

Rove beetles of medical importance in Brazil (Coleoptera, Staphylinidae, Paederinae)

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ABSTRACT. Rove beetles of medical importance in Brazil (Coleoptera, Staphylinidae, Paederinae). The rove beetles of the genus *Paederus* Fabricius, 1775 are the most important group within Coleoptera causing dermatitis around the world. The medical importance of *Paederus* depends on its toxic hemolymph released when these beetles are crushed on human skin. The effects are mainly dermatitis linearis and some sporadic cases of conjunctivitis. In Brazil seven species of *Paederus* are known to cause dermatitis: *P. amazonicus* Sharp, 1876, *P. brasiliensis* Erichson, 1840, *P. columbinus* Laporte, 1835, *P. ferus* Erichson, 1840, *P. mutans* Sharp, 1876, *P. protensus* Sharp, 1876 **stat. rev.**, and *Paederus rutilicornis* Erichson, 1840. *Paederus mutans* and *P. protensus* are for the first time recorded as of medical importance, whereas the record of *P. rutilicornis* in Brazil is doubtful. All seven species are redescribed and a dichotomous key is provided. The geographic distributions of all species are documented. The results provided here include the most recent and relevant taxonomic revision of *Paederus* of the Neotropical region, the first identification key for Brazilian species and the increase of recorded species of medical importance in the world.

KEYWORD. Insecta; Neotropical; New World; pederin; skin injuries.

Rove beetles of the genus *Paederus* Fabricius, 1775 are the most famous beetles that cause injuries of medical importance. Besides *Paederus*, there are other species, for example, within Meloidae and Oedemeridae, which evolved the ability of releasing toxic substances that cause only mild cases of erythema. The toxic hemolymph released when some species of *Paederus* are crushed on human skin causes dermatitis and conjunctivitis that may be rated as mild, moderate and severe. The substance released is a complex of three nonproteinaceous toxins named pederin, pseudopederin and pederone. An exhaustive work about medical importance of *Paederus* (and its natural history) can be found in Frank & Kanamitsu (1987), and an ethnoentomological study was made by Navarrete-Heredia & Flores (2005).

Paederus comprises 492 valid species worldwide (A.F. Newton, pers. comm.). However, only about 4% of these species have been noticed to be of medical importance and the geographical range of incidents includes most of the tropics and subtropics. Adults of *Paederus* are typical rove beetles, elongate, with a maximum of 25 mm in length and commonly exhibiting aposematic bright colors, as head and abdominal apex darker, thorax and abdominal apex orange and elytra with metallic blue or green luster. Species of the genus occur in many environments, but are usually associated with wet places, and also have been found in rural and urban areas. Eighty-eight species of *Paederus* are known from the Neotropical region (including Chile and southern Argentina), three of which also occur in the southwestern Nearctic region (States of Ari-

zona, California and Colorado in the USA) (A.F. Newton, pers. comm.). In Brazil, 23 species have been recorded.

Frank & Kanamitsu (1987) list nine species of medical importance occurring in the Neotropical region of which five in Brazil: *P. amazonicus* Sharp, 1876, *P. brasiliensis* Erichson, 1840, *P. columbinus* Laporte, 1835, *P. ferus* Erichson, 1840 and *P. rutilicornis* Erichson, 1840. The first record of *Paederus* causing dermatitis in Brazil was in Bahia state and attributed to *P. columbinus* (Silva 1912). However, since 1990, in the north and northeast of Brazil, there was an increase in the number of incidents caused by species of *Paederus* (Diogenes 1994; Albuquerque *et al.* 2008 and Amado *et al.* 2010). In 2009, the reported incidents reached 11 of the 27 Brazilian states: Amazonas, Pará, Ceará, Paraíba, Alagoas, Bahia, Pernambuco, Goiás, Minas Gerais, São Paulo and Paraná (Torres 1922; Froes 1935; Pickel 1940a, 1940b; Fain 1966; Diogenes 1994; Albuquerque *et al.* 2008; Cardoso & Haddad 2009; Amado *et al.* 2010, Mammino 2011; Fonseca *et al.* 2012).

At the moment, the identification of most species of *Paederus* is difficult in the entire world and the main problem is the lack of adequate identification keys and taxonomic review studies for most geographical regions (Frank & Kanamitsu 1987). Moreover, the correct identification of the species of *Paederus* of medical importance is essential for future studies with health focus. Thus, the present study aimed to make a complete taxonomic revision of species of *Paederus* of medical importance in Brazil, including redescription of all species, identification key and distributional lists.

MATERIAL AND METHODS

Almost 400 adult specimens of *Paederus* were examined. The abbreviations cited below for each institution are used in the text (the name of the curator is given in parentheses): BMNH, The Natural History Museum, London, United Kingdom (R.G. Booth); DZUP, Coleção de Entomologia Pe. J.S. Moure, Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, Brazil (L.M. Almeida); FMNH, Field Museum of Natural History, Chicago, United States of America (M.K. Thayer); INPA, Coleção Sistemática de Entomologia, Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil (A. Henriques); MZSP, Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil (S.A. Casari); SESA/PR, Secretaria de Estado da Saúde do Paraná, Curitiba, Brazil (G.B.G. Rubio); SMS/MG, Secretaria Municipal de Saúde de Betim, Betim, Brazil (R.B. Armando); UFMA, Universidade Federal do Maranhão, Chapadinha, Brazil (F.S. Silva); ZMHB, Museum für Naturkunde der Humboldt-Universität, Berlin, Germany (J. Willers).

All species of the current study are listed in Frank's index as subgenera unassigned, thus *Paederus* "sensu lato" (Frank 1988). Here we do not use any subgeneric concept, since the complicated status of the subgeneric classification has been noticed in some works (Frank 1988; Li & Zhou 2007, 2009). We agree with the recommendation of Frank (1988) that there are two major taxonomic needs, the first of them to review and redescribe the species of the Neotropical region (in addition to other regions), and the second to extend Fagel's work (Fagel 1958) for better understanding of classification of *Paederus*.

Type material was examined for all species names of *Paederus* listed as of medical importance in Brazil, except for *P. columbinus* Laporte, 1835 (not found, probably lost) and *P. lugubris* Motschulsky, 1858 (syntype in the Zoological Museum of Moscow University (ZMUM), junior synonym of *P. rutilicornis* Erichson, 1840 by Blackwelder (1944)). Labels from type material are organized in sequence from top to bottom, where the data from each label are enclosed within double quotes (""), a forward slash (/) separates lines, and information enclosed by square brackets ([]) provides added details about the labels. Comments on the type material are provided in the item "Note". Information from labels of additional material is organized, when complete, as follows: country: district/province/state, number of male and female specimens, municipality in italic, locality, extra information, date, collector (abbreviation of institution). The diagnosis of the species follows the glossary of the International Code of Zoological Nomenclature, 4th edition, which defines as "a statement in words that purports to give those characters which differentiate the taxon from other taxa with which it is likely to be confused" (ICZN 1999). Geographic distribution of each species is listed in the text by country and followed by, when possible, state and location (enclosed by parentheses). In "Medical Importance", we list cases from the literature and some

extra information, but we were unable to confirm identification for all species cited.

The morphological terminology adopted is from Naomi (1987–1990), including Beutel & Leschen (2005) for ventral sclerites of female genitalia and Gusarov (2002) for position of aedeagus. Measurements were taken using a micrometric ocular in a stereoscopic microscope Zeiss and Leica M165 V8 Discovery C. The following abbreviations were used: BL, body length (anterior margin of the head to the posterior margin of tergite 8); BW, body width (in the humeral region); HL, maximum head length; HW, maximum head width; PL, maximum pronotum length; PW, maximum pronotum width; and EL, maximum elytra length.

Most features were observed from dried pinned specimens and some specimens were macerated in boiling water for three minutes and then segments 8–10 were separated from the abdomen, dissected and cleared in 10% cold potassium hydroxide for ten minutes, followed by a bath of acetic acid to neutralize the hydroxide and water to remove any residue. The dissections were carried out under a stereoscopic microscope Zeiss and Leica M165 V8 Discovery C. The dissected parts were put inside microvials with glycerin or on transparent plastic board covered with Canada balsam, both pinned with the specimen. Photographs were taken with Leica DFC 500 digital camera attached to a stereoscopic microscope Leica MZ16 and the images combined using Auto-Montage Pro (Synchrosopy) image processing software at "Taxonline – Rede Paranaense Coleções Biológicas", Zoology Department of the Federal University of Paraná. The final images were edited in Photoshop CS5.1.

TAXONOMY

Paederus Fabricius, 1775

Paederus Fabricius, 1775: 268 (original description, no type designated, including two species); Latreille, 1810: 427 (citation of unique species, considered type species of the genus); Frank & Kanamitsu, 1987: 155 (natural history and medical importance); Frank, 1988: 97 (list of names applied to the genus). Type Species: *Staphylinus riparius* Linnaeus, 1758 (subsequent designation by Latreille 1810).

Synonymic list of generic names adopted for *Paederus* sensu lato: *Geopaederus* Gistel, 1848: x (as genus), type species: *Staphylinus riparius* Linnaeus, 1758 (type species by objective synonym). *Poederomorphus* Gautier des Cottés, 1861: 75 (as genus), type species: *Poederomorphus pedoncularius* Gautier des Cottés, 1861 (type fixed by monotypy) [Note: Gautier des Cottés, 1862: xxxvi, is only notices the description of the genus done before]. *Paederillus* Casey, 1905: 62 (as genus), type species: *Paederus littorarius* Gravenhorst, 1806 (subsequent designation by Blackwelder 1939). *Leucopaederus* Casey, 1905: 67 (as genus), type species: *Paederus ustus* LeConte, 1858 (type fixed by monotypy). *Pseudopaederus* Bernhauer, 1915: 137 (as subgenus), type species: *Paederus nigerrimus* Bernhauer, 1915 (type fixed by monotypy). *Gnathopaederus* Chapin, 1927: 75 (as genus), type

species: *Gnathopaederus szechuanus* Chapin, 1927 (type fixed by original designation). *Gnathopaederus* Wendeler, 1927: 1 (as subgenus), type species: *Paederus turrialbanus* Wendeler, 1927 (type fixed by monotypy). *Paederognathus* Wendeler, 1928: 37 (as subgenus, new name for the subgenus *Gnathopaederus* Wendeler, 1927), type species: *Paederus turrialbanus* Wendeler, 1927 (type species by objective synonymy) [Note: Wendeler (1931) contains the same information of Wendeler (1928)]. *Neopaederus* Blackwelder, 1939: 97 (as subgenus), type species: *Paederus morio* Mannerheim, 1830 (type fixed by original designation, but on page 120). *Eopaederus* Scheerpeltz, 1957: 458 (as subgenus), type species: *Paederus caligatus* Erichson, 1840 (type fixed by original designation). *Harpopaederus* Scheerpeltz, 1957: 459 (as subgenus), type species: *Paederus schoenherri* Czwalina, 1888 (type fixed by original designation). *Heteropaederus* Scheerpeltz, 1957: 460 (as subgenus), type species: *Paederus fuscipes* Curtis, 1826 (type fixed by original designation). *Dioncopaederus* Scheerpeltz, 1957: 464 (as subgenus), type species: *Paederus littoralis* Gravenhorst, 1802 (misspelling, cited as “*litoralis*”) (type fixed by original designation) [Note: *Paederus littoralis* is subjective junior synonym of *Poederomorphus pedoncularius* Gautier des Cottés, 1861, then *Dioncopaederus* is subjective junior synonym of *Poederomorphus* (Herman 2003)]. *Oedopaederus* Scheerpeltz, 1957: 466 (as subgenus), type species: *Paederus chinensis* Bernhauer, 1931 (type fixed by original designation). *Anomalopaederus* Scheerpeltz, 1966: 400 (as subgenus), type species: *Paederus lacordairei* Perroud, 1864 (type fixed by original designation). *Oreinoapaederus* Scheerpeltz, 1976: 112 (as subgenus), type species: *Paederus vastus* Scheerpeltz, 1976 (type fixed by original designation). *Nepalopaederus* Scheerpeltz, 1976: 111 (as subgenus), type species: *Paederus nepalensis* Scheerpeltz, 1976 (type fixed by original designation).

