

## A REVISION OF THE GENUS *DORU* BURR (DERMAPTERA, FORFICULIDAE)

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### ABSTRACT

A taxonomic revision of the genus *Doru* is given, the synonymy of the species being fully discussed and the reasons for the present interpretation of the species outlined. The segregation of the species has been partly based on the shape of the male parameres, but these are not necessarily characteristic. A key to the species based on external characters is given, and two new species are described. The more common species have been found to be *lineare* Eschscholtz (= *luteipenne* of authors, not of Serville); *luteipes* Scudder and *taeniatum* Dohrn. The two latter species represent the *lineare* of authors, not of Eschscholtz. It is suggested that the single species recorded from Australia, *spiculiferum* Kirby, may have been accidentally introduced into Australia from America.

### INTRODUCTION

Specimens of the genus *Doru* are the most common of the Neotropical Forficulidae, and are well represented in most collections from this Region, but the majority of the specimens have been considered to belong to two species. Both these species have the elytra and wings yellow with a darker sutural stripe, but, except for the legs and antennae, the other parts of the insects differ strikingly in colour. One species is blackish, whilst the other is reddish-brown. The former has been referred to *lineare* Eschscholtz, whilst the latter species has been referred to *luteipenne* Serville, as in the key in Hincks (1949).

During an examination of specimens of *Doru* from Surinam, which on external characters belonged to *lineare*, it was found that the shape of the male parameres of these specimens differed significantly from those of *lineare* as figured in Burr (1916) and more resembled those of *luteipenne* in the same publication. A check on the original descriptions showed that both of these specific names have been misapplied in the British Museum (Natural History) and in the Manchester Museum, and that the black species previously referred to *lineare* consists of two species. This led to a study of the available material of the genus in these two collections, and further to a revision of the entire genus.

The collection in the British Museum (Natural History) contains the following types, all of which have been examined:

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Manchester Museum, University of Manchester, England.

*binotatum* Kirby (holotype); *platensis* Borelli (syntype); *aculeatum* Scudder (two specimens, each labelled "Scudder's types", but evidently syntypes); and *spiculiferum* Kirby (holotype). Specimens of all species, except for *cincinnati* Machado, have been available, and the male genitalia of all available species have been examined, with the exception of that of *binotatum*. The type of this has lost the posterior segments of the abdomen, but it does not belong to the genus *Doru*: its position is explained later.

I wish to express my sincere thanks to Dr. D. R. Ragge, of the British Museum (Natural History) for permission to examine specimens in his charge, and to Dr. D. C. Geijskes, of the Rijksmuseum van Natuurlijke Historie, Leiden, for the loan of the specimens of *Doru* which initiated the present revision. I am particularly indebted to Dr. Ashley B. Gurney, of the United States National Museum, and to Dr. Hans Reichardt, of the Museu de Zoologia, Universidade de São Paulo, for the loan of material and for their kindness in reading the original draft of the manuscript and suggesting useful additions and amendments. A large number of specimens of *Doru* have also been loaned by the California Academy of Sciences, through the kindness of Dr. Paul H. Arnaud, Jr., and also by the Facultad de Agronomia, Universidad Central de Venezuela, through the kindness of Dr. F. Fernandez Yopez.

#### HISTORICAL

Burr (1907: 123) erected the genus *Doru* for a number of species of earwigs in which the male pygidium has the form of a posteriorly directed spine. He remarked "I have separated into this group those species of *Apterygida* with a sharp, pointed or spiny pygidium: they all have a strong family likeness, and are undoubtedly related to *Apterygida*". A key to species was given, which relied on male characters, and which included the following species: *binotatus* Kirby; *subaptera* Kirby, *protensa* Gerstaecker; *exilis* Scudder; *spiculifera* Kirby; *luteipennis* Serville; *luteipes* Scudder; *bimaculata* Fabricius; and *linearis* Eschscholtz, of which the last was designated as the type species. The genus itself formed the sole representative of a new subfamily, Doratinae, erected by Burr in the same paper.

In 1911 (: 75), however, Burr discarded the subfamily Doratinae, and placed *Doru* in the Forficulinae. Included in the genus were six species, and in view of the nomenclatural changes proposed in the present paper, the full list as in Burr (1911: 79) is given below:

- D. bimaculatum* Palisot de Beauvois, 1817
- D. binotatum* Kirby, 1891
- D. exile* Scudder, 1876
- D. lineare* Eschscherschich, 1822
  - Forficula californica* Dohrn, 1865
  - Forficula taeniata* Dohrn, 1862
  - Forficula suturalis* Serville, 1839
  - Forficula aculeatum* Scudder, 1876
  - Forficula luteipes* Scudder, 1876
  - Sphingolabis meridionalis* Kirby, 1891 (male only)

*D. luteipenne* Serville, 1839

*Forficula dichroa* Stal, 1858

*Forficula vellicans* Scudder, 1876

? *Forficula gracilis* Burmeister (*nec* Blanchard), 1838

*D. spiculiferum* Kirby, 1891

In view of subsequent synonymy, the genus *Phaulx* Burr, preceding *Doru* in Burr (1911: 78), and containing a single species, *albipes* Fabricius, should also be listed.

A comparison of the 1907 and 1911 lists shows certain modifications. The reference to Fabricius in 1907 as the author of *bimaculatum* was an error, and this is corrected in 1911. Two names in the 1907 list are not included in 1911: these are *subaptera* Kirby, and *protensa* Gerstaecker. The former is included in the genus *Labia* (Burr, 1911: 56) whilst the latter is given as a synonym of *Spongovostox quadrimaculatus* (Stal) (Burr, 1911: 52). The reference to Eschscherich in 1911 as the author of *lineare* should read Eschscholtz.

Four additional species have been described in *Doru* subsequently: these are *leucopteryx* Burr, 1912; *platensis* Borelli, 1912; *davisi* Rehn and Hebard, 1914; and *cincinnatoi* Machado, 1967. I am indebted to Dr. Hans Reichardt for drawing my attention to the description of the last species.

#### TAXONOMIC CHARACTERS

Since the present study was initiated by the apparent difference in shape between the parameres of *lineare* as figured by Burr (1916), and those of the apparent *lineare* from Surinam, an attempt has been made to use the structure of the male genitalia in order to separate the species. However, in the Forficulidae as a whole the male genitalia tend to be much more uniform in structure than in the more primitive Dermaptera, and are consequently much less useful in taxonomy. The male genitalia of the species of *Doru*, using the terminology of Hincks (1956), consists of a single pene (fig. 21, PE), from which arises a single median distal lobe (fig. 21, DL), sometimes called the praeputial sac. At the distal end of the pene are paired parameres (fig. 21, P). The distal lobe has a small area of fine denticulations towards the tip, and it contains, towards the base, a tubular virga (fig. 21, V) which is broadened basally to form a vesicle; a fine tube arises from the base of the vesicle, and dark, but vaguely outlined areas of sclerotisation are associated with the virga and vesicle. In all *Doru* species the virga has annular thickenings, and is broad and short; the vesicle is scarcely sclerotised, and may be straight, as in *taeniatum* (fig. 21) or strongly curved as in *robustum* (fig. 2). Machado (1967) uses the shape of the vesicle as a taxonomic character, but most species have a weakly curved vesicle, and it is only strongly curved in *robustum*. He also separates *luteipenne* (= *gracilis*) from *lineare* and *cincinnatoi* by the absence of fine denticulations in the praeputial sac, but these denticulations are present in the genitalia of *gracilis* examined, although these are faintly visible. There does seem to be some variation in this

respect, and the denticulations appear to be most conspicuous when the distal lobe is everted (fig. 32).

