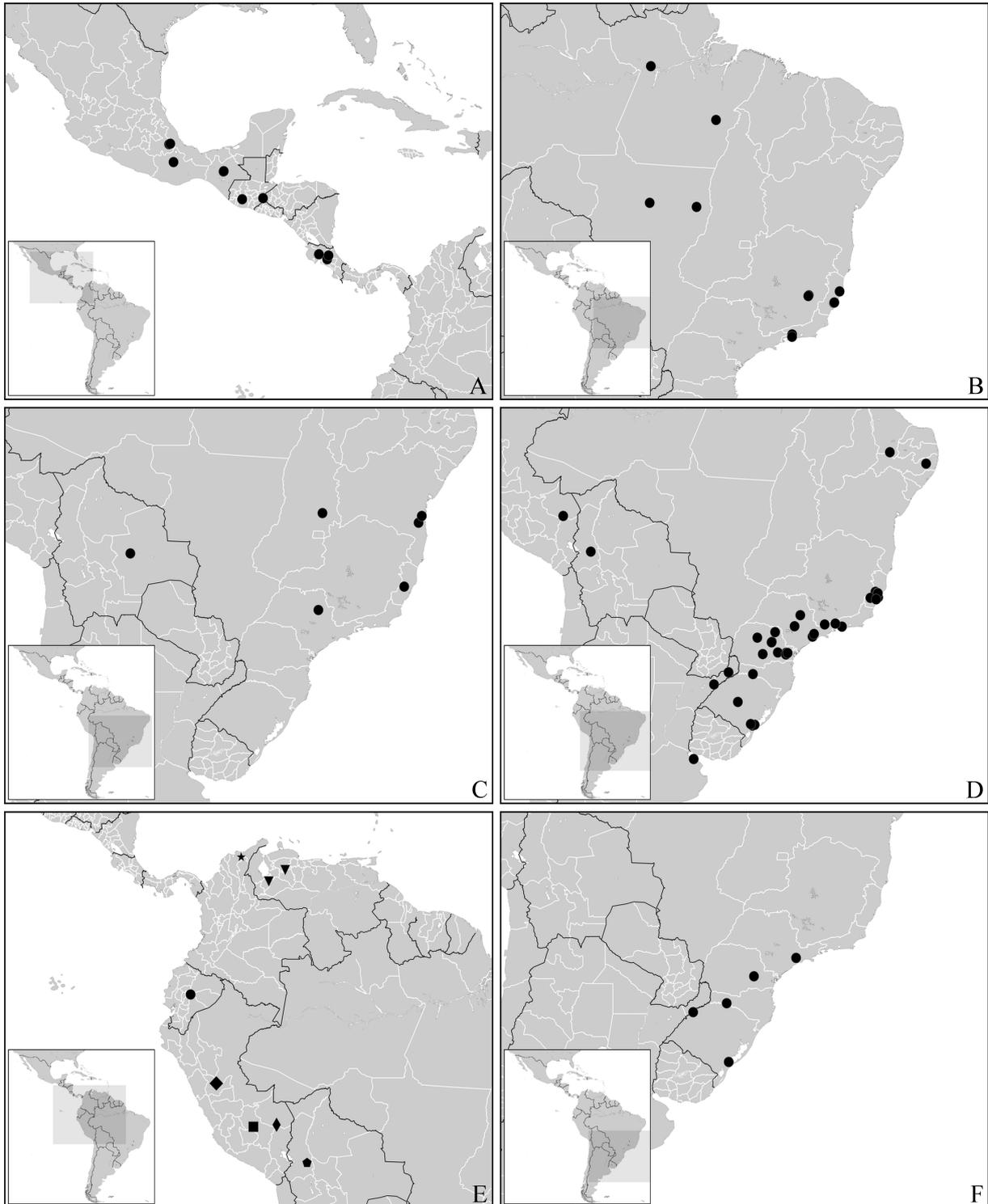
WINGS. Fore wing vein 1M+Rs anteriorly straight, posteriorly curved; crossvein 1cu-a convex, arising distinctly basad of 1M+Rs; crossvein 1m-cu irregular, continuous with 1-Rs+M; vein 1-Rs+M with bulla placed near basal 0.4; vein 2Cua  $1.05 \times$  as long as crossvein 2cu-a; 3r-m nebulous, about as long as 2r-m; vein 3-M about as long as 2-M; AWH 1.23, AAW 0.43; areolet not observed (wings folded at 2m-cu); APH 1.19; vein 4-M tubular, approximately straight. Hind wing with 8 hamuli, vein M+Cu apically moderately convex; vein M forming distinctly obtuse angle with vein Cua; HW1C 1.66; vein Cub almost straight, very slightly convex, forming straight angle with Cua; vein 2-Rs apically nebulous.

METASOMA. T1LW 1.32, T1WW 2.54; spiracle slightly prominent, at 0.48 of T1 length; median depression very shallow; lateral depression distinct; dorsolateral carina represented by blunt ridge; ventrolateral carina sharp, complete. T2LW 0.81, T2WW 1.70; thyridium about as wide as long. Tergites 2–8 coriarius; pilosity progressively denser on posterior tergites and laterally denser than dorsally. Ovipositor straight; OST 0.83; dorsal valve scarcely punctate; ventral valve distinctly overlapping dorsal valve, its apex with 8 teeth.

COLOUR. Head and mesosoma black with yellow marks; metasoma reddish. Head black; basal half of mandible, mouthparts, and clypeus pale yellow. Black stripes from base of mandible to clypeal foveae, throughout groove between face and clypeus, and from clypeal fovea to antennal foramen, thus making a distinct H-shaped figure. Orbital band pale yellow, shortly interrupted on malar space; covering entire width of gena on its ventral 0.4; gradually narrowing dorsally to 0.5 of its width; f6–8 entirely white, f5 and f9 partially white; f10–29 dark brown. Mesosoma black; collar, dorsal margin of pronotum, postero-



**Fig. 15.** *Distictus tibialis* (Brullé, 1846). **A–B.** Head, frontal view (A: UFES; B: CNCI). **C.** Mesosoma, left side (UFES). **D.** ♀, habitus (DZUP). **E.** ♂, habitus (UFES45305). **F.** Propodeum + coxae + first tergite, dorsal view (UFES51229). **G.** ♀, habitus (UFES). **H.** Apex of ovipositor, left side (UFES45337).