Diagnosis. For discussion about the diagnosis of *Paederus* sensu lato see Frank & Kanamitsu (1987) and Frank (1988).

Distribution. Worldwide.

Key to the species of *Paederus* of medical importance in Brazil

1. Head with the same color as the pronotum (Fig. 69) 2
- 1'. Head conspicuously darker than pronotum (Fig. 1) 3
2. Gular sutures with basal sides slightly parallel (Fig. 72); mandibles with symmetrical teeth (Fig. 71) *P. mutans* Sharp, 1876
- 2'. Gular sutures with basal sides strongly convergent, almost contiguous (Fig. 104); mandibles with asymmetrical teeth (Fig. 103) *P. rutilicornis* Erichson, 1840
3. Labrum with conspicuous pair of teeth on the middle third (Fig. 2); vertex of head with coarse punctures (Fig. 5, larger arrow; Fig. 21) 4
- 3'. Labrum without conspicuous pair of teeth on the middle third (Fig. 36), vertex of head with fine punctures (Fig. 39) 6

4. Antennae and tibiae unicolor, entirely brownish yellow (Fig. 1); vertex of head microsculptured (Fig. 5, smaller arrow)... *P. amazonicus* Sharp, 1876
- 4'. Antennae and tibiae bicolor, brownish yellow and dark brown (Fig. 17); vertex of head not microsculptured (Fig. 21) 5
5. Elytra with apical margin oblique (Fig. 51); sexual dimorphism in mandibles: asymmetrical in male (Fig. 55) and symmetrical in female (Fig. 56) *P. ferus* Erichson, 1840
- 5'. Elytra with apical margin truncate (Fig. 17); without sexual dimorphism in mandibles, which are symmetrical in both sexes (Fig. 19) *P. brasiliensis* Erichson, 1840
6. Pronotum with lateral sides subparallel, in which the median third is wider than the rest (Fig. 35) *P. columbinus* Laporte, 1835
- 6'. Pronotum with lateral sides not subparallel, in which the anterior third is wider than the rest (Fig. 85) *P. protensus* Sharp, 1876

Paederus amazonicus Sharp, 1876

(Figs. 1–16)

Paederus amazonicus Sharp, 1876: 287 (original description, type locality: “Ega, Tapajos”); Frank & Kanamitsu, 1987: 158 (main reference indicating medical importance); Frank, 1988: 100 (catalog with details about previous citations).

Diagnosis. *Paederus amazonicus* is similar to *P. columbinus* and *P. protensus* due to the length of the body and the apex of sternite 8 of female, which has rounded projection on the median portion of apical margin. It differs from these two species by vertex of head microsculptured and antennae and tibiae entirely brownish yellow.

Redescription. BL \approx 7.0 mm, BW \approx 1.1 mm.

Male. Body somewhat flattened dorsoventrally. Head black; subquadrate, HL \approx 1.1 mm, HW \approx 0.9 mm; vertex microsculptured (Fig. 5, smaller arrow) and with coarse punctures, distance between coarse punctures longer than the diameter of each puncture (Fig. 5, larger arrow). Eyes protruding. Antennae brownish yellow; long, almost reaching the apex of elytra. Labrum reddish brown; subtrapezoidal; apical margin toothed and with long setae; oblique lateral margins (Fig. 2). Mandibles reddish brown; falciform and symmetrical; projection bifurcated at the median of internal border, anterior tooth shorter than the posterior (Fig. 3). Gular sutures parallel on the basal two-thirds (Fig. 4, arrow). Pronotum reddish; somewhat narrowed than elytra, PL \approx 1.3mm, PW \approx 1.1 mm; nearly oviform, slightly widest on the apical two-thirds; disc very convex, longitudinal median area not punctate and glabrous, lateral areas with sparse setaceous punctures. Elytra blackish blue with metallic gloss; rectangular, EL \approx 1.6 mm; parallel sides; humeral angles slightly rounded; apical margin truncate; punctate; wings well developed. Legs long; covered with brownish yellow macrosetae; profemur entirely brownish yellow; meso- and

metafemur with apical one-third dark brown; all tibiae entirely brownish yellow; protarsi wider than meso- and metatarsi, and the four first segments bilobed. Abdomen with segments 3–6 with parallel sides; 3–6 reddish and 7–10 black; 8th tergite subrectangular, apical margin somewhat acute medially (Fig. 6); 8th sternite subquadrate, posterior margin strongly emarginated and its internal border with parallel sides, each lateral of apical margin oblique (Fig. 7); paraproct of 9th tergite contiguous at the basal region, apex strongly acute and long setae (Fig. 8); apex of 10th tergite rounded and with long setae (Fig. 9); 9th sternite elongate, apex slightly emarginate (Fig. 10). Aedeagus with median lobe not reaching the apex of lateral lobes (Figs. 11, 12); lateral lobes symmetrical, each apex with curved spine ventrally (Fig. 13, detail).

Female. Similar to male except for the following characters: 8th tergite subtrapezoidal and with apical margin curved (Fig. 14); 8th sternite subtriangular and rounded projection on the apical margin (Fig. 15); 9th sternite in single plate, elongate, basal margin wider than apical, apical margin truncate (Fig. 16); no genital plate.

Distribution records of material examined. Brazil: Amazonas (Careiro da Várzea, Carauari, Manacapuru, Fonte Boa, Manaus, Coari, Tonantins), Pará e Mato Grosso (Vila Bela da Santíssima Trindade). Peru.

Medical Importance. There is no record of incidents in the database of Brazilian Unified Health System (SUS, “Sistema Único de Saúde”, in Portuguese). However, in the literature there are mentions about incidents with this species in the Amazon region in the early 20th century (Chapin 1926; Froes 1935).

Type material. Syntype deposited in BMNH, one male, dissected, fixed on cardboard, sealed between two plates of glass slide. Manuscript on paper card with the following information: “M”/“Paederus”/“amazonicus”/“Type”/“D.S.”. The first label is printed and has the following information, “Type” [white label with red border]; the second is handwritten, “Ega” [green label]; the last two are printed and has the following information, “Brasil/Ega.” [white label with midline green], “Sharp Coll/1905 – 313.” [white label]. Note: Sharp (1876) comments “several individuals” observed. According to Dr. Roger G. Booth there are 9 syntypes deposited in BMNH in which we just observed one male. Presumably all syntypes are deposited in BMNH.

Additional material. PERU: 2 M, Rio Madeira, no date, no collector (FNHM). BRAZIL: Amazonas: 9 M, 4 F, Careiro da Várzea, Lago Januacá, 10.ix.1978, R. Best col. (INPA); 26.iii.1988, Masintilli col. (INPA); 6 M, 3 F, Carauari, vii.2005, A. Henrique & Xavier-Filho col. (INPA); 2 M, 4 F, Manacapuru, Costa do Pesqueiro 17–24.vi.2004, F. F. Xavier F. & L. Alquino col. (INPA); 1 M, 1 F, Fonte Boa, Estrada Marmopina 23.ix.2005, J.A. Rafael & F.F. Xavier F. col. (INPA); 4 M, 2 F, Rio Amazonas 19.x.1964, Cerq. col., (INPA); 1 M, Manaus, Comunidade Puraquequara, Fazenda N. Vitória, 18.iv.2008, G.L.S. Monte col. (INPA); 1 F, Puraquequara, Sítio Santa Vitória, 18.iv.2008, L.L. Coelho col. (INPA); 1 M, ZF2 Torre, 13–16.viii.2004, F.F. Xavier F. & A. R. Ururahy & A. Silva & S. Trovisco col. (INPA); 1 M, Vila Buriti, Distrito Industrial, 28.iv.2008, E. P. Silva col. (INPA); 1 M, Anori, Comunidade Santo Antonio, 3.iii.2004, F.F. Xavier Filho col. (INPA); 1 F,

Coari, Nova Esperança, Poraquê, 7.iii.2004, F.F. Xavier F. col. (INPA); 1 M, Tonantins, 16–20.ix.2005, J.A. Rafael & F.F. Xavier F. col. (INPA); Pará: 1 M, no date, no collector (FNHM); Mato Grosso: 1 F, Vila Bela da Santíssima Trindade, 1.x.1984, Elias Binda col. (INPA).

Paederus brasiliensis Erichson, 1840

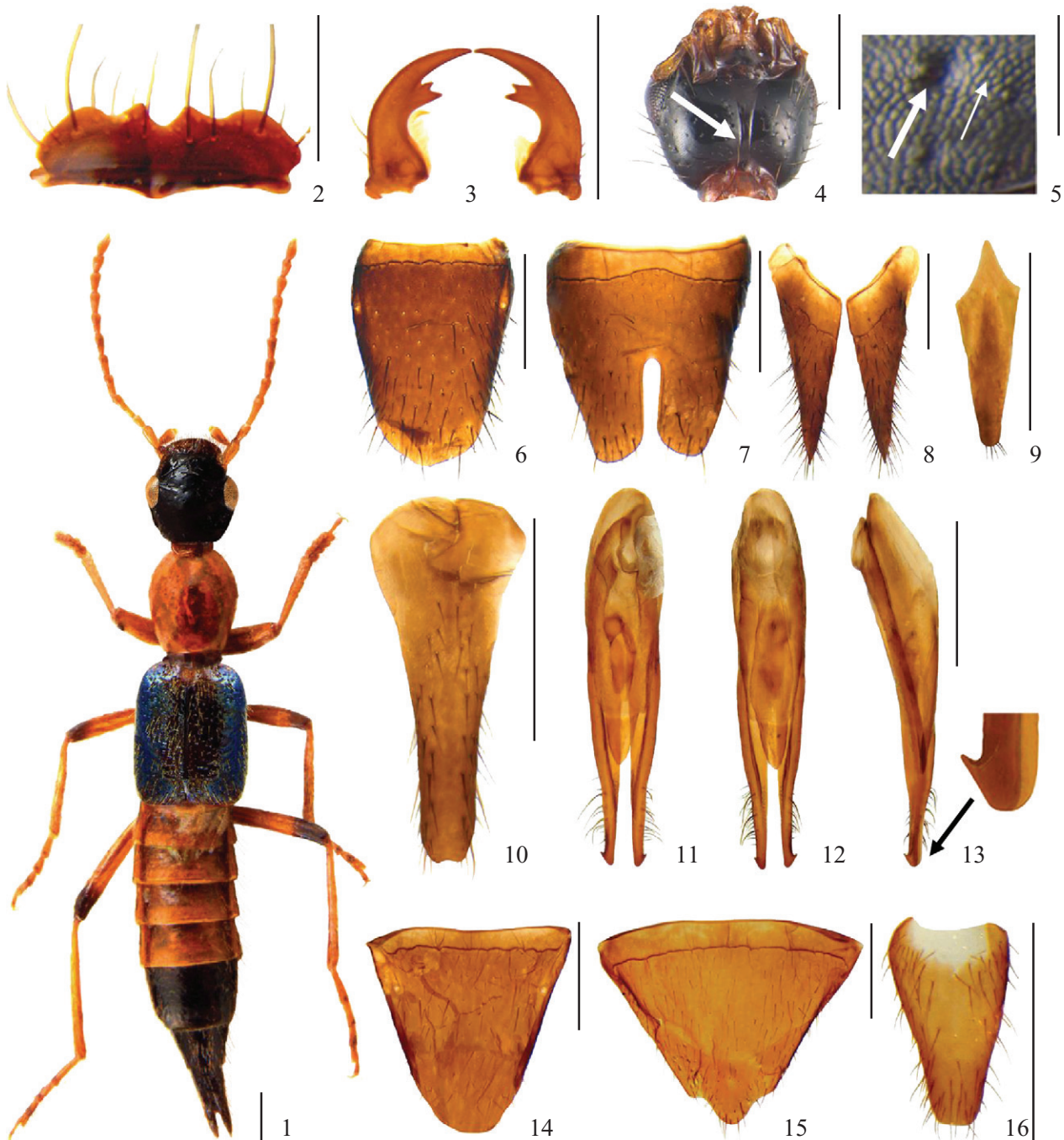
(Figs. 17–34)

Paederus brasiliensis Erichson, 1840: 658 (original description, type locality: “Brasília”); Frank & Kanamitsu, 1987: 158 (main reference indicating medical importance); Frank, 1988: 103 (catalog with details about previous citations).

