

A new genus and species of coenagrionid damselflies (Insecta, Odonata, Zygoptera, Coenagrionidae) from Vanuatu

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ABSTRACT

A new genus, *Vanuatubasis* n. gen., is described and illustrated based on specimens from the islands of Aneityum, Espiritu Santo, and Malekula, Vanuatu. Males of the new genus differ from males of the similar *Nesobasis* Selys, 1891 in having short and broad superior anal appendages and long, forcipate inferior anal appendages. The already described species, *Nesobasis malekulana* Kimmins, 1936 and *N. bidens* Kimmins, 1958, are transferred to the new genus. Both species, only known from males, are redescribed. Additionally, a new species, *Vanuatubasis santoensis* n. gen., n. sp., is described from Espiritu Santo. Males of *V. santoensis* n. gen., n. sp. differ from males of the closely related *V. malekulana* n. comb. by their larger size, a more raised hind ridge of the pronotum, the less prominent medio-posterior protuberance of the mesostigmal laminae, and the paisley-shaped superior anal appendages. A key to the males of *Vanuatubasis* n. gen. is provided.

RÉSUMÉ

Un nouveau genre et une nouvelle espèce de demoiselles coenagrionides (Insecta, Odonata, Zygoptera, Coenagrionidae) du Vanuatu.

Un nouveau genre, *Vanuatubasis* n. gen., est décrit et illustré à partir de spécimens provenant des îles Aneityum, Espiritu Santo et Malekula, Vanuatu. Les mâles de ce nouveau genre se distinguent de ceux du genre étroitement apparenté *Nesobasis* Selys, 1891 par des appendices anaux supérieurs courts, larges et aplatis et des appendices anaux inférieurs en forme de pincette. Les espèces décrites antérieurement, *Nesobasis malekulana* Kimmins, 1936 et *N. bidens* Kimmins, 1958, sont transférées dans le nouveau genre. Ces deux espèces seulement connues d'après les mâles sont redécrites. En outre une nouvelle espèce d'Espiritu Santo, *Vanuatubasis santoensis* n. gen., n. sp. est décrite. Les mâles de cette nouvelle espèce se distinguent de ceux de l'espèce proche *V. malekulana* n. comb. par leur taille supérieure, la marge arrière du pronotum plus élevée, les appendices anaux supérieurs en forme de boteh, et la protubérance médio-postérieure peu marquée de la lamina mésostigmale. Une clé d'identification des mâles de *Vanuatubasis* n. gen. est fournie.

KEY WORDS

Insecta,
Odonata,
Zygoptera,
Coenagrionidae,
Vanuatu,
new genus,
new species.

MOTS CLÉS

Insecta,
Odonata,
Zygoptera,
Coenagrionidae,
Vanuatu,
genre nouveau,
espèce nouvelle.

INTRODUCTION

The high volcanic islands of the Southwest Pacific are characterised by a complex topography with mountain ranges having a dissected terrain and, due to the large differences in altitude and vegetation, significant climatic transitions. These circumstances seem to support a rich odonate diversity. Especially in some zygopteran taxa there are numerous local radiations with a high degree of endemism (Rowe 2004). A prime example is the Fijian genus *Nesobasis* Selys, 1891, which was described on the basis of five new species from the “Îles Viti (Polynésie)” (de Selys-Longchamps 1891). Further studies on the Odonata of Fiji by Tillyard (1924), Kimmins (1943), and Donnelly (1990) added further 21 new species to the genus. On the other hand, three species were transferred to *Melanesobasis* Donnelly, 1984, one to *Teinobasis* Kirby, 1890, and another one was synonymised (Donnelly 1984, 1990). So at present there are 21 valid species of *Nesobasis* described from Fiji. According to Beatty *et al.* (2007) more than 10 additional species await their description.

Beside the Fijian species, Kimmins (1936, 1958) described two *Nesobasis* species from Vanuatu (formerly New Hebrides), *N. bidens* and *N. malekulana*. Tillyard (1924) already noted that due to the heterogeneity of the material, “the genus could easily be split up into a number of groups of at least subgeneric rank”. Donnelly (1990) pointed to distinctive morphological characters of the described and some undescribed species of Vanuatu that would justify their separation from *Nesobasis*. However, the formal description of a new genus to accommodate these species from Vanuatu has not been carried out. In the course of recent collecting of new material from the island of Espiritu Santo, Vanuatu, the new genus is described, illustrated, and compared with *Nesobasis*. *Nesobasis bidens* and *N. malekulana* are transferred to *Vanuatubasis* n. gen., and a new species, *V. santoensis* n. sp. from Espiritu Santo is added. Discriminating characters are illustrated, and a key to the males of *Vanuatubasis* n. gen. is provided.

MATERIAL AND METHODS

Altogether 19 imagines belonging to the new genus described herein were collected by Arnold H. Staniczek and Milan Pallmann, and additional material

was collected by Frédéric Durand and Emmanuel Boitier, all of them during their participation in the SANTO 2006 expedition to the island of Espiritu Santo, Vanuatu in November 2006. For a narrative of the expedition, see Bouchet *et al.* (2008), and for a review of the geography and natural history of Espiritu Santo, we refer to Bouchet *et al.* (in press).

The specimens were found at the lower courses of three rivers on the western coastline of Cumberland Peninsula, the northwestern part of Espiritu Santo. For comparison, the holotype of *Vanuatubasis bidens* n. comb., and the holotype as well as two paratypes of *V. malekulana* n. comb. were borrowed from the Natural History Museum, London (BMNH). All individuals are pinned with the exception of two freshly emerged males stored in 75% alcohol. The holotype and five paratypes of the new species are deposited in the Staatliches Museum für Naturkunde Stuttgart (SMNS). Additional paratypes are stored in the Muséum national d’Histoire naturelle, Paris (MNHN).

