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## PHYLOGENETIC ANALYSIS AND TAXONOMIC REVISION OF PHYSODACTYLINAE (COLEOPTERA, ELATERIDAE)

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### ABSTRACT

*A phylogeny based on male morphological characters and taxonomic revision of the Physodactylinae genera are presented. The phylogenetic analysis based on 66 male characters resulted in the polyphyly of Physodactylinae which comprises four independent lineages. Oligostethius and Idiotropia from Africa were found to be sister groups. Teslasena from Brazil was corroborated as belonging to Cardiophorinae clade. The South American genera Physodactylus and Dactylophysus were found to be sister groups and phylogenetically related to Heterocrepidius species. The Oriental Toxognathus resulted as sister group of that clade plus (Dicrepidius ramicornis (Lissomus sp., Physorhynchus erythrocephalus)). Taxonomic revisions include diagnoses and redescriptions of genera and distributional records and illustrations of species. Key to species of Teslasena, Toxognathus, Dactylophysus and Physodactylus are also provided. Teslasena lucasi is synonymized with T. femoralis. A new species of Dactylophysus is described, D. hirtus sp. nov., and lectotypes are designated to non-conspecific D. mendax sensu Fleutiaux and Heterocrepidius mendax Candèze. Physodactylus niger is removed from synonymy under P. oberthuri; P. carreti is synonymized with P. niger; P. obesus and P. testaceus are synonymized with P. sulcatus. Nine new species are described in Physodactylus: P. asper sp. nov., P. brunneus sp. nov., P. chassaini sp. nov., P. flavifrons sp. nov., P. girardi sp. nov., P. gounellei sp. nov., P. latithorax sp. nov., P. patens sp. nov. and P. tuberculatus sp. nov.*

**KEY-WORDS:** Morphology; Click beetles; Neotropical region; Afrotropical region; Ethiopian region; Oriental region.

### INTRODUCTION

The subfamily Physodactylinae was erected by Lacordaire (1857) to include the Brazilian genus *Physodactylus* Fischer von Waldheim, 1823 in Cebrionidae, family currently regarded as subfamily of Elateridae (Lawrence & Newton, 1995; Costa *et al.* 2010). Posteriorly, several authors included elaterids with apparently burrowing adaptations in Physodac-

tylinae based on the conspicuous features shared by cebrionines and *Physodactylus*: fossorial legs, falciform mandibles and prosternal anterior lobe (chin piece) not produced.

Fairmaire (1878) erected *Toxognathus*, from Southeast Asia and related it to *Physodactylus*. Fleutiaux (1892) erected *Dactylophysus* and *Teslasena* to include described species in *Heterocrepidius* Candèze, 1859 and new species from South America, placing

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them with *Physodactylus* in the tribe Physodactylini (Elaterinae). Schwarz (1906) added to this tribe *Margogastrius* Schwarz, 1903 (Tanzania), *Idiotropia* Schwarz, 1906 (Algeria), *Oligostethius* Schwarz, 1906 (South Africa) and *Coryssodactylus* Schwarz, 1897 (Tanzania), which were excluded by Fleutiaux (1919).

Schenkling (1927) catalogued the group as subfamily, to which he added more three genera: *Tharopsides* Fleutiaux, 1918 (Asia), *Nullarborica* Blackburn, 1911 and *Antoligostethus* Blackburn, 1911 (Australia).

Fleutiaux (1940a) separated *Toxognathus* to Toxognathinae and in 1947 transferred *Tharopsides* to Oxynopterinae, as a synonym of *Luzonicus* Fleutiaux, 1916. Van Zwaluwenburg (1953) described the Australian genus *Patriciella* in Physodactylinae. Stibick (1979) presented the group as subtribe of Denticollinae, including *Toxognathus*, based on adult characters as prognathous head, truncate prosternal anterior lobe and mesocoxae open to both mesepimeron and mesepisternum. Later, Calder (1996) transferred the Australian genera *Nullarborica* and *Antoligostethus* to Elaterinae and *Patriciella* to Cardiophorinae. Lawrence & Newton (1995) and Costa *et al.* (2010) listed Physodactylinae (incl. Toxognathinae) as subfamily of Elateridae.

After the modifications made by Fleutiaux (1947), Stibick (1979) and Calder (1996) to the classification of Schenkling (1927), Physodactylinae comprises 28 species in seven genera: *Physodactylus*, *Dactylophysus*, *Teslasena*, *Toxognathus*, *Margogastrius*, *Idiotropia* and *Oligostethius*. This is currently the composition of the subfamily and is the object of the present work.

Physodactylinae have been assumed to be paraphyletic (Costa *et al.*, 2010), although a comprehensive cladistic analysis has not been performed for the group. Douglas (2011) included in his phylogenetic analysis of Elateridae male characters of *Physodactylus henningi* and *Teslasena femoralis* and female characters of *Margogastrius schneideri*. Those physodactylines were found to be polyphyletic with *T. femoralis* and *M. schneideri* related to Cardiophorinae and *P. henningi* with uncertain relationships, but not associated with the Cardiophorinae.

This work focuses on the cladistic analysis of the Physodactylinae in order to test its monophyly and the taxonomic revision of its genera and species. The physodactylines are poorly represented in the insect collections and several species were described based on one or a few male specimens, with female specimens assigned to two species belonged to *Physodactylus* and *Dactylophysus*. In contrast, *Margogastrius* is known only from females. Larvae are unknown for

all genera. Therefore, only male characters could be scored. On the other hand, species of the rare physodactylinae genera from Africa and Southeast Asia and several species of *Physodactylus* were included in the matrix. Additionally, many species representing genera traditionally assigned or related to Physodactylinae were included as outgroups. The analysis resulted in Physodactylinae as polyphyletic and allows some insights into the phylogenetic relationships of its genera.

## MATERIAL AND METHODS

### Taxonomic revision

Label data of the type specimens with valid names are listed after each species description. A complete list of additional material and types of junior synonyms examined are listed in the Appendix 1. Each label of all type specimens is transcribed between square brackets whereas notes are in parentheses. The studied material belongs to the following collections, with their respective acronyms and curators in parentheses: Canadian National Collection of Insects, Ontario (CNC, Patrice Bouchard); Coleção Entomológica Pe. J.S. Moure, Universidade Federal do Paraná, Curitiba (DZUP, Lúcia Massuti de Almeida); Deutsches Entomologisches Institut, Müncheberg (DEI, Lothar Zerche); Instituto Biológico, São Paulo (IBSP, Sérgio Ide); Museu de Zoologia da Universidade de São Paulo, São Paulo (MZUSP, Sônia A. Casari); Museu Nacional da Universidade Federal do Rio de Janeiro, Rio de Janeiro (MNRJ, Marcela L. Monné); Museu Paraense Emílio Goeldi, Belém (MPEG, Orlando T. Silveira); Muséum National d'Histoire Naturelle, Paris (MNHN, Antoine Mantilleri); The Natural History Museum, London (BMNH, Max Barclay); Universidade Estadual Paulista "Julio de Mesquita Filho", Campus de Ilha Solteira, (UNESP-IS, Carlos A.H. Flechtmann).

I prepared drawings with a camera lucida coupled to a Stemi SV6 Zeiss stereoscopic microscope or after photos and took photographs using a digital camera Canon A640, a camera Axiocam coupled to Zeiss Imager A1 microscope and a SEM Zeiss LEO 440. Different focal planes were merged using Helicon Focus 3.10.

Terminology follows Calder (1996) & Costa *et al.* (2010), except for (followed works in parentheses): wing venation and apical sclerotizations (Kukalova-Peck & Lawrence, 2004; Muona, 1993), density of punctures (Douglas, 2003), pterotergites (Friedrich

& Beutel, 2006) and mouthparts (Casari, 2008). The term “pedunculate anterior sac” is used here in the sense of Douglas (2011). The abdominal marginal plate (Fig. 9L) is understood as the expanded lateral edge of the sternite which fits under epipleura; the lateroposterior part of phallobase is the lateral part that extend posteriorly beyond the posterior edge of the median part (Fig. 2U). The free margin of metacoxal plate (Casari, 2008) is the expanded part of metacoxal plate that overlaps part of the metatrochanter and metafemur (Fig. 12O). I referred to antennomeres and abdominal segments with Roman numerals, abdominal ventrites with Arabic numbers, abbreviated “index of eye prominence” as IEP (Calder, 1996) and cited characters and character states in the discussion by their numbers separated by hyphen (*e.g.*, 21-0). Polymorphic color patterns were numbered in the description. These numbers are used to refer to color patterns in remark section avoiding repetitions and do not correspond to hypothesis of homology among species.

Measurements were made using the stereoscopic microscope fitted with an ocular micrometer or after drawings. Index of eye prominence (IEP) and length of aedeagus, pronotum and elytra was measured according to Calder (1996). Other measurements were taken as follows:

— *Lengths*. Mandible: along a line perpendicular to the base. Prosternum, mesoventrite, metaventrite and ventrite 5: along midline; posterior edge of prosternum (excluding process) is at level of the anterior edge of procoxal cavity (Fig. 2F). Prosternal process: from anterior edge of procoxal cavity (Fig. 2F) to apex of prosternal process. Lateral part of ventrite 1: at its most external border; median part of ventrite 1: at the shortest distance between the anterior and posterior margins at middle (Fig. 5K). Phallobase: along a longitudinal line from its most anterior part to apex of the lateroposterior part (Fig. 15J); median part of the phallobase: along the midline; lateroposterior part of phallobase: from the level of the posterior margin of the median part to the apex of the lateroposterior part (Fig. 2U). Paramere: in dorsal view from its most anterior margin to the apex. Penis: in dorsal view along the longitudinal line from anterior tip of the basal strut to apex of penis; basal strut: from its anterior tip to the most posterior edge at middle (Fig. 15I). In *Teslasena* species, the triangular basal part of penis: in ventral view from the most anterior margin between the bas-

al struts to the point where lateral edges become parallel-sided; posterior part of penis: from this point to the apex (Fig. 2U).

- *Widths*. Mandible: across its basal part. Pronotum: at widest point, which is usually at mid-length (in species with rounded pronotal sides) or at base of hind angles (in species with sides convergent anteriorly); metaventrite and ventrite 5: at widest point; prosternum: at smallest transversal line between the notosternal sutures (Fig. 2F). Phallobase: at widest point.
- Diameter of coxal cavity is measured along its widest transversal line. Angle formed by the inclination of the posterior region of mesoventrite in relation to its anterior region was obtained crossing two lines, each one parallel to anterior and posterior regions in lateral view (Fig. 2K). Degree of inclination of the metacoxa in relation to the transverse body axis in ventral view was measured crossing two lines, a transversal line between the most external points of metacoxae and an oblique line between the most external point of right metacoxa and the apex of metaventrite (Fig. 1H).

### Cladistic Analysis

The ingroup included 18 taxa: 11 species of *Physodactylus*, two species of *Dactylophysus*, the type species of *Teslasena*, two species of *Toxognathus* and the monotypic genera *Oligostethius* and *Idiotropia*. The choice of outgroup taxa was based on the supposed relationships of physodactyline genera with other elaterid clades indicated by their taxonomic background and the cladistic analysis of Douglas (2011). Outgroups (material examined in Appendix 1) include 20 species: the Eucnemidae *Ceratogonis spinicornis* (Fabricius, 1801) and the following elaterid species, with the respective subfamily and tribe in parentheses: *Semiotus distinctus* (Herbst, 1806) (Seminotinae), *Lissomus* sp. (Lissominae), *Scaptolenus lecontei* Chevrolat, 1874 (Cebrioninae), *Ctenicera silvatica* (Van Dyke, 1932) (Dendrometrinae, Ctenicerini), *Athous vittatus* (Fabricius, 1792) (Dendrometrinae, Denticollini), *Melanotus similis* (Kirby, 1837) (Elaterinae, Melanotini), *Ampedus sanguinolentus* (Schrank, 1776) (Elaterinae, Ampedini), *Physorhinus erythrocephalus* (Fabricius, 1801) (Elaterinae, Physorhinini), *Dicrepidius ramicornis* (Palisot de Beauvois, 1805), *Heterocrepidius depressus* Candèze, 1859, *H. gilvellus* Candèze, 1859 (Elaterinae, Dicrepidini), *Cardiophorus tenebrosus* Leconte, 1853, *Horistonotus* sp., *Patriciella* sp.,

*Globothorax latidens* Rosa, 2011, *Triplonychus plagiatus* (Erichson, 1846), *T. crassifemoris* Rosa, 2011, *T. cruspinosus* Rosa, 2011 and *T. tibialatus* Rosa, 2011 (Cardiophorinae).

The analysis was based on 66 male morphological characters scored from examination of specimens. Female characters and therefore those from the monotypic *Margogastrius*, were not included because females are unknown for the majority of species. The data matrix (Appendix 2) was constructed in Mesquite version 2.75 (Maddison & Maddison, 2011). Autapomorphies were not included, unless they represent states in multistate series. Quantitative and multistate characters that could be ordered by morphological continuity in a linear sequence of intermediate states were treated as additive; otherwise they were treated as non-additive (unordered). The additive characters are identified as ordered in the character list. All characters were treated as having equal weight. Specific references are given to some characters that have been employed in previous cladistic analysis (Calder *et al.*, 1993; Lawrence *et al.*, 2011; Casari, 2008).

The parsimony analysis was performed with T.N.T. software (Goloboff *et al.*, 2003) with heuristic search ("traditional search" function) in 5000 random-addition sequences followed by TBR branch swapping, retaining 10 trees per replicate. Branch support was evaluated through Bremer support (Bremer, 1994) analysis as implemented in TNT, employing the option to save suboptimal trees by 20 steps and collapsing nodes with support less than one step.

## RESULTS AND DISCUSSION

### List of Characters

1. Color of body setae: [0] yellow; [1] brown; [2] silvery.
2. Frontal carina between antennal insertions: [0] absent (Fig. 5A); [1] present (Fig. 12G) (Calder *et al.*, 1993 – modified).
3. Frontal carina (contingent on character 2-0): [0] not protruded anteriorly (Fig. 22E); [1] protruded anteriorly, covering the base of labrum (Fig. 26E).
4. Antennal sensory elements beginning on antennomere: [0] III; [1] IV. (Calder *et al.*, 1993).
5. Lateral sides of antennomeres IV-XI in dorsal or ventral view: [0] flat; [1] convex.
6. Shape of the anterior edge of labrum: [0] pointed (Fig. 2D); [1] straight (Fig. 9D); [2] rounded (Fig. 3C).
7. Dorsal surface of labrum: [0] flat; [1] evenly convex; [2] posterior part convex sloping downwards anteriorly (Fig. 33E).
8. Mandible: [0] not more than 2 times as long as basal width (Fig. 9D); [1] more than 3 times as long as basal width (falciform) (Fig. 2E). (Lawrence *et al.*, 2011).
9. Mandible: [0] unidentate (Fig. 2E); [1] bidentate with subapical mesal tooth (Fig. 3C); [2] bidentate with subapical dorsal tooth (fig. 106 in Casari, 2008); [3] tridentate.
10. Row of seta on the mesal edge of mandible: [0] absent; [1] present.
11. Extension of the row of seta on the mesal edge of mandible: [0] extended on basal third (fig. 106 in Casari, 2008) to basal half (Fig. 8A); [1] restricted to a small basal area (Fig. 2E).
12. Ridge on lateroanterior margin of mandible: [0] absent (Fig. 5A); [1] present (Fig. 9D).
13. Shape of basistipes: [0] triangular as wide as long (fig. 72 in Rosa, 2011); [1] trapezoidal longer than wide (Fig. 9B).
14. Number of long thick setae on basistipes: [0] absent (autapomorphy of *Patriciella* sp.); [1] one (Fig. 32A); [2] three; [3] more than five (Fig. 12D) (ordered).
15. Setae on galea: [0] fine (Fig. 22B); [1] spiniform (Fig. 30B); [2] spatulate.
16. Shape of the apical maxillary palpomere: [0] slightly expanded and truncate apically (Fig. 12D); [1] securiform, strongly expanded and squarely to obliquely truncate apically; [2] cylindrical to fusiform (narrowed at both ends) (Fig. 9B). (Lawrence *et al.*, 2011).
17. Lateral anterior angles of prementum: [0] not prominent (Fig. 9C); [1] prominent (Fig. 32C).
18. Labial palpigers: [0] separate (Fig. 9C); [1] contiguous (Fig. 32C).
19. Sides of prothorax: [0] convergent anteriorly from posterior angles or posterior third (Fig. 12); [1] subparallel (straight or convex) on major part, convergent only on anterior angles (Fig. 8B), [2] divergent anteriorly from posterior third (Fig. 3D).
20. Pronotal lateral carina: [0] present on posterior 1/2-2/3 (Fig. 2H); [1] present on posterior 9/10 (Fig. 25D); [2] complete (Fig. 11C); [3] absent. Ordered.
21. Pronotal punctation: [0] single (Fig. 16B); [1] double (intermixed large and small punctures) (fig. 36 in Rosa, 2011).
22. Posterior edge of hypomeron adjacent to the posterior angle of prothorax: [0] straight, with-



- out notch or concavity (Fig. 3G); [1] with a V-shaped notch (Fig. 2H); [2] with a longer than wide U-shaped notch (Fig. 12L); [3] with a rectangular notch; [4] with a wider than long concave notch.
23. Anterior edge of prosternum: [0] not produced, exposing labium (Fig. 2H); [1] produced forward to form "chin piece", concealing labium (Fig. 12I) (Calder *et al.*, 1993).
  24. Procoxal cavities posteriorly to coxae: [0] open (Fig. 3E); [1] closed (Fig. 2F).
  25. Posterior region of mesoventrite in relation to its anterior region: [0] inclined ventrad approximately 45° (Fig. 2K); [1] slightly inclined ventrad (at most 30°) (Fig. 3I); [2] inclined 90°. Ordered.
  26. Mesocoxal cavity: [0] closed to both mesepimeron and mesepisternum (Fig. 2J); [1] open to mesepisternum only; [2] open to both mesepimeron and mesepisternum (Fig. 3H). Ordered. (Calder *et al.*, 1993).
  27. Mesotrochantin: [0] not visible (Fig. 2J); [1] visible (Fig. 5H) (Calder *et al.*, 1993).
  28. Mesometaventral suture: [0] not grooved (Fig. 22K); [1] grooved (Fig. 3L).
  29. Ratio of width of metaventrite to its length: [0] 1.3-1.6 (Fig. 2I); [1] 1.9 (Fig. 3L).
  30. Free margin of metacoxal plate: [0] present (Fig. 7B); [1] absent (Fig. 2I).
  31. Degree of inclination of the metacoxa in relation to the transverse body axis in ventral view: [0] 17°-20° (Fig. 22K); [1] 25°-30° (Fig. 3L).
  32. Elytral striae: [0] absent; [1] present.
  33. Punctuation of elytral striae with: [0] one row of punctures (Fig. 33N); [1] two regular rows of homogeneous punctures (equal sizes) (fig. 91 in Rosa, 2011); [2] 3-4 irregular rows of homogeneous punctures (fig. 94 in Rosa, 2011); [3] two rows of heterogeneous punctures (different sizes); [4] three rows of heterogeneous punctures (Figs. 32F, 33O).
  34. Hind wings: [0] present; [1] absent or reduced. I examined the base of mesonotum without elytra of one specimen of *Idiotropia henoni* and observed that it had no trace of hind wings. *Oligostethius capensis* has elytra fused at midlength which cannot be opened; therefore I could not examine the base of mesonotum of this species. Nevertheless, there were no hind wings in ventral view of elytra without abdomen (about 4/5 of elytral length).
  35. Apex of hind wing with sclerotizations present on: [0] anterior, median and posterior fields (Fig. 2M); [1] anterior and posterior fields (Fig. 7F); [2] anterior field only. Ordered.
  36. Hind wing with sclerotization between radial cell and anterior field sclerotization: [0] absent (Fig. 2M); [1] present (Figs. 9K, 26Q).
  37. Transverse vein CuA<sub>1</sub>: [0] absent (Fig. 2M); [1] present (Fig. 8E).
  38. Notch in the edge of anal area of hind wing: [0] absent (Fig. 7F); [1] present (Fig. 2M) (Calder *et al.*, 1993).
  39. Wedge cell of hind wing: [0] absent (Fig. 7F); [1] present (Fig. 26Q) (Calder *et al.*, 1993).
  40. Tarsal claws: [0] simple (Fig. 38B); [1] bifid (Fig. 32L); [2] trifid (fig. 89 in Rosa, 2011); [3] pectinate (with more than six teeth).
  41. Lamella on protarsomere I: [0] absent; [1] present (Fig. 33F). (Casari, 2008).
  42. Lamella on protarsomere III: [0] absent; [1] present (Fig. 33F). (Casari, 2008).
  43. Lamella on metatarsomere I: [0] absent (Fig. 33J); [1] present (Fig. 33H) (Casari, 2008).
  44. Metafemur laterally: [0] flat (Fig. 3O); [1] convex (Fig. 33J).
  45. Metafemur dorsoventrally: [0] slender; [1] broadened.
  46. Protibia: [0] slender (Fig. 3M); [1] broadened apically (Fig. 33F).
  47. Dorsal edge of protibia [0] straight; [1] sinuous.
  48. Length of the lateral part of ventrite 1 in relation to its median part: [0] 1.1-1.3x longer; [1] 2-3x longer (Fig. 5K); [2] 5-7x longer (Fig. 12R); [3] 9-10x longer; [4] more than 10x, ventrite 1 almost divided (Figs. 22L, 25H). Ordered.
  49. Abdominal marginal plate of the posterior angle of ventrite 1: [0] not protruded (Fig. 8F); [1] protruded (Fig. 25H).
  50. Marginal plate of posterior angle of ventrites 2-3: [0] not prominent (Fig. 5K); [1] prominent (Fig. 9L).
  51. Ventrite 5 at apex: [0] gradually narrowed; [1] abruptly narrowed.
  52. Posterior part of the sternite VIII: [0] with two lateral sclerotizations (Fig. 6A); [1] with three sclerotizations (Fig. 13A); [2] evenly sclerotized. Ordered.
  53. Position of fusion between tergite and sternite IX: [0] anterior (Fig. 10C); [1] posterior (Fig. 6D).
  54. Fringe of setae at apex of tergite X: [0] absent (Fig. 2S); [1] present (Figs. 10D, 13D).
  55. Longitudinal apodeme on laterodorsal surface of phallobase: [0] absent (Fig. 8H); [1] present (Fig. 16C).

56. Anterior edge of phallobase in ventral view: [0] rounded (Fig. 4F); [1] marginate, forming two lateral spines (Figs. 2T, 7D, 14D); [2] bisinuous.
57. Position of the lateral spines on anterior edge of phallobase: [0] in the same plane as the remaining phallobase (Figs. 7D, 14D); [1] on different plane (dorsal) (Fig. 2T).
58. Lateroposterior parts of phallobase in ventral view: [0] shorter than median part (Fig. 4F); [1] longer than median part (Figs. 2T, 7D).
59. Length of phallobase in relation to length of dorsal surface of parameres: [0] 0.4-0.6x shorter (Fig. 2U); [1] 0.8-1.1x as long as (Fig. 7C); [2] more than 2x longer. Ordered.
60. Parameres articulated to penis: [0] on the anterior margin of parameres (Fig. 4E); [1] at midlength of parameres (Fig. 2U).
61. Paramere at apical region: [0] tapered to apex (Fig. 2T); [1] with a lateral expansion (Fig. 8G).
62. Shape of lateral expansion on paramere at apical region (contingent on character 61-1): [0] pointed with apex acute or rounded (Figs. 7D, 6F); [1] convex (Fig. 4F). The apical region pointed has rounded apex only in *Idiotropia henoni*.
63. Contiguous sclerotized band of parameres in the anteromedian region: [0] absent (Fig. 17F); [1] present (Fig. 18L).
64. Apical part of penis: [0] dorsoventrally flattened (Fig. 8G); [1] cylindrical; [2] laterally compressed (Fig. 2U). Ordered.
65. Area of articulation between parameres and penis: [0] membranous (Fig. 19K); [1] sclerotized (Fig. 8G).
66. Ventral sclerite of penis: [0] absent (Fig. 2T); [1] present (Fig. 4F).

### Phylogenetic analysis

The phylogenetic analysis resulted in four most parsimonious trees with 281 steps, consistency index 0.35 and retention index 0.68. The strict consensus tree demonstrates the polyphyly of Physodactylinae (Fig. 36). The cladogram also indicates the sister-relationship between *Oligostethius* and *Idiotropia*, *Teslasena* nested with species of Cardiophorinae and *Dactylophysus* closely related to *Physodactylus*, both forming a clade related to *Heterocrepidius* species. *Toxognathus* is the sister-group of the clade comprising the later three genera, *Dicrepidius ramicornis*, *Lissomus* sp. and *Physorhinus erythrocephalus*.

The low branch support (Fig. 36) for most inclusive clades indicates that further investigations on phylogenetic relationships of physodactylinae genera within Elateridae are required. On the other hand, the monophyly of *Physodactylus* and *Toxognathus* are well supported (Bremer support 17 and 11 respectively) as well as the close relationship of *Idiotropia* and *Oligostethius* (Bremer = 11). The data analysed allow some insights into the phylogenetic relationships of those genera and may provide some clues to future research. The resulting synapomorphies indicated by the present analysis are plotted in the Figure 36. The main synapomorphies and their implications to the taxonomic position of the "physodactylines" are discussed below.

***Teslasena*:** The relationship between *Teslasena* and Cardiophorinae genera was investigated through the inclusion as outgroups of species of *Cardiophorus*, *Horistonotus* and Australian and South American species with fossorial legs belonging to the genera *Patriciella*, *Triplonychus* and *Globothorax*. *Teslasena* and Cardiophorinae species are nested in a clade moderately supported (Bremer = 3) by at least seven exclusive synapomorphies: basistipes triangular (13-0), one long thick seta on basistipes (14-1), procoxal cavities closed (24-1), posterior region of mesoventrite inclined ventrad about 45° (25-0), mesocoxal cavity closed to both mesepimeron and mesepisternum (26-0), loss of the transversal vein CuA<sub>1</sub> (37-0) and parameres articulated to penis at midlength of parameres (60-1). Douglas (2011) in a cladistic analysis pointed out that many characters found in Cardiophorinae genera, like closed mesocoxa, hind wing with anal area notched and wedge cell absent and paramere articulation apical of base (at midlength of parameres), are not exclusive of the group, but are shared with Negastrinae and Hypnoidinae genera, which were not represented in the present analysis. Yet, the results here indicate that *Teslasena* belongs to Cardiophorini clade, as also found by Douglas (2011).

***Idiotropia* and *Oligostethius*:** Schwarz (1906) transferred *Idiotropia* and *Oligostethius* to Physodactylinae based on their large mandibles, prosternum with truncate posterior lobe and tibiae widened apicad. The tibiae of the holotypes and specimens examined are slender and less widened than those of *Dactylophysus*. On the other hand, both genera present characters that suggest a close relationship with species of Dimini (Dendrometrinae Gistel, 1848). Dimini was defined by Candèze (1863) to assemble species with frons flat, weakly inclined and not carinate, metaven-

trite short and metacoxae with lateral 2/3 reduced. The group has a worldwide distribution and has been referred either as subfamily or tribe of Dendrometrinae (Schenkling, 1927; Golbach, 1964; Schimmel & Plattia, 1992; Schimmel, 1996; Bouchard *et al.*, 2011).

Species of Dimini was not available for this cladistic analysis, nevertheless species belonged to Dendrometrinae genera *Ctenicera* and *Athous* were included. A close relationship between *Idiotropia* and *Oligostethius* were found, nevertheless the relationship among those genera and the Dendrometrinae species was not confirmed. This result might be due to the small taxonomic sample, taking into account that Dendrometrinae is a highly diverse and possibly polyphyletic group that includes about 10 tribes, 150 genera and 1500 species (Stibick, 1979; Calder, 1998). Therefore, a more comprehensive phylogenetic analysis is required to clarify the taxonomic position of *Idiotropia* and *Oligostethius*.

The sister-group relationship between *Idiotropia henoni* and *Oligostethius capensis* is supported by the following synapomorphies: mandibles more than three times as long as basal width (8-1), mandible with a row of minuscule setae restricted to a small basal area (11-1), mesometaventral suture grooved (28-1), metaventrite short (1.9x wider than long) (29-1), loss of free margin of metacoxal plate (30-1), loss of hind wings (34-1), anterior edge of phallobase rounded (56-0) and lateral parts of phallobase shorter than median part (58-0).

**Toxognathus:** *Toxognathus* was assumed to belong to Physodactylinae (Fairmaire, 1878; Schwarz, 1906; Schenkling, 1927) based on its anterior prosternal edge not prominent and tibiae widened apicad. Fleutiaux (1940a) considered that the pectinate claws and simple tarsomeres were consistent characters to separate *Toxognathus* species and placed them in Toxognathinae. Pectinate claws and simple tarsomeres are also found in Melanotini (Elaterinae) genera, therefore a species of the genus *Melanotus* Eschscholtz, 1829 was included in the cladistic analysis. The results demonstrated that *Toxognathus* is more closely related to Dicrepidiini (Elaterinae) species included in this analysis than to *Melanotus similis*. Therefore the pectinate claws and the ridge on lateroanterior surface of mandible, observed in both *M. similis* and *Toxognathus* species, may have convergently evolved.

The sister-group relationship between the clade of *Toxognathus* species and ((*Dicrepidius ramicornis* + (*Lissomus* sp. + *Physorhinus erythrocephalus*)) + (*Heterocrepidius* + (*Dactylophysis* + *Physodactylus*))) is sup-

ported by complete frontal carina (2-1), hind wing with a sclerotization between radial cell and anterior field sclerotization (36-1), fringe of short setae at apex of tergite X (54-1) and phallobase as long as the dorsal surface of parameres (59-1).

Only specimens of *Toxognathus beauchenei*, *T. coomani* and *T. costulatus* were available to dissection of wings and could be studied in details. The latter two were included in the cladistic analysis because they represent two species group separated in the first pair of statements of the key under taxonomic revision below. According to the data present here, those species share the following synapomorphies: dorsal surface of labrum concave and sloping downwards anteriorly (7-2), mandible with a ridge on lateroanterior surface (12-1), apical maxillary palpomere cylindrical to fusiform (16-2), posterior edge of hypomeron with a V-shaped notch (22-1), loss of wedge cell (39-0) and tarsal claws pectinate (40-3). The clustering of *Toxognathus* with *Dicrepidius*, *Heterocrepidius*, *Dactylophysis* and *Physodactylus* species suggests that this genus may belong to Elaterinae. Nevertheless, the Elaterinae species included in the present analysis were not recovered as a monophylum. *Toxognathus* species also share several similarities with species of Melanotini genera (discussed below under taxonomic revision) which should be considered in future studies with focus on this tribe. A comprehensive cladistic analysis of Elaterinae would provide higher support to the phylogenetic relationships and taxonomic position of *Toxognathus*. For the moment, it should be considered *incertae sedis* within Elaterinae.

**Dactylophysis:** *Dactylophysis* was defined and included in Physodactylinae by Fleutiaux (1892) based on two species formerly in *Heterocrepidius* Candèze, 1859, which possess tibiae widened apicad. He differentiated *Dactylophysis* species from *Physodactylus* by their mandible bidentate (subapical tooth reduced in male), body weakly convex, antenna reaching the pronotal base and legs less robust. I observed that the female assigned to *Dactylophysis tibialis* by Fleutiaux is doubtful (see remarks in taxonomic discussion) and the mandible of males, slightly sinuous in some specimens, is actually unidentate (Figs. 12B, 15B). Nevertheless, the phylogenetic analysis corroborated the monophyly of *Dactylophysis* and its close relationship to *Physodactylus*. Those genera were found to be sister-groups moderately supported (Bremer = 4) by the unidentate mandible (9-0) and by posterior edge of hypomeron with a longer than wide U-shaped notch (22-0). The clade of *Dactylophysis* species is supported by labrum with anterior edge curved (6-2), anterior

edge of prosternum produced to form "chin piece" (23-1), loss of the hind wing sclerotization between radial cell and apical anterior field (36-0) and posterior part of sternite VIII with three sclerotizations (52-1).

**Physodactylus:** *Physodactylus henningi* was included by Douglas (2011) in his phylogenetic analysis of 50 Elateridae taxa. The analyses with different parameters and analytical methods resulted in *P. henningi* clustered either with several genera in a large polytomy, with *Semiotus furcatus* Fabricius, 1775 or as basal branch of the clade including species of Lissominae, Thylacosterninae and Cebrioninae. The present phylogenetic analysis found *Physodactylus* clade as sister-group of *Dactylophysus*. They were clustered with *Heterocrepidius* species in a clade supported by protibia broadened apically (46-1), lateral part of ventrite 1 5-7x longer than median part (48-2) and posterior angle of ventrite 1 with marginal plate protruded (49-1). The monophyly of *Physodactylus* is corroborated in this analysis by the following synapomorphies: lateral sides of antennomeres convex (5-1), dorsal surface of labrum with anterior part convex sloping downwards anteriorly (7-2), loss of free margin of metacoxal plate (30-1), metacoxa inclined 17° (31-0), metafemur laterally convex (44-1), dorsal edge of protibia sinuous (47-1) and ventrite 1 almost divided in the median line (48-4).

### Taxonomic Revision

#### *Margogastrius* Schwarz, 1903

*Gastrimargus* Schwarz, 1902: 309, preocc. by *Gastrimargus* Saussure, 1884 (Orthoptera).

*Margogastrius* Schwarz, 1903: 80; Schwarz, 1906: 310, 312; Schenkling, 1927: 509; Fleutiaux, 1919: 106.

*Type species* (by monotypy): *Gastrimargus schneideri* Schwarz, 1902.

**Diagnosis** (female): Mandible falcate unidentate, pronotal sides rounded without lateral carina, procoxae open externally, prosternal process with dorsal surface curved dorsad to apex; free margin of metacoxal plate short and reduced laterally, tibiae widened apicad with dorso-apical angles straight and not produced, metatrochanter strongly convex, metafemur convex weakly widened dorso-ventrally; tarsomeres and claws simple.

**Distribution:** TANZANIA.

#### *Margogastrius schneideri* (Schwarz, 1902) (Figs. 1, 34A)

*Margogastrius schneideri* Schwarz, 1903: 80; Schwarz, 1906: 312; Schenkling, 1927: 509.

*Gastrimargus schneideri* Schwarz, 1902: 310.

**Redescription** (female, Fig. 34A): Integument light brown with antennae, elytral base, ventral pterothorax and ventrites lighter; covered with short, fine and decumbent yellow setae, denser on ventral surface. Length 13.0 mm; elytral base as wide as prothorax; elytra 2.5 times longer than pronotum.

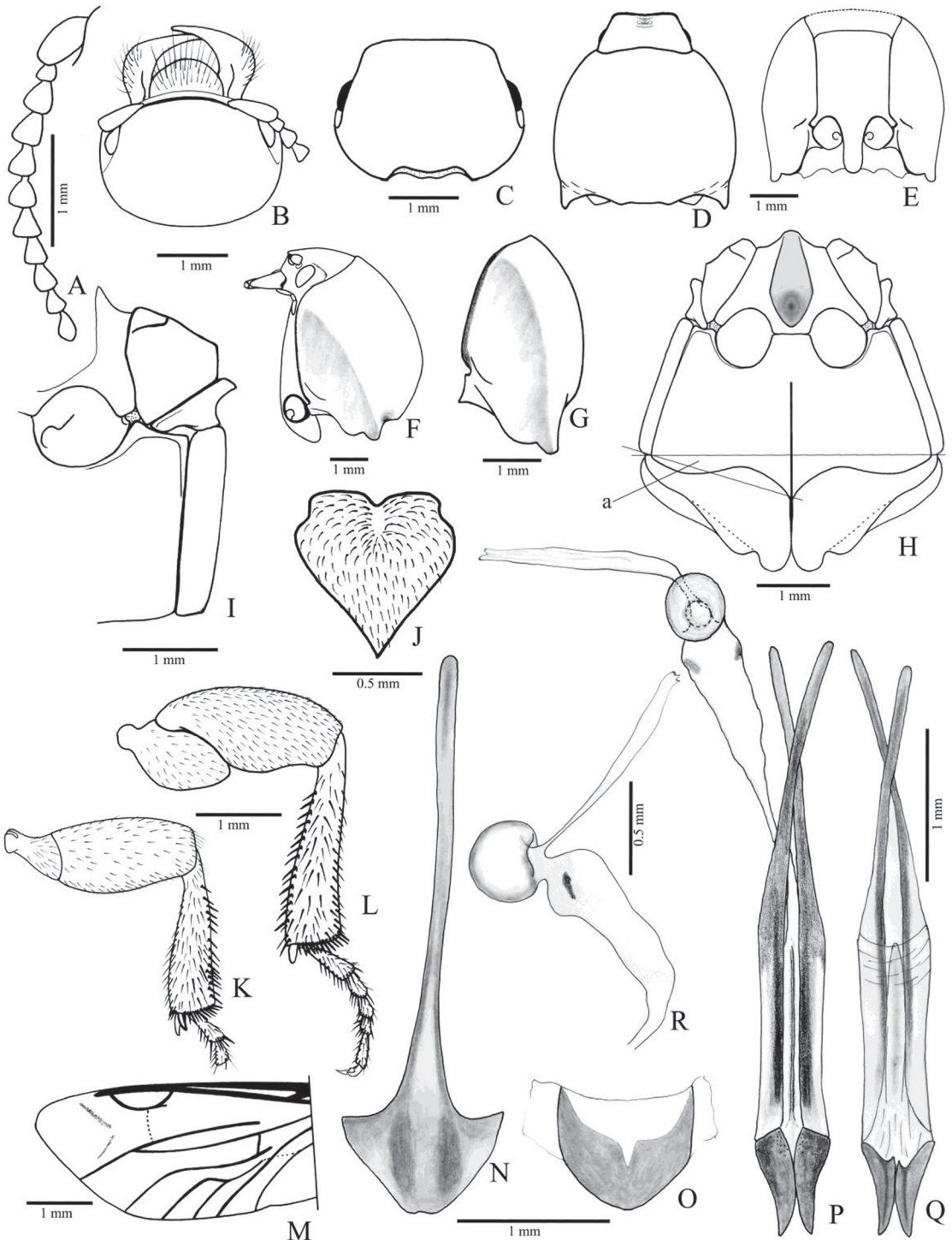
Head (Figs. 1B-C) with frons concave, frontal carina complete medially; frontoclypeal region steeply declivous to base of labrum, rectangular, about 3.0x wider than long; punctation fine and umbilicate, sparse at middle, dense on lateral and anterior margins. Antenna (Fig. 1A) with 11 antennomeres, serrate from antennomere III, nearly reaching the posterior half of the pronotum; antennomere III 2.0x longer than the II; IV as long as III. IEP 0.10. Mouthparts directed ventrally; labrum (Fig. 1B) semicircular, convex. Mandible (Fig. 1B) falcate, unidentate with laterodorsal surface with long setae; mesal margin at base with a row of short setae. Maxilla with galea trapezoidal, widened apicad, densely pilose; lacinia narrow, tongue-like, densely pilose; medistipes fused to the basistipes, corresponding area of the medistipes with one long stiff seta and several shorter and finer setae. Labium with mentum covered with fine and short setae. Maxillary and labial apical palpomeres elliptical.

Prothorax (Figs. 1D-F) dorsally and ventrally convex, 1.1x wider than long, sides rounded convergent anteriorly from midlength in dorsal view, lateral carina absent; punctures umbilicate, 1-2 diameters apart on disc, denser on lateral margins; anterior angles not produced, posterior angles acute, short. Hypomeron (Fig. 1G) with punctures 0.5-1.0 diameter apart, umbilicate; posterior margin with a V-shaped notch near the hind angle. Notosternal sutures (Fig. 1E) straight sided, margined by a shiny band along hypomera. Prosternum (Fig. 1E) 1.25x longer than wide, with umbilicate punctures larger than those of hypomera, 0.5-1 diameters apart near midline, smaller and denser on lateral margins; prosternal anterior lobe covering mouthparts to mentum when head retracted. Prosternal process (Figs. 1E, F) with dorsal surface curved dorsad to apex, 1.0-1.8x longer than diameter of procoxae. Procoxal cavities open externally.



*Pterothorax* (Figs. 1H, I): Mesoventrite with posterior region abruptly inclined ventrad about 43° in relation to anterior region, with anterior articulating surfaces

weakly concave; borders of mesoventral cavity curved. Mesocoxal cavity open to mesepisternum (Fig. 1I) (closed in the right side of the lectotype); mesotro-



**FIGURE 1:** *Margogastrius schneideri* (female): **A**, antenna; **B**, **C**, head (anterodorsal, dorsal); **D**, **E**, **F**, prothorax (dorsal with head, ventral, lateral with head); **G**, hypomeron and pronotum; **H**, **I**, pterothorax (ventral, lateroventral); **J**, scutellar shield; **K**, **L**, pro- and metathoracic legs (outer surface); **M**, hind wing (excluding basal part); **N**, sternite VIII; **O**, tergite VIII; **P**, ovipositor and reproductive tract (dorsal); **Q**, ovipositor (ventral); **R**, reproductive tract (lateral). *Abbreviation:* a, angle of metacoxal inclination.



chantin not visible externally; mesocoxae separated by 0.7x their diameters; mesepisternum with a carina on inner anterior angle (Fig. 1I); mesometaventral suture distinct. Scutellum (Fig. 1J) cordiform, notched medially on anterior margin, abruptly elevated above the level of mesoscutum. Metaventrite (Fig. 1H) 1.7x wider than long, 1.6x longer than mesoventrite, finely and densely punctate; metepisternum about 5.0x longer than wide. Elytral sides parallel-sided to apical third then gradually tapering to apices; striae with a row of punctures, interstices convex, glabrous and non-punctate; epipleura abruptly narrowed near metacoxae. Hind wings (Fig. 1M) 1/4 shorter than elytra, unfolded; cross-vein  $r_3$  very short, radial cell 3.5x longer than wide,  $CuA_1$  absent;  $MP_4$  linked to  $CuA_2$  (it is linked to  $MP_3$  in the other wing of the same specimen); wedge cell absent; apex with anterior and posterior field sclerotizations; anal notch present.

Metacoxa (Fig. 1H) inclined  $17^\circ$  in relation to transverse axis of body; free margin of metacoxal plate short, absent on outer third. Metatrochanter and metafemur laterally convex, metafemur 2.2x longer than wide (Fig. 1L). Tibia (Figs. 1K, L) compressed laterally, 2.1x wider at apex than at base, with two spurs, a row of 10-13 spiniform setae along each outer and inner apical border and several spiniform setae on dorsal and ventral margins; tarsomeres simple, with fine and spiniform setae, decreasing in length from I-IV, V as long as III and IV together; claws simple.

Abdominal ventrites with punctures umbilicate, 0.5-1 diameters apart; posterior angles of ventrites 2-4 with acute and prominent marginal plates; ventrite 5 pentagonal 1.5x wider than long. Tergite VIII (Fig. 1O) sparsely setose on anterior margin, anterior sclerotized margin rounded with a V-shaped notch medially. Sternite VIII (Fig. 1N) with base triangular with anterolateral angles acute directed laterad, apex shortly emarginate, partly membranous with a pair of longitudinal sclerotizations; spiculum 4.75 times longer than base. Sternite X (proctiger) as long as paraprocts; paraprocts 2.24x as long as coxites.

Ovipositor (Figs. 1P, Q): baculi 4.6 times longer than coxites, strongly sclerotized; coxites evenly strongly sclerotized, without setae, with apices acute and divergent, without styli. Reproductive tract (Figs. 1P, R): bursa copulatrix with a pair of narrow sclerotizations; pedunculate anterior sac spherical and weakly sclerotized; duct of spermathecal gland opening at base of the pedunculate anterior sac.

*Lectotype*: [Coll. Schwarz], [Africa or., Micindani, ex coll. F. Schneider], [*Margogastrius schneideri* Schw., *Schneideri schneideri* Schw.], [Dtsch. Entomol. Insti-

tut Berlin], [coll. DEI, Müncheberg], [*Margogastrius schneideri* Schwarz, C. Girard vid. 1974], [S/F ?? *Cardiophorinae*, C. Girard det. 1974], [Lectotype], [Lectotype *Margogastrius schneideri* Schwarz, design. Douglas 2006], female (DEI).

*Paralectotype*: [Coll. Schwarz], [Africa or., Micindani, ex coll. F. Schneider], [*Margogastrius schneideri* Schw.], [Dtsch. Entomol. Institut Berlin], [coll. DEI, Müncheberg], [*Margogastrius schneideri* Schwarz, C. Girard vid. 1974], [S/F ?? *Cardiophorinae*, C. Girard det. 1974], [Paralectotype], [Paralectotype *Margogastrius schneideri* Schwarz, design. Douglas 2006] 1 female (DEI).

*Distribution*: TANZANIA.

*Remarks*: *Margogastrius* present several characters attributed as synapomorphies to *Cardiophorinae*, such as cordiform scutellum, hind-wing without  $CuA_1$  and wedge cell, wing anal area notched, female genitalia with a "glandular reservoir" (pedunculate anterior sac) entering the bursa copulatrix (Calder, 1996) and parallel-sided prosternum (Douglas, 2011). The phylogenetic analysis carried out by Douglas (2011) found a close phylogenetic relationship between *Margogastrius* and *Cardiophorinae* species.

It presents most of the diagnostic characters attributed to the genus *Cardiophorus* Eschscholtz, 1829 based on species from Nearctic (Douglas, 2003) and Palearctic regions (Akhter *et al.*, 2011): head wider than long, frons carinate, labrum large, procoxal cavities open, scutellum notched anteriorly, tarsomeres cylindrical and claws simple. *Margogastrius* is most similar to *Coptostethus* Wollaton, 1854, with which it shares the absence of lateral carina on pronotum and the hind wing reduction. *Coptostethus* was erected as a subgenus of *Cardiophorus* and includes various short-winged *Cardiophorinae* (Douglas, 2011). I have compared *Margogastrius* species with a female of *Coptostethus globulicollis* Wollaton, 1862 from Tenerife (Canary island). Those species share the strongly dorsally and ventrally convex body, the prothorax with sides rounded and lateral carina absent, the absence of median occipital carina, the shape of metacoxal plate and the mesoventrite with posterior region abruptly inclined ventrad about  $43^\circ$  in relation to anterior region. *Magogastrius* differs from *Coptostethus globulicollis* in (the latter in parenthesis): its mandible unidentate (bidentate), tapered prosternal prosternum (truncate at apex), elytra 2.5 longer than pronotum (about 1.5 longer) and fossorial legs (slender). The fossorial legs and the prosternal process tapered in lateral

view seem to be the unique character that separate *Margogastrius* from most *Cardiophorus* species and *Coptostethus globulicollis*. *Margogastrius* also differs from those species in the mesocoxal cavity open to mesepisternum, nevertheless this is probably a labile character, since one specimen present one closed and one open mesocoxal cavity.

*Margogastrius* is similar to the fossorial genus *Patriciella* Van Zwaluwenburg, 1953 from Australia (Calder, 1996) in its pronotum with lateral pronotal carina absent, prosternal process tapered in lateral view, procoxal cavities open, scutellum cordate, metatrochanter strongly convex and tibiae widened apically. It differs from this Australian cardiophorine in (the later in parentheses): median occipital carina absent (present), free margin in metacoxal plate present (absent), the pronotum more convex, tibiae with dorso-apical angle straight (acute and produced) and metafemur slender. *Margogastrius* is also distinguishable by its short antenna, elytral interstices convex and body ventrally and dorsally strongly convex.

*Margogastrius* is also similar to the fossorial cardiophorine *Blaiseus* in the tibiae expanded apicad, the unidentate mandibles and the prosternal process curved dorsad (Douglas, 2009). It differs from this genus in (the later in parentheses): lateral pronotal carina absent (present), scutellum notched anteromedially (concave), elytral interstices convex (costate). *Blaiseus* species occurred in Oriental Region, Central America and South Africa and the only known female belonged to *B. zamoranoensis* Douglas, 2009 from Honduras. This female shares with *Margogastrius* the small eyes and the short hind wing.

### ***Teslasena* Fleutiaux, 1892**

*Anelastes* Kirby, 1857 (pars); Lucas, 1857: 71.

*Physodactylus* Fischer von Waldheim, 1823 (pars); Bonvouloir, 1875: 711.

*Teslasena* Fleutiaux, 1892: 405, 410; Schwarz, 1906: 310, 313; Schenkling, 1927: 509; Golbach, 1994: 27; Chassain, 2005: 65.

*Type species* (by monotypy): *Anelastes femoralis* Lucas, 1857.

*Diagnosis* (male): Mandible falcate, unidentate, antennae reaching or surpassing the posterior angles of pronotum, pronotal sides rounded with lateral carina directed dorsad anteriorly, not reaching the anterior margin of pronotum, prosternal process strongly curved with apex sagittiform in dorsal view, tapered in

lateral view; scutellum pentagonal; metafemur strongly convex with dorsal margin rounded, tibiae widened apicad, protibia with dorsal apical angle acute and produced, tarsomeres simple, claws bifid, elytral striae with a median and two lateral rows of punctures, the lateral ones smaller and each one bearing a seta.

