
EPHEMEROPTERA FROM CENTRAL AND SOUTH AMERICA: NEW SPECIES OF THE *FARRODES BIMACULATUS* GROUP WITH A KEY FOR THE MALES

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ABSTRACT

The genus *Farrodes* was recently revised, and two species groups were delimited: *Farrodes caribbeanus* and *Farrodes bimaculatus*. In that paper the species of the *F. caribbeanus* species group were described or redescribed. In the *F. bimaculatus* species group eight undescribed species were treated but not described. In the present paper, these new species of the *F. bimaculatus* species group are described and discussed and a key for the separation of all the species known from male imagines in this group is provided.

KEYWORDS: *Ephemeroptera*, *Leptophlebiidae*, *Farrodes*, systematics, key for male determination.

RESUMEN

En un análisis reciente del género *Farrodes* fueron delimitados dos grupos de especies: *Farrodes caribbeanus* y *Farrodes bimaculatus*. En ese trabajo las especies del grupo *F. caribbeanus* fueron descritas o redescritas. En el grupo *F. bimaculatus*, fueron tratadas ocho especies nuevas, pero no descritas. En este trabajo, estas especies nuevas son descritas y analizadas, y se provee una clave para la separación de todas las especies de este grupo conocidas de imagines machos.

INTRODUCTION

The genus *Farrodes* (Ephemeroptera, Leptophlebiidae, Atalophlebiinae) was established by Peters (1971) for three species from the West Indies, and apparently was restricted to an insular distribution. Later,

one species was described from Texas (Davis 1987), two from Argentina (Domínguez & Savage 1987), and one from Puerto Rico (Lugo-Ortiz & McCafferty 1994) giving some idea about a widespread new world distribution.

Recently, the systematics, phylogeny and biogeography of the *Homothraulax* generic complex were revised (Domínguez submitted), from which *Farrodes* is one of the components. Based on this phylogeny, two species groups were delimited within *Farrodes*: *Farrodes caribbeanus* and *Farrodes bi-*

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maculatus. The *F. caribbeanus* species group included *F. caribbeanus* (Traver) and *F. roundsi* (Traver), both transferred from *Thraululus*, plus three newly described species from Mexico and Venezuela. The *Farrodes bimaculatus* species group included all the species described previously in *Farrodes*, plus *F. maculatus* (Needham & Murphy), transferred from *Homothraululus*, and eight new species from South and Central America. The species from Puerto Rico was not included in the analysis because it is only known by nymphs.

In this paper we describe and discuss these 8 new *F. bimaculatus* species from Central and Northern South America (Map 1), providing a key for the determination of all male imagines.

MATERIAL

The material used in this study is deposited in the following institutions: Florida A & M University, Tallahassee, FL (FAMU); Instituto-Fundación Miguel Lillo, Tucumán, Argentina (IFML); Museu de Zoologia, Universidade de São Paulo, Brazil (MZUSP) and National Museum of Natural History, Washington D.C. (NMNH).

KEY TO THE MALE IMAGINES OF *FARRODES*

- 1a Species distributed in continental Americas .2
- 1b Species distributed in the Antilles 13
- 2a Apex of penis lobes acute; penal projections short, narrow apically (Figs. 5, 12) 3
- 2b Apex of penis lobes rounded; penal projections long, ending in a short terminal flap (Figs. 19, 26, 33, 40, 47, 54) 4
- 3a Membrane of fore wings slightly tinged with yellow; abdominal segments yellowish washed with black (Figs. 6–7); costal projection of hind wings 0.15 of width of wing (Figs. 2–3) *Farrodes flavipennis* sp. nov.
- 3b Membrane of fore wings hyaline; abdominal segments whitish washed with black (Figs. 13–14); costal projection of hind wings 0.20 of width of wing (Figs. 9–10) *Farrodes tulija* sp. nov.
- 4a Posterolateral projections of styliger plate short and wide (Fig. 18) 5
- 4b Posterolateral projections of styliger plate long and narrow (Figs. 25, 32, 39, 46, 53) 6
- 5a Basal ¼ of penis lobes fused; terminal flap of penal projection curved upward (Fig. 19); abdominal terga washed with black, color patterns as in figs. 20–21 *Farrodes carioca* sp. nov.
- 5b Basal ⅔ of penis lobes fused; terminal flap of penal projection rather straight; abdominal terga washed with dark reddish-brown *Farrodes texanus* Davis
- 6a Lateral projections of penes rounded apically, with a short terminal folded flap (Figs. 25–26); abdominal color pattern as in Figs. 27–28 *Farrodes ochraceous* sp. nov.
- 6b Lateral projections of penes not rounded apically, with a short terminal flap (Figs. 33, 40, 47, 54); abdominal color pattern not as above 7
- 7a Lateral projections of penes with a long ventral spine basal to terminal flap (Figs. 32–33); abdominal color pattern as in Figs. 34–35 *Farrodes longispinus* sp. nov.
- 7b Lateral projections of penes without long ventral spines (Figs. 40, 47, 54); abdominal color pattern not as above 8
- 8a Posterolateral projections of styliger plate somewhat acute apically (Fig. 39); abdominal color pattern as in Figs. 41–42 *Farrodes pakitza* sp. nov.
- 8b Posterolateral projections of styliger plate rounded apically (Figs. 46–53); abdominal color pattern not as above 9
- 9a Forceps segment I uniformly brown or greyish-brown, segments II and III lighter; abdominal segments with extensive whitish marks (Figs. 48–49) 10
- 9b Basal ½ of forceps segment I yellow or yellowish-brown, apical ½ and segments II and III yellowish-white; abdominal segments with small whitish marks (Figs. 55–56) 11
- 10a Costal projection of hind wings large (more than 0.19 of total width) (Fig. 45); apex of penal

- projections forming a strong angle (Fig. 47) . . .
 *Farrodes xingu* sp. nov.
- 10b Costal projection of hind wings small (less than 0.16 of total width); apex of penal projections not forming a strong angle
 *Farrodes maculatus* (Needham & Murphy)
- 11a Costal projection of hind wings large (more than 0.19 of total width) (Fig. 52); abdominal color pattern as in Fig. 55 *Farrodes tepui* sp. nov.
- 11b Costal projection of hind wings small (less than 0.16 of total width); abdominal color pattern not as above 12
- 12a Basal ½ of forceps segment I yellow, remainder of forceps yellowish-white; styliger plate yellow
 *Farrodes iguazuanus* Domínguez & Savage
- 12b Basal ½ of forceps segment I brown, washed with brownish-black; remainder of forceps yellowish-white; styliger plate brown, washed with brownish-black
 *Farrodes yungaensis* Domínguez & Savage
- 13a Thorax buff, sutures lighter; posterolateral projections of styliger plate narrow and long, rounded apically (Grenada)
 *Farrodes grenadae* Peters
- 13b Thorax brown, sutures lighter; posterolateral projections of styliger plate short and wide, somewhat acute apically 14
- 14a Submedian, dark brown macule near anterior margin on terga II–VI; forceps segment I uniformly brown (Cuba)
 *Farrodes bimaculatus* Peters & Alayo
- 14b Terga II–VI without submedian maculae; basal ½ of forceps segment I brown, remainder paler (Jamaica) *Farrodes hyalinus* Peters

orange-brown with abdominal segments yellowish tinged with black.

Head: yellowish-white washed with black on anterior half. Upper portion of eyes light brown, lower portion blackish. Ocelli white with basal black rings. Antennae: scapus and pedicel yellowish-white [flagellum broken-off and lost].