Diagnosis. *Paederus brasiliensis* is similar to *P. ferus* for its robust body, coarse punctuation on vertex, tridentate projection of sternite 8 and moderately to strongly bilobed apex of tergite 9, both on female. It differs from this species by parallel lateral lobes of the aedeagus and apex somewhat rounded of tergite 8 of female.

Redescription. BL \approx 9.5 mm; BW \approx 1.6 mm.

Male. Body somewhat flattened dorsoventrally. Head black; quadrate HL \approx 1.4 mm; HW \approx 1.4 mm, vertex with coarse punctures, distance between the punctures longer than the diameter of each puncture (Fig. 21). Eyes protruding. Antennae brownish yellow with the three first antennomeres lightest; long, almost reaching the apex of elytra. Labrum reddish brown; subtrapezoidal, apical margin toothed and with long setae; lateral margins rounded (Fig. 18). Mandibles reddish brown; falciform and symmetrical; projection bifurcated at the median of internal border, anterior tooth shorter than the posterior (Fig. 19). Gular sutures approximate on the basal one-third basal (Fig. 20, arrow). Pronotum reddish, narrowed than elytra, PL \approx 1.7 mm, PW \approx 1.4 mm, somewhat parallel sides, slightly widest on the apical two-thirds; disc very convex, longitudinal median area not punctate and glabrous, lateral areas with sparse setaceous punctures. Elytra blackish blue with metallic gloss, rectangular, EL \approx 2.0 mm; parallel sides, humeral angles slightly rounded, apical margin truncate; punctate and more conspicuous than from head and pronotum; wings well developed. Legs long, covered with brownish yellow macrosetae; profemur brownish yellow on basal and dark brown on apical half; meso- and metafemur brownish yellow on basal one-third and dark brown on apical two-thirds; all tibiae entirely dark brown; protarsi wider than meso- and metatarsi, and the four first segments bilobed. Abdomen with segments 3–6 with parallel sides; 3–6 reddish and 7–10 black; 8th tergite subrectangular, apical margin somewhat rounded (Fig. 22); 8th sternite quadrate, posterior margin strongly emarginated and its internal border with parallel sides, each lateral of apical margin oblique (Fig. 23); paraproct of 9th tergite contiguous at the basal region, apex strongly acute and long setae (Fig. 24); apex of 10th tergite rounded and with long setae (Fig. 25); 9th sternite elongate, apex truncate (Fig. 26). Aedeagus with median lobe not reaching the apex of lateral lobes; lateral lobes symmetrical, each with bristles on apical one-fifth and slightly curved spine ventrally (Fig. 29, detail).

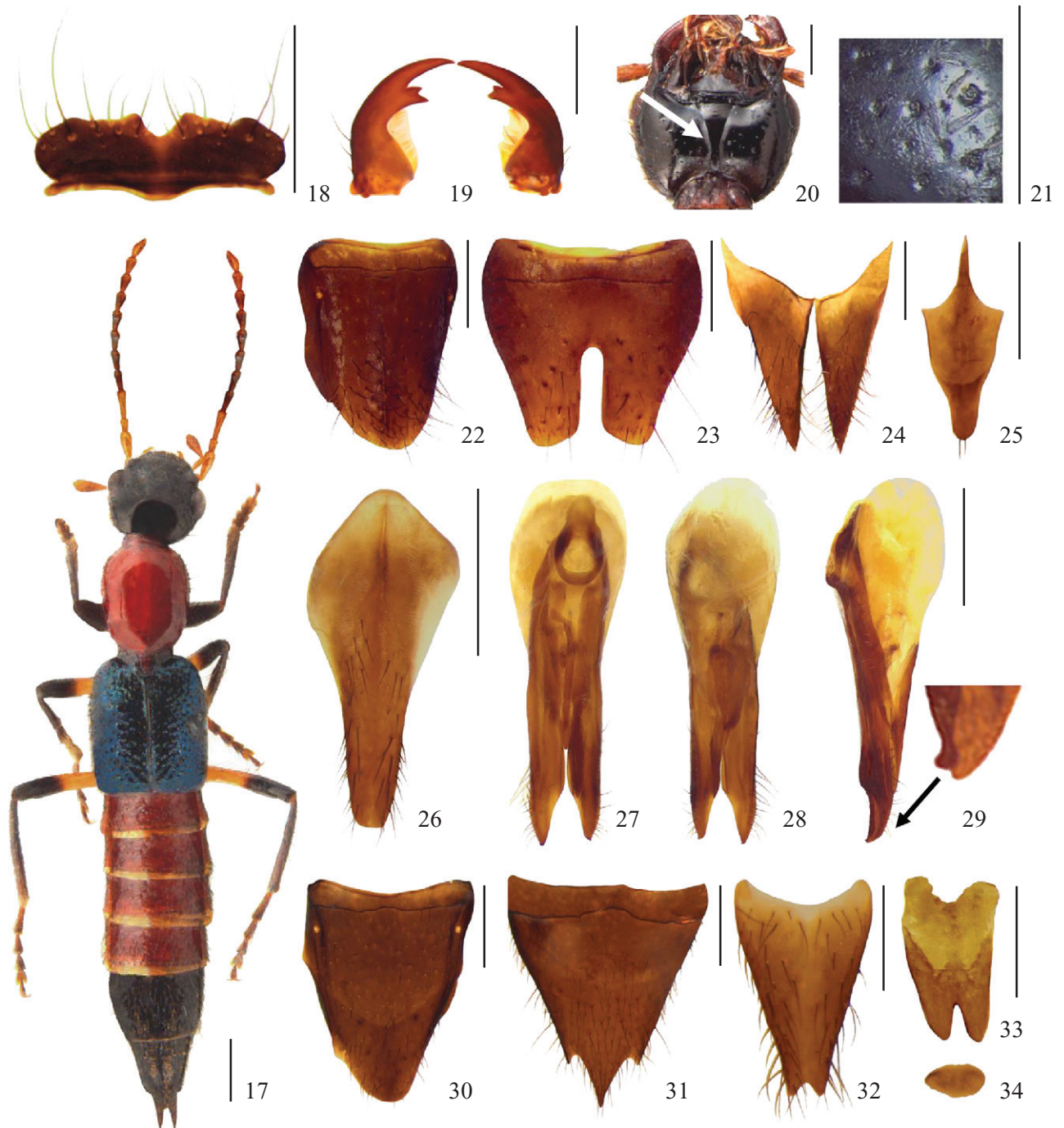


Figs. 1–16. *Paederus amazonicus*. Figs. 1–13, male; Figs. 14–16, female; 1. Habitus, dorsal view; 2. Labrum, dorsal view; 3. Mandibles, dorsal view; 4. Head, ventral view; 5. Vertex of head, dorsal, punctures (larger arrow), microsculpture (smaller arrow); 6. Tergite 8, dorsal view; 7. Sternite 8, ventral view; 8. Paraproct of the 9th tergite, dorsal view; 9. Tergite 10, dorsal view; 10. Sternite 9, ventral view; 11. Aedeagus, ventral view; 12. Aedeagus, dorsal view; 13. Aedeagus, lateral view; 14. Tergite 8, dorsal view; 15. Sternite 8, ventral view; 16. Sternite 9, ventral view. Scale bar = 1 mm, Fig. 1; 0.5 mm, Figs. 2–16.

Female. Similar to male except for the following characters: 8th tergite subtrapezoidal and curved apical margin (Fig. 30); 8th sternite subtriangular and tridentate projection on the apical margin (Fig. 31); 9th sternite in single plate, elongate, basal margin wider than apical, apical margin emarginated (Fig. 32); ventral genital plate subrectangular with apical margin strongly emarginate (Fig. 33) and dorsal plate tiny and oval (Fig. 34).

Distribution records of material examined. Brazil: Amazonas (Careiro da Várzea), Bahia (Encruzilhada), Maranhão (Chapadinha), Minas Gerais (Virginia, Águas Verme-lhas, Berizal), São Paulo (Ipiranga), Paraná (Jundiá do Sul, Ivatuba). Argentina: Jujuy (Peia).

Medical Importance. There is one record of an incident in the database of Brazilian SUS, the municipality of Ivatuba, Paraná State. However, in the literature there are mentions



Figs. 17–34. *Paederus brasiliensis* Figs. 17–29, male; Figs. 30–34 female; 17. Habitus, dorsal view; 18. Labrum, dorsal view; 19. Mandibles, dorsal view; 20. Head, ventral view; 21. Vertex of head, dorsal view; 22. Tergite 8, dorsal view; 23. Sternite 8, ventral view; 24. Paraprocts of the 9th tergite, dorsal view; 25. Tergite 10, dorsal view; 26. Sternite 9, ventral view; 27. Aedeagus, ventral view; 28. Aedeagus, dorsal view; 29. Aedeagus, lateral view; 30. Tergite 8, dorsal view; 31. Sternite 8, ventral view; 32. Sternite 9, ventral view; 33. Genital plate, part; 34. Genital plate, part. Scale bar = 1 mm, Fig. 17; 0.5 mm, Figs. 18–34.

about incidents with this species in the following states: Bahia, Ceará, Paraíba, Pernambuco and São Paulo (Froes 1935; Pickel 1940a, 1940b; Diogenes 1994 and Albuquerque *et al.* 2008). Amado *et al.* (2010) report *P. brasiliensis* causing dermatitis in Betim, Minas Gerais State, but the material studied by the authors is the true *P. protensus*.

Type material. Syntypes, three females, one dissected, all deposited in ZMHB. One of them with five labels; the first handwritten with the following information: “Brasil. Jaleo (illegible last letter)” [green label], the second printed “6455” [white label], the third “brasiliensis/Er.” [green label], the fourth handwritten “Type” [orange label] and the last one

printed with the following information “SYNTYPUS/Paederus/brasiliensis Erichson, 1840/labelled by MNHUB 2012” [red label]. Of the other two specimens, one dissected, only the first label is handwritten, “Brasilia” [white label], “Hist.-Coll. (Coleoptera)/Nr. 6455/Paederus/brasiliensis Erichs./Brasil., Sello/Zool. Mus. Berlin” [green label] “SYNTYPUS/Paederus/brasiliensis Erichson, 1840/labelled by MNHUB 2012” [red label]. Note: Erichson (1840) did not specify how many specimens he observed. We received from ZMHB three females labeled as type. Presumably all syntypes are deposited in ZMHB.