*Distribution*: BRAZIL.

*Redescription* (male): Integument (Figs. 34B, C) shiny, evenly light brown to black or colored in variable patterns; dorsal surface glabrous, except for the scutellum, base of pronotum, elytral base and striae, which are covered with yellow setae in most, ventral surface densely covered by decumbent to semi-erect yellow setae. Total length: 7.5-12.0 mm; elytral base as wide as prothorax, elytra 2.6-3.1x longer than pronotum.

Head (Fig. 2B) directed anteroventrally, anterior margin of frons straight or rounded; frontal carina complete, not produced anteriorly; frontoclypeal region (Fig. 2C) steeply declivous to base of labrum 3.0-3.7x wider than long; punctation double, smaller punctures heterogeneously distributed, larger punctures sparse anteriorly, 0.2-0.5 diameters apart posteriorly. Antenna (Fig. 2A) with 11 antennomeres, antennomere II globular, III-XI serrate, III 2.5-2.7x longer than II. IEP 0.21-0.45. Labrum (Fig. 2D) convex, 2.5 times wider than long, densely and coarsely punctate, covered with long setae. Mandible (Fig. 2E) falcate, unidentate, laterodorsal face punctate with long and short setae, lateral edge evenly or abruptly curved to apex, mesobasal margin translucent and covered with microsetae. Maxilla (Fig. 32A, 32B) with medistipes partly fused to basistipes; medistipes triangular wider than long with several short and fine setae and one long and stiff seta; galea oval, outer anterior part covered with long setae, inner part with denser and shorter setae; lacinia elongate, acutely narrowed apicad, densely pilose. Labium (Fig. 32C): prementum with anterolateral angles strongly produced laterad, anterior margin fringed by short and fine setae; palpigers contiguous, palpomere II with 2-3 long and stiff setae. Maxillary and labial apical palpomere securiform.

Pronotum (Figs. 2F-H) weakly convex 1.1-1.3x wider than long with lateral margins rounded, anterior margin straight or rounded and weakly produced anteriorly; lateral carina not reaching the anterior margin, directed dorsad anteriorly, entirely visible on dorsal view (Fig. 32D), with double punctation heterogeneously distributed, larger punctures predominant on disc, lateral and anterior margins; posterior border densely punctate with the smallest punctures, larger

punctures sparse; anterior angles indistinct; posterior angles non-carinate, narrow, acute and divergent. Hypomerion (Fig. 2H) with heterogeneous double punctation 1-3 diameters apart anteriorly, gradually sparser posteriad, smooth on anterior 1/5-1/4, posterior margin with an inverted V-shaped notch near the posterior angle. Notosternal suture (Fig. 2F) straight, hypomera not margined. Prosternum (Fig. 2F) 1.0-1.1x longer than wide, with homogeneous double punctation, 0.5-1.0 diameter apart, smaller punctures predominant; anterior margin straight, covering mentum. Prosternal process (Figs. 2F, H) 2.2-2.4x longer than diameter of procoxae; ventral surface laterally compressed and ascending at about 45° to apex. Procoxal cavity closed.

*Pterothorax* (Figs. 2I-K): Mesoventrite with posterior region inclined about 60° above of the anterior region (Fig. 2K), with anterior articulating surfaces short and weakly concave; lateral lobes narrow, directed lateroposteriad; borders of mesoventral cavity straight divergent posteriad on anterior 2/3, convergent on apical third. Mescoxal cavity closed, free trochantin absent; mesepisternum with a weak carina anteromedially (Fig. 2J). Mesometaventral suture distinct. Metaventrite 1.40-1.48x wider than long, 1.57-1.62x longer than mesoventrite, with double punctation; metepisternum 6 times longer than wide. Scutellum pentagonal 1.0-1.3 longer than wide with anterior margin straight, abruptly elevated above the level of mesoscutum. Metanotum (Fig. 2L) with prescutum separated medially from the scutum by a median membranous; posterior part of the scutellum elongate, with a longitudinal apodeme. Elytra with apices conjointly rounded, striae with a median row of punctures without seta and a pair of lateral row of minuscule puncture each one bearing a seta (Fig. 32F); interstices flat on humeral region, convex posteriorly, smooth; epipleura gradually narrowed posteriad to metacoxa (Fig. 32G). Hind wing (Fig. 2M) with radial cell about 2x longer than wide, CuA<sub>1</sub> and wedge cell absent; apex with anterior, median and posterior field sclerotizations; anal notch present.

Metacoxa inclined 28°-30° in relation to the transverse axis of body; inner third 1.7-2.1x longer than the dorsal outer 2/3; ventral part abruptly narrowed laterally with inner third 3.9-5.7x longer than outer 2/3; free margin of metacoxal plate absent (Fig. 2I). Tibiae with 8-14 spiniform setae along each outer and inner apical border (Fig. 32K), dorsal margin covered with several irregular rows of spiniform setae, outer and inner surface covered with fine setae. Protibia 2.6-2.9x wider at apex than at base, with dor-

sal margin rugose, slightly curved or sinuous with apical angle acute and produced inwards (Fig. 32H). Mesotibia 2.2-2.6x wider at apex than at base, with dorsal apical angle acute (Fig. 32I). Metatibia 2.7-3.1x wider at apex than at base with apical dorsal angle acute and produced laterad (Fig. 32J). Pro- and mesofemur subrectangular and convex; metafemur strongly convex with dorsal margin curved 1.7-1.9x longer than wide; metatrochanter less convex than metafemur. Tarsomeres (Fig. 32K) simple decreasing in length from I-IV, V shorter than III and IV together, densely covered with short setae; ventral surface of tarsomere I and apical borders of tarsomeres I-IV with long spiniform setae. Claws bifid (Fig. 32L).

Abdominal ventrites (Figs. 2N, O) densely covered with short and decumbent setae on lateral 3/4, setae short to moderately long and semidecumbent medially, with punctation double homogeneously distributed 0.5-1.0 diameter apart; marginal plate absent laterally, present on the posterior corner of ventrites 1-4 forming an acute and produced angle directed posteriad; ventrite 1 with lateral part 3.6-7.0x longer than the median part, 2-3 subequal in length, 4 shorter than 3 medially; ventrite 5 flat, pentagonal 1.5-2.1x wider than long. Pregenitalic segments and aedeagus covered with yellow setae. Tergite VIII (Fig. 2P) evenly sclerotized V-shaped with short setae on lateroposterior margin, anterior sclerotized margin curved with or without a median V-shaped notch; sternite VIII (2Q) evenly sclerotized or with a pair of circular membranous areas anteromedially, triangular to pentagonal with apex rounded, marginate or notched, covered with moderately to long setae posteriorly, anterior sclerotized margin straight or sinuous; sternite IX (Fig. 2R) fused to tergite IX at midlength of sternite IX, with anteromedian region membranous, latero-anterior margins sclerotized and strut-like; lateroposterior margins parallel or gradually narrowed posteriad, apex rounded with short and long setae; tergite IX (Fig. 2S) with anterior margin curved, apical lobes rounded, glabrous; tergite X (Fig. 2S) with apex membranous, suboval, smooth and glabrous, evenly sclerotized in most.

*Aedeagus* (Figs. 2T-V): Phallobase arch-shaped, lateroposterior parts parallel-sided, anterior margin with a pair of lateral acute and produced process, about 0.3x the total length of aedeagus, 0.8-1.1x longer than wide. Parameres tapered apicad with apex rounded; apex evenly sclerotized with one seta on each ventral and dorsal surface; dorsal surface as sclerotized as the ventral one with an oblique and elongate notch; parameres dorsally attached to penis at its midlength by a

translucent membrane. Penis posterior to struts with basal part triangular, posterior part narrow, parallel-sided 0.77-1.47x as long as the triangular basal part; with or without a very small ventral sclerite (about 1/8 the penis length); basal struts about 0.5x the total length of penis.

*Remarks:* The autapomorphies identified from *Teslasena femoralis* in the cladistic analysis are shared by *Teslasena foucarti*, making them apparent synapomorphies of both species. *Teslasena* species are most similar to *Globothorax latidens* by the pronotum convex with sides strongly rounded. Nevertheless the combination of several characters (elytral striae in three rows, apex of hind wing with three sclerotizations, tarsal claws bifid, protibiae broadened apicad with dorsal apical angle strongly prominent and the marginal plates of abdominal ventrites 2-3 strongly prominent) distinguishes *Teslasena* species from *Globothorax latidens*. Besides, *Teslasena* differs from *G. latidens* in (*G. latidens* characters in parentheses): procoxae and mesocoxae closed (open), mesoventrite more inclined posteriorly (almost horizontal), prementum with latero-anterior angles prominent (non-prominent), frons carinate (non-carinate), mandible smaller, labrum without anterior fringe of setae (fringed with setae), shape of metatibiae and hind wing with three sclerotizations (two) (illustrations of *G. latidens* in Rosa, 2011).

I have examined only photos of *Globothorax chevrolati* Fleutiaux, 1891, the type-species of the genus (figs. 105-107 in Rosa, 2011). This species is known only by female, which make comparisons with *Teslasena* species difficult, since these species are known only by males. Nevertheless, some differences not observed elsewhere to have been related to sexual dimorphism in elaterids can be pointed out between *Teslasena* and *G. chevrolati* (the latter in parentheses): labrum pentagonal (semi-elliptical), pronotum without notch between hind angle and median line (notched), prosternal process tapered in profile (truncate), free margin of metacoxal plate absent (present), claws bifid (trifid) and elytral striae with three rows of heterogeneous punctures (two rows of homogeneous punctures).

*Teslasena* species are similar to *Patriciella* from Australia (Calder, 1996 and specimen examined) sharing falcate mandibles, pronotum convex with sides rounded, prosternal process curved posteriorly of coxae and tapered in lateral view, the shape of protibia, with dorsal margin sinuous and dorso-apical angle acute and produced, the metatrochanter and metafemur strongly convex and widened dorsoventrally, the absence of free margin of metacoxal plate and abdominal marginal plate well developed. *Teslasena* differs from this fossorial cardiophorine in the presence of a lateral carina on pronotum, absence of the median occipital carina, procoxal cavity closed, meso and metatibia with dorso-apical angle less produced and tarsal claws bifid.

### Key to species for male *Teslasena*

1. Metatibial inner spur straight (Fig. 32J), pronotum with disc, anterior and lateral borders glabrous or with a few small setae (Figs. 32D, E), posterior border covered with short setae...*T. femoralis* (Fig. 34B)
- Metatibial inner spur with tip curved, pronotum nearly entirely pilose with setae moderately long, shorter on posterior border..... *T. foucarti* (Fig. 34C)

#### ***Teslasena femoralis* (Lucas, 1857) (Figs. 2, 32, 34B)**

*Anelastes femoralis* Lucas, 1857: 71.

*Physodactylus femoralis*; Bonvouloir, 1875: 711.

*Teslasena femoralis*; Fleutiaux, 1892: 411; Schwarz, 1906: 313; Schenkling, 1927: 509; Chassain, 2005: 66.

*Teslasena lucasi* Fleutiaux, 1899: 206; Schenkling, 1927: 509; syn. nov.

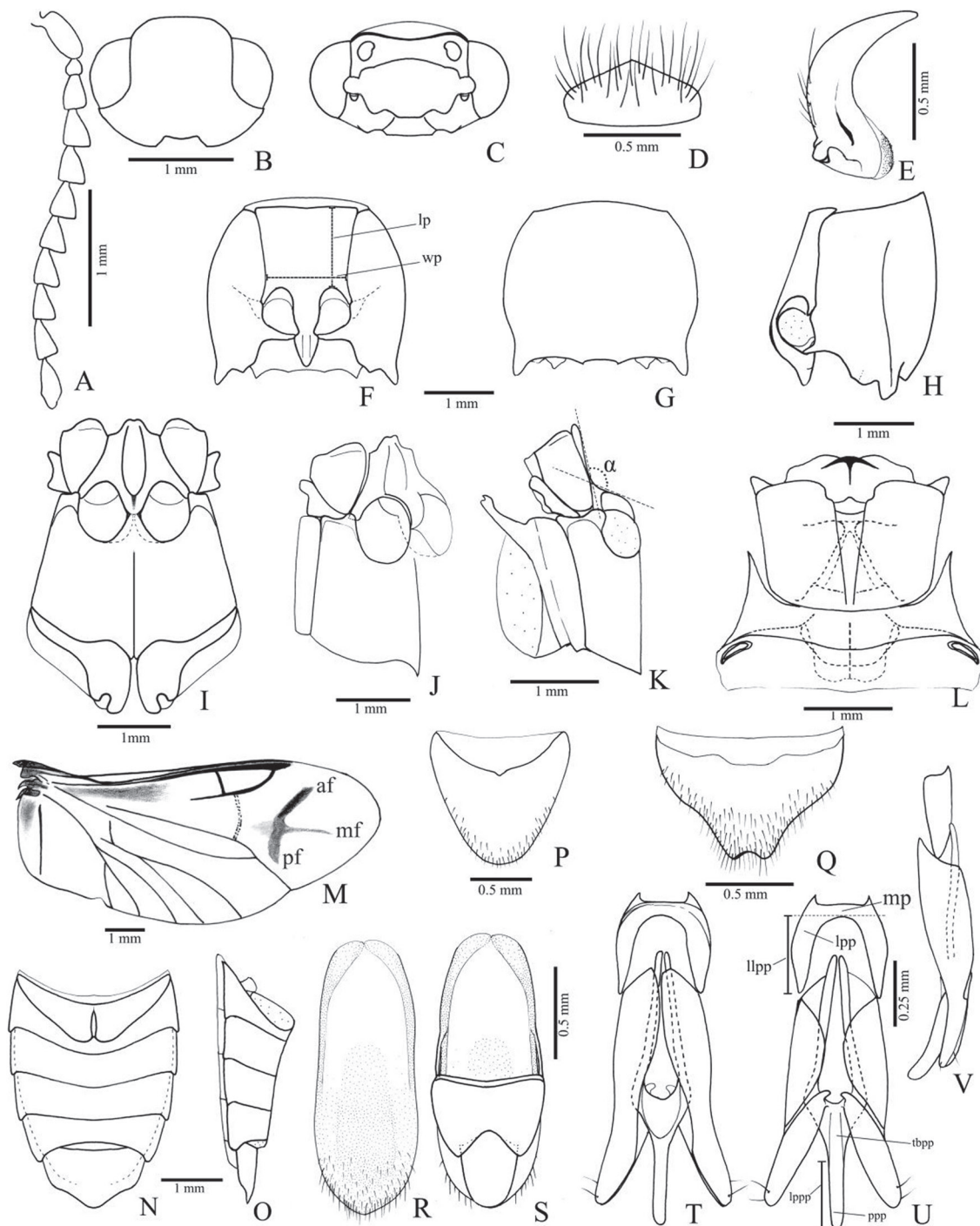
*Redescription* (male, Fig. 34B): Integument with variable color patterns: 1) entirely light brown or with antennomeres III-XI black; 2) brown to black

with antennomeres I-II and legs lighter (Fig. 34B); 3) brown to dark brown with elytra lighter; 4) brown to black with antennomeres I-II, legs and elytra lighter; 5) brown to black with legs light brown, pronotum light brown with anterior, lateral and posterior borders each one with a triangular black spot, anterior and posterior spots short or elongate and contiguous along the median longitudinal area; 6) as the former but head with light brown spots on frontal and occipital areas; 7) as color pattern 5 but elytral base light brown; 8) as color pattern 5 but elytra light brown with sutural and lateral borders black; 9) black with antennomeres III-XI light brown or black, elytra bicolored as in the pattern 7; 10) as the former but with



pronotum light brown with the median longitudinal third darker; 11) black with antenna, tibiae and tarsus light brown. Total length 7.5-12.0 mm; elytra 2.6

times longer than pronotum. Head (Figs. 2B, C) convex or with a median circular depression, frontal carina straight or rounded; IEP 0.21-0.45 antenna reaching



**FIGURE 2:** *Teslasena femoralis* (male): **A**, antenna; **B**, **C**, head (dorsal, anterior); **D**, labrum, **E**, mandible (dorsal); **F**, **G**, **H**, prothorax (ventral, dorsal, lateral); **I**, **J**, **K**, pterothorax (ventral, lateroventral, lateral); **L**, pterothorax (dorsal) and abdominal tergite I; **M**, hind wing; **N**, **O**, abdomen (ventral, lateral); **P**, tergite VIII; **Q**, sternite VIII; **R**, sternite IX; **S**, tergites IX and X; **T**, **U**, **V**, aedeagus (ventral, dorsal, lateral). **Abbreviations:** af, mf and pf: anterior, median and posterior field sclerotizations; llpp: length of lateroposterior part of phallobase, lp: length of prosternum, lpp: lateroposterior part of phallobase, mp: median part of phallobase, ppp: posterior part of penis; tbpp: triangular basal part of penis, wp: width of prosternum.



the base of pronotal hind angle or surpassing it by one antennomere. Pronotum 1.11-1.3x wider than long, with double punctation on disc, larger punctures 1-3 diameters apart, denser on lateral borders; discal, anterior and lateral borders glabrous, posterior border pilose with short setae; some specimens with a few pronotal discal or lateral punctures with a minuscule seta (Fig. 32E). Scutellum covered with short setae. Elytra tapered apicad from humerus or anterior third.

*Aedeagus* (Figs. 2T-V): Phallobase 0.27-0.32x the total length of aedeagus, 0.84-1.13x longer than wide, ratio between lateroposterior and median parts 3.8-6.7; penis: basal triangular part with sides straight, apical part 0.77-1.47 as long as the triangular basal part; with or without ventral sclerite.

*Homeotype* of *T. femoralis*: [Jatahy, prov. Goyas Brèsil, Sept. a Nov. 97], [*Teslasena femoralis* Luc, comparé 1899, Collection FLEUTIAUX], [Muséum Paris, Coll. E. Fleutiaux]; [*Teslasena femoralis* (Lucas) J. Chassain det. 05], male (MNHN).

*Material examined*: BRAZIL. *Rondônia*: 3 exs. (MZUSP); *Mato Grosso*: 65 exs. (MNHN), 50 exs. (MNRJ), 32 exs. (MZUSP); *Mato Grosso do Sul*: 66 exs. (MZUSP); *Goiás*: 1 ex. (IBSP), 2 exs. (DZUP), 7 exs. (MNHN), 6 exs. (MZUSP).

*Distribution*: BRAZIL. *Rondônia*: Vilhena; *Mato Grosso*: Utiariti, Chapada dos Parecis, Chapada dos Guimarães, Campo Verde; *Goiás*: Mineiros, Jataí; *Mato Grosso do Sul*: Cassilândia, Costa Rica, Três Lagoas, Maracaju, Porto Murtinho.

*Remarks*: Fleutiaux (1899) distinguished *Teslasena lucasi* from *T. femoralis* by its "body short and black, sides of pronotum narrowed near the base but not sinuous and punctation weaker". The holotype of *T. lucasi* and similar specimens from Jataí and Chapada dos Guimarães examined bear ratio between the body length and width (without head) 2.73-3.04. These are the smaller measurements of a ratio that varies from 2.73-3.29, with relatively short and long specimens found in populations from same region, as those from Três Lagoas with body ratio 2.95-3.29. Body entirely black as in *T. lucasi* holotype is found in some specimens from Chapada dos Guimarães, which also includes specimens with the color pattern 8. Some specimens with long body from Três Lagoas, Campo Verde and Mineiros also exhibited body entirely black. The specimens from Vilhena are black as *T. lucasi* specimens, but they have body relatively longer and

larger punctation. The holotype and two specimens of *T. lucasi* identified by Fleutiaux have the smallest punctation and the smallest eyes (IEP 0.21-0.26), however these features were also found polymorphic in specimens of *T. femoralis* of a same region. Therefore, specimens of *T. lucasi* do not present any unique combination of characters that differentiates them from specimens of *T. femoralis* examined. For this reason I propose synonymy *T. lucasi* under *T. femoralis*.

Besides the polymorphisms in the body color pattern, pronotal punctation, eye size and relative body length, specimens of *T. femoralis* exhibit high variability in the antennal length, shape of the sternite VIII and in the ratio between the apical and basal parts of the penis. Specimens from Vera, Nova Marmoré and a specimen of *T. lucasi* have the shortest penis apical part (0.77-0.96x the basal length), while specimens from Três Lagoas have apical part ranging from 0.77-1.47x the basal length. Ventral sclerite of penis is usually absent in *T. femoralis*, except in the specimens from Chapada dos Guimarães and Chapada dos Parecis, which present a small sclerite.

### *Teslasena foucarti* Chassain, 2005 (Fig. 34C)

*Teslasena foucarti* Chassain, 2005: 66.

*Redescription* (male, Fig. 34C): Integument brown to black, legs lighter. Total length 9.0-12.0 mm; elytra 2.3-2.4 times longer than pronotum. Head concave or with a median circular depression, frontal carina straight between antennal insertions; IEP 0.25-0.35 antenna reaching or surpassing the hind angle of pronotum by one antennomere. Pronotum 1.05-1.10x wider than long, with double punctation on disc, larger punctures 0.5-1.0 diameters apart, denser on lateral borders; densely pilose with long decumbent setae. Scutellum covered with short setae. Elytra tapered apicad from humerus.

*Aedeagus*: Phallobase 0.31x the total length of aedeagus, 1.10x longer than wide, length ratio between lateroposterior and median parts 4.3; penis: basal triangular part with sides straight, apical part 0.71x as long as the triangular basal part; with a ventral sclerite.

*Holotype*: [Brésil, (Mato Grosso), 14°15'50.80"S, 59°14'02.05"W, Chapada dos Parecis], [30 km N d'Uirapuru, Usine Alcomat, 1 au 15-XII-2001, A. Foucart leg.], [Holotype], [*Teslasena foucarti* sp. nov., Holotype, J. Chassain det. 04], male (MNHN).

*Paratypes*: same data as holotype, 4 exs. (MNHN), 1 ex. (MZUSP).

*Distribution*: BRAZIL. *Mato Grosso*: Chapada dos Parecis.

*Remarks*: *T. foucarti* (Fig. 34C) was detailed described by Chassain (2005), who distinguished this species from *T. femoralis* in the shape of the anterior margin of frons, which is straight in *T. foucarti*, its antennomeres relatively longer, the pronotum narrower anteriorly with punctation larger on lateral and anterior borders and the metatibial inner spur with tip curved. As discussed above, the analysis of a large series of *T. femoralis* revealed that those features, with the exception of the curved metatibial spur, are highly variable among the specimens and do not constitute consistent diagnostic characters. On the other hand, the curved tip of the metatibial inner spur was observed only in *T. foucarti* specimens, which also present body pilosity longer. The most evident difference in the pilosity of these species was observed in the pronotum, which is moderately long and usually dense on *T. foucarti* and absent or minuscule and scarce in *T. femoralis*. Their aedeagus do not present significant differences.

### *Idiotropia* Schwarz, 1897

*Athous* Eschscholtz, 1829 (*pars*); Abeille de Perrin, 1894: 91.

*Idiotropa* Schwarz, 1897: 63 (misspelling recognized by Schwarz, 1906: 314).

*Idiotropia* Schwarz, 1906: 310, 314; Schenkling, 1927: 510.

*Type species* (by monotypy): *Athous henoni* Abeille de Perrin, 1894.

*Diagnosis* (male): Frontal carina absent, mandibles long, bidentate directed anteriorly; pronotum quadrate, weakly convex, sides widened anteriorly, anterior angles right not produced, posterior angle without carina; scutellum cordiform wider than long, convex and perpendicular to mesoscutum at base; elytra subparallel to posterior third, not fused to each other, wings absent; legs narrow, tibia and tarsomeres 1-2 with spiniform setae, tibial spurs robust, longer than setae, tarsomeres and claws simple.

*Distribution*: ALGERIA.

### *Idiotropia henoni* (Abeille de Perrin, 1894) (Figs. 3, 4, 34D)

*Athous henoni* Abeille de Perrin, 1894: 91.

*Athous henoni*; Schwarz 1897: 63 (misspelling).

*Idiotropa henoni*; Schwarz, 1897: 63 (misspelling).

*Idiotropia henoni*; Schwarz 1906: 314; Schenkling, 1927: 510.

*Redescription* (male, Fig. 34D): Body weakly convex; integument light to dark brown, legs and epipleura lighter; covered with short, fine and yellow setae, erect with curved apex. Total length: 4.0-4.5 mm; elytral base 0.9-1.0x as wide as prothorax; elytra 2.3-2.4x longer than pronotum.

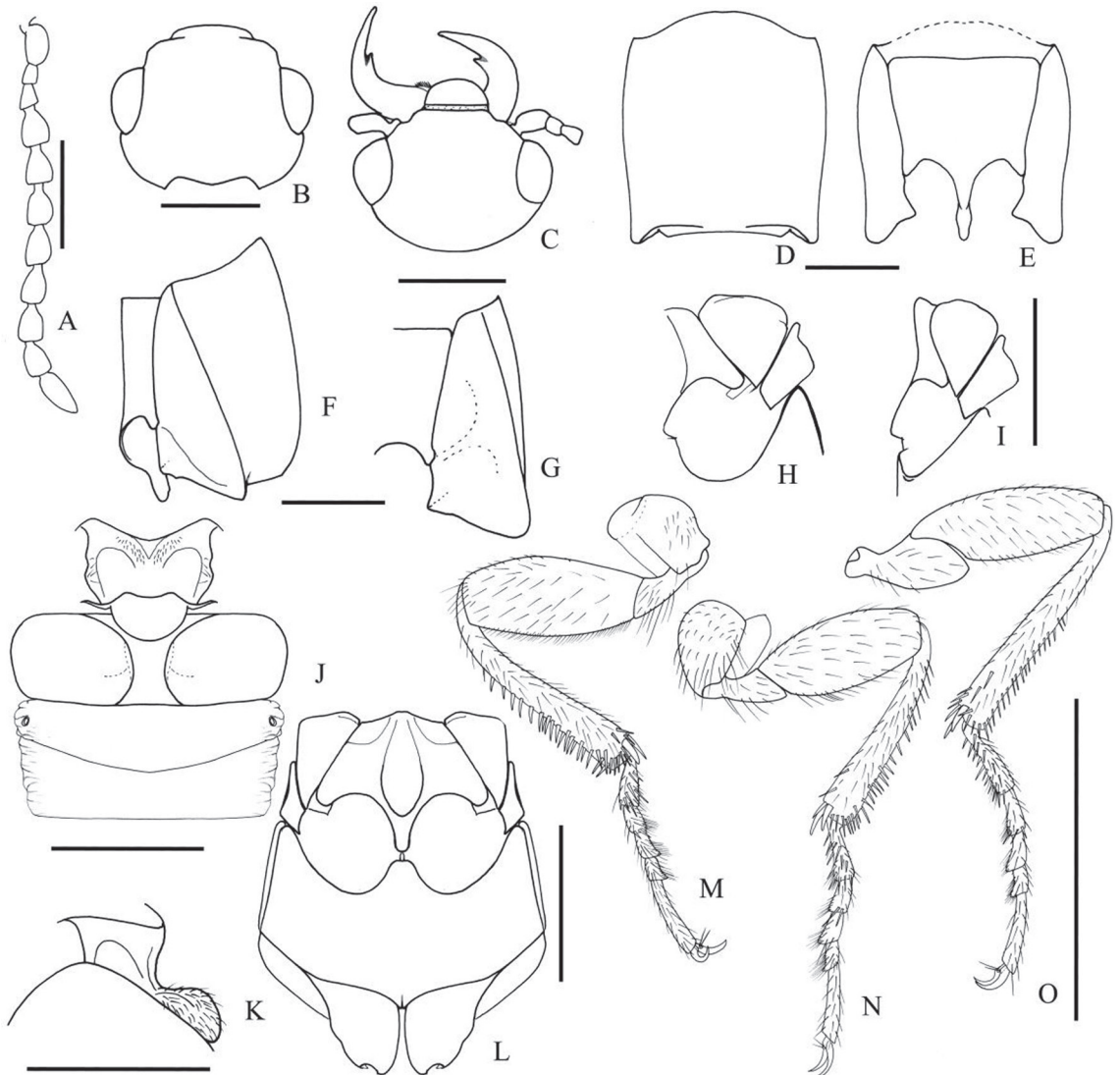
Head (Fig. 3B) with frons flattened or slightly concave at middle, frontal carina absent; frontoclypeal region 45° declivous to base of labrum; punctures umbilicate, 0.5-1.0 diameter apart. Antenna (Fig. 3A) with 11 antennomeres, serrate from antennomere IV, surpassing pronotal posterior angles by two antennomeres; antennomere III 1.1x longer than the II; IV 1.7x longer than III; antennomere IV 1.4x longer than wide. IEP 0.31-0.33. Mouthparts directed anteriorly. Labrum (Fig. 3C) semielliptical, convex, covered with long setae. Mandible (Fig. 3C) long, falcate, bidentate, apical tooth long and acute, subapical tooth short and acute; laterodorsal face at base densely punctate, with long setae; lateral edge evenly curved apicad; mesal margin at base with a row of short setae. Maxilla with galea membranous, oboval, densely pilose; lacinia elliptical, densely pilose; medistipes trapezoidal, convex, longer than wide, with several long and short setae; Labium with mentum trapezoidal with a lateroposterior pair of long setae, parpifers contiguous. Maxillary and labial apical palpomeres elliptical.

Pronotum (Fig. 3D) weakly convex, 1.0-1.1 times longer than wide, sides rounded and divergent anteriorly, lateral carina complete; punctures umbilicate, 1-2 diameters apart; anterior angles right, posterior angles short and flat; anterior margin rounded and produced (Fig. 3F). Hypomeron (Fig. 3G) with punctures umbilicate 0.5-3.0 diameters apart (sparser posteriorly); posterior margin straight and contiguous to tip of hind angle, without notch. Notosternal suture nearly straight. Prosternum (Fig. 3E) trapezoidal divergent anteriorly, 1.37x longer than wide, with punctures umbilicate and 0.5-1.0 diameter apart; anterior lobe short, covering mouthparts to mentum. Prosternal process (Fig. 3F) curved between coxae then straight to apex, 1.7x longer than diameter of procoxae. Procoxae open.

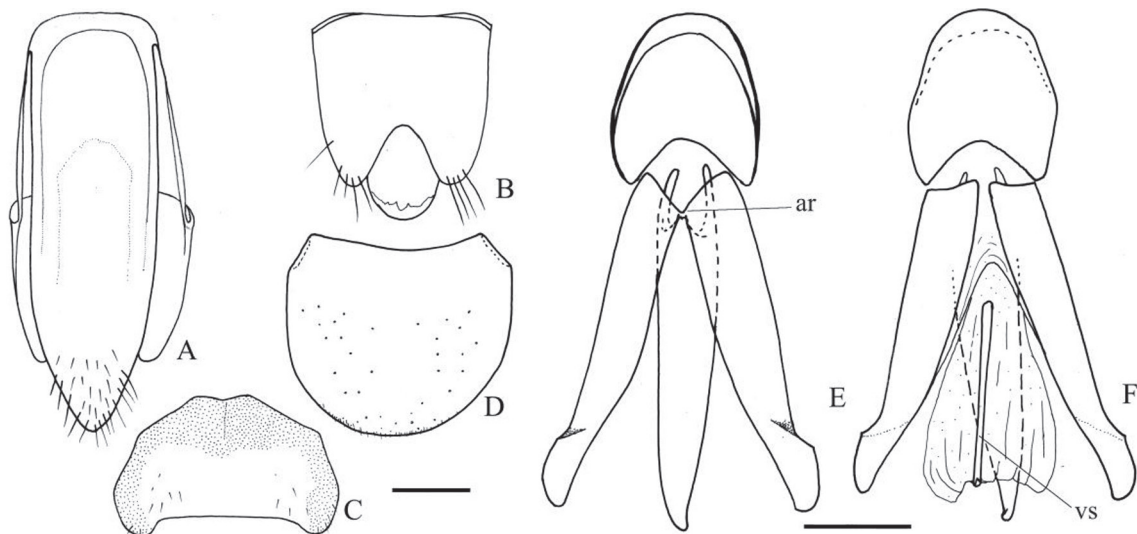
*Pterothorax*: Mesoventrite with posterior region inclined ventrad about 25° in relation to anterior region (Fig. 3I), anterior articulating surfaces concave marginate posteriorly by a curve carina (Fig. 3L); borders of mesoventral cavity divergent from base to posterior margin of posterior lobes then curved and convergent. Mesocoxal open to mesepisternum and mesepimeron, mesotrochantin visible externally (Figs. 3H, I); mesepisternum (Fig. 3H) without carina, with inner and outer angles rounded. Mesoventrite separated from metaventrite at middle by a superficial groove (Figs. 3I, L). Metaventrite (Fig. 3L) 1.91x wider than long, 1.0-1.1x as long as mesoventrite, with punctation 0.5-1.0 diameter apart; metepisternum about 11 times longer than wide. Elytra weakly convex with

sides parallel to posterior third, apices conjointly rounded; striae with a row of punctures surrounded by smaller punctures; interstices convex, epipleurae abruptly narrowed near metacoxae. Hind wings absent. Scutellum (Fig. 3J) cordiform 1.6-1.7x wider than long, convex, basal part perpendicularly elevated above the level of mesoscutum (Fig. 3K). Metanotum (Fig. 3J) with apodemes and allacrista reduced, scutellum and postnotum indistinct.

Metacoxa (Fig. 3L) about 30° inclined in relation to transverse axis of body; outer half of the ventral part reduced to a line; inner half of the ventral part about 3 times longer than the dorsal lateral part; free margin of metacoxal plate absent to very short. Legs (Figs. 3M-O) narrow, sparsely pilose. Metafemur 2.8x



**FIGURE 3:** *Idiotropia henoni* (male): **A**, antenna; **B**, **C**, head (dorsal, anterodorsal); **D**, **E**, **F**, prothorax (dorsal, ventral, lateral); **G**, hypomeron; **H**, mesocoxal cavity (lateroventral); **I**, mesoventrite (lateral); **J**, pterothorax (dorsal) and abdominal tergites I-II; **K**, mesoscutum and scutellar shield (lateral); **L**, pterothorax (ventral), **M**, **N**, **O**, pro-, meso- and metathoracic legs (outer surface). Scale = 1.0 mm.



**FIGURE 4:** *Idiotropia henoni*. **A**, sternite IX; **B**, tergites IX and X; **C**, sternite VIII; **D**, tergite VIII. **E**, **F**, aedeagus (dorsal, ventral). Scale = 0.1 mm. Abbreviations: ar, dorsal articulation; vs, ventral sclerite.

longer than wide, tibiae 2.0-2.6 wider at apex than at base, with two subequal spurs stout and longer than setae, with a row of spiniform setae along the dorsal margin and 5-7 spiniform setae along apical outer and inner borders; spiniform setae decreasing in width and length from pro- to metatibia; tarsomeres simple, with dense, long pilosity on ventral face, tarsomeres V longer than III and IV together; claws simple.

Abdominal ventrites with punctures umbilicate, 1.0-2.0 diameters apart; posterior angles of ventrites right, without marginal plates; ventrite 1 as wide as 2, gradually decreasing in width from 3 to 5; lateral part of ventrite 1 about 4.0x longer than its median part; 5 semioval 1.5-1.7x wider than long, convex at apex. Spiracles of tergite I small (Fig. 3J). Tergite VIII (Fig. 4D) suboval, evenly sclerotized, anterior margin curved, with minuscule setae on posterior margin; sternite VIII (Fig. 4C) 1.84 wider than long, sclerotized along anterolateral region, anterior margin produced anteriorly and emarginate at middle; lateroposterior angles rounded and produced with a few short setae. Sternite IX (Fig. 4A) partly sclerotized, fused to tergite IX at anterior region of sternite IX, with anterior margin straight, sides subparallel, tapering to apex on posterior third; apex sparsely pilose. Tergite IX (Fig. 4B) evenly sclerotized, apex of posterior lobes with a few long setae; tergite X (Fig. 4B) semioval with apex membranous, glabrous.

**Aedeagus** (Figs. 4A, B): Phallobase suboval, convex with anterior margin folded dorsad, 0.33x length of aedeagus; length ratio between lateroposterior and median parts 0.2. Parameres dorsoventrally flattened, apex securiform elongate with lateral angle acute

slightly produced, weakly sclerotized, without setae. Penis with sides gradually tapering from base of basal struts to apex, basal struts 0.16x length of penis; dorsal articulation of penis with a short narrow process between the basal struts fused to the parameres; ventral sclerite narrow with apex upturned.

**Holotype:** [Athous Henoni Abeille], [Collection Hénon], [Type], [Constantine, coll. Hénon], [Muséum Paris Coll. E. Fleutiaux] male, (MNHN).

**Material examined:** Without locality: 5 exs. (MNHN). ALGERIA, Constantine: 1 ex. (MNHN).

**Distribution:** ALGERIA.

**Remarks:** *Idiotropia henoni* presents the mesometasternal suture grooved which makes the meso- and meta-ventrite seem to be separated at middle, which was also observed by Candèze (1857) in South African species of *Beliophorus* Eschscholtz, 1829 (Dimini). *Idiotropia henoni* is similar to the Neotropical monotypic *Apteroelater* Golbach, 1964 (Dimini) in the metacoxal plate reduced laterally, in the convex scutellum wider than long, pronotal shape, general punctation and absence of hind wings (figs. 3, 5 in Golbach, 1964).

### ***Oligostethius* Schwarz, 1906**

*Idiotropia* Schwarz, 1897: 63 (*pars*); Schwarz, 1903: 375.

*Oligostethius* Schwarz, 1906: 310, 314; Schenkling, 1927: 510.



*Type species* (by monotypy): *Idiotropia capensis* Schwarz, 1903.

*Diagnosis* (male): Frontal carina absent between antennal insertions, mandibles long, bidentate; prothorax elongate, convex, sides rounded, wider than elytra, pronotum coarsely punctate, with anterior angles strongly produced over the eyes, posterior angles carinate; posterior margin of pronotum with a pair of lateral incisions; scutellum elliptical wider than long and strongly convex; elytra about twice longer than pronotum fused to each other, wings absent; legs narrow, tarsomeres and claws simple.

*Distribution*: SOUTH AFRICA.

***Oligostethius capensis* (Schwarz, 1903)  
(Figs. 5, 6, 34E)**

*Idiotropia capensis* Schwarz 1903: 375.

*Oligostethius capensis*; Schwarz, 1906: 315; Schenckling, 1927: 510.

*Redescription* (male, Fig. 34E): Body convex. Integument brown or dark brown with antennae and legs light brown, covered with very short, fine, decumbent silvery setae. Total length: 9.6-10.0 mm; elytral base 0.83x as wide as prothorax, elytra 1.91x times longer than pronotum.

Head (Fig. 5C) with frons (Fig. 5A) concave at median line, frontal carina absent medially; frontoclypeal region gradually declivous to base of labrum; punctures umbilicate, 0.5-1.0 diameter apart; antennal insertion (Figs. 5A, B) placed within saucer-like impression. Antenna with antennomere II cylindrical 1.3x longer than wide; antennomeres III-VI convex and serrate; III 1.7x longer than II and 1.6x wider than long; IV-VI subequal 0.92x as long as III and 1.1x wider than long. IEP 0.24; mouthparts directed ventrally. Labrum (Fig. 5A) semielliptical, convex. Mandible (Fig. 5A) narrow and long, bidentate, apical tooth long and acute, subapical tooth smaller; laterodorsal surface at base coarsely punctate with long setae, lateral edge evenly curved apicad; mesal margin at base with a row of short setae. Maxilla with galea oboval, densely pilose, lacinia elliptical, densely pilose; medistipes trapezoidal longer than wide with several long stiff setae and a few finer and shorter setae. Labial palpi separate; mentum trapezoidal with a lateroposterior pair of long setae and sparsely short setae.

Pronotum (Fig. 5D) dorsally convex, 1.17-1.19x longer than wide, sides rounded, lateral carina complete (Fig. 5F), with punctures umbilicate, coalescent forming irregular striae; anterior angle produced anteriorly, wide and rounded covering half eye (Fig. 5F); posterior angle acute, short, with tip upturned (Fig. 3F), carinate; posterior margin adjacent to posterior angle with a short incision contiguous to a cari-

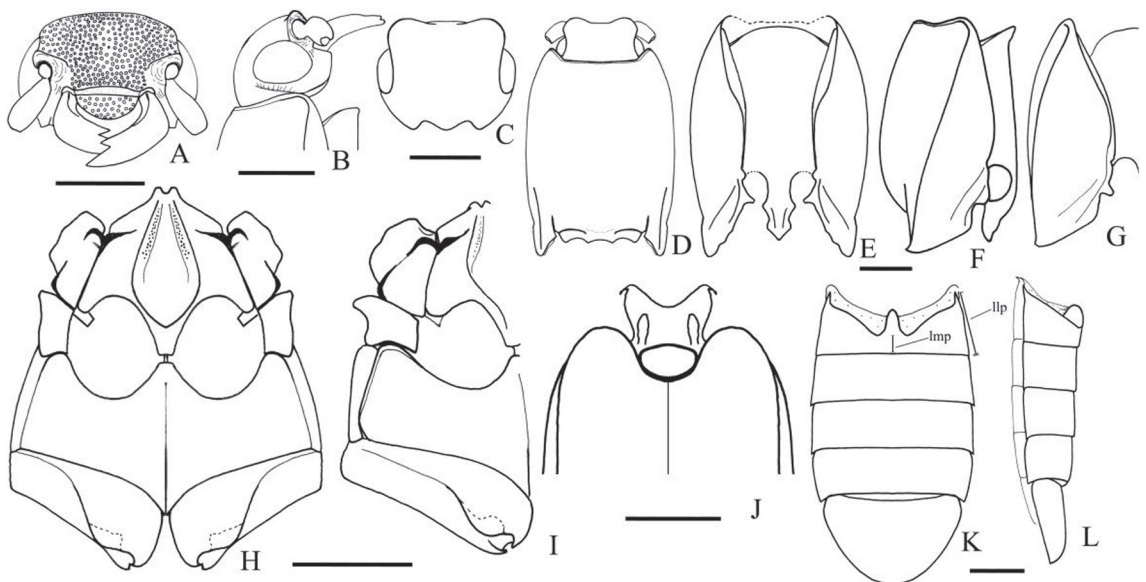
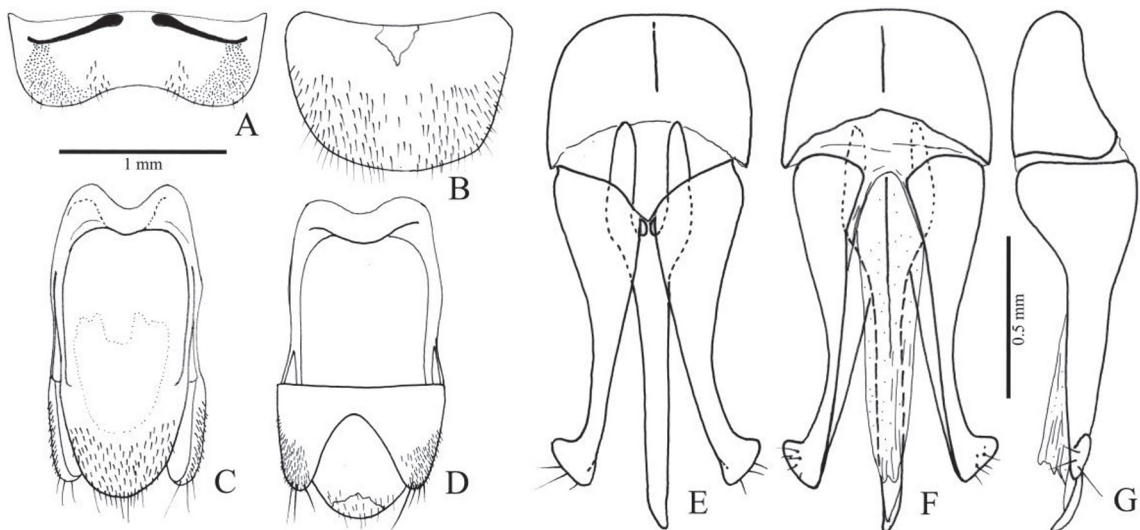


FIGURE 5: *Oligostethius capensis*. A, B, C, head (anterodorsal, lateral, dorsal); D, E, F, prothorax (dorsal, ventral, lateral); G, hypomeron; H, I, pterothorax (ventral, lateroventral); J, mesoscutum and scutellar shield; K, L, abdomen (ventral, lateral). Scale = 1.0 mm. Abbreviations: llp: length of lateral part, lmp length of median part.





**FIGURE 6:** *Oligostethius capensis*. A, sternite VIII; B, tergite VIII; C, sternite IX; D, tergites IX and X; E, F, G, aedeagus (dorsal, ventral, lateral).

na. Hypomeron (Fig. 5G) with punctures umbilicate, 0.5-1.0 diameter apart; posterior margin straight and contiguous to tip of posterior angle, without notch. Notosternal suture (Fig. 5E) margined by a shiny band along hypomeron margin at posterior half, grooved anteriorly. Prosternum (Fig. 5E) parallel-sided on posterior half, with divergent sides on anterior half, 2.31x longer than wide, with punctures umbilicate, 0.5-1.0 diameters apart; anterior prosternal lobe rounded and produced, covering mentum. Prosternal process (Figs. 5E, F) with ventral surface laterally compressed and ascending at about 45° to apex, 2.8x longer than procoxal diameter. Procoxae open.

*Pterothorax:* Mesoventrite gradually inclined ventrad posteriorly about 30°, anterior articulating surfaces (Figs. 5H, I) concave marginate posteriorly by a prominent carina; borders of mesoventral cavity divergent from base to anterior margin of mesocoxae then curved and convergent. Mesoventral cavity deep, floor with a smooth median band bordered by minuscule punctation (Fig. 5H). Mesocoxal cavity (Fig. 5I) open to mesepisternum and mesepimeron, mesepimeron long, closing the major part of cavity; mesotrochantin visible; mesepisternum with a carina on the outer angle and a prominent carina on inner anterior angle contiguous to the anterior carina of mesoventrite. Mesoventrite separated from the metaventrite at middle by a weak groove. Metaventrite (Fig. 5H) 1.91x wider than long, 0.9x as long as mesoventrite, with punctation 0.5-1.0 diameter apart; metepisternum about 7x longer than wide. Elytra fused to each other along the median suture, sides divergent from

humerus to posterior third then rounded to apex; striae with a row of punctures, interstices flat with dense, rasp-like punctation, epipleura abruptly narrowed near metacoxae. Scutellum (Fig. 5J) elliptical wider than long, strongly convex, abruptly elevated above the level of mesoscutum. Hind wings absent.

Metacoxa (Figs. 5H, I) inclined 25° in relation to transverse axis of body, median region of the dorsal surface about 15x longer than outer region; free margin of metacoxal plate very small. Legs densely pilose, setae moderately long and curved apically. Metatrochanter and metafemur compressed laterally, metafemur 3.5x longer than wide. Tibiae compressed laterally, 2x wider at apex than at base, with two subequal spurs shorter than setae, with a row of 10-13 stiff setae along apical border; tarsomeres simple, densely setose on ventral face, decreasing in length from I-IV, V as long as III and IV together; claws simple.

Abdominal ventrites (Figs. 5K, L) with punctures umbilicate, 0.5-1.0 diameter apart, marginal plates absent; lateral part of ventrite 1 2.0x longer than its median part, ventrite 1 narrower than 3, 3-4 subequal, 5 semioval 1.12x wider than long. Sternite VIII (Fig. 6A) subrectangular 2.73x wider than long with posterior margin emarginate, predominantly membranous with a pair of dark sclerotizations along the anterior margin and a pair of lateroposterior light sclerotizations; tergite VIII (Fig. 6B) semioval, pilose, evenly sclerotized except for a membranous triangular region on anteromedian margin; sternite IX (Fig. 6C) partly sclerotized, fused to tergite IX at half length of sternite IX, with anterior margin bilobed and produced dorsad; posterior margin rounded, apex with

short and long setae; tergite IX (Fig. 6D) evenly sclerotized, posterior lobes densely covered with short setae and a few long setae apically; tergite X (Fig. 6D) semicircular with apex membranous, sparsely pilose.

*Aedeagus* (Figs. 6E-G): Phallobase semicircular, strongly convex with a median dorsal apodeme, 0.3x total length of aedeagus; length ratio between latero-posterior and median parts 0.3. Parameres convex on anterior 1/3, dorsoventrally flattened on posterior 2/3 (Fig. 6G); apex securiform short with outer angle rounded and produced, with a few setae on ventral face. Penis parallel-sided from base of basal struts to apex, basal struts 0.28x length of penis; dorsal articulation of penis with a short and narrow process between the basal struts fused to the parameres; ventral sclerite reduced to a line.

*Lectotype*: [Coll. Schwarz], [Cap Alte Sammlung], [*Oligostethius capensis* Schw.], [Dtsch. Entomol. Institut Berlin], [Lectotype], [*Oligostethius capensis* Schwarz, C. Girard vid. 1979], [coll. DEI, Münchenberg, male, (DEI)].

*Material examined*: SOUTH AFRICA, 1 ex. (BMNH).

