New and little known crickets from Espiritu Santo Island, Vanuatu (Insecta, Orthoptera, Grylloidea, *Pseudotrigonidium* Chopard, 1915, Phaloriinae and Nemobiinae p.p.)

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ABSTRACT
The cricket fauna of Espiritu Santo Island (Vanuatu) has been sampled during the SANTO 2006 biological survey. About 50 cricket species have been collected and observed in the field. In the present paper, cricket species belonging to *Pseudotrigonidium* Chopard, 1915, Phaloriinae and to troglobitic Nemobiinae are studied, and their habitat characterized according to specimen observations in the field. Six new species are described, *Pseudotrigonidium personatum* n. sp., *Phaloria faponensis* n. sp., *P. nigricollis* n. sp., *P. pentecotensis* n. sp., *P. walterlinii* n. sp. and *Cophonemobius faustini* n. sp. *Podoscirtus chopardi* Willemse, 1925 is transferred to the genus *Phaloria* Stål, 1877 and redescribed, while *Phaloria chopardi* (Willemse, 1951) from the Carolines islands is renamed *P. willemsei* Desutter-Grandcolas, 2009 to avoid homonymy. The calling song of *P. chopardi* is described.

KEY WORDS
Insecta,
Orthoptera,
Grylloidea,
Phaloriinae,
Nemobiinae,
troglobitic taxa,
Micronesia,
Pacific,
Vanuatu,
bioacoustics,
new species.

RÉSUMÉ

Grillons nouveaux ou peu connus de l'île d'Espiritu Santo, Vanuatu (Insecta, Orthoptera, Grylloidea, Pseudotrigonidium *Chopard, 1915, Phaloriinae and Nemobiinae p.p.).*

Les grillons de l'île d'Espiritu Santo (Vanuatu) ont été échantillonnés dans le cadre de l'expédition biologique SANTO 2006. Environ 50 espèces de grillons ont été collectées et observées dans leur milieu naturel. Dans le présent article, les espèces appartenant au genre *Pseudotrigonidium* Chopard, 1915 et aux Phaloriinae, ainsi que les Nemobiinae troglobies sont étudiés, et leur habitat caractérisé sur la base des observations réalisées sur le terrain. Six espèces nouvelles sont décrites, *Pseudotrigonidium personatum* n. sp., *Phaloria faponensis* n. sp., *P. nigricollis* n. sp., *P. pentecotensis* n. sp., *P. walterlinii* n. sp. et *Cophonemobius faustini* n. sp. *Podoscirtus chopardi* Willemse, 1925 est transféré dans le genre *Phaloria* Stål, 1877 et redécrit, tandis que *Phaloria chopardi* (Willemse, 1951) originaire des îles Carolines est renommé *P. willemsei* Desutter-Grandcolas, 2009 pour éviter une homonymie. Le chant d'appel de *P. chopardi* est décrit.

MOTS CLÉS
Insecta,
Orthoptera,
Grylloidea,
Phaloriinae,
Nemobiinae,
taxons troglobies,
Micronésie,
Pacifique,
bioacoustique,
espèce nouvelle.

INTRODUCTION

Crickets (Insecta, Orthoptera, Grylloidea Laicharding, 1781) are famous for their level of speciation in island systems. In the Pacific, explosive speciations have been documented in Hawaii and New Caledonia. In Hawaii (Perkins 1899; Otte 1994), radiations are associated with very high rates of speciation (Mendelson & Shaw 2005), and divergence in mate recognition systems (Danley *et al.* 2007; Mullen *et al.* 2007). Radiations on original habitats such as lava tubes or mosses have also occurred, resulting in several tens of endemic species (Howarth 1991; Otte 1994). Radiations similarly took place in New Caledonia, where 94% of the 123 cricket species recorded in the area, and 18% of the genera, are endemic to the territory (Chopard 1915; Gorochov 1986; Otte *et al.* 1987; Desutter-Grandcolas 1997a, b, 2002; Desutter-Grandcolas & Robillard 2006; Robillard & Desutter-Grandcolas 2008).

The topographical and ecological complexity of islands, which is commonly related to island size (McArthur & Wilson 1967; Losos & Ricklefs 2009), may directly influence the diversity of island fauna, through allopatric speciation events (e.g., Whittaker & Fernandez-Palacios 2007) and ecological specializations (Chiba 2004). Both Hawaii and New Caledonia are actually large territories, which offer a large diversity of habitats and have experienced a long and complex geological history (Mueller-Dombois *et al.* 1981; Grandcolas *et al.* 2008). Because of their strong isolation, both present however faunal biases and originalities, especially in term of clade presence/absence, and clade diversification. In New Caledonia for example, some cricket clades are represented by speciose endemic genera (Phalangopsidae Blanchard, 1845; Podoscirtinae Saussure, 1878; Eneopterinae Saussure, 1874; Nemobiinae Saussure, 1877), while others include only few, often largely distributed species (Oecanthidae Blanchard, 1845; Trigonidiinae Saussure, 1874).

The present paper deals with the cricket fauna of the Vanuatu archipelago. The Vanuatu is composed of many, close-by islands, dated from the Miocene age. Located in south western Pacific, it stands at about equal distance both from the Loyalty islands, close to New Caledonia but of more recent origin (Orange *et al.* 2008), the Fiji islands and the Solomon islands. The Vanuatu presents a high diversity of vegetation and biotopes, but not at the same scale as Hawaii and

New Caledonia. Its large number of islands could however promote allopatric speciation in the same way as topographical complexity in larger territories (Losos & Ricklefs 2009; Mayr & Diamond 2001). For a review of the geography and natural history of Santo, we refer to Bouchet *et al.* (in press).

Preliminary studies of Vanuatuan Orthoptera concluded that this fauna was close to that of New Caledonia and the Loyalty islands (Chopard 1934). This hypothesis was based on very incomplete data and may not be supported by refined taxonomic knowledge. In fact, except for the paper of Willemse (1925), crickets from the Vanuatu have never been explicitly studied, even though some species have been described recently (Gorochov 1996, 1999). Moreover, Vanuatuan species have been described on very few specimens, often on one sex only, and their ecology and behaviours have never been observed in the field. Their present state of knowledge is thus rather poor.

During the SANTO 2006 biological survey organised by the Muséum national d'Histoire naturelle, Paris (MNHN), the Institut de Recherche pour le Développement (IRD) and Pro-Natura International (PNI) (Bouchet *et al.* 2008), crickets have been specifically sampled and observed; their habitats have been defined according to specimen observations in the field, and their calling songs have been recorded whenever possible. Other ensiferan taxa have been studied as well, from a taxonomic, behavioural and acoustic point of view, to account for the whole ensiferan fauna of the island (Hugel 2009, this volume).

This intensive fieldwork leads to the discovery of nearly 50 cricket species, belonging to all families/subfamilies already recorded in southwestern Pacific; many of them are however new to science (Desutter-Grandcolas *et al.* in press). The systematic analysis of this material will be performed following three main steps. First, Eneopterinae crickets have been studied separately, as they are used as model species for evolutionary and behavioural studies (Robillard 2009, this volume), while *Pseudotrigonidium* Chopard, 1915 species, Phaloriinae Gorochov, 1985 and troglobitic ground crickets (Nemobiinae) are the subject of the present paper. In a second step, long-legged crickets (Phalangopsidae) originating from Vanuatu and New Caledonia will be studied alltogether, to facilitate their comparative analysis. Finally, remaining crickets will be studied in a last paper.

The ultimate aim of these studies is to characterize the Vanuatuan ensiferan fauna, in term of faunal affinities and originalities, and to compare it to new caledonian and micronesian faunas, in order to answer the following questions (Dowe & Cabalion 1996): Is the Vanuatuan cricket fauna a subset of the New Caledonian fauna, or has it other taxonomic affinities? And what are the features of the cricket fauna on such an archipelago in terms of species richness, diversity and ecological originality?

MATERIAL AND METHODS

Material

Fieldwork in Vanuatu has been performed by Sylvain Hugel, Tony Robillard and the present author, in the "Forests, Mountains, Rivers" theme of the SANTO 2006 biological survey. Specimens have been collected and observed by sight, during the day and at night, and their habitat and activity individually checked. Trapping methods used in standardized biodiversity assessment are ineffective for Ensifera. All specimens are deposited in the collections of the MNHN.

Classification

Until now, no classification system has been derived for crickets from the phylogenetic analysis of an explicit data matrix by a well-specified phylogenetic algorithm. I consequently followed the classification proposed by Chopard (1949, 1969), where true crickets are distributed into several families within the superfamily Grylloidea, and modified this system to include the ascertained relationships between some cricket groups. In particular, Nemobiinae and Trigonidiinae are gathered within Trigonidiidae, as their relationships are strongly supported by morphological and anatomical characters (Gorochov 1986; Desutter

1987). By contrast, the genus *Pseudotrigonidium* and the subfamily Phaloriinae, whose relationships have not been clearly settled yet, are considered respectively as an *incertae sedis* genus within Grylloidea, and a subfamily of Grylloidea without family placement.

Scanning electron microscopy

Dry forewings have been observed after metallization (20 s, then 30 s) using a JEOL JSM-840 electronic microscope (15 kV). SEM observations were made at the Service de microscopie électronique of the MNHN.

Recordings and acoustic analysis

Recordings have been performed by Tony Robillard (MNHN) with a TASCAM HD-P2 digital recorder (96 kHz sampling frequency, 16 bit) and a Condenser Microphone Capsule CM16, with a flat frequency response from 5 kHz to 250 kHz. Temperatures have been measured during recording. Recording files have been deposited in the Sound Library of the MNHN.

Songs have been analysed using the computer software Avisoft-SASLab Pro version 4.40 (Specht 2009). The descriptions of song temporal structure follows Ragge & Reynolds (1998). Three temporal level are recognized: The syllable, which corresponds to one to-and-fro movement of the forewings, is the basic unit of cricket song. It is composed of a silent hemisyllable (forewing opening) and a noisy hemisyllable (forewing closure). The echeme (or chirp) is a group of syllables. It may comprise several distinct motives, each called a subecheme. Finally, the echeme sequence (or phrase) is generated by the more or less regular repetition of the echemes.

Abbreviations and symbols

Descriptions

Specimen origin:

fn	field number.

General morphology:

F	femur;
FW	forewing;
HW	hindwing;
T	tibia;
I, II, III	fore, median, hind (leg, femur, tibia, tarsus, basitarsus).

On the figures, dotted areas represent dark parts of head, pronotum, wings, legs and tergites, and membranous parts in male and female genitalia.

Forewing venation: named after Desutter-Grandcolas (2003) for main venation pattern and Robillard & Desutter-Grandcolas (2004) for apical field, i.e. CuA bifurcations.

FW abbreviations:

1-nA	anal veins 1 to n;
c1, c2	cells 1 and 2 of alignment “c”;
CuA, CuP	anterior, posterior cubital veins;
MA, MP	anterior, posterior media veins;
R	radial vein.

Male genitalia: named after Desutter (1987), modified in Desutter-Grandcolas (2003).

arc	ectophallic arc;
d c	dorsal cavity;
ec a	ectophallic apodeme;
ec f	ectophallic fold;
ec p	ectophallic paramere;
EI	ectophallic invagination;
ej d	ejaculatory duct;
en a	endophallic apodeme;
en I	endophallic invagination;
en s	endophallic sclerite;
G	gonopore;
ps	pseudepiphallic sclerite;
ps l	pseudepiphallic lophi;
ps p	pseudepiphallic paramere;
r	rami;
v v	ventral valves.

Measurements

L ep ap	length of dorsal apical spur of hindtibia;
LFW	maximal forewing length;
lFW	forewing width at mirror anterior angle;
LFIII	length of hindfemur;
Lovip	length of ovipositor;
Lpron	median length of pronotum dorsal disc;
lpron	posterior width (unless otherwise stated) of pronotum dorsal disc;
LTIII	length of hindtibia;
LbasIII	length of hind basitarsus;
LW	length of wings.

Institutions

BMNH	The Natural History Museum, London;
MNHN	Muséum national d’Histoire naturelle, Paris;
UMO	Oxford University Museum of Natural History, Oxford.

LIST OF SPECIES INCLUDED

Family *incertae sedis*

Pseudotrigonidium personatum n. sp.

Phaloriinae Gorochov, 1985
Phaloria chopardi (Willemse, 1925) n. comb.
Phaloria faponensis n. sp.
Phaloria nigricollis n. sp.
Phaloria offensa Gorochov, 1999
Phaloria pentecotensis n. sp.
Phaloria salomonica vanuatu Gorochov, 1999
Phaloria sp.
Phaloria walterlinii n. sp.
Phaloria willemsei n. nom. for *Heterotrypus chopardi* Willemse, 1951
Trigonidiidae Saussure, 1874
Nemobiinae Saussure, 1877
Cophonemobius faustini n. sp.
Cophonemobius faustini funafus n. subsp.
Cophonemobius sp.

SYSTEMATICS

Superfamily GRYLLOIDEA Laicharding, 1781
Family *incertae sedis*

Genus *Pseudotrigonidium* Chopard, 1915

TYPE SPECIES. — *Pseudotrigonidium sarasini* Chopard, 1915: 152.

DISTRIBUTION. — New Caledonia (Chopard 1915; Otte *et al.* 1987; Desutter-Grandcolas 1997a), New Guinea, Bismark archipelago, Java, Solomon islands (Gorochov 1999).

Pseudotrigonidium was placed by Chopard (1968, 1969) in the subfamily Itarinae, together with *Itara* Walker, 1869, *Phaloria* Stål, 1877 and a few other genera. Gorochov created the tribe Phaloriini Gorochov, 1985 and later the subfamily Phaloriinae to include both *Phaloria* and *Pseudotrigonidium* (among other genera), while he maintained *Itara* in Itarinae *s.s.* (e.g., Gorochov 1995). Even though they adopt the Phaloriinae subfamily, Eades & Otte (2009) kept *Pseudotrigonidium* in Itarinae without comment. Both hypotheses will have to be tested by the analysis of the relationships of *Pseudotrigonidium*, *Itara*, *Phaloria* and other related genera, which is far beyond the aim of the present paper. *Pseudotrigonidium* is consequently considered *incertae sedis* until conclusive evidence about its relations is available.

REMARK
The type species of the genus, *P. sarasini*, originates from New Caledonia. Its male genitalia, broadly figured by Chopard (1915), looks very similar to those of the new caledonian species presently placed in the genus *Tremellia* Stål, 1877 (Eades & Otte 2009), with which *Pseudotrigonidium* had been synonymized for many years (Chopard 1968; but see Gorochov 1996 for synonymy removal). These New Caledonian species must clearly be transfered to *Pseudotrigonidium*, i.e. *Pseudotrigonidium alpha* (Otte, 1987) n. comb., *P. aptera* (Desutter-Grandcolas, 1997) n. comb., *P. beta* (Otte, 1987) n. comb., *P. caledonica* (Otte, 1987) n. comb., *P. noctifolia* (Desutter-Grandcolas, 1997) n. comb. and *P. tiwaka* (Otte, 1987) n. comb.

Pseudotrigonidium personatum n. sp.
(Figs 1; 2)

TYPE MATERIAL. — Holotype: **Vanuatu.** [Sanma province], Espiritu Santo [Island], Big Bay, Matantas, Vatthé Conservation Area, 15°20'S, 166°95'E, nuit, sur plante, 27.X.2006, T. Robillard, 1 ♂ (fn TR393) (MNHN-ENSIF2066).
Allotype: **Vanuatu.** Espiritu Santo, Peavot, 14°59'37"S, 166°47'4"E, 38 m alt., rive N de la rivière principale, terrasse, forêt secondaire (ancien jardin), jour, sur tronc, 20.X.2006, L. Desutter-Grandcolas, 1 ♀ (fn 74) (MNHN-ENSIF2067).
Paratypes**: 8** ♂♂, 3 ♀♀. Same locality as holotype, nuit, sur plante, 21.X.2006, L. Desutter-Grandcolas, 1 ♀ (fn 68) (MNHN-ENSIF2080). — Nuit, sur plante de sous-bois, 26.X.2006, L. Desutter-Grandcolas, 1 ♂ (fn 50) (MNHN-ENSIF2081). — Jour, sous l'écorce soulevée d'un tronc à contreforts, 70 cm de diamètre, 1.80 m H, L. Desutter-Grandcolas, 1 ♂ (fn 19) (MNHN-ENSIF2082). — Nuit, sur plante, 27.X.2006, T. Robillard, 1 ♂ (fn TR394); L. Desutter-Grandcolas, 1 ♀ (fn 56) (MNHN-ENSIF2083, 2084). — Jour, sous l'écorce soulevée d'un tronc à contreforts, 1.40 m H, L. Desutter-Grandcolas, 1 ♂ (fn 1) (MNHN-ENSIF2085).
Butmas, 600 m alt., forêt du plateau de Tankara, 15°21'56"S, 166°59'E, jour, litière aérienne, fougère arborescente, dans tige morte, 13.X.2006, L. Desutter-Grandcolas, 1 ♂ (fn 14) (MNHN-ENSIF2086). — Jour, dans branche morte 60 cm diamètre, 1.50 m H, bois pulvérulent, 14.X.2006, L. Desutter-Grandcolas, 1 ♀

TABLE 1. — Field observation on the natural habitat of *Pseudotrigonidium personatum* n. sp.

	Night	Day
On undergrowth plant	5 ♂♂, 1 ♀, 4 juveniles	
Under raised bark of tree trunk		2 ♂♂, 1 ♀
Tree fern:		
- in aerial litter (often dead twig)		1 ♂, 1 ♀, 2 juveniles
- no precision		1 ♂
Under the leaf of undergrowth tree		1 juvenile
Grass and low vegetation near small lianas		1 ♂
Inside dead branch above soil level		1 ♀
On tree trunk		1 ♀
In epiphytic fern		1 ♀

(fn 8) (MNHN-ENSIF2087). — Nuit, sur plante, 17.X.2006, T. Robillard, 1 ♂ (fn TR157) (MNHN-ENSIF2076); L. Desutter-Grandcolas, 1 ♂ (fn 1) (MNHN-ENSIF2077).
Nattawa, forêt pâturée, 15°19'29"S, 167°12'9"E, jour, battage des herbes et plantes basses près de petites lianes, 29.X.2006, L. Desutter-Grandcolas, 1 ♂ (fn 38) (MNHN-ENSIF2078).

OTHER MATERIAL EXAMINED. — 2 ♂♂, 5 ♀♀, 8 juveniles. Same locality as holotype, jour, sous l'écorce soulevée d'une chandelle, 50 cm de diamètre, 1.50 m H, 26.X.2006, L. Desutter-Grandcolas, 1 ♀ (fn 17) (MNHN-ENSIF2079). — Nuit, sur plante de sous-bois, L. Desutter-Grandcolas, 1 juvenile ♀ (fn 51) (MNHN-ENSIF2088). — Jour, sous feuille d'arbuste, 2 m H, L. Desutter-Grandcolas, 1 juvenile ♀ (fn 18) (MNHN-ENSIF2089). — Nuit, sur plante de sous-bois, 27.X.2006, L. Desutter-Grandcolas, 1 juvenile ♂ (fn 57) (MNHN-ENSIF2090).
Butmas, 600 m alt., forêt du plateau de Tankara, 15°21'56"S, 166°59'E, nuit, 15.X.2006, L. Desutter-Grandcolas, 1 ♂ (fn 30) (MNHN-ENSIF2091). — Jour, litière aérienne, fougère arborescente, dans tige morte, 13.X.2006, L. Desutter-Grandcolas, 1 ♀ (fn 15), 1 juvenile ♂ (fn 17) (MNHN-ENSIF2092, 2093). — Jour, litière aérienne, fougère arborescente, battage, T. Robillard, 1 juvenile ♀ (fn TR13) (MNHN-ENSIF2094). — Nuit, sur plante de sous-bois, L. Desutter-Grandcolas, 1 juvenile ♂ (fn 24) (MNHN-ENSIF2095). — Jour, dans fougère épiphyte à 2 m H, 14.X.2006, L. Desutter-Grandcolas, 1 ♀ (fn 9) (MNHN-ENSIF2096). — Jour, fougère arborescente, L. Desutter-Grandcolas, 1 ♂ (fn 10) (MNHN-ENSIF2097).
Peavot, Mt Nouresororo, 14°59'26"S, 166°45', 636 m alt., forêt de brume, nuit, sur plante de sous-bois, 22.X.2006, L. Desutter-Grandcolas, 1 juvenile ♂ (fn 7) (MNHN-ENSIF2095).
Penaoru, malaise sol, 1200 m, A, MG12A1, 8-18.XI.2006, 1 juvenile ♀; malaise sol, 600 m B, MG06B1, 6-18. XI.2006, 1 ♀ (MNHN-ENSIF2100, 2001), both last identifications uncertained (material preserved in alcohol).
[Nouvelles-Hébrides], I. Ambrym, Mts Marum et Bembow, 1935-1936, 1 ♀ (E. Aubert de la Rüe) (MNHN-ENSIF2099).