Photographs were taken through a Leica Macro scope and processed with Leica Application Suite Version 3.1.0. A ligula of *V. santoensis* n. gen., n. sp. used for SEM was coated with a 20 nm Au/Pd layer and examined with an ISI-SS40 scanning electron microscope at 10 kV. Digital SEMs were acquired by using DISS 5 (point electronic). All figures were subsequently enhanced with Adobe Photoshop CS3.

The morphological terminology of the descriptions generally follows Corbet (1999).

SYSTEMATICS

Family COENAGRIONIDAE Kirby, 1890

Genus *Vanuatubasis* n. gen.
(Figs 1-5)

TYPE SPECIES. — *Nesobasis malekulana* Kimmins, 1936, by present designation.

ETYMOLOGY. — The name of the related genus *Nesobasis* refers to the Greek νησος (nesos = island) and βάση (basi = basis). The suffix “basis” is common in many

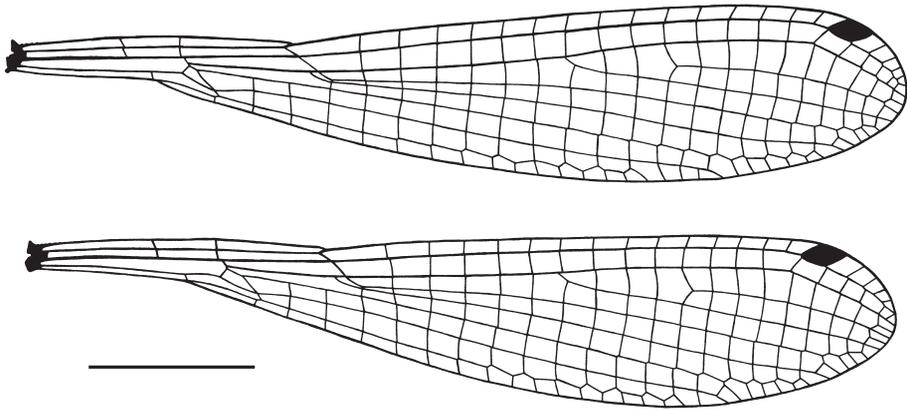


FIG. 1. — *Vanuatubasis santoensis* n. gen., n. sp., paratype, ♂ (SMNS: ODO 000246 K), right fore- and hind wing. Scale bar: 5 mm.

zygopteran genera. Accordingly, the name of the new genus is composed of “Vanuatu”, which refers to its presently known distribution, and the suffix “basis”.

DISTRIBUTION. — Currently, the genus is only known from the islands of Aneityum, Espiritu Santo, Maewo, and Malekula, Vanuatu.

DIAGNOSIS. — *Vanuatubasis* n. gen. resembles *Nesobasis*, but differs from the latter in the following characters: 1) superior anal appendages of males broad and short (Fig. 4); 2) inferior anal appendages significantly longer than superior appendages, forceps-like, apically curved inwards, each ending in a black tip (Fig. 4); and 3) pronotal hind lobe raised and medially protruding, tapering to a rounded or acute apex (Fig. 5).

REMARK

Vanuatubasis n. gen. currently contains three species, one of which is described as new in this contribution.

Vanuatubasis santoensis n. sp.

(Figs 1-3; 4C, F, I, L; 5B)

HOLOTYPE. — **Vanuatu.** Sanma Province, Espiritu Santo, surroundings of Penaoru, Penaoru River, 14.96105°S, 166.63316°E, 90 m, 13.XI.2006, leg. A. H. Staniczek & M. Pallmann, ♂ (SMNS: ODO 000242 K).

PARATYPES. — **Vanuatu.** Sanma Province, Espiritu Santo, surroundings of Tasmate, Mamasa River, 15.20976°S, 166.67705°E, 20 m, 9.XI.2006, leg. A. H. Staniczek & M. Pallmann, 2 ♂♂ (MNHN); 2 ♂♂ (SMNS: ODO 000243 K, ODO 000244 K). — Sanma Province,

Espiritu Santo, surroundings of Tasmate, Paé River, 15.21751°S, 166.68706°E, 139 m, 11.XI.2006, leg. A. H. Staniczek & M. Pallmann, 1 ♂ (SMNS: ODO 000245 K). — Sanma Province, Espiritu Santo, surroundings of Penaoru, Penaoru River, 14.96105°S, 166.63316°E, 90 m, 13.XI.2006, leg. A. H. Staniczek & M. Pallmann, 2 ♂♂ (SMNS: ODO 000246 K, ODO 000247 K). — Penaoru, Camp de base, 17.XI.2006, leg. F. Durand & E. Boitier, 2 ♂♂ (MNHN).

ETYMOLOGY. — The species is named after Santo, the shortened colloquial form of Espiritu Santo.

ADDITIONAL MATERIAL. — **Vanuatu.** Sanma Province, Espiritu Santo, surroundings of Tasmate, Mamasa River, 15.20976°S, 166.67705°E, 20 m, 9.XI.2006, leg. A. H. Staniczek & M. Pallmann, 1 ♀ (MNHN); 4 ♂♂, 1 ♀ (SMNS: ODO 000248 K-ODO 000251 K, ODO 000252 A). — Sanma Province, Espiritu Santo, surroundings of Penaoru, Penaoru River, 14.96105°S, 166.63316°E, 90 m, 13.XI.2006, leg. A. H. Staniczek & M. Pallmann, 2 ♂♂, 2 ♀♀ (SMNS: ODO 000253 K-ODO 000255 K, ODO 000256 A). — Penaoru, Camp de base, 17.XI.2006, leg. F. Durand & E. Boitier, 2 ♂♂ (MNHN).

