Review of the Neotropical genus *Oronoqua* Fennah, 1947 (Insecta, Hemiptera, Issidae)

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ABSTRACT
The genus *Oronoqua* Fennah, 1947 (Issidae, Issinae, Issini) is revised. A diagnosis of the genus is provided. *Oronoqua deina* Fennah, 1947, previously known from a single female specimen from Guyana, is recorded from French Guiana for the first time. Male genitalia of *Oronoqua deina* Fennah, 1947 are described. *Oronoqua ibisca* n. sp. is described from female specimens collected in tropical rainforests located in Panama. *Oronoqua ibisca* n. sp. differs from *O. deina* by its lateral margins of coryphe straight in lateral view, by its clypeus with sharp median keel, by its fore wings transparent with transverse veins through all the corium, by its clavus with numerous transverse veins included between postcubitus and first anal vein inside the fork, and by its first metatarsomere with four intermediate spines apically.

KEY WORDS
Insecta,
Hemiptera,
Issidae,
Issini,
Oronoqua,
tropical rainforest,
Guyana,
French Guiana,
Panama,
new species.

RÉSUMÉ

Révision du genre néotropical Oronoqua *Fennah, 1947 (Insecta, Hemiptera, Issidae).*

Le genre *Oronoqua* Fennah, 1947 (Issidae, Issinae, Issini) est révisé. La diagnose de ce genre est présentée. *Oronoqua deina* Fennah, 1947, qui n'était connue que par un seul spécimen femelle du Guyana, est citée de Guyane française pour la première fois. Les genitalia mâles d'*Oronoqua deina* Fennah, 1947 sont décrits. *Oronoqua ibisca* n. sp. est décrit d'après des spécimens femelles collectés dans des forêts pluviales tropicales à Panama. *Oronoqua ibisca* n. sp. se différencie d'*O. deina* par ses marges latérales du coryphe droites en vue latérale, par son clypéus avec une carène médiane aiguë, par son aile antérieure transparente avec des nervures transverses sur toute la longueur du corium, par son clavus avec de nombreuses nervures transverses incluses dans la fourchette entre le postcubitus et la première nervure anale, par son premier métatarsomère avec quatre épines apicales intermédiaires.

MOTS CLÉS
Insecta,
Hemiptera,
Issidae,
Issini,
Oronoqua,
forêts pluviales
tropicales,
Guyana,
Guyane française,
Panama,
espèce nouvelle.

INTRODUCTION

The family Issidae Spinola, 1839 is one of the largest fulgoroid families distributed worldwide. It comprises one subfamily, Issinae Spinola, 1839, with four tribes: Issini Spinola, 1839 (= Thioniini Melichar, 1906), Colpopterini Gnezdilov, 2003, Parahiraciini Cheng & Yang, 1991, and Hemisphaeriini Melichar, 1906 (Gnezdilov 2003b, 2009). Considering the recently proposed synonymy of Issini and Thioniini (Gnezdilov 2009), only Issini and Colpopterini occur in the Neotropics, including 24 and five genera, respectively (Gnezdilov & O'Brien 2008). Generally, members of the family Issidae are characterized by coriaceous (elytriform in many species) fore wings. In 1947, Fennah described a curious genus of Issidae, *Oronoqua,* with rather hyaline wings and bearing a "superficial resemblance to a Dictyopharid" (Fennah 1947). This genus belongs to the tribe Issini. The genus *Oronoqua* is further characterized by the shape of the coryphe and metope, and the venation of the well-developed hind wings with remigium, fore part of vannus, and anal part in shape of three subequal lobes. The type species of the genus *Oronoqua*, *O. deina* Fennah, 1947, was described from a single female specimen collected on the Oronoqua River, Guyana, in 1937 (Fennah 1947). Since then, no other record of this species was published. During the revision of issid collections in MNHN, new records of *O. deina* from French Guiana were confirmed.

During the IBISCA project (Investigating the BIodiversity of Soil and Canopy Arthropods: Didham & Fagan 2003; Basset *et al.* 2007), a large-scale study of faunal turnover and vertical stratification of arthropods within the San Lorenzo forest, a new species of the genus *Oronoqua* described below, *O. ibisca* n. sp., was collected in Panama.

MATERIAL AND METHODS

During the IBISCA project, more than 422 000 arthropods were collected from nine sites, four strata height (soil/litter, understorey, mid-canopy and upper canopy) and four seasonal replicates (September-October 2003, March 2004, May 2004 and October 2004) at the San Lorenzo forest near Colon, Panama (Basset *et al*. 2007). In particular, 15 245 Auchenorrhyncha including more than 450 species were collected by various sampling methods such as canopy fogging, Malaise, interception-flight, sticky, light and pitfall traps, beating and Winkler extracts (Y. Basset *et al*. unpubl. data; permit to collect at San Lorenzo kindly supplied by the Autoridad Nacional del Ambiente, Panama). Out of these, three specimens proved to belong to the new species

described below. Two additional specimens of the new species were discovered in the Henk Wolda collection of homopterans at the Smithsonian Tropical Research Institute, Panama. By good fortune, one live specimen was also photographed at San Lorenzo. It was very probably *O. ibisca* n. sp., but since the specimen was not captured, the identification remains tentative.