ETYMOLOGY. — *Personatus*, *-a*, *-um*, masked, according to the distinctive face colouration of this species.

DISTRIBUTION. — Vanuatu (Espiritu Santo and Ambrym islands).

HABITAT. — According to our observations (Table 1), *P. personatum* n. sp. is a forest-inhabiting species, active at night on undergrowth plants. During the day, it hides most often on tree ferns or under raised barks of tree trunks, and occasionally in epiphytic ferns or dead branches. It has been found by day on few occasions on tree trunks, under tree leaves or in low vegetation, but these observations may be associated with disturbed specimens. *P. personatum* n. sp. has never been collected in leaf litter, but its capture in malaise traps may indicate occasional moves between plants.

These data are congruent with previous observations made on *P. noctifolia* in New Caledonia, although juveniles of the latter species were found regularly in the leaf litter (Desutter-Grandcolas 1997). No additional data are available on the habitat of *Pseudotrigonidium* species; other new caledonian species originate from "tall rainforests" (Otte *et al.* 1987), and one species from the Solomon islands has been found in "grass area on ridge behind camp" (Gorochov 1999).

DIAGNOSIS. — Species very close to *P. duplum* Gorochov, 1999 from Banks islands (Vanuatu) and *P. pulchellum* Gorochov, 1999 from the Solomon islands, but easily separated by the distinctive colouration of its face (see below) and its male genitalia (Table 2). Otherwise, *P. personatum* n. sp. appears variable in size and colouration,

TABLE 2. — Characters of male genitalia separating *Pseudotrigonidium personatum* n. sp. from *P. duplum* and *P. pulchellum*.

	***P. personatum* n. sp. (Fig. 2B-D)**	***P. duplum* (Gorochov, 1999: figs 223, 225)**	***P. pulchellum* (Gorochov, 1999: figs 229, 231)**
Pseudepiphallic lophi	More triangular than squared	Distincly triangular	Rather squared
Pseudepiphallic median indentation	Wide; anterior margin straight	Narrow, deep; anterior margin rounded	Wide, less deep; anterior margin straight
Pseudepiphallic parameres	Wide, often with 3 spines	Very wide, with 2 spines	Narrow, with 2 spines
Ectophallic fold	Short, truncated	Larger, not truncated	Short, truncated
Ectophallic apodemes	Large	Narrow, thin (?)	Large

with small, dark individuals and larger, lighter ones, with all intermediate conditions.

DESCRIPTION

Global size and shape as in other species of the genus (Otte *et al.* 1987: fig. 21). Colouration light yellow, greatly ornamented with black and brown.

Head small, vertical. Eyes highly protruding anteriorly and laterally (Fig. 1A, B). Fastigium wide, nearly as wide as scapes, and not separate from the vertex. Ocelli located on fastigium; median ocellus vertical in apical position; lateral ocelli at fastigium base; distance between lateral ocelli slightly shorter than the distance between median and one lateral ocellus. Palpi short; joint 3 slightly longer than joint 4; joint 5 nearly twice as long as joint 4, slightly and regularly widened toward apex, truncated straight at apex. Pronotum transverse; anterior margin concave dorsally; posterior margin almost straight (Fig. 1C); lateral lobes somewhat raised dorsally, their posterior angle truncated (Fig. 1D). FWs well-developed in both males and females, covering the whole abdomen. Wings present, slightly shorter or longer than FWs. Legs long and thin. FIII wide and thick in basal third, and extremely narrow on apical third. Inner tympana narrow and elongate. Outer tympana lacking, often replaced by a shallow furrow. TI with 2 ventral apical spurs, the outer slightly longer. TII with 2 ventral apical spurs, the inner the longest. TIII with 3 outer apical spurs, the median the longest; 3 inner apical spurs, the dorsal spur one third longer than the median, and longer than half basitarsus III; 4 pairs of subapical spurs, the inner spurs slightly lower on TIII than the outer spurs. Cerci long and thin.

Colouration

Colouration identical in males and females, but dorsal disc of pronotum more spotted with yellow, and FI and FII less spotted with brown in females. Face yellow to light brown, with black brown ornamentation (Fig. 1A); a wide longitudinal, black band under the median ocellus, including a small, median yellow spot just below the ocellus; this band prolonged down to the clypeus, but enlarged on the face, where it is broadly triangular; a smaller triangular black brown spot joining the lower margin of each antennal pit and the lower angle of each eye. Cheeks yellow, with irregular brown spots, their lower half somewhat darker; a wide black band behind the eyes (Figs 1B, D). Eyes silvery, their lower margins brown. Head dorsum (Fig. 1B) light brown, except for black brown fastigium; a thin yellow line behind the median ocellus and two thinner, lateral ones; a wide black area between the eyes, and a thin, longitudinal black line along the inner margin of each eye. Palpi light yellow; joints 4 and 5 dark brown basally; apical third of joint 5 brownish. Scapes brownish with irregular yellow lines and spots. Antennae light brown, annulated with many lighter or yellow articles. Pronotum brown, with yellow lines and spots; dorsal disc (Fig. 1C) with a median longitudinal yellow band, more or less subdivided into two or three segments, and several diffused yellowish spots on anterior two thirds; lateral lobes dark brown with a transverse

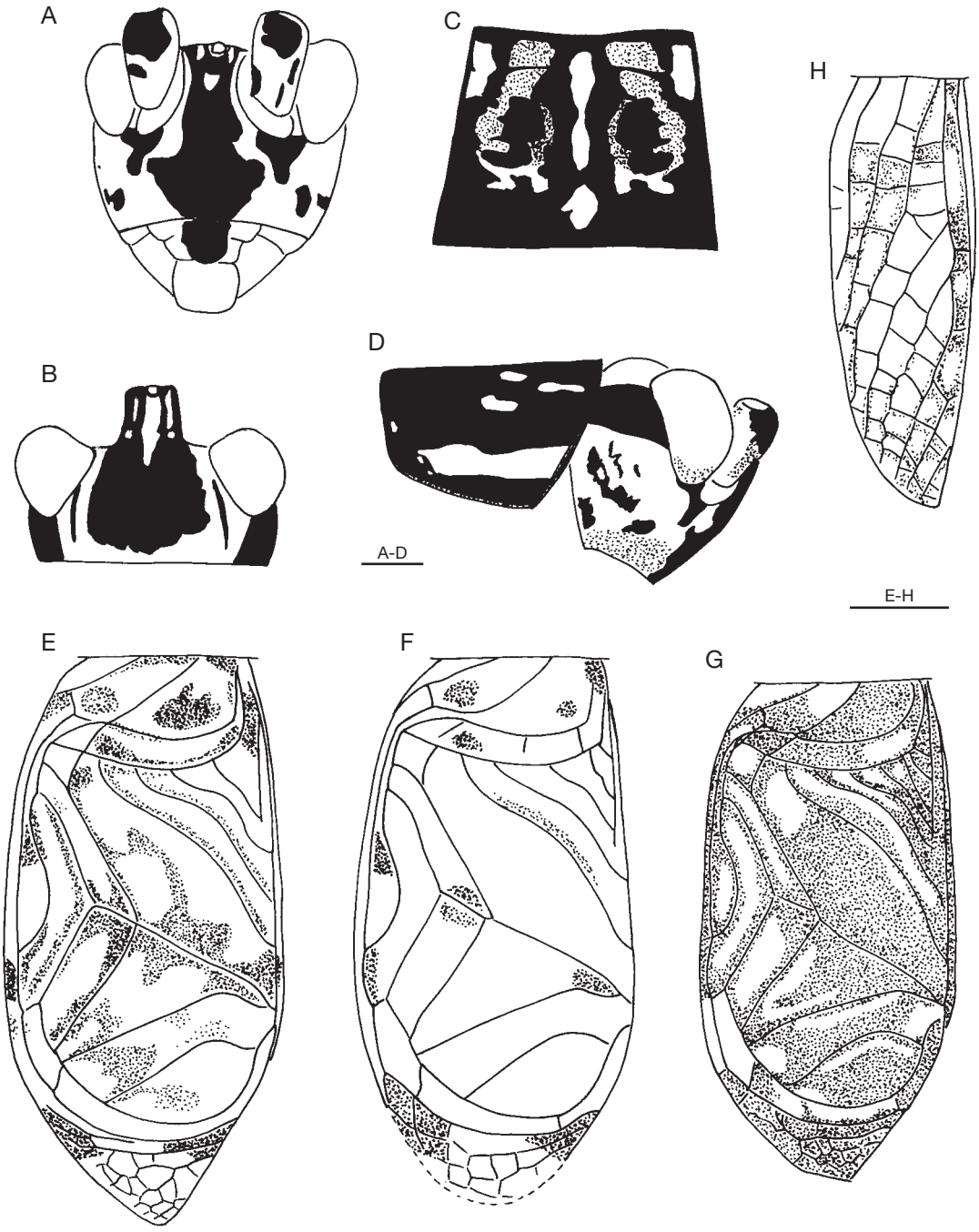

FIG. 1. — *Pseudotrigonidium personatum* n. sp.: **A**, face; **B**, head dorsum; **C**, dorsal disc of pronotum; **D**, cheek and lateral lobe of pronotum; **E**-**G**, male forewing dorsal field venation, holotype (**E**), paratype MNHN-ENSIF2081 (**F**), ♂ MNHN-ENSIF2091 (**G**); **H**, female forewing dorsal field venation, allotype. Scale bars: 1 mm.

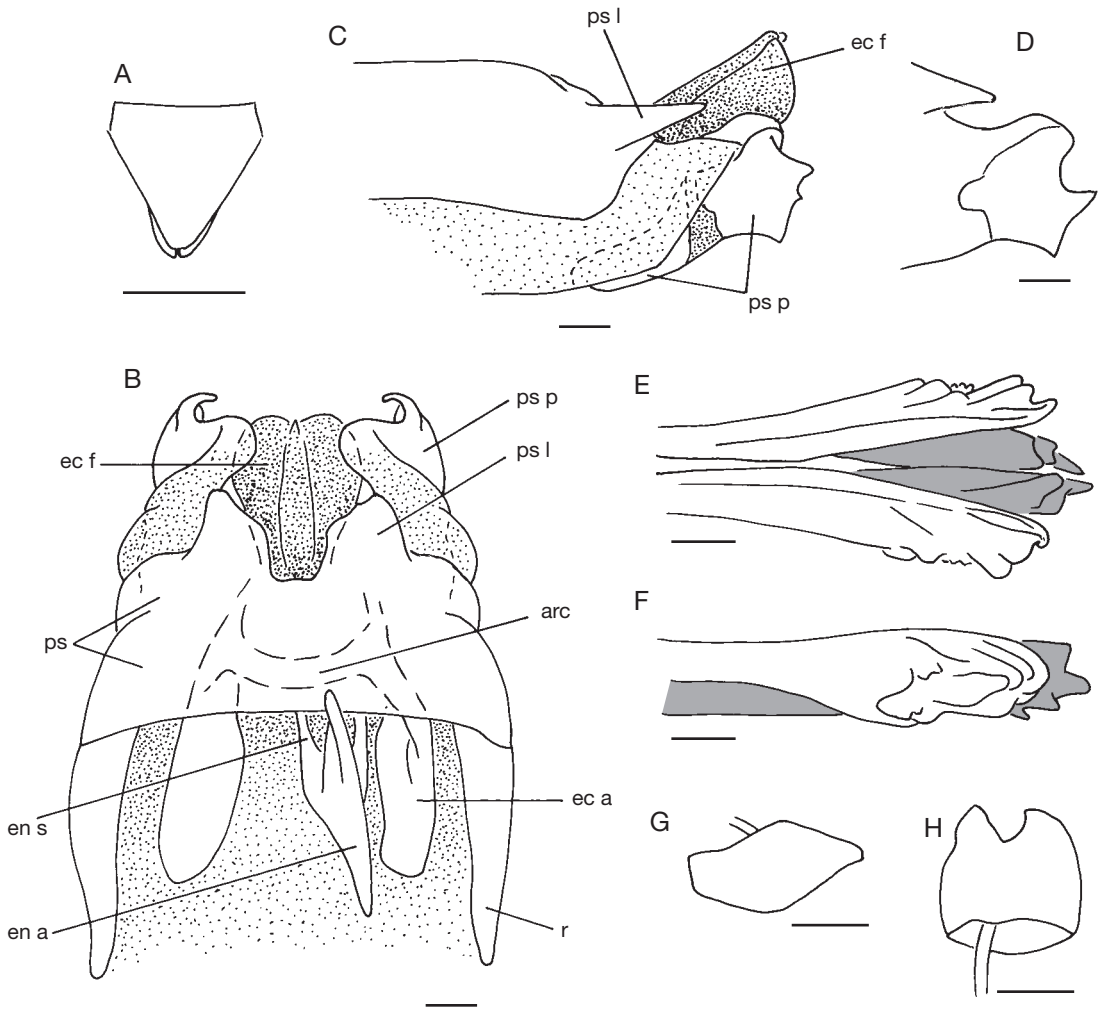

FIG. 2. — *Pseudotrigonidium personatum* n. sp.: **A**, male subgenital plate; **B**-**D**, male genitalia, dorsal (**B**), lateral (**C**, ♂ MNHN-ENSIF2091; **D**, ♂ MNHN-ENSIF2083); **E**, **F**, female ovipositor, dorsal (**E**), right lateral (**F**), ventral valves marked with grey; **G**, **H**, female copulatory papilla, lateral (**G**), dorsal (**H**). Scale bars: A, 1 mm; B-D, 0.1 mm; E-H, 0.2 mm. Abbreviations: see text.

yellow band along anterior three fourths, their lower margins bordered with yellowish (Fig. 1D). Legs light yellow, with dark brown and black spots. FI and FII with one small, subapical, and 2 larger distal, black brown rings; FII with an additional, subbasal, brown spot. TI and TII with one apical, and 1 or 2 respectively subapical, dark rings. Coxae I and II whitish with a black spot on outer margins, wider on coxae I. TIII with 4 dark rings, including one apical, their base more or less spotted dorsally. FIII with one apical ring and one subapical spot in their narrowed apical fourth; 4 additional, more or less complete and dark, rings on dorso-inner sides; dorso-outer sides greatly striated with dark brown; lower outer sides light yellow. TIII with 4 dark rings, including one apical; basally, more or less spotted dorsally. Basitarsi light yellow, brown apically. Tarsomeres 3 brown at base and apex, yellow otherwise. Tarsal claws brown. Apical spurs brown. Subapical spurs light yellow, with a median brown spot. Cerci brown with a wide lighter ring at their base.

Male
FWs only slightly widened compared to the pronotum, their lateral margins almost parallel. Limit between dorsal and lateral fields made by CuP in FW anterior third, and CuA in FW posterior half. Apical field reduced, with 3 or 4 rows of small cells. Lateral field: intermedian area greatly widened at mid length; R with 15 or 16 transverse bifurcations. Stridulatory apparatus well developed and complete (Fig. 1E-G): harp with 4 main, oblique and parallel veins, and with 1 to 3 veinlets in FW antero-outer angle; CuP well developed, crossing 1 or 2 main harp veins; mirror as wide as long, or slightly wider, crossed by 2 transverse veins; diagonal and the vein separating c1 and c2 cells fused anteriorly to the mirror or not (compare Fig. 1E, F and G). Stridulatory file with 185-222 teeth (mean number 207, n = 5). Harp, mirror and c1 surfaces partly undulated. Harp area just above the mirror anterior angle cambered and ivory coloured; dorsal field otherwise yellowish, mottled with brown; veins yellow more or less marked with brown, black in apical field; plectrum area ivory coloured. Lateral field: intermedian area light yellow; MA and MP yellow, transverse veins lighter; a few brown spots between distal transverse veins; R yellow, except for black brown basal and distal parts; R bifurcations mostly black brown, separated with light yellow. Sternites light brown, mottled with brown, their posterior margins lighter. Subgenital plate triangular, indented at apex (Fig. 2A); dark brown.

Male genitalia. Pseudepiphallic sclerite transverse; pseudepiphallic lophi widely separate, the area between them variously deep, but with the posterior margin of pseudepiphallic sclerite straight (Fig. 2B); lophi widened and rectangular basally, and broadly triangular apically. Pseudepiphallic parameres wide, with 2 well-developed apical spines (one dorsal, one ventral), and most often an additional, small median one (Fig. 2C, D). Rami not separate from pseudepiphallic sclerite, their lower margins straight. Ectophallic fold very large, protruding dorsally between pseudepiphallic parameres and lophi, and ventrally as two longitudinal ridges; dorsally enlarged before apex, truncated and not deeply indented on apical margin. Ectophallic apodemes wide; arc narrow, complete. Ventral valves very small, in very anterior position. Endophallic sclerite U-shaped; two very long, narrow, lateral branches, running along the inner sides of ectophallic fold ventral ridges, and abruptly more separated the one from the other at mid length. Endophallic apodeme originating at the junction of the two endophallic lateral branches, as in Podoscirtinae crickets, and having the shape of a very high crest extended longitudinally.

Female
FW dorsal field venation made of longitudinal parallel veins (A1-A3, CuP bifurcated 2 or 3 times; CuA bifurcated once or twice), separated by regularly spaced transverse veins (Fig. 1H). Lateral field: R bifurcated 8 times. Dorsal field yellow to light brown, mottled with dark along CuA and along an oblique pattern in FW basal third; 4 clear spots separated by brown areas along CuA, the two distal ones whitish; veins brown to black, except light ochre basal half of CuP; most veins more or less marked with brown. Lateral field yellow, the veins marked with brown. Subgenital plate transverse, its posterior margin slightly concave; lightly coloured, sometimes with a median dark spot. Ovipositor very short, as in other species of the genus; apex dark and ball-like; apex of dorsal valves with 3 successive, transverse crests; apex of ventral valves with 4 high apical teeth (Fig. 2E, F).

Female genitalia. Copulatory papilla very small and little sclerotized; more or less squared; posterior margin indented (Fig. 2G, H).

Measurements
See Table 3.

VARIATION
Smaller specimens are usually darker in colouration, with the same general pattern as larger specimens; males have also slightly fewer teeth on stridulatory file (185-204, mean 195, n = 2). Colouration: Black spots on the cheeks sometimes fused as a continuous line. In the darkest specimens, head

TABLE 3. — Measurements (in mm) of males and females of *Pseudotrigonidium personatum* n. sp. Abbreviations: see text.