*Distribution*: SOUTH AFRICA.

*Remarks*: The specimen deposited in the MNHN collection has broken legs and antennae. The specimen of the BMNH collection has complete legs, incomplete antennae, broken elytra and its abdomen was lost. Last segment of maxillary and labial palpi was lost in both specimens.

The data analyzed here support a close relationship of *Oligostethius capensis* and *Idiotropia henoni*. *Oligostethius capensis* also shares some noticeable characters with the Dimini *Apteroelater*: sutura meso-metasternal grooved and elytral suture fused to each other. As discussed above, *Oligostethius* and *Idiotropia* appear to be related to Dimini species because they share the non-carinate frons, metacoxal plate reduced laterally and loss of hind wings. *Oligostethius* also shares with species of the genera *Neodima* Schimmel & Platia, 1992 (Southeast Asia) and *Anthracopteryx* Horn, 1891 (Central and North America) the shape of scutellum (convex, wider than long) and the oblong-ovate elytra. It is distinguishable from those species by its longer prothorax, which is wider than elytra, pronotum with punctuation dense and coalescent forming irregular striae and posterior margin with a pair of lateral incisions.

### ***Toxognathus* Fairmaire, 1878**

*Toxognathus* Fairmaire, 1878: 271; Fleutiaux, 1918a: 276; Fleutiaux, 1924: 178; Schenkling, 1927: 509; Fleutiaux, 1940a: 34; Fleutiaux, 1940b: 104; Stibick, 1979: 168; Bouchard *et al.*, 2011: 319.

*Type species* (by monotypy): *Toxognathus costulatus* Fairmaire, 1878.

*Diagnosis* (male): Integument densely punctate with punctures rasp-like, covered with yellow setae predominantly erect, longer on lateral borders of elytra; pronotum wider than long, elytra parallel-sided on anterior 3/4 with striae deeply impressed with a row of punctures larger than those of pronotum, interstices convex or costate. Mandible short and wide with an oblique ridge on laterodorsal face, labrum subrectangular, concave and declivous anteroventrad. Posterior angles of ventrite 1 without marginal plate, of ventrites 2-4 with acute and produced marginal plates; tarsomeres simple, claws pectinate.

*Distribution*: SOUTHEAST ASIA.

*Redescription* (male): Integument bright, light to dark brown, reddish-brown or black; densely pilose, setae short, longer on abdominal ventrites, yellow or golden, erect on dorsal surface, predominantly decumbent ventrally. Total length: 5.0-12.0 mm; elytral base 1.0-1.1x wider than pronotum, elytra 2.5-3.1x longer than pronotum.

Head (Fig. 9E) with margins over antennal insertions straight, oblique and convergent to the median straight margin. Frontal carina complete or absent between antennal insertions; frontoclypeal region gradually or steeply declivous to base of labrum about 5x wider than long; punctures coalescent 0.2 diameter apart. Antenna (Figs. 7E, 9A) with 11 antennomeres, serrate from antennomere IV, usually flat; antennomeres II and III subequal, III 1.0-1.05x as long as II; IV 1.9-2.5x times longer than III; IV-VI subequal as wide as long; VII-XI increasing gradually in length to apex. IEP usually 0.34-0.39. Labrum (Fig. 9D) subrectangular, anterior edge slightly emarginate or straight, concave and declivous anteroventrad, about 3.5x wider than long, coarsely punctate, with long setae. Mouthparts directed anteroventrad. Mandible (Fig. 9D) wide and short, unidentate or bidentate, apical tooth short, subapical tooth smaller; laterodorsal face coarsely punctate with an oblique ridge steeply declivous to apical part; lateral edge abruptly curved apicad; mesal margin at base with a row of short setae. Maxilla and labium covered with light-brown setae.

Maxilla (Fig. 9B) with galea securiform, outer half with long and sparse setae, inner half with dense and short setae; lacinia elongate, elliptical, densely pilose; medistipes trapezoidal longer than wide with several short to long setae; Labium (Fig. 9C) with prementum deeply emarginate on anteromedian margin with anterolateral angles rounded, not produced; maxillary and labial palpi densely pilose with apical palpomere elliptical.

Prothorax 1.10-1.25x wider than long, lateral carina complete, entirely lateroventral (Fig. 8B) or lateral on posterior region and directed ventrad anteriorly (Fig. 11C). Pronotum flattened to convex, densely punctate, punctures rasp-like and umbilicate; posterior angles of pronotum non-carinate. Hypomeron (Figs. 8C, 11C) with punctures smaller than those of pronotum, sparse, umbilicate, posterior 1/5 glabrous; posterior margin with an inverted U- or V-shaped short notch adjacent to posterior angle. Prosternal suture (Figs. 8C, 9G) curved, marginate by a shiny band along hypomerall margin. Prosternum (Figs. 8C, 9G) 1.07-1.20x wider than long, with punctures larger than those of pronotum, 0.5-1.0 diameter apart; anterior lobe truncate, covering mentum. Prosternal process (Figs. 8C, 9G) 2.5-2.6x longer than diameter of procoxae, curved between procoxae then straight, ventral surface a little narrower and shorter than the ventral surface forming a subapical tooth (Fig. 8D). Procoxae open.

*Pterothorax*: Mesoventrite with posterior region abruptly inclined ventrad about 30° in relation to anterior region (Fig. 9I), with anterior articulating surfaces (Fig. 9H) concave bordered posteriorly by oblique carina, borders of mesoventral cavity nearly straight and divergent to mesocoxae then convergent (Fig. 9H); floor of cavity with shiny median band. Mesocoxal cavity (Fig. 9I) open to both mesepisternum and mesepimeron, trochantin visible; mesepisternum with an oblique carina anteriorly contiguous to the anterior carina of mesoventral articulating surface. Mesometaventral suture distinct. Metaventrite (Fig. 7B) 1.4-1.5x wider than long, 1.5-1.8x longer than mesoventrite, with punctuation umbilicate, 0.2-1.0 diameter apart; metepisternum about 6.3-7.0x longer than wide. Scutellum abruptly elevated above the level of mesoscutum, pentagonal to subrectangular, longer than wide. Elytra gradually widened from humerus to posterior 1/3-1/4 then gradually rounded to apex; apices conjointly rounded; striae deeply impressed with a row of punctures; interstices convex, punctate, rugose; epipleura abruptly narrowed near metacoxa, slightly widened apicad from ventrite 2. Hind wings (Figs. 7F, 8E, 9K) with radial cell 3.75x longer than wide, CuA<sub>1</sub> present; wedge cell absent; apex with median and posterior field

sclerotizations, convergent basad and an oblique sclerotization adjacent to the radial cell. Legs, Metacoxa inclined about 24° in relation to transverse axis of body, gradually shortened laterally, median ventral part about 3.5x longer than lateral part; free margin of metacoxal plate absent or short; metatrochanter and metafemur (Fig. 7I) weakly convex, metafemur 2.7-3.5x longer than wide. Tibiae (Figs. 7G-I; 9J) 1.7-3.5x wider at apex than at base; apices with two subequal spurs longer than setae, with a row of 8-15 spiniform setae along each outer and inner apical border and 2-3 irregular rows of spiniform setae on dorsal margin, spiniform setae shorter than the fine setae. Tarsomeres (Fig. 9J) decreasing in length from I-IV, V about 1.2x longer than III and IV together, simple, densely pilose ventrally; claws pectinate (with more than six teeth).

Abdominal ventrites (Figs. 8F, 9L) I-IV evenly covered with short setae and punctures 0.5-1.0 diameters apart, apical part of ventrite 5 with punctures coalescent forming longitudinal striae; posterior angles of ventrite 1 right without marginal plate, ventrites 2-4 with triangular marginal plates widened posteriorly; ventrite 1 about 3x longer on lateral part than at middle, ventrites 2-4 subequal in length; ventrite 5 subtriangular 1.55-1.95x wider than long, strongly convex posteriorly (Fig. 9M). Pregenitalic segments and aedeagus covered with brown setae. Sternite VIII (Fig. 10A) subrectangular, 1.7-2.0x wider than long, bilobed posteriorly, with a pair of light sclerotizations on lateral lobes and a dark T-shaped sclerotization on anteromedian margin; posterior margin of lobes with long brown setae; tergite VIII (Fig. 10B) evenly sclerotized with short and long brown setae on lateroposterior margin; sternite IX (Fig. 10C) with anteromedian margin rounded or acute, produced and curved dorsad, with a longitudinal dorsal apodeme, posterior part covered with brown setae longer on lateroposterior and apical margin; sternite and tergite IX fused near the anterior margin; tergite IX (Fig. 10D) with anterior margin bisinuate or straight, posterior lobes acute with long brown setae; tergite X (Fig. 10D) suboval with long brown setae on posterior border, apical margin membranous fringed by minuscule setae.

*Aedeagus* (Figs. 10E, F): Phallobase M-shaped with lateroposterior parts parallel-sided or divergent posteriorly. Parameres usually not contiguous ventrally (fused basally in *T. costulatus*), with apex securiform, partly membranous, with short and long brown setae. Penis tapering to apex, dorsal articulation with a short and narrow process between the basal struts fused to the parameres; basal struts 0.28-0.34x shorter than the total length of penis; ventral sclerite present.

*Remarks:* *Toxognathus* shares with “Physodacylinae” genera the widened tibiae and the prosternal anterior margin truncate, and can be easily recognized by its pectinate claws. *Toxognathus* is also similar to Melanotini (Elaterinae) genera by its pectinate claws, with more than six teeth. *Toxognathus* species differs from the majority of the species of Melanotini in (the later in parentheses): mesocoxal cavity open to mesepimeron and mesepisternum (open to mesepimeron only) and anterior prosternal margin short and truncate (rounded and produced). *Toxognathus* also differs from North American and Australian species of *Melanotus* in the phallobase with anterior edge notched (truncate or rounded) and by the absence of wedge cell on hind wing (present) (Quate & Thompson, 1967; Calder, 1983). Nevertheless, some Palearctic species have phallobase more similar to that of *Toxoganathus* species (Kabalak & Sert, 2011). Mouthparts and hind wings have been studied only for a few species of *Melanotus*, therefore the apparent synapomorphies found in these structures of *Toxognathus* could not be compared with those of other Melanotini genera.

Hayek (1990) revised the *Melanotus* group of genera and showed that the majority of species have mesocoxal cavity open to mesepimeron, although the length of the suture that separates the mesepisternum from the coxal cavity is variable and at least one species of *Priopus* Laporte, 1840 have mesocoxal cavity open to both mesepimeron and mesepisternum. *Toxognathus* can be separated from species of this genus by its posterior angles of prothorax shorter and not strongly pointed sharply in ventral view and the tibiae widened apically. Hayek (1990) presented a key to elaterid genera with pectinate claws in which she separated *Toxognathus* from the other genera with “procoxal cavity wide open posteriorly” and “mesepisternum separated from the metasternum by the mesepimeron” by the following combination of characters: mandible unidentate, anterior margin of prosternum truncate and pronotum without basal lateral incisions. Nevertheless, some species of *Toxognathus* have mandibles bidentate and a pair of short lateral incisions on pronotum, therefore they can be recognized only by the anterior prosternal margin truncate.

**Key to species for male *Toxognathus***

1. Mandibles bidentate (Fig. 8A); prothorax with sides parallel or slightly rounded (Figs. 8B; 11D, E); pronotal lateral carina not visible in dorsal view .....2
- Mandibles unidentate (Fig. 9D); prothorax with sides sinuous at base and abruptly convergent on anterior region; pronotal lateral carina visible dorsally on posterior half. (Figs. 7A, 9F) .....4
2. Frons flattened or slightly concave along the anterior border, eyes small (IEP 0.34-0.39); antenna surpassing the pronotal posterior angle; pronotum with sides rounded, posterior angles parallel (Fig. 11E); free margin of metacoxal plate short and triangular .....3
- Frons deeply concave along the anterior border, eyes very small (IEP 0.23); antenna reaching the base of pronotal posterior angle; pronotum with sides almost straight, posterior angles divergent; free margin of metacoxal plate absent, (Figs. 11D).....*T. fairmairei* (Fig. 34K)
3. Frons concave along the anterior border, frontal carina complete; antenna surpassing the hind angle of pronotum by one antennomere; posterior margin of pronotum with a pair of lateral incisions mesad of each posterior angle (Fig. 8B).....*T. coomani* (Fig. 34H)
- Frons flat, frontal carina absent medially; antenna surpassing the hind angle of pronotum by 3.5-5.0 antennomeres; posterior margin of pronotum without basal incisions (Figs. 11E) .....*T. mouboti* (Fig. 34L)
4. Frontal carina present, protibia with dorsal apical angle right and not produced (Fig. 7G) .....5
- Frontal carina absent (Fig. 9D), protibia widened apicad with dorsal apical angle acute and produced (Fig. 9J).....*T. costulatus* (Fig. 34I)
5. Integument light brown; pronotal lateral carina prominent (Fig. 7A); elytral interstices convex; free margin of metacoxal plate short and triangular (Fig. 7B).....6
- Integument dark reddish-brown to black; pronotal lateral carina not prominent; elytral interstices costate; free margin of metacoxal plate absent .....*T. beauchenei* (Fig. 34G)
6. Frons deeply concave along the anterior border; antenna surpassing the pronotal posterior angle by two antennomeres; pronotal punctation 0.2-0.5 diameter apart .....*T. doherityi* (Fig. 34J)
- Frons flattened; antenna surpassing the pronotal posterior angle by one antennomere; pronotal punctation 0.5-1.0 diameter apart.....*T. bakeri* (Fig. 34F)



***Toxognathus bakeri* Fleutiaux, 1940**  
(Figs. 7A-D; 34F)

*Toxognathus bakeri* Fleutiaux, 1940b: 104.

**Redescription** (male, Fig. 34F): Integument very bright, evenly light brown. Total length 6.0 mm; elytral base 1.0x as wide as pronotum, elytra 2.9x longer than pronotum. Frons flattened; frontal carina complete. Antennae surpassing the posterior angles of pronotum by one antennomere. Mandible unidentate. Pronotum (Fig. 7A) weakly convex 1.17x wider than long with sides sinuous converging abruptly anteriorly from anterior half, lateral carina prominent posteriorly, directed ventrad anteriorly, posterior angles divergent and convex; punctures 0.5-1.0 diameter apart. Elytral interstices slightly convex. Free margin of metacoxal plate (Fig. 7B) short, triangular; tibiae slightly widened apicad, outer angle of protibia truncate. Tergite IX with anterior margin straight.

**Aedeagus** (Figs. 7C, D): With phallobase 0.43x total length of aedeagus, 1.1x longer than wide, length ratio between lateroposterior and median parts 8.16; paramere with ventral anteromedian margins narrow, elongate and convergent; basal struts 0.33x total length of penis; ventral sclerite linear.

**Holotype:** [Island of Penang, Baker], [*Toxognathus bakeri* Fleut., type, Collection Fleutiaux], [Type], [Muséum Paris, Coll. E. Fleutiaux], [*Toxognathus bakeri* (Fleutiaux), J. Chassain det. 05], [Lectotype], (MNHN).

**Distribution:** MALAYSIA. *Penang:* Penang Island.

**Remarks:** *Toxognathus bakeri* is similar to *T. dohertyi* mainly because of its light brown integument and the prominent lateral carina of pronotum, but differs from this species in its smaller size, lighter integument, flattened frons, pronotal punctures smaller and not coalescent and elytral interstices less convex. It shares with *T. beauchenei* the produced ventral anteromedian margin of the parameres.

***Toxognathus beauchenei* Fleutiaux, 1918**  
(Figs. 7E-K; 34G)

*Toxognathus beauchenei* Fleutiaux, 1918a: 276; Fleutiaux, 1924: 178; Schenkling, 1927: 509; Fleutiaux, 1940a: 35.

**Redescription** (male, Fig. 34G): Integument dark reddish-brown, antennae evenly brown or with antennomeres I-V yellow, VI-X black and XI reddish-brown.

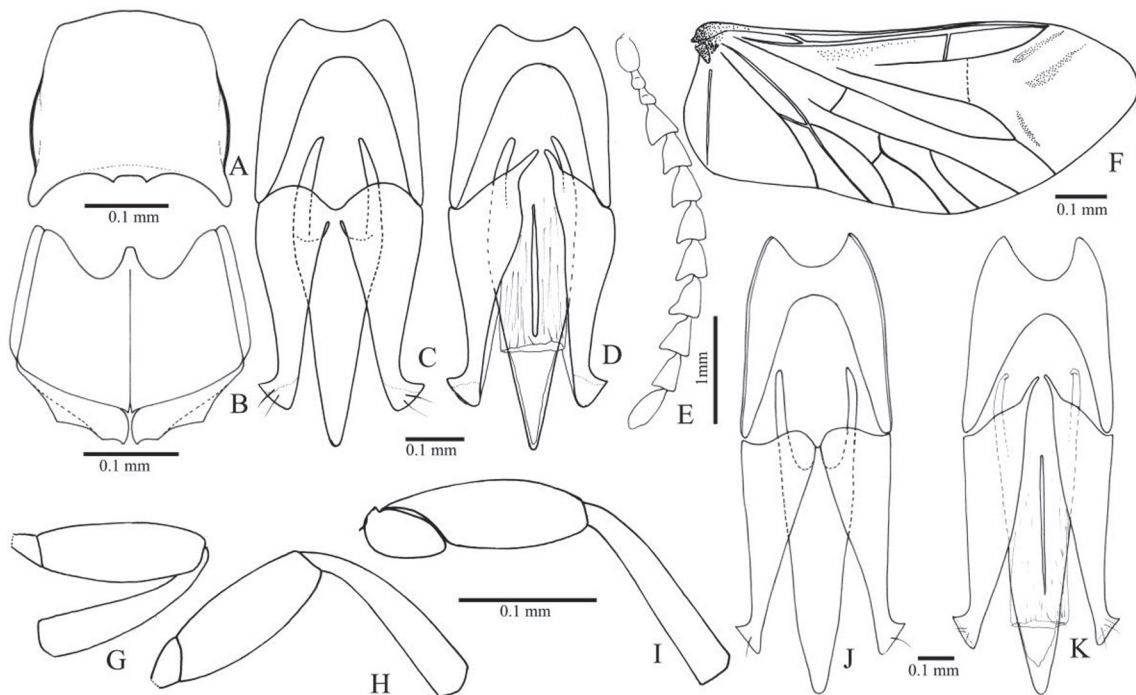


FIGURE 7: *Toxognathus bakeri*. A, pronotum; B, metaventrite; C, D, aedeagus (dorsal, ventral). *Toxognathus beauchenei*. E, antenna; F, hind wing; G, H, I, pro-, meso- and metathoracic leg (without tarsi); J, K, aedeagus (dorsal, ventral).



Total length 9.0-9.5 mm; elytral base 1.0-1.05x as wide as pronotum, elytra 2.60-2.66x times longer than pronotum. Frons deeply concave along the anterior margin; frontal carina complete. Antennae (Fig. 7E) reaching the posterior angles of pronotum. Mandible unidentate. Pronotum weakly convex 1.19-1.22x wider than long with sides sinuous converging abruptly anteriorly from anterior half, lateral carina directed ventrad anteriorly, posterior angles divergent and convex; punctures coalescent forming weak longitudinal striae. Elytral interstices costate. Free margin of metacoxal plate absent, tibia slightly widened apicad (Figs. 7G-I), outer angle of protibia truncate. Tergite IX with anterior margin straight or bisinuous.

*Aedeagus* (Figs. 7J-K): Phallobase 0.42x total length of aedeagus, 1.3x longer than wide, length ratio between lateroposterior and median parts 5.4; paramere with ventral anteromedian margin narrow, elongate and convergent, basal strut 0.29x total length of penis; ventral sclerite linear.

*Holotype*: [Hanoi, Tonkin], [*Toxognathus Beauchnei*, Fleut. Type, Colletion Fleutiaux], [Type], [Muséum Paris, Coll. E. Fleutiaux], [*Toxognathus beauchenei* (Fleutiaux), J. Chassain det. 05], [Lectotype] (MNHN).

*Material examined*: VIETNAM. Tonkin, 1 ex. (MNHN); Tam-Dao, 1 ex. (MNHN).

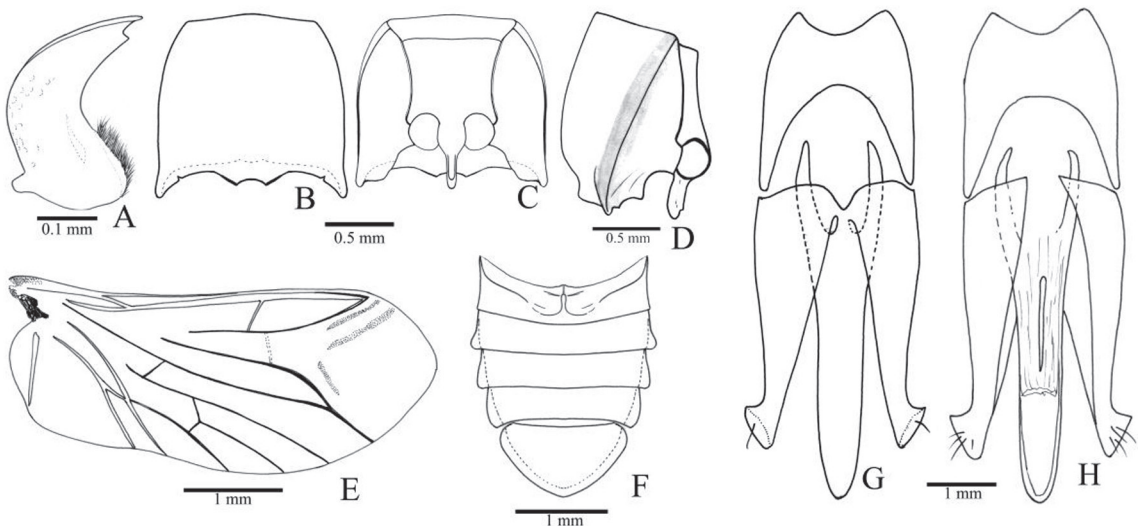
*Distribution*: VIETNAM.

*Remarks*: The specimen from Tam-Dao is somewhat different from the holotype in its more convex body, black integument with antennae and legs reddish-brown and longer antennae (surpassing the posterior angles by one antennomere). Its phallobase differs from that of the specimen from Tonkin in the relative ratio between length and width (0.98) and ratio between lateroposterior and median parts (7.3). *Toxognathus beauchenei* is most similar to *T. costulatus* by its size, color of integument and the costate elytral interstices, but can be easily distinguished by its protibia with dorsal apical angle truncate and not produced.

***Toxognathus coomani* Fleutiaux, 1940  
(Figs. 8, 34H)**

*Toxognathus coomani* Fleutiaux, 1940a: 35.

*Redescription* (male, 39H): Integument brown to dark brown, legs and antennae lighter. Total length 5.5-6.5 mm; elytral base 1.03-1.08x as wide as pronotum, elytra 2.65-2.67x longer than pronotum. Frons concave along the anterior margin; frontal carina complete. Antennae surpassing the posterior angle of pronotum by one antennomere; antennomeres IV-X as long as wide and convex. Mandible bidentate (Fig. 8A). Pronotum (Fig. 8B) flattened 1.11-1.16x wider than long with sides slightly rounded, convergent on anterior 1/4; lateral carina entirely lateroventral (not visible from dorsal view) (Figs. 8C, D), posterior angles subparallel and convex; posterior margin with a pair of lateral incisions adjacent to the posterior



**FIGURE 8:** *Toxognathus coomani*. A, mandible (ventral); B, C, D, prothorax (dorsal, ventral, lateral); E, hind wing; F, abdomen (ventral); G, H, aedeagus (dorsal, ventral).

angles; punctures 0.5 diameter apart on disc, coalescent on lateral border. Elytral interstices convex. Free margin of metacoxal plate short, triangular; tibiae slightly widened apicad with dorsal apical angle truncate. Tergite IX with anterior margin bisinuous.

*Aedeagus* (Figs. 8G, H): Phallobase 0.37x total length of aedeagus, 1.2x longer than wide, length ratio between lateroposterior and median parts 3; paramere with ventral anteromedian margin acute; basal struts 0.28x total length of penis; ventral sclerite linear.

*Holotype*: [Ton Kin, (Lac Thò), Hoa Binh, A. de Cooman], [*Toxognathus coomani*, type, Collection Fleutiaux], [Type], [Muséum Paris, Coll. E. Fleutiaux], [*Toxognathus coomani* (Fleutiaux), J. Chassain det. 05], [Lectotype], (MNHN).

*Material examined*: VIETNAM. Tonkin, 4 exs. (MNHN).

*Distribution*: VIETNAM. *Hoa Binh*: Lac Thuy.

*Remarks*: *Toxognathus coomani* shares with *T. mouhoti* and *T. fairmarei* the bidentate mandibles. It is most similar to *T. mouhoti* by its body size, eye size, shape of prothorax, free margin of metacoxal plate short and triangular and widened tibiae. It can be distinguished mainly by its frons, which is concave along the anterior border, complete frontal carina, shorter antenna and a pair of short notches on posterior margin of pronotum.

***Toxognathus costulatus* Fairmaire, 1878  
(Figs. 9, 10, 34I)**

*Toxognathus costulatus* Fairmaire, 1878: 271; Schenkling, 1927: 509; Fleutiaux, 1918a: 276; Fleutiaux, 1940a: 35.

*Redescription* (male, Fig. 34I): Integument dark brown or dark reddish-brown. Total length 11-12 mm; elytral base as wide as pronotum, elytra 2.7-3.0x longer than pronotum. Frons (Figs. 9D, E) concave medially, frontal carina absent medially. Antennae (Fig. 9A) surpassing posterior angles of pronotum by 2 antennomeres. Mandible unidentate (Fig. 9D). Pronotum (Fig. 9F) flattened 1.15-1.30x wider than long with sides sinuous converging abruptly anteriorly, posterior angles divergent and convex; with punctures less than 0.5 diameter apart. Elytral interstices costate. Free margin of metacoxal plate short and triangular;

tibiae widened apicad, dorso apical angle of protibiae acute and produced (Fig. 9J). Tergite IX (Fig. 10D) with anterior margin bisinuous.

*Aedeagus* (Figs. 10E, F): Phallobase 0.44x total length of aedeagus, 1.3x longer than wide, length ratio between lateroposterior and median parts 3.1; parameres fused to each other on ventral anteromedian margin; basal strut 0.34x total length of penis; ventral sclerite elliptical.

*Holotype*: [Conchinch. (*illegible*) 1877] [*Toxognathus* gen. et sp. nov. *costulatus*, Fairm., Conchinchine] [*Toxognathus costulatus* Fairm., J. Chassain det. 05] [Muséum Paris, Coll. E. Fleutiaux] male, (MNHN).

*Material examined*: VIETNAM. 1 ex. (MNHN). Tay Ninh, 2 exs. (MNHN).

*Distribution*: VIETNAM. *Tay Ninh*.

*Remarks*: *Toxognathus costulatus* is easily recognized by its protibia widened apicad with dorso apical angle acute and produced (Fig. 9J). The parameres with anteromedian margin fused together ventrally is unique to this species.

***Toxognathus dohertyi* Fleutiaux, 1940  
(Figs. 11A, B; 34J)**

*Toxognathus dohertyi* Fleutiaux, 1940b: 104.

*Redescription* (male, Fig. 34J): Integument very bright, evenly light brown. Total length 8.0 mm; elytral base as wide as pronotum, elytra 2.62x longer than pronotum. Frons deeply concave along the anterior margin; frontal carina complete. Antennae surpassing the posterior angles by two antennomeres. Mandible unidentate. Prothorax 1.12x wider than long with sides sinuous converging abruptly anteriorly on anterior half; lateral carina prominent posteriorly, directed ventrad anteriorly; posterior angles divergent and convex; pronotum weakly convex with punctures coalescent forming short and irregular longitudinal striae. Elytral interstices convex. Free margin of metacoxal plate short, triangular; tibiae slightly widened apicad, outer angle of protibiae truncate. Tergite IX with anterior margin straight.

*Aedeagus* (Figs. 11A, B): Phallobase 0.42x total length of aedeagus, 1.2x longer than wide, length ratio between lateroposterior and median parts 6.1; param-

eres with ventral anteromedian margin acute, basal strut 0.33x total length of penis; ventral sclerite linear.

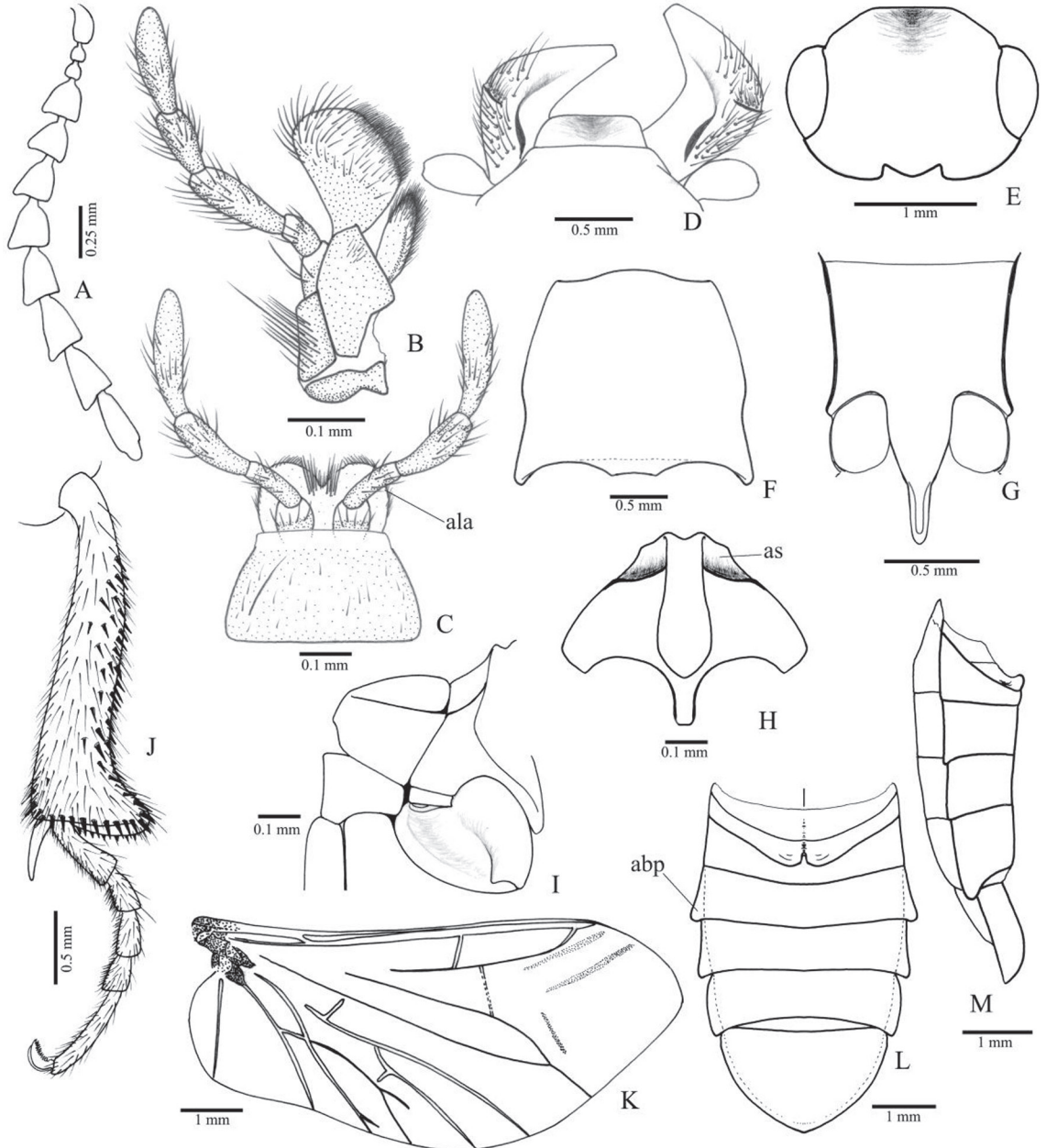
*Holotype*: [Perak, Malacca (Doherty), [Toxognathus Dohertyi Fleut., Type, Collection Fleutiaux], [Type], [Muséum Paris, Coll. E. Fleutiaux], [Toxognathus dohertyi (Fleutiaux), J. Chassain det. 05], [Lectotype], (MNHN).

*Distribution*: MALAYSIA. Perak.

***Toxognathus fairmairei* Fleutiaux, 1940**  
(Figs. 11C, D; 34K)

*Toxognathus fairmairei* Fleutiaux, 1940b: 104.

*Redescription* (male, Fig. 34K): Integument dark brown with legs and ventral abdomen brown, antenna light brown. Total length 7.5 mm; elytral base 1.09x as wide as pronotum, elytra 3.14x longer than pronotum. Frons deeply concave along the



**FIGURE 9:** *Toxognathus costulatus*. **A**, antenna, **B**, maxilla; **C**, labium; **D**, labrum and mandibles; **E**, head (dorsal); **F**, pronotum; **G**, prosternum; **H**, mesoventrite; **I**, mesoventrite, pleural sclerites and mesocoxa (lateroventral); **J**, protibia and tarsus; **K**, hind wing; **L**, **M**, abdomen (ventral, lateral). *Abbreviations*: ala, anterolateral angle; as, articulating surface; abp, abdominal marginal plate.

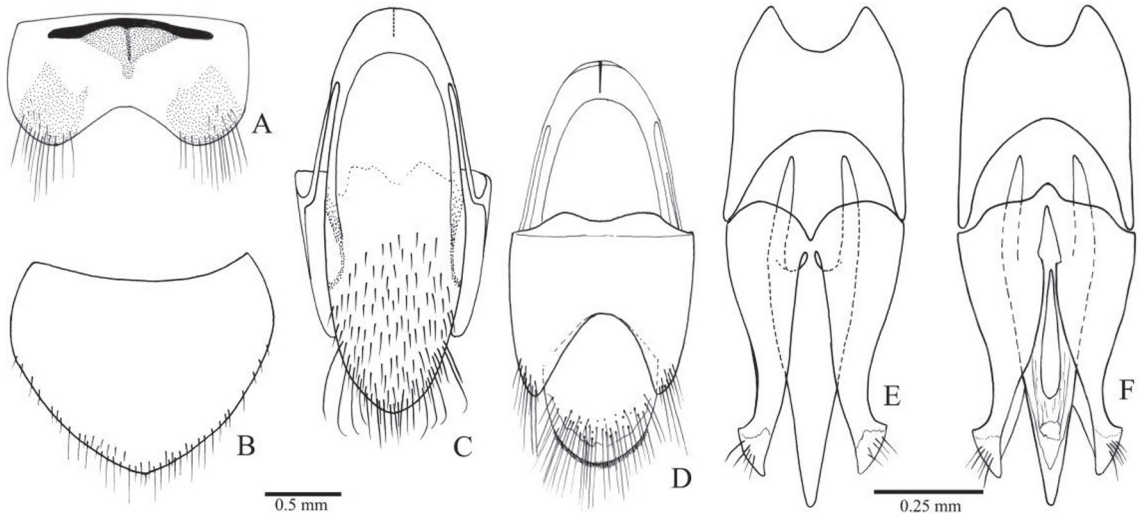


FIGURE 10: *Toxognathus costulatus*. A, sternite VIII; B, tergite VIII; C, sternite IX; D, tergites IX and X; E, F, aedeagus (dorsal, ventral).

anterior margin; frontal carina complete; eyes very small (IEP 0.23) (Fig. 11D). Antennae reaching the base of posterior angles of pronotum; antennomeres IV-X as long as wide and convex. Mandible bidentate. Pronotum weakly convex 1.20x wider than long with sides parallel from base of posterior angles to anterior third then convergent to anterior margin, lateral carina entirely lateroventral, posterior angles divergent and weakly convex; punctures less than 0.5 diameter apart; prosternum with a median longitudinal groove on posterior half and between procoxae. Elytral interstices convex. Free margin of metacoxal plate absent, tibiae slender with outer angle truncate. Tergite IX with anterior margin straight.

*Aedeagus*: Phallobase 0.36x total length of aedeagus, 1.13x wider than long. Paramere with anteromedian margin acute, ventral sclerite linear.

*Holotype*: [Foutchien, De Latouche], [Collection Fairmaire], [Collection E. Fleutiaux], [*Toxognathus fairmairei* Fleut., type, Collection Fleuxiaux], [Type], [Muséum Paris, Coll. E. Fleutiaux], [*Toxognathus fairmairei* (Fleutiaux), J. Chassain det. 05], [Lectotype], male (MNHN).

*Distribution*: CHINA. Fujian.

*Remarks*: The aedeagus of the holotype was poorly preserved, with dark musculature and apex broken;

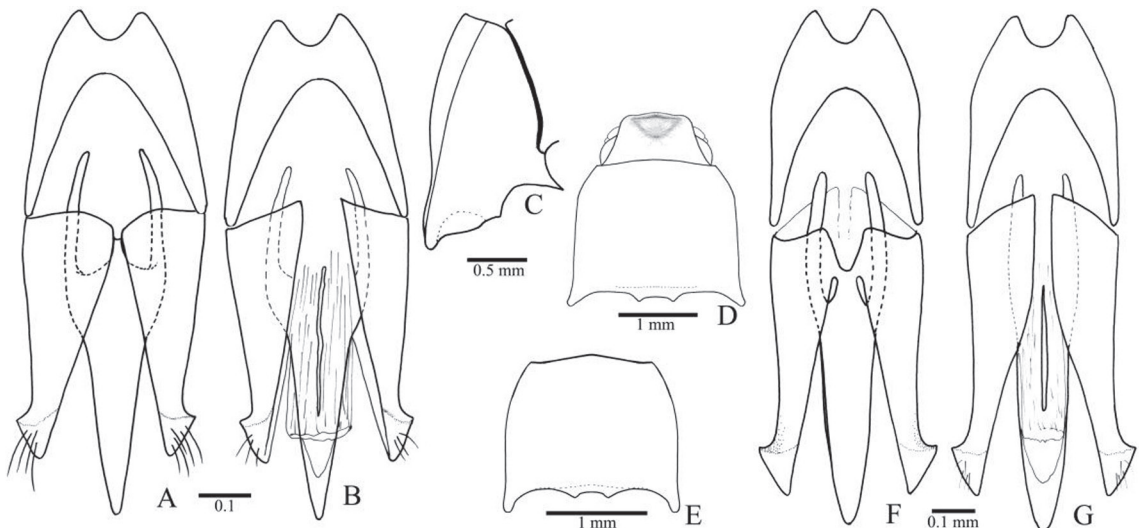


FIGURE 11: *Toxognathus dobertyi*. A, B, aedeagus (dorsal, ventral). *Toxognathus fairmairei*. C, hypomeron; D, pronotum and head. *Toxognathus mouboti*. E, pronotum; F, G, aedeagus (dorsal, ventral).



therefore it was not possible to obtain all measurements. It is distinguishable from all *Toxognathus* species by the shape of prothorax, the very small eyes and the median longitudinal groove on the prosternum.

***Toxognathus mouhoti* Fleutiaux, 1918**  
(Figs. 11E-G; 34L)

*Toxognathus mouhoti* Fleutiaux, 1918a: 277; Fleutiaux, 1918b: 236, 1924: 180; Schenkling, 1927: 509; Fleutiaux, 1940a: 35.

**Redescription** (male, Fig. 34L): Integument evenly light reddish-brown or with antennomeres I-III yellow. Total length 5.0-6.0 mm; elytral base 1.08x as wide as pronotum, elytra 2.9-3.0x longer than pronotum. Frons flattened; frontal carina absent medially. Antennae surpassing the posterior angles of pronotum by 3.5-5.0 antennomeres. Mandible bidentate. Pronotum (Fig. 11E) weakly convex 1.2x wider than long with sides slightly rounded from base of posterior angles to anterior margin, convergent on anterior 1/4, lateral carina entirely lateroventral, posterior angles subparallel and weakly convex; punctures less than 0.5 diameter apart. Elytral interstices convex. Free margin of metacoxal plate short and triangular; tibiae slightly widened apicad, dorsal apical angle of protibiae truncate. Tergite IX with anterior margin bisinuous.

**Aedeagus** (Figs. 11F, G): Phallobase 0.39x total length of aedeagus, 1.31x longer than wide, length ratio between lateroposterior and median parts 3.82 longer than median part; paramere with anteromedian margin acute, basal strut 0.35x total length of penis; ventral sclerite linear.

**Holotype:** [Chatebon Muhot], [Collection W.W. Saunders], [*Toxognathus mouhoti*, Fleut. Type, Collection Fleutiaux], [Type], [Muséum Paris, Coll. E. Fleutiaux], [*Toxognathus mouhoti* (Fleut.) J. Chassain det. 05], [Lectotype] (MNHN).

**Paratypes:** [Camboj. int. Muhot], [Collection W.W. Saunders], [Muséum Paris, Coll. E. Fleutiaux], [*Toxognathus mouhoti* (Fleut.) J. Chassain det. 05], [Paralectotype], 1 male, (MNHN); [Museum Paris, Cap St. Jacques, Coll. A. Bonhoure, 1909], [*Toxognathus mouhoti* Fleut. 1917 Fleutiaux det.], [Muséum Paris, Coll. E. Fleutiaux], [*Toxognathus mouhoti* (Fleut.) J. Chassain det. 05], [Paralectotype], 1 male (MNHN).

**Material examined:** VIETNAM. 1 ex. (MNHN).

**Distribution:** THAILAND. *Chanthaburi*. CAMBODIA. VIETNAM. *Ba Ria-Vung*.

***Dactylophysus* Fleutiaux, 1892**

*Heterocrepidius* Candèze, 1859: 31 (pars).

*Dactylophysus* Fleutiaux, 1892: 408; Schwarz, 1906: 311; Blackwelder, 1944: 292; Golbach, 1994: 27, 40.

**Type species:** Now fixed (under Article 70.3 of the Code) as *Dactylophysus capixabensis* nom. nov., misidentified as *Heterocrepidius mendax* Candèze, 1859, in the subsequent designation by Hyslop (1921).

**Diagnosis:** Body weakly convex, antenna flattened reaching the posterior angles of pronotum, labrum evenly convex, mandible unidentate; pronotum trapezoidal wider than long with complete lateral carina weakly impressed anteriorly, directed anteroventrally; anterior angles acute in dorsal view. Metacoxa 30° oblique to the transverse body axis with inner 1/4 2.5-3.5x longer than the outer 3/4; free margin of metacoxal plate short and narrow, triangular; tibiae widened apicad with each lateral border of apex with a row of 12-14 spiniform setae, pro- and mesofemur laterally flat, metafemur weakly convex; last abdominal ventrite V-shaped weakly convex apically or flattened.

**Distribution:** SOUTH AMERICA.

**Redescription** (male): Integument bright, light brown to black. Punctures umbilicate deeply impressed, densely covered with yellow setae; pilosity decumbent or erect. Total length: 9.0-12 mm; elytral base 1x as wide as prothorax, elytra 2.6-3.3x longer than pronotum.

Head (Figs. 12F, 15B) with anterior margin of frons straight or rounded, dorsal ocular margins curved inwards; frontal carina complete, weakly produced anteriad (Fig. 12H); frontoclypeal region (Fig. 12G) steeply declivous to base of labrum 5.0-6.0x wider than long; punctures as large as those of pronotum, 0.2-0.5 diameter apart. Antenna (Figs. 12A, 14A, 15A) with 11 antennomeres, antennomeres II and III subequal, III 1.0-1.16x longer than II; IV-XI laterally flattened longer than wide; IV-X serrate, IV-VII 1.3-1.6x longer than wide, VIII 1.6-1.9x longer than wide, IX-X 1.5-2.0 longer than

wide, XI elliptical abruptly narrowed at apex 2.5-2.8x longer than wide. IEP 0.4-0.5. Labrum (Fig. 12C) evenly convex, subrectangular, 2.5-3.0x wider than long, anterior margin slightly emarginate to straight, coarsely punctate, with long setae. Mouthparts directed anteroventrally. Mandible narrow, unidentate, laterodorsal face densely punctate; lateral edge evenly curved apicad; mesoapical margin evenly curved (Fig. 15B) or sinuous (Fig. 12B), mesobasal margin with a row of short setae on a prominent rectangular membranous area (Fig. 15B). Maxilla (Fig. 12D) with galea securiform, anterior border covered with short fine setae, denser on inner angle; lacinia elongate, tongue-like, densely pilose; medistipes trapezoidal longer than wide with several long setae; labium (Fig. 12E) with prementum shortly emarginate on anteromedian margin, anterolateral angles rounded and not produced; maxillary and labial palpi pilose with fine setae, apical palpomere securiform.

Pronotum (Figs. 12J, 14B, 15C) trapezoidal, flattened, 1.18-1.35x wider than long, lateral carina reaching the anterior margin, lateral on posterior region and directed ventrad anteriorly (Fig. 12K) with anterior part not visible dorsally; punctures homogeneously distributed 0.2-0.5 diameters apart, a little smaller on posterior margin than at disc; anterior angles acute; posterior angles of pronotum non-carinate. Hypomeron (Fig. 12L) with punctures usually as large as those of pronotum, denser anteriorly; posterior 1/5-1/2 glabrous; posterior margin with a U- or J-shaped notch adjacent to the posterior angle. Prosternal suture (Figs. 12I, 15D) curved, marginated by a shiny band along hypomeral margin, grooved at anterior part. Prosternum (Fig. 12I) 1.1-1.32x wider than long, with punctures larger than those of pronotum, 0.2-1.5 diameters apart; anterior lobe edge straight or rounded, produced, covering mouth parts to labial palpiger. Prosternal process (Figs. 12I, K) 2.30-2.83x longer than diameter of procoxae, ventral surface narrower than the dorsal surface with a subapical tooth, about 45° declivous dorsad posteriorad of procoxae. Procoxae open.

*Pterothorax*: Mesoventrite (Figs. 12M-O) with posterior region inclined about 30° above of the anterior region (Fig. 12N), with anterior articulating surfaces concave, smooth, bordered posteriorly by a prominent carina; borders of mesoventral cavity curved and convergent anteriorly from its half length; floor of cavity with a shiny median band. Mesocoxal cavity (Fig. 12M) open to both mesepisternum and mesepimeron, mesotrochantin visible; mesepisternum with an oblique carina anteromedially contiguous to the

anterior carina of mesoventrite. Meso-metaventral suture distinct. Metaventricle (Fig. 12O) 1.3-1.4x wider than long, 1.4x longer than mesoventrite; metepisternum 6.5-8.0x longer than wide. Scutellum abruptly elevated above the level of mesoscutum, pentagonal, 1.3-1.4x longer than wide, anterior margin rounded. Metanotum (Fig. 12P): prescutum contiguous medially to the scutum by an acute process; posterior part of the scutellum with a longitudinal apodeme. Elytra flattened with apices conjointly rounded, striae with a single row of punctures increasing in size posteriorly; interstices flat, rugose with punctures 1-2 diameters apart; epipleurae (Fig. 12Q) narrowed near metacoxa, slightly widened apicad from ventrite 2. Hind wings with radial cell 4.2x longer than wide, CuA<sub>1</sub> present; wedge cell present or absent; apex with anterior, median and posterior field sclerotizations convergent basad, not contiguous.

Metacoxa (Fig. 12M) inclined about 30° in relation to the transverse axis of body; inner quarter 2.5-3.5x longer than outer 3/4; ventral part with inner third about 1.1x longer than the outer 2/3; free margin of metacoxal plate short and narrow, triangular. Tibiae (Figs. 38A-C) with 12-14 spiniform setae along each outer and inner inner apical border (Fig. 38D), dorsal margin covered with 3-4 irregular rows of spiniform setae, outer and inner surface covered with fine setae. Protibia (Fig. 12A) 2.6-3.0x wider at apex than at base, with dorsal margin rugose, straight to sinuous with apical angle acute. Mesotibia (Fig. 12B) 2.8-3.2x wider at apex than at base, with dorsal apical angle acute. Metatibia (Fig. 12C) 2.3-2.4x wider at apex than at base with apical dorsal angle acute. Pro- and mesofemur subrectangular and laterally flattened; metafemur weakly convex, metatrochanter as convex as metafemur. Tarsomeres decreasing in length from I-IV, V longer than III and IV together; ventral surface (Fig. 12E) densely pilose, tarsomeres I-III or II-III lamellate, lamella on tarsomeres II-III subequal, on protarsomere I-II a little smaller or minuscule, on metatarsomere III present or absent; claws simple.