The terminology of the head follows Emeljanov (1995), that of the male genitalia follows Gnezdilov (2003a), and that of female genitalia follows Bourgoin (1993) and Gnezdilov (2002). The genital segments of specimens examined were macerated in 10% KOH and drawn while in glycerine jelly using a light microscope.

Photographs of the specimens were shot with a Leica MZ 8 with JVC video camera KY F7OB, and images were produced using the software Synoptics Automontage (Synoptics Ltd, Cambridge, UK); or using Leica MZ 16 with Leica video camera DFC 320, with images produced using the software Combine Z4; or with Entovision® system; or with a digital Canon EOS 450D with a EFS 60 mm f/2.8 Macro USM Canon lens.

ABBREVIATIONS

BMNH	the Natural History Museum, London;
Cirad	Centre de Coopération internationale en Recherche agronomique pour le Développement, Montpellier;
MNHN	Muséum national d'Histoire naturelle, Paris;
STRI	Smithsonian Tropical Research Institute, Panama;
UMR CBGP	Centre de Biologie pour la Gestion des Populations, Montpellier;
ZIN	Zoological Institute, Russian Academy of Sciences, St. Petersburg.

SYSTEMATICS

Family ISSIDAE Spinola, 1839
Subfamily ISSINAE Spinola, 1839
Tribe ISSINI Spinola, 1839

Genus *Oronoqua* Fennah, 1947

Oronoqua Fennah, 1947: 91.

TYPE SPECIES. — *Oronoqua deina* Fennah, 1947, by original designation.

ETYMOLOGY. — From the river Oronoqua where the holotype of *O. deina* was collected.

DISTRIBUTION. — Guyana, French Guiana, Panama.

DIAGNOSIS. — Metope narrow, elongate, widest above clypeus, angularly concave apically, with only median keel which is indistinct above clypeus. Lateral margins of metope sharp, metopo-clypeal suture straight. Ocelli present. Rostrum reaching hind coxae. Pedicel globular, twice larger than scapus. Coryphe rectangular, clearly longer than wide, projecting in front of eyes of an equal length to the widest eye diameter (Fig. 2C, F). Disc of coryphe concave. Pronotum without keels. Scutellum with lateral keels. Fore wings (Fig. 3A, B) elongate, hyaline, without hypocostal lobe. Radius bifurcate, median bi- or trifurcate, cubitus anterior simple (R 2 M 2-3 CuA 1), with transverse veins on corium and clavus. Costal margin of hind wings weakly concave, with coupling lobe. The concavity between corium and vannus and the concavity separating anal lobe are distinct. Radius, first and second anal veins bifurcate, median and cubitus posterior simple, cubitus anterior trifurcate, postcubitus tetrafurcate, (R 2 M 1 CuA 3 CuP 1 Pcu 4 A_1 2 A_2 2). Cubitus anterior and cubitus posterior are close to each other, but not flattened. Transverse veins in distal part of the wings. Hind tibia with 2-4 lateral spines. First metatarsomere with 4 or 5 intermediate spines apically.

Female (Fig. 4): sternum VII with widely and deeply concave hind margin. Female genitalia are the same in the two known *Oronoqua* species (Fig. 4). Anal tube elongate, narrowing apically, with apical concavity (Fig. 4B). Anal column long, 0.4 times as long as anal tube. Gonoplacs nearly rectangular, without keels (Fig. 4A). Posterior connective lamina of gonapophyses IX elongate (Fig. 4E). Distal parts of the lamina weakly turned to median line, each with subapical tooth. Lateral fields of the lamina in shape of short flattened semicircular processes. Median field of the lamina convex, with deep median incision (Fig. 4E). Gonocoxa VIII with almost straight hind margin (Fig. 4D). Endogonocoxal process trifurcate apically. Anterior connective lamina of gonapophysis VIII with wide plate bearing 3 large rounded teeth in apical group and 5 or 6 small teeth in lateral group (Fig. 4C, D).

SPECIES INCLUDED. — *Oronoqua deina* Fennah, 1947 and *O. ibisca* n. sp.

TAXONOMIC RELATIONSHIPS

According to the narrow and angularly apically concave metope, *Oronoqua* is close to the genus *Dracela* Signoret, 1861.

Oronoqua deina Fennah, 1947
(Figs 1A; 2A-C; 3A; 4; 5)

Oronoqua deina Fennah, 1947: 91, 92, pl. V, figs 1-7.

HOLOTYPE. — **Guyana.** Oronoqua River, 16.X.1937, ♀ (BMNH, BM 1938-319).

OTHER MATERIAL EXAMINED. — **French Guiana.** Petit Saut, 8.XI.1994, Roubaud leg., 1 ♂ (MNHN). — Piste de Kaw, 23.VII.1993, Roubaud leg., 1 ♀ (MNHN). — Montagne de Kaw, 17-23.VIII.1994, Roubaud leg., 1 ♀ (MNHN).

DISTRIBUTION. — Guyana and French Guiana.

DESCRIPTION

Total length (from apex of coryphe to apex of fore wings): male 11.2 mm, females 12.5-13.0 mm.