DISTRIBUTION. — The species is only known from the island of Espiritu Santo.

DESCRIPTION OF THE HOLOTYPE

Preserved dry, pinned. In good condition.

Head

Labium light beige; labrum aquamarine, with a very small, central brown spot at the basal margin (colour layer below the cuticula due to preservation broken and

partly shifted); genae, anteclypeus, and postclypeus aquamarine; postclypeus medially brownish at base and anteriorly with a blackish triangle, on each side flanked by two brown stripes; frons aquamarine, medially changing to yellowish with slight whitish pruinosity; dorsal part blackish; basal joints of antennae aquamarine with pale end rings, each scapus black with pale end rings, pedicelli brown, paler medially, flagella dark brown; vertex and occiput black with bronze shimmer, except for a small, creamy brown spot in front of the median ocellus and the central hind margin of the occiput, diminutive postocular spots, composed of bluish-white pruinosity; head dorsally brownish, posteriorly creamy-yellowish with slight whitish pruinosity; eyes dark brown.

Thorax

Prothorax dorsally black with slight greenish metallic shimmer, laterally brownish and slightly covered with bluish-white pruinosity in its lower half; hind lobe of pronotum raised, each side of upper rim slightly curved and forming an acute apex, lower rim broadly V-shaped and slightly protruding posteriorly, surface between both ridges concave (Fig. 5B). Synthorax: mesanepisternum with green-black metallic median band, reaching the mesopleural suture in its hindmost fourth, but elsewhere separated from it by a pale olive-green band, dorsal carina black; mesostigmal lamina slightly triangular, posterior margin proximally with a rounded protuberance; apex of lamina forming a slightly overhanging process (Fig. 5B); mesokatepisternum brown to dark brown in the upper two-thirds, pale aquamarine in its lower third, entire mesokatepisternum with slightly bluish-white pruinosity; mesepimeron yellow-brown to pale aquamarine posteriorly, with blackish median stripe; metanepisternum pale aquamarine, brownish yellow anteriorly, posteriorly with small, elongate blackish spots at the intersegmental and metapleural suture; metakatepisternum brownish, covered with a bluish-white pruinosity in its lower half; metepimeron pale aquamarine becoming brownish yellow anteriorly, slightly bluish-white pruinose posteriorly; poststernum dark brown to blackish, partly bluish-white pruinose; sternum brownish with bluish-white pruinosity. Legs dark brown, coxae, trochanters, and tarsi paler, each femur

basally with a whitish ring; coxae, trochanters, and femora slightly covered with bluish-white pruinosity; spines black.

Wings

Hyaline; venation dark brown, costa and radius black at base; pterostigma dark brown, with narrow pale margins, centrally a trace of bluish-white pruinosity, less than one cell long, rhomboidal; 15/15 postnodal crossveins in the left and 15/14 postnodal crossveins in the right forewing, 13/12 postnodal crossveins in hind wings.

Abdomen

Segment 1 dorsally dark brown to blackish, slightly covered with bluish-white pruinosity, brownish laterally; segment 2 dorsally blackish with greenish metallic shimmer, laterally pale to dark brown, centrally glaucous; secondary genital apparatus with terminal segment of ligula broadened towards its apical end, medially emarginated, basal third of terminal segment with longitudinal row of setae on each side (Fig. 2); segments 3-6 brown to dark brown, becoming paler laterally and turning yellowish ventrally, brown colouration darker at the segment borders, segments on the dorsum slightly metallic; segments 7-9 dark brown to blackish dorsally and laterally, ventrally yellow-brown; segment 10 dorsally brown, posterior margin blackish, elevated and dorsomedially excised, laterally and ventrally yellow-brown. Superior anal appendages brown, short, in dorsal view roughly resembling a paisley pattern (Fig. 4C, F); in dorsocaudal view paisley-like shape more obvious, appendages broad, with convex, bulging upper margins and slightly concave, flattened lower margins, inner margins ending ventrally in bevelled edges, laterally each upper and lower margin is converging to a prominent tip directed posteriorly; in lateral view the appendages appear roughly triangular (Fig. 4I, L). Inferior anal appendages yellow-brown, in dorsal view forceps-like, incurved, ending in a black tip which is directed inwards; about three times as long as the superior appendages (Fig. 4C, F); in lateral aspect broad at base, narrowing to an acute tip (Fig. 4I, L). Each inferior anal appendage bears basally on its inner side a strong, rounded process fringed with hairs (Fig. 4C, F).