Thorax: pronotum yellowish-brown, lateral margins, longitudinal medial stripe, and sublateral spots blackish; mesonotum bright orange-brown with carinae and margins blackish; metanotum orange-brown with a transversal medial band and lateral margins blackish; pleura orange-brown with membranous areas tinged with black; sterna light orange-brown with carinae and lateral margins blackish.

Wings (Figs. 1–3): membrane of fore wings hyaline slightly yellowish, except stigmatic area cloudy white, base tinged with light brown; longitudinal veins light brown; cross veins yellowish translucent; 5 stigmatic cross veins; membrane of hind wings hyaline with base light brown, veins C and base of Sc light brown, remaining veins yellowish translucent; size of costal projection 0.15 of total width of wing. Legs: coxae light orange-brown with margins blackish, trochanters yellowish-brown; leg I: femora yellowish-brown diffusely washed with black on distal ½; tibiae, tarsi, and claws yellowish [leg I from paratype and all legs of holotype broken-off and lost].

Abdomen (Figs. 6–7): abdominal terga yellowish; tergum I completely washed with black; terga II–VIII heavily tinged with black except on anterolateral corners and medial band with two sublateral semicircular marks on fore margins shaped as in Fig. 6; tergum IX washed with black except median band and two submedian semicircular marks on the posterior margin; tergum X orange-brown with two blackish lateral spots. Spiracles blackish. Sterna yellowish-orange.

Genitalia (Figs. 4–5): styliger plate light brown; forceps segment I greyish-yellow, remainder of forceps yellowish translucent; penes yellowish-white; apex of penis lobes acute, lateral projection short with wide base narrower toward distal apex; posterolateral projections of styliger plate short with acute apex. [Caudal filaments broken-off and lost].

DESCRIPTION AND DISCUSSION OF 8 NEW SPECIES

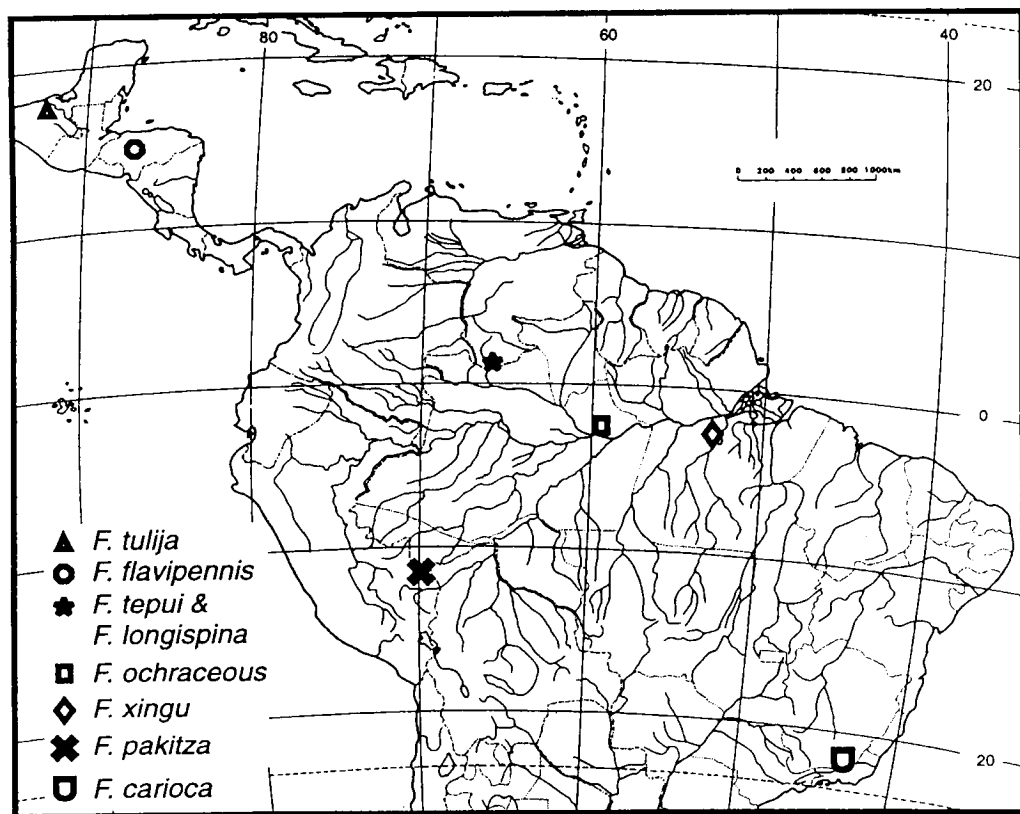
Farrodes flavipennis sp. nov.

Holotype

♂ imago in alcohol, wings and genitalia on slides.
 Length: body, 4.0–4.4 mm; fore wings, 4.6–4.8 mm; hind wings, 0.7–0.8 mm. General coloration

Etymology

From the Latin words *flavus* = yellow and *penna* = wing, due to the yellowish tint on the wings.



Map 1. Distribution of the new species of *Farrodes* in Central and South America.

Material

Holotype ♂ imago: Honduras, Departamento El Paraiso, Escuela Agrícola Panamericana, Rio Yeguaré, 10/VI/1966, J. S. Packer. Paratypes: 13 ♂ imagines, same data as holotype; 12 ♂ imagines, same data as holotype, except date 25/VI/1967. All types deposited in FAMU, except 2 ♂ imagines in IFML.

Diagnosis

Some of the paratypes have a darker abdomen, with segments VII–IX more widely tinged with black.

F. flavipennis can be separated from the other species of *Farrodes* by the following combination of characters: (1) posterolateral projections of styliger plate short with acute apex (Figs. 4); (2) basal 1/5 of penis lobes fused; (3) apex of penis lobes acutely angled; (4) lateral projections of penes cylindrical, short, narrow apically (Fig. 5); (5) abdominal segments yellowish washed with black (Figs. 6–7); (6) membrane of fore wings slightly yellowish; and (7) size of costal projections of hind wings 0.15 of width of wing.