Abdominal ventrites (Fig. 12R) weakly convex, evenly covered with dense and decumbent pilosity, short to moderately long on ventrites 2-5, shorter on ventrite 1, ventrite 5 with apex coarsely punctate with pilosity denser and stouter; posterior angle of ventrite 1 and lateral margins of ventrites 2-4 with prominent marginal plates. Ventrite 1 with lateral part 4-6x longer than the median part, 2-4 subequal in length; ventrite 5 triangular 1.5-1.61x wider than long, flattened to weakly convex apically. Pregenitalic segments and aedeagus covered with yellow setae. Sternite VIII (Figs. 13A, 15E) subrectangular,

posterior margin straight, partly covered with short setae, lateroposterior angles with long stout setae, with two lateral and one median sclerotizations posteriorly; anterior border with or without a linear transverse sclerotization; tergite VIII (Figs. 13B, 15F) evenly sclerotized U-shaped with long setae on lateroposterior and apical margin; sternite and tergite IX (Fig. 15G) fused near the anterior margin; sternite IX (Fig. 13A, 15H) with anteromedian margin rounded, produced and curved dorsad; anterolateral margins strongly sclerotized, anteromedian surface membranous, posterior surface sclerotized covered with short setae, setae long on lateroposterior and apical margin; tergite IX (Figs. 13D, 15G) with anterior margin straight, apical lobes rounded with long setae; tergite X (Figs. 13D, 15G) with apex membranous, suboval, smooth or scarcely punctate, glabrous, apical part membranous, posterior margin with a fringe of minuscule setae.

*Aedeagus*: Phallobase (Figs. 13E, 14C, 15I) M-shaped, lateral parts divergent posteriorly with a longitudinal apodeme on dorsal surface, 0.4-0.5x the total length of aedeagus, 1.2-1.3x longer than wide, length ratio

between lateroposterior and median parts 4.6-22.0. Parameres tapered apicad, 3.1-3.2x wider at base than the narrowest apical part; apex securiform with outer angle acute, membranous posteriorly, with or without short setae; dorsal surface of parameres more sclerotized than the ventral one; ventral surface sclerotized laterally, membranous medially, membrane contiguous to each other and to the phallobase membrane; penis tapering to apex from base of struts to apex, basal struts 0.3-0.4x the total length of penis; dorsal articulation with a narrow and short process fused to the parameres; ventral sclerite present.

*Remarks*: All species of *Dactylophysus* share the synapomorphies indicated by the present cladistic analysis: labrum with anterior edge curved, prosternal chin piece long and rounded anteriorly, loss of the hind wing sclerotization between radial cell and apical anterior field and posterior part of sternite VIII with three sclerotizations. The combination of those synapomorphies and the diagnostic characters distinguish *Dactylophysus* species from their most similar species belonging to *Physodactylus* and *Heterocrepidius* species.

**Key to species for male *Dactylophysus***

- 1. Prothorax with lateral margins straight, convergent anteriorly from posterior angles or anterior half, hypomeron with posterior half impunctate, lamella on protarsomere I a little smaller than the others.....2
- Prothorax with lateral margins rounded gradually convergent anteriorly (Fig. 14), hypomeron with only posterior fifth impunctate, lamella on protarsomere I much smaller than others.....*D. fleutiauxi* (Fig. 34N)
- 2. Antenna surpassing the posterior angles of prothorax by one antennomere; pronotum with lateral margins convergent anteriorly from posterior angles (Fig. 12J), elytral striae with punctures larger than those of the interstices.....*D. hirtus* sp. nov. (Fig. 34M)
- Antenna not surpassing the posterior angles of prothorax; lateral margins of pronotum parallel on posterior half then convergent anteriorly (Fig. 15C), elytral striae with punctures as large as those of the interstices.....*D. tibialis* (Fig. 34O)

***Dactylophysus hirtus* sp. nov.**  
(Figs. 12, 13, 33A-E, 34M)

*Etymology*: From Latin, *hirtus* = hairy; alluding to the dense pilosity of this species.

*Description* (male, Fig. 34M): Integument brown with ventral pterothorax, ventral abdomen, legs and antennae light brown; pilosity erect. Total length 10.0-11.0 mm; elytral base 1.0x as wide as prothorax, elytra 3.2-3.2x longer than pronotum. Frons (Figs. 12F, G) concave; antenna (Fig. 12S) surpass-

ing the posterior angles of pronotum by one antennomere. Pronotum (Figs. 12J, 12K) 1.30x wider than long, lateral margins nearly straight convergent anteriorly from posterior angle, posterior angles divergent; anterior angle strongly produced, acute; hypomeron (Fig. 12L) glabrous on posterior half. Lamellae of pro- and mesotarsomeres I (Figs. 33A, B) 1/3 shorter and 1/2 narrower than the others, metatarsomere I with or without a minuscule lamella. Elytra subparallel on anterior 2/3 then tapering to apex; punctures of striae larger than those of the interstices.

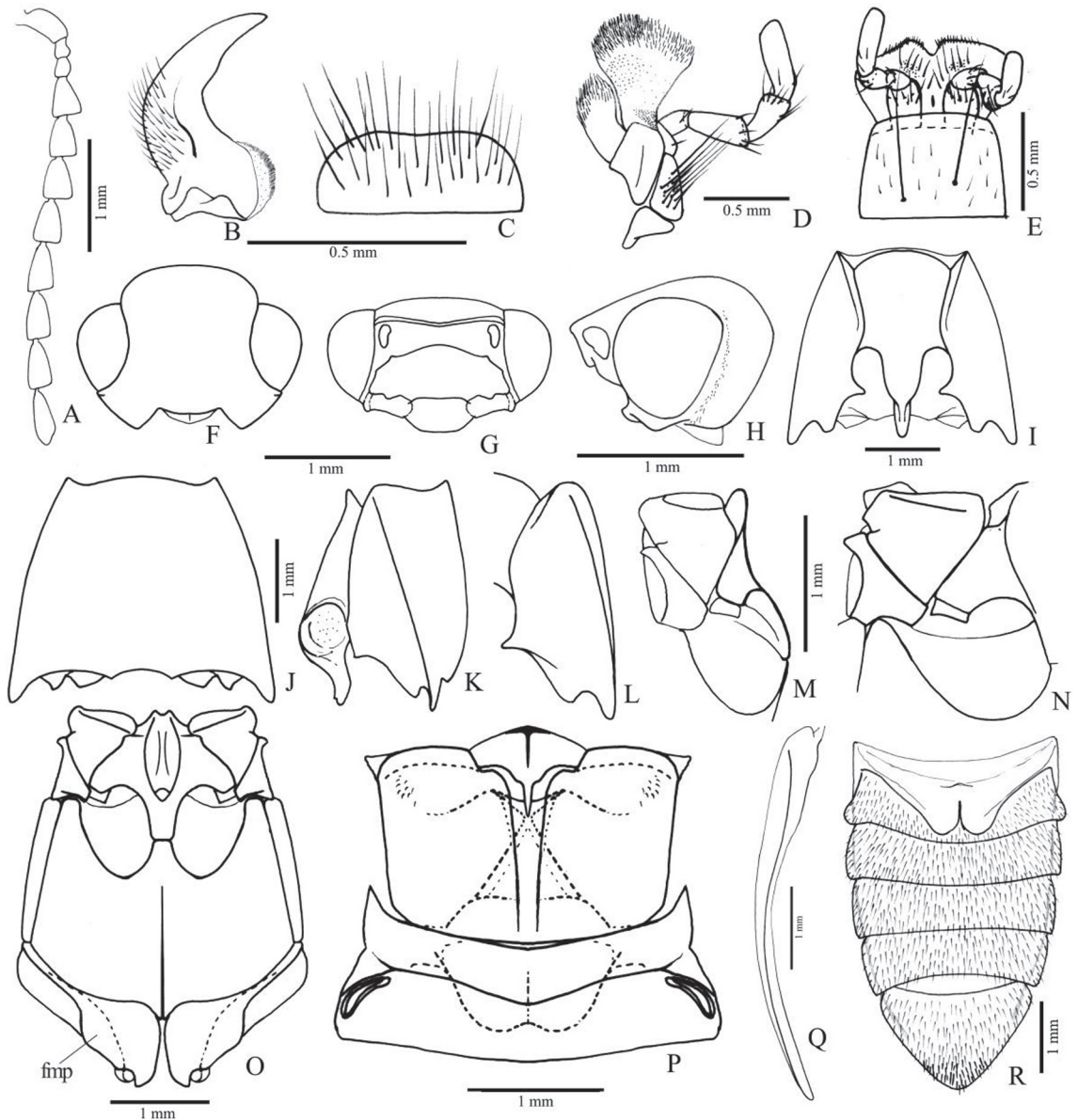
*Aedeagus* (Figs. 13E, F): Phallobase 0.46 times the total length of aedeagus, 1.24x longer than wide, length ratio between lateroposterior and median parts 4.6; paramere with ventral surface predominantly weakly sclerotized; penis with basal strut 0.36x its total length; ventral sclerite narrowed apicad, short; internal sac covered with microsclerotizations.

*Holotype*: [Santa Tereza, ES, BRAZIL 7.XII-64, C. Elias leg.], male (DZUP).

*Paratypes*: [Santa Tereza, ES, BRAZIL 11/12/1964, C. & C.T. Elias] 1 ex. (DZUP); idem but 27/01/1966, plus [DPT° ZOOL., UF-PARANÁ] 1 ex. (MZUSP), idem but 05/01/1967, 1 ex. (MZUSP).

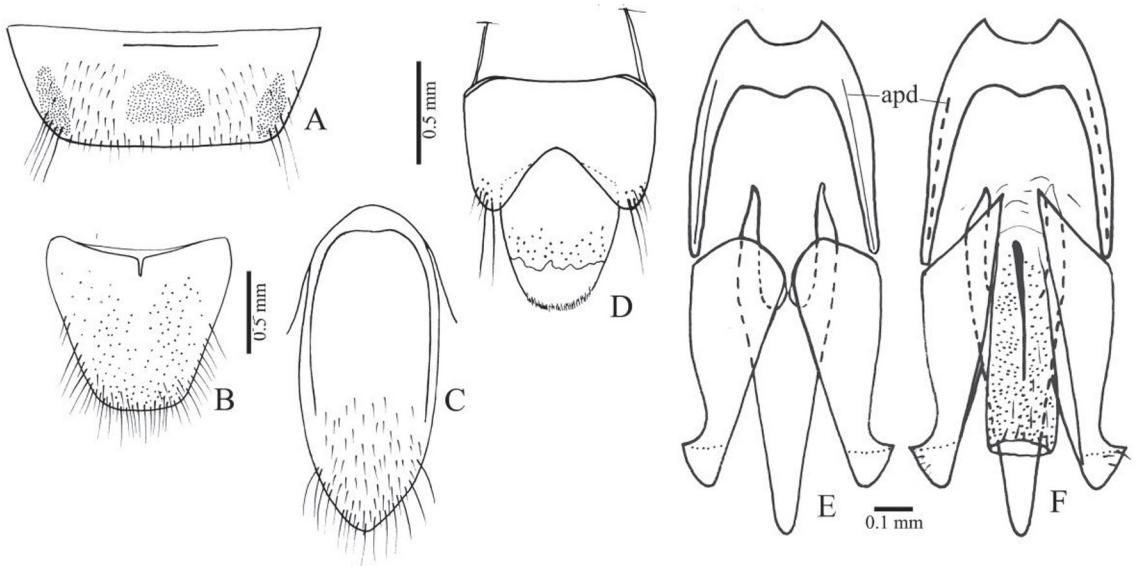
*Distribution*: BRAZIL. *Espírito Santo*: Santa Tereza.

*Remarks*: *Dactylophysus hirtus* sp. nov. is diagnosable by the combination of the following characters: pilosity erect, lateral sides of prothorax nearly straight convergent anterior from posterior angles, anterior pro-



**FIGURE 12:** *Dactylophysus hirtus* sp. nov. (paratype). A, antenna; B, mandible; C, labrum; D, maxilla; E, labium; F, G, H, head (dorsal, anterior, lateral); I, J, K, prothorax (ventral, dorsal, lateral); L, hypomeron; M, mesoventrite and pleural sclerites (lateral); N, mesoventrite and mesocoxal cavity (lateroventral); O, pterothorax (ventral); P, dorsal pterothorax and abdominal tergite I; Q, epiplura; R, abdomen (ventral). *Abbreviation*: fmp, free margin of metacoxal plate.





**FIGURE 13:** *Dactylophysis hirtus* sp. nov. **A**, sternite VIII; **B**, tergite VIII; **C**, sternite IX; **D**, tergites IX and X; **E**, **F**, aedeagus (dorsal, ventral). *Abbreviation:* apd, apodeme.

notal angle strongly produced anteriad, elytral striae with punctures larger than those of the interstices. Its aedeagus is most similar to that of *D. capixabensis*, differing in its phallobase shape and in the paramere more sclerotized ventrally.

***Dactylophysis capixabensis* nom. nov.**  
(Figs. 14, 34N)

*Dactylophysis mendax* (Candèze, 1859); Fleutiaux, 1892: 409, 410; Schwarz, 1906: 311; Blackwelder, 1944: 292; Golbach, 1994: 40.

*Dactylophysis capixabensis* nom. nov. for *Dactylophysis mendax* sensu Fleutiaux, 1892 misidentified as *Heterocrepidius mendax* Candèze, 1859.

*Etymology:* The specific name refers to “capixaba”, a popular name for native of the state of Espírito Santo, Brazil, where the species was found.

*Redescription* (male, Fig. 34N): Integument brown with pronotum darker than elytra; antenna, legs and ventral abdomen lighter than elytra. Total length 8.0-9.5 mm; elytral base 0.98x as wide as prothorax, elytra 2.6-2.8x longer than pronotum. Frons flattened, antenna reaching the posterior angle of pronotum or surpassing it by 1/2 antennomere. Pronotum (Fig. 14B) 1.2-1.3x wider than long, lateral margins rounded gradually convergent anteriad from posterior angle, posterior angles parallel; anterior angle slightly produced anteriad; hypomeron glabrous on posterior 1/5. Lamella of tarsomeres I

minuscule. Elytra parallel on anterior 2/3 then tapering to apex; punctures of striae larger than those of the interstices.

*Aedeagus:* Phallobase 0.44x the total length of aedeagus, 1.28x longer than wide, length ratio between lateroposterior and median parts 7.7; paramere with ventral surface with lateral border sclerotized, median part membranous; penis with basal strut 0.38x its total length; ventral sclerite narrowed apicad, short; internal sac covered with microsclerotizations.

*Lectotype* (present designation): [*Heterocrepidius mendax* Cand (*Chevrolat’s writing*)], [Collection Chevrolat], [*mendax* CANDÈZE], [Chevrolat det., FLEUTIAUX det], [*Dactylophysis mendax* Cand., Fleut. type, Brèsil], [TYPE], [Muséum Paris, Coll. E. Fleutiaux]. male (MNHN).

*Material examined:* BRAZIL. *Espírito Santo:* 2 exs. (MNHN).

*Distribution:* BRAZIL. Espírito Santo.

*Type material examined of Heterocrepidius mendax Candèze (1859):* *Lectotype* (present designation, Fig. 34P): [*Elater Dicrepidius, cibricollis nihi, h. in Brasilia D. Lacordaire*], [*mendax* ♂ (*Candèze’s writing*)], [Coll. Janson., ex Dejean.], [SYN-, TYPE], [Syntype, “♂”, *Heterocrepidius mendax* Candèze 1859, C.M.F. von Hayek det 1985], [486a], [mandible tooth, C.M.F. Von Hayek det. 198 (*sic*)], male (BMNH).

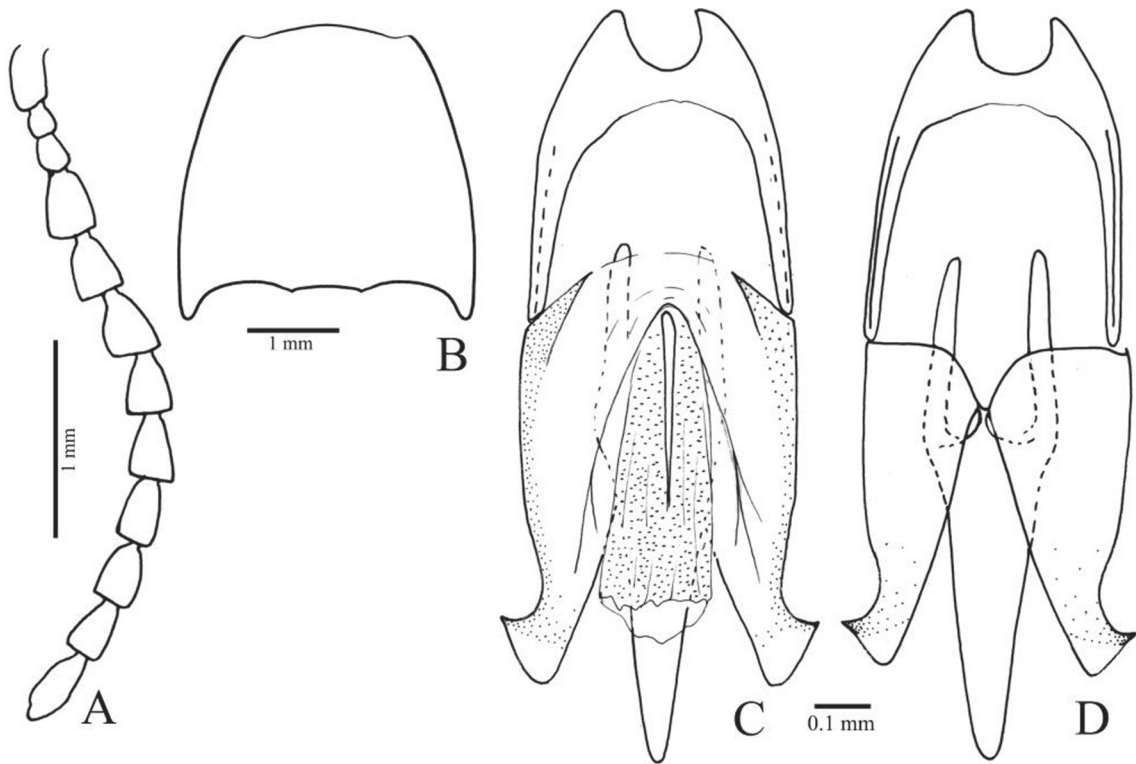


FIGURE 14: *Dactylophysus capixabensis* nom. nov. A, antenna; B, pronotum; C, D, aedeagus (ventral, dorsal).

*Paralectotype* (present designation): [*Heterocrepidius*, mendax, Brès. Cdz. (Candèze's writing)], [Coll. Janson, ex Candèze], [SYN-, TYPE], [♂], [Syntype, "♂", *Heterocrepidius mendax* Candèze 1859, C.M.F. von Hayek det 1985], [486a], [mandible tooth, C.M.F. Von Hayek det. 198], male (BMNH). *Misidentification*: [*Elater Dicrepidius*, mendax nihi, h. in Brasilia D. Lacordaire], [*illegible*] [mendax], [Coll. Janson, ex Dejean], [♂], [Syntype, "♀", *Heterocrepidius mendax* Candèze 1859, C.M.F. von Hayek det 1985], [mandibles simple, C.M.F. Von Hayek det. 198], male (BMNH).

*Remarks*: Fleutiaux described *Dactylophysus mendax* based on a specimen identified by Chevrolat (*in litt.*) as *Heterocrepidius mendax*. Candèze (1859) described *H. mendax* based on three specimens, two of them catalogued by Dejean (1833) as *Dicrepidius cibricollis* and *D. mendax*, which Candèze considered as male and female, respectively, of the same species. Actually, as observed formerly by von Hayek (*in litt.*), Dejean was right about considering them as distinct species and his *Dicrepidius mendax* (Candèze's female) is a male similar to *Dactylophysus mendax* described by Fleutiaux, with which it shares the diagnostic characters of the genus *Dactylophysus*. According to Article 49 of the International Code of Zoological Nomen-

clature the specific name *mendax* Candèze cannot be used as an available name for that taxon. Therefore, I introduce the new replacement name, *Dactylophysus capixabensis* nom. nov. for this species.

The description of *Heterocrepidius mendax* by Candèze (1859) conforms more closely to the two syntypes that he considered males (Fig. 34P). They have mandibles bidentate, antenna surpassing the prothorax by three antennomeres, prothorax gradually and little narrowed anteriorly, posterior angles carinate, slender legs, abdomen with marginal plates weakly produced, ventrite 5 without stout and denser apical setae, parameres with long membranous apex and very short in relation to the penis. For this reason, I designate herein them lectotype and paralectotype of the *H. mendax* Candèze, 1859.

The third syntype, which Candèze misidentified as *Heterocrepidius mendax* female, is most similar to *Dactylophysus mendax sensu* Fleutiaux, 1892 differing from it mainly in the shape of prothorax, which is most similar to that of *T. tibialis*. Nevertheless, as it was not possible to dissect its aedeagus, I could not confirm its identity.

*Dactylophysus capixabensis* nom. nov. differs from the described species of the genus in the prothoracic shape, with sides rounded, gradually convergent anteriorly and anterior angles less produced, pronotum

more convex, hypomeron glabrous on posterior 1/5, lamella of protarsomere I minuscule and elytra relatively shorter.

***Dactylophysus tibialis* (Candèze, 1859)**  
(Figs. 15, 34O)

*Heterocrepidius tibialis* Candèze, 1859: 34, 39.

*Dactylophysus tibialis*; Fleutiaux, 1892: 409, 410; Schwarz, 1906: 311; Blackwelder, 1944: 292; Golbach, 1994: 40.

*Dicrepidius proximus* Dejean, 1833 (*nomen nudum*).

**Redescription** (male): Integument evenly brown or dark brown with elytra and antenna brown. Total length 12.0-13.0 mm; elytral base 1.x as wide as prothorax, elytra 3.0-3.3x longer than pronotum. Frons (Fig. 15B) concave, antenna reaching the posterior angle of pronotum at base. Pronotum (Fig. 15C) 1.2-1.3x wider than long, lateral margins parallel on posterior half then straight convergent to anterior margin, posterior angles parallel; anterior angle produced anteriorly; hypomeron glabrous on posterior 1/5. Lamellae of pro- and mesotarsomeres I 1/3 shorter and 1/2 narrower than the others, metatarsomere I with a minuscule lamella. Elytra parallel on anterior 2/3-3/4 then tapering to apex; punctures of striae as larger as those of the interstices.

**Aedeagus** (Figs. 15I, J): Phallobase 0.41x the total length of aedeagus, 1.22x longer than wide, length ratio between lateroposterior and median parts 22; paramere with ventral surface laterally sclerotized, median border membranous; anteromedian margin acute and produced anteriorly, penis with basal strut

0.29x its total length; ventral sclerite parallel sided, long; internal sac without microsclerotizations.

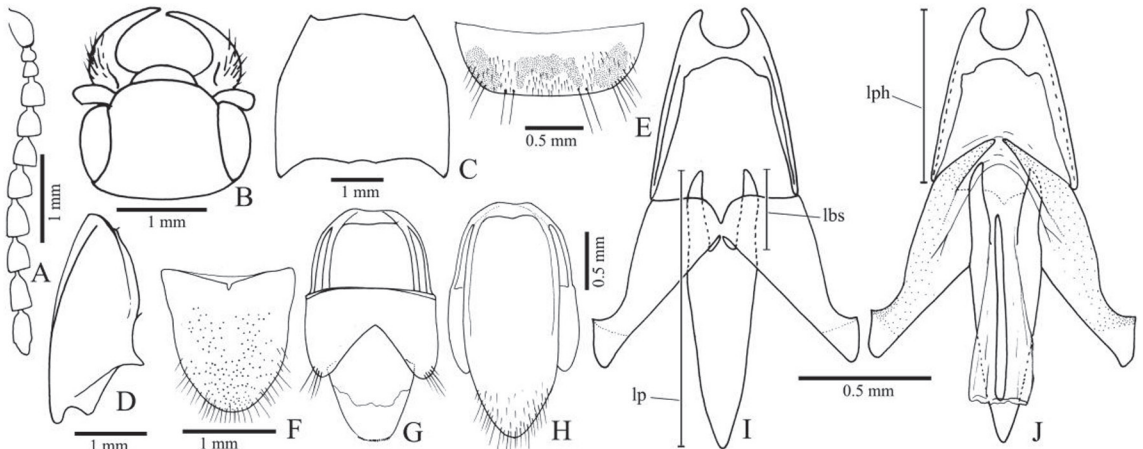
**Holotype**: [Elater *Dicrepidius*, *proximus* nihi, h. in Brasilia D. Lacordaire], [mendax var. *nubis*], [M. *tibialis*], [Coll. Janson. ex Dejean.], [Type], [SYN-, TYPE], [Type], [Syntype, *Heterocrepidius tibialis* Cand. 1859, C.M.F. von Hayek, det. 1985], male (BMNH).

**Material examined**: BRAZIL. 2 males, 1 female (MNHN); 1 female (MNHN).

**Distribution**: BRAZIL.

**Remarks**: Fleutiaux (1892) transferred *Heterocrepidius tibialis* to *Dactylophysus* based on a male probably identified by Chevrolat (*in litt.*). This specimen is very similar to the holotype of this species, with which shares the following combination of characters: antenna reaching the posterior angles of prothorax, prothorax with sides parallel on posterior half then convergent anteriorly, elytral interstices with punctures as large as those of the elytral striae.

The female specimen assigned to this species by Fleutiaux differs from the male in several characters. It has antennae shorter, smaller eyes, body convex and wings shorter, differences usually assigned as sexual dimorphism in elaterids. However, this female also differs in its mandible bidentate, antenna covered by longer and erect setae, general punctuation smaller and sparser, pronotal hind angle wider and carinate, lateral pronotal carina weaker impressed anteriorly and not reaching the anterior margin, legs slender, tarsal lamellae absent and epipleura abruptly widened at apex (as in males of *Heterocrepidius gilvellus*). Those signifi-



**FIGURE 15:** *Dactylophysus tibialis*. A, antenna; B, head (dorsal); C, pronotum; D, hypomeron; E, sternite VIII; F, tergite VIII; G, tergites IX and X; H, sternite IX; I, J, aedeagus (dorsal, ventral). Abbreviations: lbs: length of basal strut, lp: length of penis, lph: length of phallobase.

cant differences and the uninformative labels of the female specimen do not corroborate the Fleutiaux's assumption. Therefore, I conclude that this specimen is probably not the female of *D. tibialis* and that it remains unknown. There is no other female accurately assigned to *Dactylophysus* and *Heterocrepidius* species.

### ***Physodactylus* Fischer von Waldheim, 1823**

*Physodactylus* Fischer von Waldheim, 1823: 303, 1824: 450; Guérin-Méneville, 1829: 43; Lacordaire, 1857: 237; Fleutiaux, 1892: 406; Schwarz, 1906: 311; Fleutiaux, 1940c: 165; Blackwelder, 1944: 292; Golbach, 1994: 27; Lawrence & Newton, 1995: 855; Chassain, 2005: 65.

*Drepanius* Perty, 1830: 24; Lacordaire, 1857: 237 (syn).

*Type species* (by monotypy): *Physodactylus henningi* Fischer, 1823.

*Diagnosis:* Body convex. Frons carinate, antenna submoniliform not surpassing the pronotal posterior angle, labrum subrectangular strongly declivous anteroventrad, mandible falciform unidentate. Prothorax trapezoidal wider than long, lateral pronotal carina directed ventrad anteriorly; anterior angles straight or obtuse in dorsal view, not produced. Metacoxa about 17° inclined to transverse body axis with inner 1/3 about 13 times wider than the outer 2/3; free margin of metacoxal plate very short or absent. Trochanter and femur convex; tibiae widened apicad with external surface covered with spiniform seta and each inner and outer apical margins with a row of 18-27 spiniform setae. Abdominal ventrite 1 nearly divided medially.

*Distribution:* BRAZIL.

*Redescription* (male): Integument dull to very shiny with variable color patterns, with punctures umbilicate deeply or weakly impressed, covered with yellow to dark-brown setae; pilosity decumbent to semi-erect on ventral surface; setae usually absent on dorsal surface except for the erect setae on the borders of pronotum and elytra; epipleura densely covered with erect setae visible dorsally around the elytra. Total length: 5.0-20 mm; elytral base 0.96-1.11x as wide as prothorax, elytra 2.70-3.48x longer than pronotum.

Head (Figs. 18B, 26C, 28B) with anterior margin of frons straight or rounded, dorsal ocular margins curved inwards or subparallel. Frontal carina usually

present weakly to strongly impressed, produced or not anteriorly; frontoclypeal region (Fig. 26D) steeply declivous to base of labrum 5.0-6.0x wider than long; punctures larger than those of pronotum, coalescent to 0.5 diameter apart. Antenna (Fig. 16A) with 11 antennomeres, antennomeres II and III subequal, III 1.0-1.1x longer than II; IV-XI strongly convex (submoniliform); IV-X serrate, XI subcircular to elliptical. IEP 0.24-0.42. Labrum (Figs. 30C, 33E) subrectangular, anterior margin nearly straight to medially emarginate, concave and strongly declivous ventrad, 2.86-2.92x wider than long, densely and coarsely punctate, with long setae. Mouthparts directed anteroventrally. Mandible (Figs. 18B, 22C, 30C) narrow and long, falciform, unidentate, laterodorsal face densely punctate; lateral edge evenly curved apicad; mesal margin at base with a row of short setae on a prominent rectangular membranous area. Maxilla and labium covered with yellow to dark-brown setae. Maxilla (Figs. 22B, 26B) with galea securiform, anterior part usually covered with short fine setae, denser on inner angle (some species with sparse spines and spiniform setae – Fig. 20B); lacinia elongate, tongue-like, densely or sparsely pilose; medistipes trapezoidal longer than wide with several long setae; labium (Figs. 22D) with prementum deeply emarginate on anteromedian margin with anterolateral angles rounded or truncate, not produced; maxillary and labial palpi pilose with fine to stout setae, apical palpomere securiform.

Prothorax subtrapezoidal 1.07-1.56x wider than long, lateral carina directed ventrad anteriorly, nearly entirely visible or with anterior part not visible dorsally, not reaching the anterior margin (incomplete) or reaching the anterior margin (complete); anterior angles straight or obtuse in dorsal view. Pronotum weakly (Fig. 21C) to strongly (Fig. 22H) convex, disc, lateral and anterior borders convex with punctures umbilicate deeply impressed (shallowly impressed in some species), posterior margin with very small punctures (Fig. 26F); anterior angles right or obtuse, not produced; posterior angles directed ventromedially, usually non-carinate. Hypomeron with punctures usually as large as those of pronotum, denser laterally; posterior 1/5-1/3 glabrous; posterior margin with an inverted U-shaped notch adjacent to the posterior angle (Figs. 22I, 25E, 26I). Prosternal suture straight (Fig. 25C) or curved (Fig. 26G), margined by a shiny band along hypomeran margin grooved or not at anterior part. Prosternum (Figs. 18D, 20E, 22G, 25C, 26G) 1.09-1.87x wider than long, with punctures larger than those of pronotum, 0.5-1.5 diameters apart; anterior lobe truncate,



covering mouthparts to mentum. Prosternal process (Figs. 22G, H) 2.0-2.7x longer than diameter of procoxae, ventral surface narrower than the dorsal surface with or without a subapical tooth, curved between procoxae and about 45° declivous to apex. Procoxae open.

*Pterothorax:* Mesoventrite with posterior region inclined about 30° above the anterior region (Fig. 26K) with anterior articulating surfaces concave and smooth (Figs. 22K, 26J); borders of mesoventral cavity curved, convergent anteriorly from its half length, floor of cavity with or without shiny median band. Mesocoxal cavity (Figs. 22K, 26L) open to both mesepisternum and mesepimeron, trochantin visible; mesepisternum with an oblique carina anteromedially contiguous to the posterior limit of the mesoventral articulating surface. Mesometaventral suture distinct or indistinct. Metaventrite (Fig. 22K) 1.4-1.6x wider than long, 1.4-1.5x longer than mesoventrite; metepisternum about 7.0 times longer than wide. Scutellum (Figs. 22J, 30M, 33E) abruptly elevated above the level of mesoscutum, pentagonal, 1.1-1.5 longer than wide, anterior edge rounded. Metanotum (Fig. 26R): prescutum contiguous medially to the scutellum by an acute process; posterior part of the scutellum with a longitudinal apodeme. Elytra with apices conjointly rounded, striae with a single (Fig. 33N) or several (Fig. 33O) rows of punctures usually increasing in size posteriorly; interstices flat to convex, impunctate or sparsely punctate; epipleura abruptly narrowed near metacoxa, slightly widened apically from ventrite 2. Hind wings (Fig. 26Q) with radial cell 3.5x longer than wide, CuA<sub>1</sub> present; wedge cell present; apex with anterior, median and posterior field sclerotizations convergent basad and an oblique sclerotization adjacent to the radial cell.

Metacoxa (Fig. 22K) inclined about 17° in relation to transverse axis of body, ventral part as long as the dorsal one, abruptly shortened on outer 2/3, inner 1/3 about 13 times longer than outer 2/3; free margin of metacoxal plate absent or very short. Tibiae with 18-27 spiniform setae along each outer and inner apical border (Fig. 33L). Protibia (Figs. 25F, 26N, 28F, 33G) 2.2-3.5x wider at apex than at base, with dorsal margin rugose, slightly to strongly curved with apical angle usually acute and produced; dorsal margin and outer half covered with spiniform setae. Mesotibia (Fig. 18F, 19C, 21E, 26O, 33H) 2.0-3.1 wider at apex than at base, with dorsal margin curved, dorsal apical angle obtuse; covered with spiniform setae, dense on dorsal margin and outer surface, sparse on inner surface. Metatibia (Figs. 17D, 21F, 2

5G, 26P, 28H, 33K) 2.4-3.5 wider at apex than at base with apical dorsal angle produced (not produced in some *P. besckei* specimens); densely covered with spiniform setae. Femur (Figs. 33F, H, J) rectangular with outer and inner surfaces convex; metatrochanter more convex than metafemur. Tarsomeres decreasing in length from I-IV, V longer than III and IV together; ventral surface densely pilose, tarsomeres I-III or II-III lamellate (Fig. 33M), lamellae of tarsomeres II-III subequal, I a little smaller, minuscule or absent; claws simple.

Abdomen (Figs. 22L, M) with variable pilosity patterns on ventrites 1-4, ventrite 5 with apex coarsely punctate with pilosity dense and stout; posterior angle of ventrite 1 and lateral margins of 2-4 with prominent marginal plates (Fig. 25H); ventrite 5 subtriangular 1.1-1.5x wider than long, evenly convex. Ventrite 1 nearly divided medially, 2-4 subequal in length. Sternite VIII (Figs. 18I, 23A) subrectangular, with posterior margin straight to emarginate medially, partly covered with short setae, lateroposterior angles usually with long stout setae; with a pair of light sclerotizations on lateroposterior angles and a transverse band-like dark sclerotization on anteromedian border. Tergite VIII (Figs. 18J, 23B, 28K) evenly sclerotized U-shaped, covered with short setae, setae longer on lateroposterior and apical margins. Sternite IX (Figs. 18G, 23C, 28I) with anteromedian margin rounded, produced and curved dorsad; latero-anterior margins strongly sclerotized, anteromedian surface translucent, posterior surface sclerotized and covered with moderately long setae, longer on lateroposterior and apical margins; sternite and tergite IX fused near the anterior margin. Tergite IX (Figs. 18H, 23D, 28J) with anterior margin straight or sinuous, apical lobes acute or rounded with long setae. Tergite X with apex membranous, suboval, scarcely punctate, usually glabrous, apical margin with a fringe of minuscule setae.

*Aedeagus:* Phallobase M-shaped, lateral parts divergent posteriorly with a longitudinal apodeme on dorsal surface, 0.4-0.5x the total length of aedeagus, 0.9-1.6x longer than wide, length ratio between lateroposterior and median parts 3.3-3.4. Parameres tapered apically, 2.1-4.8x wider at base than the narrowest apical part; with dorsal surface more sclerotized than the ventral one; ventral surface sclerotized laterally, membranous medially, membrane contiguous to each other and to the phallobase membrane; apex securiform with outer angle acute, evenly sclerotized or membranous posteriorly, with or without short setae. Penis with basal struts 0.2-0.3x the total length of penis; dorsal articulation fused to the parameres by a median sclerotized

process (Fig. 17E) or by a membranous translucent area (Fig. 18K); ventral sclerite present.

*Remarks:* The combination of the most conspicuous characters of *Physodactylus* species (shape of labrum, the

short and laterally convex antennae – almost moniliform in some species, fossorial legs, body convex, metacoxae almost horizontal and reduced laterally and tarsomeres lamellate) easily differentiate them from other similar species as those of *Teslasena* and *Dactylophysus*.

### Key to species for male *Physodactylus*

1. Abdominal ventrite 1 partly impunctate.....2
- Abdominal ventrite 1 evenly punctate.....5
- 2(1). Prothorax gradually narrowed anteriorly (Fig. 22F); abdominal ventrite 1 almost entirely impunctate, ventrites 2-3 entirely punctate (Fig. 22F).....3
- Prothorax abruptly and strongly narrowed on anterior angle (Fig. 21K); abdominal ventrite 1-3 with a longitudinal sublateral impunctate band (Fig. 31D).....4
- 3(2). Frons with a pair of oblique protuberances over antennal insertions (Fig. 22E); antenna reaching the posterior third of pronotum; lateral pronotal carina complete (Fig. 22H)..... *P. henningi* (Fig. 35K)
- Frons without a pair of oblique protuberances (Fig. 18B); antenna reaching the base of pronotal hind angles; lateral pronotal carina absent on anterior 1/3-1/2 (Fig. 18E)..... *P. brunneus* sp. nov. (Fig. 35B)
- 4(2). Body setae yellow; pronotum with an acute tubercle on median posterior region (Figs. 31A, B).....  
..... *P. tuberculatus* sp. nov. (Fig. 35R)
- Body setae brown, pronotum without tubercle..... *P. gounellei* sp. nov. (Fig. 35J)
- 5(1). Abdominal ventrites 1-4 evenly convex.....6
- Abdominal ventrites 1-4 laterally concave.....11
- 6(5). Prothorax abruptly and strongly narrowed on anterior angle, pronotal anteromedian margin strongly produced anteriorly (Figs. 26F, H); elytral striae with a single row of punctures (Fig. 33N); protibia with dorsal margin slightly curved and rugose (Fig. 26N)..... *P. niger* (Fig. 35M)
- Prothorax gradually or abruptly narrowed anteriorly from posterior angle or posterior third, pronotal anteromedian margin not produced to slightly produced anteriorly (Figs. 28C, D); elytral striae with three rows of punctures (Fig. 33O); protibia with dorsal margin strongly curved and crenulate (Fig. 28F).....7
7. Antenna reaching the anterior third of pronotum; pro- and mesothoracic leg with lamella on tarsomeres I absent or smaller than lamellae on tarsomeres II and III.....8
- Antenna reaching the half length of pronotum; pro- and mesothoracic leg with lamella on tarsomere I as large as the lamellae on tarsomeres II and III.....10
- 8(15). Body bicolored (orange and black) or evenly brown, pronotum convex, lateral pronotal carina weakly impressed or absent near anterior angle (Figs. 30D, E)..... *P. sulcatus* (Fig. 35Q)
- Body evenly black or dark brown, pronotum weakly convex, lateral carina complete evenly impressed...9
- 9(8). Dark brown, eyes moderately large (IEP 0.32); pronotal disc with punctures 1-3 diameters apart, prosternal process curved about 90° dorsoposteriad of procoxae; elytra 2.43x longer than wide tapering to apex from its midlength, interstices flat on anterior region..... *P. costae* (Fig. 35D)
- Black, eyes small (IEP 0.24); pronotal disc with punctures 0.5-1.0 diameter apart, prosternal process curved about 45° dorsoposteriad of procoxae; elytra 2.1x longer than wide tapering to apex from its posterior quarter, interstices evenly convex on anterior region..... *P. fleutiauxi* (Fig. 35G)
- 10(7). Head black, elytra evenly brown; frontoclypeal region without longitudinal carina; pronotum 1.56x wider than long (Fig. 25B), elytra parallel-sided on anterior 2/3 then tapering to apex; abdominal pilosity very dense and semi-erect..... *P. latithorax* sp. nov. (Fig. 35L)
- Head brown, elytra reddish-brown with apical third black; frontoclypeal region with a longitudinal carina medially; pronotum (Fig. 28C) 1.46x wider than long; elytra widened with sides rounded between humerus and apical quarter; abdominal pilosity moderately dense and decumbent.....  
..... *P. patens* sp. nov. (Fig. 35O)
- 11(5). Prothorax abruptly and strongly narrowed on anterior angle (Fig. 21K), pronotum with anteromedian margin strongly produced over head..... *P. oberthuri* (Fig. 35N)

- Prothorax gradually narrowed anteriorly (Fig. 22F), pronotum with anteromedian margin rounded, not produced to slightly produced over head.....12
- 12(11). Elytral striae with two or three rows of punctures.....13
- Elytral striae with one row of punctures .....14
- 13(11). Elytral striae distinct up to apex, interstices smooth to weakly rugose.....15
- Elytral striae with punctures mixed on apical region turning the striae indistinct, interstices rugose...17
- 14(12). Body setae yellow, pronotum and elytra light brown; antenna reaching the base of pronotal hind angle .....18
- Body setae brown, pronotum reddish-brown lighter than elytra; antenna reaching the anterior third of pronotum.....19
- 15(13). Body setae yellow, head and pronotum orange; antenna reaching the third of pronotal length .....  
..... *P. flavifrons* sp. nov. (Fig. 35F)
- Body setae brown, head brown darker than pronotum, antenna reaching the base of pronotal hind angle .....16
- 16(15). Pronotum evenly brown; protibia with dorsal apical angle obtuse, not produced (Fig. 21D) .....  
..... *P. girardi* sp. nov. (Fig. 35I).
- Pronotum light brown with borders (or borders and disc) darker; protibia with dorsal apical angle acute, produced..... *P. pujoli* (Fig. 35P)
- 17(13). Pronotal lateral carina incomplete anteriorly; pilosity of the ventrites 1-4 subequal in length and density, moderately long; ventrite 1 evenly pilose..... *P. fischeri* (Fig. 35E)
- Pronotal lateral carina complete; setae minuscule on ventrite 1, long and fine on ventrites 2-4; ventrite 1 with setae scarcer and longer on lateral border ..... *P. asper* sp. nov. (Fig. 34Q)
- 18(14). Frons with a triangular concavity that extends posteriorly between eyes, pronotum convex, posterior angles short non carinate (Figs. 16F) ..... *P. besckei* (Fig. 34R)
- Frons with a transverse protuberance between antennal insertions; pronotum weakly convex, posterior angles elongate and carinate (Figs. 17B) ..... *P. brasiliensis* (Fig. 35A)
- 19(14). Punctures of the apical elytral striae a little larger than those of pronotal lateral border, interstices convex; ventrite 1 with setae about 1/3 as long as those of ventrite 2 with lateral border smooth and glabrous ..... *P. chassaini* sp. nov. (Fig. 35C)
- Punctures of the apical elytral striae twice as large as those of pronotal lateral border, interstices flat; ventrite 1 with setae about 1/5 as long as those on ventrite 2 with setae longer and sparser on marginal plates..... *P. foveatostriatatus* (Fig. 35H)

***Physodactylus asper* sp. nov.**  
(Figs. 16A-D, 34Q)

*Etymology:* From Latin, asper = rough; alluding to the rugose and coarsely punctate elytra.

*Description* (male, Fig. 34Q): Integument bright; head, antennae, legs and ventral surface black, pronotum reddish-brown, elytra dark brown with epipleura lighter; one specimen with pterothorax and ventral abdomen reddish-brown on the median longitudinal line; pilosity brown. Total length 8-10 mm; elytral base 1.0x as wide as prothorax, elytra 3.0-3.2x times longer than pronotum. Frons slightly concave, frontal carina weakly impressed; antenna (Fig. 16A) reaching the posterior third of pronotum, antennomere IV as wide as long, V-X 1.17-1.20x wider than long; XI oval 1.5x longer than wide. Pronotum (Fig. 16B) 1.20-1.26 wider than long, with lateral sides nearly straight to

rounded convergent from posterior angles to anterior margin; anteromedian margin weakly produced; posterior angles short, convex, parallel; lateral carina prominent nearly entirely visible dorsally, complete; disc with punctures 2-3 diameters apart, larger and denser on lateral and anterior borders; prosternal process without subapical tooth. Lamellae of pro- and mesotarsomeres I smaller than the others, absent on metatarsomere I. Elytra tapering to apex from anterior third or subparallel on anterior 2/3 then tapering to apex; striae with large and small dense punctation, striae indistinct on apical region where the punctation is mixed and coalescent; interstices convex and rugose, scarcely punctate; apical striae with punctures larger than those of pronotal lateral border. Abdomen with ventrites 2-4 strongly concave laterally; ventrite 1 densely punctate with minuscule fine setae, lateral border smooth with a few long, very fine setae; ventrites 2-4 punctate as ventrite 1 with long, decumbent and semi-erect fine setae,

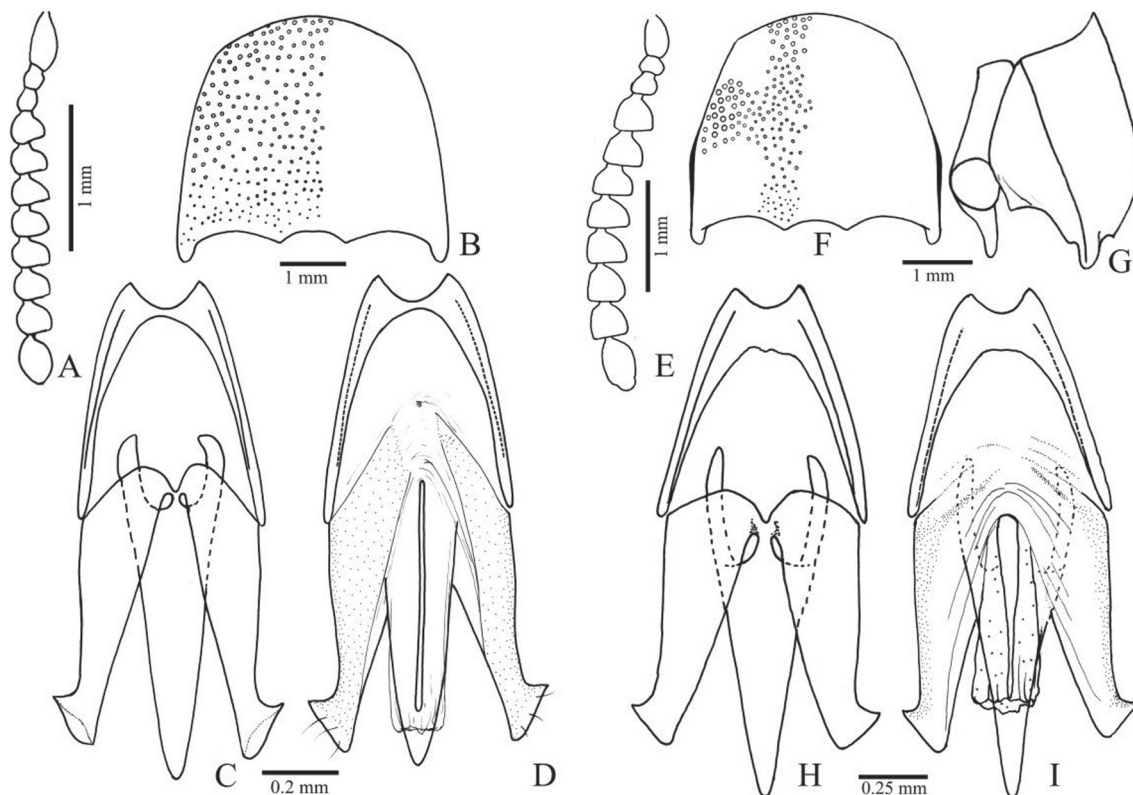


FIGURE 16: *Physodactylus asper* sp. nov. A, antenna; B, pronotum; C, D, aedeagus (dorsal, ventral). *Physodactylus besckei*. E, antenna; F, G, prothorax (dorsal, lateral); H, I, aedeagus (dorsal, ventral).

lateral border smooth with a few finer setae. Pregenitalic segments and aedeagus covered with stout dark-brown setae. Sternite VIII emarginate posteromedially, anterior sclerotization 0.62x times the total width of sternite; sternite IX with apex rounded.

**Aedeagus** (Figs. 16C, D): Phallobase 0.49x the total length of aedeagus, 1.26x longer than wide, length ratio between lateroposterior and median parts 34; paramere with ventral surface nearly entirely sclerotized with anteromedian margin distinct; penis with basal strut 0.19x its total length, articulated to the parameres by a sclerotized short process; ventral sclerite linear.

**Holotype:** [DPT<sup>o</sup> ZOOL, UF-PARANÁ], [MARACÁS, BRAZIL, BAHIA, 19/11/1965, F.M. Oliveira leg.], male (DZUP).

**Paratypes:** Same labels as holotype, 2 exs. (DZUP); idem, 1 ex. (MZUSP).

**Distribution:** BRAZIL. *Bahia*: Maracás.

**Remarks:** *Physodactylus asper* sp. nov. is similar to *P. fischeri* in the shape of prothorax, brown pilosity

and the punctation and roughness of elytra, differing from this species in its smaller size, longer antenna, weaker impressed frontal carina, lateral pronotal carina complete, pilosity pattern of the abdominal ventrites, aedeagus with parameres more extensively sclerotized ventrally and articulated to penis through a sclerotized process, basal struts shorter and wider and median part of phallobase shorter.