	Lpron	**lpron**	**LFW**	**lFW**	**LFIII**	**LTIII**	
Males							**File**
Holotype	2.1	2.9	8.5	4	11.1	9.8	–
Paratypes (n = 5)	1.9-2	2.6-3	7.9-8.9	3.8-4.1	10-12.2	8.8-11.2	185-222
Mean values	2	2.9	8.3	4	11.1	10.1	207
Females							**Lovip**
Allotype	1.9	2.4	6.6	10.2	9.6	9.6	4.2
Paratypes (n = 5)	1.8-2.2	2-2.6	5.9-7.2	9.2-11.5	8.6-10.5	8.6-10.5	4.1-4.8
Mean values	2	2.4	6.6	10.3	9.7	9.7	4.3

dorsum almost entirely brown, except for a yellow line behind median ocellus. Pronotum lateral lobes clearly bordered with yellow along their lower margins, and with a transverse yellow band over their whole width. Male FW: cambered area of the harp of the same dark colouration as surrounding areas (Fig. 1G). One female from Butmas (MNHN-ENSIF2092; identification uncertain), has almost completely dark FWs, with a row of yellow spots between CuP bifurcations; its copulatory papilla is also extremely indented apically.

Subfamily PHALORIINAE Gorochov, 1985

Genus *Phaloria* Stål, 1877

TYPE SPECIES. — *Phaloria amplipennis* Stål, 1877.

Three *Phaloria* species are presently recorded from Vanuatu, *P. offensa* Gorochov, 1999, *P. chopardi* (Willemse, 1951) and *P. solomonica vanuatu* Gorochov, 1999 (Eades & Otte 2009). *Phaloria offensa* originates from Banks and Malekula islands, and *P. solomonica vanuatu* from Aneytum island. *Phaloria chopardi* has however been described as *Heterotrypus chopardi* from the Carolines islands, North East of New Guinea, as confirmed by Nishida (1979), and is erroneously mentioned from Vanuatu.

To these species should be added *Podoscirtus chopardi* Willemse, 1925, described from Hog Harbour (Espiritu Santo) on a single female. Transferred by Chopard (1968) in the genus *Munda* Stål, 1877, this species actually belongs to the genus *Phaloria* as revealed by type examination (see below). Because of its transfer into *Phaloria*, *Podoscirtus chopardi* Willemse, 1925 becomes a senior secondary homonym of *Heterotrypus chopardi* Willemse, 1951 transferred to *Phaloria* by Gorochov (1996). This last species should consequently be renamed, and I propose here the name *Phaloria willemsei* n. nom.

Four additional species are described here, attesting the diversity of the genus in eastern Micronesia: *P. nigricollis* n. sp. is a stout and light ochre species, with short and equal sized subapical spurs on TIII and short HWs, resembling in these characters to *P. chopardi* (Willemse, 1925). By contrast, *P. walterlinii* n. sp., *P. faponensis* n. sp., *P. offensa* and *P. pentecotensis* n. sp. are slender and highly spotted with yellow and dark brown. The last three species are moreover characterized by very long wings and TIII subapical spurs.

REMARKS

Phaloria is a very wide and diversified genus, which includes now more than 50 described species. Three subgenera have been defined to take into account this diversity (Gorochov 1996), but their definitions seem insufficient with regards to the monophyly criterion. For example, one criterion to separate the subgenus *Phaloria* from *Papuloria* Gorochov, 1996 and *Trelloria* Gorochov, 1996 is the presence of one (*Papuloria*, *Trelloria*) versus two (*Phaloria*) pseudepiphallic "distal lobes" (Gorochov 1996). This character would place *P. chopardi* in the subgenus *Phaloria*, while it is clearly very close to *P. solomonica*, presently placed in the genus *Papuloria*. A phylogenetic analysis using as many morphological and anatomical characters as possible is clearly necessary to clarify the systematics of this group.

KEY TO THE *PHALORIA* STÅL, 1877 SPECIES KNOWN FROM VANUATU (BOTH MALES AND FEMALES)

Phaloria solomonica vanuatu Gorochov, 1999 has been defined on male characters only, as one entry of an identification key, which makes comparison with additional material hazardous. The present key consequently considers only the species *P. solomonica* Gorochov, 1996, not its subspecies.

1. Colouration globally light ochre, with no or few coloured marks. General shape wide, especially in males (Fig. 3) 2
— Colouration yellow and brown, with brown and black spots and stripes. General shape more elongate in both males and females 4

2. Pronotum black with ochre margins ..... *P. nigricollis* n. sp.
— Pronotum entirely ochre, more or less mottled with yellow and brown 3

3. Female: ovipositor less than 12 mm in length. Male genitalia: pseudepiphallic lophi well developed, long and membranous (Fig. 5A) ..... *P. chopardi*
— Female: ovipositor more than 14 mm in length. Male genitalia: pseudepiphallus without median lophi (Gorochov 1996: fig. 365) ..... *P. solomonica*

4. Tibia III: inner subapical spurs long but shorter than the outer ones, the spurs of each side about the same size; dorsal inner apical spur as long as basitarsus III. Wings only slightly longer than FWs in both males and females. Female ovipositor longer than tibia III ..... *P. walterlinii* n. sp.
— Tibia III: inner apical and subapical spurs very long, longer than outer ones, the subapical spurs increasing in length toward tibia apex (Fig. 9A); dorsal inner apical spur longer than basitarsus III. Wings much longer than forewings in both males and females. Female ovipositor very short (< 5 mm), much shorter than tibia III 5

5. Colouration pale yellowish with brown patterns on head and legs. Dorso inner apical spur of tibia III more than 1.4 times longer than basitarsi III. Female genitalia: copulatory papilla entirely sclerotized, with a pair of ventral longitudinal crests. Male unknown ..... *P. faponensis* n. sp.
— Colouration darker, especially on brown head. Dorso inner apical spur of TIII less than 1.3 times longer than basitarsi III. Female genitalia (unknown in *P. offensa*): copulatory papilla sclerotized ventrally only, having the shape of a horse shoe 6

6. Mouthparts and palpi light yellow. Lateral lobe of pronotum with a transverse yellow band, crossed by a small brown line at anterior fourth. Female ovipositor more than 4.5 mm in length. Male unknown ..... *P. pentecotensis* n. sp.
— Mouthparts and palpi light brown. Lateral lobe of pronotum with two yellow spots connected by light stripes. Female ovipositor less than 4.5 mm in length. Male genitalia: see Gorochov (1999: figs 84-86) ..... *P. offensa*

Phaloria chopardi (Willemse, 1925) n. comb. (Figs 3; 4; 5A-D; 6)

Podoscirtus chopardi Willemse, 1925: 521.

Munda chopardi – Chopard 1968: 412.

This species was known up to now by one female only (Willemse 1925). Several males have been found during SANTO 2006, which allow to propose an amended diagnosis and description.

HOLOTYPE. — Female, Jan 8 1923, N Hebrides [Vanuatu], *c.* 500 ft, E. c'st Esp[iritu] Santo I., open forest near Hog Harb[our], dd J.R. Baker and & Percy Sladen Mem. FD. 1923 / Santo 8 Jan 1923 [manuscript label] / TYPE female Willemse Podoscirtus chopardi. Tr. Ent. Soc. L. 1925, p. 521. [white label with red margin] / Podoscirtus chopardi nov. sp. female Det. C. Willemse / Type [red

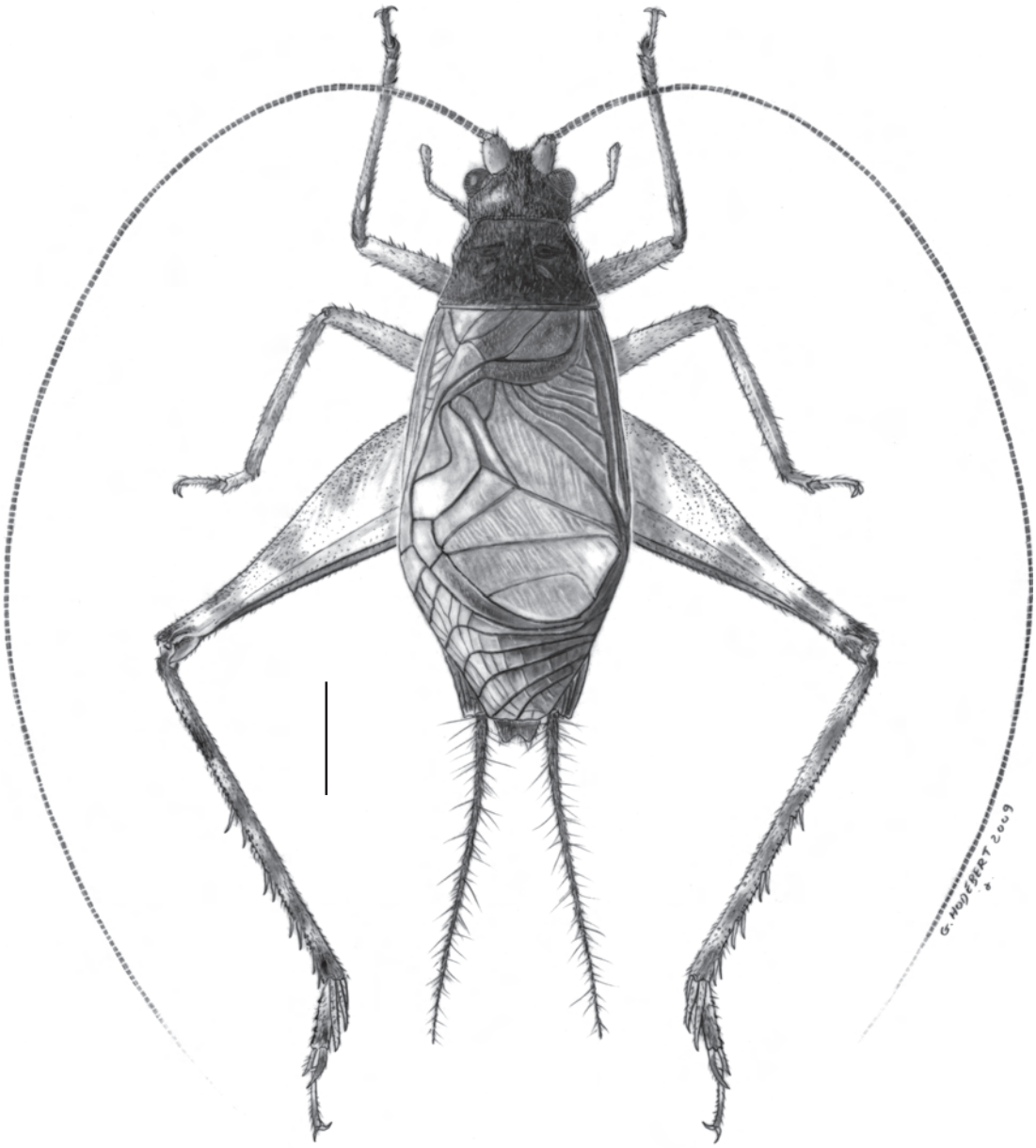

FIG. 3. — *Phaloria chopardi* (Willemse, 1925) n. comb., ♂ MNHN-ENSIF2102. Scale bar: 3 mm.

label] / Jan 8 1923, N Hebrides [Vanuatu], c. 500 ft, E. c'st Esp[iritu] Santo I., open forest near Hog Harb[our], dd J.R. Baker and & Percy Sladen Mem. FD. 1923 [same as above] / TYPEORTH: 908 Podoscirtus chopardi Willemse's HOPE DEPT.OXFORD. (UMO). Type in bad condition (legs III missing, right FW broken at base, right HW damaged, ovipositor slightly damaged, antennae missing except left antenna base, colouration unclear).

OTHER MATERIAL EXAMINED. — 4 ♂♂, 5 ♀♀.
Vanuatu. [Sanma province], Espiritu Santo [Island],

Peavot, 14°59'37"S, 166°47'4"E, 38 m alt., rive S de la rivière principale, terrasse, forêt secondaire (ancien jardin), nuit, sur plante, 2 m H, sous feuille d'arbre, 20.X.2006, 1 ♂ (fn TR254), 1 ♀ (fn TR253), observed in copula (MNHN-ENSIF2102, 2103). — *Idem*, nuit, sur plante, 21.X.2006, L. Desutter-Grandcolas, 1 ♂ (fn 65) (MNHN-ENSIF2104).
Butmas, 600 m alt., forêt du plateau de Tankara, 15°21'56"S, 166°59'E, jour, sur plante, 13.X.2006, T. Robillard, 1 ♀ (fn TR21) (MNHN-ENSIF2109). — Nuit, lisière proche du camp, herbes hautes en bord de piste, sur feuille, 14.X.2006, T. Robillard, 1 ♂ (fn TR75) (MNHN-ENSIF2106). — Jour, sur plante de sous-bois, 1 m H, 15.X.2006, T. Robillard, 1 ♀ (fn TR116) (MNHN-ENSIF2110). — Nuit, végétation secondaire, bord de piste, 17.X.2006, L. Desutter-Grandcolas, 2 ♀♀ (fn 5-6) (MNHN-ENSIF2108, 2107).
Big Bay, Matantas, Vatthé Conservation Area, 15°20'S, 166°95'E, nuit, sur plante, 27.X.2006, T. Robillard, 1 ♂ (fn TR398) (MNHN-ENSIF2105).

DISTRIBUTION. — Vanuatu, Espiritu Santo island: species known from western (Peavot, Vatthé Conservation Area) and eastern (Hog Harbour, type locality) coastal areas around Big Bay and in the inland (Butmas).

AMENDED DIAGNOSIS. — Species close to *Phaloria solomonica* Gorochov, 1996 from the Solomon Islands, from which it differs by its smaller size, the smaller ovipositor of the females (between 11.3 and 12.7 mm, compared to 14.4 mm in *P. solomonica*), female tegminal venation (more numerous transverse veins on dorsal field, Fig. 4F, G; R less bifurcated), and male genitalia (Fig. 5A-D): pseudepiphallic lophi well developed, long and membranous (lacking in *P. solomonica*, see Gorochov 1996: fig. 365); ectophallic fold more deeply indented than in *P. solomonica* (compare to Gorochov's figure 367); ectophallic parameres thin and relatively short, not going beyond pseudepiphallic sclerite, but longer than in *P. solomonica*. Due to the discoveries of additional species, the diagnostic characters mentioned by Willemse (1925) revealed uninformative for species recognition (proportions of maxillary palpi joints, position of median ocellus on fastigium, female FW venation, colouration).

REDESCRIPTION

Size medium. Overall colouration light ochre, the head and pronotum darker dorsally, the legs lighter with indistinct darker rings and spots, highly pilose.

Head (Fig. 3). Fastigium flattened dorsally, slightly narrower than the scape. Ocelli small, the distance between the median and one lateral ocellus hardly greater than the distance between lateral ocelli; median ocellus subapical in position, protruding. Eyes small, but protruding laterally and anteriorly. Head dorsum rounded. Maxillary palpi: joint 5 longer than joint 3, which is longer than joint 4; joint 5 widened from mid length to the tip, truncated in oblique. Pronotum. Anterior and posterior margins of dorsal disc slightly concave and convex respectively.

Legs. TI with 2 very small apical spurs, both ventral in position; tympana both open, small and oval, the outer less than half the surface of the inner; tympana prolonged by a small more distal depression. TII with 3 small apical spurs, the upper outer spur missing; upper inner spur longer than ventral spurs. TIII with 4 pairs of subapical spurs; within each pair, inner spur lower on the tibia; inner spurs longer, and more apart from the main axis of the tibia, than the outer spurs. TIII serrulated over their whole length; inner spines number: 0 between apex and spur 1, and between spurs 1 and 2; 1 or 2 between spurs 2 and 3; 2 or 3 between spurs 3 and 4; 8-13 above subapical spur 4; outer spines bigger and more numerous: 0 or 1 between apex and spur 1; 2-4 between spurs 1 and 2; 3-5 between spurs 2 and 3; 4-7 between spurs 3 and 4, 10-13 above subapical spur 4. TIII with 3 apical spurs on each side (Fig. 4A, B); outer spurs very small, the median the longest; inner spurs much longer, the median twice as long as the ventral one, the upper the longest, as long as basitarsus. Basitarsi III asymetrical, their dorsal outer side crested with 4 or 5 spines in addition to apical one; spines bigger toward basitarsus apex. FWs and HWs well developed in both males and females; HWs somewhat shorter or longer than FWs, both about body size; FWs covered with numerous, very short golden setae.

Colouration

In holotype, no obvious colouration pattern on head and legs; dorsal disc of pronotum perhaps darker on posterior third. In other specimens, face, clypeus, labre and cheeks whitish; a small oblique, brown line converging from the lower angle of each eye toward the epistemal suture, but not going further than mid face. Ocelli whitish. Head dorsum dark ochre. Antennae light ochre. Palpi light ochre; tip of joints 4 and 5 somewhat darker. Mouthparts

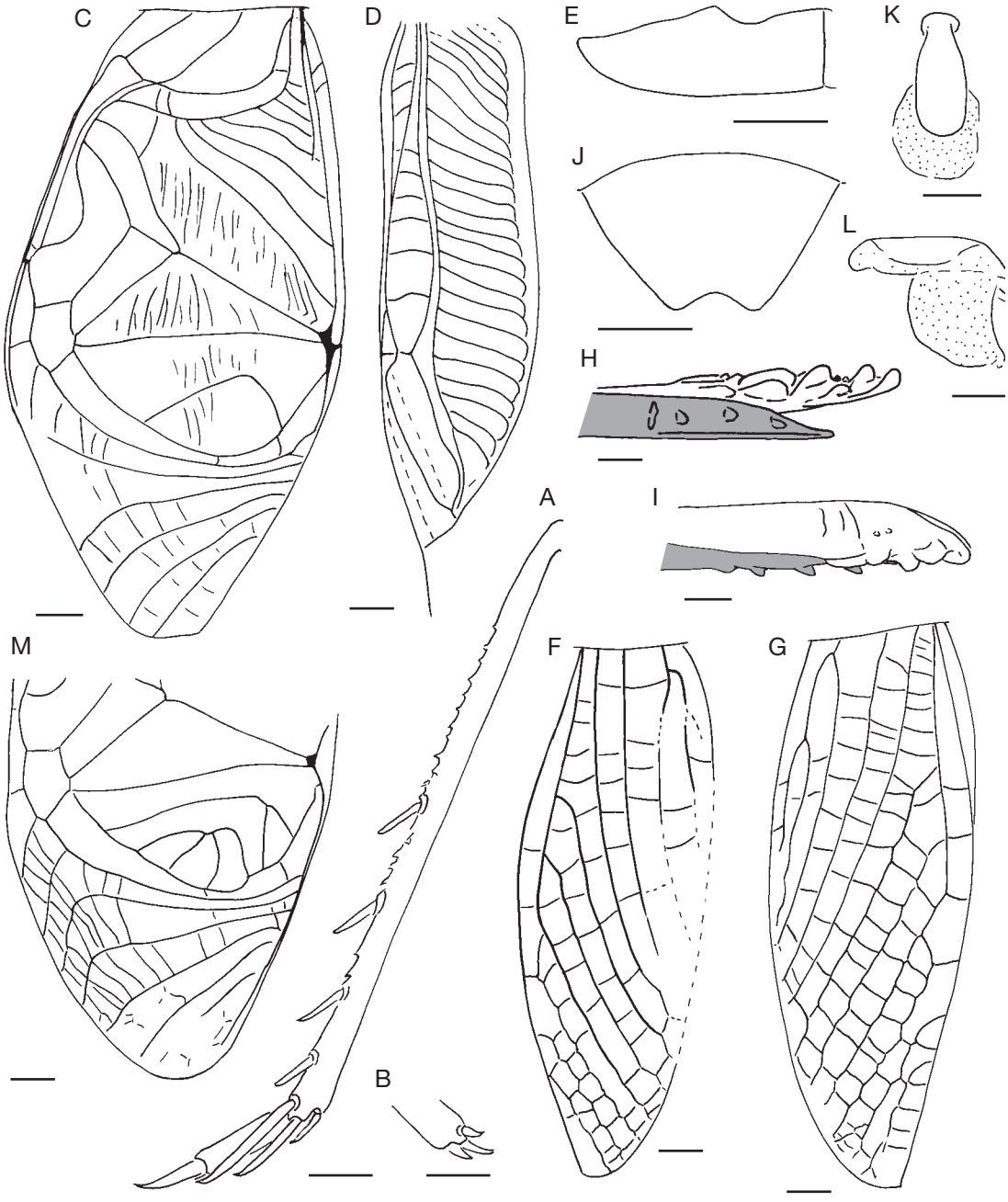

FIG. 4. — *Phaloria chopardi* (Willemse, 1925) n. comb.: **A**, **B**, tibia III, inner subapical and apical spurs (**A**), outer apical spurs (**B**); **C**, **D**, male forewing venation, dorsal field (**C**) and lateral field (**D**); **E**, male subgenital plate, lateral view; **F**, **G**, female forewing venation, holotype (**F**) and ♀ MNHN-ENSIF2103 (**G**); **H**, **I**, holotype ovipositor, ventral (**H**), lateral (**I**) views of right valves, ventral valves marked with grey; **J**, holotype subgenital plate; **K**, **L**, holotype copulatory papilla, dorsal (**K**), lateral (**L**) views; **M**, variation in male forewing dorsal field venation, ♂ ENSIF2104. Scale bars: A-G, J, M, 1 mm; H, I, K, L, 0.2 mm.