Male genitalia (Fig. 5)

Pygofer with convex hind margin (Fig. 5G). Anal tube wide medially, narrowing apically (Fig. 5G), lateral margins and apex turned down (Fig. 5D). Anal column long (0.4 times as long as anal tube). Phallobase in shape of a weakly sclerotized sac subapically, with denticles (Fig. 5A). Ventral phallobase lobe long and wide, weakly narrowing apically, with apical concavity. Aedeagus with pair of long and narrow, acuminate ventral hooks. Connective bowl-shaped. Style with convex hind margin. Capitulum of style long and narrow, lateral tooth quadrate (Fig. 5E, F).

Oronoqua ibisca n. sp.
(Figs 1B, C; 2D-G; 3B, C)

HOLOTYPE. — **Panama.** Colon Province, San Lorenzo Protected Area (9°16'S, 79°58'W), "IBH 2826", "HOISSI-22000012", "FL-C1A7h", flight-interception trap at 7 m height, 15.II.2004, M. Gonzalez leg., ♀ (MNHN).

PARATYPES. — **Panama.** San Lorenzo Forest (9°16'S 79°58'W), "IBH 2797", "FL-C1A14q", flight-interception trap 14 m height, 3-13.VIII.2004, M. Rapp, K. Didham & L. Fagan leg., paratype 1, 1 ♀ (right anterior leg spread forwards) (ZIN).
Panama, San Lorenzo Forest (9°16'S, 79°58'W), "IBH 2804", "FL-C1A14q", flight-interception trap 14 m height, 3-13.VIII.2004, M. Rapp, K. Didham & L. Fagan leg., paratype 2, 1 ♀ (wings somewhat spread) (Cirad-CBGP).
Panama Canal Zone, Barro Colorado I., "5 m-23", "STRI-ENT 0 022 843", 14.IV.1976, Silberglied & Aiello leg., paratype 3, 1 ♀ (STRI).
Panama, Coclé Province, Above El Copé, "STRI-ENT 0 022 844", 8.XI.1992, A. Aiello leg., paratype 4, 1 ♀ (STRI).

ETYMOLOGY. — Dedicated to all participants of the IBISCA project in Panama, whose collective efforts allowed the discovery of this species.

DISTRIBUTION. — In Panama, recorded from San Lorenzo Protected Area, Colon Province, Barro Colorado Island, Panama Province, and El Copé, Coclé Province.

DESCRIPTION

Rather similar to *O. deina*, but with lateral margins of coryphe straight in lateral view, clypeus with sharp median keel, and fore wings completely transparent (other distinctive characters provided in key, below).

Fore wings (Fig. 3B): radial and medial veins connected by transverse veins through all the corium. Clavus with numerous transverse veins.

Hind legs: left hind tibia of holotype with three strong lateral spines, right hind tibia with four lateral spines. All paratypes with three lateral spines. First metatarsomere with four intermediate spines apically.

General coloration light brown, with the ventral body side and the head paler, close to ochre-yellow. Two longitudinal parallel black bars on coryphe. Lateral margins of metope black edged with fading red, median keel red-orange. Pigmentation of scutellum darker on the external side of lateral keels. Fore wings vitreous (not smoke-filled), with venation brown-reddish.

Total length of females: 13-14 mm.

Holotype measurements

Total length (from apex of coryphe to apex of fore wings): 14 mm.

Body length (from apex coryphe to apex of abdomen): 10.1 mm.

Length of fore wing: 11 mm.

Length of head and pronotum: 2 mm; width of head (including eyes): 1.8 mm.

Length/width of pronotum: 0.8 mm/2.0 mm.

Length/width of scutellum: 2.5 mm/3.1 mm.