**Fig. 16.** Distribution records for *Distictus* spp. **A.** *D. mexicanus* Kasparyan & Ruíz, 2005. **B.** *D. ateles* sp. nov. **C.** *D. paratibialis* sp. nov. **D.** *D. tibialis* (Brullé, 1846). **E.** Least common species: *D. commatus* sp. nov. (star), *D. daelus* sp. nov. (triangle), *D. asterios* sp. nov. (circle), *D. notabilis* sp. nov. (lozenge), *D. ardens* sp. nov. (square), *D. caligaris* sp. nov. (thin lozenge) and *D. apaensis* sp. nov. (pentagon). **F.** *D. terrosus* sp. nov.

lateral corner of propleuron, central spot on mesoscutum, tegula, scutellum, postscutellum, subalar ridge, central mark on mesopleuron, dorsal portion of hypoepimeron, dorsal division of metapleuron and sublateral spots on posterior area of propodeum pale yellow. Fore and mid coxae pale yellow; fore first trochanter pale yellow with blackish spot; mid first trochanter, fore and mid second trochanters and femora orange, trochanters with blackish spots; fore and mid tibia pale yellow; fore and mid tarsi dark yellow, brownish towards apex. Hind coxa, trochanters and femur reddish, coxa with dorso-basal yellow spot; hind tibia pale yellow; hind t1–4 pale yellow, t5 blackish. Wings hyaline. Metasoma reddish, lighter towards posterior segments; T1 with narrow, faint posterior yellow stripe.

VARIATION. Morphometric ranges for this species can be seen in Table 1. Mesosternum centrally densely pilose; supra-clypeal area sometimes entirely yellow, or sometimes with small blackish spots, or sometimes M-shaped spot; malar space rarely yellow (smaller specimens); orbital band sometimes complete, but very narrow on malar space; supra-antennal area medially and near ocelli sometimes rugulose; clypeus sometimes basally slightly convex; T1 posteriorly usually with a wide yellow band, covering about 10% of its length, but in some specimens this band fading or smaller to different degrees, up to entirely absent; metasoma sometimes darker (probably related to specimen conservation); yellow spot on hypoepimeron varying in size; yellow spot on mesopleuron varying in size and shape; veins 2Cua and 2cu-a sometimes aligned straight, sometimes evenly arched; vein Cub sometimes straight to distinctly curved on posterior portion; areolet rarely higher than wide; crossvein 1cu-a sometimes arising a little basad of 1M+Rs; vein 3-M sometimes distinctly longer than 2-M; median depression of T1 sometimes absent; lateral depression of T1 absent or very shallow in smaller specimens; yellow mark on propleuron varying in size and shape, sometimes propleuron fully yellow or sometimes almost entirely black; anterior side of metapleuron sometimes very densely pilose.

#### Male

Face never black, except malar space; T1 with fuscous lateral areas; areolet usually slightly less convergent than in female.

VARIATION. Antenna with 27–31 flagellomeres; T1LW 2.63–3.71; T1WW 1.64–2.04. Specimens from Serra da Bocaina and Curitiba with hind tibia basally orange, apically brownish and hind tarsus basally brownish, apically whitish (except for last tarsomere, brown); one specimen from Avispas with very small yellow mark on anterior ventral border of scape. Specimen from Serra do Araripe also with yellow spot on metapleuron.

#### Types

The original type specimen is lost (Yu *et al.* 2005) and this is problematic because this is, at the same time, the type species, the most common species of the genus, and a complex taxon, easy to confuse with other species, the most obvious of which is *D. paratibialis* sp. nov. The designation of a neotype is necessary to settle and stabilize the definition of the species. Brullé (1846: 242) cites the original location of the type specimen as “Brésil (prov. de Guaratuba)”, which corresponds to the present city of Guaratuba, state of Paraná, in southern Brazil. We have not been able to find specimens of *Distictus* from Guaratuba. The present designation of a neotype is justified on the basis of its representativeness of the species, as interpreted here, the specimen’s integrity, and because the collecting place was the closest possible (80 km) to Guaratuba.

#### Comments

Structurally, *D. tibialis* differs from all other species in the genus by having four exclusive features: posterior area of propodeum rugulose (Fig. 15F); epicnemial carina reaching subalar ridge; pronotum distinctly striate along posterior margin and collar; and epomia distinctly sinuous after diverging from pronotal collar.

This species shares several structural and colour features with *D. paratibialis* sp. nov. These are the most similar species in *Distictus* and can be easily confused. They are nonetheless structurally distinct by 36 features, of which the most important are as follows: posterior area of propodeum rugulose (Fig. 15F) (vs strigate-rugulose in *D. paratibialis* sp. nov., Fig. 13B); anterior margin of propodeum medially distinctly concave (Fig. 15F) (vs medially very slightly concave, Fig. 13B); pronotum distinctly striate along posterior margin (vs weakly striate). The new species also differs in colour pattern by having metapleuron entirely black (Fig. 15C) (vs with distinct yellow mark, Fig. 13D); fore and mid coxae entirely pale yellow (Fig. 15G) (vs with small dorso-apical brown spot, Fig. 13D); mesosternum black (vs with large yellow marks); and large central mark on mesopleuron extending to sternaulus (Fig. 15G) (vs extending beyond sternaulus, Fig. 13D).

The new species is also similar to *D. ateles* sp. nov., from which it differs in 50 structural features, of which the most important are as follows: posterior area of propodeum rugulose and matte (Fig. 15F) (vs strigate and shiny, Fig. 7C); metapleuron rugulose (vs lineate); mesoscutum punctate-coriarius (vs densely punctate); anterior transverse carina of propodeum slightly and uniformly arched forwards (Fig. 15F) (vs slightly arched forwards, medially more distinctly curved, Fig. 7C); median tubercle of clypeus small (vs large); epicnemial carina reaching subalar ridge, irregular (vs reaching about 0.70 of distance to subalar ridge, more or less uniformly curved); areolet  $0.31\text{--}0.38 \times$  as high as wide (vs 0.45); anterior margin of propodeum medially concave (Fig. 15F) (vs medially very slightly concave, Fig. 7C); spiracle of propodeum oval (Fig. 15G) (vs elongate, Fig. 7D); SWL 1.11–1.55 (vs 1.25–2.05); propodeum moderately pilose (vs sparsely pilose). The two species are also similar in colour pattern, but *D. tibialis* can be isolated by having the metapleuron entirely black (Fig. 15G) (vs with distinct yellow mark, Fig. 7D); T1 orange (vs mostly black); hind femur fully reddish (Fig. 15G) (vs apically blackish, Fig. 7D).