Additional material. BRAZIL: Amazonas: 1 M, *Careiro da Várzea*, Lago Janaúacá, 27–28.III.1988, Machado L.C. col. (INPA); Bahia: 2 F, 5 M, *Encruzilhada*, 10–12.XII.2007, P. Grossi, Rafael & Parizotto col. (DZUP); Maranhão: 1 F, 7 M, *Chapadinha*, 2009, 13.VIII.2009, 19.VIII.2009, 25.I.2010, F.S. Silva col. (DZUP); Minas Gerais: M, *Virgínia*, Fazenda dos Campos, 13–15.II.2010, Mielke & Casagrande col. (DZUP); 1 F, *Águas Vermelhas*, 13.XII.2007, P. Grossi, Rafael & Parizotto col. (DZUP); 1 F, *Berizal*, Fazenda Veredão, 14.XII.2007, P. Grossi, Rafael & Parizotto col. (DZUP); São Paulo: 1 F, 1 M, no locality, no date, Mraz LGT col. (FMNH); Paraná: 1 F, *Jundiá do Sul*, Fazenda Monte Verde, 30.XI.1986, Profaupar col. (DZUP); 1 M, *Ivatuba*, I.2010, SESA/PR col. (DZUP); ARGENTINA: Jujuy: 1 F, *Peia*, Dique La Ciénaga, III.1953, A. Martines col. (DZUP).

Paederus columbinus Laporte, 1835

(Figs. 35–50)

Paederus columbinus Laporte, 1835: 123 (original description, type locality: “Colombie”); Frank & Kanamitsu, 1987: 158 (main reference indicating medical importance); Frank, 1988: 106 (catalog with details about previous citations).

Paederus aequinoctialis Erichson, 1840: 657 (original description, type locality: “Columbia, Cayenna”, described as variety of *P. columbinus*); Gemminger & Harold, 1868: 626 (first time cited as junior synonym of *P. columbinus* Laporte, 1835); Frank & Kanamitsu, 1987: 158 (mention as of medical importance); Frank, 1988: 99 (catalog with details about previous citations).

Diagnosis. *Paederus columbinus* is similar to *P. amazonicus* and *P. protensus* due to their similar body length and apex of sternite 8 of female, which has a projection on the median portion of apical margin. It differs from these two species by brownish color of the head and median lobe of the aedeagus with two small teeth dorsally.

Redescription. BL \approx 8.7 mm, BW \approx 1.5 mm.

Male. Body, somewhat flattened dorsoventrally. Head black, subhexagonal HL \approx 1.4 mm; HW \approx 1.3 mm, vertex punctate, distance between the punctures longer than the diameter of each puncture (Fig. 39). Eyes protruding. Antennae brownish yellow with the antennomere 4–8 darker; long, almost reaching the apex of elytra. Labrum reddish brown, subtrapezoidal, apical margin somewhat truncate with median emargination evident and long setae, lateral margins oblique (Fig. 36). Mandibles reddish brown, falciform and symmetrical; projection bifurcated at the median of internal border, anterior tooth shorter than the posterior (Fig. 37) Gular sutures gradually converging to basal region (Fig. 38, arrow). Pronotum reddish; slightly narrowed than elytra, PL \approx 1.6

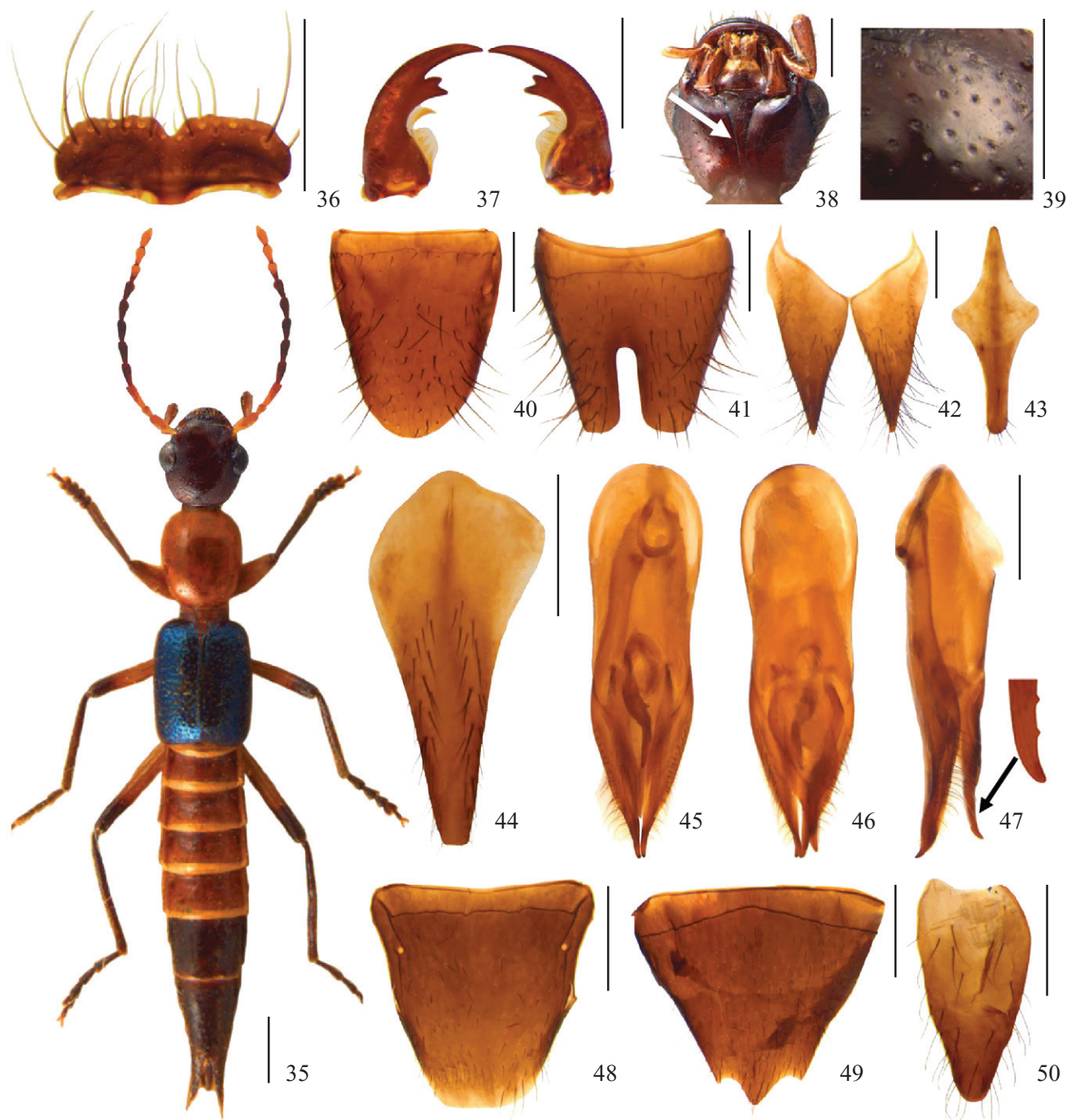
mm, PW \approx 1.4 mm, somewhat oviform, slightly widest on the apical two-thirds; disc very convex, longitudinal median area not punctate and glabrous, lateral areas with sparse setaceous punctures. Elytra blackish blue with metallic gloss; rectangular, EL \approx 2.3 mm, parallel sides; humeral angles slightly rounded; apical margin truncate; punctate and more conspicuous than head and pronotum; wings well developed. Legs long, covered with brownish yellow macrosetae; profemur brownish yellow and darker on apical one-fourth; meso- and metafemur brownish yellow and darker on apical two-thirds; protarsi wider than meso- and metatarsi, and the four first segments bilobed. Abdomen with segments 3–6 with parallel sides; 3–6 reddish and 7–10 black; 8th tergite subrectangular, apical margin somewhat rounded (Fig. 40); 8th sternite subquadrate, posterior margin strongly emarginated and its internal border with parallel sides, each lateral of apical margin oblique (Fig. 41); paraproct of 9th tergite contiguous at the basal region, apex strongly acute and long setae (Fig. 42); apex of 10th tergite rounded and with long setae (Fig. 43); 9th sternite elongate, apex truncate (Fig. 44). Aedeagus with median lobe almost reaching the apex of lateral lobes, the apical 1/3 strongly narrowed, slightly curved dorsally and with two small teeth at the apex (Fig. 47, arrow); lateral lobes with apices contiguous, symmetrical, slightly curved ventrally and with lateral bristles on apical 1/2 (Figs. 45–47).

Female. Similar to male except for the following characters: 8th tergite subquadrate, apical margin slightly rounded to truncate (Fig. 48); 8th sternite subtriangular and with evident small median projection on the apical margin (Fig. 49); 9th sternite in single plate, elongate, basal margin wider than apical, apical margin rounded (Fig. 50); no genital plate.

Distribution records of material examined. Brazil: Amazonas; Ceará (Limoeiro do Norte); Maranhão (Chapadinha and Santa Helena) and Rio Grande do Norte. Panamá (Bugaba). Venezuela (Pangals).

Medical importance. There is no record of incidents in the database of Brazilian SUS. However, in the literature there are mentions of incidents with this species in Bahia and Ceará States (Chapin 1926; Froes 1935; Diogenes 1994). Here, we report the first record of accident with *P. columbinus* in Maranhão State (material collected by Mr. Francinaldo S. Silva, Federal University of Maranhão – UFMA).

Type material. *Paederus columbinus*: Type material not found, probably lost. *Paederus aequinoctialis*: Syntypes deposited in ZMHB, three males and two females (one male and one female dissected), four of them with only the first label handwritten “Columbia” [white label], the other printed “Paratypus” [dark red label] “Hist.-Coll. (Coleoptera)/Nr. 6454/Paederus/aequinoctialis Erichs./Columb., Moritz./Zool. Mus. Berlin” [green label], “SYNTYPUS/Paederus/aequinoctialis Erichson, 1840/labelled by MNHUB 2012” [red label]; one male, with the first label handwritten “Columb. Dai” [green label], and the other printed “6454”



Figs. 35–50. *Paederus columbinus* Figs. 35–47, male; Figs. 48–50 female; 35. Habitus, dorsal view; 36. Labrum, dorsal view; 37. Mandibles, dorsal view; 38. Head, ventral view; 39. Vertex of head, dorsal view; 40. Tergite 8th, dorsal view; 41. Sternite 8th, ventral view; 42. Paraprocts of the 9th tergite, dorsal view; 43. Tergite 10, dorsal view; 44. Sternite 9, ventral view; 45. Aedeagus, ventral view; 46. Aedeagus, dorsal view; 47. Aedeagus, lateral view; 48. Tergite 8, dorsal view; 49. Sternite 8, ventral view; 50. Sternite 9, ventral view. Scale bar = 1 mm, Fig. 35; 0.5 mm, Figs. 36–50.

[white label], “aequinoctia/lis Er. Dai” [green label], “Holotypus” [dark red label], “SYNTYPUS/*Paederus*/aequinoctialis Erichson, 1840/ labeled by MNHUB” [red label]. Note: Erichson (1840) did not specify how many specimens he observed. We received from ZMHB three males and two females labeled as type. Presumably all syntypes are deposited in ZMHB. Since the type material of Laporte

is lost, we consider the types from Erichson for interpreting this species.