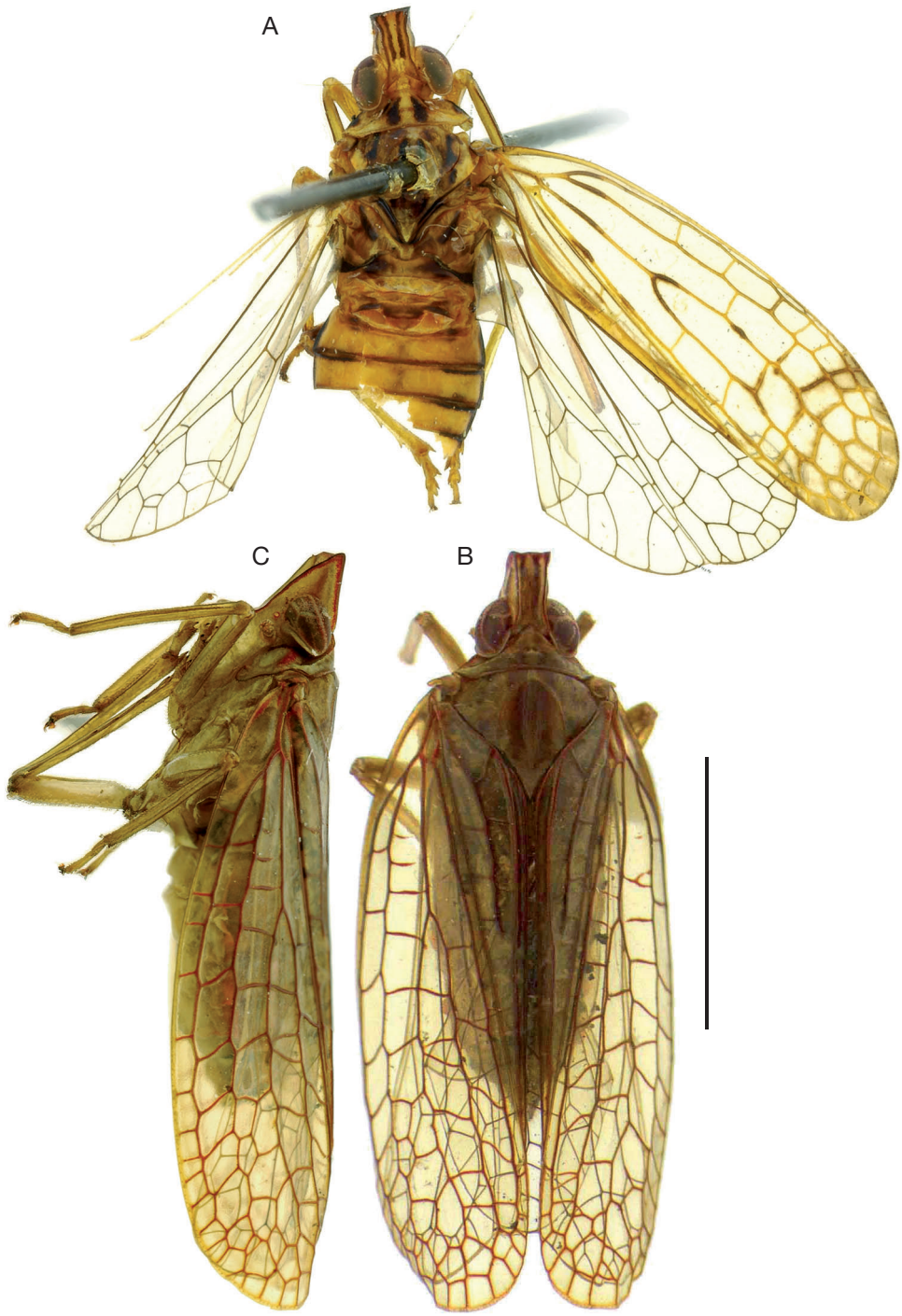

Fig. 1. — **A**, *Oronoqua deina* Fennah, 1947, ♀ holotype habitus, dorsal view; **B**, *O. ibisca* n. sp., ♀ holotype habitus, dorsal view; **C**, same, lateral view. Photos: H.-P. Aberlenc. Scale bar: 5 mm.