### Host

One specimen (USUC 143.2) was reared from *Diatraea saccharalis* (Fabricius, 1794) (Lepidoptera, Crambidae), the sugarcane borer. This moth is the most important pest of sugarcane, and some parasitoid species have been successfully used in its biological control in Brazil (see Molnár *et al.* 2016). Label information: “S[outh]A[merican]Par[asite] Labo[ratory]/Montevideo/No 143.2//Est de Sao/Paulo [São Paulo State] Braz[il]//issIx.5/HLParker//Parasiting *D. saccharalis*/?*Mesostenus tibialis* Bédet Cush1941”. The specimen was reared by the South American Parasite Laboratory, part of the United States Department of Agriculture, apparently in one of the team’s collecting excursions in the Brazilian state of São Paulo (mentioned in Parker *et al.* 1953). The reared specimen apparently died inside its pupa, or soon after emerging: wings are delicate and collapsed, propodeum apex is damaged and ovipositor valves separated.

### Distribution records

Argentina, Bolivia, Brazil (CE, ES, RJ, SP, PR, SC, RS), Peru.

### Discussion

This is the most complete investigation of *Distictus* up to now, supported by the study of 289 specimens and 100 morphological characters, of which 23 are morphometric ratios, generated from over 2200 measurements. It seems noteworthy that, even after such a thorough investigation and genus-level redefinition, the concept of *Distictus* as proposed by Townes (1966, 1970) was essentially correct. This might be somewhat surprising because *Distictus* is not easy to recognise as a separate, distinct unit, the main problem being its overall similarity with other Cryptinae genera, such as *Mallochia*, *Cyclaulus*, *Digonocryptus* and others. Townes (1970) also had a fair notion of the moderate diversity of *Distictus*, reporting only 5 species (4 undescribed). In fact, the group does not appear to be speciose, with only twelve species reported here. In addition, based mainly on the number of examined specimens and the

most recent date of collection, only *D. tibialis* can be considered common, while all other *Distictus* can be classified as moderately common to uncommon (*D. ateles* sp. nov., *D. mexicanus*, *D. paratibialis* sp. nov., *D. terrosus* sp. nov.), or rare (*D. apaensis* sp. nov., *D. ardens* sp. nov., *D. asterios* sp. nov., *D. daelus* sp. nov., *D. caligaris* sp. nov., *D. commatus* sp. nov., *D. notabilis* sp. nov.).

In spite of the inclusion of *Distictus* in a morphological (Aguiar 2005a, using literature information) and in a morphological + molecular (Santos 2017, using *D. tibialis*) phylogenetic investigation, its precise relationships with other Cryptinae remain to be settled. The evolutionary relationships and biogeographic history of its species also need to be investigated.

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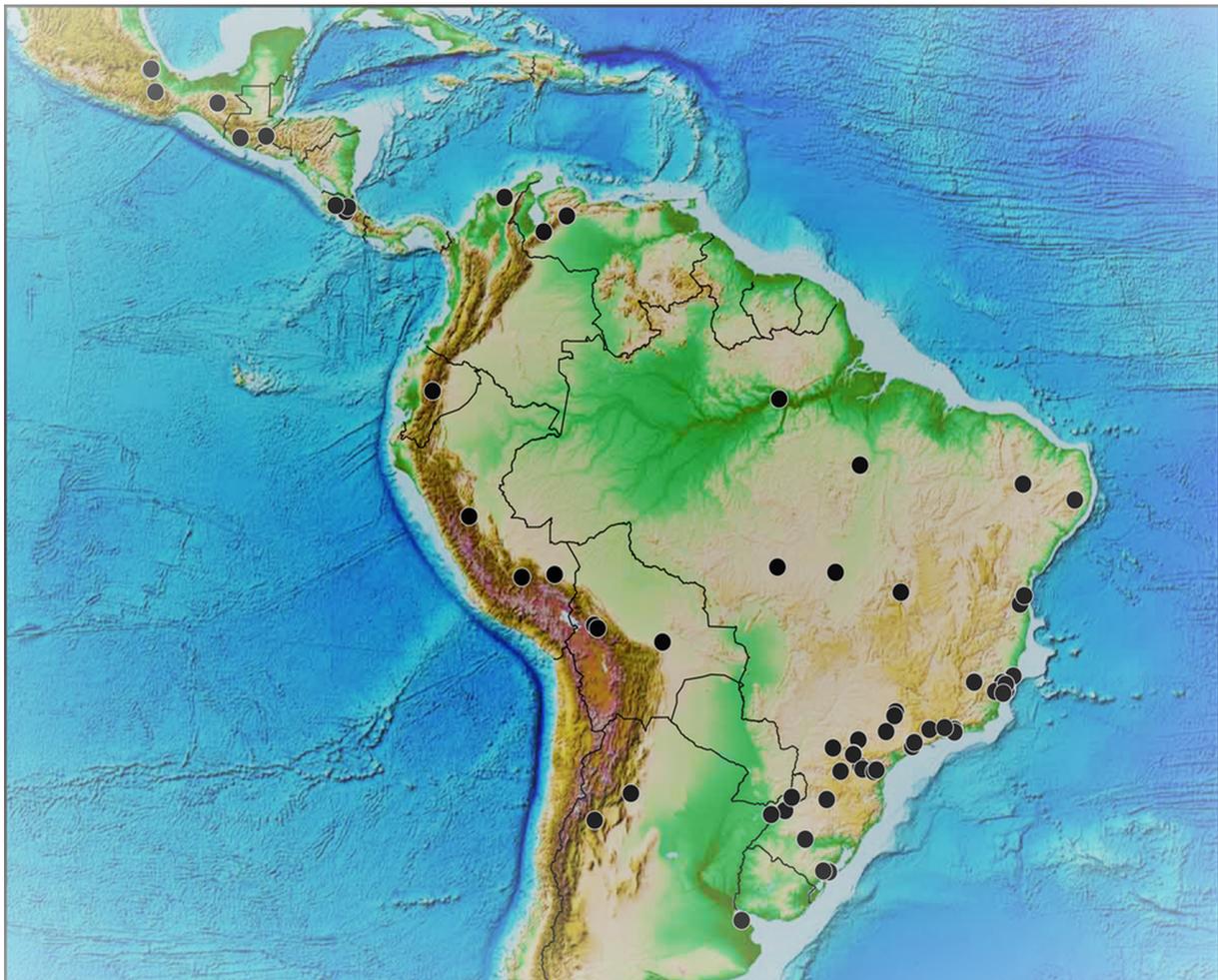


Fig. 17. Distribution records for *Distictus* spp., all records combined. Terrain + vegetation projection.