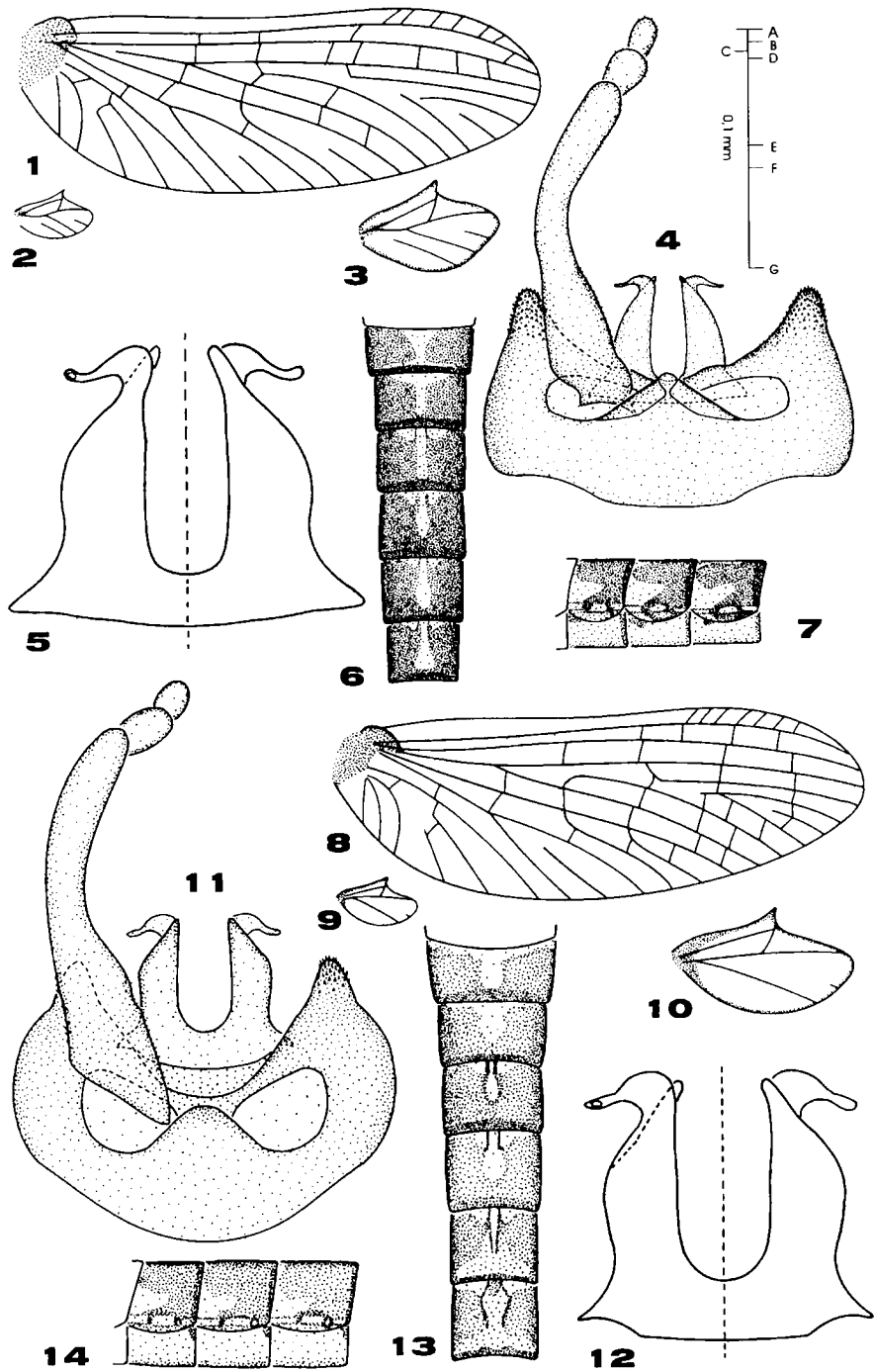
Farrodes tulija sp. nov.

Holotype

♂ imago in alcohol. Length: body, 4.8–5 mm; fore wings, 4.6–4.7 mm; hind wings, 0.7–0.8 mm. General coloration orange-brown, abdominal segments whitish tinged with black.

Head: yellowish-brown with anterolateral margins and around base of antennae and eyes blackish. Upper portion of eyes light orange-brown, lower portion blackish. Ocelli white with basal black rings. Antennae yellowish, joints between scapus and pedicel blackish [flagellum broken-off and lost].

Thorax: pronotum light orange-brown with carinae, sublateral spots and lateral margins blackish; mesonotum bright orange-brown with carinae and lateral margins blackish, postscutellum II washed with black; metanotum light orange-brown, with a transversal blackish band near posterior margin with a darker U-shaped medial mark, carinae and margins blackish; pleura orange-brown with membranous areas and base of wings and legs tinged with black;



Figs. 1-14. *Farrodes flavipennis* (Figs. 1-7): 1, forewing (scale AB); 2, hind wing (AB); 3, hind wing (detail) (AC); 4, ♂ genitalia (AE); 5, detail of penes (right, d.v.; left, v.v.) (AG); 6, abdominal terga II-VII (d.v.) (AC); 7, abdominal segments III-V (l.v.) (AC); *Farrodes tulija* (Figs. 8-14): 8, forewing (AB); 9, hind wing (AB); 10, hind wing (detail) (AD); 11, ♂ genitalia (AF); 12, detail of penes (right, d.v.; left, v.v.) (AG); 13, abdominal terga II-VII (d.v.) (AC); 14, abdominal segments III-V (l.v.) (AC).

sterna light orange-brown, central areas lighter, with carinae and lateral margins darker.

Wings (Figs. 8-10): membrane of fore wings hyaline, except base light brown; stigmatic area cloudy

white; longitudinal veins light brown lighter toward posterior margin; stigmatic cross veins light brown, remaining cross veins yellowish translucent; 6-7 stigmatic cross veins. Membrane of hind wings hyaline,

with base light brown; veins C, and base of Sc and MA light brown, remainder translucent; size of costal projection 0.20 of total width.

Legs: coxae and trochanter I orange-brown with joints blackish; trochanters II and III yellowish-white [remaining of all legs broken-off and lost].

Abdomen (Figs. 13–14): tergum I completely washed with black with anterior margin darker; terga II–VI whitish translucent washed with black except for anterolateral corners and a medial triangle-shaped mark with base on anterior margin; terga VII–X heavily washed with black, except anterior margin of terga VII and VIII with 2 submedial triangular marks. All terga with a pair of submedial longitudinal blackish strikes. Spiracles blackish. Sterna I–VI yellowish translucent with posterolateral margins washed with black, remainder yellowish-grey.

Genitalia (Figs. 11–12): styliger plate and basal ½ of segment I of forceps yellowish-grey; remainder of forceps yellowish-white; penes yellowish-white, penis lobes with acute apex, lateral projections of penes short with wide base, narrower toward distal apex; posterolateral projections of styliger plate long and straight with an acute apex. [Caudal filaments broken-off and lost].

Material

Holotype ♂ imago: Mexico, Chiapas, Río Tulija, 48 km. S. Palenque, 17/V/1981. C.M. & O.S. Flint Jr. (NMNH). Paratype: 1 ♂ imago, same data as holotype (wings and genitalia on slide) (NMNH).

Etymology

Named after the river *Tulija*, where the material was collected.

Diagnosis

The paratype of this species differs from the holotype in having the pronotal sublateral spots wider, and the abdominal sterna with posterolateral margins not washed with black.

F. tulija can be separated from the other species of *Farrodes* by the following combination of characters: (1) posterolateral projections of styliger plate long, with an acute apex (Fig. 11); (2) basal ¼ of penis lobes fused; (3) apex of penis lobes acute apically; (4) lateral projections of penes cylindrical, short, narrower toward apex (Fig. 12); (5) abdominal segments whitish translucent washed with black as in Figs. 13–14; (6) membrane of fore wings hyaline;

and (7) size of costal projection of hind wings 0.20 of the width of wing. This species is more closely related to *F. flavipennis* (Domínguez, submitted) but can be separated from it by characters 5 – 7.

Farrodes carioca sp. nov.

Holotype

♂ imago in alcohol, wings and genitalia on slides. Length: body, 4.9–5.1 mm; fore wings, 5.6–5.7 mm; hind wings, 0.7–0.8 mm. General coloration orange-brown, abdominal segments yellowish-white washed with grey.