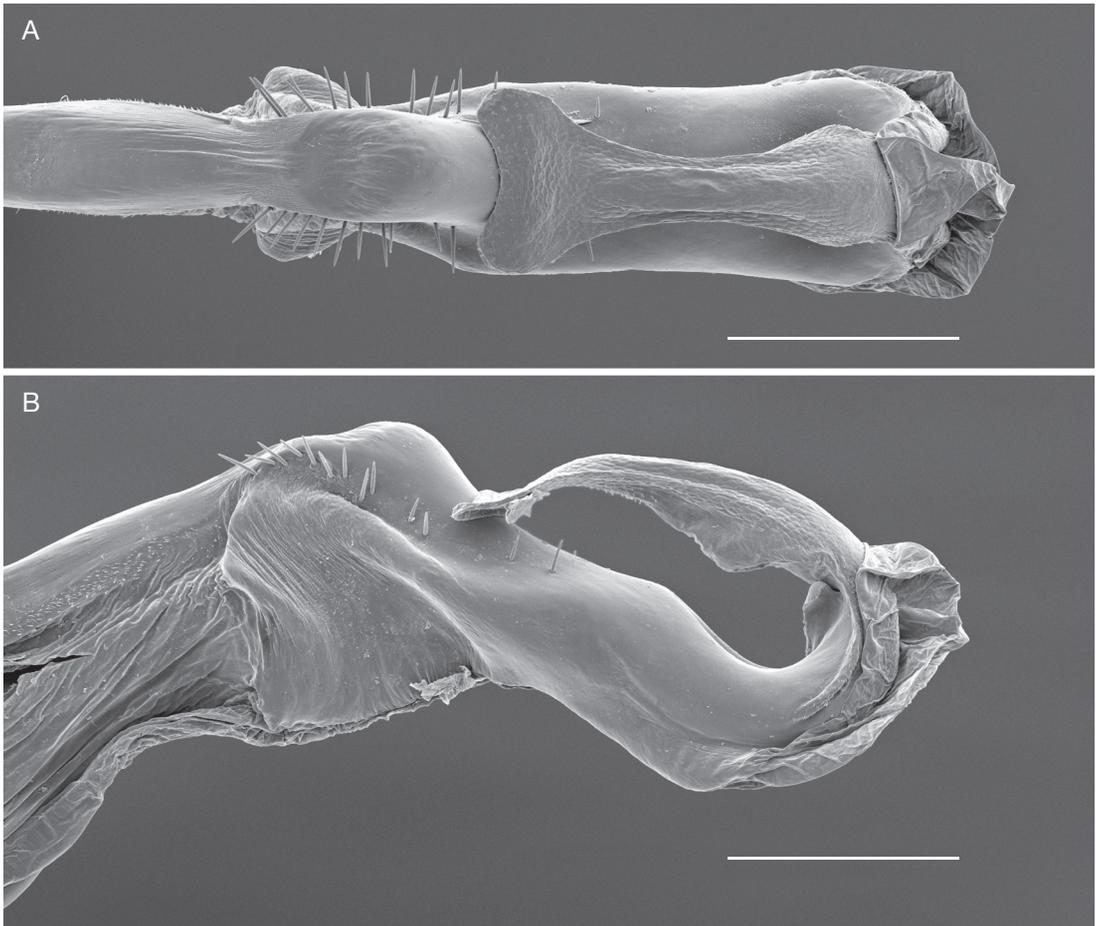


FIG. 2. — *Vanuatubasis santoensis* n. gen., n. sp., paratype, ♂ (SMNS: ODO 000244 R), ligula in ventral (A) and lateral (B) views. Scale bars: 200 μ m.

Measurements

Length of abdomen: *c.* 35 mm (not completely elongated), length of hind wings: 22.3 mm.

VARIATION

Colouration of mature males only with minor variations. Colour of face in two males pale greenish-blue, in four males light blue, and in three males dull aquamarine; the pruinose postocular spots are completely missing in four males. Yellow-brownish to olive-green colouration on prothorax dorso-laterally sometimes more expanded. Green metallic shimmer on dorsum of thorax in six specimens lacking; the lateral thoracic colouration

varies between pale aquamarine and brownish-olive-green; brown to black colouration on mesepimeron is differently developed and ranges from small, elongate, pale spots to broad, dark stripes, three males without any spots; extension of bluish-white pruinosity very variable, two males without any pruinescence. Segment 1 and 2 laterally often brighter pale aquamarine and less brown than in holotype. Segment 9 and 10 in three males dorsally and laterally with more extensive light brown to beige colouration. Superior and especially inferior anal appendages uniformly coloured. Three teneral males are straw-coloured with the exception of following parts: head dorsally green-black metallic,



FIG. 3. — *Vanuatubasis santoensis* n. gen., n. sp., ♀ at Mamasa River, Espiritu Santo, Vanuatu.

prothorax and synthorax dorsally brown to dark brown, abdominal segments 1-8 brown dorsally and at segment borders, segments 9 and 10 whitish dorsally. Males also differ slightly in the shape of pronotal structures. In two males the upper rim of pronotal hind lobe is curved with rounded apex, in four specimens the rim is more conspicuously curved forming a very acute tip medially. The median apex of the upper rim is connected with the lower rim by a more or less prominent keel in several males. There are also considerable differences in the extension of the inner process of inferior anal appendages. In six males the strong basal process on the inner side of each inferior anal appendage is only very small and more or less directed inwards. It is not clear at present if this is an artefact of preservation.

The female of *V. santoensis* n. sp. could not be identified with certainty. Therefore we refrained

from designing female paratypes. However, we tentatively assign four females to the new species, as they generally match the male colouration with following exceptions: aquamarine colouration of face paler or more glaucous, legs yellowish-brown, and apical two-thirds of segment 9, and segment 10 creamy or glaucous dorsally (light blue in life, see Fig. 3). One female has a slightly darker face and greenish eyes, and the pruinosity is more developed than in the other females. Pronotal hind lobe of females erected, rounded, not curved and not forming an apex medially; on the posterior rim of each mesostigmal lamina there is only a very inconspicuous protuberance. Cerci shorter than segment 10; ovipositor finely serrate at ventral border and slightly extending beyond segment 10.

The paratype series varies in dimensional and venational characters as follows: abdomen length: c. 30-37.5 mm, hind wing length: 19.6-22.9 mm, 12-17 postnodal crossveins in forewings, 10-14 postnodal crossveins in hind wings.

REMARKS

At first glance, males of *V. santoensis* n. sp. resemble males of *V. malekulana* n. comb., but a closer view reveals differences in the shapes of pronotal hind lobe, mesostigmal laminae, and superior anal appendages. In *V. santoensis* n. sp. the upper hind rim of the prothorax is more raised and only slightly curved, the lower ridge is not or only marginally protruding posteriorly. The protuberance of each mesostigmal hind ridge is less prominent and the superior anal appendages are paisley-shaped, contrary to the crescent-like form in *V. malekulana* n. comb. In lateral view, the flattened inner angle of the superior anal appendages is not visible in *V. santoensis* n. sp. Moreover, *V. santoensis* n. sp. is larger in size and the pterostigmata are dark brown versus light brown in *V. malekulana* n. comb.