Additional material. PANAMÁ: 2 M, Bugaba, 1905, Champion col. (FMNH). VENEZUELA: 2 F, Pangals, no date, Schuster col. (FMNH). BRAZIL: 1 M, no locality, no date, Friederichs col. (FMNH); 1 M, no locality, 1910, O A. Corwol col. (FMNH); Amazonas: 1 M, AM 010, Km 268, 19.I.1978, no collector (INPA); Ceará: 2 F, *Limoeiro do Norte*,

28.III.1985, Cristopoli, V. col. (DZUP); Maranhão: 3 F, 2 M, *Chapadinha*, 13.VIII.2009, 21.VIII.2009, F. S. Silva col. (DZUP); *Santa Helena*, 18.VIII.1965, Dr. Cerq. Dd. col. (INPA); Rio Grande do Norte: 1 F, no locality, VII.1949, M. Alvarenga col. (DZUP).

Paederus ferus Erichson, 1840

(Figs. 51–68)

Paederus ferus Erichson 1840: 659 (original description, type locality: “Brasília”); Frank & Kanamitsu, 1987: 158 (main reference indicating medical importance); Frank, 1988: 110 (catalog with details about previous citations).

Diagnosis. *Paederus ferus* is similar to *P. brasiliensis* due to robust body, coarse punctation on vertex, tridentate projection of sternite 8 and moderately to strongly bilobed apex of tergite 9, both on female. It differs by sexual dimorphism in the mandibles, which are asymmetrical in male, median and lateral lobes of the aedeagus strongly twisted and asymmetrical, and only a single genital plate in female.

Redescription. BL \approx 11.0 mm; BW \approx 1.9 mm.

Male. Body somewhat flattened dorsoventrally. Head black; subquadrate HL \approx 1.8 mm, HW \approx 1.8 mm, vertex with coarse punctation, distance between the punctures longer than the diameter of each puncture (Fig. 54). Eyes protruding. Antennae brownish yellow, the antennomere 4–8 darker; long, almost reaching the apex of elytra. Labrum reddish brown; subtrapezoidal, apical margin toothed and long setae; oblique lateral margins (Fig. 52). Mandibles reddish brown, falciform and asymmetrical, right mandible with a dorsal projection tridentate at the median and no tooth at internal border (Fig. 55, lower arrow), left mandible with a projection truncate at the apex and another bifurcate at the median of internal border (Fig. 55, large arrow). Gular sutures almost contiguous at basal half (Fig. 53, arrow). Pronotum brownish, somewhat narrowed than elytra, PL \approx 1.9 mm, PW \approx 1.8 mm, widest on the apical two-thirds; disc very convex, longitudinal median area not punctate and glabrous, lateral areas with sparse setaceous punctures. Elytra blackish blue with metallic gloss, rectangular, EL \approx 2.5 mm; parallel sides, humeral angles slightly rounded, apical margin truncate; punctate and more conspicuous than from head and pronotum; wings well developed. Legs long, covered with brownish yellow macrosetae; profemur brownish yellow, apical half darker; meso- and metafemur dark brownish, apical one-third darker; all tibiae entirely dark brown; protarsi wider than meso- and metatarsi, and the four first segments bilobed. Abdomen with segments 3–6 with parallel sides; 3–6 reddish and 7–10 black; 8th tergite subtriangular, apical margin somewhat truncate to rounded (Fig. 57); 8th sternite subtrapezoidal, posterior margin strongly emarginated and its internal border with parallel sides, each lateral of apical margin oblique (Fig. 58); paraproct of 9th tergite contiguous at the basal region, apex strongly acute and with long setae (Fig. 59); apex of 10th tergite rounded and with long setae (Fig. 60); 9th sternite elongate, apex rounded (Fig. 61). Aedeagus with median lobe almost reaching the apex of left lateral lobe, but exceeds the right lobe (Fig. 62–63); lateral lobes strongly

asymmetrical, both with apex curved ventrally (Fig. 64, arrow).

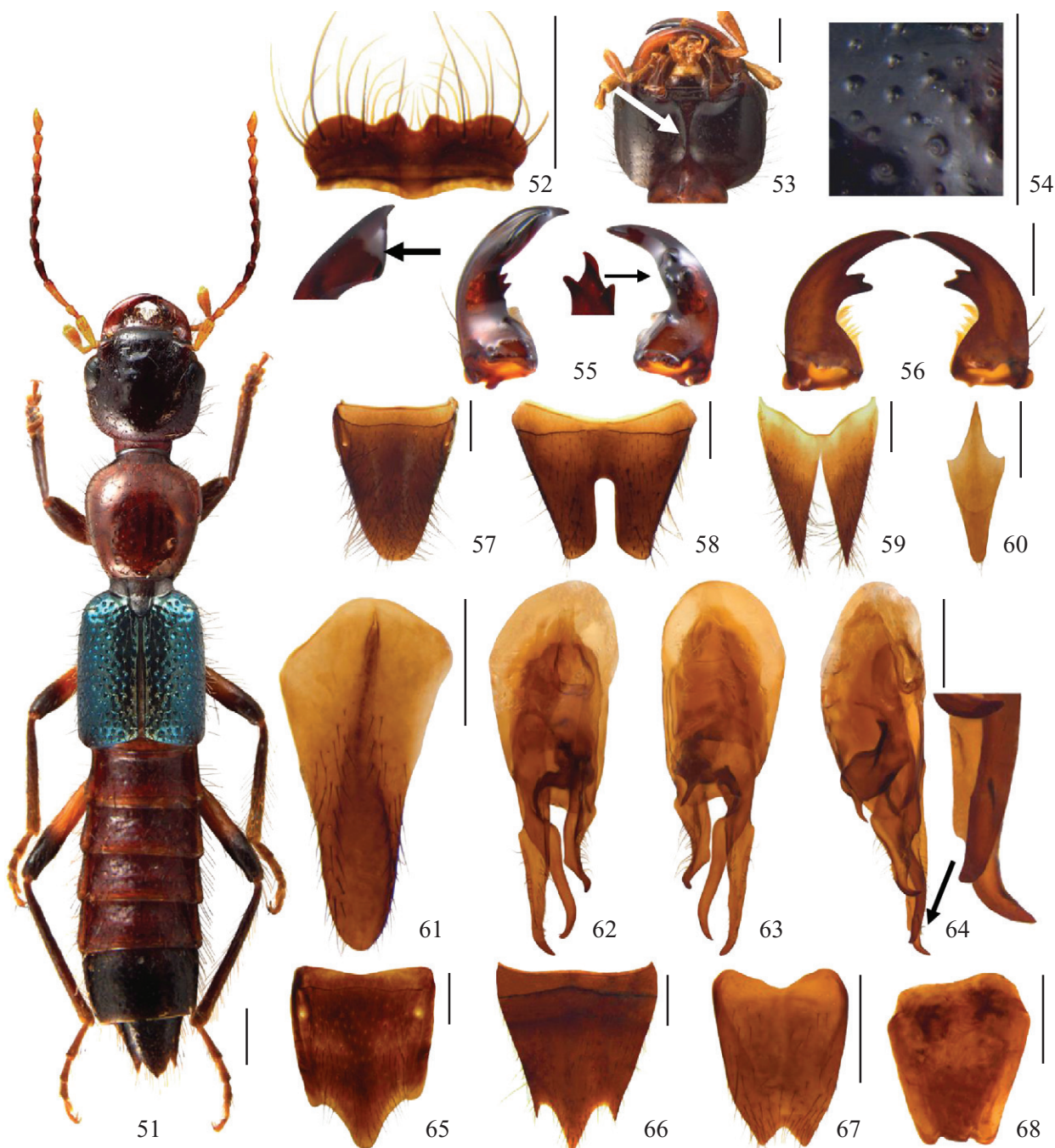
Female. Similar to male except for the following characters: symmetrical mandibles, each with bifurcate projection at the median on internal border (Fig. 56); 8th tergite subquadrate with a rounded projection on the apical margin (Fig. 65); 8th sternite subtriangular and tridentate projection on the apical margin (Fig. 66); 9th sternite in single plate, elongate, basal margin wider than apical, apical margin bilobed (Fig. 67); genital plate single, subrectangular, with apical margin sinuous (Fig. 68).

Distribution records of the material examined. Brazil: Espírito Santo (Santa Tereza); Minas Gerais (Santa Barbara, Pouso Alegre); Rio de Janeiro (Bom Jesus de Itapabo, Nova Friburgo); São Paulo (São Carlos do Pinhal, Barueri, Salesópolis, Três Irmãos); Paraná (Guaraqueçaba, Antonina, São José dos Pinhais, Morretes, Pitanga); Santa Catarina (Seara). Ecuador (Santa Inés); Bolívia (La Paz).

Medical Impotence. There is no record of incidents in the database of Brazilian SUS. However, Pickel (1940b) reported accidents in Pernambuco State, and recently, Albuquerque *et al.* (2008) reported incidents in Paraíba State.

Type material. Syntypes deposited in ZMHB, one male and one female, male dissected with the first three labels, except the number, handwritten and the last two printed, with the following information: “Brasil. Verm” [green label], “Type”, [red label], “ferus/Er.”, [green label], “6459”, [white label], “SYNTYPUS/Paederus/ferus Erichson, 1840/labeled by MNHUB 2012” [red label]. Female, only the first label handwritten and the last two printed: “Brasília” [white label], “Hist.-Coll. (Coleoptera)/Nr. 6459/Paederus/ferus Erichs./Brasil., Vermnd./Zool. Mus. Berlin” [green label], “SYNTYPUS/Paederus/ferus Erichson, 1840/labeled by MNHUB 2012” [red label]. Note: Erichson (1840) did not specify how many specimens he observed. We received from ZMHB one male and one female labeled as type. Presumably all syntypes are deposited in ZMHB.

Additional material. ECUADOR: 1 M, Santa Jnéz, no date, R. Haensch S. col. (FMNH). BRASIL: 1 F, 2 M, no locality, no date, no collector (DZUP); Espírito Santo: 2 F, *Santa Tereza*, 5.II.1964, C. Elias col.; 12.V.1967, C. T. & C. Elias col. (DZUP); Minas Gerais: 1 F, *Santa Barbara*, Serra do Caraça, 23–25.XI.1960, Araújo & Martins col. (MZSP); 1 M, *Pouso Alegre*, XII.1965, F. S. Pereira col., (MZSP); Rio de Janeiro: 1 F, *Bom Jesus do Itapapoana*, 1906, Walter, Ana col. (FMNH); 1 M, *Nova Friburgo*, 14–19. XI. 2007, P. C. Grossi col. (DZUP); São Paulo: 1 F, no locality, no date, Barbiellini col. (FMNH); 1 M, *São Carlos do Pinhal*, 1–8.I.1901, Riedel col. (FMNH); 1 F, *Barueri*, X. 1965, K. Lenko col., (MZSP); 1 F, 1 M, *Salesópolis*, Est. Biol. Boraceia, 1.II.1961, K. Lenko col.; 23.III.1961, Reichardt col. (MZSP); 1 F, *Três Irmãos*, IX.1990, Rogério Bert col. (MZSP); Paraná: 2 F, *Guaraqueçaba*, SPVS, 16.II.2008, E. Caron col., (DZUP); 1 F, *Antonina*, Reserva Sapitanduva, 31.V.1986, no collector (DZUP); 1 F, *São José dos Pinhais*, 8.I.1970, Giacomet – Laroça & Becker col. (DZUP); 1 M, *Morretes*, IAPAR, 21.I.1985, C. I. I. F. col. (DZUP); 1 F, *Pitanga*, 14.VIII.1966, Moure, Marinoni col. (DZUP); Santa Catarina: 3 F, 5 M, *Nova Teutônia*, no date, Fritz Plaumann col. (FMNH); 1 F, 1 M, *Nova Teutônia*, VIII.1939, B. Pohl col. (MZSP); 1 F, 3 M, *Nova Teutônia*, IV.1966, F. Plaumann col. (MZSP); 15.VII.1948, no collector, V.1980, no collector (DZUP); BOLÍVIA: 2 M, La Paz, *Reys*, Rio Beni, 1891, Balzon col., (FMNH); 1 M, *La Paz*, Yungas Coroico, XII.1948, A. Martines col. (MZSP).