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## Appendix

Full set (2234 values) of measurements, in mm, from which all morphometric ratios and values in the text were derived. Hyphens (216 instances) indicate unavailable values. The lists are meant to be copied and pasted into any Python console, where values can be processed as desired, but can easily be adapted for use in other programming languages. Each species' list contains one or more lists of measurements for all measured specimens. Each individual list contains, respectively, the following values: [0] number of specimen, as cited between brackets in the 'Material examined' section for each respective species; [1] sex of specimen, with 0 for male and 1 for female; [2] Areolet min width (= anterior vein); [3] Areolet max height; [4] Areolet max width; [5] Clypeus max height; [6] Clypeus max width; [7] Number of flagellomeres; [8] Fore wing vein 2Cu<sub>a</sub> max length; [9] Fore wing crossvein 2cu-a max length; [10] Fore wing vein 2m-cu length; [11] Fore wing max length; [12] Hind tibia max length; [13] Hind wing vein Cua length; [14] Hind wing crossvein cu-a length; [15] Hind wing number of hamulli; [16] Mandible max length; [17] Mandible min width (apex); [18] Mandible max width (base); [19] Malar space max width; [20] Mesoscutum length; [21] Mesoscutum width; [22] Notauli max length; [23] Ovipositor ventral valve, number of teeth; [24] Ovipositor length; [25] Propodeal spiracle max length; [26] "Pre-sheath" ovipositor length; [27] Propodeal spiracle max width; [28] Pterostigma max width; [29] T2 max length; [30] T2 min width; [31] T2 max width; [32] T1 max length; [33] T1 min width; [34] T1 max width; [35] T1 length from base to spiracle; [36] T1 length from spiracle to apex.

*apaensis* = [[0, 1, 0.117, 0.258, 0.275, 0.340, 0.660, 28.000, 0.358, 0.292, 0.840, 9.880, 4.050, 0.383, 0.233, 9.000, 0.475, 0.158, 0.317, 0.283, 1.620, 1.400, 0.900, 8.000, 4.900, 0.100, 1.840, 0.075, 0.267, 1.300, 0.833, 1.533, 1.120, 0.388, 0.850, 0.617, 0.625]]

*ardens* = [[0, 1, 0.142, 0.333, 0.350, 0.283, 0.683, '-', 0.458, 0.375, 0.960, 11.600, 4.531, 0.458, 0.308, 10.000, 0.517, 0.183, 0.375, 0.283, 1.880, 1.608, '-', 7.000, 6.320, 0.117, 1.880, 0.092, 0.258, 1.656, 0.967, 1.800, 1.300, 0.333, 0.867, 0.783, 0.767], [1, 1, 0.432, 0.400, 0.298, 0.463, 1.012, 30.000, 0.600, 0.570, '-', 15.744, '-', 0.672, 0.352, '-', 0.910, 0.300, 0.580, 0.470, 2.848, 2.304, 2.080, 8.000, 5.333, 0.180, '-', 0.098, 0.400, 2.275, 1.325, 2.425, 2.050, 0.463, 1.100, 0.960, 0.940]]

*asterios* = [[0, 1, 0.084, 0.300, 0.296, 0.283, 0.650, '-', 0.400, 0.300, 0.830, 10.800, 4.275, 0.417, 0.250, 8.000, 0.500, 0.175, 0.350, 0.300, 1.720, 1.440, '-', 8.000, 4.700, 0.117, 1.367, 0.083, 0.233, 1.560, 0.920, 1.800, 1.283, 0.367, 0.867, 0.683, 0.667]]

*ateles* = [[0, 1, 0.150, 0.358, 0.392, 0.420, 0.960, 30.000, 0.500, 0.383, 0.800, 13.000, 5.688, 0.500, 0.358, 10.000, 0.667, 0.250, 0.492, 0.300, 2.013, 1.840, 1.125, 7.000, 5.750, 0.167, 2.013, 0.133, 0.300, 1.700, 1.192, 2.212, 1.650, 0.496, 1.080, 0.883, 0.800], [1, 1, 0.241, 0.413, 0.540, 0.500, 1.125, 0.000, 0.680, 0.640, '-', 18.821, '-', 0.750, 0.537, '-', 1.062, 0.375, 0.500, 0.537, 2.560, 3.400, '-', 7.000, 2.923, 0.262, 2.615, 0.128, 0.476, 2.752, 1.568, 3.040, 2.720, 0.600, 1.660, 1.260, 1.320], [2, 1, 0.114, 0.387, 0.387, 0.512, 1.280, 0.000, 0.670, 0.650, '-', 14.600, '-', 0.863, 0.562, '-', 1.075, 0.450, 0.750, 0.537, 3.880, 3.080, 2.800, 7.000, 8.872, 0.301, 3.282, 0.150, 0.575, 2.800, 1.920, 3.640, 2.688, 0.640, 1.760, 1.480, 1.500]]

*caligaris* = [[0, 0, 0.080, 0.160, 0.160, 0.210, 0.480, '-', 0.240, 0.204, 0.360, 6.400, '-', 0.274, 0.160, '-', 0.340, 0.120, 0.220, 0.160, 1.040, 0.920, 0.500, '-', '-', 0.080, '-', 0.076, 0.190, 1.160, 0.280, 0.530, 1.160, 0.160, 0.340, 0.500, 0.590]]

*commatus* = [[0, 1, 0.160, 0.300, 0.342, 0.367, 0.733, 30.000, 0.494, 0.460, 0.800, 12.619, 5.250, 0.517, 0.317, 10.000, 0.633, 0.217, 0.417, 0.317, 2.125, 1.740, 1.400, 8.000, 7.600, 0.158, 2.375, 0.100, 0.217, 1.667, 1.250, 1.860, 1.533, 0.408, 1.200, 0.917, 0.833]]

*daelus* = [[0, 1, 0.192, 0.383, 0.367, 0.383, 0.833, 30.000, 0.467, 0.383, 0.900, 12.250, 5.188, 0.590, 0.260, 10.000, 0.517, 0.200, 0.433, 0.317, 2.100, 1.820, 0.950, 9.000, 6.400, 0.158, 1.900, 0.108, 0.258, 1.640, 1.150, 1.890, 1.600, 0.450, 1.050, 0.933, 0.825]]

*mexicanus* = [[0, 1, 0.094, 0.320, 0.275, 0.300, 0.650, '-', 0.383, 0.350, 0.800, 10.480, 4.562, 0.417,

0.317, 8.000, 0.533, 0.200, 0.367, 0.292, 1.820, 1.620, 1.120, 7.000, 4.525, 0.125, 1.517, 0.075, 0.267, 1.483, 1.083, 1.610, 1.267, 0.375, 1.067, 0.717, 0.750], [1, 1, 0.168, 0.360, 0.332, 0.550, 1.150, 29.000, 0.472, 0.512, ‘-’, 17.077, ‘-’, 0.660, 0.360, ‘-’, 0.960, 0.349, 0.603, 0.425, 3.040, 2.592, 2.144, 7.000, 4.923, 0.200, ‘-’, 0.130, 0.430, 2.272, 1.824, 3.040, 2.500, 0.700, 1.700, 1.125, 1.125], [2, 1, 0.152, 0.298, 0.286, 0.390, 0.880, 28.000, 0.413, 0.413, ‘-’, 13.077, ‘-’, 0.470, 0.349, ‘-’, 0.720, 0.254, 0.476, 0.343, 2.225, 1.950, 1.875, 6.000, 6.000, 0.125, 1.949, 0.075, 0.368, ‘-’, ‘-’, ‘-’, ‘-’, 0.560, 1.600, 1.392, 0.900]]