The shape of the cerci is also a significant difference to *V. bidens* n. comb., in which the superior anal appendages are ovate and bidentate.

Vanuatubasis bidens (Kimmins, 1958) n. comb.
(Fig. 4A, D, G, J)

Nesobasis bidens Kimmins, 1958: 239-241, figs 1, 2a, b.

HOLOTYPE. — Vanuatu. Tafea Province, Aneityum, 3 miles NE of Anelcauhat, Red Crest, 1200 ft, VI.1955, leg. L. E. Cheesman, ♂ (BMNH).

LABELS. — Holotype: Type; NEW HEBRIDES:/ Aneityum./ Red Crest.1,200ft./ 3m.N.E.of Anelcauhat./ vi vii 1955.; L.E.Cheesman./ B.M.1955-217.; Nesobasis/ ♂ bidens Kim/ D.E.Kimmins det.1957/ TYPE.

ADDITIONAL MATERIAL. — Not available.

DISTRIBUTION. — The species is only known from the type locality.

REDESCRIPTION OF THE HOLOTYPE

Preserved dry, pinned. In good condition, but right foreleg and left hind leg missing. Right forewing and abdomen between segments 6, 7 and 8 glued.

Head

Labium pale fulvous; labrum dark fulvous, with a small, central dark brown spot at the basal margin; genae, anteclypeus, and postclypeus dark fulvous, postclypeus with a denoted dark brown T-mark; frons brown; antennae brown, inner side of each scapus blackish; vertex and occiput black except for a small brown spot in front of the median ocellus; rear of head brownish; eyes dark brown.

Thorax

Prothorax dorsally bright black, laterally fulvous; hind lobe of pronotum rounded, prominent, with distinct, fulvous median keel connecting upper and inconspicuous lower pronotal hind ridge. Synthorax: mesanepisternum with shiny black median band reaching the mesopleural suture in its hindmost fourth, but elsewhere separated from it by a narrow, pale fulvous band, dorsal carina brown; mesostigmal lamina slightly triangular, anterior and posterior ridge convergent and ending in a protuberance, posterior rim with small median tubercle; mesokatepisternum fulvous with dark brown spot in its upper half; mesepimeron fulvous; metanepisternum fulvous, posteriorly with two small, elongate, brown spots at the intersegmental and metapleural suture; metakatepisternum fulvous; metepimeron fulvous becoming yellowish posteriorly; poststernum yellowish, posterior margin black; sternum yellowish. Legs yellowish, basal inner surface of protibia brownish; spines dark brown.

Wings

Hyaline; venation dark brown; pterostigma brownish with narrow pale margin, less than one cell long, rhomboidal; 15/14 postnodal crossveins in forewings and 13/12 postnodal crossveins in hind wings.

Abdomen

Segments 1 and 2 yellowish, dorsally brown to dark brown; segments 3-6 yellowish, dorsally light brown to brown, dorsal brown colouration extending downwards at the posterior part of each segment but missing anteriorly, there the yellowish colouration reaches the dorsal carina in a spot of almost triangular shape; on segment 7 the yellowish colouration turns creamy and the brown colour gets darker and extends posteriorly to form a dark triangle as seen in lateral view, brown of segments 1-6 with a slight greenish metallic shimmer getting bronze on segment 7; segment 8 with the exception of a narrow creamy line on the lower lateral border dark brown to blackish with a metallic sheen; the colouration of segment 9 is divided in a ratio of 5:3, being bluish-white in the upper, and brown in the lower part; segment 10 almost entirely bluish-white, only ventrally a bit creamy. Superior anal appendages short, in dorsal view broad and ovate, upper surface slightly concave, dark brown, lateral part paler, the apical margins with two small, acute, shiny black teeth, one at the inner angle, the other just in the centre (Fig. 4A, D); in lateral view the inner tooth appears as an elevated knob; lateral part of superior anal appendages bulged (Fig. 4G, J); in posterior view the appendages are straightened diagonally, forming a rounded roof. Inferior anal appendages in dorsal view forceps-like, but only slightly incurved, ending in black tips which are directed inwards, about two and a half times as long as the superior appendages (Fig. 4A, D), yellowish-white at base, forceps brown to dark brown; in lateral aspect broad at base, abruptly narrowed to an acute apex (Fig. 4G, J). In posterior view a small protuberance is visible basally on the inner side of each appendage.

Measurements

Length of abdomen: *c.* 35 mm (not completely elongated), length of left hind wing: 22.1 mm, length of right hind wing: 21.8 mm.

VARIATION

The species is only known from the holotype.

REMARKS

Due to the colouring it is likely that the specimen is immature. A comparison with the original description (Kimmins 1958) reveals that the colouration has lost its intensity over the last 53 years. According to Kimmins (1958) it could be quite possible that the yellowish-fuscous areas become bluish or greenish during the maturation process. Males of *V. bidens* n. comb. can be easily distinguished from males of the other two species of the genus by the bidentate apical margins of the superior anal appendages. These appendages appear in the dried specimen in a very upright position, in life, they may be in a more oblique position. The length of the abdomen was stated by Kimmins (1958) as 25 mm, this seems to be a literal error.

Vanuatusbasis malekulana

(Kimmins, 1936) n. comb.

(Figs 4B, E, H, K; 5A)

Nesobasis malekulana Kimmins, 1936: 72, 73, figs 5, 6.