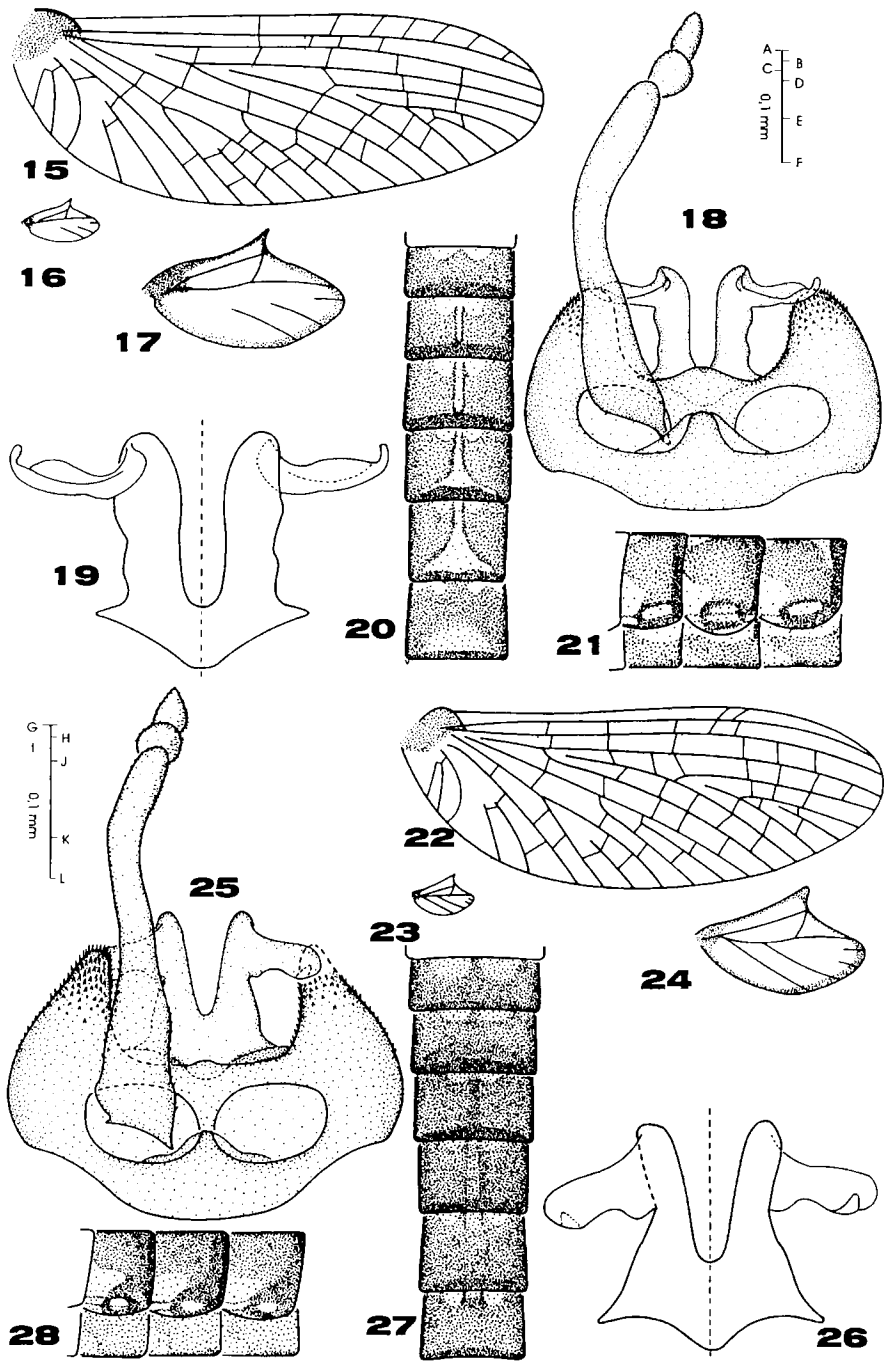
Head: yellowish-brown heavily washed with black around base of antennae and between antennae and eyes. Upper portion of eyes light brown, lower portion blackish. Ocelli white with basal black rings. Antennae yellowish-white.

Thorax: pronotum orange-brown with anterolateral margins and longitudinal medial stripe blackish; mesonotum bright orange-brown with carinae and margins blackish; metanotum orange-brown, with a transversal medial strike, carinae and margins blackish; pleura bright orange-brown with membranous areas and base of wings and legs tinged with black; sterna light orange-brown with anterior half slightly washed with black, carinae and posterior margins blackish.

Wings (Figs. 15–17): membrane of fore wings hyaline, base tinged with light brown; longitudinal veins light brown; cross veins yellowish translucent, except stigmatic cross veins darker; 7 stigmatic cross veins. Membrane of hind wings hyaline, with base greyish-brown; veins C, Sc and $\bar{1}$, basal of MA greyish, remaining veins translucent.

Legs: coxae orange-brown washed with black; trochanters yellowish-brown. Leg I: femora yellowish-brown with distal apex darker; tibiae, tarsi and claws yellowish, greyish at joints (leg I described from paratype, broken-off and lost in holotype). Leg II: femora yellowish with a subapical mark, and diffuse blackish longitudinal stripe in middle of leg; tibiae and tarsi yellowish-white; claws greyish. Leg III: femora yellowish with a subapical mark and outer margin blackish; tibiae yellowish-white washed with grey heavier toward apex; segment I of tarsi yellowish-white, segments II–V and claws greyish.

Abdomen (Figs. 20–21): tergum I completely washed with black, terga II–VII yellowish-white tinged with black, except anterolateral corners, an-



Figs. 15-28. *Farrodes carioca* (Figs. 15-21): 15, forewing (AB); 16, hind wing (AB); 17, hind wing (detail) (AD); 18, ♂ genitalia (AE); 19, detail of penes (right, d.v.; left, v.v.) (AF); 20, abdominal terga II-VII (d.v.) (AC); 21, abdominal segments III-V (l.v.) (AC); *Farrodes ochraceous* (Figs. 22-28): 22, forewing (GH); 23, hind wing (GH); 24, hind wing (detail) (GJ); 25, ♂ genitalia (GK); 26, detail of penes (right, d.v.; left, v.v.) (GL); 27, abdominal terga II-VII (d.v.) (GI); 28, abdominal segments III-V (l.v.) (GI).

teromedian semicircular areas and posteromedial areas of segments V-VII as in Fig. 20; terga VIII-X light orange-brown heavily tinged with black, ex-

cept a pair of submedial marks on anterior margin and anterolateral corners of segments VIII. Posterior margins of all segments darker. Spiracles blackish.

Sterna yellowish-white; sternum I heavily washed with black, sterna II–VIII slightly tinged with black except medial areas of all and lateral margins of segments IV–VII. All segments darker at posterior margins.

Genitalia (Figs. 18–19): styliger plate and $\frac{1}{2}$ basal of segment I of forceps light orange-brown, remainder of forceps yellowish-white; penes yellowish-white; apex of penis lobes rounded, lateral projections cylindrical with wide base terminating in a rounded short flap; posterolateral projections of styliger plate long, straight and with apex blunt. [Caudal filaments broken-off and lost].

Allotype

♀ imago in alcohol. Length: body, 4.2–4.3 mm; fore wings, 5.1–5.3 mm; hind wings, 0.5–0.6 mm. General coloration orange-brown.

Head: as ♂ imago, eyes black.

Thorax: terga, pleura, sterna and wings as in ♂ imago, except submedial longitudinal blackish stripe present on pronotum; legs I as in ♂ imago, legs II yellowish [legs III broken-off and lost].

Abdomen: all terga heavily tinged with black except anterolateral corners of segments II–VI and anteromedian semicircular areas of segments III and IV. All terga with a pair of submedial strikes and posterior margins darker. Sterna widely tinged with black except anterior margins of segments II–VII; sternum VII with a V-shaped blackish mark with apex on anterior margin of sternum VIII; posterior and lateral margins of all segments darker. Ninth sternum notched apically. [Caudal filaments broken-off and lost].