In all species of *Doru* the genitalia is remarkably similar, but the parameres show some specific differences. The value of these differences, however, is reduced by the variation which occurs in specimens of the same species, and often the parameres of the same genitalia are not identical; this seems to be due to the parameres being weakly sclerotized and possible distortion when mounted in balsam or other material. Conversely, some species which are very distinct externally have very similar genitalia. *D. taeniatum* has parameres which vary in exact shape (figs. 21-25); those of *leucopteryx* are almost identical to those of *luteipes* (fig. 27). The most distinctive parameres are those of *platense* (fig. 29) which are sharply pointed, and those of *robustum* (fig. 2) which are almost parallel-sided.

The shape of the pronotum has been used to separate some species and this character seems useful, although some variation occurs. The pronota of *lineare* (fig. 7) and of *luteipes* (fig. 9) are different in shape and this is associated with a difference in the shape of the male parameres (figs. 27, 28), and in the general colouration. The small difference in the shape of the pronota of *platense* and of *gracilis* (figs. 3, 5) is associated with a difference in the shape of the male parameres (figs. 26, 29) and the male forceps and pygidia (figs. 13, 20).

It should be noted, however, that Rehn & Hebard (1917) stated *Doru albipes*, "The pronotum is found to vary from slightly broader than long (normal) to slightly longer than broad; this is of neither generic or specific value".

The fact that Rehn & Hebard (1917) regarded variation in the shape of the pronotum as an individual feature, rather than one of specific value, would explain why the difference in the shape of the pronotum between *aculeatum* and *davisi* was not mentioned in the original description of the latter species. In this description, Rehn & Hebard (1914) remarked that *davisi* was distinct from *aculeatum* by its more slender form and by the longer pygidial spine of the male, and no mention was made of the difference in the shape of the pronota of these two species. The figure of *davisi* given by these authors clearly shows that the pronotum is obviously longer than broad, and this corresponds with that of specimens of this species examined (as fig. 6). The pronota of specimens of *aculeatum* examined are quadrate (fig. 8). In view of the relative constant pronotal shape found in other species in the present study, *davisi* is considered to be distinct. The variation in the shape of the pronotum appears to be usually small within a species, but the value of this character should not be over-estimated. That of *luteipenne* for example may be widened posteriorly (fig. 5) or be almost quadrate; *platense* may have the pronotum widened posteriorly (fig. 3) or with the lateral margins sinuate (fig. 4).

The general colouration of the species seems to be fairly constant; all the specimens of *lineare* have been reddish-brown in general colouration; those of *taeniatum* are intensely black, with the exception of the legs, antennae and the yellow longitudinal stripe on the elytra and wings. Specimens of species do occur, however, in which the full colouration has not been attained. In many species the elytra and wings are normally developed,

whilst in others the elytra are short and the wings absent or concealed. These characters also seem to be generally constant, but there is some variation in *luteipes*. The forceps of the males usually have an inner tooth towards the apex of each branch (figs. 11, 12, 13, 15) but the males of some species may lack this inner tooth (figs. 14, 19). In *platense* the tooth is near the mid-point (fig. 20) and the pygidium is spatulate. In all other species the pygidium is spine-like, but may vary in size in different species.

The examination of the present material, and reference to relevant papers published since 1911, has shown that considerable modifications should be made to the list of species of *Doru* in Burr (1911) and listed previously in the present paper.

#### SYNONYMY

The following comments follow the list as in Burr (1911) with the additional species from the literature.

*bimaculatum*: Rehn & Hebard (1917) regarded this as synonymous with *albipes* and sank *Phaulex* Burr, 1911, as a synonym of *Doru*. The characters given by Burr (*l.c.*) to separate *Phaulex* from *Doru* were discussed by these authors, and it was suggested that the absence of a pygidial spine in the male of *Phaulex*, given by Burr (1911) as a generic character, was an error, possibly due to the author inadvertently using a female specimen instead of a male. The male specimens in the British Museum (Natural History) have pygidial spines, and Menozzi (1931) figured pygidial spines on the males of *albipes* and *bimaculatum*, so that Rehn & Hebard (1917) were correct in synonymizing *Phaulex* with *Doru*. Menozzi (1931) considered *albipes* and *bimaculatum* to be distinct, but present studies agree with Rehn & Hebard (1917) that these are synonymous.

*binotatum*: the type of this species is clearly not a *Doru*, and it does not belong to the family Forficulidae since the second tarsal segments are simple. On this character it belongs to the family Labiidae, and agrees with the genus *Vostox*. A correction concerning this species is in course of publication (Brindle, in press). In the original description the pygidium was described as having the form of a truncated cone, not that of a spine.

*exile*: this was originally described from Texas, and was synonymized with *lineare* (and *taeniatum*) by Rehn & Hebard (1914). The *lineare* of these authors is a black species, not the *lineare* of Eschscholtz. Specimens from Texas appear to be identical with specimens of *taeniatum* from Mexico; *exile* is therefore synonymized with *taeniatum*.

*lineare*: the original description shows that this is the species referred to as *luteipenne* Serville in the key in Hincks (1949). The essential characters in the description are that the general colouration is reddish-brown; the elytra and wings are yellow with the sutures reddish-brown; the pronotum is strongly convex on the posterior margin. The sex is not given, and no mention is made of the pygidium; if this is a *Doru*, however, then it is clearly that referred to by the late Dr. Hincks as *luteipenne*. This interpre-

tation by Dr. Hincks seems to follow the later interpretation of Burr. In earlier works, e. g. 1907, Burr certainly interpreted *lineare* and *luteipenne* correctly for he referred to the absence of wings in the latter species, and duplicate specimens of *lineare* are so labelled in a box in the British Museum (Natural History). The figure of the male genitalia of *lineare* in Burr (1916) however, is not the reddish-brown species but a black species (*taeniatum*), whilst his figure of the genitalia of *luteipenne* resembles those of *lineare* as now interpreted.

This change of opinion by Burr probably resulted from his view, held at one time, that *luteipenne* was a variety of *lineare* (Burr, 1912: 99), but his later examination of the male genitalia must have caused him to change his view. It was this change which presumably led to the misapplication of the specific names.

*californica*: according to Rehn & Hebard (1914) this is a form of *lineare* in which the inner tooth on the male forceps is absent (fig. 14). The *lineare* of these authors is thought to refer to *taeniatum*, and this would agree with the distribution of the species. Male specimens in which the inner tooth on the branches of the forceps also occur in *luteipes* (fig. 19) and in *lineare*, so that this form is not restricted to one species. It may be noted that the original description of *californica* mentions that the pronotum is longer than broad, but that of *taeniatum* is transverse. This discrepancy may be due to an error in the original description; all specimens from California examined have been referable to *taeniatum*, and a proportion lack the inner tooth on the forceps.

*taeniatum*: this seems to be clearly distinct and it is not synonymous with *lineare*. It is a black species with a distribution extending from South America into the southern part of North America. The specimens of *Doru* from Surinam which correspond to the *lineare* of authors were provisionally determined as *taeniatum*. Both *taeniatum* and *luteipes* occur in Surinam and may be separated by the shape of the pronotum.

*suturalis*: the original description shows that this is a reddish-brown species with normally developed elytra and wings, so it is synonymized with *lineare*. The type is a female from Brazil.