***Physodactylus besckei* Mannerheim, 1842**  
(Figs. 16E-I, 34R)

*Physodactylus besckei* Mannerheim, 1842: 93; Lacordaire, 1857: 237; Fleutiaux, 1892: 406, 407; Schwarz, 1906: 311; Schenkling, 1927: 508; Fleutiaux, 1940c: 168; Blackwelder, 1944: 292.

*Physodactylus besckii* Mannerheim, 1842: 93 (misspelling).

**Redescription** (male, Fig. 34R): Integument light yellowish-brown except for head and antennae dark brown, metaventrite darker on lateral borders, abdominal ventrites 1-4 partly black; pilosity yellow. Total length 11.0-13.0 mm; elytral base 1.0-1.1x as wide



as prothorax, elytra 3.0-3.1x longer than pronotum. Frons concave along the anterior border with a transverse weak protuberance between antennal insertions, frontal carina produced; antenna (Fig. 16E) reaching the base of pronotal posterior angles; antennomere IV-VIII as long as wide; IX and X 1.25 and 1.12x longer than wide, XI oval 1.75x longer than wide. Pronotum (Fig. 16F) convex, 1.12-1.18x wider than long, lateral sides subparallel on posterior 1/3 then abruptly convergent anteriorly, posterior angles short, non-carinate; lateral carina complete, dorsally visible only on posterior third; pronotal disc with punctures umbilicate, 1-2 diameters apart, larger and denser on lateral and anterior borders; prosternal process (Fig. 16G) without subapical tooth. Metatibia with dorsal apical angle not produced to weakly produced; lamellae of pro- and mesotarsomeres I a little smaller than the others, present on metatarsomere I. Elytra subparallel on anterior 2/3 then tapering to apex; punctures of apical striae as large as those of lateral pronotum; elytral interstices weakly convex, smooth, impunctate or scarcely punctate. Abdomen with ventrites 2-3 strongly concave laterally with long decumbent setae on ventrites 2-4, a little shorter on ventrite 1. Pregenitalic segments and aedeagus covered with yellow setae. Sternite VIII with posteromedian margin emarginate, anterior sclerotization inverted V-shaped 0.27x the total width of sternite; sternite IX with apex rounded.

*Aedeagus* (Figs. 16H, I): Phallobase 0.43x the total length of aedeagus, 1.09x longer than wide, ratio between lateroposterior and median parts 6.12; paramere with ventral surface predominantly membranous ex-

cept for the lateral border and an anteromedian submarginal band weakly sclerotized; penis with basal strut 0.34x its total length, articulated to the parameres by a sclerotized process; ventral sclerite tapering to apex.

*Holotype*: Not examined.

*Material examined*: BRAZIL. 2 exs. (MNHN); São Paulo, 4 males (MNHN).

*Distribution*: BRAZIL. São Paulo.

*Remarks*: Holotype of *Physodactylus besckei* was not examined, therefore the redescription, based on specimens identified by E. Fleutiaux, requires confirmation. This species is most similar to *P. brasiliensis* in the coloration of the dorsal surface, abdominal pilosity, shape and relative length of the antenna. It differs from this species in its frons concave along anterior border, less shiny integument, shape of prothorax, more convex pronotum, which is more produced anteriorly over head, sternite IX with rounded apex, dorsal articulation of penis with process less sclerotized, shape of ventral sclerite and the sclerotization of the anteromedian border of parameres.

***Physodactylus brasiliensis* Fleutiaux, 1892  
(Figs. 17, 35A)**

*Physodactylus brasiliensis* Fleutiaux, 1892: 406, 408; Schwarz, 1906: 311; Fleutiaux, 1940c: 168; Schenkling, 1927: 508; Blackwelder, 1944: 292.

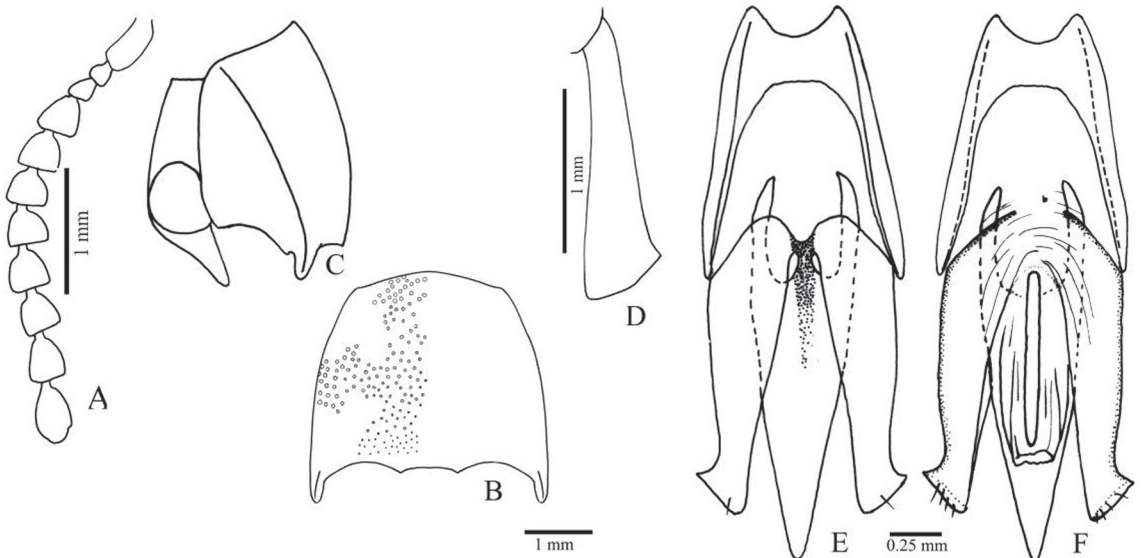


FIGURE 17: *Physodactylus brasiliensis*. A, antenna; B, C, prothorax (dorsal, lateral); D, metatibia; E, F, aedeagus (dorsal, ventral).

*Redescription* (male, Fig. 35A): Integument very shiny, head dark brown with frons lighter, antennomeres I-III reddish-brown, IV-XI dark brown; pronotum light yellowish-brown or ochre with posterior angles, anterior and posterior borders black; scutellum with borders darker, elytra light brown with surrounding area of punctures darker; ventral surface dark brown to black, except for the posterior part of prosternum, epipleura, femur and lateral border of ventrites 1-4 and ventrite 5 light brown; pilosity yellow. Total length 10.0-14.0 mm; elytral base 1.10-1.12x wider than prothorax, elytra 3.12-3.33x longer than pronotum. Frons with a triangular concave area, frontal carina produced; antenna (Fig. 17A) reaching the base to apex of the posterior pronotal angles; antennomere IV-IX as long as wide; X 1.28x longer than wide; XI oval 1.75x longer than wide. Pronotum weakly convex (Fig. 17B) 1.17-1.19x wider than long, lateral sides straight and roundly narrowed from posterior angle to anterior margin, posterior angles long, narrow and carinate; lateral carina nearly reaching the anterior margin, nearly entirely visible dorsally; disc with punctures umbilicate, 1-2 diameters apart, a little larger and denser on lateral and anterior borders; prosternal process (Fig. 17C) without subapical tooth. Lamellae of pro- and mesotarsomere I a little smaller than the others, present on metatarsomere I. Elytra tapering apicad from humerus or anterior third, punctures of apical striae larger than those of the pronotal lateral border; elytral interstices weakly convex, smooth, sparsely punctate. Abdomen with ventrites 2-3 strongly concave laterally, with long decumbent setae on ventrites 2-4, a little shorter on ventrite 1. Pregenitalic segments and aedeagus covered with yellow to light-brown setae. Sternite VIII with posterior margin straight or emarginate medially, anterior sclerotization inverted V-shaped 0.28x the total width of sternite; sternite IX with apex acute.

*Aedeagus* (Figs. 17E, F): Phallobase 0.49x the total length of aedeagus, 1.36x longer than wide, length ratio between lateroposterior and median parts 5.70; paramere with ventral surface predominantly membranous except for the lateral border and anterior margin sclerotized; penis with basal strut 0.27x its total length, articulated to the parameres by a strongly sclerotized process; ventral sclerite parallel-sided.

*Holotype*: [Brésil, Caraça, P. Germain, 2<sup>o</sup> semestre 1884], [*Physodactylus brasiliensis* ♂ Fleut. Type Brésil], [Fltx. 1891], [Museum Paris ex Coll. R. Oberthur], [Type], [Lectotype], [*Physodactylus brasiliensis* Fleut. J. Chassain det. 05], male (MNHN).

*Material examined*. BRAZIL. *Minas Gerais*: Monlevade, 1 ex. (MNHN); Caraça, 2 exs. (MZUSP); Serra do Cipó, 1 ex. (MZUSP).

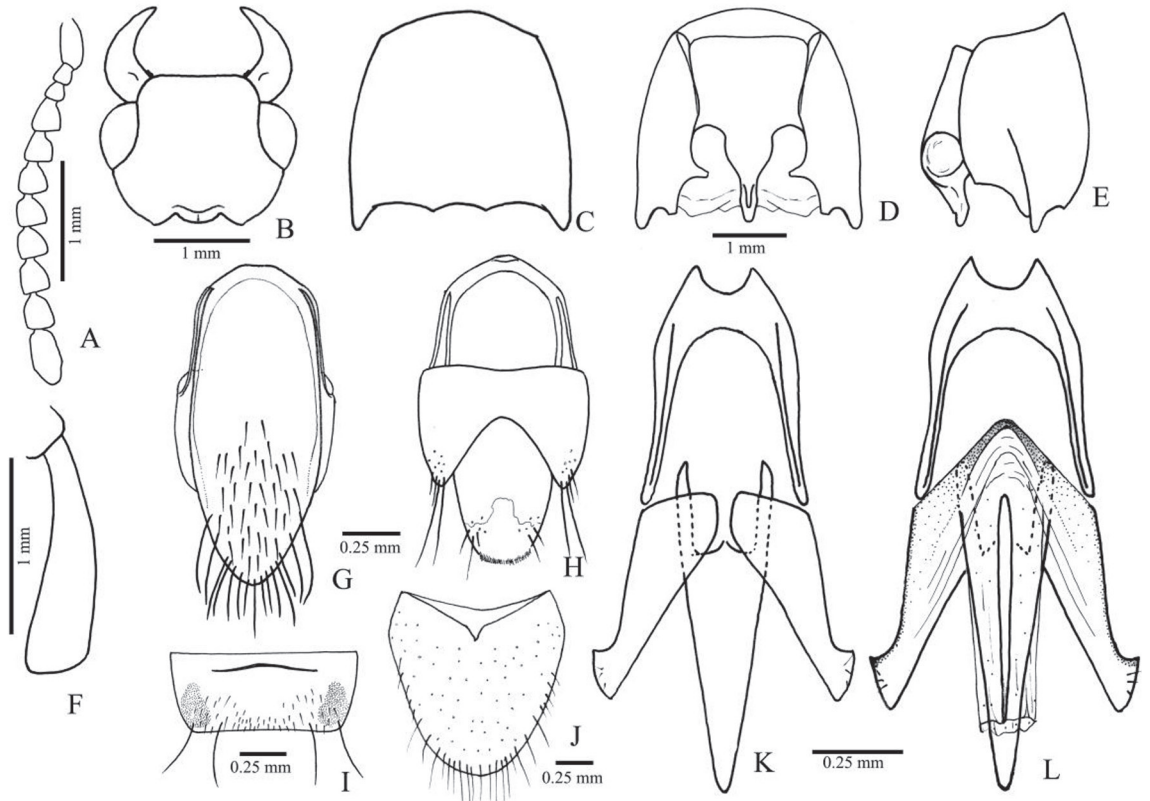
*Distribution*: BRAZIL. *Minas Gerais*: João Monlevade; Serra do Caraça; Serra do Cipó.

*Remarks*: The specimen with the Fleutiaux's label has terminalia with light-brown setae and sides of penis more rounded. *Physodactylus brasiliensis* is distinguishable from the other species in its pattern color, the very shiny integument and the long and carinate posterior pronotal angles.

***Physodactylus brunneus* sp. nov.**  
(Figs. 18, 35B)

*Etymology*: From latin, *brunneus* = brown; alluding to the body color of this species.

*Description* (male, Fig. 35B): Integument very shiny; head and antenna dark brown to black, ventral pro- and pterothorax and legs dark brown, pronotum and elytra equally brown or with pronotum darker; ventral abdomen brown with irregular areas lighter; pilosity light brown to brown. Total length 8.0-11.0 mm; elytral base 1.0-1.1x wider than prothorax, elytra 3.1-3.3x longer than pronotum. Frons (Fig. 18B) flat to slightly concave, frontal carina not produced anteriorly; antenna (Fig. 18A) reaching the base of posterior angles; antennomere IV-VIII 1.1x longer than wide, IX-X 1.2-1.3x longer than wide, XI elliptical 2.1x longer than wide. Pronotum (Fig. 18C) weakly convex 1.12-1.20 wider than long, lateral sides nearly straight to rounded convergent anteriorly from posterior angles or anterior third; anteromedian margin slightly produced anteriorly; posterior angles short, convex, parallel; lateral carina (Fig. 18E) prominent and visible dorsally on posterior 1/3, absent on anterior 1/3-1/2; disc with punctures homogeneously or heterogeneously distributed, 2-3 diameters apart, larger and denser on lateral and anterior borders; prosternal process (Figs. 18D, E) with a subapical tooth. Lamellae of pro- and mesotarsomeres I smaller than the others, minuscule or absent on metatarsomere I. Elytra parallel-sided on anterior 2/3 then tapering to apex, striae with a row of punctures; interstices rugose, flat, sparsely punctate; apical striae with punctures a little larger than those of pronotal lateral border. Abdomen with ventrites 2-4 strongly concave laterally, ventrite 1 impunctate on anterior and median inner 2/3 with setae a little smaller than those of ventrite 2 on lateral and posterior borders; ven-



**FIGURE 18:** *Physodactylus brunneus* sp. nov. **A**, antenna; **B**, head and mandible (dorsal); **C**, **D**, **E**, prothorax (dorsal, ventral, lateral); **F**, mesotibia; **G**, sternite IX; **H**, tergites IX and X; **I**, sternite VIII; **J**, tergite VIII; **K**, **L**, aedeagus (dorsal, ventral).

trites 2-4 with long decumbent and semi-erect setae, sparser on lateral borders. Pregenitalic segments and aedeagus covered with stout light-brown setae. Sternite VIII (Fig. 18I) with posterior margin straight, anterior sclerotization linear 0.55x the total width of sternite; sternite IX (Fig. 18G) tapering to apex.

**Aedeagus** (Figs. 18K, L): Phallobase 0.45x the total length of aedeagus, 1.32x longer than wide, length ratio between lateroposterior and median parts 6.1; paramere with ventral surface weakly sclerotized laterally, anterior margin sclerotized and contiguous medially; penis with basal strut 0.28x its total length, articulated to the parameres by a translucent membrane; ventral sclerite tapering to apex.

**Holotype:** [BRAZIL, Encruzilhada 980 m. Bahia, XI.1974, M. Alvarenga], male (MZUSP).

**Paratypes:** Same label as holotype, 9 exs. (MZUSP), 17 exs. (CNC); [Dpto. Zool., UF-Paraná], [Encruzilhada, Bahia, 960 m – BRAZIL 11/72, Alvarenga & Seabra], 5 exs. (MZUSP), 11 exs. (DZUP); [Coleção M. Alvarenga], [Encruzilhada, 980 m, Bahia, Brasil, XI.1972, M. Alvarenga], 2 exs. (DZUP); [Frei Gaspar

MG, Sítio Recanto Paraíso, I.2008 Luz, M.R. Santos col.], 1 ex. (MZUSP).

**Distribution:** BRAZIL. *Bahia:* Encruzilhada; *Minas Gerais:* Frei Gaspar.

**Remarks:** The unique combination of characters of *P. brunneus* sp. nov. includes antenna reaching the base of pronotum, lateral carina incomplete, elytral striae with a row of punctures, interstices flat and ventrite 1 partly impunctate. It is most similar and sympatric to *P. pujoli*, from which is distinguished in its larger pronotal punctation, color pattern, abdominal pilosity and aedeagus shape.

***Physodactylus chassaini* sp. nov.**  
(Figs. 19A-E, 35C)

**Etymology:** In homage to the entomologist Mr. Jacques Chassain, for his dedication to the Physodactylinae collection of the MNHN.

**Description** (male, Fig. 35C): Integument bright; dark brown to black, pronotum reddish-brown with

irregular black areas along the borders, epipleurae usually lighter than elytra; pilosity brown. Total length 11.0-15.0 mm; elytral base 1.0-1.1x as wide as prothorax, elytra 3.0-3.25x longer than pronotum. Frons concave, frontal carina not produced;

antenna (Fig. 19A) reaching the posterior third of pronotum; antennomere IV 1.14x wider than long, V-X 1.28-1.50x wider than long; XI oval 1.22x longer than wide. Pronotum (Fig. 19B) 1.16-1.31x wider than long, lateral sides nearly straight to rounded

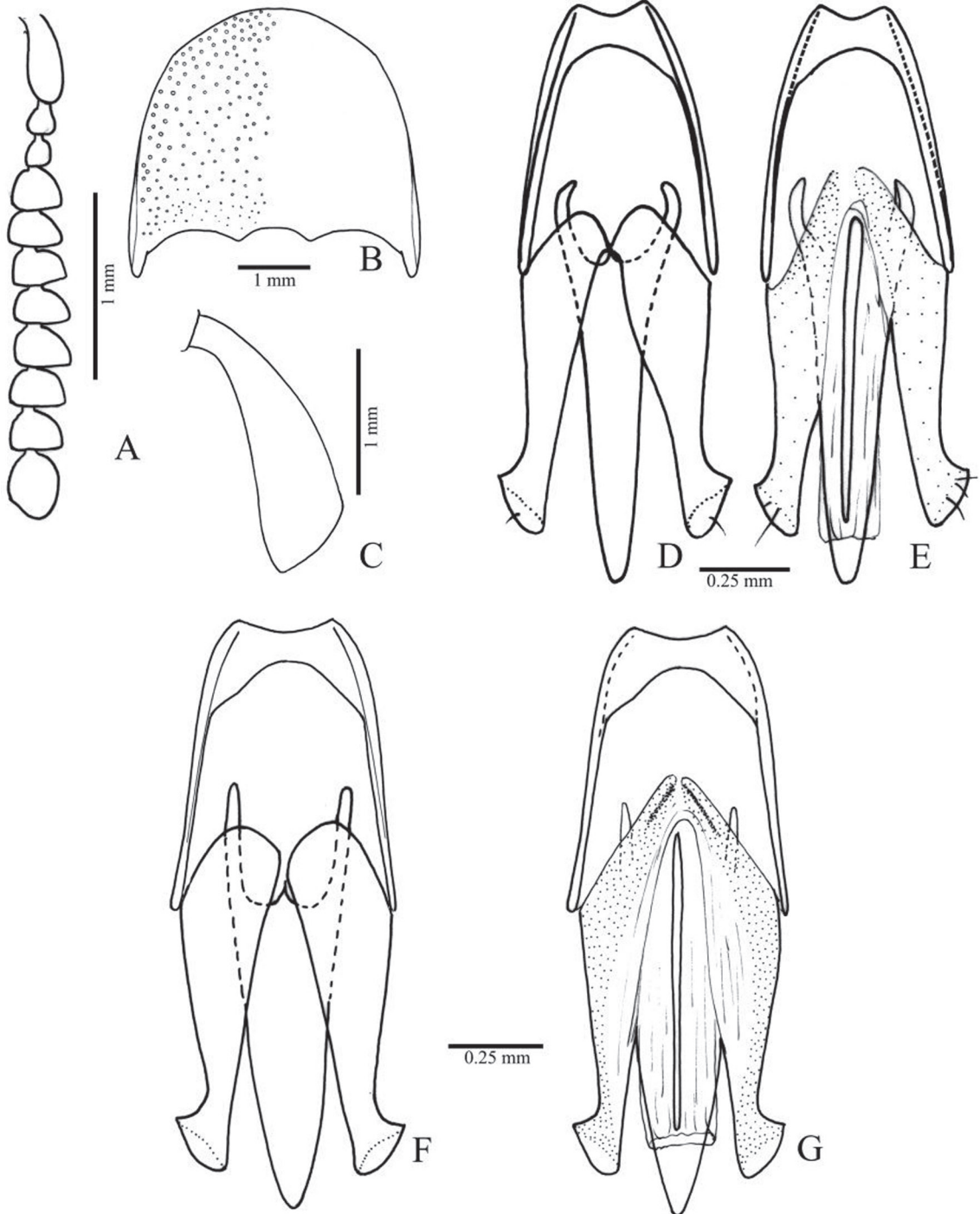


FIGURE 19: *Physodactylus chassaini* sp. nov. A, antenna; B, pronotum; C, mesotibia; D, E, aedeagus (dorsal, ventral). *Physodactylus fischeri*. F, G, aedeagus (dorsal, ventral).



convergent from posterior angles to anterior margin; anteromedian margin weakly produced; posterior angles short, convex, parallel; lateral carina complete prominent nearly or entirely visible dorsally; disc with punctures heterogeneously distributed, 2-8 diameters apart, larger and denser on lateral (2-4 diameters apart) and anterior borders (0.5-1.0 diameters apart); prosternal process with a subapical tooth. Lamellae of pro- and mesotarsomeres I smaller than the others, present on metatarsomere I. Elytra tapering to apex from anterior third; striae with a single row of punctures; interstices convex and weakly rugose, scarcely punctate; apical striae with punctures a little larger than those of pronotal lateral border. Abdomen with ventrites 1-4 strongly concave laterally, ventrite 1 densely punctate with setae about 1/3 as long as those of ventrite 2, lateral border impunctate. Ventrites 2-4 densely punctate with long and semi-erect stout setae, lateral border sparsely punctate with a few fine setae. Pregenitalic segments and aedeagus covered with stout dark-brown setae. Sternite VIII with lateroposterior sclerotizations separate or contiguous medially; posterior margin straight, anterior sclerotization 0.4-0.6x the total width of sternite; sternite IX with apex rounded.

*Aedeagus* (Figs. 19D, E): Phallobase 0.47x the total length of aedeagus, 1.39x longer than wide, length ratio between lateroposterior and median parts 7.4; paramere with ventral surface nearly entirely sclerotized with anteromedian margin distinct, acute and produced anteriorly; penis with basal strut 0.20x its total length, articulated to the parameres by a sclerotized short process; ventral sclerite tapering to apex.

*Holotype*: [BRASIL, MG: Águas Vermelhas, XII.1998, Vaz de Mello & Bello col.], male (MZUSP).

*Paratypes*: Same label as holotype, 33 exs. (MZUSP), 1 ex. (UFMT); [Brasil, Encruzilhada, 980 m. Bahia, XI.1974, M. Alvarenga], 4 exs. (CNC), 2 exs. (MZUSP); [Estr. Rio Bahia, km 965, Motel da Divisa 960 m, Encruzilhada, Bahia, Brasil XII.1980 – B. Silva], 1 ex. (MNRJ); [Coleção M. Alvarenga], [Encruzilhada, 980 m, Bahia, Brasil, XI.1972, M. Alvarenga], 1 ex. (DZUP).

*Distribution*: BRAZIL. *Bahia*: Encruzilhada; *Minas Gerais*: Águas Vermelhas.

*Remarks*: *Physodactylus chassaini* sp. nov. is similar to *P. fischeri*, *P. asper* sp. nov. and *P. foveatostriatatus* in its color pattern, shape of prothorax, brown pilosity and

shape of antenna. It differs from the two first species mainly by its elytral striae with a single row of punctures distinct to apex and interstices smoother with a few sparse punctures. Its abdominal pilosity pattern is most similar to that of *P. asper* sp. nov., but the setae of the later are smaller on ventrite 1 and finer on ventrites 2-4. *Physodactylus chassaini* sp. nov. is also similar to *P. foveatostriatatus* in its elytral striae punctation, but it is distinguished by its smaller punctures of these striae, interstices more convex and by the abdominal pilosity pattern. All these species have aedeagus quite similar, with a few differences mainly on the length of the median part of the phallobase, shapes of the basal struts, ventral sclerite and dorsal articulation.

***Physodactylus costae* Chassain, 2005  
(Fig. 35D)**

*Physodactylus costae* Chassain, 2005: 69.

*Redescription* (male, Fig. 35D): Integument dark brown with pronotum, sutural elytral interstice and borders of elytra lighter and legs brown; pilosity yellow. Total length 12.0 mm; elytral base 1.0-1.1x wider than prothorax, elytra 3.3x longer than pronotum. Frons concave, frontal carina not or slightly produced; antenna reaching the anterior third of pronotum. IEP 0.30. Antennomere IV 1.4x wider than long, V-X 1.7x wider than long, XI 1.1x as long as wide. Maxilla with galea covered with fine and spiniform setae. Pronotum convex 1.3x wider than long, parallel on posterior third then straight convergent to anterior margin; anteromedian margin slightly produced anteriorly; posterior angles short, convex, parallel; lateral carina evenly prominent to anterior margin; dorsally visible only on posterior third; disc with punctures medium size homogeneously distributed 2.0-3.0 diameters apart, smaller and denser on lateral and posterior borders; prosternal process without subapical tooth. Lamellae of pro- and mesotarsomere I very small, absent on metatarsomere I. Elytra parallel-sided on anterior half then tapering to apex; apex conjointly rounded; striae deeply impressed, with three rows of punctures, punctures glabrous on the median row, smaller and bearing a small seta on the lateral row; interstices weakly convex on posterior half, flattened on anterior part, smooth and glabrous; apical striae with punctures smaller than those of pronotal lateral border and as large as those of elytral base. Ventral abdomen evenly convex, ventrites 1-5 evenly pilose with short decumbent setae. Pregenitalic segments

and aedeagus covered with stout yellow setae. Sternite IX tapered to apex.

*Aedeagus*: Phallobase 0.5x total length of aedeagus, 1.5x longer than wide, length ratio between lateroposterior and median parts 5.5; ventral surface of paramere with the lateral half sclerotized; penis with basal strut 0.3x its total length, articulated to the parameres by a strongly sclerotized process; ventral sclerite parallel-sided.

*Holotype*: [Brésil, Mato Grosso, 14°15'50.80"S, 59°13'02.05"W, Chapada dos Parecis, 30 km N d'Uirapuru], [01 au 15-12-2000, A. Foucart leg.]. [Holotype], [*Physodactylus costae*, Holotype, J. Chassain det. 04], male (MNHN).

*Distribution*: BRAZIL. *Mato Grosso*: Campo Novo dos Parecis.

*Remarks*: Sternite VIII was not examined. *Physodactylus costae* (Fig. 35D) and *P. fleutiauxi* (Fig. 35G) are sympatric species from Chapada dos Parecis (Mato Grosso state) and were described by Chassain (2005). They are most similar to *P. sulcatus* in the antennal length: this do not surpass the anterior third of pronotum. The habitus illustrations in Chassain (2005) show *P. fleutiauxi* with lamella of meso- and metatarsomere I as large as the other ones and *P. costae* without any lamella in all legs. Actually, as described by Chassain (2005), the lamellae of the tarsomeres I are very small on the pro- and mesothoracic legs and absent on the metathoracic leg in both species. *Physodactylus costae* is most similar to *Physodactylus fleutiauxi*, from which can be separated by the features cited in the key proposed herein. *Physodactylus costae* has aedeagus similar to that of *P. latithorax*, however the later has penis wider at apex and narrower at base of the basal struts.

***Physodactylus fischeri* Fleutiaux, 1940  
(Figs. 19F-G, 35E)**

*Physodactylus fischeri* Fleutiaux, 1940c: 166; Blackwelder, 1944: 292.

*Redescription* (male, Fig. 35E): Integument bright, head with frons black, gradually lighter posteriorly with the same color of pronotum at base, prothorax reddish-brown, antenna, elytra and ventral abdomen black, ventral pterothorax and legs dark brown; pilosity brown. Total length 17.0 mm; elytral base

1.03x as wide as prothorax, elytra 2.98x longer than pronotum. Frons slightly concave, frontal carina not produced; antenna reaching the half length of pronotum; antennomere IV 1.05x as wide as long, V-VII 1.20x wider than long; VIII-X 1.0-1.1x as wide as long; XI oval 1.28x longer than wide. Pronotum 1.28x wider than long, lateral sides rounded convergent from posterior angles to anterior margin; anteromedian margin weakly produced; posterior angles short, convex, parallel; lateral carina dorsally visible only on posterior third, absent on anterior half; disc with punctures 2-3 diameters apart, larger and denser on lateral and anterior borders. Lamellae of pro- and mesotarsomeres I smaller than the others, absent or minuscule on metatarsomere I. Elytra subparallel on anterior 2/3 then tapering to apex; striae with large and small dense punctation, indistinct on apical region where the punctation is mixed; interstices convex and rugose, scarcely punctate; apical striae with punctures larger than those of pronotal lateral border. Abdomen with ventrites 2-4 concave laterally, 1-4 evenly covered with decumbent, moderately long pilosity, setae of ventrite 1 as long as those of ventrite 2. Pregonitalic segments and aedeagus covered with stout dark-brown setae. Sternite VIII with posteromedian margin emarginate, anterior sclerotization 0.28x the total width of sternite; sternite IX with apex rounded.

*Aedeagus* (Figs. 19F, G): Phallobase 0.52x the total length of aedeagus, 1.27x longer than wide, length ratio between lateroposterior and median parts 11.5; paramere with ventral surface partly sclerotized, anteromedian margin with a long median sclerotized strip convergent anteriorly; penis with basal strut 0.27x its total length, articulated to the parameres by a translucent membrane; ventral sclerite linear.

*Holotype*: [Bahia, Brasil], [TYPE], [*Physodactylus fischeri* Fleut., COLLECTION FLEUTIAUX type], [Muséum Paris, Collection E. Fleutiaux], [LECTO-TYPE], [*Physodactylus fischeri* Fleut., J. Chassain det. 05], male (MNHN).

*Distribution*: BRAZIL. *Bahia*.

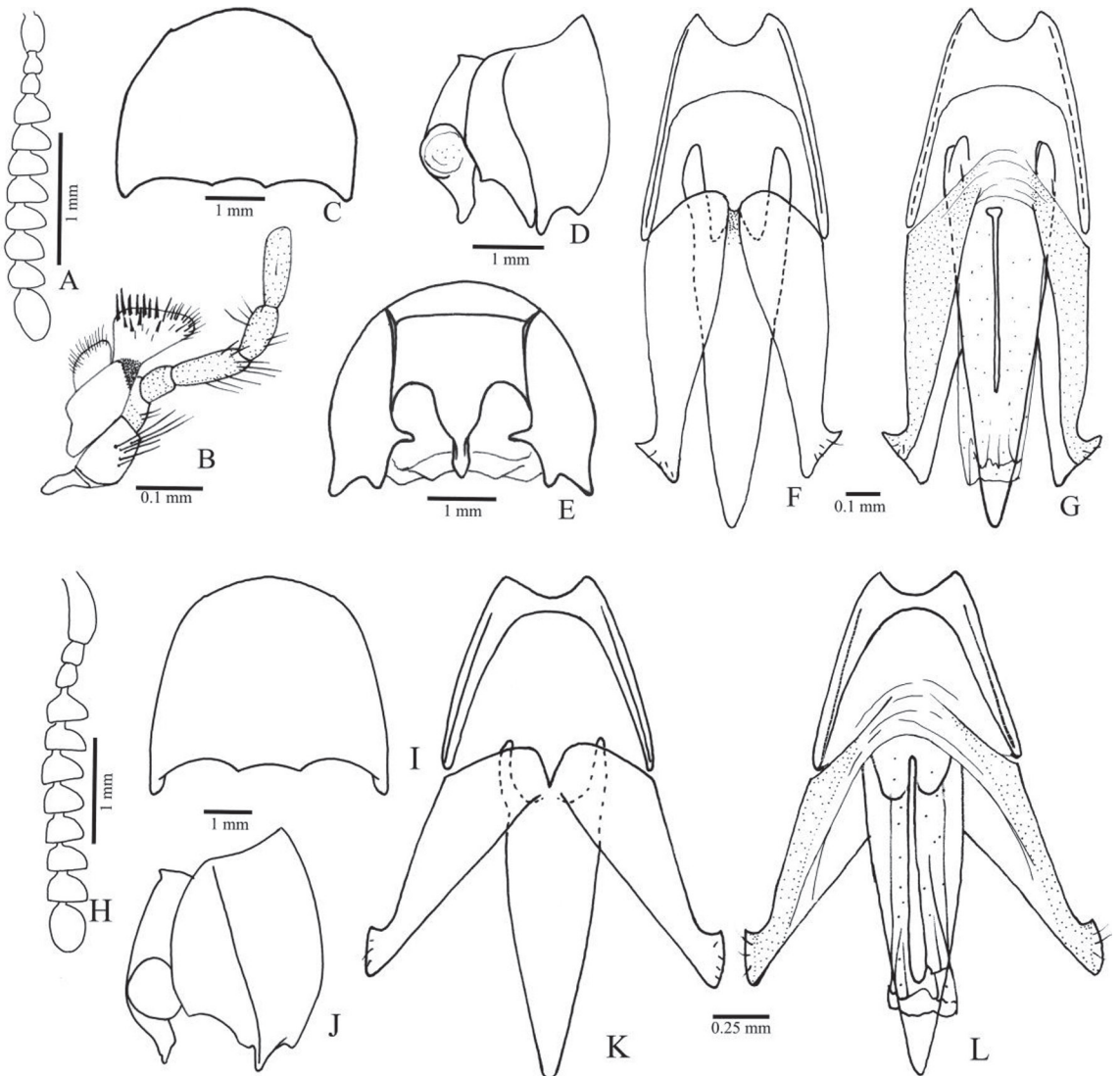
*Remarks*: The apex of the prosternal process was not examined. *Physodactylus fischeri* is recognized by the following combination of characters: antennae reaching the posterior half of pronotum, lateral pronotal carina absent on anterior half, elytral striae densely punctate and indistinct on apical region and pilosity of the ventrites 1-4 subequal.

***Physodactylus flavifrons* sp. nov.**  
(Figs. 20A-G, 35F)

*Etymology:* From Latin, *flavis* = yellow; alluding to the orange head of this species.

*Description* (male, Fig. 35F): Integument bright; head entirely orange except for the black tips of mandible; antennomeres I-III, prothorax, ventral pterothorax and scutellum orange; leg orange with tibia dark brown; antennomeres IV-XI and ventral abdomen dark brown to black, elytra black with an orange spot a little narrower than elytra on anterior 1/5-1/3; pilosity yellow. Total length 10.0-12.5 mm; elytral base 0.9-1.0 as wide as prothorax, elytra 3.2-3.3x longer

than pronotum. Frons flattened, frontal carina not produced; antenna (Fig. 20A) reaching the posterior third of pronotum; antennomere IV 1.22x wider than long, V-VI 1.56 and 1.62x wider than long, VII-VIII 1.44x wider than long, IX-X 1.30-1.33x wider than long, XI oval 1.54x longer than wide. Maxilla (Fig. 20B) with galea covered with a few fine and spiniform setae. Pronotum (Fig. 20C) convex 1.40-1.46x wider than long with posterior 1/3-1/2 parallel, anterior part straight convergent to anterior margin; anteromedian margin produced anteriorly; posterior angles short, convex, parallel; lateral carina complete strongly prominent on posterior 2/3, sinuous in lateral view (Fig. 20D), nearly entirely visible dorsally; disc with punctures heterogeneously or



**FIGURE 20:** *Physodactylus flavifrons* sp. nov. A, antenna; B, maxilla; C, D, E, prothorax (dorsal, lateral, ventral); F, G, aedeagus (dorsal, ventral). *Physodactylus foveatostriatus*. H, antenna; I, J, prothorax (dorsal, lateral); K, L, aedeagus (dorsal, ventral).

homogeneously distributed 0.5-1.0 diameters apart, smaller and denser on anterior margin, denser on lateral border; prosternal process (Fig. 20D) without subapical tooth. Lamellae of pro- and mesotarsomeres I as large as those of tarsomeres II-III, small on metatarsomere I. Elytra parallel-sided on anterior 2/3 then tapering to apex; striae deeply impressed, with three rows of punctures, punctures glabrous on the median row, smaller and bearing a small seta on the lateral row; interstices convex, smooth and glabrous; apical striae with punctures smaller than those of pronotal lateral border and as large as those of elytral base. Abdomen with ventrites 2-4 concave, ventrite 1 evenly pilose with setae 1/3 as long as those of ventrite 2, ventrites 2-5 covered with very long semi-erect setae. Pregenitalic segments and aedeagus covered with stout yellow setae. Sternite VIII with posterior margin nearly straight, anterior sclerotization 0.55x the total width of sternite; sternite IX tapered to apex.

*Aedeagus* (Figs. 20F, G): Phallobase 0.44x the total length of aedeagus, 1.2x longer than wide, length ratio between lateroposterior and median parts 4.8; paramere with ventral surface nearly entirely sclerotized; penis with basal strut 0.24x its total length, articulated to the parameres by a strongly sclerotized process; ventral sclerite linear.

*Holotype*: [Fazenda Taperinha, prox. Santarém, PA, 01-11.II.1968, Exp. Perm. Amaz.] male, (MZUSP).

*Paratypes*: Same label as holotype, 2 exs. (MZUSP).

*Distribution*: BRAZIL. *Pará*: Santarém.

*Remarks*: *Physodactylus flavifrons* sp. nov. is diagnosable by the unique combination of characters: pilosity yellow, antenna reaching the anterior third of pronotum, prothorax 1.40-1.46x wider than long, lamellae of pro- and mesotarsomeres I as large as the other ones, elytra with striae deeply impressed and as wide as the interstices, abdominal ventrites 2-4 concave with very long setae. This species is most similar to *P. sulcatus*, *P. patens* sp. nov. and *P. latithorax* sp. nov. in shape of prothorax, antenna and elytral striae; however it can be promptly distinguished by its longer abdominal pilosity and ventrites 2-4 concave.

***Physodactylus fleutiauxi* Chassain, 2005  
(Fig. 35G)**

*Physodactylus fleutiauxi* Chassain, 2005: 68.

*Redescription* (male, Fig. 35G): Integument bright, evenly black; pilosity yellow. Total length 13.5-15.5 mm; elytral base 1.0-1.1x wider than prothorax, elytra 2.7-2.8x longer than pronotum. Frons concave to convex, frontal carina not or slightly produced; IEP 0.21-0.25; antenna reaching the anterior third of pronotum; antennomere IV 1.2x wider than long, V-X 1.8x wider than long, XI oval 1.2x longer than wide. Maxilla with galea covered with fine and spiniform setae. Pronotum convex 1.3x wider than long, parallel on posterior third then straight or roundly convergent to anterior margin; anteromedian margin slightly produced anteriorly; posterior angles short, convex, parallel; lateral carina evenly prominent to anterior margin; dorsally visible only on posterior third; disc with punctures medium size homogeneously distributed 0.5-1.0 diameters apart, smaller and denser on anterior margin, denser on lateral border; prosternal process without subapical tooth. Lamellae of pro- and mesotarsomeres I very small, absent on metatarsomere I. Elytra parallel-sided on anterior 2/3 then tapering to apex; apex usually with a very small sutural spine; striae deeply impressed, with three rows of punctures, punctures glabrous on the median row, smaller and bearing a small seta on the lateral row; interstices convex, smooth and glabrous; apical striae with punctures smaller than those of pronotal lateral border and as large as those of elytral base. Abdomen with ventrites 1-4 strongly and evenly convex, ventrite 1 evenly pilose with short decumbent setae, 2-4 with long semi-erect setae. Pregenitalic segments and aedeagus covered with stout yellow setae. Sternite VIII subrectangular, posterior margin straight, anterior sclerotization 0.5x the total width of sternite; sternite IX tapered to apex.

*Aedeagus*: Phallobase 0.5x the total length of aedeagus, 1.6x longer than wide, length ratio between lateroposterior and median parts 4.5-6.1; ventral surface of paramere with the lateral half and anterior margin sclerotized; penis with basal strut 0.2-0.3x its total length, articulated to the parameres by a strongly sclerotized process; ventral sclerite parallel-sided.

*Holotype*: [Brésil, (Mato Grosso), 14°15'50.80"S, 59°14'02.05"W, Chapada dos Parecis, 30 km N d'Uirapuru], [01/15-12-2000, A. Foucart]. [Holotype], [*Physodactylus fleutiauxi*, Holotype, J. Chassain det. 04], male (MNHN).

*Paratype*: [Brésil, Mato grosso, 14°15'50.80"S, 59°14'02.05"W, Chapada dos Parecis], [30 km N d'Uirapuru, Usine alcomat, 01 au 15-XII-2002, A.



Foucart leg], [Paratype], [*Physodactylus fleutiauxi* sp. nov. J. Chassain det 04], 1 ex. (MZUSP).

*Distribution:* BRAZIL. *Mato Grosso:* Chapada dos Parecis.

*Remarks:* *Physodactylus fleutiauxi* has aedeagus similar to that of *P. sulcatus*, differing only in its slender phallobase. *Physodactylus fleutiauxi* differs also from that species in its body evenly black, pronotum weakly convex with lateral carina complete and pronotal punctation distinctly different from the finer and sparser hypomeral punctation.

***Physodactylus foveostriatus* Fleutiaux, 1892  
(Figs. 20H-L, 35H)**

*Physodactylus foveostriatus* Fleutiaux, 1892: 406; Schwarz, 1906: 311; Fleutiaux, 1940c: 164, 166; Blackwelder, 1944: 292.

*Redescription* (male, Fig. 35H): Integument bright; dark brown to black with prothorax orange to reddish-brown; legs colored as elytra or with femur reddish-brown; pilosity brown. Total length 11.5-16.0 mm; elytral base 1.0-1.03x as wide as prothorax, elytra 2.7-3.0x longer than pronotum. Frons concave, disc of anterior part of head strongly convex, frontal carina weakly impressed; antenna (Figs. 20H, 23A) reaching the posterior third of pronotum; antennomere IV 1.22x wider than long, V 1.47x wider than long, VI-X 1.25-1.37x wider than long; XI oval 1.3x longer than wide. Pronotum (Fig. 20I) 1.23-1.34x wider than long, lateral sides nearly straight to rounded convergent from posterior angles to anterior margin; anteromedian margin weakly produced; posterior angles elongate, convex, parallel; lateral carina complete weakly impressed, dorsally visible only on posterior half; disc with punctures 2-3 diameters apart, a little larger and denser on lateral and anterior borders; prosternal process (Fig. 20J) with a subapical tooth. Lamellae of pro- and mesotarsomeres I a little smaller than the others, present on metatarsomere I. Elytra parallel-sided on anterior 2/3 then tapering to apex, apex usually dehiscent; striae with a single row of punctures; interstices flattened, scarcely punctate, weakly rugose; apical striae with punctures about 2 times larger than those of pronotal lateral border. Abdomen with ventrites 2-3 slightly concave laterally, ventrite 1 punctate, covered with fine setae about 1/5 as long as those of ventrite 2, setae longer and

sparser on marginal plates; ventrites 2-4 with setae moderately long, decumbent, sparser on marginal plates. Pregenitalic segments and aedeagus covered with stout dark-brown setae. Sternite VIII with lateroposterior sclerotizations separate or approximated medially; posterior margin straight, anterior sclerotization 0.3-0.4x the total width of sternite; sternite IX with apex rounded.

*Aedeagus* (Figs. 20K, L): Phallobase 0.4x the total length of aedeagus, 0.9-1.0 as long as wide, length ratio between lateroposterior and median parts 11.8-15.0; paramere with ventral surface weakly sclerotized, anteromedian margin with a linear sclerotization directed anteriorly; penis with basal strut 0.2x times its total length, articulated to the parameres by a sclerotized short process or by a translucent membrane; ventral sclerite elongate, widened apicad.

*Holotype:* [*Physodactylus foveostriatus* Chv, Brasilia ex. mus. Castelnau, Collection Chevrolat], [Type], [Collection Chevrolat], [*Physodactylus foveostriatus* ♂, (Chv.) Fleuti. Type, Brèsil], [*P. foveostriatus* Fleut. Ann. Soc. Ent. Fr. 1892 p. 406, Collection FLEUTIAUX], [TYPE], [Lectotype], [*Physodactylus foveostriatus* Fleutiaux, J. Chassain det. 05].

*Paratypes:* [nov. spec.], [Chevrolat], [Collection Chevrolat], [*P. foveostriatus* Fleut. Ann. Soc. Ent. Fr. 1892 p. 406, Collection FLEUTIAUX], [Paralectotype], [*Physodactylus foveostriatus* Fleutiaux, J. Chassain det. 05], 1 ex. (MNHN); idem plus [Bahia], [Coll. Fl. 335], [Muséum Paris, Collection E. Fleutiaux], 1 ex. (MNHN); [Bahia], [Collection Chevrolat], [ex mus. Castelnau], [Chevrolat], [Henningi ?], [*P. foveostriatus* Fleut. Ann. Soc. Ent. Fr. 1892 p. 406, Collection FLEUTIAUX], [Paralectotype], [*Physodactylus foveostriatus* Fleutiaux, J. Chassain det. 05], 1 ex. (MNHN).

*Material examined:* BRAZIL, 2 exs. (MNHN); *Bahia:* 2 exs. (MNHN).

*Distribution:* BRAZIL. *Bahia.*

*Remarks:* *Physodactylus foveostriatus* is distinguished by its large punctures of the elytral striae, a unique character among *Physodactylus* species. This autapomorphy combined with the shape of elytra, more tapered and dehiscent at apex, the abdominal pilosity pattern and the shorter phallobase easily separate this species from the morphologically closest species, which are *P. fischeri*, *P. asper* and *P. chassaini*.

*Physodactylus girardi* sp. nov.  
(Figs. 21A-I, 35I)

*Etymology*: In homage to the Dr. Claude Girard, for his contribution to the knowledge of Elateridae.

*Description* (male, Fig. 35I): Integument bright; light brown to brown, head darker, ventral abdomen black with lateral borders light brown; pilosity brown. Total length 8-11 mm; elytral base 1.03-1.08x as wide as prothorax, elytra 2.81-2.91x longer than pronotum. Frons flat to slightly concave, frontal carina not produced anteriorly. Antenna (Fig. 21A) reaching the base

of posterior angles; antennomere IV 1.05x as wide as long, V 1.14x wider than long, VI-IX 1.1-1.3x wider than long, XI oval 1.66 times longer than wide. Pronotum (Figs. 21B, C) convex 1.07-1.12x wider than long with lateral sides gradually convergent anteriorly from posterior angle; anteromedian margin weakly produced; posterior angles short, convex, parallel and carinate; lateral carina complete, nearly entirely visible dorsally; disc with punctures 2-3 diameters apart, larger and denser on lateral and anterior borders. Protibia (Fig. 21D) with dorsal apical angle obtuse and not produced, lamellae of pro- and mesotarsomeres I minuscule, absent on metatarsomere I. Elytra

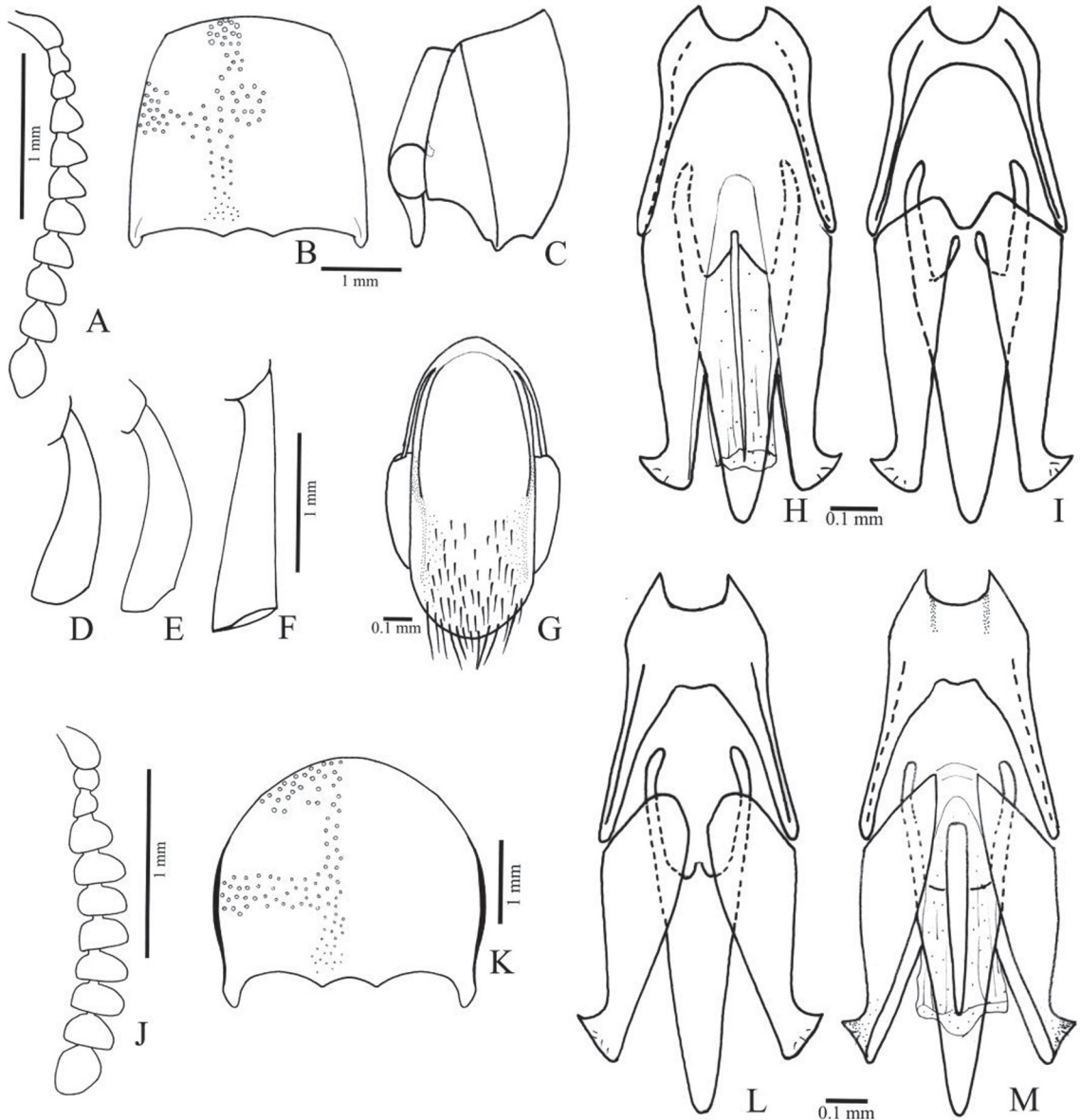


FIGURE 21: *Physodactylus girardi* sp. nov. A, antenna; B, C, prothorax (dorsal, lateral); D, E, F, pro, meso- and metatibia; G, sternite IX; H, I, aedeagus (ventral, dorsal). *Physodactylus gounellei* sp. nov. J, antenna; K, pronotum; L, M, aedeagus (dorsal, ventral).

parallel-sided on anterior 2/3 then tapering to apex, striae with irregular rows of punctures; interstices flat, scarcely punctate, rugose; apical striae with punctures as large as those of pronotal lateral border. Abdomen with ventrites 2-3 slightly concave laterally, ventrite 1 with setae a little smaller than those of ventrite 2, black area of ventrites 2-4 covered with moderately long setae and dense punctation, lateral brown area with punctures smaller and setae sparse. Pregonitalic segments and aedeagus covered with stout brown setae. Sternite VIII with posterior margin straight, anterior sclerotization 0.58x the total width of sternite; sternite IX (Fig. 21G) with apex rounded.