Material

Holotype ♂ imago: Brazil, Rio de Janeiro, 950 m., Nova Friburgo, municipal water supply, 20/IV/1977, C.M. & O.S. Flint, Jr. (MZUSP). Allotype ♀ imago: Brazil, Rio de Janeiro, 410 m. Km. 54, 26 km. E. of Nova Friburgo, 25/IV/1977, C.M. & O.S. Flint, Jr. (MZUSP) Paratype: 1 ♂ imago, same data as allotype (NMNH).

Etymology

From the Tupi word *Carioca* meaning „House of the white man”, today the common name applied to the inhabitants of Rio de Janeiro.

Diagnosis

F. carioca can be separated from the other species of *Farrodes* by the following combination of characters: (1) posterolateral projections of styliger plate short, wide and with apex blunt (Fig. 18); (2) basal $\frac{1}{4}$ of penis lobes fused; (3) apex of penis lobes rounded; (4) lateral projections of penes cylindrical, long, ending in a rounded short flap (Fig. 19); and (5) abdominal color pattern (as in Figs. 20–21).

Farrodes ochraceous sp. nov.

Holotype

♂ imago in alcohol, wings and genitalia on slides. Length: body, 3.9–4.1 mm; fore wings, 4.1–4.3 mm; hind wings, 0.5–0.6 mm. General coloration orange-brown.

Head: yellowish-white diffusely washed with black on anterior margin. Upper portion of eyes yellowish-brown, lower portion blackish. Ocelli white with basal black rings. Antennae: scapus and pedicel yellowish washed with black, flagellum yellowish-brown.

Thorax: pronotum orange-brown with margins, a longitudinal medial stripe and sublateral spots blackish, posterolateral corners darker; mesonotum bright orange-brown with carinae and margins blackish; metanotum orange-brown, with carinae and margins darker; pleura orange-brown with membranous areas and base of wings and legs tinged with black; sterna light orange-brown with medial area lighter, carinae and margins blackish.

Wings (Figs. 22–24): membrane of fore wings hyaline slightly tinged with brown, base light brown; stigmatic area cloudy white; longitudinal veins light brown; cross veins yellowish translucent, except stigmatic cross veins darker; 7 stigmatic cross veins, 1 costal cross vein basal to bullae. Membrane of hind wings hyaline, with base light brown; veins C, Sc and $\frac{1}{2}$ basal of MA light brown, remaining yellowish translucent.

Legs: coxae and trochanters light brown washed with black; femora I yellowish [remainder of legs I and II broken-off and lost]; femora III yellowish heavily washed with black, except basal and distal apices; tibiae and tarsi yellowish, tarsi washed with grey, claws yellowish-brown.

Abdomen (Figs. 27–28): terga yellowish widely washed with orange-brown, except anterolateral corners and part of anterior margin, and posterior margins darker. Spiracles darker. Sterna yellowish-white

widely washed with orange-brown, except anterolateral corners of segments II–VII. Segments VII–X yellowish-brown.

Genitalia (Figs. 25–26): styliger plate and basal $\frac{3}{4}$ of segment I of forceps yellowish grey; remainder of forceps yellowish-white; penes yellowish-white darker at base; apex of penis lobes rounded; lateral projection of penes rounded, long, with wide base, and with a short terminal flap folded (Fig. 26); posterolateral projections of styliger plate long with apex acute. [Caudal filaments broken-off and lost].

Etymology

From the Greek word *ochra* = earthy oxide of iron, because of the general clay color of the body of the holotype.

Material

Holotype ♂ imago: Brazil, Amazonas, Reserva Ducke, 26 km. E. Manaus, 1-5/II/1979, O.S. Flint, Jr. (MZUSP).

Diagnosis

F. ochraceous can be separated from the other species of *Farrodes* by the following combination of characters: (1) posterolateral projections of styliger plate long and narrow, with apex acute (Fig. 25); (2) basal $\frac{2}{5}$ of penis lobes fused; (3) apex of penis lobes rounded; (4) lateral projections of penes cylindrical, long and wide, with a short flap folded ventrally (Fig. 26); and (5) abdominal segments washed with orange-brown (Figs. 27–28).

Farrodes longispinus sp. nov.

Holotype

♂ imago in alcohol, wings and genitalia on slide. Length: body, 3.4–3.7 mm; fore wings 3.9–4 mm; hind wings, 0.4–0.5 mm. General coloration orange-brown.

Head: yellowish-brown, with anterior margin and around antennal sockets blackish. Upper portion of eyes light brown, lower portion blackish. Ocelli white with basal black rings. Antennae: scapus yellowish, pedicel and flagellum paler.

Thorax: pronotum yellowish-brown, with margins and longitudinal submedian marks blackish; meso- and metanotum light orange-brown with carinae and posterior margins black; pleura light brown with membranous areas and base of legs heavily washed with black; sterna light brown, diffusely washed with black, posterior margin of prosternum blackish.

Wings (Figs. 29–31): membrane of fore wings hyaline with a very faint brown tinge, base brown; longitudinal veins light brown, paler toward hind margin; cross veins translucent except stigmatic cross veins light brown; 5 stigmatic cross veins; 2 costal cross veins basal to bullae; membrane of hind wings hyaline, with base and basal $\frac{1}{2}$ of subcostal area tinged with brown; veins C, Sc and $\frac{1}{2}$ basal of MA yellowish-brown, cross veins translucent.

Legs: [Legs I broken off and missing] Coxae orange-brown washed with black; trochanters, femora and tibiae yellowish, femora III with two black bands, one wide covering medial $\frac{2}{3}$ and one narrow subapical; tarsi grey-yellowish, darker at joints. Claws greyish.

Abdomen (Figs. 34–35): tergum I completely washed with black, terga II–VI yellowish translucent, widely washed with black, except for anterolateral corners and an anteromedian semicircular area, black markings reduced posteriorly; terga VII–X yellowish-brown, with black markings more diffuse; tracheae smoky, spiracles black; sterna yellowish-white, with posterior margins of sterna I–II, posterolateral margins of sterna III–VI and wide stripes on sterna VII–IX blackish.

Genitalia (Figs. 32–33): styliger plate shaped as in Fig. 32, with medial area blackish, lateral areas yellowish-brown; basal $\frac{1}{2}$ of forceps segment I light brown, remainder of forceps yellowish-white; penes yellowish, spines blackish; penis lobes rounded apically; lateral penal projections with wide base and short terminal flap, and long ventral spines basal to the terminal flaps (Fig. 33); posterolateral projections of styliger plate long, straight, with apex blunt. [Caudal filaments broken-off and lost].