*aculeatum*: this was brought out of synonymy by Rehn & Hebard (1914) and appears to be quite distinct. The elytra are always rather short and the wings always concealed beneath the elytra; the pygidium of the male is long (as fig. 15). This species is restricted to North America.

*luteipes*: this was synonymized with *lineare* by Burr (1911) and by Rehn & Hebard (1914). From the original description it agrees with the blackish South American species of the genus previously known as *lineare*. The elytra and wings may be normally developed, or the wings may be almost or quite concealed beneath the elytra. The species was first described from two females from Brazil, and the pronotum was described as being quadrate. It is apparently a variable species.

*meridionalis*: this was described from one male and one female from Brazil, of which the male was synonymized with *lineare* by Burr (1911). A specimen labelled as the type of *meridionalis* in the British Museum (Natural History) proves to be a male of *Sarakas devians* (Dohrn). The female specimen has not yet been located.

*luteipenne*: the original description is based on a female from Brazil, and is rather short; the essential characters are that it is a yellowish-brown species with short elytra and without visible wings; the abdomen is very dark red and long and the forceps long. Specimens which agree with this description have been found in the British Museum (Natural History). The species seems to be distinct by the short elytra and rather long abdomen; the wings are absent or concealed.

*dichroa*: from the original description this is a yellowish-brown species in which the elytra are short, and the wings absent, and is based on a male from Rio de Janeiro. No mention is made of the pygidial spine, but it appears to be synonymous with *luteipenne*.

*vellicans*: the original description, based on two females from Brazil, indicates that this is also synonymous with *luteipenne*.

*gracilis*: in the original description, based on a specimen from Brazil (no sex is given), mention is made of the yellowish-brown colour, the short elytra, and the absence of wings; all of which suggest that it refers to *luteipenne*.

*spiculiferum*: the type of this is clearly a *Doru*, and is based on a male of New South Wales, a remarkable locality, since this is the only specimen of *Doru* recorded from outside the Neotropical and Nearctic Regions. The locality label on the specimen is very small and simply bears the letters "NSW" in handwriting. The pin of the specimen originally passed through the letter "S" so that this is rather indistinct, but there appears to be no doubt that the recorded locality is correct. Whether *spiculiferum* is really an Australian species, or whether the specimen may have been accidentally introduced into this country is an interesting point. Certainly no other record of the species has been made. *Doru* species have often been recorded amongst grasses, but some show a marked preference for hiding in species of *Opuntia*, particularly the "prickly pear" forms of the genus (J. A. C. Rehn, *in litt.*). The first *Opuntia* was introduced into Australia in 1788 or 1789, but, according to Nicol (1943), it was from the second introduction that the well known *Opuntia inermis* infestation of the continent resulted. This second introduction consisted of a single potted plant, which was brought to Scone, in New South Wales, in 1839, and presumably the present stringent precautions against the accidental introductions of insects were not then in force. There is, therefore, a possibility that *spiculiferum* is a specimen of one of the New World species which was accidentally introduced into New South Wales, a possibility which would be resolved if the circumstances in which the specimen was taken were known. The *Opuntia* was from Brazil, so on distribution the most likely species

is *luteipes*, but *spiculiferum* seems to be more structurally allied to *aculeatum*, which is Nearctic in distribution. At present *spiculiferum* is regarded as distinct.

*leucopteryx*: originally described from Venezuela, and based on a single male. This is a very distinctive species, and a series from the University of Venezuela has recently been examined. It is apparently confined to this country.

*platense*: although the spine-like pygidium of the male was given by Burr (1907) as the main generic character of *Doru*, Borelli (1912) described *platensis* under *Doru*, although the pygidium of the male is spatulate. The parameres of the male genitalia are rather unusual in being sharply pointed (fig. 29), and the male forceps have the inner tooth on each branch about the midpoint (fig. 20) and not towards the apex as in most other *Doru* species. However, *platense* seems to be closely related to other species of the genus so that its inclusion is probably justified. There is, however, a difference in shape of the pronotum of the originally described specimens, and that of Borelli's syntype in the British Museum (Natural History). In the original description the pronotum is stated to be gradually widened posteriorly (fig. 3), and has a median longitudinal black stripe. The sutural margins of the elytra are also black.

Specimens which agree with this description have been found amongst undetermined material in the British Museum (Natural History). The pronotum of the syntype in this institution, however, has the lateral margin sinuate (fig. 4). The genitalia of the syntype and of the normal *platense* appear to be identical, as are the forceps. Another male specimen similar to the syntype is in the Manchester Museum, and a third male has been seen from the United States National Museum, this being labelled as the variety *longipennis* of *platense*.

*davisi*: this was originally described from Florida, and is regarded as distinct. Cantrall (1943) however, mentioned that T. H. Hubbell had found in Florida specimens intermediate in form between *aculeatum* and *davisi*, so that Gurney (1950) listed *davisi* as a subspecies of *aculeatum*. In the Manchester Museum is a specimen from Florida, determined by Hubbell as being of this intermediate form, but this has normally developed elytra and visible wings. Both *aculeatum* and *davisi* have rather short elytra and are without visible wings, the wings always being entirely concealed beneath the elytra. Hebard (1943) keys out *aculeatum* by the absence of visible wings.

The specimen in the Manchester Museum is rather immature and is a female; the full colouration is not developed, but structurally it seems to be identical with one male in the British Museum (Natural History), also from Florida. The genitalia of this specimen is so similar to those of *taeniatum* that it is regarded as this species. The pronota of the Florida specimens are transverse, as in *taeniatum*, but are relatively smaller and slightly widened posteriorly. It would seem, however, that the intermediate forms between *aculeatum* and *davisi* found by Hubbell, are really referable to *taeniatum* as interpreted in this paper.

In the material belonging to the United States National Museum is one male specimen of a new species of *Doru* from Peru. A second new species is represented by a single male specimen in a collection sent by Dr. H. Reichardt, from the Museu de Zoologia, Universidade de São Paulo. Further specimens of this second new species have been found in a collection belonging to the Universidad Central de Venezuela, Facultad de Agronomía, sent by Dr. F. Fernandez Yopez.

Dr. Ashley B. Gurney has kindly informed me that most of the types of species described by Scudder are in the Museum of Comparative Zoology, Harvard University, Cambridge, Mass., United States. These include the types of species concerned in the present paper. The types of those species described by Stål are in the Naturhistoriska Riksmuseum, Stockholm, Sweden. The types of those of Serville and Burmeister appear to be located in various institutions in Europe, and it is not yet certain which of these types are in existence, nor in which institution each type can be found.

Although the date of Burmeister's Handbook of Entomology, volume 2, is printed as 1839 in the copy referred to by the present author, Dr. Reichardt has informed me that the correct date of the pages concerned with the Dermaptera in volume 2 is 1838, and in view of its wide importance an account of this discrepancy is to be published by Dr. Reichardt (\*). The name *gracilis* Burmeister, therefore has priority over *luteipenne* Serville; the dates given for these names in Burr (1911) are correct.

#### GENERIC CHARACTERS AND CHECK LIST

##### **Doru** Burr, 1907

*Doru* Burr, 1907: 123.

*Phaulex* Burr, 1911: 75, 78.