*Aedeagus* (Figs. 21H, I): Phallobase 0.44x the total length of aedeagus, 1.14x longer than wide, length ratio between lateroposterior and median parts 9.5; paramere with ventral surface entirely membranous and translucent; penis with basal strut 0.31x its total length, articulated to parameres by a sclerotized process; ventral sclerite elongate, tapering apicad.

*Holotype*: [BRAZIL: Pirapora, M. Gervais (*sic*), XI.1975, M. Alvarenga], male (MZUSP).

*Paratypes*: Same label as holotype, 1 ex. (MZUSP), 3 exs. (CNC).

*Distribution*: BRAZIL. *Minas Gerais*: Pirapora.

*Remarks*: *P. girardi* can be recognized by the combination of the following characters: antenna reaching the base of the pronotal posterior angles, lateral carina complete and nearly entirely visible dorsally, pronotal posterior angles short and carinate, apical dorsal angle of protibia not produced, lamella of tarsomere I very small on the pro- and mesothoracic legs and absent on the metathoracic leg.

***Physodactylus gounellei* sp. nov.**  
(Figs. 21J-M, 35J)

*Etymology*: In honor to the French entomologist Pierre Émile Gounelle, who collected the holotype.

*Description* (male, Fig. 35J): Integument very bright; antennae, legs, pronotum and elytra light brown to brown; head and ventral surface of thorax dark brown; abdomen with ventrites 1-3 black with lateral borders light brown, ventrite 4 brown with lateral border lighter, V evenly light brown or brown with borders lighter; pilosity light to dark brown. Total

length 10.0-11.0 mm; elytral base 0.96x as wide as prothorax, elytra 2.90-3.04x longer than pronotum. Frons concave along the anterior border, with a pair of transverse protuberances between antennal insertions; frontal carina strongly produced; antenna (Fig. 21J) reaching the half length of pronotum; antennomere IV 1.28x wider than long, V-IX 1.67x wider than long; X 1.58x wider than long; XI oval, 1.25x longer than wide. Pronotum (Fig. 21K) 1.20-1.24x wider than long, lateral sides rounded from posterior angles to anterior margin, strongly narrowed on anterior angles, anteromedian margin produced anteriorly over head; posterior angles elongate, convex, parallel; lateral carina complete strongly prominent on posterior 2/3, not visible dorsally on anterior third; disc and lateral margin with punctures 1-2 diameters apart, larger on lateral and anterior borders, homogeneously distributed; prosternal process without subapical tooth. Lamellae of pro- and mesotarsomeres I smaller than the others, present on metatarsomere I. Elytra subparallel on anterior 2/3 then tapering to apex; apical striae with a row of punctures as large as those of pronotal lateral border, interstices convex, smooth, scarcely punctate. Abdomen with ventrites 2-3 concave laterally, pilosity of the approximately inner 3/4 (0.76-0.80) of the ventrites 1-3 separated from those of the marginal plates by a shiny impunctate longitudinal band; ventrite 1 with short setae on inner 3/4 and a little longer and denser setae on marginal plate; ventrites 2-3 with setae a little longer, semi-erect and denser than those of the inner part of ventrite 1, sparser and decumbent on marginal plate; ventrite 4 with setae sparser and longer than those of inner part of ventrite 3, denser on lateral border; ventrite 5 with setae denser and stouter than those of ventrite 4. Pregonitalic segments and aedeagus covered with brown setae. Sternite VIII subrectangular, nearly straight posteriorly, anterior sclerotization 0.69x the total width of sternite; sternite IX tapering to apex.

*Aedeagus* (Fig. 21L, M): Phallobase 0.49x the total length of aedeagus, 1.33x longer than wide, length ratio between lateroposterior and median parts 3.37; paramere with ventral surface sclerotized, with anteromedian margin distinct; penis with basal strut 0.31x its total length, articulated to the parameres by a translucent membrane; ventral sclerite tapering to apex.

*Holotype*: [Bello Horizonte, Minas], [Museum Paris, Brèsil, E. Gounelle. 1911], [Comparé au type par J. Chassain = conforme], [*Physodactylus carreti* Fleut., v. testaceipennis Flx. J. Chassain det. 05], male (MNHN).

*Paratypes*: [Muséum Paris, Coll. Gounelle, 1915], [Muséum Paris, Coll. E. Fleutiaux], [Comparé au type par J Chassain, conforme], [Physodactylus carreti Fleut., J. Chassain det 05], 1 ex. (MNHN); [Muséum Paris, Coll. Gounelle, 1915], [Physodactylus carreti Fleut., v. testaceipennis Flx., J. Chassain det 05], 1 ex. (MNHN).

*Distribution*: BRAZIL. *Minas Gerais*: Belo Horizonte.

*Remarks*: *Physodactylus gounellei* sp. nov. is similar to *P. tuberculatus* sp. nov. by its pronotal punctation and having the pilosity of the abdominal ventrites 1-3 divided laterally by a longitudinal smooth band, but differs from this species in its brown pilosity, lateral carina less prominent, anteromedian margin of pronotum less produced over head, absence of tubercle

on pronotum, elytral striae with smaller punctures, the longer setae of the abdominal ventrite 1, the position of the smooth longitudinal band on the abdomen and by the stouter and denser setae on the ventrite 5.

***Physodactylus henningi* Fischer von Waldheim, 1823  
(Figs. 22-24, 28, 33F-M)**

*Physodactylus henningi* Fischer von Waldheim, 1823: 303, 1824: 450; Guérin-Méneville, 1829: 43; Lacordaire, 1857: 237; Schwarz, 1906: 311; Fleutiaux, 1892: 406; Fleutiaux, 1940c: 165; Blackwelder, 1944: 292.

*Physodactylus henningi* var. *erythrocephalus* Fleutiaux, 1892: 406.

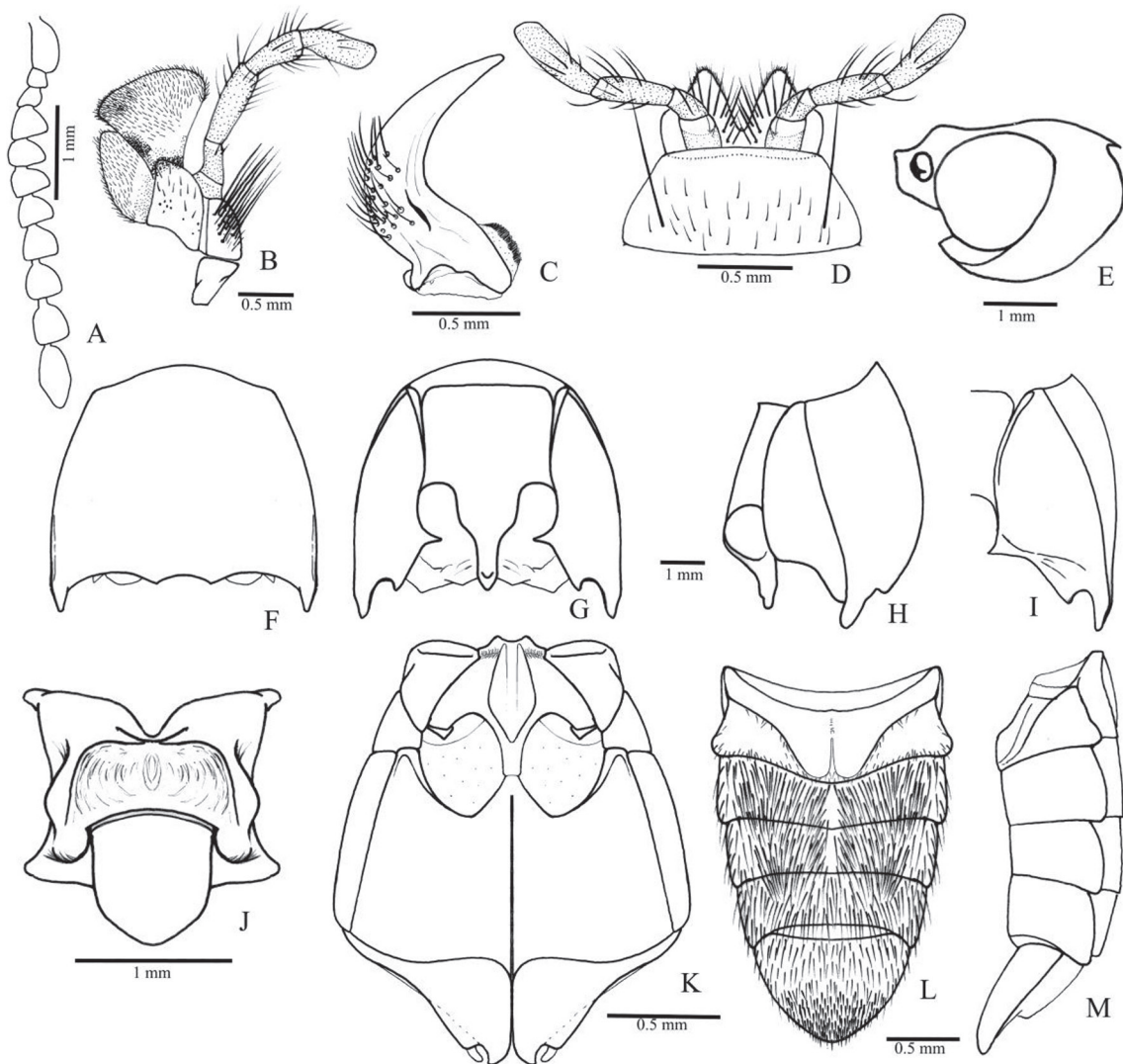


FIGURE 22: *Physodactylus henningi*. A, antenna; B, maxilla; C, mandible (dorsal); D, labium; E, head (lateral); F, G, H, prothorax (dorsal, ventral, lateral); I, hypomeron; J, mesoscutum and scutellar shield; K, pterothorax (ventral); L, M, abdomen (ventral, lateral).



*Physodactylus henningi* var. *nigricollis* Fleutiaux, 1940c: 165.

*Physodactylus henningi* var. *puncticollis* Fleutiaux, 1940c: 165.

*Drepanius clavipes* Perty 1830: 25; Fleutiaux, 1892: 406 (syn.).

**Redescription** (male, Fig. 35K): Integument bright with brown pilosity and variable color patterns: 1) head and epipleura reddish-brown, pronotum evenly reddish-brown or with lateral carina, posterior angles and posterior margin black; antenna, ventral surface of prothorax and elytra black, pterothorax and legs dark reddish-brown, ventral abdomen black and dark reddish-brown; 2) head, antennae and elytra dark brown, prothorax reddish-brown, ventral pterothorax and abdomen dark reddish-brown; 3) head dark reddish-brown, pronotum, hypomeron, epipleura and middle of scutellum orange to reddish-brown; elytra, borders of scutellum, legs, antennae, prosternum, ventral pterothorax and abdomen dark brown; 4) evenly brown to dark reddish-brown with epipleura lighter; 5) evenly black; 6) dark brown with elytra lighter. Total length 14.0-20.0 mm; elytral base 1.0-1.08x as wide as prothorax, elytra 3.03-3.16x times longer than pronotum. Frons (Fig. 22E) flattened with a pair of oblique protuberances over antennal insertions, convergent posteriorly; frontal carina not produced; antenna (Fig. 22A) reaching the posterior third of pronotum; antennomere IV 0.89-1.22x as wide as long, V-VIII 1.0-1.2x as wide

as long; IX 0.89-1.07x as wide as long; X 1.14-1.43x longer than wide; XI elliptical, 1.85-2.10x longer than wide. Pronotum (Figs. 22F, 26H) 1.19-1.25x wider than long, lateral sides slightly rounded or straight convergent from posterior angles to anterior margin; anteromedian margin weakly produced; posterior angles elongate, convex, parallel; lateral carina complete, dorsally visible only on posterior third; disc with punctures 2-4 diameters apart to medium 1-2 diameters apart, larger on lateral and anterior borders, homogenously distributed; prosternal process (Fig. 22H) with a subapical tooth. Lamellae of pro- and mesotarsomeres I a little smaller than the others, present on metatarsomere I; pro- and mesotarsal lamellae as wide as or wider than the subsequent tarsomeres including its setae, largely visible on dorsal view. Elytra subparallel on anterior 2/3 then tapering to apex or tapering to apex from anterior third; apical striae with a row of punctures as large as those of pronotal lateral border, interstices weakly convex, rugose, sparsely punctate. Abdomen (Figs. 22L, M) with ventrites 2-5 strongly concave laterally, ventrite 1 nearly entirely impunctate, except on borders which are usually scarcely pilose, rarely pilose; ventrites 2-5 densely covered with moderately long, stout and semi-erect setae. Pregenitalic segments and aedeagus covered with stout dark-brown setae. Sternite VIII (Fig. 23A) with posterior margin nearly straight, anterior sclerotization 0.33-0.38x the total width of sternite; sternite IX (Fig. 23C) tapering to apex.

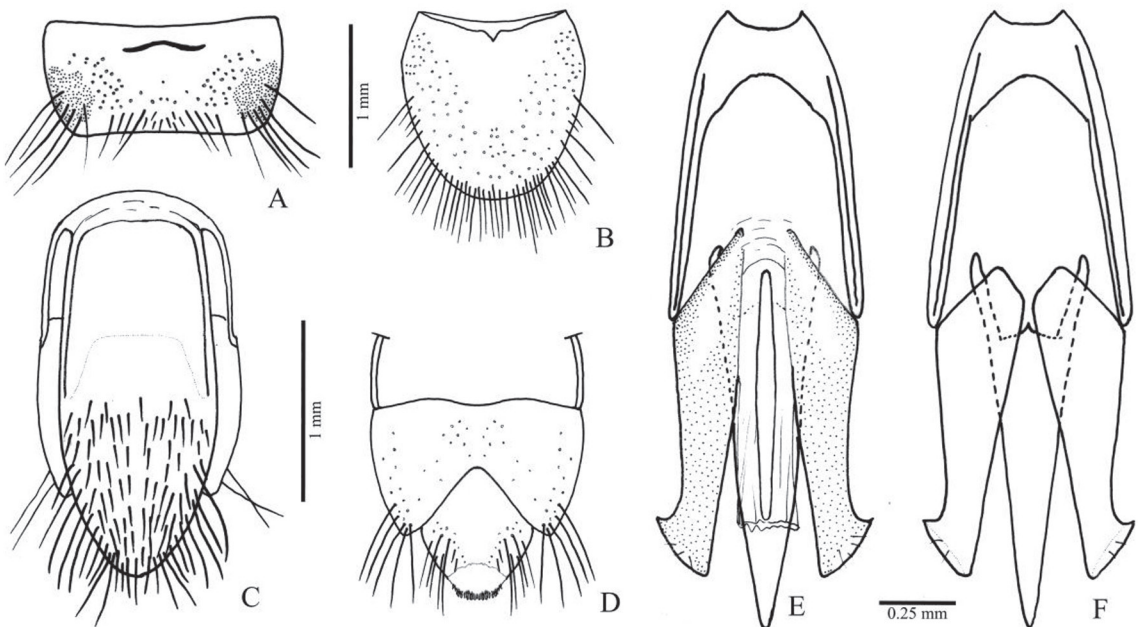


FIGURE 23: *Physodactylus henningi*. A, sternite VIII; B, tergite VIII; C, sternite IX; D, tergites IX and X; E, F, aedeagus (ventral, dorsal).

*Aedeagus* (Figs. 23E, F): Phallobase 0.44-0.51x the total length of aedeagus, 1.17-1.51x longer than wide, length ratio between lateroposterior and median parts

4.10-10.0; paramere with ventral surface nearly entirely sclerotized with anteromedian margin distinct or partly membranous and translucent; penis with

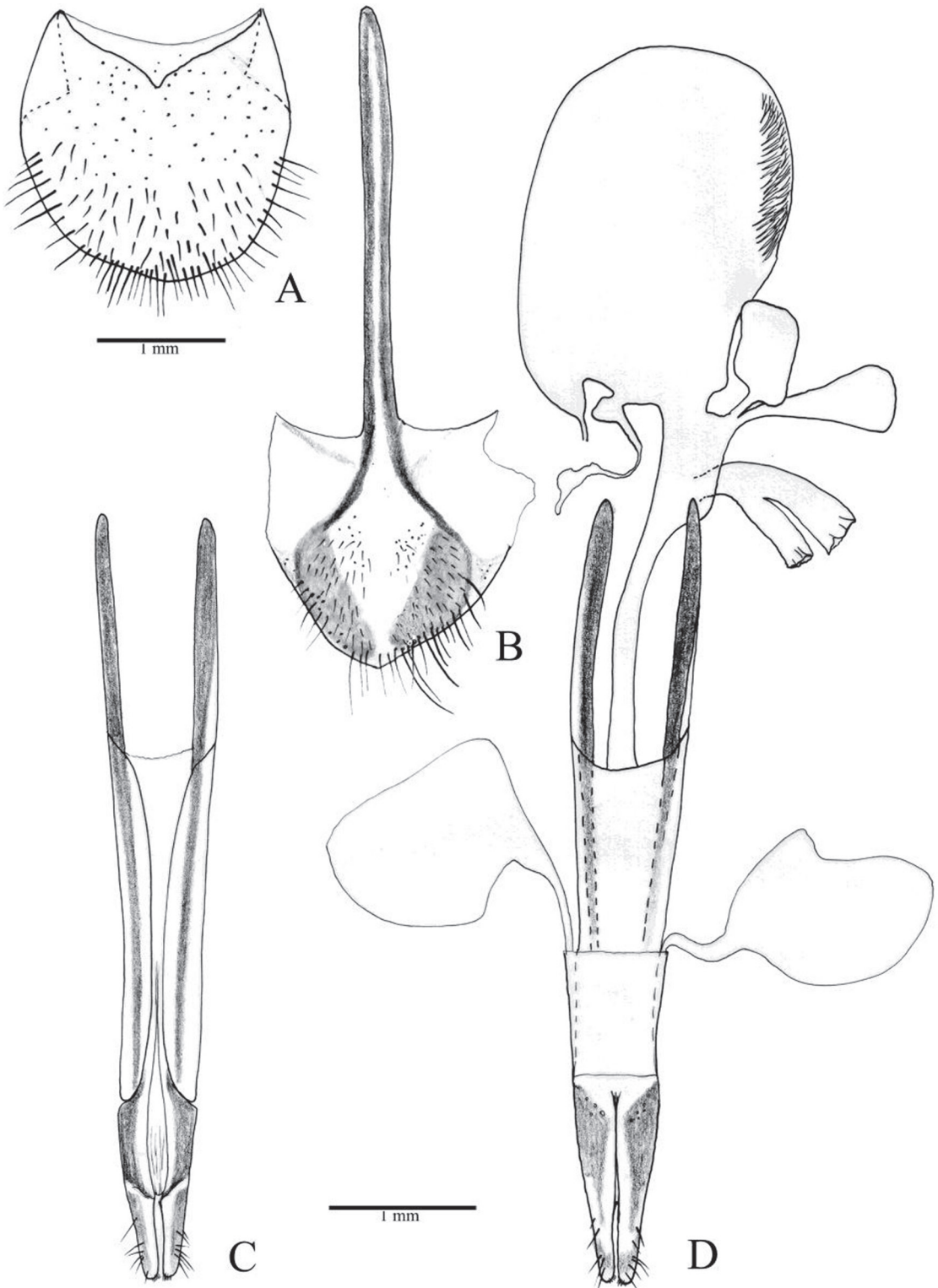


FIGURE 24: *Physodactylus henningi*. A, tergite VIII; B, sternite VIII; C, ovipositor (ventral); D, ovipositor and reproductive tract (dorsal).

basal strut 0.23-0.32x its total length, articulated to the parameres by a translucent membrane; ventral sclerite elliptical.

*Female:* Total length 21 mm; elytral base as wide as prothorax, elytra 2.82x longer than pronotum. Dorsal and ventral surface strongly convex; pronotal punctation smaller and sparser, elytral punctation larger, abdominal pilosity shorter and finer than those of the male; frons concave along the anterior border, with a pair of oblique protuberances over antennal insertions convergent posteriorly; frontal carina not produced; antenna nearly reaching the half length of pronotum; antennomere IV-X 1.1-1.5 wider than long; XI oval, 1.08x longer than wide. Elytra with sides slightly divergent to posterior third then tapering to apex; interstices strongly convex. Hind wings 0.81x as long as elytra. Lamella of tarsomeres absent. Pregenital segments and ovipositor with stout brown setae. Sternite VIII (Fig. 24B) with spiculum 0.7x as long as its total length, apical part with lateroanterior angles rounded, partly sclerotized with long and short setae lateroposteriorly, tergite VIII (Fig. 24A) semioval, evenly sclerotized with short seta lateroposteriorly, anterior sclerotized margin emarginate. Ovipositor (Figs. 24C, D) with coxites partly sclerotized with short setae lateroapically, without styli, baculi 3.3x longer than coxites. Reproductive tract (Fig. 24D): bursa copulatrix oval with a row of spines laterally, with a slender diverticulum entering the posterior part of bursa copulatrix; a pair of sac-shaped structures posterior of bursa copulatrix (possibly colleterial glands), lubricating glands sac-shaped near lateroposterior part of baculi.

*Material examined:* BRAZIL, 8 exs. (MNHN); *Bahia:* 3 exs. (MNHN), 1 ex. (MZUSP); *Espírito Santo:* 7 exs. (DZUP), 10 exs. (MNRJ); 24 exs. (1 female) (MZUSP).

*Distribution:* BRAZIL. *Bahia;* *Espírito Santo:* Conceição da Barra, Barra do São Francisco, Linhares, Aracruz.

*Remarks:* The holotype of *Physodactylus henningi* was supposed to be in the Zoological Museum of the Moscow State University (ZMMU), but it was neither found there nor in the German Collections of the Deutsches Entomologisches Institut (DEI, Dresden) and Zoologisches Staatssammlung (ZSM, Munich). There is no evidence that Fleutiaux compared the holotype with the specimens he identified as *P. henningi*, on which he based its revisions (1892,

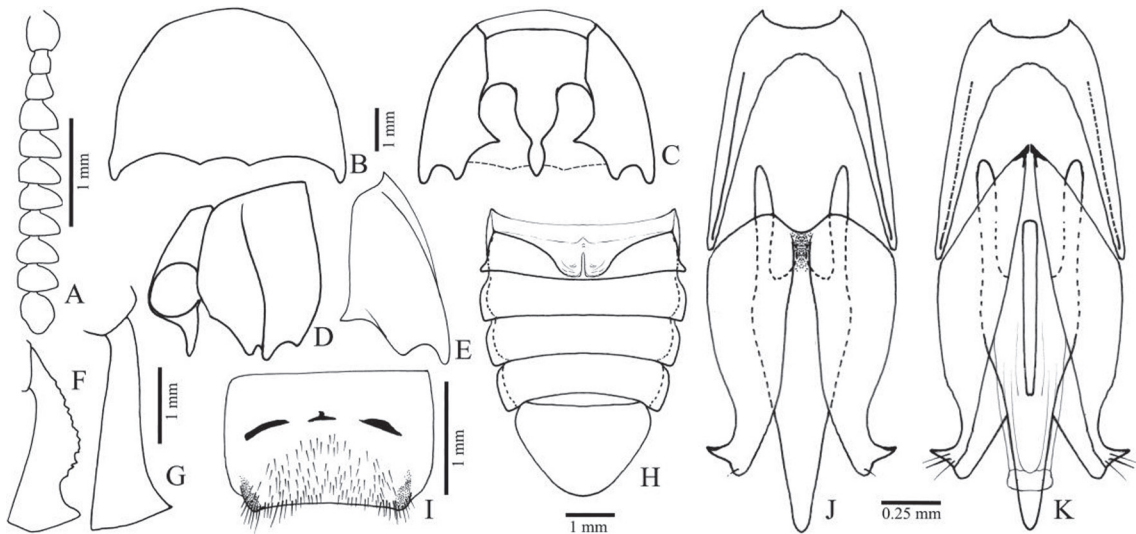
1940c). The confirmation of the identity of these specimens and remaining material examined herein was based on the description and illustrations provided by Fischer von Waldheim (1824). The combination of size (18 mm) to the general appearance, shape of antenna and tarsal lamellae of the specimen illustrated in this work is unique among the *Physodactylus* species examined. The lamella of the protarsomere I of the specimens examined is usually a little narrower than those of the tarsomeres II and III, only a few specimens have it nearly as wide as the other ones as illustrated by Fischer von Waldheim (1824).

I have examined only photos of the dorsal habitus of *Drepanius clavipes* type, whose antenna illustrated by Perty (1830) is different from that of *P. henningi*. However, the dorsal view of the specimen deposited at ZSM (Munich) were insufficient to confirm its identity. For this reason I maintain *D. clavipes* as synonym of *P. henningi*, although this synonymy should be confirmed.

*Physodactylus henningi* specimens from Linhares present the color pattern 1, while those from Bahia present the color patterns 1 and 2; specimens identified by Fleutiaux (*in litt.*) as *P. henningi* v. *erythrocephalus* without detailed locality have the pattern color 3. The specimens from Aracruz and Conceição da Barra are entirely black (color pattern 5). The specimens described by Fleutiaux (1940; *in litt.*) as *P. henningi* v. *puncticollis* (Bahia) and *P. henningi* v. *nigricollis* ("Brésil") are nearly entirely black, except for the pronotum partly dark brown. The specimens from Barra do São Francisco ("Córrego Ita") present the color patterns 4-6. There are also small variations in size and density of punctation and in the shape of phallobase, nevertheless those differences were found among individuals from same region. On the other hand, all specimens present the following combination of characters: pilosity dark brown, frons with a pair of oblique protuberances over antennal insertions, lateral carina of pronotum complete, first abdominal ventrite nearly entirely smooth and tarsal lamellae as wide as tarsomeres including its setae. These characters clearly distinguish *P. henningi* from the remaining species of the genus.

***Physodactylus latithorax* sp. nov.**  
(Figs. 25, 35L)

*Etymology:* From Latin, *latus* = wide; alluding to the thorax of this species, the widest among *Physodactylus* species.



**FIGURE 25:** *Physodactylus latithorax* sp. nov. A, antenna; B, C, D, prothorax (dorsal, ventral, lateral); E, hypomeron; F, G, pro- and metatibia; H, abdomen (ventral); I, sternite VIII; J, K, aedeagus (dorsal, ventral).

**Description:** Integument bright ventrally, dull dorsally; head, antenna, mesoventrite, metepisternum and ventral abdomen black, pro- and mesothoracic legs dark brown with femur orange (except its apical margin dark brown), metathoracic leg as the other ones but with trochanter orange; hypomeron orange with inner margin black, prosternum orange with anterior margin and process black; pronotum and elytra brown; pilosity yellow. Total length 18.0 mm; elytral base as wide as prothorax, elytra 3.48x longer than pronotum. Frons concave, frontal carina not produced anteriorly, frontoclypeal region with a longitudinal carina medially; antenna (Fig. 25A) reaching the half length of pronotum; antennomere IV 1.08x longer than wide, V 1.08x wider than long, VI-VIII 1.64x wider than long, IX-X 1.5x wider than long, XI oval 1.5x longer than wide. Maxilla with galea covered with a few fine and spiniform setae. Pronotum (Fig. 25A) weakly convex 1.56x wider than long with posterior third subparallel then convergent to anterior margin; anteromedian margin weakly produced anteriorly; posterior angles short, flat, parallel; lateral carina absent on anterior angle (Fig. 25D), visible on posterior 2/3 dorsally; disc with punctures 0.5-1.5 diameters apart, larger and denser on anterior and lateral borders; prosternal process curved 90° dorsad posteriad of procoxae, without subapical tooth (Fig. 25D). Protibia with dorsal margin strongly curved and crenulate (Fig. 25F); lamellae of pro- and mesotarsomeres I as large as those of tarsomeres II-III, small on metatarsomere I. Elytra parallel-sided on anterior 2/3 then tapering to apex; striae deeply impressed, with three rows of punctures, punctures glabrous on the median row, smaller and bearing

a small seta on the lateral row; interstices flat, smooth and glabrous; apical striae with punctures smaller than those of pronotal lateral border and as large as those of elytral base. Abdomen (Fig. 25H) with ventrites 1-4 evenly strongly convex, ventrite 1 evenly and densely pilose with semi-erect setae as long as those of the lateral part of ventrite 2; ventrites 2-3 densely covered with short semi-erect setae laterally and long setae medially; ventrite 4 densely covered with long setae. Pregenitalic segments and aedeagus covered with stout yellow setae. Sternite VIII (Fig. 25I) subrectangular, posterior margin nearly straight, anterior margin with three sclerotizations occupying 0.75x the total width of sternite; sternite IX tapered to apex.

**Aedeagus:** Phallobase 0.47x the total length of aedeagus, 1.27x longer than wide, length ratio between latero-posterior and median parts 8.71; paramere with ventral surface nearly entirely sclerotized, anteromedian part acute produced anteriorly with tips strongly sclerotized and contiguous; penis with sides rounded posteriorly, abruptly narrowed near apex, basal strut 0.31x its total length, articulated to the parameres by a strongly sclerotized process; ventral sclerite parallel-sided.

**Holotype:** [Brasil Pará, Serra Norte, N2-Floresta, 04-XI-1985], [Brasil Pará, P. Tadeu] male (MPEG).

**Distribution:** BRAZIL. *Pará:* Serra Norte.

**Remarks:** *Physodactylus latithorax* is distinguished by the combination of pilosity yellow, antenna reaching the half length of pronotum, frontoclypeal region



divided medially by a longitudinal carina, prothorax 1.56x wider than long, prosternal process curved 90° dorsad, lamellae of pro- and mesotarsomeres I as large as the other ones, elytra with striae deeply impressed, abdominal ventrites 2-4 strongly convex, ventrite I evenly densely covered with short and semi-erect setae; aedeagus with outer-apical angle spiniform and penis rounded posteriorly to the struts. This species is most similar to *P. sulcatus* and *P. patens* sp. nov., all sharing a convex abdomen and elytral striae, from which *P. latithorax* sp. nov. differs in its color pattern, larger mandible, frontoclypeal longitudinal carina, wider prothorax, longer pronotal setae, abdominal pilosity pattern and aedeagus shape.

***Physodactylus niger* Fleutiaux, 1892**  
(Figs. 26; 27A-B; 33E, N; 35M)

*Physodactylus niger* Fleutiaux, 1892: 406, 407;  
Schwarz, 1906: 311; Schenking, 1927: 508;  
Fleutiaux, 1940c: 168; Blackwelder, 1944: 292.  
*P. carreti* Fleutiaux, 1940c syn. nov.  
*P. carreti* var. *testaceipennis* syn. nov.

*Redescription* (male, Fig. 35M): Integument with yellow pilosity and variable color patterns: 1) brown to reddish-black with epipleura lighter; 2) black with pronotum dark reddish-brown; 3) pronotum light yellowish-brown to orange, elytra light brown to dark brown,

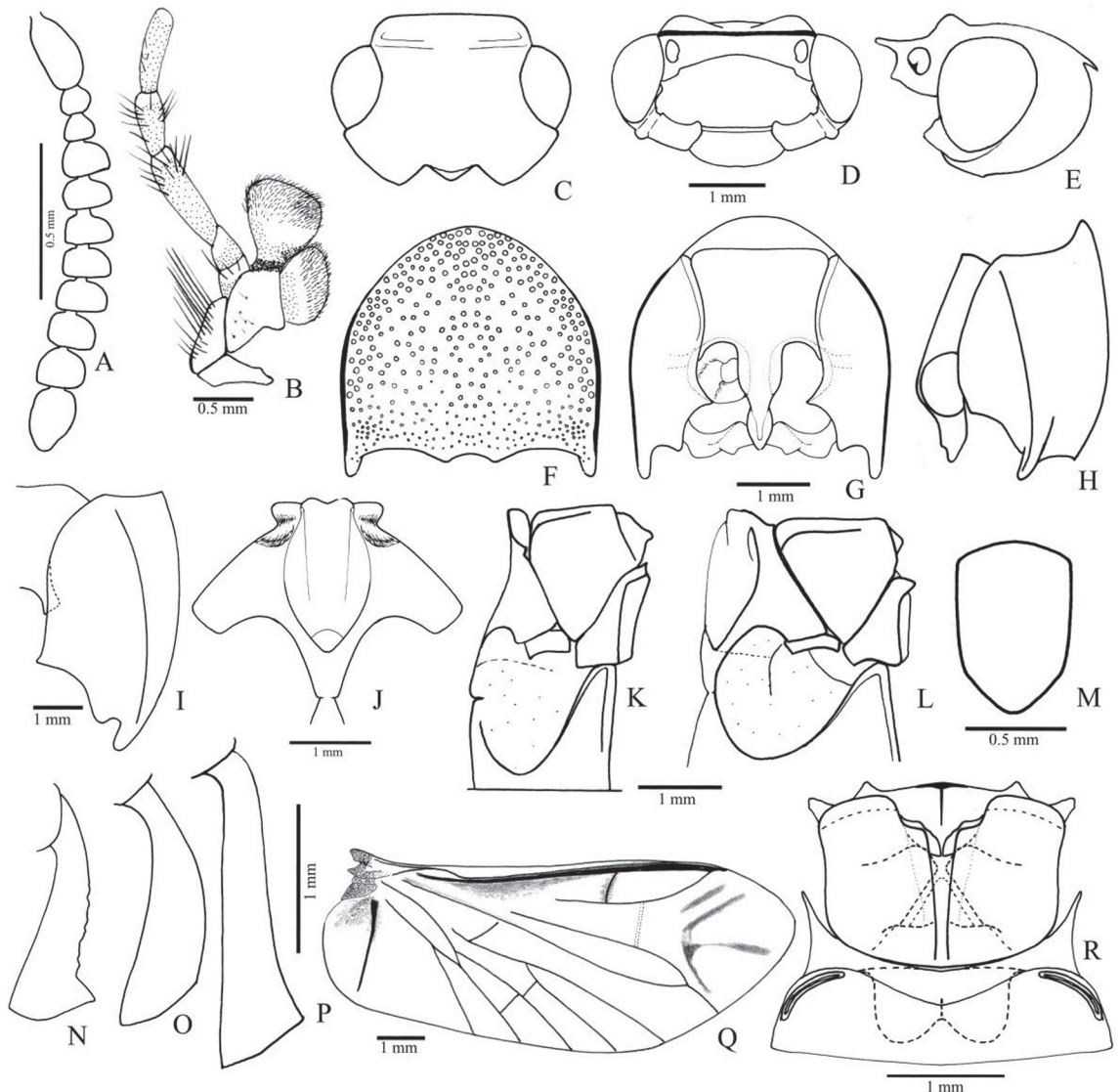


FIGURE 26: *Physodactylus niger*. A, antenna; B, maxilla; C, D, E, head (dorsal, anterior, lateral); F, G, H, prothorax (dorsal, ventral, lateral); I, hypomeron and pronotum; J, mesoventrite; K, L, mesoventrite and pleural sclerites (lateral, lateroventral); M, scutellar shield; N, O, P, pro-, meso- and metatibia; Q, hind wing; R, pterothorax and abdominal tergite I (dorsal).

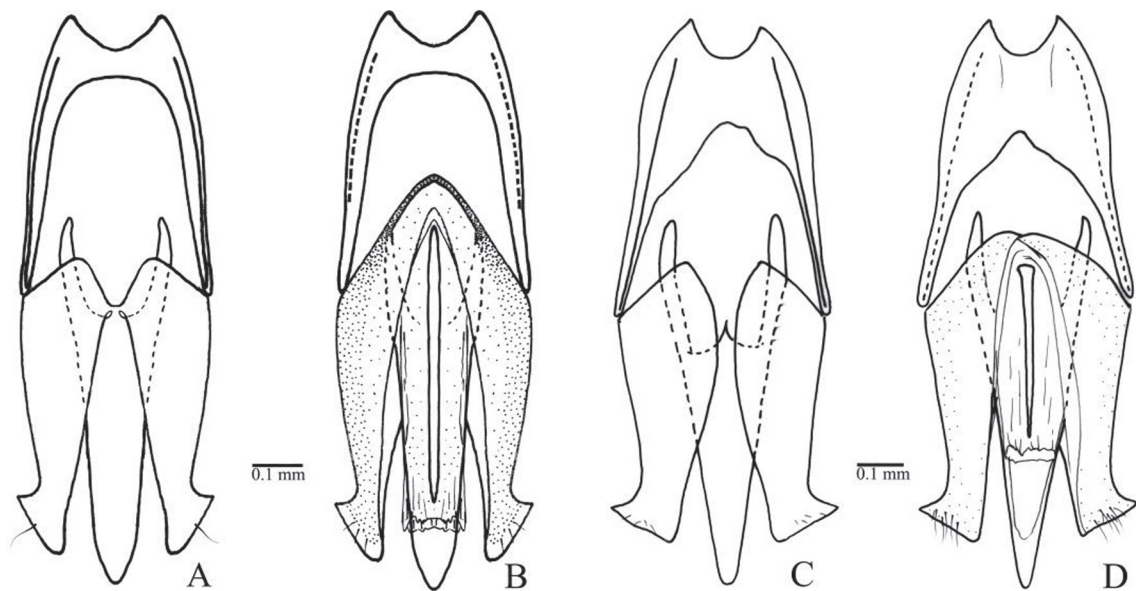


FIGURE 27: *Physodactylus niger*. A, B, aedeagus (dorsal, ventral). *Physodactylus oberthuri*. C, D, aedeagus (dorsal, ventral).

ventral surface dark brown to black, legs evenly dark brown to black or with dorsal margin of tibiae lighter; epipleura light brown; 4) same as the former but with lateral carina and pronotal anterior and posterior margins black, some specimens also with a black median longitudinal strip; 5) head reddish-black, pronotum, elytra and epipleura light yellowish-brown, ventral surface and legs darker; 6) same as the former but with ventral surface, legs and scutellum black; 7) same as the former but with pronotal borders black. Antenna evenly dark brown, scutellum usually with the same color as elytra, sometimes with borders darker. Total length 8.0-15.0 mm; elytral base 0.97-1.03x as wide as prothorax, elytra 2.73-3.10x longer than pronotum. Frons (Figs. 26C-E) flattened with a weakly to strongly produced transverse protuberance between antennal insertions, less prominent medially; frontal carina produced anteriorly; antenna (Fig. 26A) nearly reaching to surpassing by one antennomere the half length of pronotum; antennomere IV 1.1-1.2x wider than long, V-VIII 1.5-1.6x wider than long; IX-X 1.2-1.3x wider than long; XI oval 1.4-1.5x longer than wide. Pronotum (Fig. 26F) 1.10-1.29x wider than long, lateral sides rounded from posterior angles to anterior margin, strongly narrowed on anterior angle, anteromedian margin strongly produced (Fig. 26H); posterior angles elongate, convex, parallel to convergent; lateral carina prominent, nearly entirely visible dorsally, reaching or nearly reaching the anterior margin (Fig. 26I); disc with punctures umbilicate, 1-2 or 2-4 diameters apart, usually irregularly distributed, larger and denser on lateral and anterior borders; prosternal process with subapical tooth (Figs. 26G, H). Lamellae of pro- and

mesotarsomeres I smaller than the others, absent on metatarsomere I. Elytra tapering apicad from base or its half length, striae (Fig. 26N) with a row of punctures, punctures of apical striae larger than those of the lateral pronotal border; interstices slightly convex, sparsely punctate. Abdominal ventrites weakly convex with setae short and decumbent on ventrites 2-4, half shorter, very fine and sparser on ventrite 1. Pregenitalic segments and aedeagus covered with yellow setae. Sternite VIII with posterior margin straight or slightly emarginate medially, anterior sclerotization curved or bisinuous 0.47-0.85x the total width of sternite; sternite IX with apex rounded.

*Aedeagus* (Figs. 27A, B): Phallobase 0.41-0.49x the total length of aedeagus, 1.27-1.65x longer than wide, length ratio between lateroposterior and median parts 5.7-10.7; paramere with ventral surface partly membranous, except for the lateral half and the anterior margin sclerotized; anteromedian sclerotized margin usually contiguous and arch-shaped; penis with basal strut 0.23-0.27x its total length, articulated to the parameres by a sclerotized process; ventral sclerite parallel-sided.

*Holotype*: [Saint Paul], [*Physodactylus niger*, Fleut., ♂ Type, Brèsil], [Fleut. Ann. Soc. Ent. Fr. 1892, p. 407, t. 8, f. 3, Collection FLEUTIAUX], [niger], [*Physodactylus Oberthuri* Fleut. comparé ou type, 1940, Collection FLEUTIAUX] [type], [nig. ♂ (*terminalia and aedeagus attached*)] [Museum Paris, Coll. E. Fleutiaux], [*Physodactylus niger* Fleut., J. Chassain det. 05], [Holotype], male (MNHN).

*Material examined:* Without locality: 2 exs. (MNHN); BRAZIL. Holotype of *P. carreti* syn. nov. (MNHN). *Minas Gerais:* 2 exs. (MNHN). *São Paulo:* 3 exs. (MNHN), 61 exs. (MZUSP), 3 exs. (CNC), 1 ex. (IBSP). *Goiás:* 1 ex. (MNHN), 3 exs. (MZUSP). *Mato Grosso do Sul:* 2 exs. (MZUSP), 2 exs. (UNESP-IS).

*Distribution:* BRAZIL. *Goiás:* Jataí, Rio Verde; *Mato Grosso do Sul:* Três Lagoas, Selvíria; *Minas Gerais:* Uberaba; *São Paulo:* Ribeirão Preto, Mogi Guaçu, Araras, Orlândia, Sud Menucci, Pradópolis, São José do Rio Preto, Pirassununga, Assis, Magda, Piracicaba, Guataporá, Batatais.

*Remarks:* Fleutiaux (1892) described *Physodactylus niger* as similar to *P. oberthuri* and distinguished it by its smaller size, the black, narrower and less convex body, the pronotum more strongly punctate with anterior margin more widely rounded. In 1940, Fleutiaux considered these features insufficient to separate those species and synonymized *P. niger* under *P. oberthuri*. The analysis of a larger series of specimens revealed that *P. niger* is a valid species that exhibit polymorphisms in color pattern, size and punctuation among specimens from same region. Nevertheless, this species can be distinguished from other *Physodactylus* species by the following combination of characters: general pilosity yellow, frons with a transverse protuberance, frontal carina produced anteriorly; prothorax strongly and abruptly narrowed anteriorly with lateral carina prominent, pronotal anteromedian margin produced over head, pronotal punctuation heterogeneously distributed; lamella of mesotarsomere I absent; abdominal ventrites weakly convex, ventrite 1 with setae fine, half shorter and sparser than those of ventrite 2, ventrites 2-4 evenly pilose. *Physodactylus niger* can be promptly distinguished from *P. oberthuri* by its larger and denser pronotal punctuation, yellow pilosity and convex abdomen (brown pilosity and laterally concave abdomen in *P. oberthuri*).

The holotype of *Physodactylus carreti* syn. nov. has color pattern 3, punctuation 1-2 diameters apart on pronotal disc and antenna nearly reaching the base of pronotum; its aedeagus has the apex broken but does not present any consistent difference from those of other *P. niger* specimens. The type of *P. carreti* var. *testaceipennis* syn. nov. has the color pattern 6, pronotal punctuation more sparsely distributed (2-4 diameters apart on pronotal disc). Specimens collected at Ribeirão Preto and Mogi Guaçu exhibit all color patterns. The specimens from Sud Menucci and São José do Rio Preto are the smallest, while those from Rio Verde, Jataí and Três Lagoas are the largest, rep-

resenting the extreme sizes of a morphocline in body length. The specimens from Três Lagoas have the anteromedian sclerotized margin of parameres more widely separate. Some specimens from other localities also present this margin separate in variable width.

***Physodactylus oberthuri* Fleutiaux, 1892  
(Figs. 27C, D; 35N)**

*Physodactylus oberthuri* Fleutiaux, 1892: 406, 407; Schwarz, 1906: 311; Schenkling, 1927: 508; Fleutiaux, 1940c: 168; Blackwelder, 1944: 292; Chassain, 2005: 68.

*Redescription* (male, Fig. 35N): Integument very bright, dark brown with elytra lighter; pilosity brown. Total length 12.5 mm; elytral base 0.97x as wide as prothorax, elytra 2.7x longer than pronotum. Frons with a circular protuberance medially; frontal carina produced anteriorly; antenna nearly reaching the half length of pronotum; antennomere IV-X 1.2-1.3x wider than long; XI oval. Pronotum 1.18x wider than long, lateral sides rounded from posterior angles to anterior margin, strongly narrowed on anterior angle, anteromedian margin strongly produced; posterior angles elongate, convex, parallel; lateral carina complete, prominent, nearly entirely visible dorsally; disc and lateral margin with punctures very small and weakly impressed, 4-6 diameters apart, larger on anterior margin, homogeneously distributed. Lamellae of pro- and mesotarsomeres I smaller than the others, present on metatarsomere I. Elytra rounded on anterior 2/3 then tapering to apex; striae with a row of punctures larger than those of lateral pronotal border, interstices slightly convex, rugose, sparsely punctate. Abdomen with ventrites 2-3 concave laterally, with setae moderately long and decumbent on ventrites 2-5, ventrite 1 with setae a little shorter than and as dense as those of ventrites 2-5. Pregenitalic segments and aedeagus covered with brown setae. Sternite VIII with posterior margin emarginate medially, anterior sclerotization curved 0.57x the total width of sternite; sternite IX with apex acute.

*Aedeagus* (Figs. 27C, D): Phallobase 0.49x the total length of aedeagus, 1.32x longer than wide, length ratio between lateroposterior and median parts 3.7; paramere with ventral surface partly membranous, except for the lateral margin and the anterior margin sclerotized; anteromedian sclerotized margin approximate at middle; penis with basal strut 0.34x its total length, articulated to the parameres by a translucent membrane; ventral sclerite tapering apicad.

*Holotype*: [Brèsil mér], [ex-Musaeo Miniszech], [TYPE], [Fltx. 1891], [1940, FLEUTIAUX det.], [Fleut. Ann. Soc. Ent. Fr. 1892, p. 407, t. 8 f. 2 Collection FLEUTIAUX], [Physodactylus oberthuri ♂ Fleut. type], [Physodactylus oberthuri ♂ Fleut. type, Brèsil (Coll. Oberthur)], [Museum Paris, ex. Coll. R. Oberthur], [Lectotype], [Physodactylus oberthuri Fleutiaux, J. Chassain det. 05], male, (MNHN).

*Distribution*: BRAZIL.

*Remarks*: The apical part of the prosternal process was not examined. *Physodactylus oberthuri* is similar to *P. niger* and *P. tuberculatus* sp. nov. in prothoracic shape. It is most similar to this latter in the shape of aedeagus, very bright integument and pronotal punctation homogenously distributed. It differs from both species mainly in its brown setae and the very fine pronotal punctation.