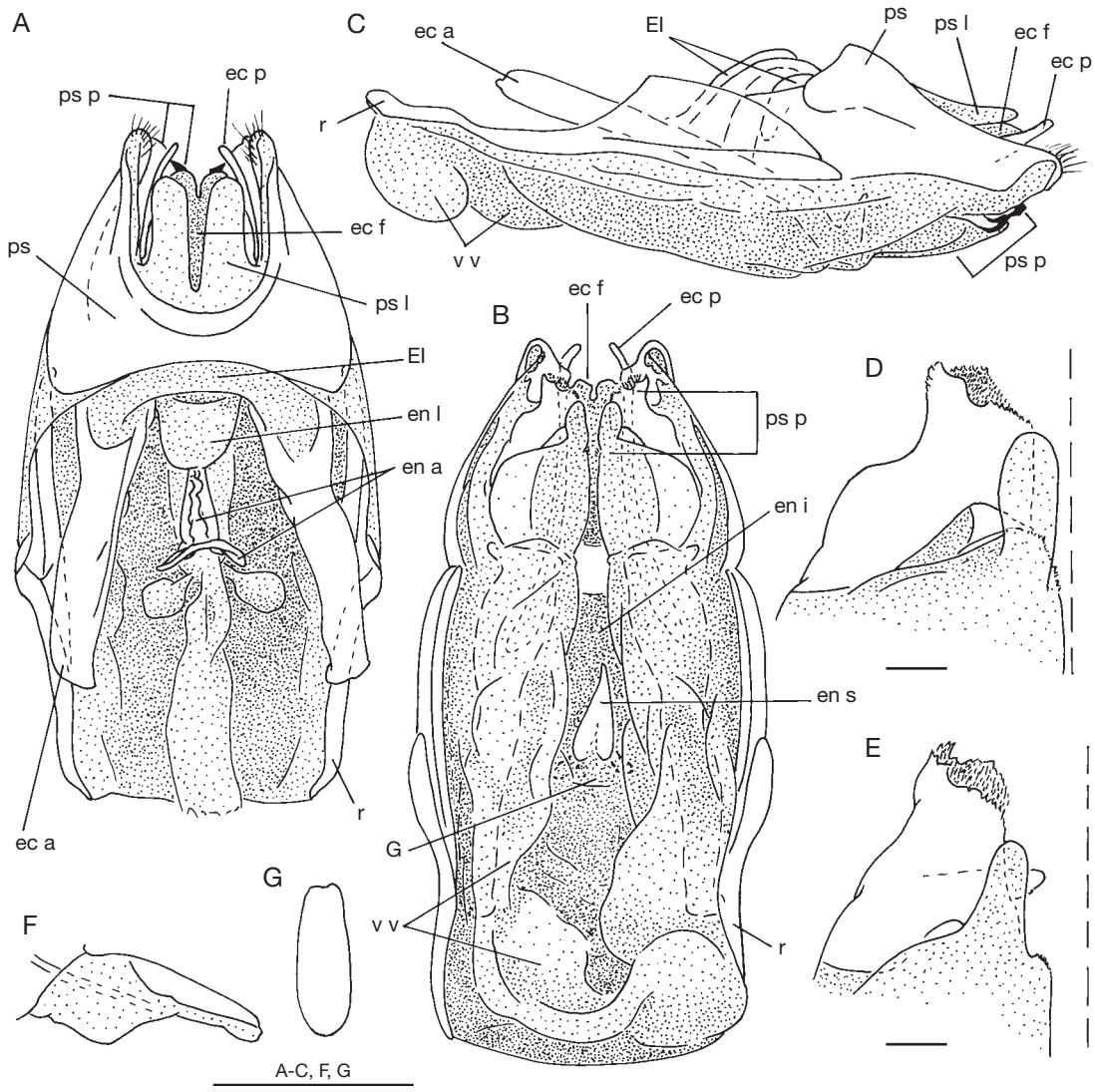

FIG. 5. — **A**-**D**, *Phaloria chopardi* (Willemse, 1925) n. comb.; **A**-**C**, male genitalia, ♂ MNHN-ENSIF2102, in dorsal (**A**), ventral (**B**) and lateral (**C**) views; **D**, right pseudepiphallic paramere, ventral view; **E**, *P. nigricollis* n. sp., male genitalia, ♂ MNHN-ENSIF2113, right pseudepiphallic paramere, ventral view; **F**, **G**, *P. nigricollis* n. sp. (?), female copulatory papilla in lateral (**F**) and dorsal (**G**) views, ♀ MNHN-ENSIF2114. Scale bars: A-C, F, G, 1 mm; D, E, 0.1 mm. Abbreviations: see text.

yellowish. Dorsal disc of pronotum dark ochre, with yellowish inscriptions; lateral lobe with a large yellow spot. Legs I and II light ochre; one darker subapical ring on femora; 3 darker dorsal spots on tibiae, in addition to one little spot near the knees. Legs III ochre but more spotted with dark; TIII with 5 dark spots/rings, one at the level of each pair of subapical spurs and one below the knee; subapical spurs brown, yellow near the apex, black at apex; apical spurs yellowish, their apex black; FIII darker, without a very clear pattern of colouration: more or less, one dark subapical ring, surrounded by

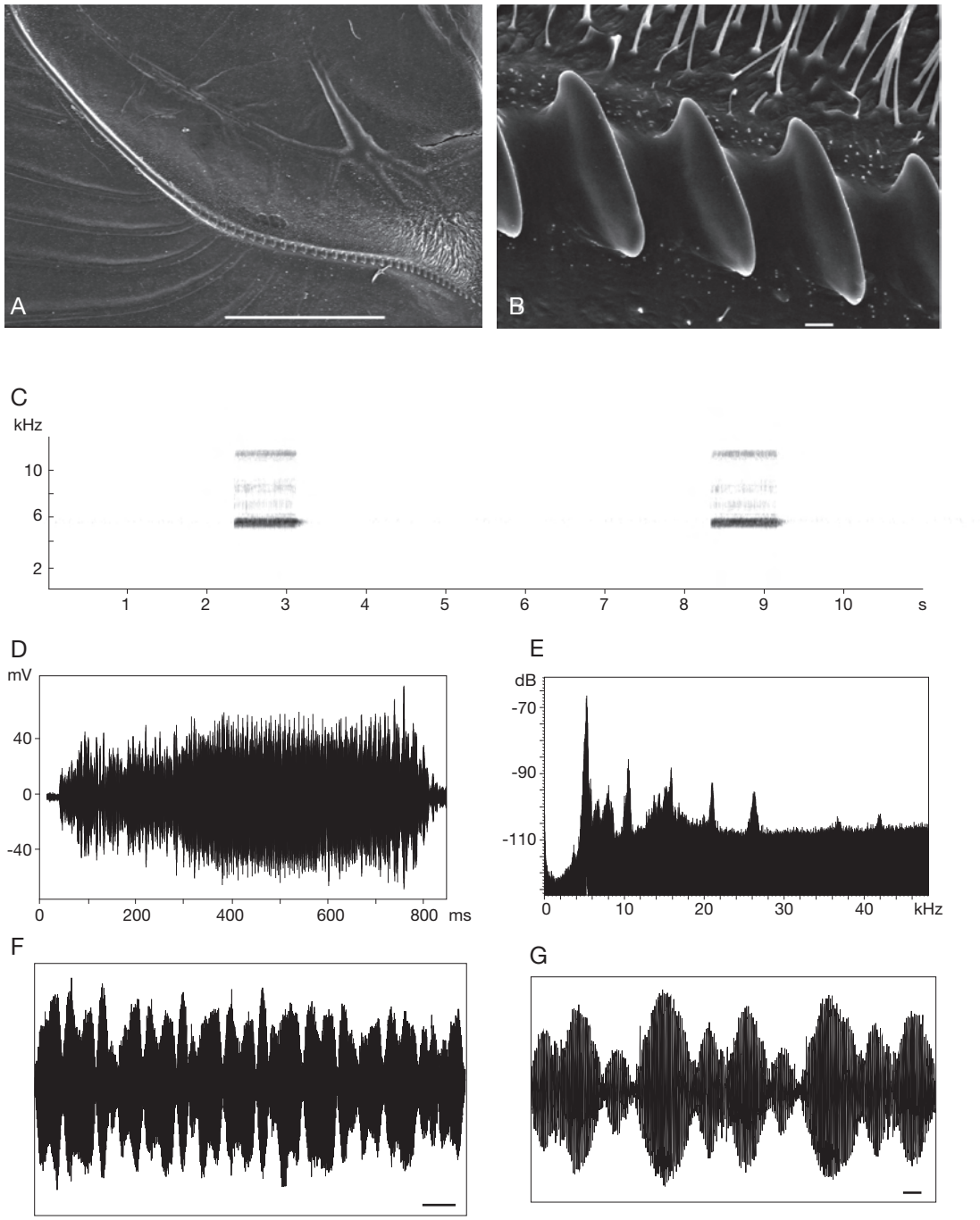

FIG. 6. — *Phaloria chopardi* (Willemse, 1925) n. comb., stridulatory file and calling song: **A**, **B**, stridulatory file of ♂ MNHN-ENSIF2104 (**A**), with detailed view of stridulatory teeth (**B**); **C**-**G**, calling song, spectrogram showing two successive echemes (**C**), oscillograms of a complete echeme (**D**), of a 105 ms part of the same echeme (**F**), of one subecheme comprising three syllables (**G**); **E**, power spectrum of an echeme. Scale bars: A, 100 µm; B, 10 µm; F, 5 ms; G, 2 ms.

TABLE 4. — Measurements (in mm) of males and females of *Phaloria chopardi* (Willemse, 1925) n. comb. Abbreviations: see text.

	Lpron	lpron	LFW	lFW	LFIII	LTIII	
Males							**File**
n = 4	2.5-2.8	4.1-4.3	12.3-12.5	6.1-6.5	10.2-11.5	8.9-10.4	34-37
Mean values	2.7	4.2	12.4	6.3	11.2	10	36
Females							**Lovip**
Holotype	2.6	3.1	10.3	–	–	–	11.6
n = 5	2.5-2.7	3.8-3.9	10.3-10.9	4-4.1	10.8-11.7	9.5-10	11.3-11.8
Mean values	2.7	3.7	10.7	4	11.3	10	11.6

yellowish areas, and 2 dark patches on inner and dorsal sides, these patches more or less prolonged by dark stripes on outer face. Basitarsi III whitish, brown basally and apically.

Male

Metanotum and abdomen without evident glandular structures. FWs and HWs well developed, HWs almost as long as FWs. FW dorsal field venation standard for the genus (Fig. 4C); CuP vein prolonged down to mid harp; CuA bifurcated 6 times after the mirror; apical field with clear cell alignments; lateral field smaller than dorsal field, its venation as on Fig. 4D, R with more than 20 bifurcations. Stridulatory apparatus: harp with 8 veins; mirror crossed by two veins (male MNHN-ENSIF2102); file with 34-37 teeth (mean 36, n = 4), the teeth located only on inner half of 1A (Fig. 6A), well separate from each other and slightly oblique (i.e. not transverse to FW surface, Fig. 6B). Subgenital plate long, not very high (Fig. 4E), its apex deeply indented. Colouration: FWs light ochre, the veins darker in apical field; plectrum area whitish. Sternites light ochre, with an indistinct median dark band.

Male genitalia. Male genitalia long and of regular width; rami twice as long as pseudepiphallic sclerite. Pseudepiphallic sclerite very largely and deeply indented, making two lateral "arms" which entirely enclose the long and membranous lophi (Fig. 5A); posterior margin of pseudepiphallus, around the lophi, thickened. Pseudepiphallic parameres well developed, well sclerotized in their distal third only, and comprising 4 distinct lobes: a dorsal lobe, thin and transverse; two median, plate-like lobes, which are the most evident part of the parameres, and a latero-ventral, mostly membranous, lobe, comprising a free, membranous apical bud, and a small, spiny plate (Fig. 5B, D). Ectophallic invagination sclerotized laterally only (no sclerotized arc); ectophallic apodemes thick. Ectophallic fold long and wide, its lateral margin sclerotized from the ectophallic invagination and prolonged by a pair of free, thin ectophallic parameres (Fig. 5C); apex of ectophallic fold deeply indented and well separate from the lateral ectophallic parameres (Fig. 5A). Endophallic sclerite well developed, triangular; endophallic apodeme comprising a high, undulated longitudinal crest along the whole length of endophallic sclerite, and a pair of transverse sclerites along the anterior margin of endophallic sclerite (Fig. 5A). Endophallic membrane invaginated posteriorly to endophallic sclerite, making a kind of small, half-closed "dorsal cavity".

Female

FWs longer than body; HWs slightly longer than FWs. Venation (Fig. 4F, G): longitudinal veins parallel and strong, separated by numerous, fainter transverse veins; A3 bifurcated twice, near its base, CuP twice and CuA three times. Lateral field: area between R and MA wide; R with 11 bifurcations. Ovipositor apex: dorsal valves with 4 large crests, in addition to the curved apex; ventral valves with 4 transverse crests, in addition to acute apex, the 3 most apical higher than wide, the most basal low and very wide (Fig. 4H, I). Subgenital plate large, its distal margin deeply concave (Fig. 4J).

Colouration: FWs light ochre; longitudinal veins ochre; CuP and CuA dark brown basally and at

TABLE 5. — Measurements (in mm) of two males (MNHN-ENSIF2111, MNHN-ENSIF2112) of *Phaloria chopardi* (Willemse, 1925) n. comb., from Big Bay. Abbreviations: see text.

	Lpron	lpron	LFW	lFW	LFIII	LTIII	File
Males (n = 2)	2.6-2.7	4.3	12	6-6.3	10.5-11.8	9.4-10.8	30-34
Mean values	2.7	4.3	12	6.2	11.2	10.1	32

mid length respectively; transverse veins darker; in lateral field, MA base dark brown.

Female genitalia. Copulatory papilla always short, thin and hardly sclerotized dorsally only, and shorter in female holotype; lateral margins subparallel, apex rounded more or less bent ventrally; membrane ventral to copulatory papilla forming a kind a plicated pouch (Fig. 4K, L).

Measurements
See Table 4.

VARIATION
Eyes often dark brown in their lower half. Dark patches of leg colouration more or less evident. In male FW, mirror crossed by an additional, bifurcated vein (Fig. 4M). Veins joining at the anterior angle of the mirror either fused before the mirror (Fig. 4M), or separate (Fig. 4C). In females, FW transverse veins almost as strong as longitudinal veins.

REMARK
Two males originating from Big Bay (Matantas, Vatthé Conservation Area, 15°20'S, 166°95'E, nuit, sur plante, 27.X.2006, T. Robillard, 1 ♂ [fn TR399] [MNHN-ENSIF2111]; nuit, sur plante de sous-bois, L. Desutter-Grandcolas, 1 ♂ [fn 55] [MNHN-ENSIF2112]) differ slightly from the above mentioned males, especially by their more contrasted colouration (FIII distinctly annulated, yellow spot on lateral lobe of pronotum and oblique brown lines on the face more obvious), their slightly lower number of teeth in the stridulatory file (30 and 34), and their male genitalia (ectophallic apodemes shorter and thinner, ectophallic fold somewhat longer, longitudinal crest of endophallic apodeme almost missing). Their identification as *P. chopardi* n. comb. cannot be ascertained yet. See Table 5 for measurements.

CALLING SONG
The male MNHN-ENSIF2102 has been recorded in semi-captivity by night (temperature 27.3°C, microphone at about 20 cm), being raised in a small mosquito net cage selected to avoid echoes during recording.

The calling song is made by the repetition of short buzzing echemes, separated by long intervals (Fig. 6C). Echeme duration ranges from 760 ms to 1 s (mean 866 ms, n = 20); that of the intervals ranges from 2.14 s to 8.06 s (mean 4.43 s, n = 20). Each echeme is composed of several tens of subechemes emitted at a very quick rate, and which exhibits clear amplitude modulations (Fig. 6D). Most subechemes have a total number of elementary oscillations which exceeds the number of stridulatory teeth (here 38). A subecheme thus cannot be produced by one complete FW closure movement. Unless echoes have nethertheless damaged the amplitude pattern of the eschemes, it must then be hypothesized that each subecheme is produced by a complex FW closure movement involving one or several partial reopening(s) of the FWs, and so that each subecheme comprises two or three syllables emitted extremely rapidly (Fig. 6F, G). Subecheme duration ranges from 9.41 ms (2 syllables) to 18.20 ms (4 syllables), with a mean duration of 14.45 ms (n = 20; mean number of syllables = 3). Subechemes are separated by very short intervals lasting from 1.02 to 4.75 ms (mean 2.54 ms, n = 20). Within echemes, the interval between syllables is extremely short, less than 3 ms and most often less than 2 ms. An alternative hypothesis would be that both FW closing and FW opening are used for stridulation, as in ensiferan Tettigoniidae; the movement of sound production is anyway extremely fast in this species (K.-G. Heller pers. comm.).

The dominant frequency of the call is its fundamental frequency. Up to 8 harmonics are documented

on frequency spectrum (Fig. 6E); harmonics H2 to H5 are almost equally powerful, and H6 almost lacking. Dominant frequency ranges from 5222 Hz to 5425 Hz (mean 5292, n = 20).

Phaloria nigricollis n. sp.
(Fig. 5E-G)

TYPE MATERIAL. — Holotype: **Vanuatu.** [Tafea province], I. Tanna, env. de Lamuemaura, 1935-1936, E. Aubert de la Rüe, 1 ♂ (MNHN-ENSIF2113).

ETYMOLOGY. — Species named after the distinctive colouration of its pronotum.

DIAGNOSIS. — Species close to *P. chopardi* n. comb., from which it can be readily separated by the uniform black colouration of its pronotum.

DESCRIPTION (HOLOTYPE)
Species very similar to *P. chopardi* n. comb. Global colouration quite homogeneously ochre, except for black pronotum. Characters as in *P. chopardi* n. comb., except for: TII with 4 apical spurs, the inner spurs longer than the outer. TIII serrulation: inner spine number: 0 between apex and spur 1, and between spurs 1 and 2; 1 or 2 between spurs 2 and 3; 2 between spurs 3 and 4; 7 or 8 above subapical spur 4; number of outer spines: 0 between apex and spur 1; 3 between spurs 1 and 2; 5 between spurs 2 and 3; 4 or 5 between spurs 3 and 4, 14 above subapical spur 4. Basitarsi III as in *P. chopardi* n. comb., but with 3 or 4 dorsal spines in addition to apical one. HWs and FWs as in *P. chopardi* n. comb.

Colouration
Head almost entirely ochre, the head dorsum, upper part of the face, tibiae and femora apex somewhat darker; eye dorsal third lighter. Pronotum black, with ochre margins; a wider ochre band along the posterior margin of dorsal disc and a narrow one along the lower margin of lateral lobe. Legs without distinct coloured stripes or rings.