Etymology

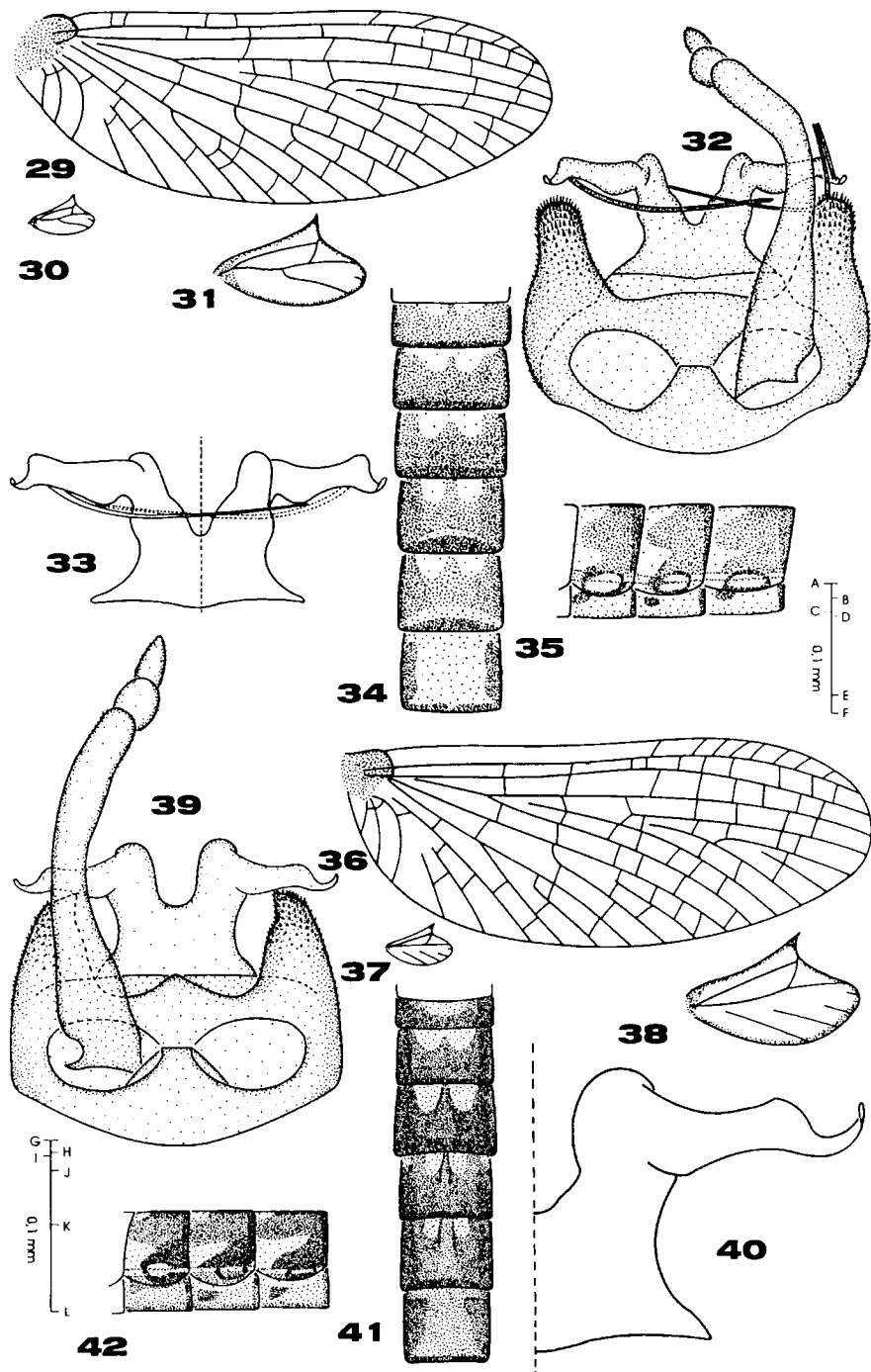
From Latin words *longus* = long and *spina* = spine, because of the long subapical ventral spine on the penes.

Material

Holotype ♂ imago: Venezuela, T.F. Amazonas, Cerro de la Neblina, Basecamp, 0 50'N, 66 94' W, 140 m. elevation, 4-12/FEB/1984. D. Davis, T. McCabe (FAMU).

Diagnosis

F. longispinus can be separated from the other species of *Farrodes* by the following combination of characters: (1) posterolateral projections of styliger



Figs. 29–42. *Farrodes longispinus* (Figs. 29–35): 29, forewing (AB); 30, hind wing (AB); 31, hind wing (detail)(AD); 32, ♂ genitalia (AE); 33, detail of penes (right, d.v.; left, v.v.) (AF); 34, abdominal terga II–VII (d.v.) (AC); 35, abdominal segments III–V (l.v.) (AC); *Farrodes pakitza* (figs. 36–42): 36, forewing (GH); 37, hind wing (GH); 38, hind wing (detail) (GJ); 39, ♂ genitalia (GK); 40, detail of penes (right, d.v.; left, v.v.) (GL); 41, abdominal terga II–VII (d.v.) (GI); 42, abdominal segments III–V (l.v.) (GI).

plate long and narrow with apex blunt (Fig. 32); (2) basal ½ of penis lobes fused; (3) apex of penis lobes rounded; (4) lateral projections of penes cylindrical,

long, ending in a short flap, with a long ventral spine basal to terminal flap (Fig. 33); (5) abdominal color pattern (as in Figs. 34–35).

Farrodes pakitza* sp. nov.Holotype*

♂ imago in alcohol, wings and genitalia on slides. Length: body, 4.4–4.6 mm; fore wings, 4.5–4.7 mm; hind wings, 0.5–0.6 mm. General coloration orange-brown, abdominal segments yellowish washed with black.

Head: yellowish-brown tinged with black between eyes and antennae and anterior margin. Upper portion of eyes light brown, lower portion blackish. Ocelli white with basal black rings. Antennae: scapus and pedicel yellowish-brown, flagellum paler.

Thorax: pronotum light orange-brown with margins, a longitudinal medial stripe and paired sublateral spots blackish; mesonotum light orange-brown with margins blackish, medial area lighter, lateral areas of postscutellum II darker; metanotum light orange-brown with carinae, lateral margins and a median transversal band blackish; pleura orange-brown with membranous areas and base of wings and legs tinged with black; sterna light orange-brown with margins blackish, central area lighter.

Wings (Figs. 36–38): membrane of fore wings hyaline slightly tinged with light brown, base light brown; longitudinal veins light brown darker toward hind margin; cross veins yellowish translucent, except stigmatic cross veins yellowish-brown; membrane of hind wings hyaline with base tinged with light brown, veins C, ½ basal of Sc and MA light brown, remaining veins translucent.

Legs: coxae orange-brown washed with black on margins; trochanters yellowish-brown; legs II: femora and tibiae yellowish, tarsi and claws yellowish grey; legs III: femora light brown with subapical brown band and basal ⅔ washed with black, tibiae and tarsi light yellow, tarsi washed with grey, claws greyish [legs II and III from paratype, all legs of holotype broken-off and lost].

Abdomen: (Figs. 41–42) abdominal terga yellowish-white; tergum I completely washed with black with a longitudinal medial darker stripe; terga II–VI widely washed with black, except anteromedian semicircular areas shaped (as in Fig. 41), and anterolateral corners; terga VII–X lighter, washed with grey on anterolateral areas; posterior margin of all terga blackish. Spiracles blackish. Sterna yellowish-white, sterna III–VIII washed with brown more heavily toward posterior segments; anterolateral corners of sterna II–VIII darker.

Genitalia: (Figs. 39–40) styliger plate and ½ basal of forceps segment I brown, remainder of forceps yellowish-white; penes yellowish; apex of penis lobes rounded, lateral projections of penes cylindrical, with wide base and terminating in a narrow flap; posterolateral projections of styliger plate long, straight, with apex blunt. [Caudal filaments broken-off and lost].

Material

Holotype ♂ imago: Peru, Madre de Dios, Manu, Pakitza (12° 7' S- 70° 58' W), 250 m, 11/IX/1988, O.S. Flint & N. Adams, trail 1, 1st stream. UV light (on indefinite loan to NMNH). Paratype: 1 ♂ imago (wings and genitalia on slides) Peru, Madre de Dios, Manu, Pakitza (11° 56' S- 71° 18' W), 250 m, 12-18/IX/1989, N. Adams et al., malaise trap (NMNH).