***Physodactylus patens* sp. nov.**  
(Figs. 28, 35O)

*Etymology*: From latin, *patens* = wide; alluding to the widened elytra of this species.

*Description* (male, Fig. 35O): Integument bright ventrally, dull dorsally; brown with posterior third of elytra and abdominal marginal plates black; tibiae and tarsi dark brown; pilosity yellow. Total length 17.0 mm; elytral base 1.04x as wide as prothorax, elytra 3.15x longer than pronotum. Frons (Fig. 28B) concave; frontal carina not produced anteriorly; frontoclypeal region with a longitudinal carina medially;

antenna (Fig. 28A) reaching the half length of pronotum; antennomere IV 1.27x wider than long, V 1.58x wider than long, VI-VIII 1.4-1.5x wider than long, IX-X 1.4 and 1.33x wider than long, XI suboval 1.25x longer than wide. Maxilla with galea covered with a fine and spiniform setae. Pronotum (Fig. 28C) convex 1.46x wider than long with sides rounded and convergent from posterior angles to anterior margin; antero-median margin produced anteriorly; posterior angles short, convex, parallel; lateral carina nearly reaching the anterior margin, prominent, nearly entirely visible dorsally; disc with punctures small 0.5-1.0 diameters apart, denser on anterior border, larger and denser on lateral border; prosternal process without subapical tooth (Fig. 28D). Protibia with dorsal margin strongly curved and crenulate (Fig. 28F); lamellae of pro- and mesotarsomeres I as large as those of tarsomeres II-III, small on metatarsomere I. Elytra widened and rounded from base to posterior 1/4 then tapering to apex; striae deeply impressed, with three rows of punctures, punctures glabrous on the median row, smaller and bearing a small seta on the lateral row; interstices convex, smooth and glabrous; apical striae with punctures smaller than those of pronotal lateral border and as large as those of elytral base. Abdomen with ventrites 1-4 evenly strongly convex, ventrite 1 evenly pilose with fine setae as long as those of the lateral part of ventrite 2; ventrites 2-3 covered with short fine setae laterally and long fine setae medially, ventrite 4 with long fine setae. Pregenitalic segments (Figs. 28I-L) and aedeagus covered with stout yellow setae. Sternite VIII (Fig. 28L) subrectangular, posterior margin nearly straight, anterior sclerotization 0.72x the total width of sternite; sternite IX (Fig. 28I) tapered to apex.

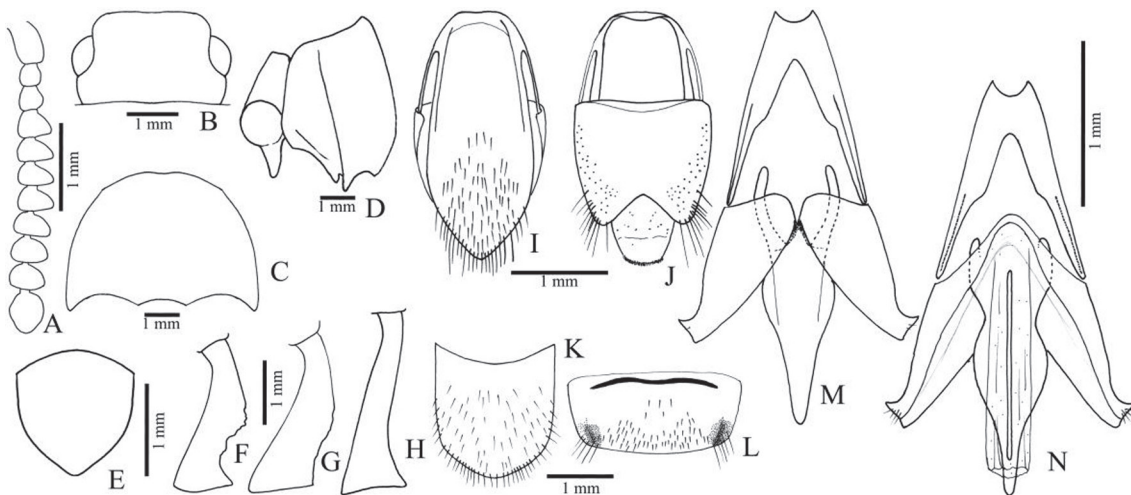


FIGURE 28: *Physodactylus patens* sp. nov. A, antenna; B, head (dorsal); C, D, prothorax (dorsal, lateral); E, scutellar shield; F, G, H, pro-, meso- and metatibia; I, sternite IX; J, tergites IX and X; K, tergite VIII; L, sternite VIII; M, N, aedeagus, (dorsal, ventral).



*Aedeagus* (Figs. 28M, N): Phallobase 0.47x the total length of aedeagus, 1.31x longer than wide, with lateral part abruptly narrowed on posterior half, length ratio between lateroposterior and median parts 5.36; ventral surface of paramere with the lateral half sclerotized, anteromedian margin contiguous arch-shaped; penis with sides strongly widened and rounded posteriorly of struts then abruptly narrowed and tapering to apex, with basal strut 0.30x its total length, articulated to the parameres by a strongly sclerotized process; ventral sclerite linear.

*Holotype*: [Jacareacanga, Pará Brasil, XII-1968, M. Alvarenga], [Coleção M. Alvarenga] male (DZUP).

*Distribution*: BRAZIL. *Pará*: Jacareacanga.

*Remarks*: *P. patens* is diagnosable by the combination of pilosity yellow, antenna reaching the half length of pronotum, prothorax 1.46x wider than long, lamellae of pro- and mesotarsomeres I as large as the other ones on the same leg, elytra with striae deeply impressed, abdominal ventrites 2-4 strongly convex, ventrite 1 densely covered with short, decumbent and fine setae. The aedeagus with penis strongly widened and rounded posteriorly of the struts and the phallobase with lateral parts abruptly narrowed on posterior half are autapomorphies of this species. Its strongly convex abdomen is a character shared with *P. sulcatus* and *P. latithorax* sp. nov., from which it differs in its color pattern and elytral shape. It is most similar to *P. latithorax* by the pilosity pattern and elytral striae, but the elytra of *P. pat-*

*ens* sp. nov. are wider and rounded and the abdominal setae are finer, decumbent and sparser. The carina on the frontoclypeal region is unique to this species.

***Physodactylus pujoli* Fleutiaux, 1940  
(Figs. 29, 35P)**

*Physodactylus pujoli* Fleutiaux, 1940c: 164, 166; Blackwelder, 1944: 292.

*Redescription* (male, Fig. 35P): Integument very shiny; head, antenna, ventral pterothorax and legs dark brown, pronotum light brown with borders (or borders and disc) darker, elytra evenly brown or gradually darker apicad; ventral abdomen black with lateral borders brown; pilosity brown. Total length 9.5-12.0 mm; elytral base as wide as prothorax, elytra 2.8-3.0x longer than pronotum. Frons concave, frontal carina produced; antenna (Fig. 29A) reaching the base of posterior angles; antennomere IV as wide as long, V-VI 1.1-1.2x wider than long, VII-VIII as wide as long, IX-X 1.1-1.2x longer than wide, XI elliptical 2.0x longer than wide, apex constricted. Pronotum (Fig. 29B) weakly convex 1.22-1.27x wider than long, with lateral sides nearly straight from posterior angles or posterior third to anterior margin; anteromedian margin weakly produced anteriorly; posterior angles short, convex; lateral carina complete weakly impressed anteriorly, dorsally visible only on posterior half; disc with punctures 2-4 diameters apart, a little larger and denser on lateral and anterior borders.

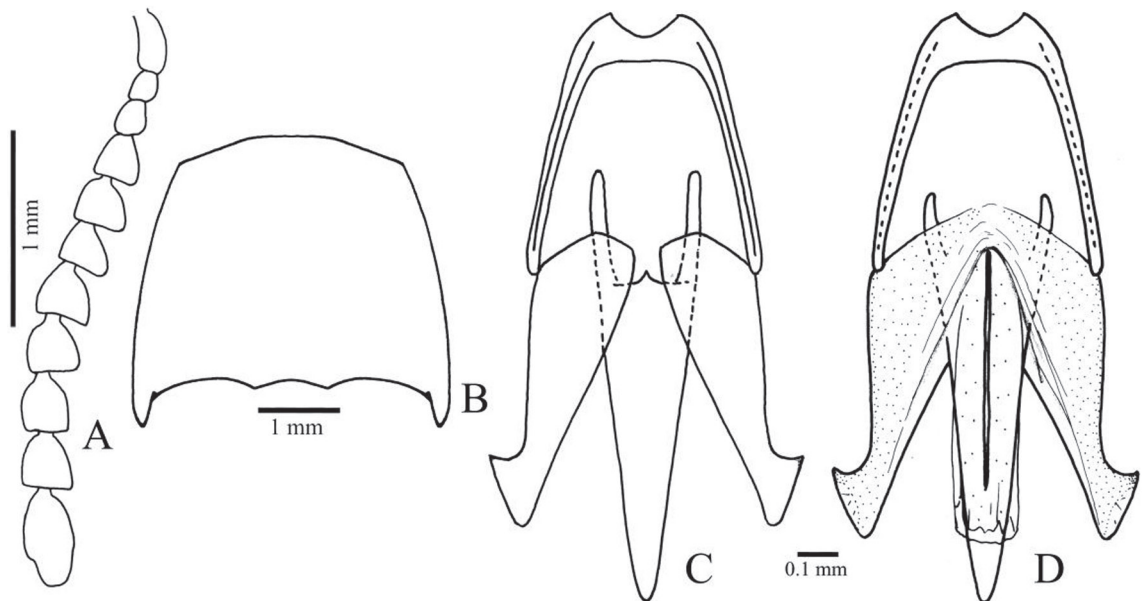


FIGURE 29: *Physodactylus pujoli*. A, antenna; B, pronotum; C, D, aedeagus (dorsal, ventral).

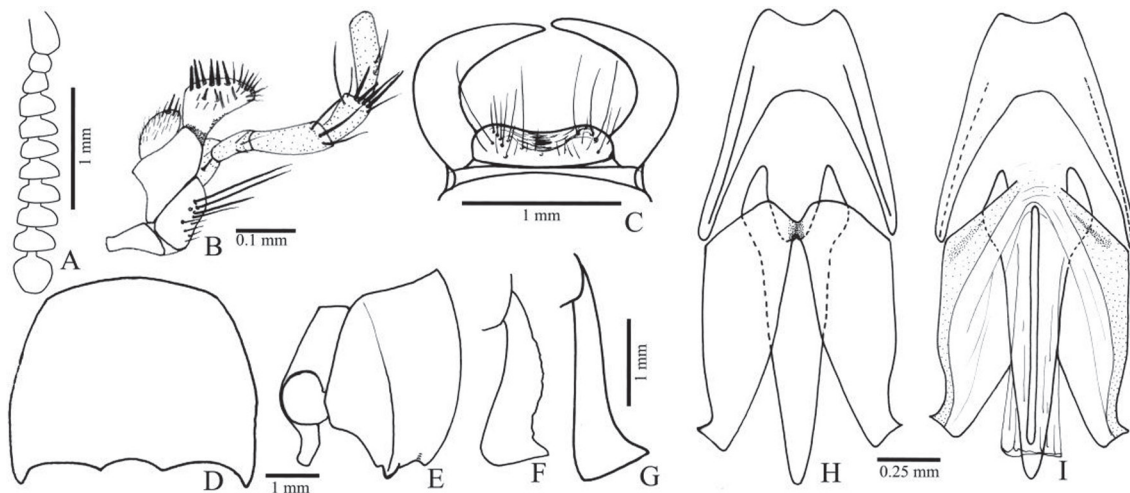


FIGURE 30: *Physodactylus sulcatus*. A, antenna; B, maxilla; C, labrum and mandible; D, E, prothorax (dorsal, lateral); F, G, pro and metatibia; H, I, aedeagus (dorsal, ventral).

Lamellae of pro- and mesotarsomeres I smaller than the others, minuscule or absent on metatarsomere I. Elytra parallel-sided on anterior 2/3 then tapering to apex, striae with rows of large and small punctation; interstices convex, scarcely punctate, rugose; apical striae with punctures about 2.0 larger than those of pronotal lateral border. Abdomen with ventrites 2-4 strongly concave laterally, ventrite 1 with setae a little smaller than those of ventrite 2, black area of ventrites 1-4 covered with long decumbent and semi-erect setae and dense punctation, lateral brown area with punctures finer and setae sparser. Pregenitalic segments and aedeagus covered with stout dark-brown setae. Sternite VIII subrectangular, posterior margin nearly straight, anterior sclerotization 0.44x the total width of sternite; sternite IX tapered to apex.

**Aedeagus** (Figs. 29C, D): Phallobase 0.44x the total length of aedeagus, 1.12x longer than wide, length ratio between lateroposterior and median parts 13.7; paramere with ventral surface weakly sclerotized laterally and along the anteromedian margin; penis with basal strut 0.26x its total length, articulated to the parameres by a translucent membrane; ventral sclerite linear weakly sclerotized apically.

**Holotype**: [Cachimbo, Prov. Bahia, Ch. Pujol 1890], [TYPE], [*Physodactylus pujoli* Fleut., FLEUTIAUX det. type], [Muséum Paris, Coll. E. Fleutiaux], [Lectotype, male (MNHN)].

**Paratypes**: [Cachimbo, Prov. Bahia, Ch. Pujol 1890], [COTYPE], [*Physodactylus pujoli* Fleut., FLEUTIAUX det. cotype], [Muséum Paris, Coll. E. Fleutiaux], [Lectotype], 1 ex. (MNHN).

**Material examined**: BRAZIL. Bahia: 2 exs. (MNHN).

**Distribution**: BRAZIL. Bahia: Ribeirão do Largo.

**Remarks**: The prosternal process was not examined. *Physodactylus pujoli* is similar to *P. brasiliensis* in its very shiny integument, color pattern and weakly convex pronotum, but can be promptly distinguished from this species by its brown pilosity. It shares with *P. asper* and *P. fischeri* the elytral striae punctation, but its striae are more deeply impressed and distinct at apex. *Physodactylus pujoli* shares the antennal length with *P. asper* sp. nov. and *P. girardi* sp. nov. It is sympatric with the former, from which it differs in the color pattern, pilosity of the ventrite 1, pronotal punctation and elytral striae and interstices.

### ***Physodactylus sulcatus* Fleutiaux, 1940 (Figs. 30, 33O, 35Q)**

*Physodactylus sulcatus* Fleutiaux, 1940c: 165, 167; Blackwelder, 1944: 292; Chassain, 2005: 70.

*Physodactylus obesus* Fleutiaux, 1940c: 165, 167; Blackwelder, 1944: 292; Chassain, 2005: 70; syn. nov.

*Physodactylus testaceus* Fleutiaux, 1940c: 165, 167; Blackwelder, 1944: 292; Chassain, 2005: 68, 70; syn. nov.

**Redescription** (male, Fig. 35Q): Integument entirely bright or with elytral interstices dull; pilosity yellow; color patterns: 1) dark brown with prothorax orange; 2) head and elytra black, antenna, ventral pterothorax, legs and ventral abdomen dark brown, prothorax

and epipleura orange, scutellum dark orange; 3) head, elytra, prosternum apically, ventral pterothorax and abdomen black, prothorax (except prosternum apically), epipleura and apical elytral suture light to dark orange, with or without an orange spot on base and apex of elytra, ventral abdomen evenly colored or with lateral borders lighter; 4) as the former but antenna orange and femur entirely or partly orange; 5) as pattern 3 but pronotal disc dark brown; 6) antenna, prothorax (except prosternum apically), elytra and epipleura brown, head, prosternum apically, ventral pterothorax and abdomen dark brown to black, legs dark brown with femur lighter. Total length 8.0-15.0 mm; elytral base 1.0-1.1x wider than prothorax, elytra 3.0-3.4x longer than pronotum. Frons concave to convex, frontal carina not or slightly produced; antenna (Fig. 30A) reaching or surpassing the anterior third of pronotum but not reaching its half length; antennomere IV 1.3-1.4x wider than long, V-X 1.6-1.86x wider than long, XI circular to oval 1.0-1.1x times as long as wide. Maxilla (Fig. 30B) with galea covered with fine and spiniform setae. Pronotum (Fig. 30D) convex 1.3-1.4x wider than long, parallel on posterior third then straight or roundly convergent to anterior margin; anteromedian margin slightly produced anteriorly; posterior angles short, convex, parallel; lateral carina evenly prominent to anterior margin or weaker impressed to absent on anterior third; dorsally visible only on posterior third; disc with punctures medium homogeneously distributed 0.5-1.0 diameters apart, smaller and denser on anterior margin, denser on lateral border; prosternal process without subapical tooth (Fig. 30E). Lamellae of pro- and mesotarsomere I very small, minuscule or absent on metatarsomere I. Elytra parallel-sided on anterior 2/3 then tapering to apex; apex usually with a very small sutural spine; striae (Fig. 33O) deeply impressed, with three rows of punctures, punctures glabrous on the median row, smaller and bearing a small seta on the lateral row; interstices convex, smooth and glabrous; apical striae with punctures smaller than those of pronotal lateral border and as large as those of elytral base. Abdomen with ventrites 1-4 strongly and evenly convex, ventrite 2 evenly pilose with short decumbent setae, II-IV with mixed short decumbent and long semi-erect setae, longer setae denser on median region. Pregenitalic segments and aedeagus covered with stout yellow setae. Sternite VIII subrectangular, posterior margin straight, anterior sclerotization 0.6x the total width of sternite; sternite IX tapered to apex.

*Aedeagus:* Phallobase 0.5x the total length of aedeagus, 1.2x longer than wide, length ratio between

lateroposterior and median parts 3.5-5.2; ventral surface of paramere with the lateral half and anterior margin sclerotized; penis with basal strut 0.2-0.3x its total length, articulated to the parameres by a strongly sclerotized process; ventral sclerite parallel-sided.

*Holotype:* [Jatahy, Goyas Brèsil], [*Physodactylus sulcatus* Fleut. COLLECTION FLEUTIAUX], [TYPE], [Muséum Paris, Coll. E. Fleutiaux], [Lectotype], [*Physodactylus sulcatus* Fleutiaux, J. Chassain det. 05], male (MNHN).

*Material examined:* BRAZIL. *Mato Grosso:* 10 exs. (MZUSP), 8 exs. (CNC), holotype of *P. testaceus* syn. nov. (MNHN). *Mato Grosso do Sul:* 1 ex. (MNHN); holotype of *P. obesus* syn. nov. (MNHN).

*Distribution:* BRAZIL. *Mato Grosso:* Cuiabá, Rosário Oeste, Sinop, Vera; *Mato Grosso do Sul:* Corumbá.

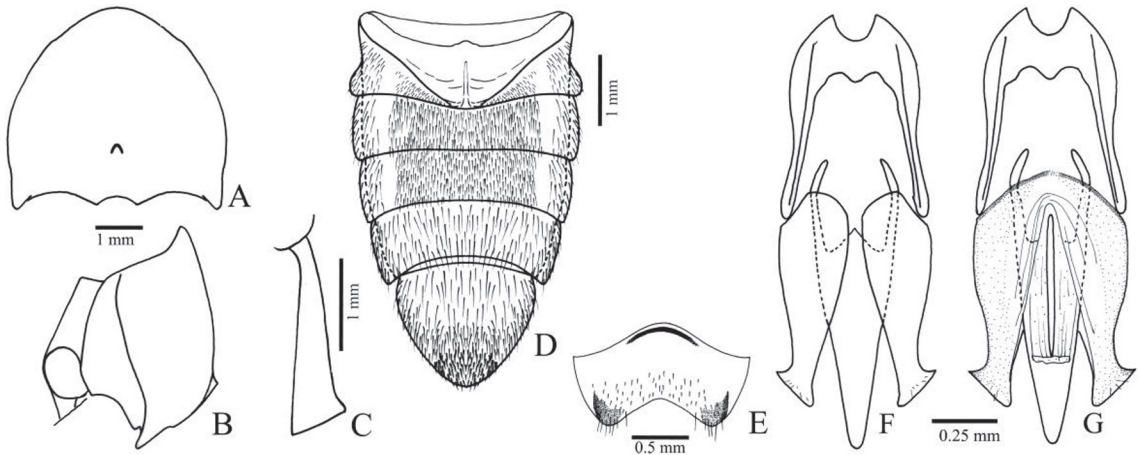
*Remarks:* Fleutiaux (1940c) described *Physodactylus sulcatus*, *P. obesus* and *P. testaceus*, each one based on a single specimen. He distinguished them by color pattern, integument brightness and size. However, the analysis of a larger series showed that the differences in those features are variations. Specimens from Vera (MT) exhibit all color patterns, including specimens with the same color (pattern 6) and size of *P. testaceus* holotype. Material examined from Sinop (MT) includes specimens as small as the *P. sulcatus* holotype (9 mm) and specimens as large as the *P. obesus* holotype (13 mm).

***Physodactylus tuberculatus* sp. nov.**  
(Figs. 31, 35R)

*Etymology:* From Latin, *tuberculum* = tubercle; alluding to the conspicuous pronotal tubercle of this species.

*Description* (male Fig. 35R): Integument very bright, dark brown with elytra lighter or black with elytra dark reddish-brown and epipleura lighter; pilosity yellow. Total length 11.0-13.5 mm; elytral base 0.93-1.05x as wide as prothorax, elytra 2.73-3.03x times longer than pronotum. Frons with a transverse or circular protuberance medially; frontal carina strongly produced anteriorly; antenna nearly reaching the half length of pronotum; antennomere IV and V 1.4-1.5x wider than long, VI-VIII 1.9-2.0x wider than long; IX-X 1.6x wider than long; XI subcircular as wide as long. Pronotum (Fig. 31A) 1.18-1.21x wider than long, lateral sides rounded from posterior

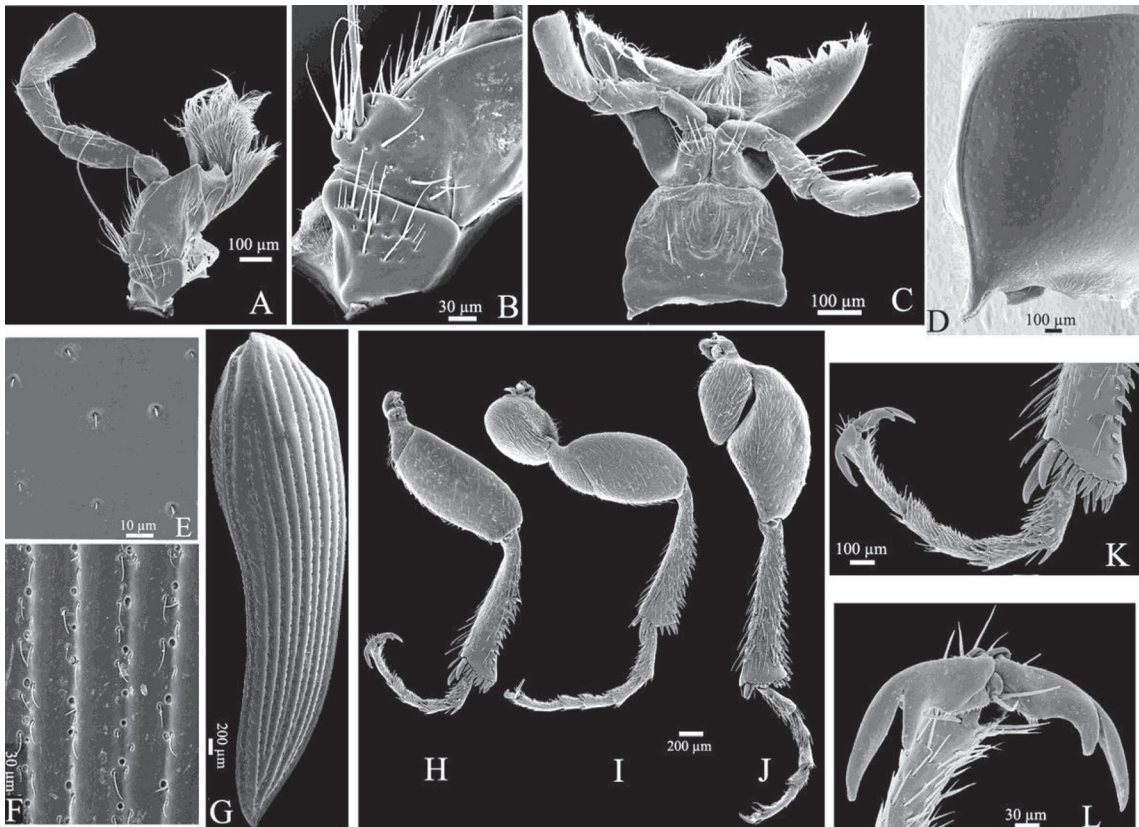




**FIGURE 31:** *Physodactylus tuberculatus* sp. nov. **A, B**, prothorax (dorsal, lateral); **C**, metatibia; **D**, abdomen (ventral); **E**, sternite VIII; **F, G**, aedeagus (dorsal, ventral).

angles to anterior margin, strongly narrowed on anterior angles, anteromedian margin strongly produced; posterior third at middle with a small spiniform tubercle (Fig. 31B); posterior angles elongate, convex, parallel; lateral carina complete, strongly prominent on posterior half, not visible dorsally on anterior half; disc and lateral margin with punctures 1-2 diameters

apart, larger on anterior angle, homogenously distributed; prosternal process without subapical tooth. Lamellae of pro- and mesotarsomeres I smaller than the others, present on metatarsomere I. Elytra tapering from base to apex; striae apical striae with a row of punctures about 3 times larger than those of pronotal disc; interstices flat, slightly rugose, sparsely



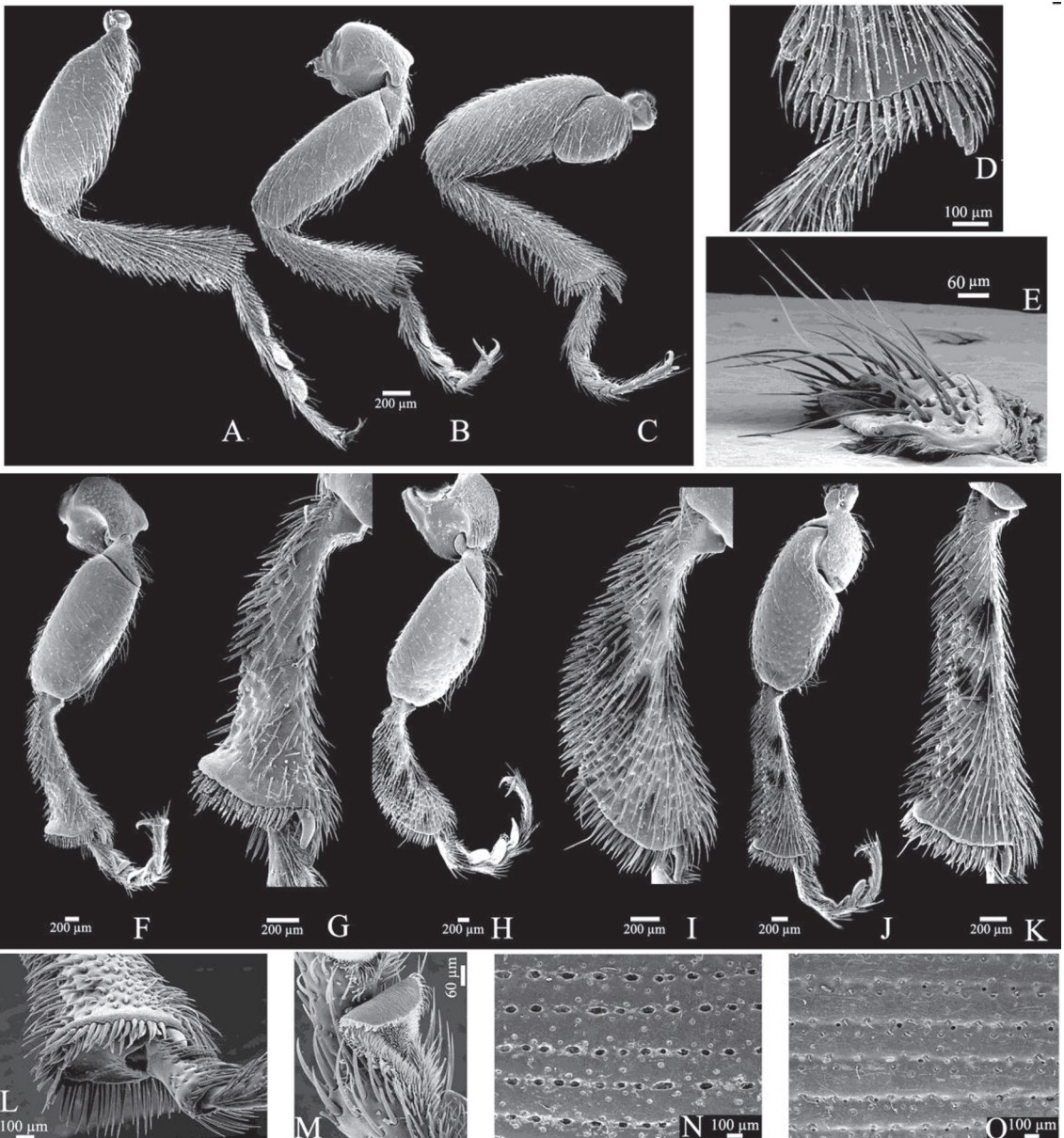
**FIGURE 32:** *Teslasena femoralis*. **A**, maxilla; **B**, detail of maxillar base; **C**, labium; **D**, pronotum (laterodorsal); **E**, pronotal punctation; **F**, elytral striae; **G**, elytron (dorsolateral); **H, I, J**, pro-, meso and metathoracic legs; **K**, protarsus; **L**, claw.



punctate. Abdomen (Fig. 31D) with ventrites 2-3 concave laterally, pilosity of the inner 2/3 (0.6-0.7) of the ventrites 1-3 separated from those of lateral border by a glabrous and impunctate longitudinal band; ventrite 1 with short setae on inner third and twice longer, denser and stouter setae on lateral border; ventrites 2-3 with setae semi-erect twice longer, denser and stouter than those of the inner part of ventrite 1, sparser on lateral border; ventrite 4 with setae sparser, longer and stouter than those of the inner part of ventrite 3, denser on lateral border; ventrite 5 with

median setae sparse, denser on borders. Pregenitalic segments and aedeagus covered with yellow setae. Sternite VIII subrectangular with anterior margin and anterior sclerotization strongly curved, posterior margin slightly to strongly emarginate (Fig. 31E), anterior sclerotization 0.4x the total width of sternite; sternite IX with apex rounded.

*Aedeagus* (Figs. 31F, G): Phallobase 0.47x the total length of aedeagus, 1.36x longer than wide, length ratio between lateroposterior and median parts 3.3-4.8;



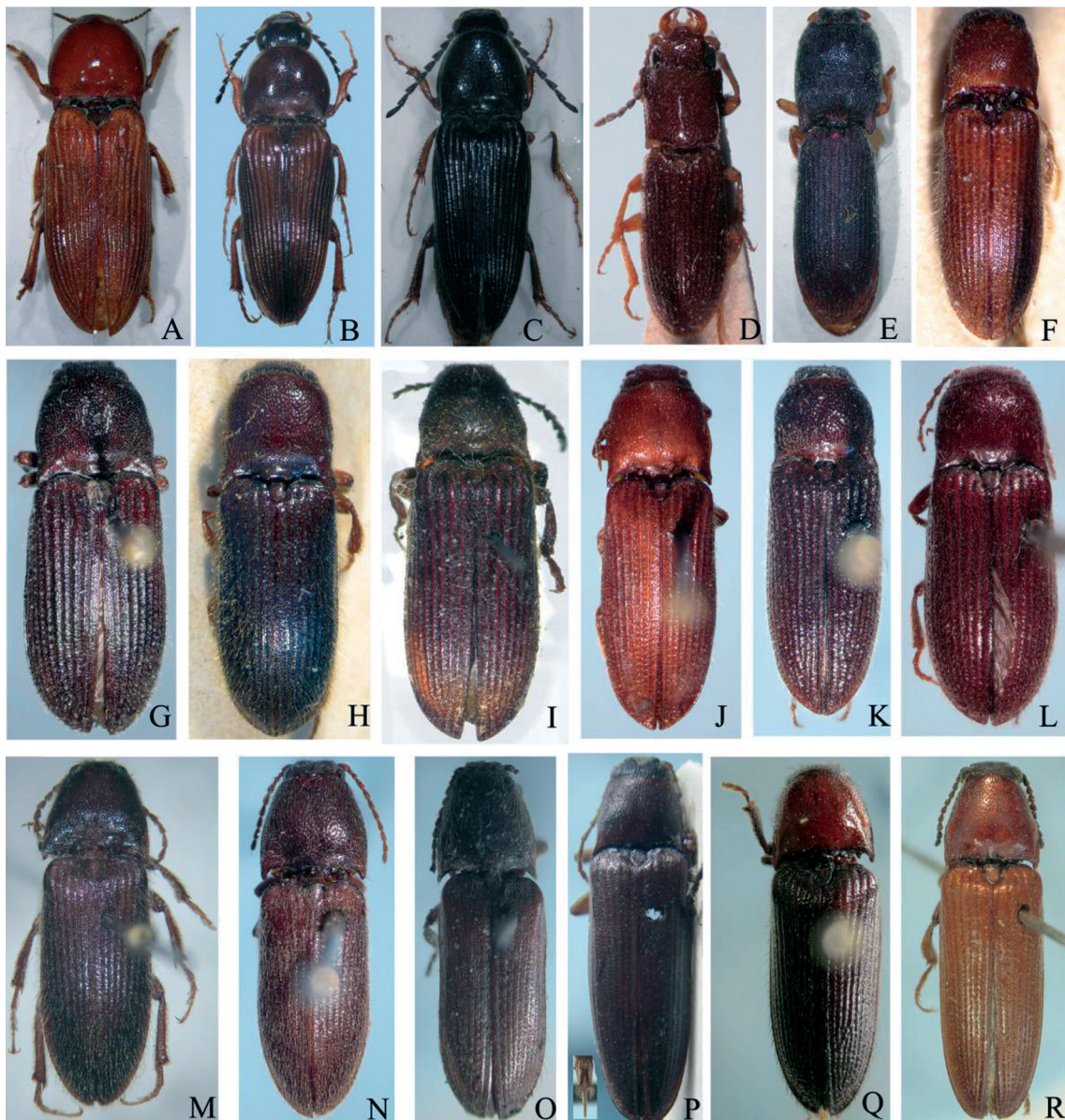
**FIGURE 33:** *Dactylophysus hirtus* sp. nov. **A, B, C**, pro-, meso- and metathoracic legs; **D**, apex of protibia. *Physodactylus niger*. **E**, labrum. (lateroanterior). *Physodactylus henningi*. **F**, prothoracic leg; **G**, protibia; **H**, mesothoracic leg; **I**, mesotibia; **J**, metathoracic leg; **K**, metatibia; **L**, apex of metatibia; **M**, lamella of protarsomere I. *Physodactylus niger*. **N**, elytral striae. *Physodactylus sulcatus*. **O**, elytral striae.



paramere with ventral surface predominantly membranous, except for the lateral and the anterior margin sclerotized; anteromedian sclerotized margin approximate at middle; penis with basal strut 0.32x its total length, articulated to the parameres by a translucent membrane; ventral sclerite parallel-sided.

*Holotype*: [Gorham Collection acc69966], [*Physodactylus*, nov (*illegible*), Brazil], [*Physodactylus oberthuri*, comparado ao tipo, C. Costa 1995] male, (MZUSP).

*Paratypes*: [Brésil], [Collection Bonvouloir], [Fleutx. 1891], [*Physodactylus oberthuri*, Fleut, FLEUTIAUX det. 1944], [Museum Paris, ex Coll. R. Oberthur], [Museum Paris Coll. E. Fleutiaux], [*Physodactylus niger* Fleut. ?, J. Chassain det. 05] 1 ex., (MNHN); [Lavras, Minas Gerais, 13/12/1988, R.C. Garcia], [*Physodactylus oberthuri* (Fleut., 1892), S.A.C. Chen det. 1989], 1 ex. (MZUSP); [Minas Geraes], [Fry Coll., 1905.100.], [486<sup>a</sup>], 1 ex. (BMNH), idem plus [♂], [486<sup>a</sup>], [3681],



**FIGURE 34:** Habitus. **A**, *Margogastrius schneideri* (13.0 mm); **B**, *Teslasena femoralis* (9.0 mm); **C**, *T. foucarti* (9.5 mm); **D**, *Idiotropia henoni* (4.5 mm); **E**, *Oligostethius capensis* (10 mm); **F**, *Toxognathus bakeri* (6.0 mm); **G**, *T. beauchenei* (9.0 mm); **H**, *T. coomani* (6.5 mm); **I**, *T. costulatus* (11.0 mm); **J**, *T. doherty* (8.0 mm); **K**, *T. fairmairei* (7.5 mm); **L**, *T. mouboti* (5.0 mm); **M**, *Dactylophysus hirtus* sp. nov. (10.5 mm); **N**, *D. capixabensis* nom. nov. (9.0 mm); **O**, *D. tibialis* (12.0 mm); **P**, *Heterocrepidius mendax* (9.0 mm); **Q**, *Physodactylus asper* sp. nov. (9.5 mm); **R**, *P. besckei* (11.0 mm). **A**, **D** = lectotypes; **E-G**, **I**, **J**, **L**, **M**, **P**, **R**, **Q** = holotypes.

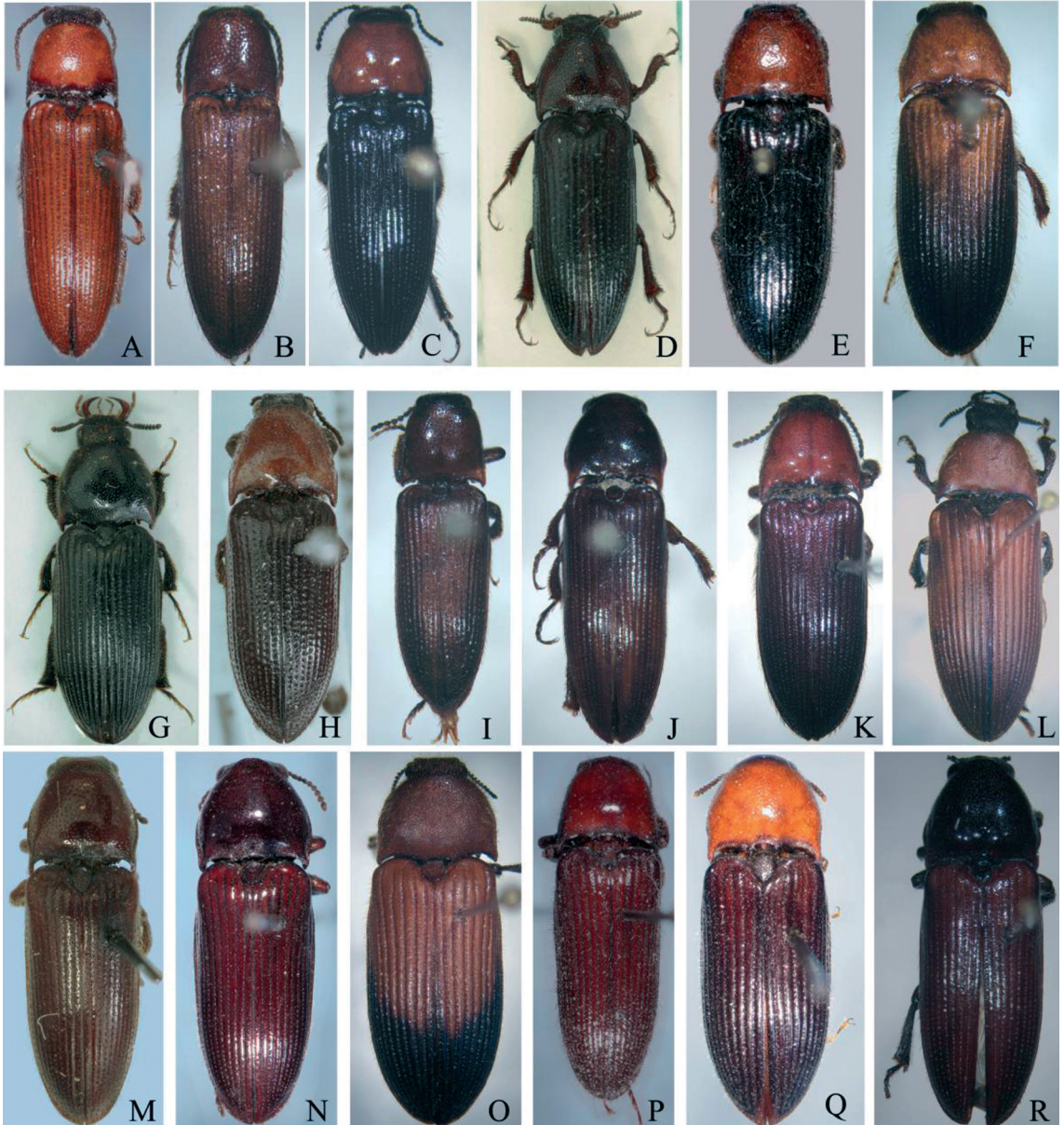


[*P. oberthuri* Fleut, ex desc. Det. K.G. Blair], 1 ex. (BMNH).

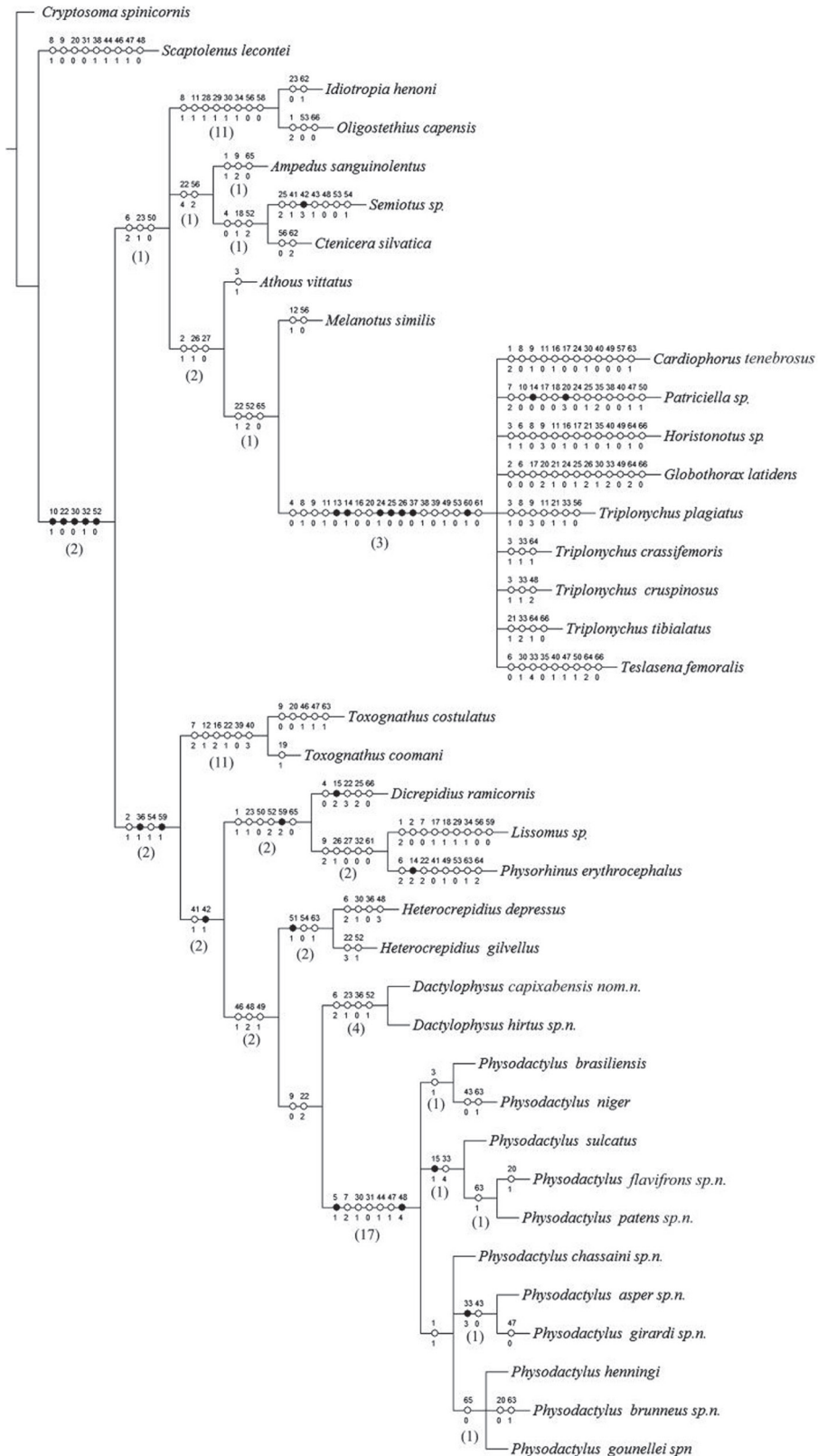
*Distribution:* BRAZIL. *Minas Gerais:* Lavras.

*Remarks:* The specimen from Lavras differs from the other two specimens in the coloration pattern (elytra black with lighter epipleura) and relatively longer elytra. Its genitalia is also somewhat different from that

of the holotype in the shape of the sternite VIII, with posterior margin slightly emarginate, and the larger ratio between lateroposterior and median parts of the phallobase (4.75). The genitalia of the MNHN and BMNH paratypes were not examined. All specimens share the conical tubercle on posterior region of pronotum and the pilosity pattern of abdomen, which are unique characters for *Physodactylus tuberculatus* sp. nov.



**FIGURE 35:** Habitus. **A**, *Physodactylus brasiliensis* (12.8 mm); **B**, *P. brunneus* sp. nov. (9.0 mm); **C**, *P. chassaini* sp. nov. (11.5 mm); **D**, *P. costae* (12.0 mm); **E**, *P. fischeri* (17.0 mm); **F**, *P. flavifrons* sp. nov. (10.0 mm); **G**, *P. fleutiauxi* (15.0 mm); **H**, *P. foveatostriatus* (12.0 mm); **I**, *P. girardi* sp. nov. (9.0 mm); **J**, *P. gounellei* sp. nov. (10.5 mm); **K**, *P. henningi* (15.0 mm); **L**, *P. latithorax* sp. nov. (18.0 mm); **M**, *P. niger* (11.0 mm); **N**, *P. oberthuri* (12.5 mm); **O**, *P. patens* sp. nov. (17.0 mm); **P**, *P. pujoli* (12.0 mm); **Q**, *P. sulcatus* (9.0 mm); **R**, *P. tuberculatus* sp. nov. (12.0 mm). **A-D, F-J, L-R** = holotypes.



**FIGURE 36:** Strict consensus of four most parsimonious trees from the phylogenetic analysis of Physodactylinae (length = 281 steps, CI = 0.35, RI = 0.68). Character and state numbers are respectively above and below internodes. Black circles indicate exclusive synapomorphies and white circles homoplastic synapomorphies. Absolute Bremer support in parentheses.



*Physodactylus tuberculatus* sp. nov. shares with *P. niger* and *P. oberthuri* the shape of prothorax, but is easily distinguishable by the above mentioned unique characters. It shares with *P. niger* the yellow pilosity and differs from this species also in its smaller and homogeneously distributed pronotal punctation, anteromedian margin of pronotum more produced, elytral striae with larger punctures, flat elytral interstices, antennomeres shorter and the lateral carina more prominent posteriorly and less prominent anteriorly. It is most similar to *P. oberthuri* in the aedeagal shape, very bright integument, pronotal punctation homogeneously distributed and the color pattern, usually with elytra lighter, a pattern not found among *P. niger* specimens. *Physodactylus tuberculatus* sp. nov. can be distinguished from *P. oberthuri* by its yellow pilosity, larger pronotal punctation, the pronotal tubercle and the abdominal pilosity pattern.

## RESUMO

Uma análise filogenética baseada em dados morfológicos masculinos e uma revisão taxonômica dos gêneros e espécies de *Physodactylinae* são apresentadas. A análise de 66 caracteres resultou na polifilia de *Physodactylinae* que compreende quatro linhagens independentes. *Oligostethius* e *Idiotropia da África foram recuperados como grupos-irmãos. Teslasena (Brasil) foi corroborado como membro do clado Cardiophorinae. Os gêneros Physodactylus e Dactylophysus, da América do Sul, formam um clado monofilético filogeneticamente relacionado a espécies de Heterocrepidius. O gênero oriental Toxognathus resultou como grupo-irmão deste clado mais (Dicrepidius ramicornis (Lissomus sp, Physorhynchus erythrocephalus)). A revisão taxonômica inclui diagnose e redescricao dos gêneros, bem como redescições, distribuição e ilustrações para as espécies. Chave para as espécies de Teslasena, Toxognathus, Dactylophysus e Physodactylus são apresentadas. Teslasena lucasi é sinonimizado com T. femoralis. Uma nova espécie de Dactylophysus é descrita, D. hirtus sp. nov., e lectótipos são designados para os não-conspicíficos D. mendax sensu Fleutiaux e Heterocrepidius mendax Candèze. Physodactylus niger é removido da sinonímia sob P. oberthuri; P. carreti é sinonimizado com P. niger; P. obesus and P. testaceus são sinonimizados com P. sulcatus. Nove novas espécies são descritas para Physodactylus: P. asper sp. nov., P. brunneus sp. nov., P. chassaini sp. nov., P. flavifrons sp. nov., P. girardi sp. nov., P. gounellei sp. nov., P. latithorax sp. nov., P. patens sp. nov. e P. tuberculatus sp. nov.*

PALAVRAS-CHAVE: Cladística; Morfologia; Região Neotropical; Região Afrotropical; Região Oriental.