Male
FWs and stridulatory apparatus similar to that of *P. chopardi*; file with 38 stridulatory teeth (n = 1); harp with 9 veins, 5 of which crossed by CuP; mirror crossed by 2 veins, the upper one beginning below (= more distally) the junction between the mirror and c1 cell; lateral field: R bifurcated 19 times. Subgenital plate as in *P. chopardi* n. comb.

TABLE 6. — Measurements (in mm) of *Phaloria nigricollis* n. sp. holotype. Abbreviations: see text.

	Lpron	lpron	LFW	lFW	LFIII	LTIII	File
Holotype	2.9	4.9	14.7	7.2	11	10	32

Male genitalia. Similar to that of *P. chopardi*, in size and structure, in particular for the pseudepiphallic sclerite and lophi, the parameres as on Figure 5E.

Measurements
See Table 6.

REMARK
Two females from Vanuatu, Shefa province, Epi island (Mt. Alempe, 1935-1936, E. Aubert de la Rüe [MNHN-ENSIF2114, 2115]), could also belong to *P. nigricollis* n. sp., with which they share the same pattern of pronotum colouration. In one female distinct yellowish spots are however visible on the face and cheeks. These females have an ovipositor which is much smaller than that of *P. chopardi* n. comb.(see measurements); their subgenital plate is large, with a deeply concave posterior margin; their FW venation shows 3 anal veins, A1 bifurcated with or without distal anastomosis, CuP and CuA bifurcated twice or 3 times each. Their copulatory papilla is hardly sclerotized only dorsally, its apex sinuated dorsally (Fig. 5F, G). See Table 7 for measurements.

Phaloria sp.

MATERIAL EXAMINED. — **Vanuatu.** [Sanma province], Espiritu Santo [island], Butmas, 600 m alt., forêt du plateau de Tankara, 15°21'56"S, 166°59'E, jour, sur plante, bord de piste, 13.X.2006, L. Desutter-Grandcolas, 1 ♀ (fn 19) (MNHN-ENSIF2116).

DIAGNOSIS. — Species close to *P. chopardi* n. comb., from which it differs mostly by its TIII and its pattern of colouration. The specimen examined probably belongs to

TABLE 7. — Measurements (in mm) of two females of *Phaloria nigricollis* n. sp. originating from Epi island. Abbreviations: see text.

	Lpron	lpron	LFW	LFIII	LTIII	Lovip.
Females (n = 2)	2.4-2.5	3.3-3.4	10.2-10.7	10.3-10.5	9.1-9.2	10.8-11.3
Mean values	2.5	3.4	10.5	10.4	9.2	11.1

a new *Phaloria* species, which will have to be described with additional material of both sexes.

DESCRIPTION

General features as in *P. chopardi* n. comb. TIII highly pilose, distincly annulated and asymetrical, with a distinct longitudinal crest along outer margin; this crest dark brown; serrulation as in *P. chopardi* n. comb.; inner spines number: 0 between apex and spur 1, and between spurs 1 and 2; 1 between spurs 2 and 3; 2 between spurs 3 and 4; 9 above subapical spur 4; number of outer spines: 0 between apex and spur 1; 3 between spurs 1 and 2; 3 between spurs 2 and 3; 5 between spurs 3 and 4, 10 above subapical spur 4. Basitarsi III with 2 outer spines, in addition to apical one.

Colouration

Global colouration more contrasted than in *P. chopardi* n. comb. Head dorsum dark ochre, the lateral ocelli hardly distinct (whitish in *P. chopardi* n. comb.). Scapes dark ochre, their base and an outer band yellowish. Pronotum very dark brown, the dorsal muscular inscriptions light ochre; lateral lobes also dark brown, without obvious yellow spot.

Female

FWs very similar to that of *P. chopardi* n. comb.; transverse veins as strong as longitudinal veins; dorsal field venation: 3 anal veins, A3 bifurcated; CuA and CuP both bifurcated 3 times. Lateral field with Sc bifurcated 11 times. Ovipositor as long as in *P. chopardi* n. comb., its apex however much smaller, not distinctly enlarged and of the same colour as the rest of the ovipositor.

Female genitalia. Copulatory papilla not distinct.

Measurements

See Table 8.

TABLE 8. — Measurements (in mm) of *Phaloria* sp. female MNHN-ENSIF2116. Abbreviations: see text.

	Lpron	lpron	LFW	LFIII	LTIII	Lovip
♀ ENSIF2116	2.8	–	11.5	11	9.4	11.9

Phaloria walterlinii n. sp.
(Figs 7-9)

TYPE MATERIAL. — Holotype: **Vanuatu.** [Sanma province], Espiritu Santo [Island], Butmas, 600 m alt., forêt du plateau de Tankara, 15°21'56"S, 166°59'E, nuit (18-20h), 16.X.2006, T. Robillard, 1 ♂ (fn TR121), sur plante de sous-bois, 0.40 m H (fougère), chant sur fougère, femelle à proximité (40 cm) (TR vidéo 3) (MNHN-ENSIF2117).
Allotype: same locality and date as the holotype, sur plante de sous-bois, nuit, L. Desutter-Grandcolas, 1 ♀ (fn 2) (MNHN-ENSIF2118).
Paratype: data as allotype, 1 ♀ (fn 1) (MNHN-ENSIF 2119).

ETYMOLOGY. — Species dedicated to Walter Lini, who led Vanuatu to independence.

DIAGNOSIS. — Species characterized by its large size, its dark and very contrasted pattern of colouration, and its male genitalia (arms of pseudepiphallic sclerite only little separate and diverging distally, lophi small and membranous, ectophallic fold partly sclerotized dorsally and ventrally, but without free ectophallic parameres, ectophallic apodemes very long and thin, dorsal cavity lacking). It is thus clearly distinct from *P. offensa* described from Banks island, but also from *P. chopardi* n. comb. (with additional characters on female genitalia: papilla shorter and wider, with sinuated apex) and *Phaloria* sp. described above.

DESCRIPTION

Size greater than *P. chopardi* n. comb. and *Phaloria* sp. Overall colouration dark brown, with clear yellow pattern (Fig. 7). Numerous short, light ochre setae.

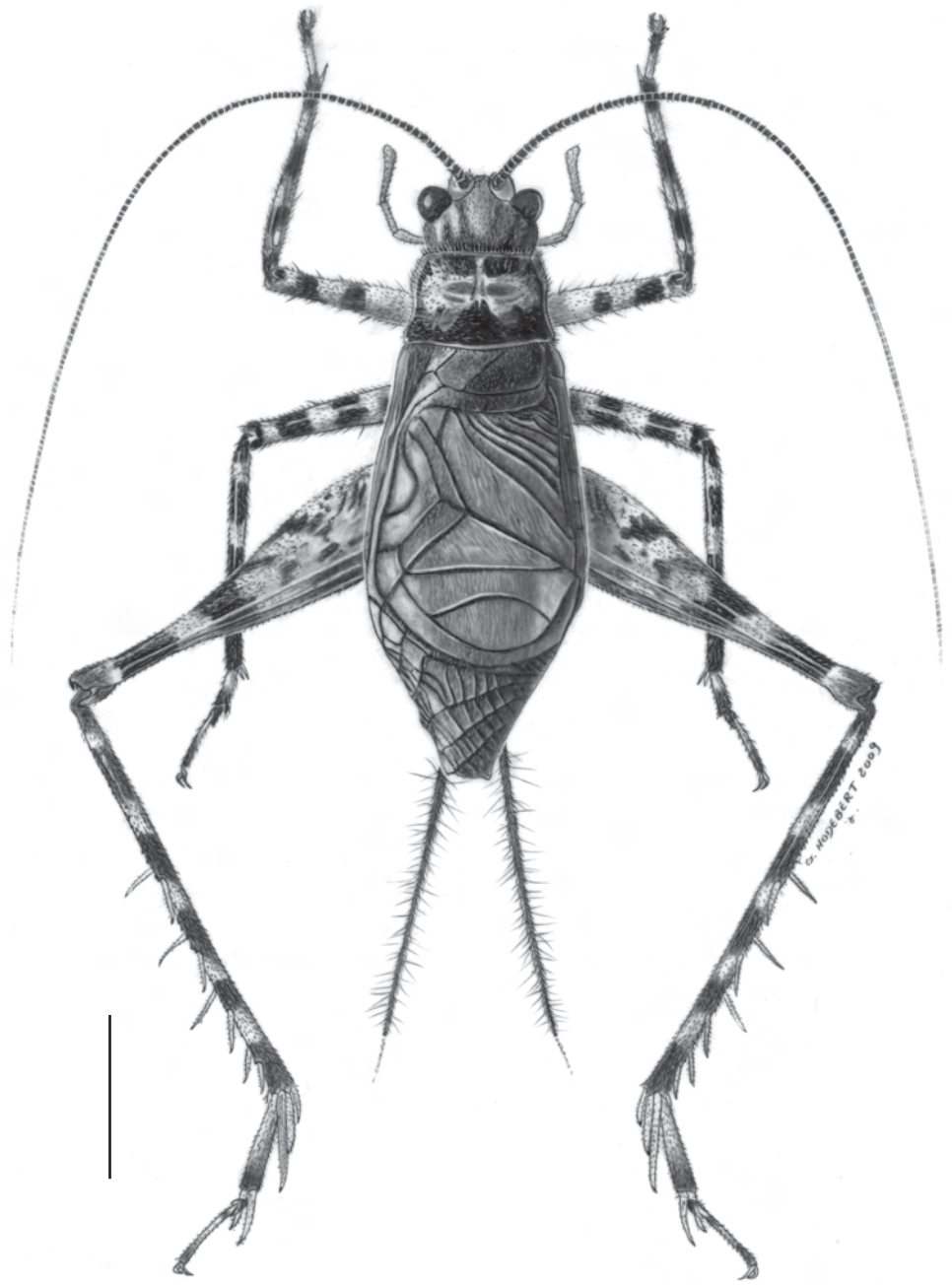

FIG. 7. — *Phaloria walterlinii* n. sp., holotype ♂. Scale bar: 5 mm.

Head. Ocelli small, arranged as an acute triangle, the distance between lateral ocelli much larger than between lateral and median ocelli; a faint transverse furrow behind lateral ocelli; median ocellus subapical in position, within a faint longitudinal furrow. Fastigium clearly narrower

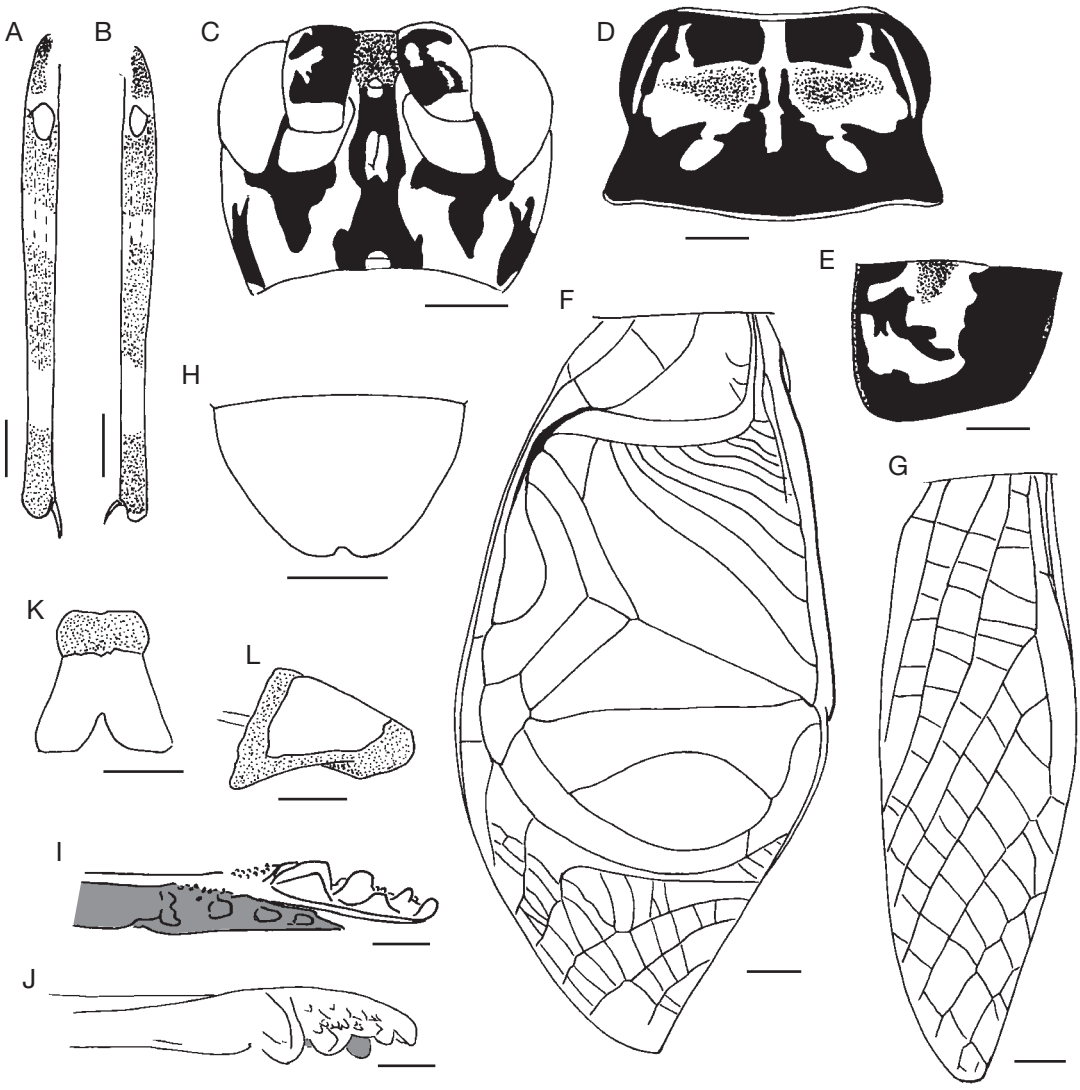

FIG. 8. — *Phaloria walterlinii* n. sp.: **A**, **B**, tibia I, inner (**A**) and outer (**B**) apical spur, tympanum and the depression below the tympanum (dashed line), brown areas marked with dots; **C**, colour pattern on the face; **D**, dorsal disc of pronotum; **E**, pronotum lateral lobe; **F**, male dorsal field forewing venation; **G**, female forewing dorsal field venation; **H**, female subgenital plate; **I**, **J**, female ovipositor, ventral (**I**), lateral (**J**) views of right valves, ventral valves marked with grey; **K**, **L**, female copulatory papilla, dorsal (**K**), lateral (**L**) views. Scale bars: A-H, 1 mm; I-L, 0.2 mm.

than scape. Eyes protruding anteriorly (Fig. 7). Maxillary palpi: joint 5 longer than joint 3, itself longer than joint 4.

Pronotum. Anterior and posterior margins of dorsal disc concave and convex respectively; anterior angle of lateral lobe slightly raised.

Legs. TI clearly grooved below, and especially near tympana (Fig. 8A, B); both inner and outer tympana small and oval; 2 apical spurs, the inner slightly longer than the outer; outer spur slightly more toward tibial medio-ventral axis. TII with 3 apical spurs; outer dorsal spur lacking; inner dorsal

spur the longest. TIII with 4 pairs of long and thin, subapical spurs, the outer slightly longer and more apart from tibial main axis; 3 small, outer apical spurs; 3 inner apical spurs, the dorsal the longest, slightly longer than basitarsus III; between subapical spurs, spines located on a kind of sub median, longitudinal carina; serrulation made of few, little spines, lacking between tibia apex and the first subapical spur, slightly more numerous on outer side (3-6 between successive spurs) than on inner side (0-3 between successive spurs); 7-10 (inner) and 7-14 (outer) spines above subapical spurs. Basitarsi III with 3 small, outer spines, in addition to apical spine.

Colouration
Head dorsum yellowish brown, with 3 pairs of longitudinal brown lines (a more lateral one behind the eyes, one from the inner angles of the eyes, a median one behind lateral ocelli); each median line including a rounded yellowish spot at one third of its length. Ocelli whitish. Antennae brown, scapes brown and yellow, their outer margin largely yellow. Maxillary palpi yellow, 5th joint apex brownish. Face yellow; a large, median, brown band below the median ocellus, down to the epistemal suture, but subdivided before it and prolonged as two brown bands on the clypeus; two thin yellow lines included in the median brown line at the level of antennal pits; a broadly triangular brown fleck below each antennal pit and inner angle of eye; cheeks mottled with brown (Fig. 8C). Pronotum (Fig. 8D, E): anterior and posterior margins light ochre; dorsal disc otherwise brown; muscular inscriptions yellowish, prolonged laterally by a large, more or less trilobate, yellowish area, connected to yellow part of lateral lobe; lateral lobe largely light brown along lower and posterior margins, yellow otherwise. Legs ringed and mottled with brown; TI and TII with 4 brown rings, including one near the knee, one at the level of the tympana, one subapical and one apical (Fig. 8A, B); FI and FII with two brown rings, one apical near the knee and one subapical, and 2 dorsal brown areas, one subbasal and one basal; TIII with a dorsal area near the knee and a brown ring below the knee and at the level of each pair of subapical spurs; FIII with 3 brown rings, one apical and 2 subapical, the most basal not complete, 2 more basal brown areas, covering the inner and dorsal sides, and a light brown elongated area on outer side. Basitarsi III yellow with a basal dorsal brown area and a brown apical ring. Spurs all yellow, with brown apex; median and dorsal inner apical spurs of TIII with an additional brown line on their outer face. Cerci brown.

Male
Metanotum and abdomen without evident glandular structures, but the scutum lateral reliefs with long golden setae. HWs slightly longer than FWs. FW venation (Fig. 8F) coherent with genus definition; harp with 10 veins; mirror crossed by 2 veins, its anterior angle wide; stridulatory file with 88 teeth (n = 1), located on 1A outer four-fifths (no stridulatory teeth on 1A inner part); CuA bifurcated 4 times in apical field; lateral field similar to that of *P. chopardi* n. comb., but with 26 bifurcations of R. FWs brown, shining, densely covered with very short golden setae; yellowish spots along the plectrum, 3A and the chords; harp veins slightly lighter. Subgenital plate short, its apex wide and straight.

Male genitalia. Small and wide, compared to that of *P. chopardi*. Pseudepiphallic sclerite broadly triangular, slightly concave and hardly sclerotized (Fig. 9A); the two arms close to each other and converging apically (Fig. 9A); lophi small and membranous, separated by a roughly rectangular, small indentation; pseudepiphallic arms flat (Fig. 9C), partly sclerotized dorsally and laterally; dorsal lobe of pseudepiphallic parameres spiny and located between the arms, their ventral lobe located ventrally to the arms. Rami connected to pseudepiphallic sclerite, enlarged over the posterior two-thirds of their length and crossed at about mid length by transverse inner crests (Fig. 9C). Ectophallic fold visible just below the lophi, sclerotized both ventrally and dorsally (Fig. 9A, B), but without free ectophallic parameres; rami long and thin (Fig. 9A); ventral valves well developed, hemicircular. Endophallic sclerite very small, more or less U-shaped (Fig. 9B), without a well-developed apodeme; no dorsal cavity.