*notabilis* = [[0, 1, 0.183, 0.360, 0.392, 0.383, 0.950, 30.000, 0.500, 0.417, 1.280, 14.000, 6.160, 0.575, 0.367, 9.000, 0.633, 0.267, 0.483, 0.400, 2.100, 2.060, 1.130, 6.000, 6.062, 0.208, 2.150, 0.125, 0.333, 1.840, 1.258, 2.300, 1.650, 0.500, 1.150, 0.933, 0.908]]

*paratibialis* = [[0, 1, 0.133, 0.250, 0.233, 0.267, 0.700, 27.000, 0.383, 0.292, 0.950, 9.560, 4.225, 0.375, 0.333, 9.000, 0.483, 0.183, 0.350, 0.233, 1.720, 1.520, 0.900, 8.000, 3.940, 0.100, 1.183, 0.083, 0.217, 1.350, 0.983, 1.660, 1.317, 0.367, 0.917, 0.717, 0.733], [1, 1, 0.108, 0.217, 0.225, 0.217, 0.517, 26.000, 0.250, 0.233, 0.680, 7.344, 3.120, 0.292, 0.192, 8.000, 0.367, 0.150, 0.275, 0.183, 1.283, 1.117, 0.700, 7.000, 3.280, 0.092, 1.117, 0.058, 0.208, 1.067, 0.650, 1.267, 0.933, 0.267, 0.650, 0.550, 0.550], [2, 1, 0.100, 0.192, 0.220, 0.233, 0.467, 27.000, 0.242, 0.200, 0.620, 6.875, ‘-’, 0.250, 0.167, 8.000, 0.404, 0.142, 0.260, 0.183, 1.160, 1.010, 0.780, 7.000, 3.400, 0.117, 1.250, 0.092, 0.192, 1.017, 0.700, 1.242, 1.017, 0.250, 0.692, 0.550, 0.533], [3, 1, 0.133, 0.310, 0.275, 0.217, 0.667, 27.000, 0.383, 0.342, 0.840, 10.040, 4.250, 0.442, 0.300, 9.000, 0.542, 0.200, 0.400, 0.250, 1.680, 1.570, 1.160, 8.000, 4.850, 0.133, 1.860, 0.100, 0.280, 1.467, 0.900, 1.900, 1.367, 0.392, 1.017, 0.833, 0.733], [4, 1, 0.108, 0.224, 0.183, 0.217, 0.525, 26.000, 0.250, 0.225, 0.720, 7.438, 3.312, 0.283, 0.200, 7.000, 0.400, 0.125, 0.300, 0.183, 1.300, 1.080, 0.760, 6.000, 3.480, 0.092, 1.167, 0.067, 0.240, 1.067, 0.733, 1.317, 1.000, 0.267, 0.683, 0.533, 0.525]]

*terrosus* = [[0, 1, 0.200, 0.375, 0.367, 0.317, 0.833, 30.000, 0.517, 0.417, ‘-’, 13.450, 6.000, 0.558, 0.358, 10.000, 0.617, 0.250, 0.500, 0.317, 2.200, 1.830, 1.200, 7.000, 5.750, 0.183, 2.200, 0.108, 0.300, 1.710, 1.350, 2.225, 1.567, 0.433, 1.300, 0.967, 0.842], [1, 1, 0.183, 0.470, 0.400, 0.400, 0.900, 30.000, 0.558, 0.458, 1.060, 15.067, 6.400, 0.583, 0.400, ‘-’, 0.650, 0.300, 0.540, 0.400, 2.325, 2.025, 1.160, 8.000, 6.280, 0.175, 1.700, 0.117, 0.320, 2.020, 1.483, 2.580, 1.700, 0.500, 1.400, 0.933, 0.917], [2, 1, 0.217, 0.383, 0.333, 0.383, 0.900, 30.000, 0.542, 0.450, ‘-’, 13.750, ‘-’, 0.567, 0.358, ‘-’, 0.675, 0.250, 0.517, 0.367, 2.150, 1.980, 1.438, 8.000, 6.188, 0.175, 2.200, 0.100, 0.300, 1.820, 1.400, 2.438, 1.740, 0.500, 1.400, 1.033, 0.867], [3, 1, 0.167, 0.400, 0.358, 0.350, 0.950, ‘-’, 0.517, 0.442, 1.120, 14.333, 6.304, 0.583, 0.350, 12.000, 0.617, 0.250, 0.517, 0.367, 2.350, 2.000, 1.100, 7.000, 6.250, 0.200, 1.800, 0.117, 0.300, 2.120, 1.500, 2.480, 1.700, 0.500, 1.500, 1.108, 0.892], [4, 1, 0.175, 0.367, 0.350, 0.333, 0.833, 29.000, 0.533, 0.400, 1.040, 12.950, 5.840, 0.533, 0.433, 10.000, 0.667, 0.217, 0.508, 0.333, 2.025, 1.770, 0.970, ‘-’, ‘-’, 0.175, 1.710, 0.108, 0.300, 1.670, 1.283, 2.212, 1.650, 0.483, 1.283, 0.925, 0.825], [5, 1, 0.217, 0.410, 0.406, 0.483, 1.017, ‘-’, 0.550, 0.433, ‘-’, 14.733, 6.106, 0.567, 0.408, 12.000, 0.700, 0.250, 0.517, 0.433, 2.400, 1.950, 1.200, 7.000, 6.219, 0.192, 1.700, 0.133, 0.283, 1.840, 1.483, 2.609, 1.900, 0.525, 1.517, 1.067, 0.883], [6, 1, 0.192, 0.400, 0.375, 0.392, 0.900, 30.000, 0.533, 0.433, ‘-’, 14.067, 6.062, 0.550, 0.433, 10.000, 0.683, 0.258, 0.500, 0.350, 2.300, 1.880, 1.420, 7.000, 6.480, 0.196, 2.000, 0.116, 0.333, 1.710, ‘-’, 2.250, ‘-’, ‘-’, ‘-’, 0.917, 0.800], [7, 1, 0.200, 0.346, 0.346, 0.317, 0.767, 29.000, 0.417, 0.367, 1.100, 12.100, 5.281, 0.500, 0.325, 11.000, 0.525, 0.217, 0.450, 0.250, 1.940, 1.620, 0.840, 7.000, 5.500, 0.158, 1.960, 0.100, 0.267, 1.517, 1.133, 2.013, 1.333, 0.367, 1.067, 0.800, 0.750], [8, 1, 0.175, 0.380, 0.317, 0.333, 0.900, 31.000, 0.567, 0.450, ‘-’, 14.267, ‘-’, 0.625, 0.408, ‘-’, 0.750, 0.267, 0.517, 0.367, 2.375, 1.960, 1.180, 5.000, 6.188, 0.175, 1.800, 0.108, 0.350, 1.970, 1.500, 2.516, 1.820, 0.560, 1.500, 1.008, 0.883], [9, 1, 0.167, 0.375, 0.342, 0.400, 0.933, 31.000, 0.567, 0.450, 1.060, 13.933, ‘-’, 0.583, 0.400, ‘-’, 0.733, 0.250, 0.517, 0.400, 2.040, 2.000, 1.020, 7.000, 6.250, 0.192, 1.720, 0.133, 0.317, 1.980, 1.433, 2.500, 1.820, 0.508, 1.433, 1.125, 0.967], [10, 1, 0.225, 0.392, 0.333, 0.367, 0.833, ‘-’, 0.500, 0.400, 1.080, 13.150, ‘-’, 0.583, 0.400, ‘-’, 0.692, 0.250, 0.483, 0.400, 2.125,