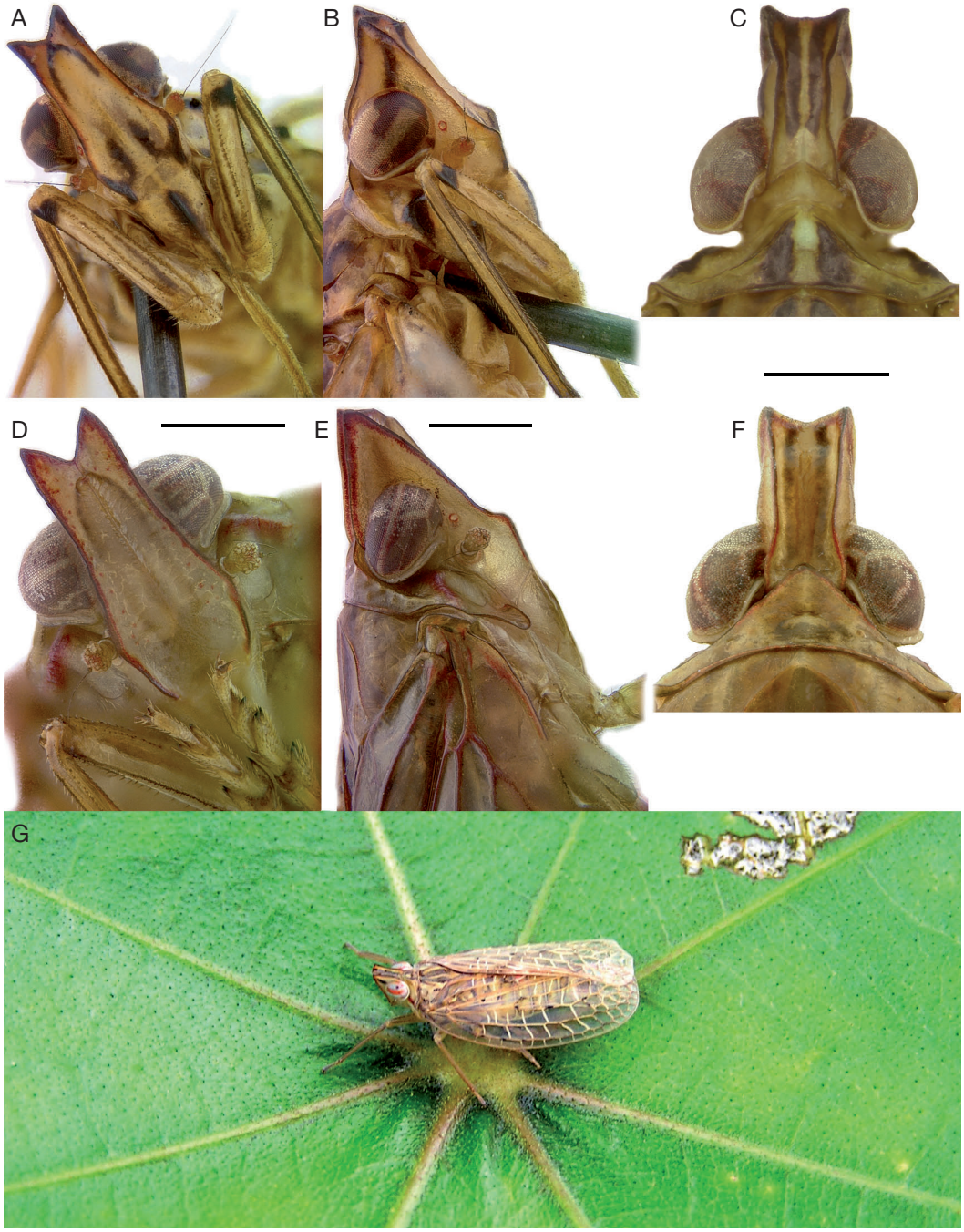

Fig. 2. — **A**-**C**, *Oronoqua deina* Fennah, 1947; **A**, ♀ holotype, head in ventral view; **B**, same, head in lateral view; **C**, ♀ from French Guiana, head in dorsal view; **D**-**G**, *O. ibisca* n. sp.; **D**, ♀ holotype, head in ventral view; **E**, same, head in lateral view; **F**, same, head in dorsal view; **G**, specimen alive. Photos: A, B, D-F, H.-P. Aberlenc; C, V. M. Gnezdilov; G, P. Cuénoud. Scale bars: 1 mm.

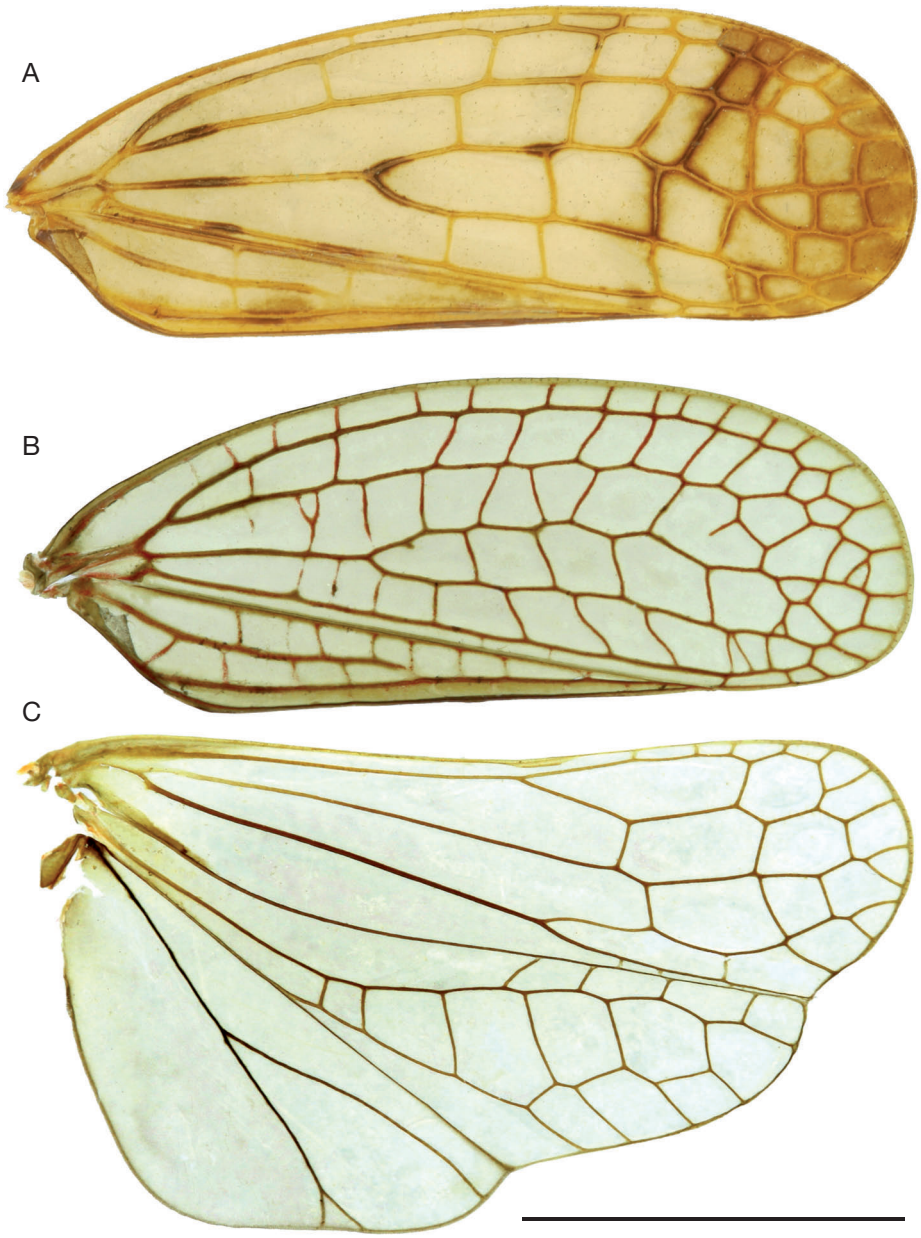

FIG. 3. — **A**, *Oronoqua deina* Fennah, 1947, female holotype, left fore wing in ventral view; **B**, **C**, *O. ibisca* n. sp., ♀ holotype; **B**, right fore wing in dorsal view; **C**, right hind wing in dorsal view. Photos: H.-P. Aberlenc. Scale bar: 5 mm.