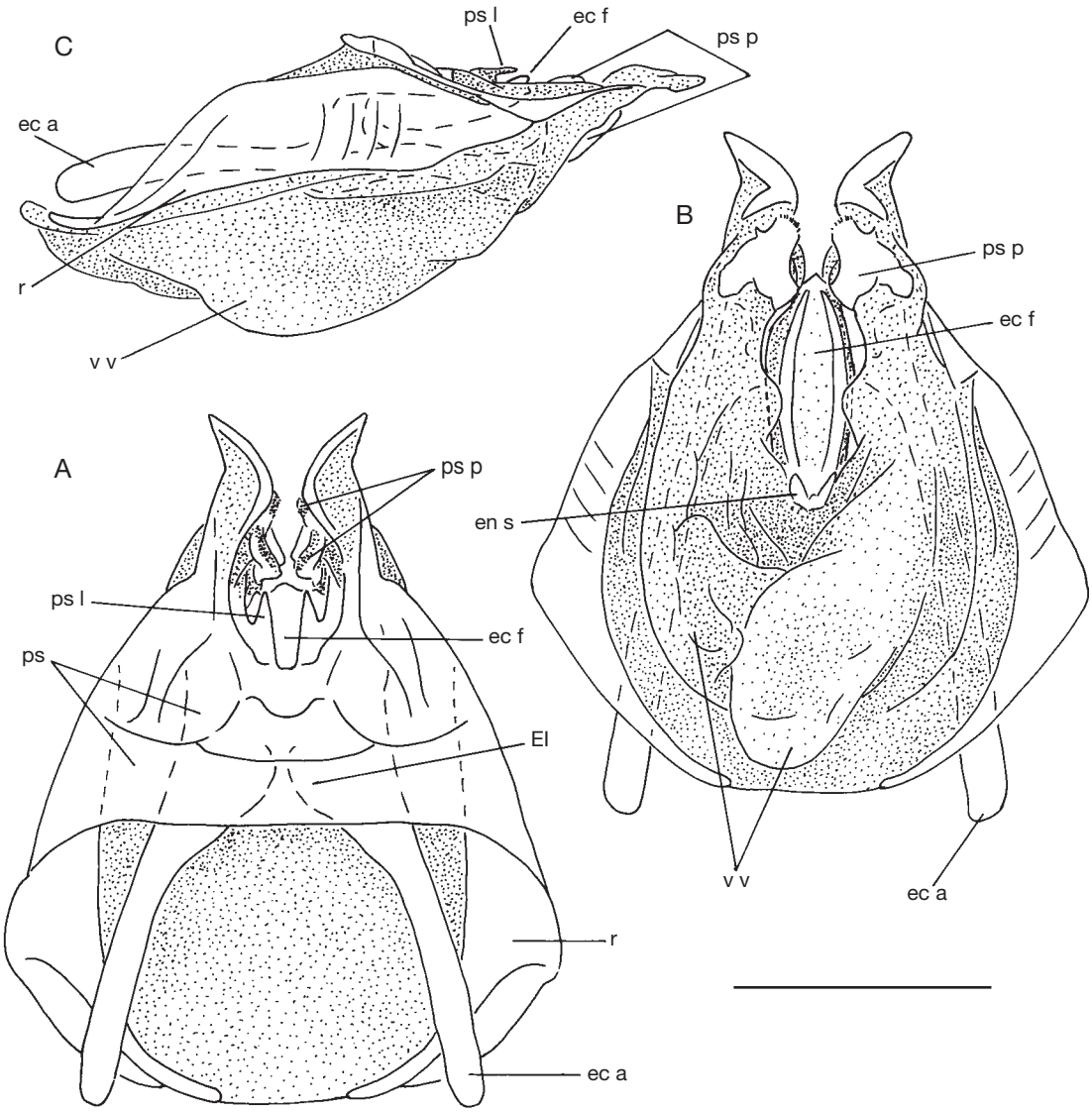

FIG. 9. — *Phaloria walterlinii* n. sp., male genitalia, in dorsal (**A**), ventral (**B**) and lateral (**C**) views. Abbreviations: see text. Scale bar: 1 mm.

Female

Wings slightly longer than FWs (see Table 9); brown, their veins yellowish. FW venation: 3 anal veins, CuP and CuA bifurcated twice each (Fig. 8G); MP close to CuA on lateral field, and R bifurcated 8 times; transverse veins numerous, as strong as longitudinal veins, but fainter between anal veins. Subgenital plate quite large, its distal margin more or less indented (Fig. 8H). Ovipositor much longer than in *P. offensa* (about 7.2 mm versus 4.2 mm in the latter); apex ornamentation as in the other species of the genus (Fig. 8I, J). Colouration: FWs brown with some indistinct, yellowish flecks; veins brown, CuA and CuP ochre.

TABLE 9. — Measurements (in mm) of male and females of *Phaloria walterlinii* n. sp. Abbreviations: see text.

	Lpron	Ipron	LFW	lFW	LW	LFIII	LTIII	
Males								**File**
Holotype	2.5	3.7	11.9	5.4	–	12	11.3	88
Females								**Lovip**
Allotype	2.4	3.2	9.8	3	10.8	10.9	10.1	7.4
Paratype	2.3	3.2	9.8	2.9	10.6	10.4	9.2	7
Mean values	2.4	3.2	9.8	3	10.7	10.7	9.7	7.2

Female genitalia. Copulatory papilla shorter and wider than in *P. chopardi* n. comb.; continuously sclerotized dorsally, but membranous distally; apical margin sinuated (Fig. 8K, L).

Measurements
See Table 9.

VARIATION
The colouration of the female paratype is very light, but with the specific pattern of brown and yellow spots. TIII serrulation: spine number variable within all examined specimens.

Phaloria pentecotensis n. sp.
(Figs 10A-D; 11A-F)

TYPE MATERIAL. — Holotype: Nouvelles-Hébrides [Vanuatu], [Penama province], I. Pentecôte, Baie Melsisi, E. Aubert de la Rüe, 1 ♀ (MNHN-ENSIF2120).

ETYMOLOGY. — Species named after the type locality, Pentecost island.

DIAGNOSIS. — Species close to *P. offensa*, by its long HWs, longer than FWs, its long subapical and apical inner spurs of TIII, which increase in size toward TIII apex, the longest being the dorso apical spur (Fig. 10E, F), and by its short ovipositor, much shorter than TIII. It can be separated from *P. offensa* by its larger size, colouration and ovipositor ornamentation. Female genitalia (unknown in *P. offensa*) made of a horse-shoe ventral sclerite. Male unknown.

DESCRIPTION
Size medium for the genus; shape elongate, due to very long FWs (much longer than the abdomen) and HWs (much longer than FWs).

Head. Eyes protruding both anteriorly and laterally. Fastigium wider than the scape. Ocelli all large; median ocellus vertical, apical in position; lateral ocelli separate by a distance greater than the distance between the median and one lateral ocellus. Palpi: joint 3 slightly longer than joint 4; joint 5 slightly longer than joint 3, slightly widened toward apex and truncated apically (Fig. 10A). Antennae missing. Pronotum transverse, narrowed anteriorly; anterior margin concave; posterior margin bisinuate (Fig. 10B). TI with a small, rounded outer tympanum; inner tympanum twice as long, oval, prolonged ventrally by a deep depression more than tympanum width in length; 2 apical spurs, both ventral, the outer the longest. TII with 3 apical spurs, without dorsal outer spur; ventral spurs the longest, about equal size. TIII with 4 pairs of subapical spurs, the most apical pair as separate from tibia apex as from the 2nd pair; outer subapical spurs of nearly equal size, and located lower on tibia than inner spurs; inner subapical spurs longer than outer ones, and increasing in size toward tibia apex, the most apical one the longest; 3 outer apical spur, the median the longest, but shorter than outer subapical spurs; 3 inner apical spurs, the median as long as four-fifths basitarsus III, and the dorsal, the longest, much longer than basitarsus III (see Table 10); tibiae and spurs densely covered with long setae. TIII serrulated over their whole length with few, very small spines located on a kind of submedian, longitudinal carina, made by the narrow, dorsal surface of tibiae III; serrulation again present on TIII outer and inner margins above subapical spurs 4 only; serrulation spine number: 0 or 1 spine between tibia apex and subapical spur 1-3

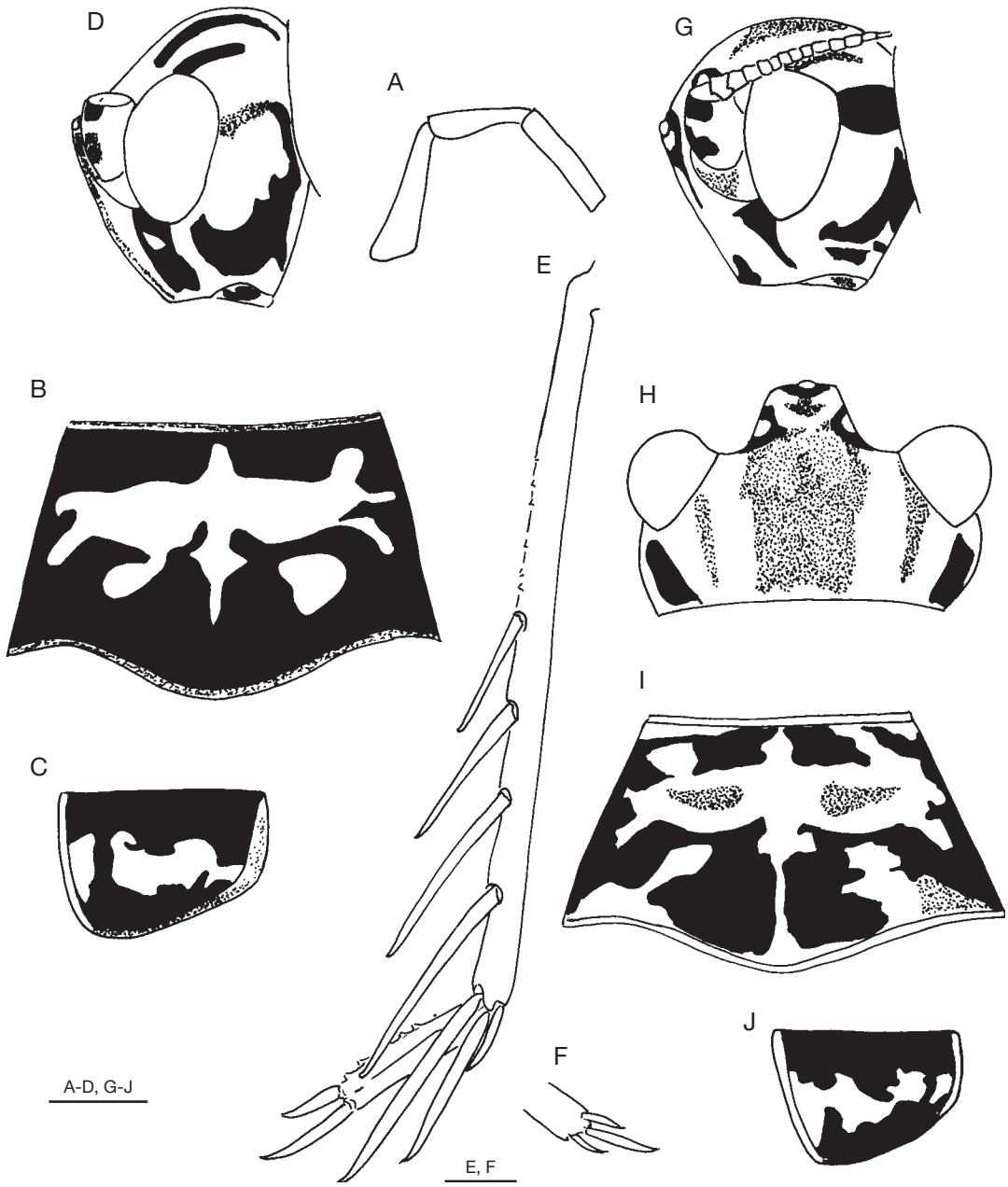

FIG. 10. — **A**-**D**, *Phaloria pentecotensis* n. sp., maxillari palpi (**A**), dorsal disc (**B**) and lateral lobe (**C**) of pronotum, and colouration of head lateral side (**D**); **E**-**J**, *Phaloria faponensis* n. sp., tibia III, inner apical and subapical spurs (**E**) and outer apical spurs (**F**), colouration of head lateral side (**G**) and head dorsum (**H**), dorsal disc (**I**) and lateral lobe (**J**) of pronotum. Scale bars: 1 mm.

between subapical spurs 1 and 2, 2-4 between subapical spurs 2 and 3, 2-6 between subapical spurs 3 and 4, and 6-8 inner and 7-10 outer teeth above subapical spur 4. Basitarsi III flattened dorsally; serrulation (5-7 very small spines) on outer margin only.

Colouration
Colouration of head dorsum not clearly visible on female holotype, probably brownish with darker pattern, including 4 well-separate longitudinal brown lines on vertex, 2 median and 2 close to the inner margins of the eyes, and an additional faint, wider, brown line behind each eye; this line becoming darker and being prolonged on the posterior margin of the cheek, covering its whole lower third, and finally raising toward the lower angle of the eye, having the shape of a dark brown "J" (Fig. 10D). Fastigium yellow; median ocellus surrounded with black dorsally and laterally, and with a wide yellow spot anteriorly; lateral ocelli surrounded with brown. Face: a wide yellow band below the median ocellus, bordered in its upper half by a pair of thin dark lines prolonging laterally the black colouration around the median ocellus and joining together under the median ocellus; under each eye, a wide brown band enclosing 2 yellow spots. Brown areas of the face and of the cheek separate by yellow. Palpi yellow; apex of joint 5 darker. Scapes yellowish, their anterior sides darker. Mouthparts yellow. Pronotum brown with yellowish margins, and well-defined yellow areas on dorsal disc and lateral lobes (Fig. 10B, C): on dorsal disc, one median line, the muscular inscriptions and a pair of rounded spots; on lateral lobe, a transverse yellow band, crossed by a brown line at one-third of its length. Legs yellowish marked with brown. TI with 3 rings, the most basal covering the tympana and including a dorsal yellowish spot above tympana level. TII with 4 rings, conspicuous mostly dorsally. TIII with 7 rings or spots, also mostly dorsal, two above subapical spurs, the most basal the smallest, and one at the level of each pair of subapical spurs (these becoming smaller and smaller toward tibia apex). FI with one preapical ring and a median spot on each side. FII with one preapical ring and 2 spots on each side, one close to the middle and the other near the base. FIII with a wide ring on the knee and one almost complete near the middle; basal half with brown stripes, mostly on outer side. Basitarsi yellow, brown apically; tarsomeres 2 dark brown; tarsomeres 3 yellow, with base and apex brown. Tarsal claws yellow. Cerci yellowish brown, yellow basally.

Male
Unknown.

Female
FWs and HWs well developed, longer than the body; HWs longer than FWs. Dorsal field venation regular, made of 11 regularly spaced and parallel longitudinal veins, and of regularly spaced transverse veins, making regular alignments of squared or rectangular cells. Venation (Fig. 11A): 3 anal veins not bifurcated; CuP bifurcated 2 times; CuA bifurcated 5 times; MP very close to CuA along basal third of its length; intermedian area regular, without transverse veins, visible dorsally over FW mid length. Lateral field: area between MA and R wide, crossed by transverse veins; R bifurcated 14 times. FWs light yellow, transparent, densely covered with very short, golden setae; veins ochre, marked with brown, CuP, CuA, MP and MA lighter. HWs brown, including the veins. Subgenital plate as in *P. faponensis* n. sp. (see below), wider than high, the posterior margin deeply concave. Subgenital plate and sternites yellowish. Ovipositor very short; ornamentation of valves apex as in other species of the genus, but ventral valve teeth quite wide, especially the most basal one (Fig. 11B, C), and apex of dorsal valves clearly separate by a deep furrow (Fig. 11B).

Female genitalia. Copulatory papilla small, sclerotized only ventrally and having the shape of a horse-shoe (Fig. 11D-F).

Measurements
See Table 10.

Phaloria faponensis n. sp.
(Figs 10E-J; 11G-N)

TYPE MATERIAL. — Holotype: **Vanuatu.** [Sanma province], Espiritu Santo [Island]. Butmas, grotte de Fapon, 15°19'51.6"S, 166°57'53.6"E, jour, paroi proche de l'entrée, 15.X.2006, L. Desutter-Grandcolas, 1 ♀ (fn 15) (MNHN-ENSIF2121).

ETYMOLOGY. — Species named after the type locality.

DIAGNOSIS. — Species close to *P. offensa* and *P. pentecotensis* n. sp. It can be separate from *P. offensa* by its larger size,

TABLE 10. — Measurements (in mm) of *Phaloria pentecotensis* n. sp. holotype. Abbreviations: **TL**, total length (body + wings); other abbreviations, see text.

	TL	Lpron	lpron	LFW	lFW	LW	LFIII	LTIII	Lovip.
Holotype	27	2.5	4	18.3	4	22.8	10.7	9.6	4.8

its much lighter colouration and the ornamentation of its ovipositor, and from *P. pentecotensis* n. sp. by its colouration, genitalia and ovipositor ornamentation. Male unknown.

DESCRIPTION

Size and global shape, as well as head (including eyes, fastigium, ocelli, palpi), pronotum shape and legs as in *P. pentecotensis* n. sp. (see above). TIII serrulation: no spine between tibia apex and subapical spur 1, 2 between subapical spurs 1 and 2, 2 or 3 between subapical spurs 2 and 3, 3 between subapical spurs 3 and 4, and 2 inner and 5 or 6 outer teeth above subapical spur 4. Basitarsi III with 7 very small spines on outer margin.

Colouration

Fastigium light yellow; ocelli all circled with black. Head dorsum light yellow, with the same 4 brown lines as in *P. pentecotensis* n. sp., but the median lines fused; a wider brown line behind each eye, not connected to brown spots of the cheek (Fig. 10H). Face light brown; a pair of thin, longitudinal brown lines, prolonging laterally the dark colouration around the median ocellus; a pair of dark, submedian spots along the epistemal suture; and a brown, oblique line from the lower angle of each eye getting thinner toward the inner angle of the mandibles (Fig. 10G). Scapes light yellow, the anterior side with a basal ochre spot and an apical brown spot, the two separate by a small, ivory-coloured area. Mouthparts light yellow, except for two short brown lines on clypeus. Antennae brown over their whole length. Pronotum brown with well-defined yellow patterns on both dorsal disc (Fig. 10I) and lateral lobes (Fig. 10J).

Male

Unknown.

Female

FW venation very similar to that of *P. pentecotensis* n. sp., with 10 longitudinal veins on dorsal field and slight differences in CuP bifurcations (compare Fig. 11A with Fig. 11G). FWs whitish, transparent, with numerous, very short, dark brown setae, and yellowish veins surrounded with brown; lateral field transparent with dark brown veins. Subgenital plate wider than long, its posterior margin concave (Fig. 11I). Ovipositor as short as in *P. pentecotensis* n. sp.; ornamentation of valve apex similar to that of *P. pentecotensis* n. sp., but the teeth of ventral valves much higher and narrower, and the large teeth of dorsal valves located before lanceolate valve apex much bigger (Fig. 11M, N).

Female genitalia. Copulatory papilla broadly conical in shape, narrowed before mid line; entirely sclerotized, except for gonopore area on ventral side; posteriorly to gonopore, a pair of sclerotized, longitudinal crests (Fig. 11J-L).

Measurements

See Table 11.

Family TRIGONIDIIDAE Saussure, 1874
Subfamily NEMOBIINAE Saussure, 1877

Genus *Cophonemobius* Chopard, 1929

TYPE SPECIES. — *Cophonemobius buxtoni* Chopard, 1929.

EMENDED DIAGNOSIS. — TI without tympana. TIII with 3 pairs of long subapical spurs; 3 outer apical spurs; 3 inner apical spurs, the dorsal 1.5 times as long as the median, and longer than half basitarsus III. FWs present in both males and females, hardened, very short, and only slightly overlapping; lateral and dorsal fields with longitudinal, parallel veins. Palpi very long.

In Vanuatuan species, male genitalia wide and distinctly curved dorso-ventrally (Fig. 14). Pseudepiphallic sclerite

TABLE 11. — Measurements (in mm) of *Phaloria faponensis* n. sp. holotype. Abbreviations: **TL**, total length (body + wings); other abbreviations, see text.

	TL	Lpron	lpron	LFW	lFW	LW	LFIII	LTIII	Lovip.
Holotype	25.5	2.4	4.1	16.9	4.1	21.1	11.1	10.1	4.7

round and convex, its anterior margin deeply indented; 4 more sclerotized longitudinal areas, each bearing long and strong setae; pseudepiphallic "lophi", parameres and ectophallic fold gathered under pseudepiphallus apex, with a 90° angle from pseudepiphallic sclerite. Pseudepiphallic parameres having the shape of vertical plates, hardly sclerotized. Female ovipositor with acute apex, slightly raised dorsally; dorsal valves with longitudinal carinae and inconspicuous lateral teeth. No distinct copulatory papilla.