1.930, ‘-’, ‘-’, 6.062, 0.183, 1.860, 0.108, 0.300, 1.760, 1.383, 2.375, 1.667, 0.450, 1.300, 0.983, 0.800]]  
*tibialis* = [[0, 1, 0.075, 0.200, 0.175, 0.200, 0.417, 26.000, 0.250, 0.208, ‘-’, 7.031, ‘-’, 0.242, 0.200, ‘-’,  
0.333, 0.142, 0.200, 0.133, 1.167, 1.067, 0.600, 7.000, 3.200, 0.067, 0.833, 0.050, 0.183, 0.967, 0.675,  
1.250, 0.933, 0.275, 0.683, 0.483, 0.483], [1, 1, 0.167, 0.325, 0.292, 0.333, 0.667, 28.000, 0.417, 0.350,  
‘-’, 11.300, ‘-’, 0.458, 0.325, ‘-’, 0.670, 0.200, 0.440, 0.250, 2.025, 1.660, 1.160, ‘-’, 4.850, 0.058, 1.300,  
0.042, 0.317, 1.600, ‘-’, ‘-’, 1.233, 0.408, ‘-’, ‘-’, ‘-’], [2, 1, 0.100, 0.283, 0.250, 0.340, 0.720, 28.000,  
0.375, 0.267, 0.880, 10.280, ‘-’, 0.350, 0.183, 8.000, 0.433, 0.183, 0.283, 0.250, 1.770, 1.430, 1.100,  
7.000, 4.350, 0.100, 1.183, 0.067, 0.250, 1.350, 0.967, 1.750, ‘-’, 0.350, 0.900, 0.700, 0.733], [3, 1,  
0.150, 0.317, 0.317, 0.300, 0.700, 29.000, 0.500, 0.342, 1.020, 11.000, ‘-’, 0.467, 0.267, ‘-’, 0.608,  
0.200, 0.408, 0.300, 1.880, 1.880, 1.240, 8.000, 4.525, 0.108, 1.317, 0.075, 0.267, 1.642, 1.196, 1.667,  
‘-’, ‘-’, 0.533, ‘-’, ‘-’], [4, 1, 0.125, 0.300, 0.300, 0.300, 0.617, 27.000, 0.317, 0.275, ‘-’, 9.040, 4.062,  
0.358, 0.208, ‘-’, 0.450, 0.175, 0.333, 0.233, 1.383, 1.433, 0.740, 8.000, 4.100, 0.100, 1.125, 0.075,  
0.200, 1.333, ‘-’, 1.667, 1.233, ‘-’, ‘-’, ‘-’, ‘-’], [5, 1, 0.133, 0.283, 0.292, 0.300, 0.625, 26.000, 0.350,  
0.308, ‘-’, 9.160, ‘-’, 0.358, 0.258, ‘-’, 0.467, 0.175, 0.333, 0.217, 1.608, 1.367, 0.840, 7.000, 4.100,  
0.067, 1.333, 0.050, 0.240, 1.258, 0.900, 1.780, 1.130, 0.320, 0.860, ‘-’, ‘-’], [6, 1, 0.092, 0.217, 0.225,  
0.233, 0.533, 26.000, 0.267, 0.225, 0.660, 7.688, ‘-’, 0.267, 0.200, 7.000, 0.400, 0.133, 0.300, 0.192,  
1.367, 1.133, 0.600, 7.000, 3.480, 0.096, 0.983, 0.072, 0.183, 1.100, ‘-’, 1.350, 1.000, 0.242, 0.650, ‘-’,  
‘-’], [7, 1, 0.100, 0.208, 0.233, 0.200, 0.475, 26.000, 0.233, 0.208, ‘-’, 7.188, ‘-’, 0.252, 0.254, ‘-’, 0.350,  
0.133, 0.250, 0.167, 1.292, 1.108, 0.760, 7.000, 3.200, 0.075, 1.058, 0.058, 0.167, 1.000, 0.700, 1.267,  
0.967, 0.267, 0.633, 0.474, 0.540], [8, 1, 0.150, 0.275, 0.275, 0.300, 0.722, 28.000, 0.392, 0.342, ‘-’,  
10.760, 4.688, 0.417, 0.325, 9.000, 0.517, 0.200, 0.350, 0.250, 2.013, 1.660, 1.220, 8.000, 4.700, 0.108,  
1.367, 0.092, 0.283, 1.492, 1.133, 1.970, 1.440, 0.392, 1.020, 0.820, 0.754], [9, 1, ‘-’, ‘-’, ‘-’, 0.158,  
0.383, 24.000, 0.150, 0.230, ‘-’, 5.125, 2.312, 0.200, 0.142, 6.000, 0.320, 0.100, 0.214, 0.140, 0.917,  
0.800, 0.440, 8.000, 2.500, 0.060, 1.000, 0.054, 0.175, 0.966, 0.480, 0.840, 0.400, 0.100, 0.258, ‘-’, ‘-’],  