Shining to rather dull species of medium size; head smooth, broad; eyes small; antennae with first segment usually shorter than distance between antennal bases; segments more or less cylindrical, not greatly elongated. Pronotum variable in shape; elytra normally developed or short, usually meeting along sutures; wings absent or present. Head, pronotum, elytra and wings coriaceous. Abdomen parallel-sided or widened posteriorly, punctured; last tergite transverse, usually with a tubercle above the base of each branch of the forceps, or with smaller and more numerous tubercles between the branches. Forceps of male with branches well separated, arcuate or almost straight, inner tooth absent or present; pygidium spatulate or pointed; female forceps slender, branches contiguous.

Male genitalia weakly sclerotized, parameres long; virga short and broad; vesicle large, straight or curved; distal lobe with denticulated areas.

Type-species: *lineare* Eschscholtz, by original designation.

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(\*) See footnote on page of "Papéis Avulsos de Zoologia", volume 23 (10), 1969.

1. *albipes* (Fabricius, 1787)
2. *leucopteryx* Burr, 1912
3. *robustum*, sp. n.
4. *spiculiferum* (Kirby, 1891)
5. *aculeatum* (Scudder, 1876)
6. *davisi* Rehn & Hebard, 1914
7. *gracilis* (Burmeister, 1838)
8. *cincinnatoi* Machado, 1967
9. *lineare* (Eschscholtz, 1822)
10. *luteipes* (Scudder, 1876)
11. *taeniatum* (Dohrn, 1862)
12. *unicolor*, sp. n.
13. *platense* Borelli, 1912

## KEY TO SPECIES

1. Each elytron dark brown or blackish, with a yellow median spot; male last tergite with four tubercles near posterior margin. West Indies ..... *albipes* (Fabricius)  
Elytra not spotted ..... 2
2. Elytra blackish-brown or dark brown unicolorous; wings yellow or white; male last tergite with ten tubercles near posterior margin. Venezuela ..... *leucopteryx* Burr  
Elytra striped or unicolorous; wings when present, not conspicuously lighter in colour than elytra; male last tergite with two tubercles near posterior margin ..... 3
3. Pronotum strongly transverse; elytra shorter than pronotum, wings absent (fig. 1). Peru and Ecuador. *robustum*, sp. n.  
Pronotum not strongly transverse; elytra longer, at least meeting along sutures ..... 4
4. Pronotum longer than broad (figs. 3, 4, 6) ..... 5  
Pronotum quadrate or transverse (figs. 5, 7-10) ..... 7
5. Pronotum evenly widened posteriorly (fig. 3) or with lateral margins sinuate (fig. 4); yellow with median longitudinal blackish stripe usually present; male pygidium spatulate (fig. 20). Argentina ..... *platense* Borelli  
Pronotum with lateral margins straight (fig. 6); male pygidium spine-like ..... 6
6. Australian species; more robust in build; male pygidium long (fig. 15) ..... *spiculiferum* (Kirby)  
Nearctic species; slender in build; male pygidium very long ..... *davisi* Rehn & Hebard
7. Uniformly dark reddish-brown in colour; elytra and wings fully developed; first antennal segment longer than distance between antennal bases (fig. 31, U); male pygidium with a very narrow spine (fig. 30). Brazil and Venezuela ..... *unicolor*, sp. n.

- Not uniformly dark reddish-brown; first antennal segment shorter than distance between antennal bases (fig. 31, T); spine of male pygidium widened basally ..... 8
8. Pronotum small, posterior margin strongly convex (fig. 7); reddish-brown, elytra and wings with a yellow stripe, and always fully developed. South America .....  
..... *lineare* (Eschscholtz)  
Pronotum larger, much less strongly convex posteriorly 9
9. Pronotum transverse (fig. 10); elytra and wings always fully developed; general colouration deep black and bright yellow. South to North America .... *taeniatum* (Dohrn)  
Pronotum as broad as long (figs. 8, 9) ..... 10
10. North America; robust species; elytra short, wings concealed; pronotum relatively large (fig. 8); pygidial spine of male long (as fig. 15) ..... *aculeatum* (Scudder)  
South and Central America; elytra normally developed or short; wings visible or concealed; pygidial spine of male shorter ..... 11
11. Wings present and visible ..... 12  
Wings absent or concealed ..... 13
12. Pronotum widened posteriorly (as fig. 5). *cincinnatoi* Machado  
Pronotum parallel-sided (fig. 9) ..... *luteipes* (Scudder)
13. Pronotum usually widened posteriorly (fig. 5); abdomen comparatively long, dark red; male forceps with branches generally with a double curve, inner tooth about two thirds from base (fig. 13) ..... *gracilis* (Burmeister)  
Pronotum parallel-sided (fig. 9); abdomen shorter, usually blackish; male forceps evenly curved, inner tooth about three-quarters from base (fig. 11) .... *luteipes* (Scudder)

#### DESCRIPTIONS OF SPECIES

#### **Doru albipes** (Fabricius, 1787)

(Figs. 16-17)

*Forficula albipes* Fabricius, 1787: 224.

*Forficula bimaculata* Palisot de Beauvois, 1817: 165.

*Phaulx albipes* (Fabricius); Burr, 1911: 78.

*Doru bimaculatum* (Fabricius); Burr, 1911: 79.

*Doru albipes* (Fabricius); Rehn & Hebard, 1917: 649; Menozzi, 1931: 324.

*Doru bimaculatum* (Beauvois); Menozzi, 1931: 325.

Head blackish; antennae brown with basal two or three segments yellow; pronotum yellow, with two longitudinal black bands, either narrow or wider, sometimes covering most of sclerite;

elytra dark brown, each elytron with a yellow anterior spot, variable in size; wings yellow; legs yellow; abdomen blackish; forceps dark red. Last tergite of male with four tubercles near posterior margin, arranged transversely; forceps of male with branches evenly curved or sinuate, without an inner tooth, dentated on inner margin basally, and variable in length (figs. 16, 17); those of female shorter, branches more or less straight except at apices, contiguous, inner margin dentated basally.

Length: body 8-15 mm, forceps 2.5-10 mm (males), 2-2.5 mm (females).

Distribution: West Indies (Greater and Lesser Antilles: Cuba, Dominican Republic and Haiti, Porto Rico, Tortola, Dominica, St. Vincent).

The type of *albipes* is in the Kiel Museum; the location of the type of *bimaculatum* is not known. Menozzi (1931) regarded *albipes* as a distinct species to *bimaculatum*, and stated that the elytral spot of *bimaculatum* is larger and more elongated than that of *albipes*, the latter having a circular spot. The pronotum of *bimaculatum* was stated by Menozzi (*l.c.*) to be rather longer than broad, whilst that of *albipes* was transverse. These characters, however, seem to be variable in the specimens examined, and *albipes* and *bimaculatum* seem to refer to the same species.

### **Doru leucopteryx** Burr, 1912

(Fig. 18)

*Doru leucopteryx* Burr, 1912: 333.

Head and pronotum blackish, the latter with yellow lateral margins; antennae brown; elytra blackish or dark brown; wings yellow or white; legs yellowish brown; abdomen black. Last tergite of male with ten small conical tubercles, but the size of these is subject to some variation; forceps of male black, inner margin of each branch dentated and with an inner tooth (fig. 18); female forceps black, shorter, branches almost contiguous, straight except at apices.

Length: body 7.5-13 mm, forceps 3-5.75 mm (males), 2.5-3.5 mm (females).

Distribution: Venezuela.

Described from a single male, now in the Vienna Museum. The size of this species seems to vary considerably, but the colour remains constant.