Etymology

Named after the locality *Pakitza*, where the material was collected.

Diagnosis

The paratype is a little darker than the holotype on the mesonotum, pleura and abdominal segments.

F. pakitza can be separated from the other species of *Farrodes* by the following combination of characters: (1) posterolateral projections of styliger plate long and narrow with a somewhat acute apex (Fig. 39); (2) basal ½ penis lobes fused; (3) apex of penis lobes rounded; (4) lateral projections of penes cylindrical, long, ending in a small narrow flap (Fig. 40); (5) abdominal segments washed with black (Figs. 41–42).

Farrodes xingu* sp. nov.Holotype*

♂ imago in alcohol. Length: body, 4.1–4.3 mm; fore wings, 4.5–4.6 mm; hind wings, 0.65–0.7 mm. General coloration orange-brown, abdominal segments yellowish washed with black.

Head: yellowish with anterior margin and around base of antennae blackish. Upper portion of eyes light brown, lower portion blackish. Ocelli white with basal black rings. Antennae: scapus and pedicel yellowish-brown, flagellum paler.

Thorax: pronotum light orange-brown with lateral margins, a longitudinal medial stripe and paired sublateral spots blackish; meso- and metanotum or-

ange-brown with carinae, lateral margins and postcutellum II blackish; pleura orange-brown with membranous areas and base of wings and legs heavily washed with black; sterna orange-brown with margins blackish.

Wings: (Figs. 43–45) membrane of fore wings hyaline, base tinged with light brown; longitudinal veins light brown; cross veins light yellow, lighter toward posterior margin; membrane of hind wings hyaline with base tinged with yellowish, veins C, base of Sc and MA greyish, remainder of longitudinal veins light yellow, cross veins translucent.

Legs: coxae orange-brown washed with black; trochanters yellowish-brown, [remainder of legs I and II broken-off and lost]; femora III yellowish-brown washed with black in medial area, with a subapical black band covering distal $\frac{1}{4}$; tibiae, tarsi and claws yellowish darker at joints.

Abdomen (Figs. 48–49): tergum I completely washed with black; terga II–VIII yellowish-white tinged with black, except anteromedian semicircular areas, anterolateral corners, and posterior margin of segment VII; anteromedian semicircular areas divided by a pair of longitudinal black strikes; posterior margin of all segments blackish. Spiracles blackish. Sterna yellowish-white with lateral and posterior margins washed with black, more extensively toward posterior segments.

Genitalia (Figs. 46–47): styliger plate and forceps segment I greyish-brown, remainder of forceps yellowish-white; penes yellowish-white tinged with black at base; apex of penis lobes rounded, lateral projections of penes cylindrical, long, with wide base and terminating in a short flap; posterolateral projections of styliger plate cylindrical, long and straight, with apex blunt [caudal filaments broken-off and lost].

Allotype

♀ imago in alcohol. Length: body, 3.9–4.0 mm; fore wings, 4.3–4.4 mm; hind wings, 0.48–0.5 mm. General coloration orange-brown.

Head: light yellow; anterior margin and around antennae blackish, tinged with black between antennae and base of eyes and ocelli. Antennae as in ♂ imago, [flagellum broken-off and lost].

Thorax: terga, pleura, wings and legs III as in ♂ imago, except black areas on pronotum more extensive; sterna light brown with margins blackish.

Abdomen: terga as ♂ imago but light areas small-

er; sterna I–VI yellowish-white with lateral margins blackish, sterna VII with a blackish V-shaped mark, with apex toward posterior margin, remaining sterna light orange-brown. Ninth sternite notched apically. [Caudal filaments broken-off and lost].

Material

Holotype ♂ imago: Brazil, Para, Rfo Xingu, Camp. (52°22'W, 3°39'S), Ca 60 km, S. Altamira, 8-16/X/1986. P. Spangler and O. S. Flint (MZUSP). Igarape Jabuti, Malaise trap, day and night collection. Allotype ♀ imago, same data as holotype (MZUSP). Paratypes: 15 ♂ imagines, 26 ♀ imagines, 3 ♂ subimagines, and 7 ♀ subimagines, same data as holotype. (3 ♂ and 3 ♀ imagines each in FAMU and IFML, remainder in NMNH).

Etymology

Named after the river *Xingu*, where the holotype was collected.

Diagnosis

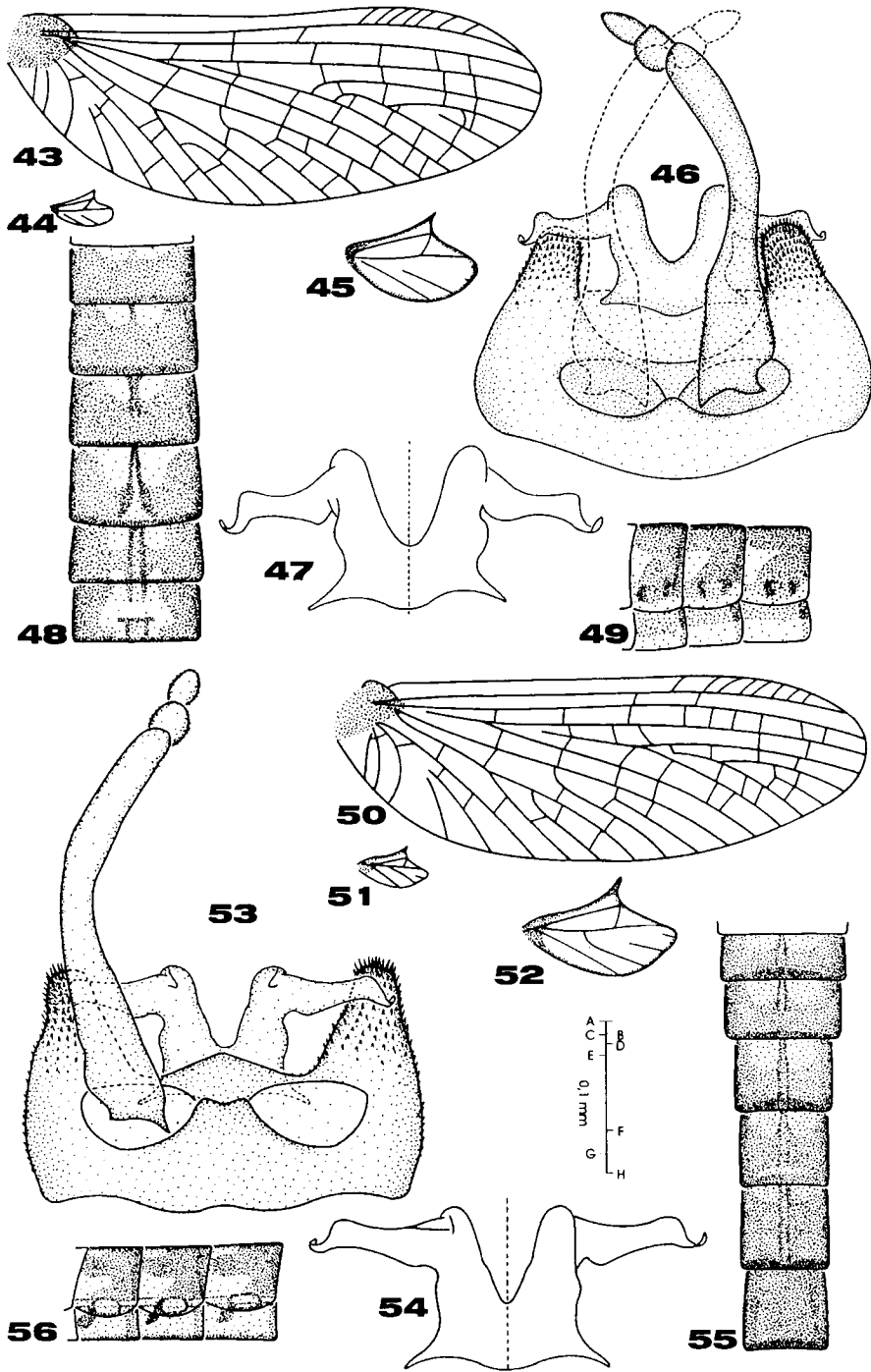
The male imagines of *F. xingu* can be separated from the other species of *Farrodes* by the following combination of characters: (1) projections of styliger plate long and narrow, with apex rounded, (Fig. 46); (2) basal $\pm \frac{1}{3}$ of penis lobes fused; (3) apex of penis lobes rounded; (4) lateral projections of penes cylindrical, long, ending in a short flap (Fig. 47); (5) abdominal segments with extensive whitish marks (Figs. 48–49); and (6) forceps segment I greyish-brown, segments II–III yellowish-white. This species is more similar to *Farrodes tepui* than to the others, but can be separated from it, by characters 5–6.