[10, 1, 0.117, 0.267, 0.242, 0.283, 0.617, 27.000, 0.308, 0.258, ‘-’, 9.360, ‘-’, 0.350, 0.233, ‘-’, 0.442,  
0.158, 0.350, 0.217, 1.342, 1.508, ‘-’, 8.000, 3.980, 0.083, 1.275, 0.058, 0.267, 1.250, 0.850, 1.525, ‘-’,  
0.300, 0.800, 0.608, 0.617], [11, 1, 0.083, 0.217, 0.200, 0.225, 0.525, 26.000, 0.233, 0.225, 0.640, 7.219,  
‘-’, 0.270, 0.220, ‘-’, 0.383, 0.133, 0.258, 0.158, 1.280, 1.075, 0.700, 7.000, 3.560, 0.067, 1.117, 0.058,  
0.200, 0.983, 0.708, 1.308, 0.983, 0.250, 0.642, 0.517, 0.517], [12, 1, 0.083, 0.208, 0.217, 0.233, 0.600,  
27.000, 0.325, 0.242, ‘-’, 9.120, ‘-’, 0.317, 0.267, ‘-’, 0.417, 0.175, 0.325, 0.225, 1.367, 1.383, 0.960,  
8.000, 4.175, 0.092, 1.417, 0.075, 0.183, 1.233, 0.892, 1.633, 1.183, 0.342, 0.800, 0.583, 0.658], [13, 1,  
0.150, 0.342, 0.300, 0.383, 0.800, 29.000, 0.475, 0.350, ‘-’, 12.190, 5.250, 0.517, 0.292, 8.000, 0.617,  
0.217, 0.467, 0.317, 2.125, 1.810, 1.475, 7.000, 4.875, 0.133, 1.890, 0.092, 0.292, 1.660, 1.300, 2.000,  
‘-’, 0.400, ‘-’, 0.883, 0.883], [14, 1, 0.108, 0.225, 0.242, 0.150, 0.500, ‘-’, 0.250, 0.242, ‘-’, 7.500, ‘-’,  
0.283, 0.183, 8.000, 0.400, 0.133, 0.267, 0.183, 1.230, 1.100, 0.880, 7.000, 3.180, 0.083, 0.942, 0.067,  
0.233, 1.092, 0.675, 1.300, 0.967, 0.267, 0.608, 0.492, 0.533], [15, 1, 0.142, 0.283, 0.267, 0.233, 0.625,  
28.000, 0.358, 0.283, 0.860, 9.680, ‘-’, 0.383, 0.283, ‘-’, 0.620, 0.183, 0.396, 0.240, 1.700, 1.550, 0.950,  
7.000, 4.800, 0.083, 1.583, 0.067, 0.233, 1.400, 0.850, 1.475, 1.300, 0.367, 0.950, 0.700, 0.733], [16, 1,  
0.133, 0.283, 0.275, 0.320, 0.660, ‘-’, 0.383, 0.258, ‘-’, 9.520, 4.250, 0.367, 0.250, ‘-’, 0.467, 0.167,  
0.325, 0.233, 1.660, 1.433, 0.860, 6.000, 3.300, 0.100, 1.225, 0.067, 0.267, 1.308, 0.900, 1.567, 1.267,  
0.333, 0.817, 0.660, 0.700], [17, 1, 0.117, 0.225, 0.225, 0.200, 0.575, 26.000, 0.283, 0.250, 0.700, 8.344,  
‘-’, 0.308, 0.200, ‘-’, 0.450, 0.150, 0.283, 0.208, 1.460, 1.220, 0.800, 7.000, 3.440, 0.083, 1.167, 0.067,  
0.217, 1.183, 0.683, 1.425, 1.040, 0.267, 0.767, 0.592, 0.558], [18, 1, 0.100, 0.250, 0.233, 0.217, 0.608,  
27.000, 0.325, 0.258, ‘-’, 8.880, ‘-’, 0.367, 0.233, ‘-’, 0.383, 0.167, 0.300, 0.217, 1.560, 1.360, 0.780,  
6.000, 3.840, ‘-’, 1.308, ‘-’, 0.200, 1.300, 0.875, 1.583, 1.167, 0.336, 0.838, 0.633, 0.633], [19, 1, 0.108,  
0.333, 0.267, 0.383, 0.850, 29.000, 0.383, 0.383, 0.900, 11.700, 5.250, 0.492, 0.317, 8.000, 0.617, 0.233,  
0.450, 0.350, 2.175, 1.870, 1.100, 8.000, 5.156, 0.142, 1.650, 0.100, 0.317, 1.670, 1.367, 2.350, 1.600,  
0.450, 1.267, 0.883, 0.850], [20, 1, 0.100, 0.320, 0.242, 0.367, 0.767, ‘-’, 0.350, 0.350, ‘-’, 11.100, ‘-’,  
0.417, 0.342, ‘-’, 0.617, 0.233, 0.433, 0.283, 1.950, 1.640, 1.260, 8.000, 5.469, 0.133, 1.720, 0.092,