Figs. 51–68. *Paederus ferus* Figs. 51–55, 57–64, male; Figs. 56, 65–68 female; 51. Habitus, dorsal view; 52. Labrum, dorsal view; 53. Head, ventral view; 54. Vertex of head, dorsal view; 55. Mandibles, dorsal view, (larger arrow, lateral view), (smaller arrow, ventral view); 56. Mandibles, dorsal view; 57. Tergite 8, dorsal view; 58. Sternite 8, ventral view; 59. Tergite 9, dorsal view; 60. Tergite 10, dorsal view; 61. Sternite 9, ventral view; 62. Aedeagus, ventral view; 63. Aedeagus, dorsal view; 64. Aedeagus, lateral view; 65. Tergite 8, dorsal view; 66. Sternite 8, ventral view; 67. Sternite 9, ventral view; 68. Genital plate; Scale bar = 1 mm, Fig. 51; 0.5 mm, Figs. 52–68.

***Paederus mutans* Sharp, 1876**
(Figs. 69–84)

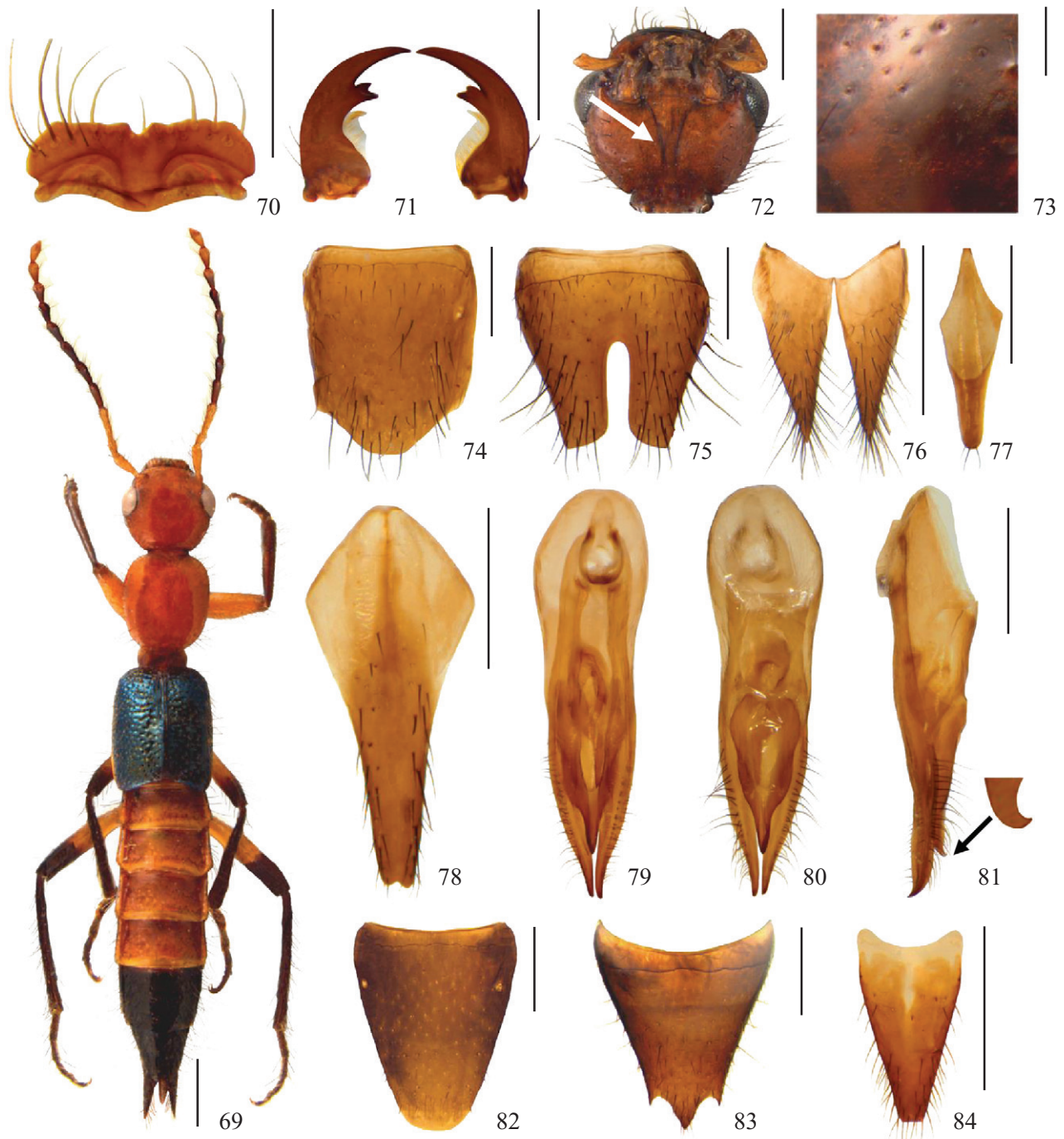
Paederus mutans Sharp 1876: 286 (original description, type locality “Tapajos and Pará”); Frank, 1988: 123 (catalog with details about previous citations).

Diagnosis. *Paederus mutans* is similar to *P. amazonicus* in body length, emarginated apex of sternite 9th of male and

truncate apex of sternite 9th of female. It differs for the red head and apex of median lobe of aedeagus strongly narrowed and curved dorsally.

Redescription. BL ≈ 8.8 mm; BW ≈ 1.4 mm.

Male. Body somewhat flattened dorsoventrally. Head red; quadrate, HL ≈ 1.3 mm, HW ≈ 1.3 mm, vertex inconspicuously punctate (Fig. 73). Eyes slightly protruding laterally. Antennae brownish yellow, 4–9 darker; long, almost reach-



Figs. 69–84. *Paederus mutans* Figs. 69–81, male; Figs. 82–84 female; 69. Habitus, dorsal view; 70. Labrum, dorsal view; 71. Mandibles, dorsal view; 72. Head, ventral view; 73. Vertex of head, dorsal view; 74. Tergite 8th, dorsal view; 75. Sternite 8th, ventral view; 76. Paraproct of the 9th tergite, dorsal view; 77. Sternite 9th, ventral view; 78. Sternite 9th, ventral view; 79. Aedeagus, ventral view; 80. Aedeagus, dorsal view; 81. Aedeagus, lateral view; 82. Tergite 8th, dorsal view; 83. Sternite 8th, ventral view; 84. Sternite 9th, ventral view. Scale bar = 1 mm, Fig. 69; 0.5 mm, Figs. 70–84.

ing the apex of elytra. Labrum red, subtrapezoidal, apical margin slightly truncate and with long setae; rounded on the lateral margins (Fig. 70). Mandibles reddish brown, falciform and symmetrical; projection bifurcate at the median of internal border, anterior tooth shorter than the posterior (Fig. 71). Gular sutures approximate on the basal one-third (Fig. 72, arrow). Pronotum reddish, slightly narrowed than elytra, PL

≈ 1.5 mm, PW ≈ 1.4 mm, somewhat oviform, widest on the apical two-thirds; disc very convex, longitudinal median area not punctate and glabrous, lateral areas with sparse setaceous punctures. Elytra blackish blue with metallic gloss; rectangular, EL ≈ 1.9 mm; parallel sides; humeral angles slightly rounded; apical margin truncate; punctate and more conspicuous than from head and pronotum; wings well developed. Legs

long; covered with brownish yellow macrosetae; profemur entirely brownish yellow; meso- and metafemur with apical one-third dark brown; all tibiae entirely brownish yellow; protarsi wider than meso- and metatarsi and the four first segments bilobed. Abdomen with segments 3–6 with parallel sides; 3–6 reddish and 7–10 black; 8th tergite subrectangular, apical margin truncate to rounded (Fig. 74); 8th sternite subtrapezoidal, posterior margin strongly emarginated and its internal border with parallel sides, each lateral angle of apical margin oblique (Fig. 75); paraproct of 9th tergite contiguous at the basal region, apex strongly acute and long setae (Fig. 76); apex of 10th tergite rounded and with long setae (Fig. 77); 9th sternite elongate, apex slightly emarginate (Fig. 78). Aedeagus with median lobe almost reaching the apex of lateral lobes; median lobe with hooked apex oriented dorsally (Fig. 81, arrow); lateral lobes symmetrical, apices contiguous, apex slightly curved ventrally and with lateral bristles on apical half (Figs. 79–81).

Female. Similar to male except for the following characters: 8th tergite subtrapezoidal with apical margin truncate to rounded (Fig. 82); 8th sternite subtriangular, apical margin tridentate with median acute apex (Fig. 83); 9th sternite in a single plate, elongate, basal margin wider than apical, apical margin truncate (Fig. 84).

Distribution records of the material examined. Brazil: Amazonas (Manaus, Presidente Figueiredo, Nhamunda, Querari), Pará (Itaituba, Jacareacanga), Maranhão (Chapadinha) and Espírito Santo.

Medical Importance. There is no record of incidents in the database of Brazilian SUS. However, in 2010 there were incidents in the region of the municipality of Chapadinha, Maranhão State (personal communication, Mr. Francinaldo S. Silva – UFMA). So, this is the first record of an incident involving this species.

Type material. Syntype deposited in BMNH, one male, dissected, fixed on cardboard, sealed between two plates of glass slide. Manuscript on paper card with the following information: “*Paederus*”/”mutans”/”Type”/”D.S.”. The first label is printed and contains the following information, “Type” [white label with red border]; the second is handwritten, “Tapajos” [green label]; the last two are printed and contains the following information, “S. America:/Brasil.” [white label with midline green], “Sharp Coll/1905 – 313.” [white label]. Note: Sharp (1876) mentions two males and two females. We examined only one male deposited in BMNH. According to Dr. Roger G. Booth there are 4 syntypes deposited in BMNH. Presumably all syntypes are in BMNH.

Additional material. BRASIL: Amazonas: 2 M, *Manaus*, CEPLAC Km 31, 8.V.1976, Erufino & Nilce col. (INPA); 1 F, *Presidente Figueiredo*, Com. São Francisco Km 24, 26.VII- 3.VIII.2005, F. F. Xavier F. & G. M. Lourido & R. Machado col. (INPA); 1 M, *Presidente Figueiredo*, Est. de Balbina Km 12, 3–5. II. 2006, F. F. Xavier F. col. (INPA); 1 M, 1 F, Rio Nhamunda, Ig. Areias, 17–20. V. 2008, Rafael & equipe col. (INPA); 1 M, *Querari*, Pelotão, 8–9. IV. 1993, Motta C. & Ferreira R. & Vidal & Matteo B. col. (INPA); 1 M, Lago do Janaoacá, 26. III. 1988, Amorim M. col. (INPA); Para: 2 F, *Itaituba*, 16.X.1977, B. C. Ratcliffe col. (INPA); 1 F,

Jacareacanga, 0.IV.1969, F. R. Barbosa col. (INPA); Maranhão: 2 M, F, *Chapadinha*, Mata de Galeria 8–10h, 5.VIII.2009, F. S. Silva col. (DZUP); Espírito Santo: 1 M, 2.IX.1948, no collector (MZSP).