Paratypes measurements

Total length (from apex of coryphe to apex of fore wings): paratype 1, 13 mm; paratype 2, 13.3 mm; paratype 3, 13 mm; paratype 4, 14 mm.

BIOLOGY

Male, nymph, host-plant and biology unknown. Specimens were collected in flight-interception traps at 7 and 14 m (mid-canopy). Adults occurred

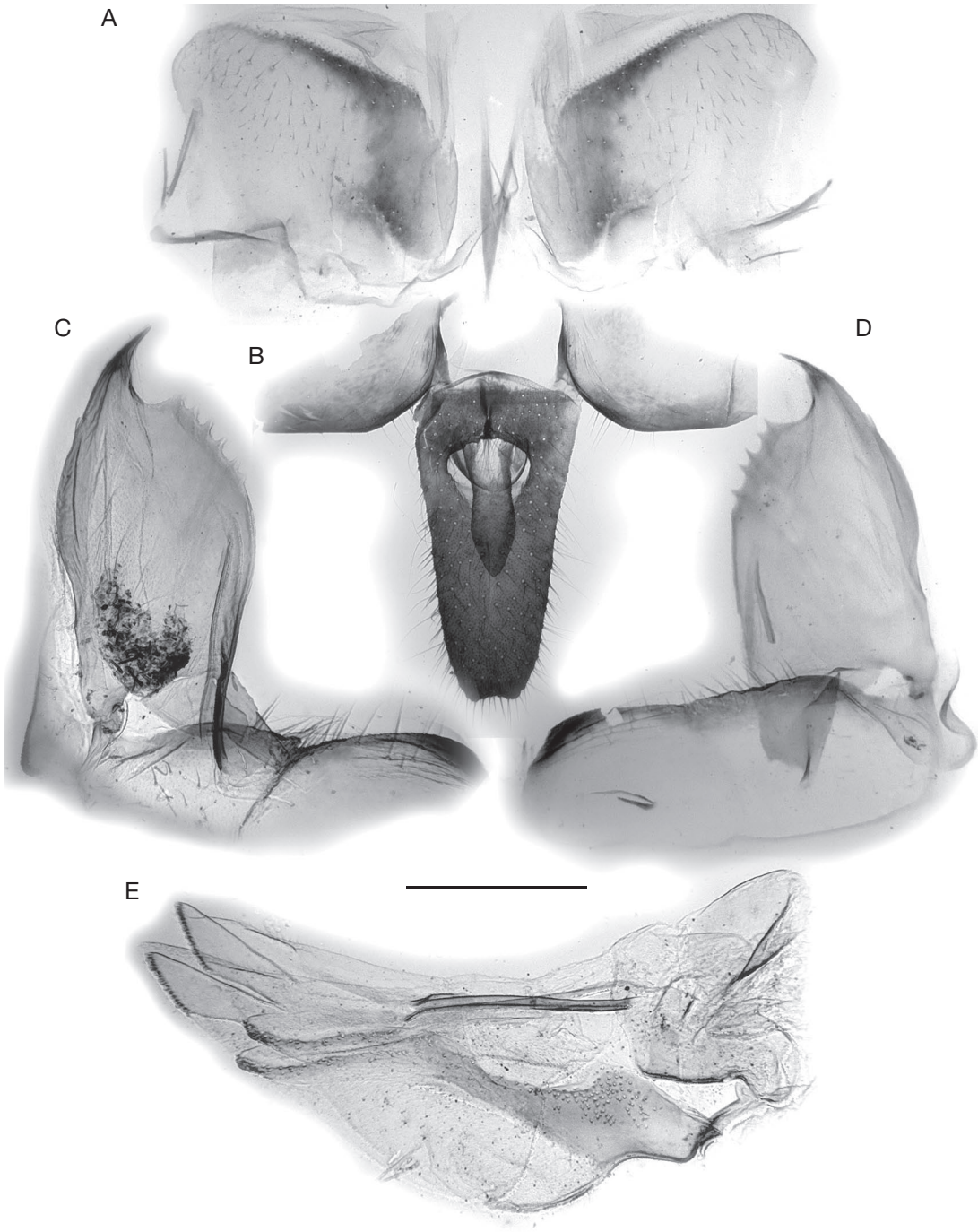

Fig. 4. — *Oronoqua deina* Fennah, 1947, slide-mounted ♀ holotype genitalia: **A**, gonoplacs in dorsal view; **B**, anal tube in dorsal view; **C**, anterior connective lamina of gonapophysis VIII in dorsal view; **D**, same in ventral view; **E**, posterior connective lamina of gonapophyses IX in lateral view. Photos: H.-P. Aberlenc. Scale bar: 0.5 mm.