### **Doru robustum**, sp. n.

(Figs. 1-2)

A broad, robust species, with a very transverse pronotum; greatly reduced elytra; and with short and broad forceps.

Male (fig. 1): dark brown in general colouration, posterior abdominal tergites blackish. Cuticle generally coriaceous, impunctate; glabrous, except for legs which are sparsely pubescent. Head

dark reddish-brown, broad; occiput depressed slightly, lateral margins curving smoothly into posterior margin; eyes small. Antennae yellowish-brown basally, brown distally. First segment shorter than distance between antennal bases; ratio of basal segments as follows: 1st. 16: 2nd. 2: 3rd. 5.5: 4th 7.5: 5th. 11. Distal segments narrowed basally. Pronotum almost parallel-sided, but lateral margins slightly curved, transverse, with a short median longitudinal furrow on disc. Elytra short, not quite meeting at sutures, cuticle somewhat wrinkled; wings absent. Legs short, tibiae and tarsi yellow; tarsi short, first segment with numerous short fine hairs ventrally.

Abdomen gradually widened posteriorly; last tergite transverse, strongly depressed near posterior margin between bases of the forceps, the posterior margin slightly concave; on each side of the depression is a large tubercle. Penultimate sternite broad, posterior margin rounded, cuticle of basal half strongly punctured. Forceps dark reddish-brown, each branch short and broad, trigonal at base, inner margin with a dorsal and ventral ridge. Ventral ridge sharp, well defined, dentated, and gradually passing dorsally to meet the dorsal ridge about the midpoint of the branch; dorsal ridge rounded, and with small isolated blackish tubercles; distal half of branch cylindrical, inner margin with isolated small tubercles. Genitalia (fig. 2): parameres broad, almost parallel-sided, rounded apically; virga short, broad, vesicle strongly curved.

Length: body 11.5 mm, forceps 3.25 mm.

Female unknown.

Distribution: Peru, Ollantaytambo, May 11, 1915, O. F. Cook col. (holotype ♂, United States National Museum). The type bears a label "*Doru* sp, Tow. '43" — evidently having been examined by Townes. A second male specimen from Ecuador (Prov. Carchi, 3,500 ft.) has been found in material from the California Academy of Sciences; this specimen has the pronotum whitish, as if newly moulted; the rest of the insect is fully coloured.

### ***Doru spiculiferum* (Kirby, 1891)**

(Figs. 6, 15)

*Sphingolabis spiculifera* Kirby, 1891: 528.

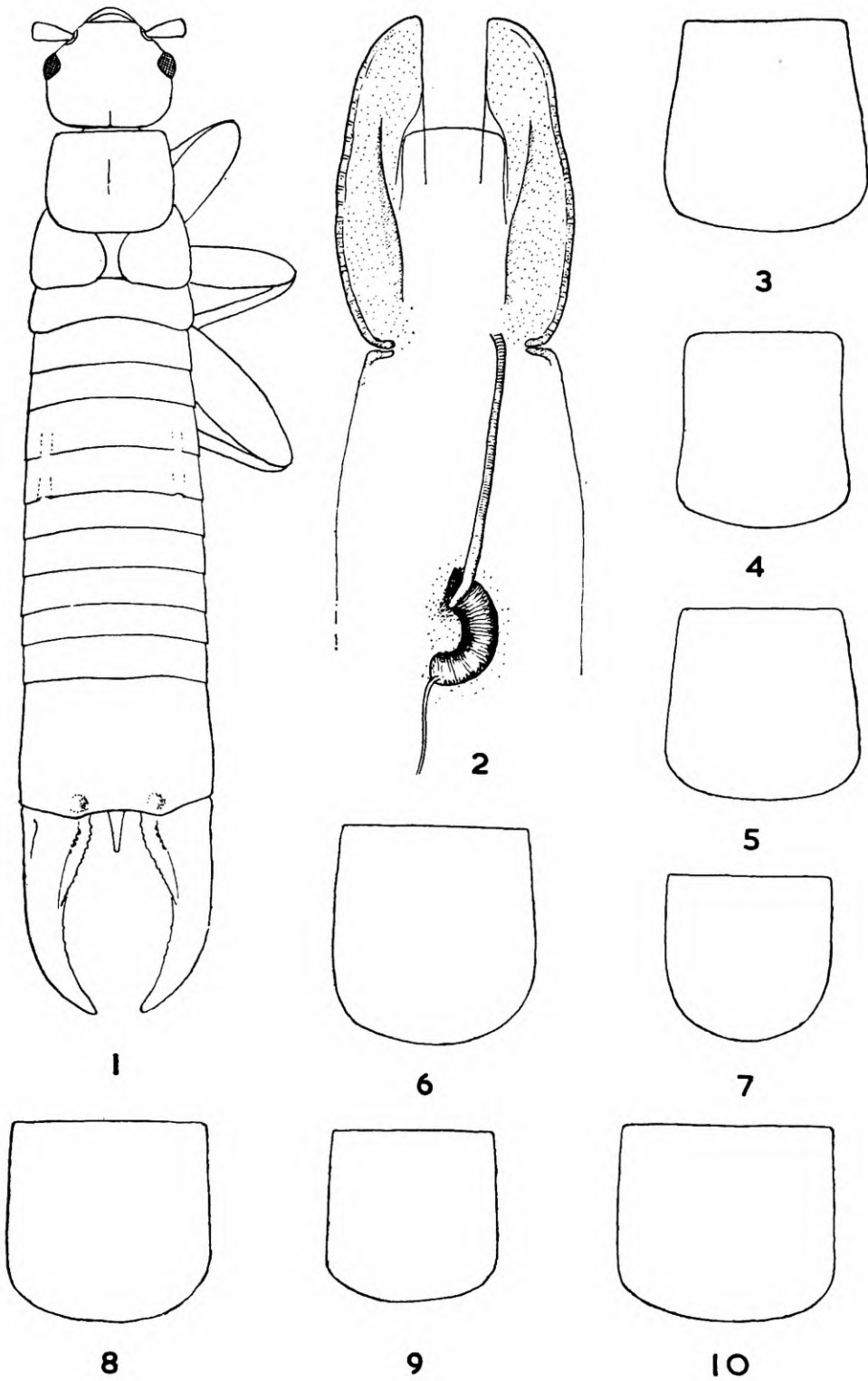
*Doru spiculiferum* (Kirby); Burr, 1911: 79.

Head dark brown; antennae brown; pronotum blackish with lateral margins yellow; elytra brown, suture slightly darker; wings absent or concealed; legs yellowish-brown; abdomen very dark reddish-brown; male forceps blackish, rather long and robust, each branch with a dorsal crenulated ridge near the base; pygidium long (fig. 15). Parameres of male genitalia similar to fig. 27.

Length: body 11 mm, forceps 5.75 mm.

Distribution: Australia (New South Wales).

The present figure of the pronotum of this species (fig. 6) has been taken from the type; although Kirby described the pronotum as being nearly twice as long as broad, this estimate seems



*Doru robustum*, sp. n., 1, male; 2, male genitalia. Pronota: 3, *platense* (normal); 4, *platense* (syntype); 5, *gracilis*; 6, *spiculiferum*; 7, *lineare*; 8, *aculeatum*; 9, *luteipes*; 10, *taeniatum*

to be excessive. The unique type is in the British Museum (Natural History).

**Doru aculeatum** (Scudder, 1876)

(Fig. 8)

*Forficula aculeatum* Scudder, 1876: 262.

*Doru lineare* Eschscherich; Burr, 1911: 79 (*partim*).