DISTRIBUTION. — Until now *Cophonemobius* was known from Samoa islands only. Its presence is largely attested in Vanuatu, where it is abundant in cave habitats. It is not present in New Caledonia (Chopard 1915; Gorochov 1986; Otte *et al.* 1987; Desutter-Grandcolas 1997a, b).

REMARKS

Cophonemobius is widely distributed in Espiritu Santo. It occurs in many caves, often with great abundance and deep inside galleries, and could be one of the most characteristic animal of Vanuatuan karstic environment. It has never been observed outside caves, neither by day nor by night (pers. obs.), which would indicate that *Cophonemobius* is truly troglobitic, i.e. caves may constitute its natural habitat, even though it does not present the morphological syndrome most often associated with cave life (Desutter-Grandcolas 1997c).

The specimens studied here form quite a homogeneous stock, which supports the description of a new species, *Cophonemobius faustini* n. sp. Observed variation in male genitalia and colouration is however sufficiently stable and coherent to allow the definitions of at least two subspecies, *C. faustini faustini* and *C. faustini funafus*. Additional juvenile specimens have been collected in different caves during SANTO 2006, including Amarirua on Malo island, which could not be identified at species level (material in alcohol, MNHN-ENSIF2151).

Cophonemobius faustini n. sp.
(Figs 12-14; 15A, B)

TYPE MATERIAL. — Holotype: **Vanuatu.** [Sanma province], Espiritu Santo [Island]. Big Bay, Matantas, Vatthé Conservation Area, 15°20'S, 166°95'E, jour, paroi, grotte de la falaise avec chauves-souris et guano, 26.X.2006, L. Desutter-Grandcolas, 1 ♂ (fn 21) (MNHN-ENSIF2122).
Allotype: same data as holotype, 1 ♀ (fn 24) (MNHN-ENSIF2123).
Paratypes: 5 ♂♂, 14 ♀♀. Same data as holotype, 3 ♂♂ (fn 20, 22, 23), 13 ♀♀ (fn 25-37) (MNHN-ENSIF2124-2139). — Same locality and collector as the holotype, nuit, paroi, grotte de la falaise avec chauves-souris et guano, 27.X.2006, 2 ♂♂ (fn 49, 50), 1 ♀ (fn 48) (MNHN-ENSIF2140-2142).

OTHER MATERIAL EXAMINED. — Same data as holotype, 8 juveniles (fn 38-45) (MNHN). — Same locality, habitat and collector as the holotype, 27.X.2006, 1 juvenile (fn 51) (MNHN).
Butmas, grotte de Fapon, 15°19'51.6"S, 166°57'53.6"E, jour, sur paroi dans grotte, 15.X.2006, L. Desutter-Grandcolas, 1 ♂ (fn 16), 1 ♀ (fn 19) (MNHN-ENSIF2143, 2144), 2 juveniles (fn 17, 18). — Butmas, gouffre Mba, pitfall trap, 16.VIII.2005, J. Lips, 1 ♂, 1 juvenile (fn 1901) (MNHN-ENSIF2150).
Sarabo, grotte de Sarabo, pitfall trap, 6.VIII.2005, 1 ♂, 1 ♀, 9 juveniles (fn 1708); by sight, 8.IX.2006, J. Lips, 4 ♂♂, 4 ♀♀, 1 juvenile (SK06-0622) (MNHN-ENSIF2150).

ETYMOLOGY. — Species dedicated to Franck Faustin, who was of great help for fieldwork during SANTO 2006 biological survey, especially cave exploration.

DIAGNOSIS. — In *Cophonemobius*, species characterized by its large size and its pattern of colouration (pronotum with a wide, transverse white band on dorsal disc anterior fourth and a variable median whitish fleck near posterior margin; tergites 2 and 3 white, the former with an additional, median brown fleck; head dorsum light ochre; rest of the body black with white or yellow spots, especially on legs).

DESCRIPTION

Very large nemobiine. Global colouration black brown, shining, with whitish pattern on dorsal disc

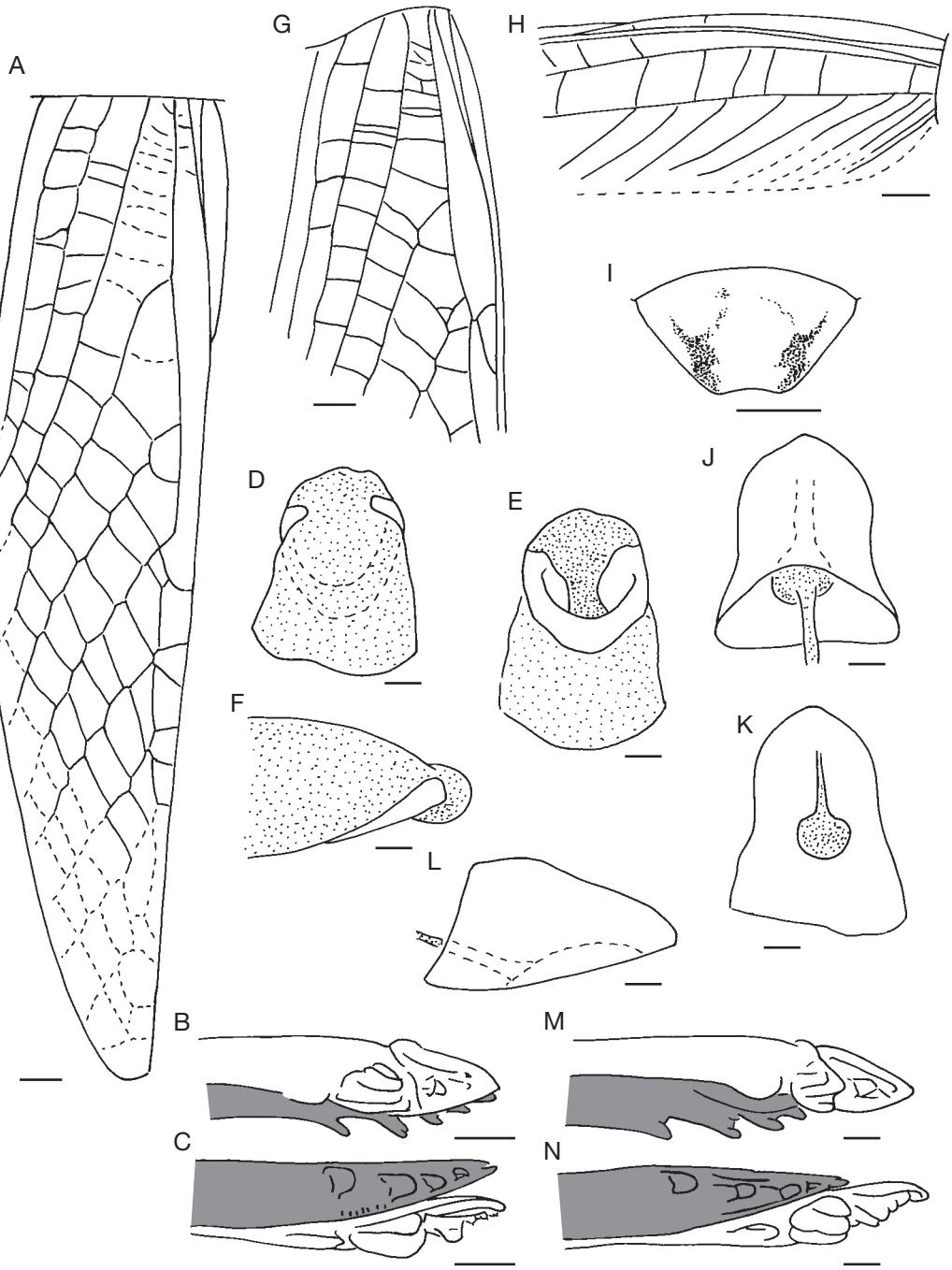

FIG. 11. — **A**-**F**, *Phaloria pentecotensis* n. sp.; **A**, female forewing dorsal field venation; **B**, **C**, female ovipositor, lateral (**B**) and ventral (**C**) views of right valves, ventral valves marked with grey; **D**-**F**, female copulatory papilla, dorsal (**D**), ventral (**E**) and lateral (**F**) views; **G**-**N**, *Phaloria faponensis* n. sp.; **G**, **H**, female forewing venation, at base of dorsal field (**G**) and lateral field (**H**); **I**, Female subgenital plate; **J**-**L**, female copulatory papilla in dorsal (**J**), ventral (**K**) and lateral (**L**) views; **M**, **N**, female ovipositor in lateral (**M**) and ventral (**N**) views, ventral valves marked with grey. Scale bars: A, G-I, 1 mm; B, C, 0.2 mm; D-F, J-N, 0.1 mm.

of pronotum, tergites II and III, and femora; long and strong, black setae distributed on the whole body and legs (Fig. 12).

Head. Eyes not at all protruding, rounded and flat on head surface (Fig. 13A); facets large. Ocelli all small; median ocellus vertical, subapical on fastigium and located behind a wide, shallow depression; distance between lateral ocelli greater than the distance between median ocellus and one lateral ocellus. Fastigium very wide, wider than the scapes, rounded. Scapes transverse. Palpi very long; joint 5 longer than joint 3, itself longer than joint 4; joint 5 slightly widened toward apex and truncated straight apically (Fig. 13B). Pronotum very large, narrowed posteriorly; dorsal disc longer than lateral lobes (Fig. 13C); dorsal disc with slightly concave anterior margin and convex posterior margin, and with a longitudinal median furrow over four-fifths of its length. Lateral lobes with anterior angle slightly raised dorsally; lower margin almost straight (Fig. 13C). FWs present in both males and females, hardened, very short, not reaching tergite 2 mid length; venation of dorsal and lateral fields made of 5 or 6 longitudinal parallel veins each, without a clear separation between dorsal and lateral fields. Legs all long and thin; spurs all long. TI without tympana; 2 ventral, apical spurs, located close to one another, the inner the longest. TII with 3 apical spurs (no outer dorsal spur); the ventral spurs subequal and the longest. TIII (Fig. 13D, E) with 3 pairs of very mobile, subapical spurs; inner subapical spurs lower on the tibia, the first (most apical) spur close to inner apical spurs, the third (most basal) spur the shortest; 3 outer apical spurs, the median slightly longer than the dorsal, both twice as long as the ventral; 3 inner apical spurs, the median more than twice as long as the ventral, the dorsal the longest, about one third longer than the median and longer than half basitarsus III; ventral apical spurs: inner longer than the outer. Tarsi very long, especially basitarsi. Barsitarsi III without dorsal serrulation, except one inner and one outer apical spines; inner apical spur longer than the outer. Tarsal claws long and acute.

Colouration

Blackish, shining, with white marks. Head dorsum dark ochre brown, with some lighter areas. Cheeks, fastigium and lateral parts of the face dark ochre brown; a median, more or less ^- or Δ-shaped, yellowish area on the face above epistemal suture (Fig. 13A). Palpi light brown. Scapes whitish, except for brown lower margins and a brown spot along inner margins. Antennae light brown. Pronotum black brown and dark ochre brown, with whitish and ochre spots (Figs 12; 13C); margins all blackish; dorsal disc with a wide, transverse white band in anterior fourth, an inconspicuous, rounded median whitish spot along posterior margin, and a light ochre indistinct transverse line in median zone. Coxae and thoracic sternites light yellow. Legs black and yellowish with whitish spots, densely covered with strong, black setae. FI and FII black dorsally and ventrally, yellowish laterally; a white spot on dorsal side at mid length. TI and TII yellowish, blackish basally. FIII black and yellow (Fig. 13F), their distal half black; 3 white spots on dorsal side, almost on a row, each near a very long and black hair. TIII yellowish, except for black dorsal side and apex; spurs all yellow, the dorsal side of apical spurs somewhat darker. Tarsi yellowish. Tergites (Fig. 12) black, densely covered with short, golden and dark ochre setae; tergites 2 and 3 white, tergite 3 with a brown median area; tergite 4 with a pair of whitish rounded spots near anterior margin. Cerci yellowish brown with a wide yellowish basal ring. Sternites blackish.

Male

Subgenital plate short, truncated apically; black, covered by short, golden setae, a whitish spot along anterior margin. Tergite X and epiproct ochre.

Male genitalia. Pseudepiphallic sclerite not reaching pseudepiphallus distal margin; wide and rounded from above, convex, with a distinctive shape in lateral view (Fig. 14B); 4 slightly more sclerotized, longitudinal areas covered with long and strong setae, with a wide, shallow depression between the two median areas; on each side, area located between setae rows little sclerotized (Fig. 14A). Anterior margin of pseudepiphallic sclerite very deeply indented, up to sclerite mid length; posterior margin narrow, more abruptly concave, and more strongly sclerotized. Distal margin of

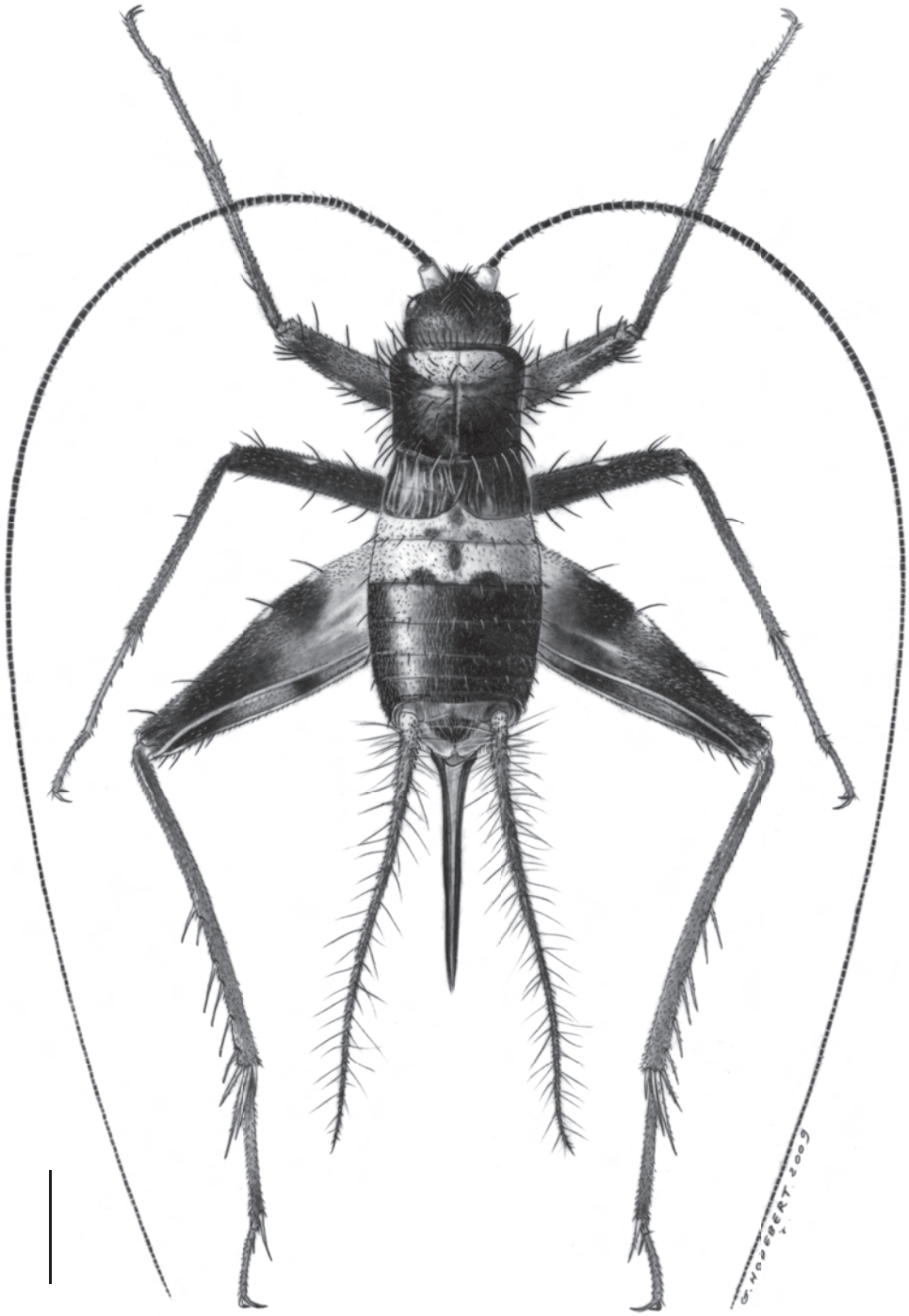

FIG. 12. — *Cophonemobius faustini* n. sp., allotype ♀. Scale bar: 2 mm.

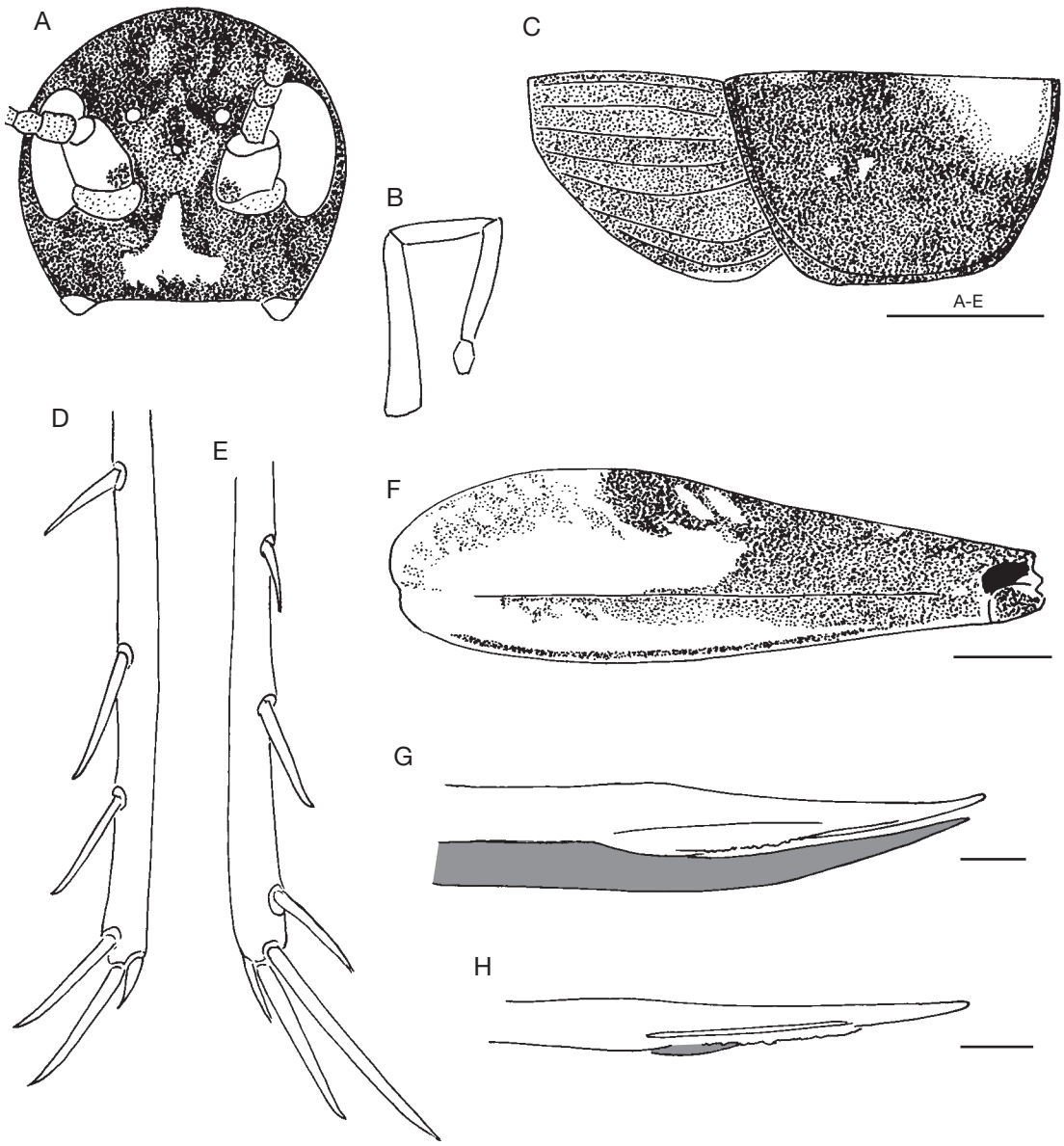

FIG. 13. — *Cophonemobius faustini* n. sp.: **A**, face; **B**, maxillary palpi; **C**, right lateral lobe of pronotum and forewing lateral field; **D**, **E**, tibia III, outer (**D**) and inner (**E**) apical and subapical spurs; **F**, colouration of left femur III outer side; **G**, **H**, female ovipositor, lateral (**G**) and dorsal (**H**) views of right valves, ventral valves marked with grey. Scale bars: A-F, 1 mm; G, H, 0.2 mm.