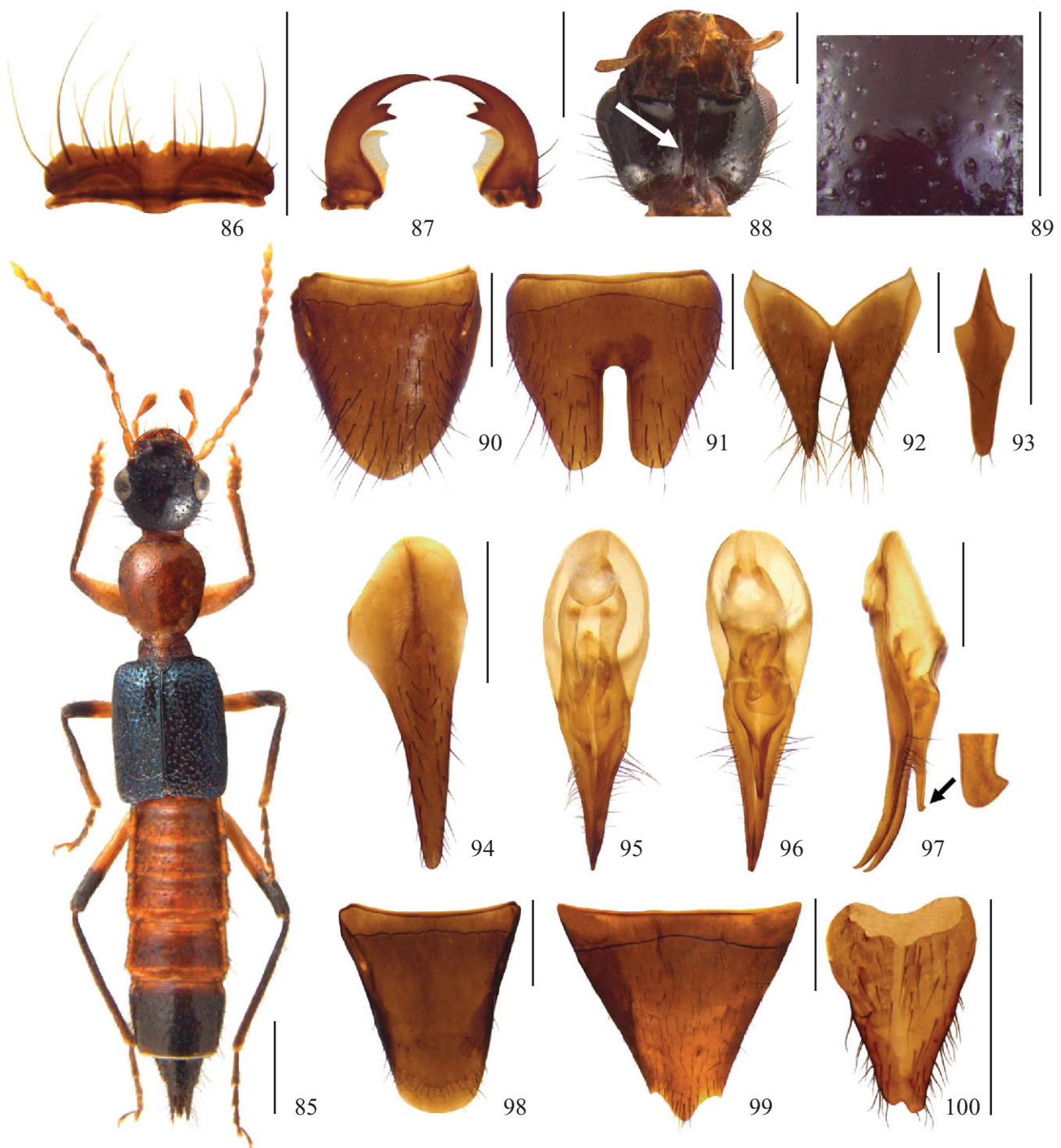
Paederus protensus Sharp, 1876 revalidated status (Figs. 85–100)

Paederus protensus Sharp 1876: 287 (original description, type locality: “Pará”); Fauvel 1891: 100 (the first time cited as junior synonym of *P. columbinus* Laporte, 1835); Frank, 1988: 123 (catalog with details about previous citations).

Diagnosis. *Paederus protensus* is similar to *P. amazonicus* and *P. columbinus* in size and apex of female 8th sternite which have a rounded projection on the median portion of apical margin. It differs from these two species in the apex of the median lobe of aedeagus with a sharp spike-shaped projection oriented dorsally and female 9th sternite bilobed and asymmetrical.

Redescription. BL \approx 8.1 mm; BW \approx 1.4 mm.

Male. Body somewhat flattened dorsoventrally. Head black; subhexagonal, HL \approx 1.0 mm; HW \approx 1.1 mm, vertex punctate, distance between coarse punctures longer than the diameter of each puncture (Fig. 89); Eyes protruding. Antennae brownish yellow; long, almost reaching the apex of elytra. Labrum reddish brown, subrectangular, apical margin truncate, median twice small teeth and long setae on apical margin (Fig. 86). Mandibles reddish brown, falciform and symmetrical; projection bifurcate at the median of internal border, anterior tooth shorter than the posterior (Fig. 87). Gular sutures approximate the basal half (Fig. 88, arrow). Pronotum reddish, somewhat narrowed than elytra, PL \approx 1.2 mm, PW \approx 1.1 mm; nearly oviform, slightly widest on the apical two-thirds; disc very convex, longitudinal median area not punctate and glabrous, lateral areas with sparse setaceous punctures. Elytra blackish blue with metallic gloss; rectangular, EL \approx 1.8 mm; parallel sides; humeral angles slightly rounded; apical margin truncate; punctate and more conspicuous than from head and pronotum; wings well developed. Legs long, covered with brownish yellow macrosetae; profemur brownish yellow and darker on apical one-fourth; meso- and metafemur brownish yellow and darker on apical one-third; all tibiae entirely dark brown; protarsi wider than meso- and metatarsi and the four first segments bilobed. Abdomen with segments 3–6 of parallel sides; 3–6 reddish and 7–10 black; 8th tergite subtriangular, apical margin rounded (Fig. 90); 8th sternite subtrapezoidal, posterior margin strongly emarginate and its internal border with parallel sides, each lateral of apical margin oblique (Fig. 91); paraproct of 9th tergite contiguous at the basal region, apex strongly acute and long setae (Fig. 92); apex of 10th tergite rounded and with long setae (Fig. 93); 9th sternite elongate, apex rounded (Fig. 94). Aedeagus with median lobe not reaching the apex of lateral lobes, apex of median lobe hooked shaped dorsally directed (Fig. 97, narrow); lateral lobes with apices contiguous, symmetrical, narrow and slightly curved ventrally, with lateral bristles on apical half (Figs. 95–97).



Figs. 85–100. *Paederus protensus* Figs. 85–97, male; Figs. 98–100 female; 85. Habitus, dorsal view; 86. Labrum, dorsal view; 87. Mandibles, dorsal view; 88. Head, ventral view; 89. Vertex of head, dorsal view; 90. Tergite 8th, dorsal view; 91. Sternite 8th, ventral view; 92. Tergite 9th, dorsal view; 93. Tergite 10th, dorsal view; 94. Sternite 9th, ventral view; 95. Aedeagus, ventral view; 96. Aedeagus, dorsal view; 97. Aedeagus, lateral view; 98. Tergite 8th, dorsal view; 99. Sternite 8th, ventral view; 100. Sternite 9th, ventral view. Scale bar = 1 mm, Fig. 85; 0.5 mm, Figs. 86–100.

Female. Similar to male except for the following characters: 8th tergite subtrapezoidal with apical margin rounded (Fig. 98); 8th sternite subtriangular, apical margin with apex slightly acute (Fig. 99); sternite 9 elongate, basal margin wider than apical; apical margin bilobed and asymmetrical (Fig. 100); no genital plates.

Distribution records of the material examined. Brazil: Bahia (Lençóis, Rio de Contas), Maranhão (Chapadinha), Ceará (Sobral), Espírito Santo (Linhares), Minas Gerais (Betim).

Medical Importance. There is no record of incidents in the database of Brazilian SUS. However, Amado *et al.* (2010)

report *P. brasiliensis* causing dermatitis in Betim, Minas Gerais State, but the material studied by Amado is the true *P. protensus*. In 2010 there were incidents in the municipality of Chapadinha, Maranhão State (Francinaldo S. Silva, pers. comm.). So, here we record this species for the first time as of medical importance, independently of its previous taxonomic situation.

Type material. Syntype deposited in BMNH, one male, dissected, fixed on cardboard sealed between two plates of glass slides, with a male symbol. Manuscript on paper card with the following information: “*Paederus*”/“*protensus*” amazons”/“Type”/“D.S.”. The first label is printed and has the following information, “Type” [white label with red border]; the second is handwritten, “Pará” [green label]; the last two are printed and have the following information, “S. America:/Brasil.” [white label with midline green], “Sharp Coll/1905 – 313.” [white label]. Note: Sharp (1876) studied four specimens and according to Dr. Roger G. Booth there are 3 syntypes deposited in BMNH, of which we observed only one male. The fourth syntype has not been found. Presumably all syntypes are deposited in BMNH. Since Fauvel (1891) this name is considered junior synonym of *P. columbinus* Laporte, 1835, but through the analyses of the type material from both names it was possible to separate in two morphological distinct species, so here we revalidate the species *P. protensus* Sharp, 1876.

Additional material. BRASIL: Bahia: 1 M, 1 F, *Lençóis*, Ribeirão de Baixo, 4.VI.2007, J. A. Rafael & F. F. Xavier Fo. Luz col. (DZUP); 2 M, 5 F, *Rio de Contas*, 28.I, 3.II. 2005; 25–30.I.2007, Mielke & Casagrande col. (DZUP); Maranhão: 14 M, 10 F, *Chapadinha*, 8,13,17,19,21,24. VIII.2009, 16, 25.I.2010, F. S. Silva col. (DZUP); Ceará: 1 M, *Sobral*, IV.1957, no collector (MZSP); Espírito Santo: 1 F, *Linhares*, 5–6.V.2007, J.A. Rafael, F.F. Xavier Fo. col. (INPA); Minas Gerais: 1 M, 1 F, *Betim*, 2009, no collector, (DZUP); 2 F, 2 M, *Betim*, 2009, R.C. Amado col. (DZUP).

Paederus rutilicornis Erichson, 1840

(Figs. 101–118)

Paederus rutilicornis Erichson, 1840: 666 (original description, type locality: “Bogotae in Columbia interiore”); Frank & Kanamitsu, 1987: 158 (main reference indicating medical importance); Frank, 1988: 130 (catalog with details about previous citations).

Paederus lugubris Motschulsky, 1858: 635 (original description, type locality: “Brésil”); Gemminger & Harold 1868: 628 (first time cited as junior synonym of *P. rutilicornis* Erichson, 1840); Frank, 1988: 119 (catalog with details about previous citations).

Diagnosis. *Paederus rutilicornis* is similar to *P. ferus* and *P. brasiliensis* due to the presence of the female genital plate. However, it differs from these two species for its entirely dark color, asymmetrical mandibles in both sexes, absence of posterior wings and lateral lobes of aedeagus asymmetrical in male.