*Doru aculeatum* (Scudder); Rehn & Hebard, 1914: 93.

Head and pronotum dark brown, the latter with yellow lateral margins; elytra short, yellowish brown to brown, sutures darker; wings not visible; legs yellowish-brown; abdomen and forceps blackish; forceps of male of usual pattern, pygidium long (as fig. 15).

Length: body 7-12 mm, forceps 3.5-6.8 mm (males), 3-3.6 mm (females).

Distribution: Western and Southern United States (New York, North Illinois, South Michigan, Nebraska, Indiana, Kentucky, Pennsylvania, Georgia and Alabama).

There are two syntypes in the British Museum (Natural History), one male from Illinois and one female from New York. There is one male from Alabama in the Manchester Museum.

**Doru davisii** Rehn & Hebard, 1914

*Doru davisii* Rehn & Hebard, 1914: 95.

*Doru aculeatum davisii* Rehn & Hebard; Gurney, 1950: 202.

Head and pronotum reddish-brown or brown; antennae brown, pronotum with yellow lateral margins; elytra short, brown, scarcely darker along sutures; wings not visible; legs yellowish; abdomen and forceps dark brown, each branch of male forceps more slender and more curved dorsally than in *aculeatum*; pygidium of male longer than in *aculeatum* or *spiculiferum* (longer than fig. 15).

Length: body 8-11.5 mm, forceps 6-9 mm (male), 3-3.5 mm (females); pygidium of males, 1.8-2.2 mm.

Distribution: Florida.

A much more slender species than *aculeatum* and distinct externally by the shape of the pronotum.

**Doru gracilis** (Burmeister, 1838)

(Figs. 5, 13, 26)

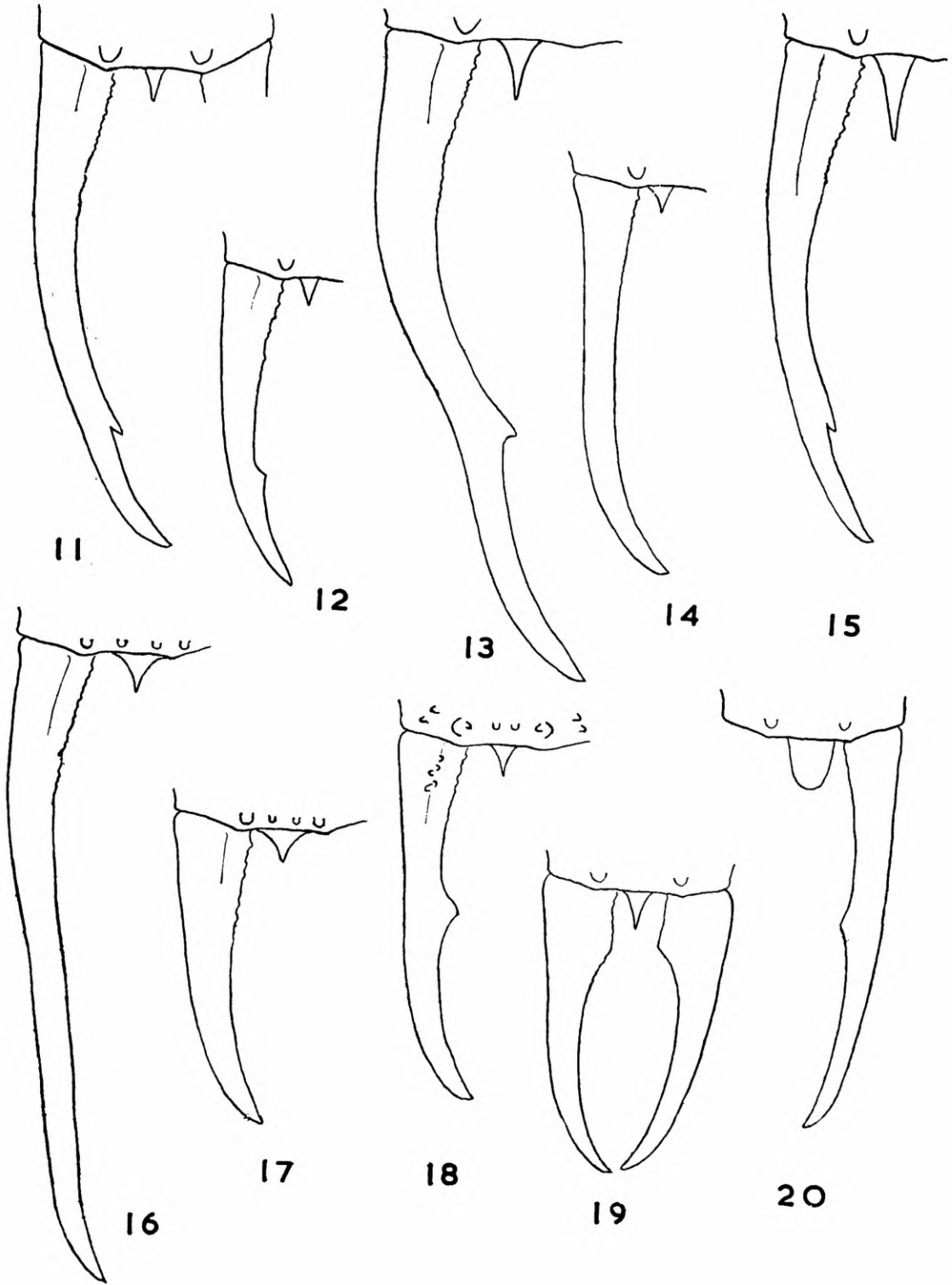
*Forficula gracilis* Burmeister, 1838: 755.

*Forficula luteipenne* Serville, 1839: 46.

*Forficula dichroa* Stal, 1858: 301.

*Forficula vellicans* Scudder, 1876: 254.

Head, pronotum and elytra yellow or yellowish-brown, pronotum sometimes darker; elytra darker or sometimes darkened slightly along sutures; pronotum usually widened posteriorly



Male forceps: 11, *luteipes*; 12, *lineare*; 13, *gracilis*; 14, *taeniatum*; 15, *spiculiferum*; 16, 17, *albipes*; 18, *leucopteryx*; 19, *luteipes* (assymetrical); 20, *platense*.

(fig. 5) or almost parallel-sided; legs yellow; male forceps long, rather sigmoid in shape (fig. 13); those of female long but shorter than those of male, simple, branches contiguous. Elytra always short and wings always concealed or absent; abdomen always comparatively long, and very dark red. Male paramere, fig. 26.

Length: body, 10-15 mm, forceps 5-7 mm (males), 4-4.5 mm (females).

Distribution: Brazil (Rio de Janeiro, Tijuca; Petrópolis), Peru (Satipo; Chanchamayo), Bolivia (Mapiri), Colombia (no exact locality) and Venezuela (Aragua).

A feature of this species is the relatively long abdomen; in one specimen the elytra measure 2.5 mm in length, whilst the abdomen measures 9 mm.

### **Doru cincinnatoi** Machado, 1967

*Doru cincinnatoi* Machado, 1967: 129.

Head yellowish; pronotum, legs and wings yellowish-brown; elytra and abdomen dark brown. Pronotum quadrate, widening posteriorly, posterior margin convex (as fig. 5); elytra long, wings short, extending only slightly beyond second abdominal tergite. Forceps and pygidium of male of usual type, but branches of forceps rather sigmoid (as fig. 13).