pseudepiphallus membranous, connected to two elongate, median lobes (lophi?), oriented at 90° ventrad, and slightly sclerotized. Pseudepiphallic sclerite greatly narrowed at the level of rami base. Rami long and wide, not separated from pseudepiphallic sclerite. Pseudepiphallic parameres located under the lophi, as two median vertical plates longer than the lophi; hardly sclerotized

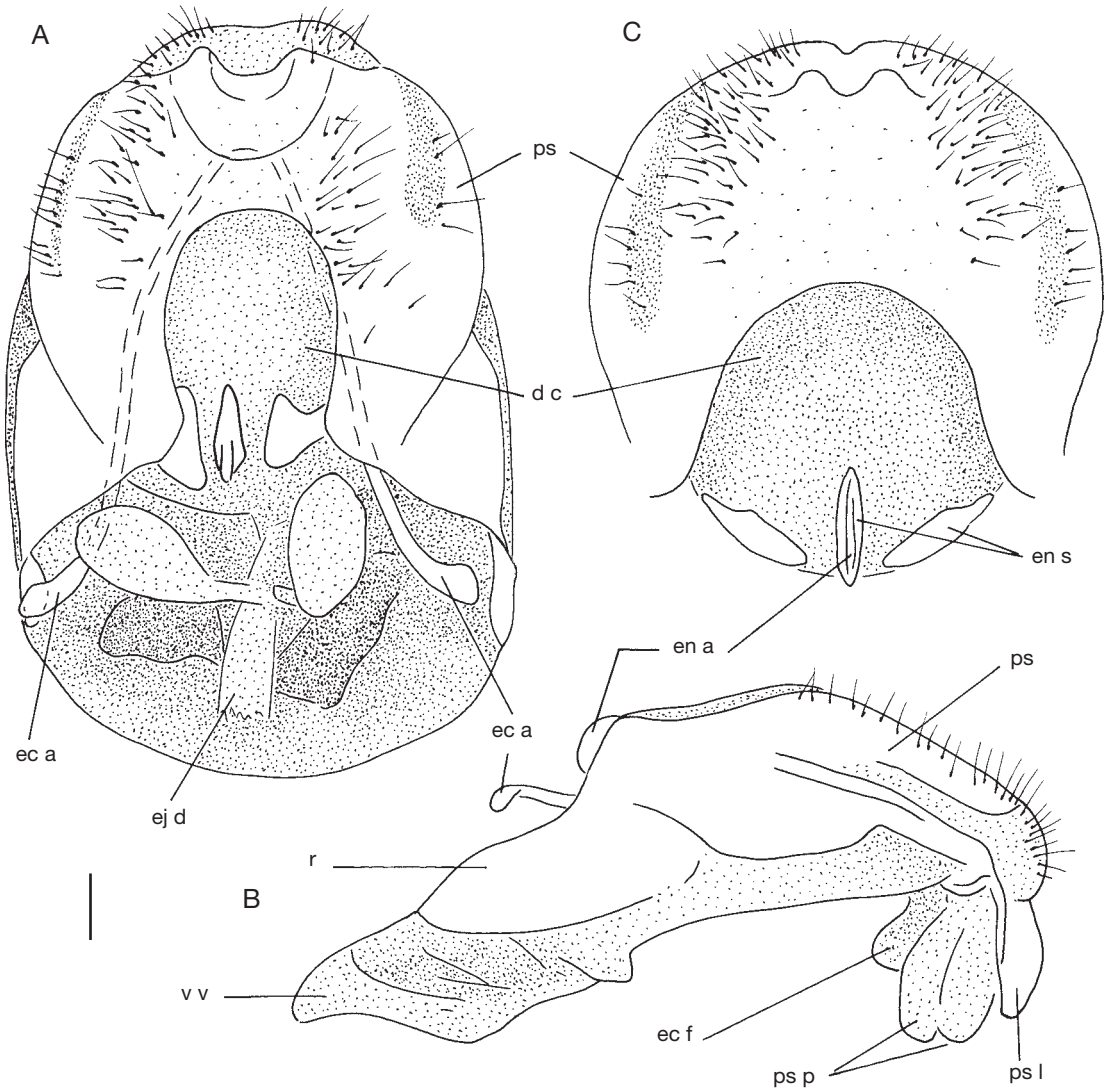

FIG. 14. — *Cophonemobius faustini* n. sp., male genitalia in dorsal (**A**, **C**) and lateral (**B**) views: **A**, **B**, *C. faustini faustini* n. subsp.; **C**, *C. faustini funafus* n. subsp. Abbreviations: see text. Scale bar: 0.1 mm.

on their upper and inner sides, membranous otherwise; partly coiled (Fig. 14B). Ectophallic apodemes very long and thin, divergent (Fig. 14A). Ectophallic fold short and membranous, its apex located between the pseudepiphallic parameres; in lateral view ectophallic fold slightly shorter than pseudepiphallic lophi. Ventral valves normal for the subfamily, but their distal margin distinctly narrowed compared to their base. Endophallic sclerite comprising a narrow, elongate median sclerite, bearing a longitudinal, crest-like endophallic apodeme, and two wide lateral plates without apodemes (Fig. 14A); the median sclerite prolonged posteriorly on the ventral side of ectophallic fold. Endophallic membrane widely, but not deeply, concave (Fig. 14A).

TABLE 12. — Measurements (in mm) of males and females of *Cophonemobius faustini* n. sp. Abbreviations: see text.

	Lpron	lpron	FWmidL	LFIII	LTIII	LbasIII	
Males							
Holotype	2.1	1.9	0.8	6.2	5.5	2.5	
Paratypes (n = 4)	2-2.1	1.8-2 (n = 3)	0.9-1.3	5.8-6.2	5.2-5.6	2.2-2.7	
Mean values	2.1	1.9	1.1	6	5.4	2.4	
Females							**Lovip**
Allotype	2.3	2.2	1.1	6.4	6	2.4	4.2
Paratypes (n = 4)	2.2-2.3	2.2-2.3	1-1.2	6.4-7.2	5.9-6.3	2.5-2.7	4-4.2
Mean values	2.3	2.2	1.1	6.6	6.1	2.5	4.1

TABLE 13. — Measurements (in mm) of males and females of *Cophonemobius faustini* n. sp. originating from Amarur caves. Abbreviations: see text.

	Lpron	lpron	FWmidL	LFIII	LTIII	LbasIII	
Males							
n = 2	1.9	2 (n = 1)	1.4 (n = 1)	5-5.2	4.8-4.9	2-2.1	
Mean values	1.9	–	–	5.1	4.9	2.1	
Females							**Lovip**
n = 2	1.7-1.9	2 (n = 1)	1.2 (n = 1)	5.5-5.8	5-5.4	2.1	3.2-3.3
Mean values	1.8	–	–	5.7	5.2	2.1	3.3

Female

FW venation with 5 or 6 longitudinal veins on dorsal field, sometimes irregularly bifurcated, and 4 or 5 longitudinal veins on lateral field, most often straight and simple. Subgenital plate short, transverse; posterior margin slightly indented; yellowish. Ovipositor quite long, straight basally, and curved apically; valve apex without conspicuous ornamentation: dorsal valves with a strong, dorso-lateral subapical keel, their lower margins additionally carinated and slightly undulated, but without conspicuous teeth (Fig. 13G, H).

Female genitalia. Membrane around aperture of spermathecal duct somewhat invaginated, but no conspicuous copulatory papilla; spermathecal duct very long and thin.

Juveniles

Similar to adults in colouration.

Measurements

See Table 12.

VARIATION

Head dorsum variously brown and light ochre. White spots on FIII dorsal side sometimes quite dull. Dorsal disc of pronotum: posterior whitish spot and median ochre band variously conspicuous, but always much fainter than the white transverse band along anterior margin (Fig. 15A). Tergite 2 sometimes with a brown median area, as tergite 3; whitish spots on tergite 4 more or less conspicuous, sometimes almost absent. Male genitalia: posterior indentation of pseudepiphallic sclerite variable. Female FW venation (vein number and pattern) polymorphic, even within individuals.

The male originating from Butmas (MNHN-ENSIF2143) has the same pattern of colouration as the males from Big Bay, but it is distinctly darker; the anterior margin of its pseudepiphallic sclerite is not as rounded in shape.

In the male collected in Mba sinkhole, the whitish anterior band of pronotum is subdivided into two spots; its subgenital plate is similar to that of Amarur males (see below).

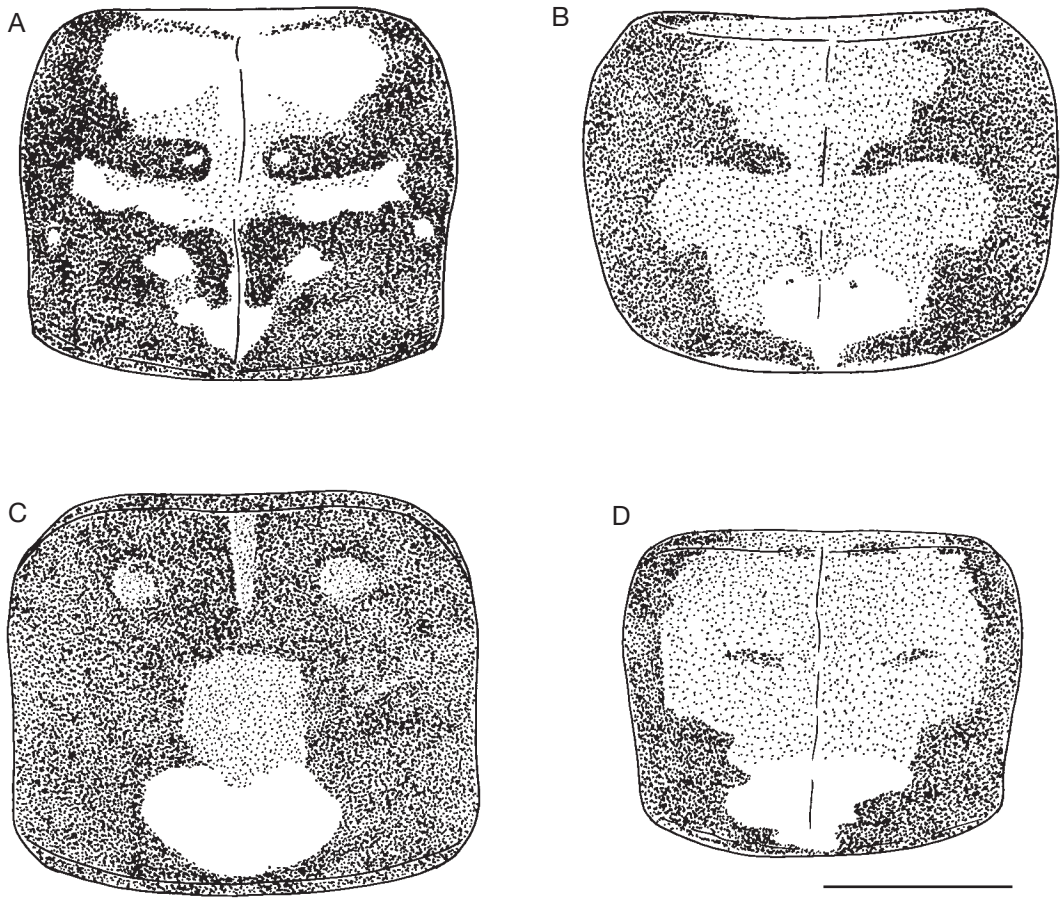

FIG. 15. — *Cophonemobius faustini* n. sp., variation in pronotum colouration in populations and putative subspecies: **A**, *C. faustini faustini* n. subsp., ♂ from Sarabo cave (MNHN-ENSIF2150, alcohol); **B**, *C. faustini faustini* n. subsp. (?), ♂ from Amarur cave (MNHN-ENSIF2150, alcohol); **C**, *C. faustini funafus* n. subsp., ♂ from Funafus cave (MNHN-ENSIF2145, dry); **D**, *C. faustini funafus* n. subsp., ♂ from Riorua cave (MNHN-ENSIF2152, alcohol). Scale bar: 1 mm.

REMARK

Additional material collected in Amarur cave (Nambel, pitfall trap, 1.VIII.2005, J. Lips, 2 ♂♂, 2 ♀♀ [fn 1648] [MNHN-ENSIF2150]) and preserved in alcohol presents additional white spots on the posterior half of pronotum dorsal disc, especially a white, rounded spot near the posterior margin (the most conspicuous spot) expanded anteriorly up to pronotum mid length, where it is widened laterally; these spots are separated from the anterior whitish band by a transverse, brown area (Fig. 15B). The yellow spot on their face also looks thinner than in other observed *C. faustini faustini* n. subsp. specimens. Male subgenital plate is brown, with a whitish median spot near anterior margin in addition to a longitudinal whitish median line. Male genitalia are similar to that of *C. faustini faustini* n. subsp. males, especially for their size, but the ectophallic apodemes look somewhat more convergent before apex. These characters, together with a smaller size, lead to suspect that these specimens could represent an additional subspecies of *C. faustini* n. sp. See Table 13 for measurements.

Cophonemobius faustini funafus n. subsp.
(Figs 14C; 15C, D)

TYPE MATERIAL. — Holotype: **Vanuatu.** [Sanma province] Espiritu Santo [Island], Funafus, 15°32'46.4"S, 167°00'46"E, grotte, sur paroi, 30.X.2006, L. Desutter-Grandcolas, 1 ♂ (fn 2) (MNHN-ENSIF2145).
Allotype: same data as holotype, 1 ♀ (fn 4) (MNHN-ENSIF2146).
Paratypes: same data as holotype, 1 ♂ (fn 5), 1 ♀ (fn 3) (MNHN-ENSIF2147, 2148).

OTHER MATERIAL EXAMINED. — Same data as holotype, 1 juvenile (fn 1). — Sanma province, Funafus, Kafae limestone cave, pitfall trap, 1 ♂, 1 ♀, 17 juveniles (fn SK06-2104); 2 ♂♂, 1 ♀, 3 juveniles (SK06-2105); 6 ♂♂, 4 ♀♀, 8 juveniles (SK06-2107); 1 ♂, 2 ♀♀, several broken specimens (SK06-2108, Pb5, fn 440); 2 ♀♀, 2 juveniles (SK06-2103, Pb1, fn 433) (J. Lips) (MNHN-ENSIF2152). — Riorua cave, pitfall trap, 1 ♂, 2 ♀♀, 6 juveniles (fn 1783) (J. Lips) (MNHN-ENSIF2152). — Belmol, Fioha limestone cave, 1 ♂, 2 juveniles (fn SK06-07-15) (J. Lips) (MNHN-ENSIF2152).

ETYMOLOGY. — Subspecies named after the type locality, close to Funafus village.

DIAGNOSIS. — Separated from the nominal subspecies by the different colouration of its pronotum (dorsal disc blackish with a large, rounded white spot near posterior margin) and its male genitalia (pseudepiphallic sclerite larger and more rounded in shape).

DESCRIPTION
Similar to *C. faustini faustini* n. subsp. (see above) except for the following.

Colouration
Dorsal disc of pronotum (Fig. 15C) with two small, whitish, rounded spots near anterior margin (instead of a whitish transverse band in *C. f. faustini* n. subsp.), more or less surrounded with ochre, and a large, more or less oval, whitish spot near posterior margin, this being the most conspicuous spot on pronotum; dorsal disc median zone irregularly and inconspicuously ochre brown. Lateral lobes blackish. Head dorsum contrastingly very light ochre, the cheeks and fastigium brown; ocelli white, circled with black; a thin orange line, reversed-Y in shape, near and between the lateral ocelli. Face as in *C. f. faustini* n. subsp., but somewhat more spotted with light ochre. Legs as in *C. f. faustini* n. subsp., but inner sides of FI and FII yellow; a large yellow spot on FI and FII dorsal side, next to the small white spot, but more apical. Tergites 2 and 3 white, with black sides and a large black median spot.

Male
Last tergites and supra anal plate black. Sternites brownish. Subgenital plate brownish, with a whitish spot close to its anterior margin.

Male genitalia. Shorter and wider than in *C. f. faustini* n. subsp. (Fig. 14C). Indentation of pseudepiphallic anterior margin wider and shorter. Pseudepiphallic sclerite almost reaching pseudepiphallus posterior margin. Pseudepiphallic parameres longer than lophi (?), as in *C. f. faustini* n. subsp., but only slightly longer than ectophallic fold.

Measurements
See Table 14.

VARIATION
Pronotum: median zone of dorsal disc with inconspicuous light ochre line or area (Fig. 15D); anterior half of lateral lobe with a very small orange spot, both features polymorphic in most observed specimens.

REMARK
The material collected with pitfall traps and preserved in alcohol differ from hand-collected, dry-preserved specimens by the colouration of their pronotum dorsal disc, which presents in addition to the white spot near the posterior margin (distinctive of *C. faustini funafus* n. subsp.), a more or less conspicuous whitish band near the anterior margin (more or less as in *C. faustini faustini* n. subsp.), and various light ochre areas in dorsal disc median zone, making as a whole a clear area more or less the shape of a wide 8 crossed by a transverse bar; their head dorsum is also very light ochre in colouration. The pronotum colouration is polymorphic within sampled populations, while male genitalia are always similar to that of Funafus males. Specimens are most often in very bad condition, having lost their FWs, and with inflated abdomen and evaginated genitalia in males.

TABLE 14. — Measurements (in mm) of males and females of *Cophonemobius faustini funafus* n. subsp. Abbreviations: see text.

	Lpron	lpron	FWmidL	LFIII	LTIII	L tarIII	
Males							
Holotype	2.1	1.9	1.2	6.1	5.8	2.3	
Paratype	2	2.1	1.2	5.6	5.4	2.3	
Mean values	2.1	2	1.2	5.9	5.6	2.3	
Females							**Lovip**
Allotype	2.4	2.6	1.3	6.5	6.3	2.5	3.9
Paratype	2.3	2.6	1.3	6.7	6.3	2.6	4.1
Mean values	2.4	2.6	1.3	6.6	6.3	2.6	4

Cophonemobius sp.

MATERIAL EXAMINED. — **Vanuatu.** [Sanma province] Espiritu Santo [Island], village de Kolé, Loru Protected Area, grotte, 28.X.2006, L. Desutter-Grandcolas, 1 ♂ juvenile (fn 1) (MNHN-ENSIF2149).

REMARK

I separate here a *Cophonemobius* juvenile which presents a colouration pattern similar to that of *C. faustini* n. sp., except for: tergites 2 and 3 dorsally whitish, with 3 distinct brown spots along anterior margin, one median and two lateral; tergites 5 and 6 brown with whitish zigzag patterns; pronotum dorsal disc largely whitish, with a transverse band along anterior margin separate from posterior whitish area by a light brown line; anterior and still more posterior margins marked with dark brown. The status of this specimen will have to be reconsidered after additional sampling.

Acknowledgements

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