Farrodes tepui sp. nov.

Holotype

♂ imago in alcohol. Length: body, 3.8–4.2 mm; fore wings, 4.1–4.3 mm; hind wings, 0.5–0.6 mm. General coloration light orange-brown, abdominal segments yellowish translucent washed with grey. Head: yellowish-white slightly washed with black between eyes and antennae and darker around base of antennae. Upper portion of eyes light brown, lower portion blackish. Ocelli white with basal black rings. Antennae: scapus yellowish-white, pedicel and flagellum greyish-yellow with joints blackish.

Thorax: pronotum yellowish-brown, with margins, a longitudinal medial stripe, and paired sublateral



Figs. 43–56. *Farrodes xingu* (Figs. 43–49): 43, forewing (AB); 44, hind wing (AB); 45, hind wing (detail) (AD); 46, ♂ genitalia (AF); 47, detail of penes (right, d.v.; left, v.v.) (AG); 48, abdominal terga II–VII (d.v.) (AD); 49, abdominal segments III–V (l.v.) (AD); *Farrodes tepui* (Figs. 50–56): 50, forewing (AC); 51, hind wing (AC); 52, hind wing (detail) (AE); 53, ♂ genitalia (AG); 54, detail of penes (right, d.v.; left, v.v.) (AH); 55, abdominal terga II–VII (d.v.) (AD); 56, abdominal segments III–V (l.v.) (AD).

spots blackish; mesonotum light orange-brown with margins blackish, postscutellum II slightly darker; metanotum yellowish-brown with a transversal me-

dial stripe, carinae, margins, and medial area blackish; pleura light orange-brown washed with black on membranous areas and base of wings and legs; ster-

na light orange-brown with carinae and margins blackish, medial area yellowish-white.

Wings (Figs. 50–52): membrane of fore wings hyaline, base tinged with light brown; longitudinal veins light brown; cross veins yellowish translucent except stigmatic cross veins yellowish-brown; 7 stigmatic cross veins. Membrane of hind wing hyaline, base tinged with light brown; basal $\frac{1}{2}$ of veins C and Sc greyish-brown; remaining veins translucent.

Legs: coxae light orange-brown with margins blackish; trochanters yellowish; femora I and II yellowish-white slightly washed with grey, tibiae yellowish-white with basal $\frac{1}{3}$ slightly washed with grey, tarsi and claws greyish-yellow; legs III: femora yellowish with a medial mark and a subapical band washed with black [legs III described from paratype, in holotype legs III broken-off and lost].

Abdomen (Figs. 55–56): yellowish translucent; tergum I completely washed with black with margins darker; terga II–VII diffusely washed with black, except anterolateral corners, and marks on antero-medial areas of segments II–V shaped as in Fig. 55; terga II–V with a pair of darker submedial stripes; lateral areas of all terga darker; terga VIII–X light orange-brown diffusely tinged with black; posterior margins of terga heavily washed with black. Spiracles blackish. Sterna I–VI yellowish translucent with posterior margins and anterolateral corners blackish; sternum VII yellowish-brown darker on lateral areas; remaining sterna light orange-brown diffusely tinged with black.

Genitalia (Figs. 53–54): styliger plate orange-brown; $\frac{1}{2}$ basal of forceps segment I yellowish-brown, remainder of forceps yellowish-white; penis yellowish-white; apex of penis lobes rounded, lateral projections cylindrical, long, with wide base and terminating in a short flap; posterolateral projections of styliger plate long, straight, with apex blunt. Caudal filaments yellow darker at joints.

Allotype

♀ imago in alcohol. General coloration dark orange-brown, abdominal segments orange-brown widely washed with black.

Head: light brown washed with black between eyes and antennae; eyes blackish; ocelli as in ♂ imago; antennae: scapus dark brown [pedicel and flagellum broken-off and lost].

Thorax: pronotum as in ♂ imago except a M-shaped median blackish mark; meso- and metan-

otum bright orange-brown, mesonotum slightly washed with black; pleura and sterna as in ♂ imago. Wings: as in ♂ imago except longitudinal veins darker.

Legs: coxae and trochanters as in ♂ imago; legs II greyish-yellow, femora and tibiae with a distal subapical blackish band [legs I and III broken-off and lost].

Abdomen: orange-brown washed with black; terga as in ♂ imago except more extensively washed with black and longitudinal median stripe present on segments II–VIII; sterna yellowish-brown with posterior margins blackish. Ninth sternite notched apically. [caudal filaments broken-off and lost].

Material

Holotype ♂ imago: Venezuela, T. F. Amazonas, Basecamp, 0° 51' N – 66° 10' W, Cerro de la Neblina, 140m, 13-15/III/1984, O. Flint & J. Louton, light trap (NMNH). Allotype ♀ imago: Venezuela, T.F. Amazonas, Basecamp, 0° 50' N – 66° 9' 44" W, Cerro de la Neblina, 140m, 1-10/III/1984, D. Davis & T. McCabe (NMNH). Paratypes: 9 ♂ imagines, same data as holotype (NMNH); 1 ♂ imago and 1 ♀ imago, same data as allotype (IFML); and 21 ♂ imagines, same data as holotype, except date: 20-24/III/1984 (1 in IFML, 3 in FAMU, remainder in NMNH).

Etymology

From the Yanomami word *Tepui*, meaning „House of the gods“, denominating the tablemountains in Venezuela and Brazil.

Diagnosis

F. tepui can be separated from the other species of *Farrodes* by the following combination of characters: (1) posterolateral projection of styliger plate long and narrow, with apex blunt (Fig. 53); (2) basal $\frac{3}{5}$ of penes lobes fused; (3) apex of penis lobes rounded; (4) lateral projections of penes cylindrical, long, ending in a short flap as in Fig. 54; (5) abdominal segments with small whitish marks as in figs. 55–56; and (6) basal $\frac{1}{2}$ of forceps segment I yellowish-brown, distal $\frac{1}{2}$ and segments II–III yellowish-white.

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