Length: body 13 mm, forceps, 5 mm.

Female unknown.

Distribution: Brazil (Pernambuco).

The type male and one paratype male are in the National Museum, Rio de Janeiro. This species is most similar to *gracilis*, and may be a fully winged form of this species; however, all specimens of *gracilis* examined have short elytra and there seems to be no evidence that the development of the elytra may be variable.

### **Doru lineare** (Eschscholtz, 1822)

(Figs. 7, 12, 28)

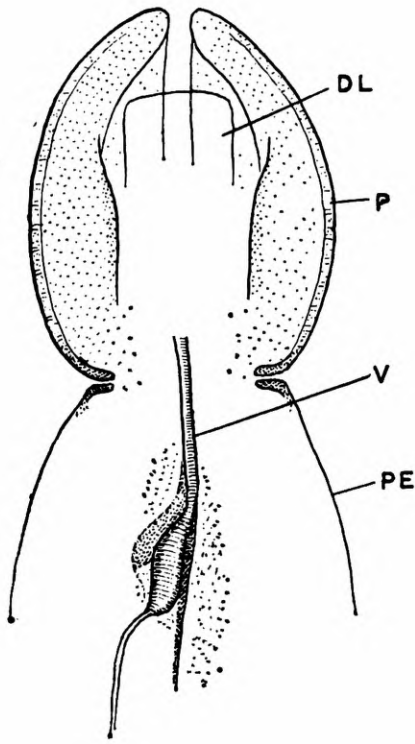
*Forficula lineare* Eschscholtz, 1822: 81.

*Forficula suturalis* Serville, 1839: 40.

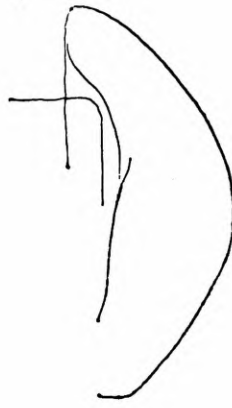
*Doru luteipenne* auctt., nec Serville, 1839.

Head and pronotum reddish-brown, sides of pronotum yellow; antennae brown; elytra and wings yellow, sutures and lateral margins reddish-brown; abdomen reddish or darker; legs yellow. Pronotum small, strongly convex on posterior margin (fig. 7); forceps and pygidium of male (fig. 12); forceps of female with branches simple, almost straight, contiguous. Male paramere fig. 28.

Length: body, 10-12 mm, forceps, 4.5-5 mm (males), 3-3.5 mm (females).



21



22



23



24



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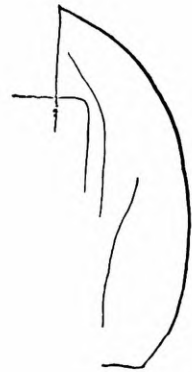
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27



28



29

Male genitalia: 21, *taeniatum* (Jalapa, Mexico). Male parameres (only right paramere shown): 22, *taeniatum* (San Blas, Mexico); 23, *taeniatum* (Monteria, Bolivia); 24, *taeniatum* (San Salvador); 25, *taeniatum* (Palмира, Colombia)); 26, *gracilis*; 27, *luteipes*; 28, *lineare*; 29, *platense*. (DL = distal lobe; P = paramere; Pe = pene; V = virga).

Distribution: Brazil (Itatiaia; Petrópolis; Teresópolis; Rio de Janeiro, Tijuca; Minas Gerais; São Paulo; Nova Teutônia; São Leopoldo; Constância), Paraguay (Itapuá; Puerto Bertoni; Hohenau; Sapucay; Chaco) and Argentina (Misiones, Iguazu; Salta, Yatasto; Tucumán, Trancas, Santa Ana).

The type of *lineare* is possibly in Leningrad.

**Doru luteipes** (Scudder, 1876)

(Figs. 9, 11, 19, 27)

*Forficula luteipes* Scudder, 1876: 255.

*Doru lineare* auctt., nec Eschscholtz, 1822 (*partim*).

Head and pronotum blackish, the latter with yellow lateral margins; elytra and wings fully developed, yellow with sutures and lateral margins black; abdomen blackish or almost so; male forceps with or without inner teeth (figs. 11, 19); forceps of female of usual type, simple, branches contiguous. Pronotum quadrate, all margins more or less straight (fig. 9). Male parameres fig. 27.

The above is the description of most specimens from South America examined, but a series from Argentina are smaller, the elytra are short and entirely yellowish, and there are no visible wings; the male genitalia of these appear to be identical with normal *luteipes*. The male forceps of these specimens have no inner teeth (fig. 19) (Argentina, province of Buenos Ayres, Martinez col.).

Length: body, 10-13 mm, forceps 4-5 mm (males), 2.5-3.5 mm (females). Small series from Argentina: body, 8-9 mm, forceps, 2 mm (males and females).

Distribution: Brazil (Bahia; Mato Grosso; Paraná, Iguazu; Santa Catarina, Nova Teutônia; Espírito Santo), Argentina (Misiones, Iguazu; Buenos Ayres); Peru (Callanga; Marcapata; Chanchamayo; Satipo); Bolivia (Mojos); Colombia (Nabin) and Surinam (Brokoponda, Paramaribo).

**Doru taeniatum** (Dohrn, 1862)

(Figs. 10, 14, 21-25, 31)

*Forficula taeniata* Dohrn, 1862: 230.

*Forficula californica* Dohrn, 1865: 85.

*Forficula exilis* Scudder, 1876: 262.

*Doru exile* Scudder; Burr, 1911: 79.

*Doru lineare* auctt., nec Eschscholtz, 1822 (*partim*).

Head and pronotum black, the latter with lateral yellow margins; elytra and wings yellow, sutures and lateral margins black; abdomen black or almost so; legs yellow. Pronotum transverse, large (fig. 10); abdomen strongly punctured; male forceps of usual type (as fig. 11) or without teeth on inner margins (fig. 14). Male parameres figs. 21-25.

Length: body, 12-14 mm, forceps, 5-5.5 mm (males), 3.5-4.5 mm (females).

Distribution: Western part of South America through Central America to the southern part of North America (Bolivia, Colombia, Venezuela, Surinam, Costa Rica, Nicaragua, Honduras, El Salvador, Mexico, California, Texas, Florida).

This is often a large and robust species, very distinctive by the transverse pronotum; usually intensely black, with contrasting yellow stripes on the elytra and wings. There appears to be no constant difference between the specimens from South America and those from more northern localities. All records of *lineare* from Central and North America are referable to *taeniatum*.

**Doru unicolor, sp. n.**

(Figs. 30-32)

Almost entirely dark reddish-brown, sometimes almost blackish-brown, shining; pronotum yellowish laterally; tibiae lighter in colour than rest of legs. Rather slender.

Male (fig. 30): head transverse, almost blackish; lateral margins curving medially, but posterior angles present, posterior margin more or less straight; occiput convex; eyes small; antennae reddish-brown, basal segments darker. First antennal segment longer than distance between antennal bases, ratio of basal segments as follows: 1st. 20: 2nd. 4: 3rd. 8: 4th. 10.5: 5th. 17. Distal segments cylindrical. Pronotum quadrate or slightly transverse, and slightly widened posteriorly, posterior margin weakly convex. Elytra and wings long, fully developed, unicolorous. Legs rather slender, femora not strongly broadened.