0.280, 1.517, 1.300, 1.950, ‘-’, 0.450, 1.120, 0.733, 0.817], [21, 1, 0.083, 0.200, 0.192, 0.200, 0.483, 26.000, 0.267, 0.258, ‘-’, 7.656, ‘-’, 0.308, 0.200, ‘-’, 0.383, 0.150, 0.292, 0.183, 1.342, 1.142, 0.840, 8.000, 3.780, 0.092, 1.233, 0.075, 0.200, 1.075, 0.717, 1.300, 0.967, 0.283, 0.708, 0.517, 0.550], [22, 1, 0.100, 0.250, 0.233, 0.242, 0.542, 27.000, 0.250, 0.267, ‘-’, 7.875, ‘-’, 0.300, 0.217, ‘-’, 0.425, 0.150, 0.317, 0.183, 1.350, 1.220, 0.840, 8.000, 3.520, 0.075, 0.983, 0.058, 0.233, 1.117, 0.767, 1.367, 1.000, 0.267, 0.767, 0.533, 0.592], [23, 1, 0.167, 0.317, 0.292, 0.233, 0.717, 27.000, 0.417, 0.317, ‘-’, 11.300, ‘-’, 0.417, 0.317, ‘-’, 0.558, 0.200, 0.367, 0.267, 1.980, 1.620, 1.200, 8.000, 4.875, 0.117, 1.433, 0.092, 0.283, 1.533, 1.150, 1.880, ‘-’, 0.433, 1.117, 0.633, 0.650], [24, 1, 0.108, 0.208, 0.217, 0.167, 0.483, 25.000, 0.217, 0.200, 0.580, 6.500, 3.060, 0.242, 0.125, ‘-’, 0.333, 0.117, 0.250, 0.183, 1.160, 1.020, 0.580, 7.000, 2.938, 0.067, 0.883, 0.050, 0.192, 0.967, 0.650, 1.158, 0.917, 0.294, 0.580, 0.483, 0.467], [25, 1, 0.125, 0.233, 0.208, 0.300, 0.617, 27.000, 0.342, 0.225, ‘-’, 8.840, 4.000, 0.325, 0.217, ‘-’, 0.450, 0.167, 0.308, 0.217, 1.560, 1.350, 0.760, 7.000, 4.300, 0.092, 1.333, 0.067, 0.233, 1.300, 0.850, 1.467, 1.167, 0.300, 0.825, 0.633, 0.650], [26, 1, 0.100, 0.180, 0.175, 0.200, 0.450, ‘-’, ‘-’, ‘-’, ‘-’, 8.750, ‘-’, ‘-’, ‘-’, ‘-’, 0.317, 0.125, 0.233, 0.167, 1.120, 0.940, ‘-’, ‘-’, ‘-’, 0.067, 1.000, 0.050, 0.244, 0.917, 0.575, 1.067, 0.850, 0.200, 0.575, ‘-’, ‘-’], [27, 1, 0.133, 0.250, 0.250, 0.233, 0.617, ‘-’, 0.300, 0.250, ‘-’, 8.640, ‘-’, 0.342, 0.242, ‘-’, 0.450, 0.167, 0.325, 0.250, 1.580, 1.360, 0.900, 7.000, 4.000, 0.092, 1.283, 0.067, 0.225, 1.267, 0.900, 1.625, 1.183, 0.317, 0.883, 0.617, 0.650], [28, 1, 0.208, 0.350, 0.383, 0.390, 0.800, 28.000, 0.483, 0.400, ‘-’, 11.500, ‘-’, 0.517, 0.300, 9.000, 0.550, 0.217, 0.400, 0.300, 2.087, 1.820, 1.360, 8.000, 5.750, 0.133, 2.025, 0.092, 0.300, 1.660, 1.258, 2.000, 1.483, 0.475, 1.150, 0.817, 0.833], [29, 1, 0.083, 0.175, 0.183, 0.200, 0.408, 24.000, 0.167, 0.200, 0.460, 5.700, ‘-’, 0.217, 0.133, ‘-’, 0.340, 0.100, 0.234, 0.125, 0.917, 0.808, 0.600, 7.000, 2.438, 0.058, 0.583, 0.042, 0.175, 0.733, 0.517, 1.000, 0.667, 0.192, 0.433, 0.375, 0.400], [30, 1, 0.108, 0.183, 0.183, 0.150, 0.400, 25.000, 0.217, 0.183, ‘-’, 6.550, ‘-’, 0.233, 0.183, ‘-’, 0.317, 0.100, 0.217, 0.125, 1.020, 0.900, ‘-’, ‘-’, 2.844, 0.067, 0.717, 0.050, 0.217, 0.800, 0.600, 0.967, 0.933, 0.217, 0.600, 0.425, 0.433], [31, 1, 0.133, 0.292, 0.275, 0.283, 0.625, 28.000, 0.342, 0.308, ‘-’, 9.520, ‘-’, 0.350, 0.300, ‘-’, 0.500, 0.183, 0.342, 0.233, 1.700, 1.450, 0.880, 7.000, 4.125, 0.100, 1.458, 0.083, 0.258, 1.350, 0.917, 1.690, 1.167, 0.333, 0.833, 0.575, 0.667], [32, 1, 0.183, 0.300, 0.292, 0.333, 0.667, 27.000, 0.433, 0.317, ‘-’, 10.840, ‘-’, 0.417, 0.233, ‘-’, 0.433, 0.183, 0.308, 0.267, 1.820, 1.650, ‘-’, 7.000, 4.675, 0.117, 1.267, 0.083, 0.270, 1.533, 1.150, 1.850, 1.425, 0.400, 1.075, 0.758, 0.767], [33, 1, 0.133, 0.264, 0.242, 0.233, 0.475, 27.000, 0.292, 0.267, ‘-’, 8.281, ‘-’, 0.317, 0.250, ‘-’, 0.417, 0.150, 0.333, 0.192, 1.433, 1.317, ‘-’, 8.000, 4.150, 0.083, 1.317, 0.067, 0.180, 1.183, 0.850, 1.433, 1.117, 0.292, 0.758, 0.575, 0.608], [34, 1, 0.092, 0.210, 0.240, 0.233, 0.508, 26.000, 0.250, 0.217, ‘-’, 7.344, ‘-’, 0.267, 0.217, ‘-’, 0.358, 0.133, 0.267, 0.167, 1.140, 1.060, 0.680, 7.000, 3.520, 0.075, 1.425, 0.050, 0.240, 1.133, 0.683, 1.300, 0.933, 0.267, 0.650, 0.450, 0.500], [35, 1, 0.100, 0.233, 0.217, 0.208, 0.450, 26.000, 0.242, 0.233, ‘-’, 6.875, ‘-’, 0.284, 0.162, ‘-’, 0.383, 0.125, 0.240, 0.160, 1.120, 1.067, 0.600, 8.000, 2.938, 0.100, 0.850, 0.083, 0.225, ‘-’, ‘-’, ‘-’, 0.740, 0.250, 0.594, 0.260, 0.517], [36, 1, 0.133, 0.308, 0.250, 0.317, 0.817, 29.000, 0.383, 0.367, ‘-’, 10.760, ‘-’, 0.442, 0.267, ‘-’, 0.567, 0.183, 0.375, 0.300, 1.850, 1.700, 1.260, 8.000, 5.062, 0.133, 1.333, 0.100, 0.258, 1.583, 1.150, 1.950, 1.450, 0.433, 1.100, 0.767, 0.817], [37, 1, 0.133, 0.330, 0.300, 0.325, 0.683, ‘-’, 0.383, 0.358, ‘-’, 10.120, ‘-’, 0.417, 0.317, ‘-’, 0.533, 0.200, 0.383, 0.250, 1.760, 1.560, 0.940, 7.000, 4.350, 0.142, 1.217, 0.092, 0.317, 1.500, 1.092, 1.800, ‘-’, ‘-’, ‘-’, 0.733, 0.750], [38, 1, 0.133, 0.317, 0.292, 0.267, 0.683, 28.000, 0.433, 0.350, ‘-’, 10.640, ‘-’, 0.433, 0.275, ‘-’, 0.680, 0.175, 0.400, 0.250, 1.780, 1.640, 0.920, 6.000, 4.850, 0.117, 1.350, 0.100, 0.267, 1.617, 1.100, 1.920, 1.540, 0.404, 1.042, 0.800, 0.825], [39, 1, 0.142, 0.317, 0.283, 0.358, 0.742, 28.000, 0.425, 0.358, ‘-’, 10.160, ‘-’, 0.458, 0.267, ‘-’, 0.533, 0.200, 0.417, 0.267, 1.720, 1.590, ‘-’, 8.000, 5.000, 0.133, 1.740, 0.108, 0.300, 1.550, 1.150, 2.000, 1.533, 0.417, 1.033, ‘-’, ‘-’]]