HOLOTYPE. — **Vanuatu**. Malampa Province, Malekula, Unua, III-IV.1929, leg. L. E. Cheesman, ♂ (BMNH).

PARATYPES. — **Vanuatu**. Malampa Province, Malekula, Unua, II.1929, leg. L. E. Cheesman, 5 ♂♂ (BMNH).

LABELS. — Holotype: Holo-/ type; New Hebrides:/ Malekula,/ Ounua./ Mar.&Apl.1929./ Miss L.E.Cheesman./ B.M.1929-343.; 331.; NESOBASIS/ malekulana/ ♂ sp.n./ Holotype/ det.D.E.Kimmins. Paratypes: Para-/ type; New Hebrides:/ Malekula,/ Ounua./ Feb.1929./ Miss L.E.Cheesman./ B.M.1929-234.; 231.; NESOBASIS/ malekulana/ ♂ sp.n./ det. D.E. Kimmins.

ADDITIONAL MATERIAL. — Not available.

DISTRIBUTION. — The species is only known from the type locality.

REDESCRIPTION OF THE HOLOTYPE

Preserved dry, pinned. In fairly good condition. Head, prothorax, left foreleg, right hind wing, and abdomen between segments 5, 6 and 7 glued.

Head

Labium pale fulvous; labrum dark blue-green, centrally more glaucous, with a semicircular, central dark brown spot at the basal margin; genae glaucous; anteclypeus greyish-brown; postclypeus blackish, laterally at the basal margin glaucous; frons below a semicircular line from the basal joints of the antennae to the postclypeus glaucous, above blackish; antennae at the basal joints glaucous, each scapus dark brown, anteriorly with a small glaucous stripe, pedicelli and flagella brown; vertex and occiput black except for a small brown spot in front of the median ocellus, diminutive postocular spots, composed of whitish pruinosity; back of head yellowish with a diagonal dark brown stripe; eyes dark brown.

Thorax

Prothorax black with a touch of a greenish metallic shimmer, laterally with slight bluish-white pruinosity; hind lobe of pronotum slightly raised, each side of upper rim sinusoidally shaped, medially forming a slightly rounded apex. The apex is connected with the prominent, lower ridge by a median keel (Fig. 5A). Synthorax: mesanepisternum with black median band, slightly greenish metallic, reaching the mesopleural suture in its hindmost fifth, but elsewhere separated from it by a brownish band, dorsal carina black; mesostigmal lamina slightly triangular, posterior margin proximally with a distinctive, rounded, slightly quadrangular protuberance, apex of lamina forming a slightly overhanging process (Fig. 5A); mesokatepisternum brownish to dark brown in the upper, pale greenish-grey in the lower half; mesepimeron pale greenish-grey with a dark brown to blackish triangular streak in the anterior part; metanepisternum pale greenish-grey, posteriorly with a small, elongate, dark brown to blackish spot at the metapleural suture; metakatepisternum light ochre with slight bluish-white pruinosity; metepimeron pale greenish-grey becoming creamy anteriorly; poststernum bluish-white pruinose, posterior margin black; sternum creamy to light brown with bluish-white pruinosity. Legs creamy, except outer surface of coxae, trochanters, and femora, and inner median parts of tibiae, which are light to dark brown, especially the coxae with bluish-white pruinosity; spines dark brown.