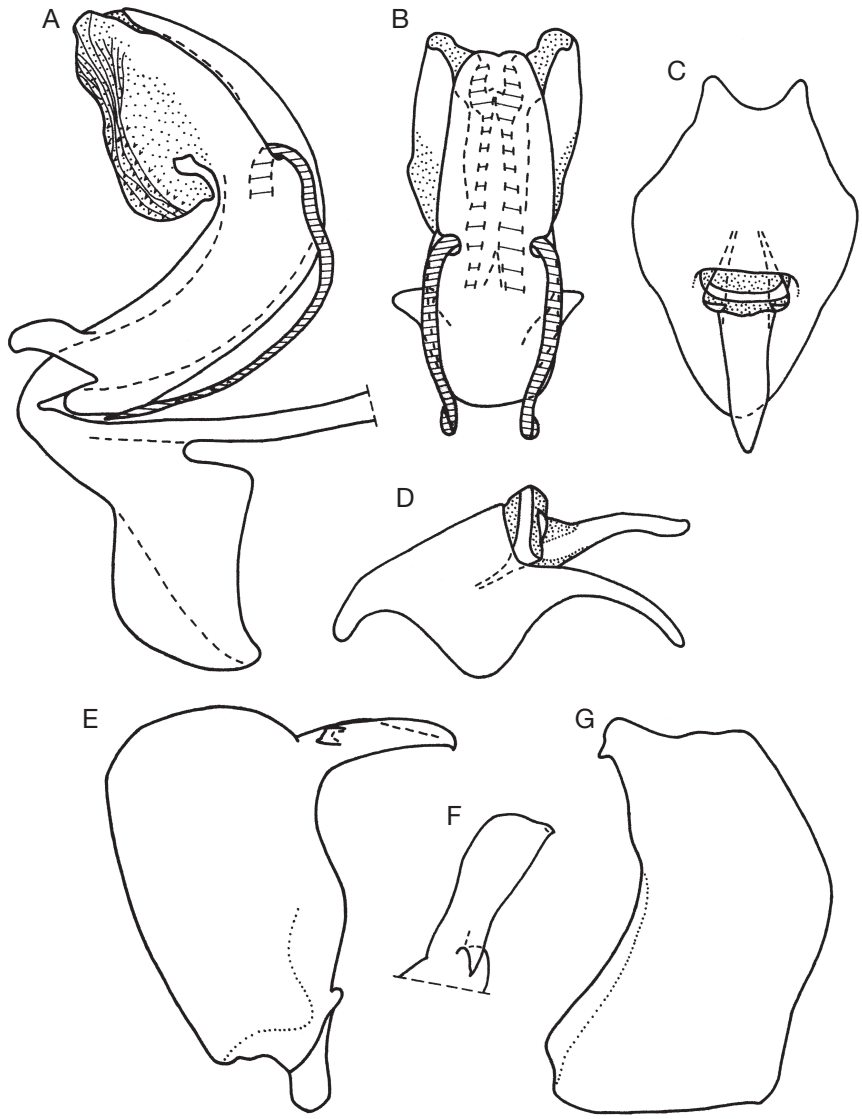

FIG. 5. — *Oronoqua deina* Fennah, 1947, male genitalia: **A**, penis and connective, lateral view; **B**, penis, ventral view; **C**, anal tube, dorsal view; **D**, same, lateral view; **E**, style, lateral view; **F**, capitulum of style, dorsal view; **G**, pygofer, lateral view. Drawings: V. M. Gnezdilov.

both during the Panamanian dry and wet seasons, in February, April, August and November. A live specimen tentatively identified as *O. ibisca* n. sp. was observed in the understorey, on a *Cecropia insignis* Liebm. (Cecropiaceae) (Fig. 2G). Its coloration was brown yellowish to pinkish, with eyes with horizontal red bands and one blue band. The coloration is darker on dried specimens, with the pink fading and the coloration being closer to ochre yellow greenish to reddish.

KEY TO SPECIES OF THE GENUS *ORONOQUA* FENNAH, 1947

1. Lateral margins of coryphe straight in lateral view (Figs 1C; 2E). Clypeus with sharp median keel. Fore wings transparent (Fig. 3B), with transverse veins through all the corium. Clavus with numerous transverse veins including between postcubitus and first anal vein inside the fork. Hind tibiae with 3 or 4 lateral spines. First metatarsomere with four intermediate spines apically. Head and pronotum with weak or without black bars (Fig. 2F) ..... *O. ibisca* n. sp.
— Apices of lateral margins of coryphe turned apically in lateral view (Fig. 2B). Clypeus with smoothed median keel. Fore wings smoke-filled apically (Fig. 3A), with transverse veins presented mostly in distal part of corium. Clavus with three transverse veins between cubitus posterior and postcubitus + first anal vein and without veins between postcubitus and first anal vein inside the fork. Hind tibiae with 2 or 3 lateral spines. First metatarsomere with five intermediate spines apically. Head and pronotum with well visible black bars (Figs 1A; 2C) ..... *O. deina*

DISCUSSION

So far, the genus *Oronoqua* has been only recorded from Guyana, French Guiana and Panama. In Panama, it seems absent from the drier forests of the Pacific side, as large-scale trapping with interception-flight traps in the Parque Natural Metropolitano near Panama City failed to provide any specimen from this genus (Y. Basset pers. obs.). Therefore, it is possible that *Oronoqua* may be restricted to wet evergreen tropical rainforests.