Abdomen parallel-sided, tubercles on fourth segment large, those on third small; cuticle coriaceous on basal tergites, tergites 7-9 punctured, rather rugose laterally, last tergite transverse, mainly smooth, but punctured on a longitudinal band ending in a swollen area above the base of each branch of the forceps; each swollen area forms two broad tubercles, the tubercles with one or more apex or apices; between the swollen areas the tergite is depressed and flat. Each branch of forceps long, sinuous, trigonal at base, dorsal surface with an oblique short crenulated ridge; inner margin dentated for basal third; distal two-thirds of branch cylindrical, with isolated small teeth ventrally, and with one larger tooth directed ventromedially. Pygidium with a short transverse base, spine long and narrow. Genitalia (fig. 32).

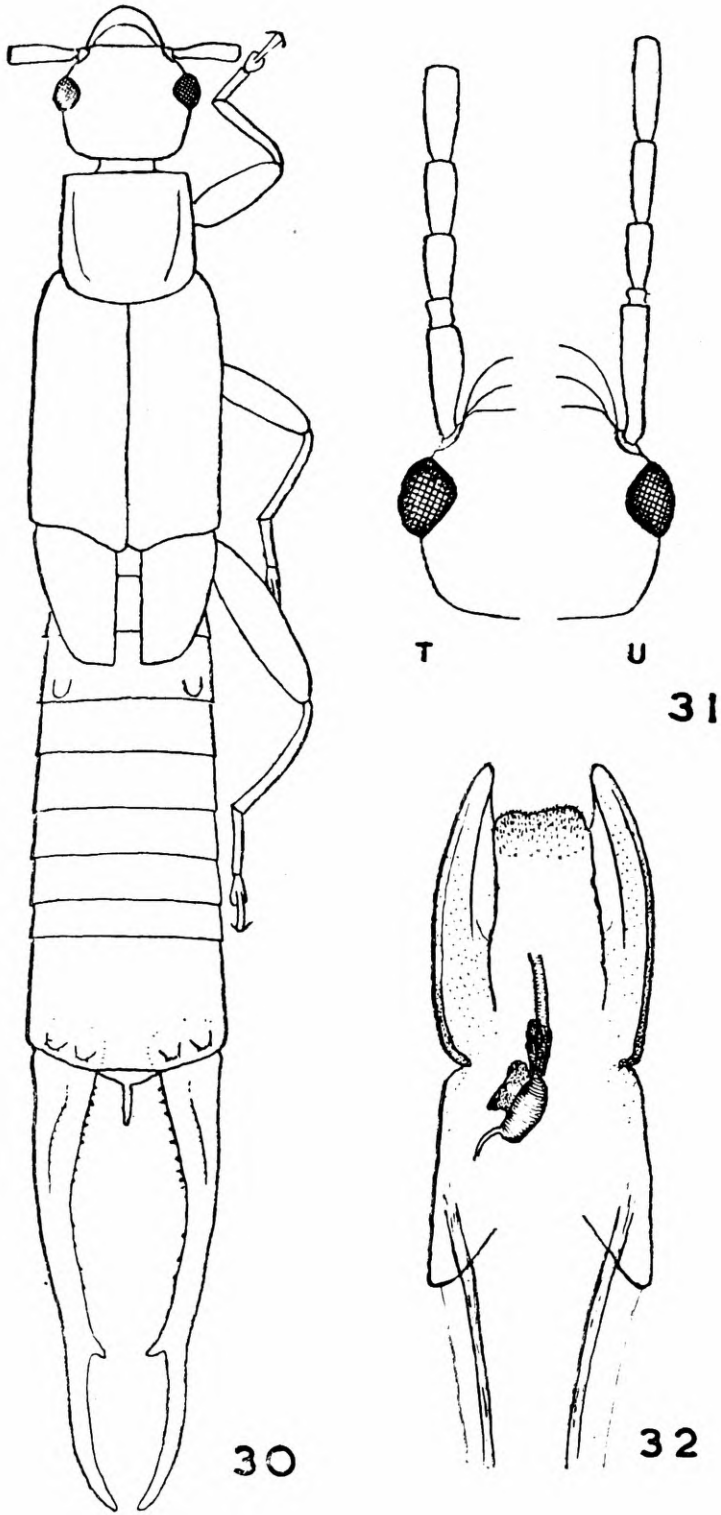
Length: body, 10 mm, forceps, 4.5 mm.

Female: similar to male but last tergite narrower, each branch of forceps slender, slightly curved, branches contiguous.

Length: body, 9 mm, forceps, 3 mm.

Distribution: Brazil and Venezuela.

The holotype male (Brazil, São Paulo, Itu, Fazenda Pau d'Alho, 13.I.1962, A. Zunt, U. Martins col.) in the Museu de Zoologia, Universidade de São Paulo. The specimens from Venezuela have not been designated as paratypes, but are undoubtedly conspecific. These are seven males and two females, the localities as below:



30, *Doru unicolor*, sp. n., male; 31, basal antennal segments of *taeniatum* (T) and *unicolor* (U); 32, *O. unicolor*, male genitalia.

Venezuela: Aragua, La Cabrera, 24.X.1960; El Limon, 450 m. 19.I.1951, C. Rosales col.; Tasajeras, 450 m, 30.X.1948, J. Loggiodice col.; Monagas, Jusepin, 13-14.IX.1965, F. Fernandez Yopez & C. J. Rosales col.

All the Venezuelan specimens are in the Instituto de Zoologia Agricola, Universidad Central de Venezuela, Facultad de Agronomia, except for two males and one female which have been retained in the Manchester Museum. One male is to be passed over to the British Museum (Natural History).

The lengths of the Venezuelan specimens vary from 10-13 mm in body length (males) and 9 mm (females); the forceps from 4.5-6 mm (males) and 3 mm (females). The swollen area of the base of each branch of the male forceps show variation; this is sometimes more greatly swollen, and the two main tubercles may have several small tubercles.

The species is very distinct on account of the uniform colouration and the slender build.

### **Doru platense** Borelli, 1912

(Figs. 3-4, 20, 29)

*Doru platensis* Borelli, 1912: 2; form *ciclolabia* Borelli, 1912: 3; var. *longipennis* Borelli, 1912: 3.

Head, pronotum, elytra and legs yellowish-red to brown; the head may be darker; pronotum with median black longitudinal stripe usually present but may be indistinct or absent; elytra with sutures darkened; abdomen very dark reddish-brown, last tergite black; forceps black. The pronotum is longer than broad and widened posteriorly in the type (fig. 4); the elytra are rather longer than the pronotum, and wings are absent; abdomen coriaceous, slightly punctured on posterior tergites. Forceps long, cylindrical, inner tooth about mid-point, inner margins dentated to tooth, pygidium spatulate, black (fig. 20). Forceps of female more or less straight, branches contiguous.

The form *ciclolabia* is similar but the forceps are shorter, "internally bisinuose, with large triangular tooth on each branch".

The variety *longipennis* is fully winged; according to the original description the pronotum does not differ from the type; specimens of this variety in the British Museum (Natural History) labelled as syntypes, and determined by Borelli, have the pronotum shaped as fig. 4. This shape agrees with that of a similar specimen in the Manchester Museum and also one male in the United States National Museum.

Length: body, 13 mm, forceps, 11 mm (macrolabic males); body, 13.5 mm, forceps, 6 mm (form *ciclolabia*, males); body, 11.5-12.5 mm, forceps, 4.5 mm (males), 3.5 mm (females), var. *longipennis*.

Distribution: Argentina.

The types are presumed to be in the Zoological Institute, Turin.

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