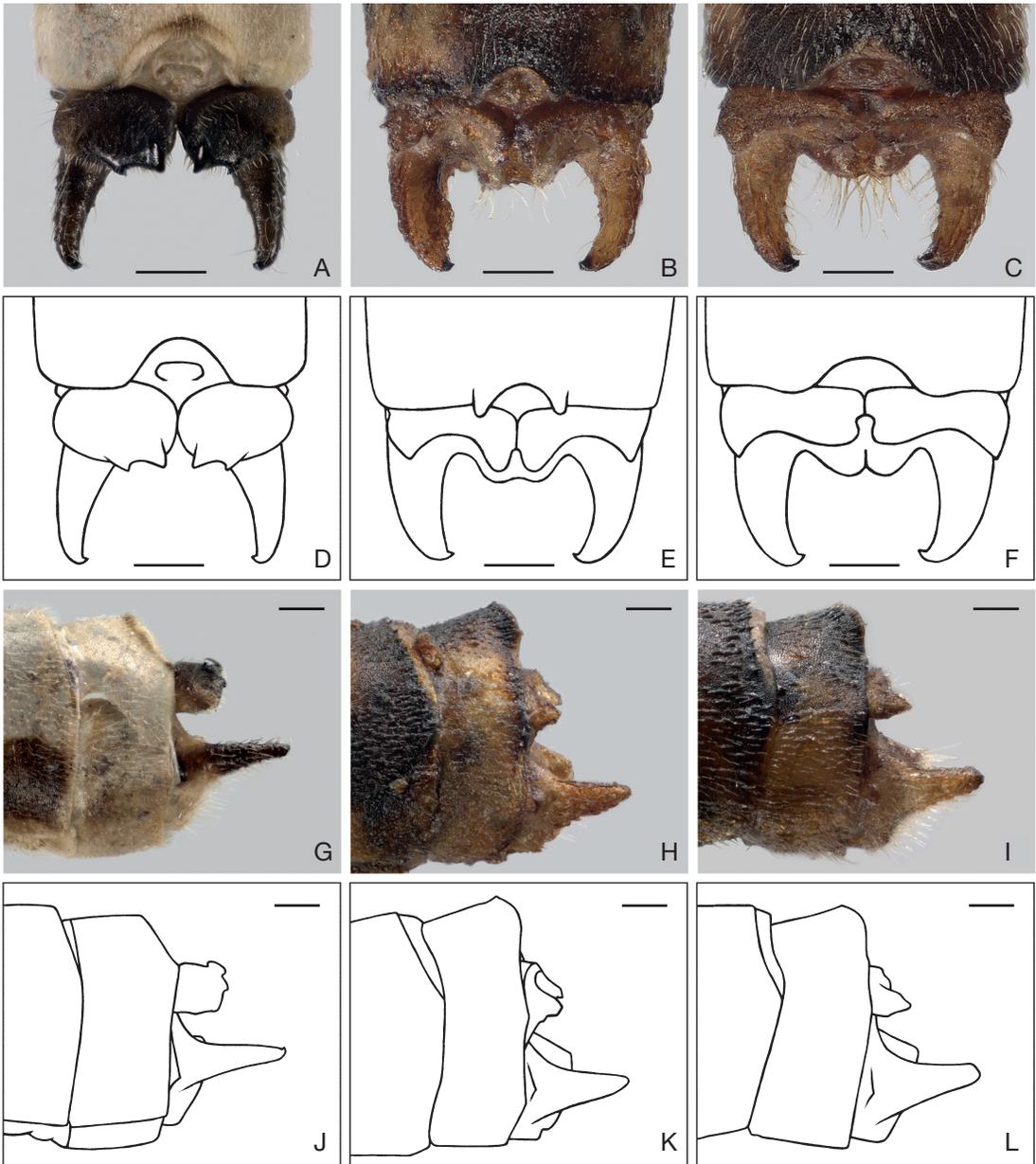


FIG. 4. — **A, D, G, J**, *Vanuatubasis bidens* (Kimmins, 1958) n. comb., holotype, ♂ (BMNH), anal appendages in dorsal and lateral view; **B, E, H, K**, *V. malekulana* (Kimmins, 1936) n. comb., holotype, ♂ (BMNH), anal appendages in dorsal and lateral view; **C, F, I, L**, *V. santomensis* n. gen., n. sp., holotype, ♂ (SMNS: ODO 000242 K), anal appendages in dorsal and lateral views. Scale bars: 0.2 mm.

Wings

Hyaline; venation brown; pterostigma pale brown, anteriorly with small pale margin, less than one

cell long, rhomboidal; 13/12 postnodal crossveins in the left and 15/14 postnodal crossveins in the right forewing, 11/10 postnodal crossveins in the

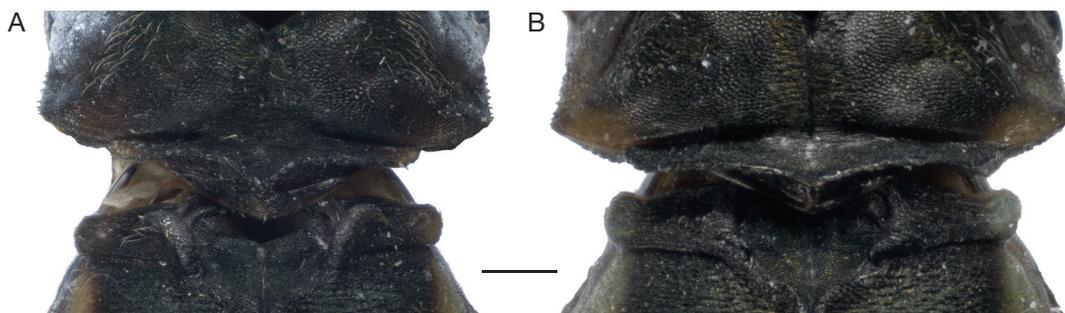


FIG. 5. — **A**, *Vanuatubasis malekulana* (Kimmins, 1936) n. comb., paratype, ♂ (BMNH), hind lobe of pronotum and mesostigmal laminae in dorsal view; **B**, *V. santoensis* n. gen., n. sp., holotype, ♂ (SMNS: ODO 000242 K), hind lobe of pronotum and mesostigmal laminae in dorsal view. Scale bar: 0.2 mm

left and 12/11 postnodal crossveins in the right hind wing.

Abdomen

Segment 1 dorsally dark brown with bluish-white pruinosity, creamy and greenish-grey laterally; segment 2 dorsally blackish with slight greenish metallic shimmer, laterally greenish-grey and partly creamy; segments 3-6 brown to dark brown, getting paler laterally and pale ochre ventrally, brown colouration darker at the segment borders; segments 7-9 dark brown dorsally and at sides, ventrally reddish brown; segment 9 dorsally with a reddish-brown, centrally creamy bar, incurved anteriorly; segment 10 reddish-brown, dark brown dorsally, apical margin blackish, raised and excised at its centre. Superior anal appendages reddish-brown, short, in dorsal view crescent-shaped (Fig. 4B, E); in dorsocaudal view broad with convex upper margins and slightly concave lower margins, both laterally and medially converging to strong, posteriorly projected, rounded tips; in lateral view each tip appears triangular, the inner tip being higher and more protruded than the outer one (Fig. 4H, K). Inferior anal appendages reddish-brown, in dorsal view forceps-like, incurved, ending in a black tip which is directed inwards, about three times as long as the superior appendages (Fig. 4B, E); in lateral aspect broad at base, narrowing to an acute tip (Fig. 4H, K). Each inferior anal appendage bears basally on its inner side a strong, quadrate process fringed with hairs (Fig. 4B, E).

Measurements

Length of abdomen: *c.* 33 mm (not completely elongated), length of hind wings: 20.3 mm.