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## REFERENCES

- ABEILLE DE PERRIN, E. 1894. Diagnoses de Coléoptères Réputés Nouveaux. *L'Echange, Revue Linneenne*, 10: 91-94.
- AKHTER, M.A.; DRUMONT, A.; RIZVI, S.A. & AHME, Z. 2011. Notes on species of Cardiophorinae (Candèze, 1860) from Pakistan with description of a new Species (Coleoptera: Elateridae) and new records. *Pakistan Journal of Zoology*, 43: 477-481.
- BLACKWELDER, R.E. 1944. Checklist of the coleopterous insects of Mexico, Central America, the West Indies, and South America. Part 1. *Bulletin of the United States National Museum*, 185(2): 280-303.
- BONVOULOIR, H. 1875. Monographie de la famille des Eucnémides (parts 3 & 4). *Annales de La Société Entomologique de France, Serie 4*, 10(Suppl.): 561-907, pls. 37-42.
- BOUCHARD, P.; BOUSQUET, I.; DAVIES, A.E.; ALONSO-ZARAZAGA, M.A.; LAWRENCE, J.F.; LYAL C.H.C.; NEWTON, A.F.; REID, C.A.M.; SCHMITT, M.; ŚLIPIŃSKI, S.A. & SMITH, A.B.T. 2011. Family-group names in Coleoptera (Insecta). *ZooKeys*, 88: 1-972.
- BREMER, K. 1994. Branch support and tree stability. *Cladistics*, 10: 195-304.
- CALDER, A.A. 1983. *Melanotus* Eschscholtz, a genus new to Australia (Coleoptera: Elateridae). *Journal of the Australian Entomological Society*, 22: 257-260.
- CALDER, A.A. 1996. Click Beetles: Genera of Australian Elateridae (Coleoptera). In: *Monographs on Invertebrate Taxonomy*. Collingwood, CSIRO Publishing. v. 2, x + 401p.
- CALDER, A.A. 1998. Coleoptera: Elateroidea. In: Wells, A. (Ed.). *Zoological Catalogue of Australia*. Melbourne, CSIRO Publishing. v. 29.6, 248 p.
- CALDER, A.A.; LAWRENCE, J.F. & TRUMAN, J.W. 1993. *Austrelater*, gen. nov. (Coleoptera: Elateridae). With a description of the larva and comments on elaterid relationships. *Invertebrate Taxonomy*, 7: 1349-1394.

- CANDÈZE, E. 1857. *Monographie des Élatérides. Tome premier*. Liège, H. Dessain. viii + 400p.
- CANDÈZE, E. 1859. *Monographie des Élatérides. Tome second*. Liège, H. Dessain. 543p.
- CANDÈZE, E. 1863. *Monographie des Élatérides. Tome quatrième*. Liège, H. Dessain. 534p.
- CASARI, S.A. 2008. A phylogenetic study of the subtribe Dicrepidina (Elateridae, Elaterinae, Ampedini). *Revista Brasileira de Entomologia*, 52: 182-260.
- CHASSAIN, J. 2005. Description de trois nouvelles espèces de Physodactylinae du Mato Grosso (Brésil) (Coleoptera, Elateridae). *Boletín Sociedad Entomológica Aragonesa*, 36: 65-71.
- COSTA, C.; LAWRENCE, J.F. & ROSA, S.P. 2010. Elateridae Leach, 1815. In: Beutel, R.G. & Leschen, R.A.B. (Orgs.). *Handbook of Zoology, Vol. IV, Arthropoda: Insecta, Coleoptera: Evolution and Systematics (Polyphaga Part)*. Jena, Friedrich-Schiller-Universität Jena. p. 75-103.
- DEJEAN, P.F.M.A. 1833. *Catalogue des coléoptères de La collection de M. le comte Dejean*, Paris. livr. 2, p. 97-176.
- DOUGLAS, H. 2003. Revision of *Cardiophorus* (Coleoptera: Elateridae) species of eastern Canada and United States of America. *The Canadian Entomologist*, 135: 493-548.
- DOUGLAS, H. 2009. Revision of *Blaiseus* Fleutiaux, a genus now known from Asia, Africa and North America (Coleoptera, Elateridae, Cardiophorinae). *Coleopterists Bulletin*, 63: 86-100.
- DOUGLAS, H. 2011. Phylogenetic relationships of Elateridae inferred from adult morphology, with special reference to the position of Cardiophorinae. *Zootaxa*, 2900: 1-45.
- FAIRMAIRE, L. 1878. Coléoptères de Conchinchine recueillis par M. le docteur Morice. *Annales de La Société Entomologique de France*, 5<sup>a</sup> ser., 8: 269-274.
- FISCHER VON WALDHEIM, M.G. 1823. *Entomographia imperii russici; genera insectorum systematica exposita et analysi iconographica instructa*. Mosque, Auctoritate Societatis Caesareae Naturae Scrutatorum Mosquensis. v. 2, 262 p.
- FISCHER VON WALDHEIM, M.G. 1824. Extrait d'une lettre adressée à M. Henning sur le Physodactyle, nouveau genre de Coléoptère voisin des Taupin. *Annales des Sciences Naturelles*, 3: 448-451, plate 27B.
- FLEUTIAUX, E. 1892. Note sur les Physodactylini. *Annales de La Société Entomologique de France*, 61: 403-412.
- FLEUTIAUX, E. 1899. Description d'une nouvelle espèce appartenant au genre *Teslasena* (Elateridae) [Col.]. *Bulletin de La Société Entomologique de France*, 1899: 206.
- FLEUTIAUX, E. 1918a. Nouvelles contributions à la faune de l'Indo-Chine Française. *Annales de La Société Entomologique de France*, 87: 175-278.
- FLEUTIAUX, E. 1918b. Coléoptères Élatérides Indochinois de la collection du Muséum d'Histoire Naturelle de Paris. Catalogue et description des espèces nouvelles. *Bulletin du Muséum D'Histoire Naturelle*, 24: 205-236.
- FLEUTIAUX, E. 1919. Insectes Coléotères XIII. Elateridae, Trixagidae et Melasidae. In: *Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911-1912). Résultats Scientifiques*. Paris, Librairie des Sciences Naturelles. p. 1-119.
- FLEUTIAUX, E. 1924. Melasidae et Elateridae. Faune entomologique de l'Indochine française. 1. Coléoptères serricornes. 2. Fam. Elateridae. *Opuscules de l'Institut Scientifique de l'Indochine*, 2(7): 31-184.
- FLEUTIAUX, E. 1940a. Les élatérides de l'Indo-chine française. Huitième et dernière partie. *Annales de La Société Entomologique de France*, 109: 19-40.
- FLEUTIAUX, E. 1940b. Élatérides nouveaux. *Bulletin et Annales de La Société Entomologique de Belgique*, 80: 89-104.
- FLEUTIAUX, E. 1940c. Revision des *Physodactylus* Fischer (Col. Elateridae). *Revue Française d'Entomologie*, 7: 164-168.
- FLEUTIAUX, E. 1947. Révision des Élatérides (Coléoptères) de l'Indo-Chine Française. *Notes d'Entomologie Chinoise*, 11(8): 233-420.
- FRIEDRICH, F. & BEUTEL, R.G. 2006. The pterothoracic skeletomuscular system of Scirtoidea (Coleoptera: Polyphaga) and its implications for the high-level phylogeny of beetles. *Journal of Zoological Systematics and Evolutionary Research*, 44: 290-315.
- GOLBACH, R. 1964. *Apteroelater werauchi* gen. et sp. nov. (Coleoptera, Elateridae). *Acta Zoologica Lilloana*, 20: 137-143.
- GOLBACH, R. 1994. Elateridae (Coleoptera) de la Argentina. Historia, catálogo actualizado hasta 1991 inclusive y clave de subfamilias y de géneros de Centro y Sudamérica. *Opera Lilloana*, 41: 1-48.
- GOLOBOFF, P.; FARRIS, J. & NIXON, K. 2003. T.N.T.: Tree analysis using new technology. *Program and documentation*. available from the authors, and [www.zmuc.dk/public/phylogeny](http://www.zmuc.dk/public/phylogeny).
- GUÉRIN-MÉNEVILLE, F.E. 1829-1844. Iconographie du règne animal de G. Cuvier, ou représentation d'après nature de l'une des espèces les plus remarquables, et souvent non encore figurées de chaque genre d'animaux. Avec un texte descriptif mis au courant de la science. Ouvrage pouvant servir d'atlas à tous les traités de zoologie. Insectes. Texte. Paris, J.B. Baillière. 576p.
- HAYEK, C.M.F. VON. 1990. A reclassification of the Melanotus group of genera (Coleoptera: Elateridae). *Bulletin of the British Museum (Natural History)*, 59: 37-115.
- HYSLÖP, J.A. 1921. Genotypes of the Elaterid beetles of the world. *Proceedings of United States of National Museum*, 58: 621-680.
- KABALAK, M. & SERT, O. 2011. Systematic studies on the male genital organs of Central Anatolian Elateridae (Coleoptera) Species part I: the subfamilies Elaterinae and Melanotinae. *Hacettepe Journal of Biology and Chemistry*, 39: 71-82.
- KUKALOVA-PECK, J. & LAWRENCE, J.F. 2004. Relationships among coleopteran suborders and major endoneopteran lineages: Evidence from hind wing characters. *European Journal of Entomology*, 101(1): 95-144.
- LACORDAIRE, J.T. 1857. *Histoire Naturelle des Insectes. Genera des Coléoptères*. Paris, Librairie Encyclopédique de Roret. v. 4, 579 p.
- LAWRENCE, J.F. & NEWTON, A.F. 1995. Families and subfamilies of Coleoptera (with selected genera, notes, references and data on family-group names). In: Pakaluk, J. & Slipinski, S.A. (Eds.). *Biology, Phylogeny, and Classification of Coleoptera*. Warszawa, Muzeum i Instytut Zoologii PAN. v. 2, p. 779-1006.
- LAWRENCE, J.F., ŚLIPIŃSKI, A.; SEAGO, A.E.; THAYER, M.K.; NEWTON, A.F. & MARVALDI, A.E. 2011. Phylogeny of the Coleoptera based on morphological characters of adults and larvae. *Annales Zoologici (Warszawa)*, 61: 1-217.
- LUCAS, P.H. 1857. Entomologie. In: Laporte, F.L.N.C. *Animaux nouveaux ou rares recueillis pendant l'expédition dans les parties centrales de l'Amérique du Sud, Rio de Janeiro à Lima, et de Lima au Para; exécutée par ordre du Gouvernement français pendant les années 1843 à 1847, sous la direction du Comte de Castelnau*. Paris. 204 p.
- MADDISON, W.P. & MADDISON, D.R. 2011. Mesquite: a modular system for evolutionary analysis. Version 2.75, <http://mesquiteproject.org>.
- MANNERHEIM, C.G. 1842. Description d'une nouvelle espèce de genre *Physodactylus*. *Acta Societatis Scientiarum Fennicae*, 1: 93-99.
- MUONA, J. 1993. Review of the phylogeny, classification and biology of family Eucnemidae (Coleoptera). *Entomologica Scandinavica*, 44: 1-133.
- PERTY, J.A.M. 1830. Insecta Brasiliensia. In: Spix, J. & Martius, C. *Delectus animalium articulatorum, quae in itinere per Brasiliam annis 1817-1820 jussu et auspiciis Maximilliani Josephi*

- I Bavariae regis augustissimi peracto*. München, Frid. Fleischer. p. 1-60, pls. 1-12.
- QUATE, L.W. & THOMPSON, S.E. 1967. Revision of Click Beetles of the genus *Melanotus* in America North of Mexico (Coleoptera, Elateridae). *Proceedings of the United States National Museum*, 121: 1-86.
- ROSA, S.P. 2011. New species of *Triplonychus* Candèze and *Globothorax* Fleutiaux from Brazil (Coleoptera, Elateridae, Cardiophorinae). *Zootaxa*, 2831: 1-22
- SCHENKING, S. 1927. Pars 88: Elateridae. In: Schenkling, S. (Ed.). *Coleopterorum Catalogus XI*. Berlin, W. Junk. p. 265-636.
- SCHIMMEL, R. 1996. *Das Monophylum Diminae Candèze, 1863 (Insecta: Coleoptera: Elateridae)*. Bad Durkheim, Pollichia-Buch, 33: 1-227.
- SCHIMMEL, R. & PLATTIA, G. 1992. Neue Arten des supraspezifischen Taxons *Dimina* Candèze, 1863 aus Südostasien (Coleoptera: Elateridae). *Beiträge zur Entomologie* 42(2): 293-315.
- SCHWARZ, O. 1897. Ueber *Athus Henoni* Ab. *Deutsche Entomologische Zeitschrift*, 1897: 63-64
- SCHWARZ, O. 1902. Neue Elateriden. *Stettiner Entomologische Zeitung*, 63: 194-316.
- SCHWARZ, O. 1903. Neue Elateriden aus Africa und Madagaskar. *Deutsche Entomologische Zeitschrift*, 1903: 357-376.
- SCHWARZ, O. 1906. Coleoptera, Fam. Elateridae Fasc. 46A. In: Wytzman, P. (Ed.). *Genera Insectorum*. Bruxelles, Verteneuil & Desmet, p. 310-315.
- STIBICK, J.N.L. 1979. Classification of the Elateridae (Coleoptera). Relationships and classification of the subfamilies and tribes. *Pacific Insects*, 20: 145-186.
- VAN ZWALUWENBURG, R.H. 1953. Note: *Patriciella*, new name. *Proceedings of the Hawaiian Entomological Society*, 15: 20.

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## APPENDIX 1

## List of additional examined material and junior synonym types

*Teslasena femoralis* (Lucas, 1857)

BRAZIL. *Rondônia*: Vilhena, XI.1987, O. Roppa & P. Magno col, 3 exs. (MZUSP); *Mato Grosso*: Vera, X.1973, Alvarenga & Roppa col. 50 exs. (MNRJ), 11 exs. (MZUSP), Vila Vera; X.1973, Roppa & Alvarenga col., ex Coll. Campos Seabra, 1 ex. (MZUSP); Chapada dos Parecis, 14°15'50.80"S, 59°14'02.05"W, A. Foucart col, 5 exs. (MZUSP); 65 exs. (MNHN); Murtinho, R. Spitz col., 27.XI.29, 1 ex. (MZUSP); idem but 1929, 1 ex.; 16.XII.29, 1 ex.; 27.XI.1929, 1 ex. (MZUSP); Utiariti, Rio Papagaio, 22-31.X.1966, Lenko & Pereira col., 1 ex. (MZUSP); Chapada dos Guimarães, 03-13.XI.2008, S.P. Rosa, F. Fernandes, R. Kawada e J. Almeida col., 8 exs. (MZUSP); Chapada dos Guimarães, 28.I.1961, J & B. Bechyné col., 2 exs. (MZUSP); Campo Verde, Fazenda Mourão, 18.I.2003, 3 exs. (MZUSP); idem but 19.I.2004, 1 ex. (MZUSP). *Mato Grosso do Sul*: Três Lagoas, International Paper, Horto Rio Verde, Flechtmann, C.A.H. col., 07.XII.1993, 3 exs. (MZUSP); idem but 02.XI.1992, 2 exs.; 28.IX.1993, 1 ex.; 07.XII.1993, 1 ex.; 12.X.1993, 2 exs.; 03.VIII.1993, 1 ex. (MZUSP); Três Lagoas, marg(em). esq(uerda). do Rio Sucuriu, Faz(end) Canaã, I.1968, F. Lane col., 4 exs. (MZUSP); Maracaju, Shannon Lane col., 03.(1)937, 1 ex. (MZUSP); Cassilândia, Faz(end) Olho d'Água, 02.XI.1986, E.I.H. Bechara, S. Ide, V. Viviani, L. Ferro, J. Sanchez col., 1 ex. (MZUSP); Costa Rica, Fazenda Santo Antonio, 08-14.II.1986, E.P. Teixeira col., 6 exs. (MZUSP); idem but 07-14.II.1986, 24 exs. (MZUSP); Faz(end) Santa Cruz, 16.XII.1993, Exp. MZ-IQUSP col., 17 exs. (MZUSP). *Goiás*: Jataí, XI.1972, F.M. Oliveira col., 2 exs. (DZUP), 1 ex. (MZUSP); IX-XI.1897 ex Coll. E. Fleutiaux, 5 exs. (MNHN); Rio Verde, 19-28.XI.1966, G.R. Kloss col., 1 ex. (MZUSP); [Mineiros, Parque Nac(ional) (das) Emas, 25.X-01.XI.1986, Bechara, Ide, Viviani, Ferro e Sanchez col., 1 ex. (MZUSP); Mineiros, X.1994, O. Roppa & P. Magno col, 3 exs. (MZUSP), 3 exs. (MNRJ); Goiatuba, I.1946, J. Guer(in) col, 1 ex. (IBSP).

Holotype of *Teslasena lucasi* Fleutiaux, 1899: [Jatáhy, Prov. Goyas Brèsil, Sept. a Nov. 97], [Fleut. Ann. Soc. Ent. Fr. 1899 p. 206], [*Teslasena lucasi* Fleut., Type, Collection FLEUTIAUX], [Lectotype], [*Teslasena lucasi* Fleutiaux, J. Chassain det. 05], [Muséum Paris, Coll. E. Fleutiaux] male (MNHN). Paratypes: [Jatáhy, Goyas. Brèsil], [*Teslasena lucasi* Fleut.], [Paralectotype], [*Teslasena lucasi* Fleutiaux, J. Chassain det. 05], [Muséum Paris, Coll. E. Fleutiaux] 2 exs. (MNHN).

*Idiotropia henoni* (Abeille de Perrin, 1894)

Without locality, ex Collection Hénon, ex collection Fleutiaux, 5 exs. (MNHN); ex coll. Perrandièn, ex Coll. E. Fleutiaux, 1 ex. (MNHN).

*Oligostethius capensis* (Schwarz, 1903)

SOUTH AFRICA. 1903-130, Janson col., 1 ex. (BMNH).

*Toxognathus beauchenei* Fleutiaux, 1918

VIETNAM. Tonkin, ex Coll. E. Fleutiaux, 1 male (MNHN); Tam-Dao, alt. 1100-1300 m, ex Coll. Le Moul, ex Coll. E. Fleutiaux, 1 male (MNHN).

*Dactylophysus capixabensis* nom. nov.

BRAZIL. *Espírito Santo*: ex Coll. E. Fleutiaux, 2 exs. (MNHN).

*Dactylophysus tibialis* (Candèze, 1859)

BRAZIL. ex Coll. Chevrolat, ex Coll. Fleutiaux, 1 male (MNHN); ex Coll. Thorey, ex Coll. E. Fleutiaux, 1 male (MNHN); ex Coll. E. Fleutiaux, 1 female (MNHN).

*Physodactylus besckei* Mannerheim, 1842

BRAZIL. Without locality, ex Coll. Chevrolat, ex Coll. Fleutiaux, 1 ex. (MNHN); ex Coll. Mniszech, ex Coll. Fleutiaux, 1 male (MNHN); São Paulo [St. Paul], ex Coll. Chevrolat, ex Coll. Fleutiaux, 2 exs. (MNHN); idem but ex Coll. Bonvouloir, ex Coll. Fleutiaux, 2 exs. (MNHN).

*Physodactylus brasiliensis* Fleutiaux, 1892

BRAZIL. *Minas Gerais*: João Monlevade, ex Coll. Fleutiaux (compared to type), 1 ex. (MNHN). Serra (do) Caraça, 1380 m, XI.1961, Kloss, Lenko, Martins & Silva col., 2 exs. (MZUSP). Serra do Cipó, 27.X.1974, Froelich col., 1 ex. (MZUSP).

*Physodactylus foveostriatus* Fleutiaux, 1892

BRAZIL. Without locality, ex Coll. Fleutiaux, 3 exs. (MNHN); *Bahia*: ex Coll. Fleutiaux, 2 exs. (MNHN).



***Physodactylus henningi* Fischer von Waldheim, 1823**

BRAZIL. Without locality, ex Coll. Fleutiaux 2 exs. (MNHN); *Bahia*: ex Coll. E. Fleutiaux, 4 exs. (MNHN); Andaraí, Mata Carrasco, 13-14.XII.1990, S.T.P. Amarante col, 1 ex. (MZUSP); *Minas Gerais*: Linhares, XI.(19)65, A. Maller col, 2 exs. (DZUP), 1 ex. (MZUSP); 1(I).(19)66, 1 male, 1 female (MZUSP); idem but 1(I).(19)65, 1 ex. (DZUP); XI.1964, 1 ex. (MZUSP); Barra do São Francisco [Córrego Itá], 10-31.X.1956, W. Zikan col, 10 exs. (MZUSP); XI.1954, W. Zikan col, 1 ex. (DZUP); XI-1956, W. Zikan col, 10 exs. (MNRJ); idem, 7 exs. (MZUSP); I.1956, ex Coll. M. Alvarenga, W. Grossmann col., 2 exs. (DZUP); Conceição da Barra, 08-14.X.(19)68, C. & C.T. Elias col; 1 ex. (DZUP); Aracruz, 08.III.1989, J.B. Silva col., 3 exs. (MZUSP).

Holotype of *Physodactylus henningi* var. *erythrocephalus* Fleutiaux, 1892. [*Physodactylus erythrocephalus* Chv., Brasília, Collection Chevrolat], [Collection Chevrolat], [Type], [*Physodactylus henningi* Fisch., v. *erythrocephalus* (Chv.)], [Fleut. type ♂, conformis (Chev.) Brèsil], [*P. henningi* v. *erythrocephalus* Fleut. Ann. Soc. Ent. Fr. 1892, p. 406, Collection CHEVROLAT], [Muséum Paris, Coll. E. Fleutiaux], [Lectotype], [*Physodactylus henningi* Fischer v. *erythrocephalus* Flx., J. Chassain det. 05], 1 ex. (MNHN). Paratypes: [*Physodactyla conformis* Chv, Brasília, ex mus. Castelnau], [Chevrolat], [Collection Chevrolat], [*Erythrocephalus*], [Fleut. Ann. Soc. Ent. Fr. 1892, p. 406, Collectio FLEUTIAUX], [Muséum Paris, Coll. E. Fleutiaux], [Paralectotype], [*Physodactylus henningi* Fisch. v. *erythrocephalus* Flx., J. Chassain det. 05], 1 ex. (MNHN); [Collection Bonvouloir], [Fltx. 1891], [*Physodactylus henningi* Fisch. v. *erythrocephalus* Fleut. ♂, Brèsil], [1940, FLEUTIAUX det.], [Muséum Paris, Coll. E. Fleutiaux], [*Physodactylus henningi* Fisch. v. *erythrocephalus* Flx., J. Chassain det. 05], 1 ex. (MNHN).

Holotype *Physodactylus henningi* var. *nigricollis* Fleutiaux, 1940. [Brèsil], [ex-Musaeo Mniszecz], [Fltx. 1891], [Henningi Fisch., v. *nigricollis* Fleut., FLEUTIAUX det. Type], [Muséum Paris, Coll. E. Fleutiaux], [Lectotype], [*Physodactylus henningi* Fisch. v. *nigricollis* Fleut., J. Chassain det. 05], 1 ex. (MNHN).

Holotype of *Physodactylus henningi* var. *puncticollis* Fleutiaux, 1940. [Bahia, Brasil], [Collection E. Fleutiaux], [*Physodactylus henningi* Fisch. v. *puncticollis* Fleut., type, Collection FLEUTIAUX], [Lectotype], [*Physodactylus henningi* Fisch. v. *puncticollis* Fleut., J. Chassain det. 05], 1 ex. (MNHN).

***Physodactylus niger* Fleutiaux, 1892**

BRAZIL. *Goiás*: Jataí, [1895, 1896 Ch. Pujol], ex Coll. E. Fleutiaux, 1 ex. (MNHN); Rio Verde, 07.XI.1945, Coll. H. Zellibor, 3 exs. (MZUSP). *Mato Grosso do Sul*: Três Lagoas, International Paper, Horto Rio Verde, Flechtmann, C.A.H. col. 22.XII.1994, 1 ex. (MZUSP); idem but 01.XII.1994, 2 exs. (UNESP-IS); Selvíria, UNESP's Farm, Flechtmann, C.A.H. col. 17.XI.1989, 1 ex. (MZUSP). *São Paulo*: Ribeirão Preto, Rio Tamandua, 15.XI.54, Dr. Duret col. 1 ex. (MNHN); ex Coll. DURET [788/93], ex Coll. E. Fleutiaux, 1 ex. (MNHN); Dr. G.V. Sydow, 05.II.1923, 1 ex. (MNHN); Faculdade de Medicina, XI.1954, Barreto col., 18 exs. (MZUSP); Mogi Guaçu, Faz(end) Campininas, 01-08.I.1970, J.M. & B.A. Campbell col, 13 exs. (MZUSP); idem, but 29-31.XII.1969, 3 exs. (CNC); Araras, 18.XII.1981, R.C. Devitte col, 2 exs. (MZUSP); idem but 06.X.1981, 2 exs. (MZUSP, J. Borges col., 1979, 3 exs. (MZUSP); Dirings col., X.1955], 2 exs. (MZUSP); Orlandia, 21.X.1962, Exp. Dep. Zool. col., 3 exs. (MZUSP); Sud Menucci, 27.XII.1993, A.C. Lofego col., 3 exs. (MZUSP); Pradópolis, P.S.M. Botelho, XI.1977, 2 exs. (MZUSP); São José do Rio Preto 24-31.XII.1972, M.E. Jorge col., 1 ex. (MZUSP); Pirassununga, Schubart col., 15.II.1945, 1 ex. (MZUSP); idem but 20.XII.1975, 1 ex.; 30-I.1949, 1 ex. 07.II.1945, 1 ex.; 27.XII.1945, 1 ex.; 06.I.1946, 1 ex.; 21.I.1945, 1 ex. (MZUSP); Assis [II 18 Newmann], 1 ex. (MZUSP); Magda, 03-10.I.1959, J. Lane col., 1 ex. (MZUSP); Indiana, 15.XII.1934, 1 ex. (MZUSP); Piracicaba, 08.XII.1965, C.A. Triplehorn col., 1 ex. (MZUSP); Guatapará, I.1945, M. Carrera col., 1 ex. (MZUSP); Batatais, Coll. J. Guerin, 1 ex. (IBSP). *Minas Gerais*: Uberaba, ex Collection Fleutiaux, 1 ex., (MNHN).

Holotype of *Physodactylus carreti* syn. nov. [Brèsil], [Brèsil (carreti) Fairmaire], [TYPE], [Lectotype], [*Physodactylus carreti* Fleutiaux], male (MNHN).

Holotype of *P. carreti* v. *testaceipennis* syn. nov. [Uberaba, Minas Gerais], [*Physodactylus carreti* var. *testaceipennis* type, COLLECTION FLEUTIAUX], [Lectotype], [*Physodactylus carreti* var. *testaceipennis* Fleut., J. Chassain det. 05], male (MNHN).

***Physodactylus sulcatus* Fleutiaux, 1940**

BRAZIL. *Mato Grosso do Sul*: Corumbá, ex Coll. E. Fleutiaux 1 ex. (MNHN). *Mato Grosso*: Rosario Oeste, I.1971, Dirings col., 1 ex. (MZUSP); idem but II.1971, 3 exs.; X.1973, 1 ex. (MZUSP); Vera, X.1973, M. Alvarenga col. 4 exs. (CNC); 3 exs. (MZUSP); Sinop, X.1975, M. Alvarenga col., 2 exs. (CNC), 2 exs. (MZUSP); idem but X.1976, 2 exs. (CNC).

Holotype of *Physodactylus obesus* syn. nov. [Corumba Matt Grosso], [*Physodactylus obesus* Fleut. Type, COLLECTION FLEUTIAUX], [TYPE], [Muséum Paris, Coll. E. Fleutiaux], [Lectotype], [*Physodactylus obesus* Fleutiaux, J. Chassain det. 05], (MNHN).

Holotype of *Physodactylus testaceus* syn. nov. [Cuyaba, Matt. Grosso], [*Physodactylus testaceus* Fleut., Type, COLLECTION FLEUTIAUX], [Type], [Muséum Paris, Collection E. Fleutiaux], [Lectotype], [*Physodactylus testaceus* Fleut., J. Chassain det. 05], male (MNHN).

**Outgroups**

*Ampedus sanguinolentus* (Schränk, 1776). Without locality, 27.II.1982, T. Pavlíček, 1 ex. (MZUSP).

*Athous vittatus* (Fabricius, 1792). Without locality, 15.05.1979, T. Pavlíček, 2 exs. (MZUSP). [MOR. 15.05.1979, Pavlovské, Urchy, T. Pavlíček], 1 ex. (MZUSP).

*Cardiophorus tenebrosus* Leconte, 1853. CANADA. Saskatchewan: Saskatoon, 15.V.1957, A.R. Brooks col., 3 exs. (MZUSP).

*Ceratogonis spinicornis* (Fabricius, 1801). BRAZIL, *Mato Grosso do Sul*: [Rio] Taquarassu, XI.1949, Dirings col., 3 exs. (MZUSP).

*Ctenicera silvatica* (Van Dyke, 1932). UNITED S. California: Lassen Peak [Mt. Lassen] 10.VII.(19)63, D.J. & J.N. Knull col., 1 ex. (MZUSP). Canada. British Columbia: Robson, 10.V.1940, H.R. Foxleecol., 1 ex. (MZUSP). idem, but 01.VI.1948, 1 ex. (MZUSP).

*Dicrepidius ramicornis* (Palisot de Beauvois, 1805). BRAZIL. *Paraná*: Ponta Grossa, XII.1988, C.A. Camargo col., 5 exs. (MZUSP).

*Heterocrepidius depressus* Candèze, 1859. BRAZIL. *Goia's*: Leopoldo Bulhões, XII.1933, Coll, R. Spjtz, 3 exs. (MZUSP); XII. 1937, Dr. Nick col., 1 ex. (MZUSP).

*Heterocrepidius gilvellus* Candèze, 1859. BRAZIL. *Mato Grosso do Sul*: Três Lagoas, Faz(enda) Canaã, F. Lane col., 8 exs. (MZUSP).

*Horistonotus* sp. BRAZIL. *Santa Catarina*: Nova Teotônia, IX.1966, F. Plaumann col, 5 exs. (MZUSP).

*Melanotus similis* (Kirby, 1837). UNITED S. Texas: Fort Davis, 19.VI.1963, G.H. Nelson col., 2 exs. (MZUSP); idem but 13.VI.1963, 3 exs. (MZUSP).

*Patriciella* sp. AUSTRALIA. Alice Springs, Hamilton Downs Station, 60 km NW, 11.XI.1976, G. Griffin col., 1 ex. (MZUSP).

*Physorinus erythrocephalus* (Fabricius, 1801). BRAZIL. *Espírito Santo*: Linhares, XI.1972, P.C. Elias col. 5 exs. (MZUSP).

*Scaptolenus lecontei* Chevrolat, 1874. UNITED S. Ithaca: Cornell University, X-XII.(19)06, G. Hammar col., 3 exs. (MZUSP).

*Triplonychus cruspinosus* Rosa, 2011, *Triplonychus crassifemoris* Rosa, 2011, *Triplonychus tibialatus* Rosa, 2011 and *Globothorax latidens* Rosa, 2011: Complete list of material examined in Rosa (2011).

*Triplonychus plagiatus* (Erichson, 1846). BRAZIL. *Pará*: Itaituba, Rio Tapajoz, I.1961, Dirings col., 4 exs. (MZUSP).

APPENDIX 2

Data matrix for Physodactylinae. (?) missing data; (-) innaplicable characters

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
<i>Ceratogonis spinicornis</i>	1	0	-	0	0	?	-	0	1	0	-	0	-	-	0	0	0	1	0	2	0	4
<i>Lissomus</i> sp.	2	0	-	1	0	1	0	0	2	1	0	0	1	3	0	1	1	1	0	2	0	0
<i>Scaptolenus lecontei</i>	0	0	-	1	0	1	0	1	0	0	-	0	-	-	0	0	0	0	0	0	0	4
<i>Semiotus distinctus</i>	0	0	0	0	0	2	1	0	1	1	0	0	1	3	0	1	0	1	0	2	0	4
<i>Ctenicera silvatica</i>	0	0	-	0	0	2	1	0	1	1	0	0	1	3	0	1	1	1	0	2	0	4
<i>Melanotus similis</i>	0	1	0	1	0	2	1	0	1	1	0	1	1	3	0	1	1	0	1	2	0	1
<i>Ampedus sanguinolentus</i>	1	0	-	1	0	2	1	0	2	1	0	0	1	3	0	1	1	0	0	2	0	4
<i>Athous vittatus</i>	0	1	1	1	0	2	1	0	1	1	0	0	1	3	0	1	1	1	1	2	0	0
<i>Physorhinus erythrocephalus</i>	1	1	1	1	0	2	1	0	2	1	0	0	1	2	0	1	0	0	0	2	0	2
<i>Dicrepidius ramicornis</i>	1	1	0	0	0	1	1	0	1	1	0	0	1	3	2	1	0	0	0	2	0	3
<i>Heterocrepidius depressus</i>	0	1	0	1	0	2	1	1	1	1	0	0	1	3	0	0	0	0	2	0	0	0
<i>Heterocrepidius gilvellus</i>	0	1	0	1	0	1	1	0	1	1	0	0	1	3	0	0	0	0	0	2	0	3
<i>Cardiophorus tenebrosus</i>	2	1	0	0	0	2	1	0	1	1	0	0	0	1	0	1	0	1	1	?	0	1
<i>Patriciella</i> sp.	0	1	0	0	0	2	2	1	0	0	-	0	0	0	0	0	0	0	1	3	0	1
<i>Horistonotus</i> sp.	0	1	1	0	0	1	1	0	3	1	0	0	0	1	0	1	0	1	1	0	1	1
<i>Globothorax latidens</i>	0	0	-	0	0	0	1	1	0	1	1	0	0	1	0	0	0	1	1	2	1	1
<i>Triplonychus plagiatus</i>	0	1	1	0	0	2	1	0	3	1	0	0	0	1	0	0	1	1	1	0	1	1
<i>Triplonychus crassifemoris</i>	0	1	1	0	0	2	1	1	0	1	1	0	0	1	0	0	1	1	1	0	0	1
<i>Triplonychus cruspinosus</i>	0	1	1	0	0	2	1	1	0	1	1	0	0	1	0	0	1	1	1	0	0	1
<i>Triplonychus tibialatus</i>	0	1	0	0	0	2	1	1	0	1	1	0	0	1	0	0	1	1	1	0	1	1
<i>Idiotropia benoni</i>	0	0	-	1	0	2	1	1	1	1	1	0	1	3	0	2	0	0	2	2	0	0
<i>Oligostethius capensis</i>	2	0	-	1	0	2	1	1	1	1	1	0	1	3	0	?	0	0	1	2	0	0
<i>Teslasena femoralis</i>	0	1	0	0	0	0	1	1	0	1	1	0	0	1	0	0	1	1	1	0	0	1
<i>Toxognathus costulatus</i>	0	1	0	1	0	1	2	0	0	1	0	1	1	3	0	2	0	0	0	0	0	1
<i>Toxognathus coomani</i>	0	1	0	1	0	1	2	0	1	1	0	1	1	3	0	2	0	0	1	2	0	1
<i>Dactylophysus capixabensis</i> nom. nov.	0	1	0	1	0	2	1	1	0	1	0	0	1	3	0	0	0	0	0	2	0	2
<i>Dactylophysus hirtus</i> sp. nov.	0	1	0	1	0	2	1	1	0	1	0	0	1	3	0	0	0	0	0	2	0	2
<i>Physodactylus henningi</i>	1	1	0	1	1	1	2	1	0	1	0	0	1	3	0	0	0	0	0	2	0	2
<i>Physodactylus asper</i> sp. nov.	1	1	0	1	1	1	2	1	0	1	0	0	1	3	0	0	0	0	0	2	0	2
<i>Physodactylus chassaini</i> sp. nov.	1	1	0	1	1	1	2	1	0	1	0	0	1	3	0	0	0	0	0	2	0	2
<i>Physodactylus brunneus</i> sp. nov.	1	1	0	1	1	1	2	1	0	1	0	0	1	3	0	0	0	0	0	0	0	2
<i>Physodactylus girardi</i> sp. nov.	1	1	0	1	1	1	2	1	0	1	0	0	1	3	0	0	0	0	0	2	0	2
<i>Physodactylus gounellei</i> sp. nov.	1	1	0	1	1	1	2	1	0	1	0	0	1	3	0	0	0	0	0	2	0	2
<i>Physodactylus brasiliensis</i>	0	1	1	1	1	1	2	1	0	1	0	0	1	3	0	0	0	0	0	1	0	2
<i>Physodactylus niger</i>	0	1	1	1	1	1	2	1	0	1	0	0	1	3	0	0	0	0	0	1&2	0	2
<i>Physodactylus sulcatus</i>	0	1	0	1	1	1	2	1	0	1	0	0	1	3	1	0	0	0	0	2	0	2
<i>Physodactylus flavicaput</i> sp. nov.	0	1	0	1	1	1	2	1	0	1	0	0	1	3	1	0	0	0	0	1	0	2
<i>Physodactylus patens</i> sp. nov.	0	1	0	1	1	1	2	1	0	1	0	0	1	3	1	0	0	0	0	0&2	0	2
	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
<i>Ceratogonis spinicornis</i>	0	0	2	1	0	1	0	1	1	0	-	0	1	0	1	0	1	0	0	0	0	0
<i>Lissomus</i> sp.	1	?	1	1	0	0	1	0	1	0	-	1	0	1	1	0	1	0	1	1	1	0
<i>Scaptolenus lecontei</i>	0	0	1	2	1	0	0	1	0	0	-	0	2	0	1	1	1	0	0	0	0	1
<i>Semiotus</i> sp.	1	0	2	2	1	0	0	0	1	1	0	0	2	0	1	0	1	0	1	3	1	0
<i>Ctenicera silvatica</i>	1	0	1	2	1	0	0	0	1	1	0	0	2	0	1	0	1	0	0	0	0	0
<i>Melanotus similis</i>	1	0	1	1	0	0	0	0	1	1	0	0	0	0	1	0	1	3	0	0	0	0
<i>Ampedus sanguinolentus</i>	1	0	1	2	1	0	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0
<i>Athous vittatus</i>	1	0	1	1	0	0	0	0	1	1	0	0	2	0	1	0	1	0	0	0	0	0
<i>Physorhinus erythrocephalus</i>	1	0	1	1	0	0	0	0	1	0	-	0	0	1	1	0	1	0	0	1	0	0
<i>Dicrepidius ramicornis</i>	1	0	2	2	1	0	0	0	1	1	0	0	0	1	1	0	1	0	1	1	1	0
<i>Heterocrepidius depressus</i>	0	0	1	2	1	0	0	1	1	1	0	0	0	0	1	0	1	0	1	1	0	0
<i>Heterocrepidius gilvellus</i>	0	0	1	2	1	0	0	0	1	1	0	0	0	1	1	0	1	0	1	1	0	0
<i>Cardiophorus tenebrosus</i>	1	0	0	0	0	0	0	1	1	1	0	0	1	0	0	1	0	0	0	0	0	0
<i>Patriciella</i> sp.	0	0	1	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	0	0	1
<i>Horistonotus</i> sp.	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	1	0	0	0	0
<i>Globothorax latidens</i>	0	0	1	2	0	0	0	1	1	1	2	0	1	0	0	1	0	2	0	0	0	1
<i>Triplonychus plagiatus</i>	1	1	0	0	0	0	0	0	1	1	1	0	1	0	0	1	0	2	0	0	0	0

<i>Triplonychus crassifemoris</i>	1	1	0	0	0	0	0	0	1	1	1	0	1	0	0	1	0	2	0	0	0	1
<i>Triplonychus cruspinosus</i>	0	1	0	0	0	0	0	0	1	1	1	0	1	0	0	1	0	2	0	0	0	0
<i>Triplonychus tibialatus</i>	0	1	0	0	0	0	0	0	1	1	2	0	1	0	0	1	0	2	0	0	0	1
<i>Idiotropia henoni</i>	0	0	1	2	1	1	1	1	1	1	0	1	-	-	-	-	-	0	0	0	0	0
<i>Oligostethius capensis</i>	1	0	1	2	1	1	1	1	1	1	0	1	-	-	-	-	0	0	0	0	0	0
<i>Teslasena femoralis</i>	0	1	0	0	0	0	0	1	1	1	4	0	0	0	0	1	0	1	0	0	0	1
<i>Toxognathus costulatus</i>	0	0	1	2	1	0	0	0	1	1	0	0	1	1	1	0	0	3	0	0	0	0
<i>Toxognathus coomani</i>	0	0	1	2	1	0	0	0	1	1	0	0	1	1	1	0	0	3	0	0	0	0
<i>Dactylophysus capixabensis</i> nom. nov.	1	0	1	2	1	0	0	0	1	1	0	0	0	0	1	0	1	0	1	1	1	0
<i>Dactylophysus hirtus</i> sp. nov.	1	0	1	2	1	0	0	0	1	1	0	0	0	0	1	0	1	0	1	1	0&1	0
<i>Physodactylus henningi</i>	0	0	1	2	1	0	0	1	0	1	0	0	1	0	1	0	1	0	1	1	1	1
<i>Physodactylus asper</i> sp. nov.	0	0	1	2	1	0	0	1	0	1	3	0	0	1	1	0	1	0	1	1	0	1
<i>Physodactylus chassaini</i> sp. nov.	0	0	1	2	1	0	0	1	0	1	0	0	0	1	1	0	1	0	1	1	1	1
<i>Physodactylus brunneus</i> sp. nov.	0	0	1	2	1	0	0	1	0	1	0	0	0	1	1	0	1	0	1	1	0&1	1
<i>Physodactylus girardi</i> sp. nov.	0	0	1	2	1	0	0	1	0	1	3	0	0	1	1	0	1	0	1	1	0	1
<i>Physodactylus gounellei</i> sp. nov.	0	0	1	2	1	0	0	1	0	1	0	0	0	1	1	0	1	0	1	1	1	1
<i>Physodactylus brasiliensis</i>	0	0	1	2	1	0	0	1	0	1	0	0	0	1	1	0	1	0	1	1	1	1
<i>Physodactylus niger</i>	0	0	1	2	1	0	0	1	0	1	0	0	0	1	1	0	1	0	1	1	0	1
<i>Physodactylus sulcatus</i>	0	0	1	2	1	0	0	1	0	1	4	0	0	1	1	0	1	0	1	1	0&1	1
<i>Physodactylus flavicaput</i> sp. nov.	0	0	1	2	1	0	0	1	0	1	4	0	0	1	1	0	1	0	1	1	1	1
<i>Physodactylus patens</i> sp. nov.	0	0	1	2	1	0	0	1	0	1	4	0	0	1	1	0	1	0	1	1	1	1
	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
<i>Ceratogonis spinicornis</i>	0	0	0	1	1	1	0	2	?	0	0	2	-	0	0	0	0	-	1	0	?	1
<i>Lisomus</i> sp.	0	0	0	0	0	0	0	?	1	1	0	0	-	1	0	0	0	-	0	0	0	1
<i>Scaptolenus lecontei</i>	0	1	1	0	0	-	0	2	1	0	0	1	1	1	0	0	1	1	0	0	1	1
<i>Semiotus</i> sp.	0	0	0	0	0	0	0	2	0	1	0	2	0	1	0	0	1	0	0	0	1	1
<i>Cenicera silvatica</i>	0	0	0	1	0	0	0	2	1	0	0	0	-	1	0	0	1	2	0	0	1	1
<i>Melanotus similis</i>	0	0	0	1	0	0	0	2	1	0	0	0	-	1	0	0	1	2	0	0	0	1
<i>Ampedus sanguinolentus</i>	0	0	0	1	0	0	0	0	1	0	0	2	-	1	0	0	1	0	0	0	0	1
<i>Athous vittatus</i>	0	0	0	1	0	0	0	0	1	0	0	1	0	1	0	0	1	0	0	0	1	1
<i>Physorhinus erythrocephalus</i>	0	0	0	3	1	0	0	2	0	1	0	1	0	1	2	0	0	-	1	2	0	1
<i>Dicrepidius ramicornis</i>	0	0	0	1	0	0	0	2	1	1	1	1	0	1	2	0	1	1	0	0	0	0
<i>Heterocrepidius depressus</i>	0	1	0	3	1	1	1	0	1	0	1	1	0	1	1	0	1	0	1	0	1	1
<i>Heterocrepidius gilvellus</i>	0	1	0	2	1	1	1	1	1	0	1	1	0	1	1	0	1	0	1	0	1	1
<i>Cardiophorus tenebrosus</i>	0	0	0	1	0	0	0	2	0	0	0	1	0	1	0	1	0	-	1	0	0	1
<i>Patriciella</i> sp.	1	1	1	1	1	1	0	2	0	0	0	1	1	1	0	1	0	-	0	0	0	1
<i>Horistonotus</i> sp.	0	0	0	1	0	0	0	2	0	0	0	1	1	1	0	1	0	-	0	1	0	0
<i>Globothorax latidens</i>	1	1	0	1	0	0	0	2	0	0	0	1	1	1	0	1	0	-	0	2	0	0
<i>Triplonychus plagiatus</i>	0	0	0	1	1	0	0	2	0	0	0	0	-	1	0	1	0	-	0	0	0	1
<i>Triplonychus crassifemoris</i>	1	1	0	1	1	0	0	2	0	0	0	1	1	1	0	1	0	-	0	1	0	1
<i>Triplonychus cruspinosus</i>	0	0	0	2	1	0	0	2	0	0	0	1	1	1	0	1	0	-	0	0	0	1
<i>Triplonychus tibialatus</i>	1	1	0	1	1	0	0	2	0	0	0	1	1	1	0	1	0	-	0	1	0	0
<i>Idiotropia henoni</i>	0	0	0	1	0	0	0	0	1	0	0	0	-	0	0	0	1	1	0	0	1	1
<i>Oligostethius capensis</i>	0	0	0	1	0	0	0	0	0	0	0	0	-	0	0	0	1	0	0	0	1	0
<i>Teslasena femoralis</i>	1	1	1	1&2	1	1	0	2	0	0	0	1	1	1	0	1	0	-	0	2	0	0
<i>Toxognathus costulatus</i>	0	1	1	1	0	1	0	0	1	1	0	1	0	1	1	0	1	0	1	0	1	1
<i>Toxognathus coomani</i>	0	0	0	1	0	1	0	0	1	1	0	1	0	1	1	0	1	0	0	0	1	1
<i>Dactylophysus capixabensis</i> nom. nov.	0	1	0	1&2	1	1	0	1	1	1	1	1	0	1	1	0	1	0	0	0	1	1
<i>Dactylophysus hirtus</i> sp. nov.	0	1	0	2	1	1	0	1	1	1	1	1	0	1	1	0	1	0	0	0	1	1
<i>Physodactylus henningi</i>	0	1	1	4	1	1	0	0	1	1	1	1	0	1	1	0	1	0	0	0	0	1
<i>Physodactylus asper</i> sp. nov.	0	1	1	4	1	1	0	0	1	1	1	1	0	1	1	0	1	0	0	0	1	1
<i>Physodactylus chassaini</i> sp. nov.	0	1	1	4	1	1	0	0	1	1	1	1	0	1	1	0	1	0	0	0	1	1
<i>Physodactylus brunneus</i> sp. nov.	0	1	1	4	1	1	0	0	1	1	1	1	0	1	1	0	1	0	1	0	0	1
<i>Physodactylus girardi</i> sp. nov.	0	1	0	4	1	1	0	0	1	1	1	1	0	1	1	0	1	0	0	0	1	1
<i>Physodactylus gounellei</i> sp. nov.	0	1	1	4	1	1	0	0	1	1	1	1	0	1	1	0	1	0	0	0	0	1
<i>Physodactylus brasiliensis</i>	0	1	1	4	1	1	0	0	1	1	1	1	0	1	1	0	1	0	0	0	1	1
<i>Physodactylus niger</i>	0	1	1	4	1	1	0	0	1	1	1	1	0	1	1	0	1	0	1	0	1	1
<i>Physodactylus sulcatus</i>	0	1	1	4	1	1	0	0	1	1	1	1	0	1	1	0	1	0	0	0	1	1
<i>Physodactylus flavicaput</i> sp. nov.	0	1	1	4	1	1	0	0	1	1	1	1	0	1	1	0	1	0	1	0	1	1
<i>Physodactylus patens</i> sp. nov.	0	1	1	4	1	1	0	0	1	1	1	1	0	1	1	0	1	0	1	0	1	1