During project IBISCA, most of Issidae (60%) were collected by flight-interception traps, as these compact species behave probably as beetles do when hitting surfaces: by dropping themselves. Catches were much poorer with fogging, Malaise or light traps. All three *Oronoqua* specimens from San Lorenzo originated from flight-interception traps, which also collected species of *Colpoptera* Burmeister, 1835, *Thionia* Stål, 1859, *Picumna* Stål, 1864, and *Dracela* Signoret, 1861. Therefore, flight-interception traps may represent an efficient method to collect issids in tropical rainforests.

The rarity of *O. ibisca* n. sp. within the homopteran material collected with a range of sampling methods during the IBISCA project does not necessarily mean that this interesting species is rare. It merely emphasizes our ignorance of the biology of this species. As for many other tropical herbivorous insects, knowledge of the biology and host-plant(s) are crucial to infer sound patterns of specific spatial and seasonal distribution.

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Mr Mick Webb (BMNH) drew our attention to the holotype of *Oronoqua deina* Fennah, 1947 and kindly arranged its loan. Prof. Thierry Bourgoin (MNHN) facilitated the study of *Oronoqua* material from French Guiana and Dr Mike Wilson (Cardiff) helped its imaging. The IBISCA-Panama project was funded by SolVin-Solvay, the STRI, the United Nations Environment Programme, a Walcott endowment fund grant from the Smithsonian Institution, the European Science Foundation and the Global Canopy Programme, and facilitated by Pro-Natura International, Océan Vert and STRI. Thanks to all IBISCA participants for help in the field and collegial activities. V. M. Gnezdilov was financially supported by the MNHN, the Royal Society of London and the Russian Foundation for Basic Research (08-04-00134).

REFERENCES

BASSET Y., CORBARA B., BARRIOS H., CUÉNOUD P., LEPONCE M., ABERLENC H.-P., BAIL J., BITO D., BRIDLE J. R., CASTAÑO-MENESES G., CIZEK L., CORNEJO A., CURLETTI G., DELABIE J. H. C., DEJEAN A., DIDHAM R. K., DUFRÊNE M., FAGAN L. L., FLOREN A., FRAME D. M., HALLÉ F., HARDY O. J., HERNANDEZ A., KITCHING R. L., LEWINSOHN T. M., LEWIS O. T., MANUMBOR M., MEDIANERO E., MISSA O., MITCHELL A. W., MOGIA M., NOVOTNY V., OLIVEIRA E. G. DE, ØDEGAARD F., ORIVEL J., OZANNE C. M. P., PASCAL O., PINZÓN S., RAPP M., RIBEIRO S. P., ROISIN Y., ROSLIN T., ROUBIK D. W., SAMANIEGO M., SCHMIDL

J., SØRENSEN L. L., TISHECHKIN A., VAN OSSELAER C. & WINCHESTER N. N. 2007. — IBISCA-Panama, a large-scale study of arthropod beta-diversity and vertical stratification in a lowland rainforest: rationale, description of study sites and field methodology. *Bulletin de l'Institut royal des Sciences naturelles de Belgique, Entomologie* 77: 39-69.

BOURGOIN T. 1993. — Female genitalia in Hemiptera Fulgoromorpha, morphological and phylogenetic data. *Annales de la Société entomologique de France (N.S.)* 29 (3): 225-244.

DIDHAM R. K. & FAGAN L. L. 2003. — Project IBISCA. Investigating the biodiversity of soil and canopy arthropods. *The Weta* 26: 1-6.

EMELJANOV A. F. 1995. — [On the problem of classification and phylogeny of the family Delphacidae (Homoptera, Cicadina) taking into consideration larval characters]. *Entomologicheskoe obozrenie* 74 (4): 780-794 (in Russian with English summary; English translation published in *Entomological Review* 75 (9): 134-150).

FENNAH R. G. 1947. — Two exotic new Fulgoroidea from the New World. *Proceedings of the Biological Society of Washington* 60: 91-94.

GNEZDILOV V. M. 2002. — [Morphology of the ovipositor in members of the subfamily Issinae (Homoptera, Cicadina, Issidae)]. *Entomologicheskoe obozrenie* 81 (3): 605-626 (in Russian with English summary; English translation published in *Entomological Review* 82 (8): 957-974).

GNEZDILOV V. M. 2003a. — [Review of the family Issidae (Homoptera, Cicadina) of the European fauna, with notes on the structure of ovipositor in planthoppers]. *Chteniya pamyati N.A. Kholodkovskogo [= Meetings in memory of N.A. Cholodkovsky]* 56 (1): 1-145 (in Russian with 46 pages of English translation, 24 pages of illustrations with Russian and English legends).

GNEZDILOV V. M. 2003b. — A new tribe of the family Issidae (Homoptera, Cicadina) with comments on the family as a whole. *Zoosystematica Rossica* 11 (2): 305-309.

GNEZDILOV V. M. 2009. — Revisionary notes on some tropical Issidae and Nogodinidae (Hemiptera: Fulgoroidea). *Acta Entomologica Musei Nationalis Pragae* 49 (1): 75-92.

GNEZDILOV V. M. & O'BRIEN L. B. 2008. — New taxa and new combinations in Neotropical Issidae (Hemiptera: Fulgoroidea). *Insecta Mundi* 31: 1-26.

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