VARIATION

Only two of the five designated paratypes were available for study. One paratype nearly resembles the holotype in colouration, but face dull aquamarine and thorax somewhat paler with a smaller and less intensive brown spot on mesepimeron. The pruinosity is a little more intensive posteriorly. Abdominal segments 1 and 2 laterally glaucous, segments 9 and 10 dorsally creamy with reduced brown markings. Pronotal hind lobe less raised than in holotype and in other paratype. The other, somewhat smaller paratype is more intensively coloured: face aquamarine, thorax bluish-green with dark brown to blackish stripes on mesepimeron and metepimeron; mesokatepisternum and metakatepisternum dark brown. Brown colouration on abdominal segments 1 and 2 generally more developed, bluish-green colouration reduced, but brighter than in the other two specimens at hand. Only a small pale brown spot dorsally on segment 9.

Venation in both paratypes only slightly different from holotype: 12-15 postnodal crossveins in forewings, 11-13 postnodal crossveins in hind wings.

REMARKS

This species is only known from six males found at the type locality. All paratypes have identical

label data (see above) (D. Goodger pers. comm.). *Vanuatubasis malekulana* n. comb. differs from *V. bidens* n. comb. in the way, less erected pronotal hind ridge and the strong, medio-posterior protuberance of the mesostigmal laminae. The shape of

the superior anal appendages is crescent-like, the forcipate inferior anal appendages are more incurved than in *V. bidens* n. comb.

For differences to the closely related *V. santoensis* n. sp. see above.

KEY TO THE MALES OF *VANUATUBASIS* N. GEN.

1. Superior anal appendages ovate in dorsal view, each with two acute, shiny black teeth at the posterior margin (Fig. 4A, D); median process at posterior margin of each mesostigmal lamina situated in the middle of mesanepisternum *V. bidens* n. comb.
- Superior anal appendages more elongated in dorsal view, with acute outer tip directed posteriorly; median process at posterior margin of each mesostigmal lamina situated closer to the dorsal carina 2
2. Superior anal appendages crescent-like in dorsal view, inner angle acute, extended posteriorly (Fig. 4B, E); upper pronotal hind ridge sinusoidally shaped, only slightly raised, lower ridge protruding posteriorly, median keel between upper and lower rim distinct; median process at the posterior margin of each mesostigmal lamina strong and roughly quadrangular (Fig. 5A) *V. malekulana* n. comb.
- Superior anal appendages roughly paisley-shaped in dorsal view, inner posterior angle flattened, not extended posteriorly (Fig. 4C, F); upper pronotal hind ridge only slightly curved, raised, lower ridge not or only slightly protruding posteriorly, median keel between upper and lower rim only faintly pronounced; median process at the posterior margin of each mesostigmal lamina small and rounded (Fig. 5B) *V. santoensis* n. sp.

DISCUSSION

The higher phylogeny of Coenagrionidae is still unsettled, and even their monophyly is in question (O'Grady & May 2003; Carle *et al.* 2008). Donnelly (1990) included *Vanuatubasis* n. gen. ("a still undescribed genus from Vanuatu") together with *Nesobasis* and *Melanesobasis* in the *Nesobasis* group. Tillyard (1924) placed *Nesobasis* "between *Austroagrion* and *Xanthocnemis* on the one hand and *Teinobasis* on the other". Fraser (1957) classified *Nesobasis* in his Amphineminae that were later synonymised with Teinobasinae (de Marmels 2007). De Marmels (2007) demonstrated a closer relationship between *Melanesobasis* and *Teinobasis* in the Teinobasini (a tribe within Teinobasinae) based on the presence of a movable ventrobasal spur on the male superior anal appendages, the morphology of the apical ligula segment, and a more or less angulate frons. As none of these characters is present in *Nesobasis*, de Marmels (2007) excluded

Nesobasis from the Teinobasini and even from the Teinobasinae. The same has to be stated for *Vanuatubasis* n. gen. that lacks the ventral spur and also has a rounded clypeus.

In a cladistic analysis of Coenagrionidae based on morphological characters two species of *Nesobasis* were included, but did not cluster together (O'Grady & May 2003). A recent molecular analysis of Coenagrionidae (Carle *et al.* 2008) unfortunately did not cover *Nesobasis* at all. Nevertheless, *Nesobasis* has an overall similarity with *Vanuatubasis* n. gen., and thus we tentatively presume a closer relationship between these two genera. Within *Vanuatubasis* n. gen., *V. malekulana* n. comb. and *V. santoensis* n. sp. are phenetically very similar to each other, while *V. bidens* n. comb. seems to be more separated.

Nesobasis, which is endemic to the Fiji archipelago, is "one of the most speciose odonate genera found in any oceanic island group in the world" (Beatty *et al.* 2007). Up to now, 21 species are formally described

(Donnelly 1990), and there are even more records of still undescribed species (Beatty *et al.* 2007). This is insofar remarkable as presently only four Fijian islands, namely Kadavu, Ovalau, Vanua Levu, and Viti Levu, have been investigated. Furthermore, there is a high degree of endemism, as almost all of these species are confined to a sole island (Donnelly 1990; Beatty *et al.* 2007).

Vanuatu offers a comparably diverse environment. Its volcanic islands are scattered on an area of about 860 000 km² with an elevation of up to 1879 m a.s.l. During our stay on Espirito Santo only water bodies situated near the coast and at lower elevations were investigated. Therefore it would be not surprising if even more unknown species of *Vanuatubasis* n. gen. could be discovered in such a diverse environment, the more as only four out of 83 islands of Vanuatu have been investigated so far. Indeed, we also collected a female specimen of *Vanuatubasis* n. gen. that most probably represents another new species. As we only have a single female, we refrain from describing it in this contribution. Donnelly (1990) also mentioned some still undescribed species from Vanuatu. Further extensive studies are certainly needed to clarify the diversity, distribution and phylogeny of *Vanuatubasis* n. gen. and related taxa in the southwestern Pacific.

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