Redescription. BL \approx 14.5 mm; BW \approx 2.0 mm.

Male. Body somewhat flattened dorsoventrally. Head black, subrectangular, HL \approx 2.7 mm, HW \approx 2.4 mm; vertex punctate, distance between coarse punctures longer than the diameter of each puncture (Fig. 105). Eyes protruding. Antennae

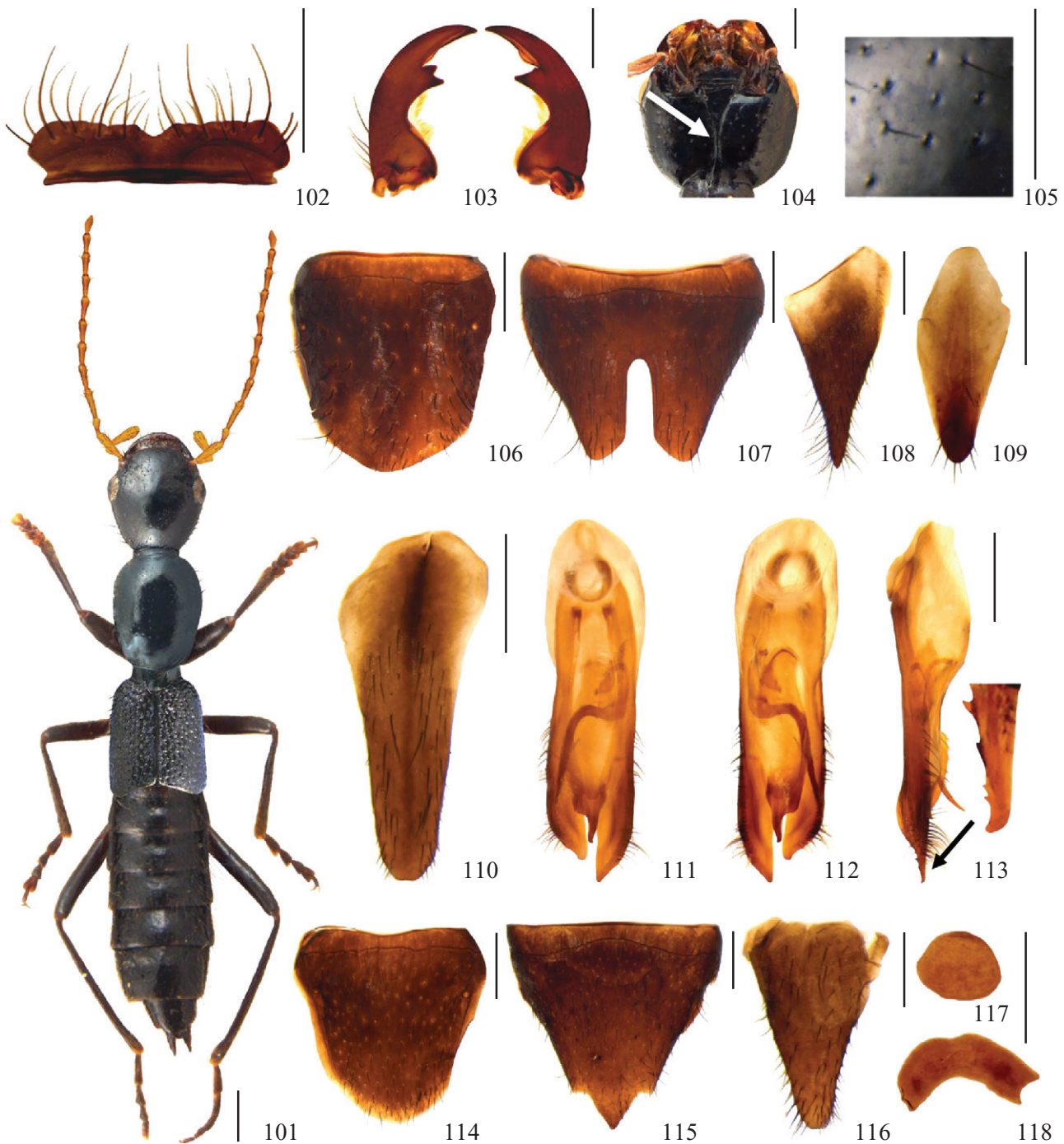
brownish yellow; long, almost reaching the apex of elytra. Labrum dark brown, subrectangular, apical margin truncate with conspicuous median emargination, oblique lateral margins (Fig. 102). Mandibles brown, falciform and asymmetrical, right mandible with one tooth in the median of internal border; left mandible with a projection bifurcated at the median of internal border, anterior tooth shorter than the posterior (Fig. 103). Gular sutures strongly approximates at the basal half (Fig. 104, arrow). Pronotum black, almost the same wide of elytra, PL \approx 2.8 mm, PW \approx 2.4 mm, nearly oviform, slightly widest on the apical two-thirds; disc very convex, longitudinal median area not punctate and glabrous, lateral areas with sparse setaceous punctures. Elytra blackish blue with metallic shine; rectangular, EL \approx 3.1 mm, with sides slightly parallel, humeral angles rounded; apical margin oblique; punctate and more conspicuous than from head and pronotum; wings not developed. Legs long; covered with brownish yellow macrosetae; femurs and tibiae entirely black; protarsi wider than meso- and metatarsi and the four first segments bilobed. Abdomen elongate; entirely black, ventrite 3–6 with parallel sides; 8th tergite subquadrate, apical margin rounded (Fig. 106); 8th sternite subtrapezoidal, posterior margin strongly emarginate and its internal border with parallel sides, each lateral of apical margin oblique (Fig. 107); paraproct of 9th tergite contiguous at the basal region, apex strongly acute and long setae (Fig. 108); apex of 10th tergite rounded and with long setae (Fig. 109); 9th sternite elongate, apex somewhat emarginated to truncate (Fig. 110). Aedeagus with median lobe with abrupt apex and asymmetrical, almost reaching the apex of right lateral lobe in dorsal view (Fig. 112); lateral lobes asymmetrical, inner margin of parallel sides, apex curved ventrally, right lateral lobe with four small spines (Fig. 113, arrow).

Female. Similar to male except for the following characters: 8th tergite subtrapezoidal, with apical margin rounded (Fig. 114); 8th sternite subtriangular, apical margin with median projection of acute apex (Fig. 115); 9th sternite in single plate, subtriangular, basal margin wider than apical, apical margin truncate (Fig. 116); dorsal genital plate subquadrate and rounded (Fig. 117), ventral rectangular and strongly curved (Fig. 118).

Distribution records of the material examined. Colombia (Bogotá, Pacho, Cudinamarca).

Medical Importance. There is no record of incidents in the database of Brazilian SUS. However, Froes (1935) reports this species in Bahia state. During this study, all material of *P. rutilicornis* observed was from Colombia. The study of the type of *P. lugubris* possibly will clarify the taxonomic situation of the two names.

Type material. *Paederus rutilicornis*: syntypes deposited in ZMHB, two female and three males. One syntype with the following information: “Bogotá Buq. [green label]”, “6467 [white label]”, “*rutilicornis*/(two illegible letters) [green label], “Type” [orange label], “SYNTYPUS/*Paederus/rutilicornis* Erichson, 1840/labelled by MNHUB 2012” [red label]. The others with the following information: “Bogotá” [white label, handwritten], “Hist.-Coll. (Coleoptera)/Nr. 6467/*Paederus*”



Figs. 101–118. *Paederus rutilicornis* Figs. 101–113, male; Figs. 114–118 female; 101. Habitus, dorsal view; 102. Labrum, dorsal view; 103. Mandibles, dorsal view; 104. Head, ventral view; 105. Vertex of head, dorsal view; 106. Tergite 8th, dorsal view; 107. Sternite 8th, ventral view; 108. Tergite 9th, right part, dorsal view; 109. Tergite 10th, dorsal view; 110. Sternite 9th, ventral view; 111. Aedeagus, ventral view; 112. Aedeagus, dorsal view; 113. Aedeagus, lateral view; 114. Tergite 8th, dorsal view; 115. Sternite 8th, ventral view; 116. Sternite 9th, ventral view; 117. Genital plate, part; 118. Genital plate, part. Scale bar = 1 mm, Fig. 101; 0.5 mm, Figs. 102–118.

rutilicornis Erichs./Bogotá., Buq./Zool. Mus. Berlin” [green label], “SYNTYPUS/*Paederus/rutilicornis* Erichson, 1840/labelled by MNHUB 2012” [red label]. Note: Erichson (1840) did not specify how many specimens he observed. We received from ZMHB three males and two females labeled as type. Presumably all syntypes are deposited in ZMHB. *Paederus*

lugubris: syntype deposited at the Zoological Museum of Moscow University (ZMUM), a female, not observed.

Additional material. COLOMBIA: 1 M, no locality, no date, no collector (FMNH); 1 M, Bogotá, don. Shandinga, no date, no collector (FMNH); Cundinamarca: 5 F, 3 M, Pacho, no date, 1900atm, Corwill col. (FMNH); 20 F, 14 M, Pacho, no date, 2000atm, Corwill col. (FMNH).

CONCLUSION

We summarize here the main results of this complete taxonomic revision of the species of *Paederus* of medical importance in Brazil. Seven species of *Paederus* have been recorded in Brazil causing dermatitis, of which five, *P. brasiliensis*, *P. columbinus*, *P. ferus*, *P. mutans* and *P. protensus*, are confirmed with study of voucher material. On the other hand, *P. amazonicus* and *P. rutilicornis* are cited as having medical importance based only on old literature, in which misidentification is possible. Moreover, two species are listed for the first time as of medical importance, *P. mutans* and *P. protensus*, the latest previously considered as a junior synonym of *P. columbinus* and here revalidated.

Before the current study, species of *Paederus* of medical importance in Brazil had been recorded in 11 States, all based on diverse literature: Amazonas, Pará, Ceará, Paraíba, Pernambuco, Alagoas, Sergipe, Goiás, Minas Gerais, São Paulo and Paraná. Now, we recorded six additional States: Maranhão, Rio Grande do Norte, Mato Grosso, Espírito Santo, Rio de Janeiro and Santa Catarina.

However, during this study no material of *Paederus* of medical importance has been seen in Paraíba, Pernambuco and Alagoas. At the moment, there is no record of any species of *Paederus* of medical importance in the following 10 Brazilian States: Roraima, Amapá, Acre, Rondônia, Tocantins, Piauí, Sergipe, Distrito Federal, Mato Grosso do Sul and Rio Grande do Sul. It is a general consensus, however, that these states cannot be considered free of *Paederus* of medical importance. Regarding the presence of the species in the main five regions of Brazil, the confirmed geographic distribution of each species of *Paederus* of medical importance shows that *P. amazonicus* occurs in the north and central-west regions, *P. brasiliensis* in almost all of the five regions, except the central-west one, *P. columbinus* in north and northeast regions, *P. ferus* in southeast and south regions, *P. mutans* in north, northeast and southeast regions and *P. protensus* in northeast, central-west and southeast regions. In contrast, *P. rutilicornis* was confirmed only for Colombia and its record in Brazil needs to be confirmed, possibly after the study of the type of *P. lugubris*.

Five species are also here confirmed in other countries, *P. amazonicus* in Peru, *P. brasiliensis* in Argentina, *P. columbinus* in Panama and Venezuela, *P. ferus* in Ecuador and Bolivia, and *P. rutilicornis* found only in Colombia.

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