

**CULEX (CULEX) BANKSENSIS, A NEW SPECIES OF
MOSQUITO (DIPTERA: CULICIDAE) FROM THE
BANKS ISLANDS, NEW HEBRIDES**

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Abstract: *Culex (Culex) banksensis*, a new species and member of the *pipiens* group, *triflatus* subgroup, is described and illustrated. This species is mainly a treehole breeder and is known only from the Banks Islands.

During a malariometric survey conducted by one of us (M. M.) in August 1971 in the Banks and Torres island groups, northern end of the New Hebrides, incidental collections of mosquitoes, mostly immature stages, were made. Data on these collections are reported elsewhere (Maffi & Ratard 1974, Maffi & Taylor 1977).

A preliminary examination of available material revealed the presence in the Banks Islands of larvae which show morphological characters suggestive of *Culex (Culex) pacificus* Edwards, but differ in some respects (Maffi & Ratard 1974: 6). In October 1975, an attempt was made to collect additional specimens of all stages from one of the 1971 breeding sites, but only a single female reared from a pupa and 5 larvae were obtained. However, additional pupae from these same larval breeding sites turned up in the 1971 collections. Although no adult male was available, some of the male pupae were in an advanced stage of development and the genitalia of the incipient male imagoes had structures sufficiently formed to permit comparisons with other known species of the South Pacific subgenus *Culex*.

Terminology of structural parts largely follows Belkin (1962). All measurements are in millimeters (mm). Descriptions and illustrations of male genitalia are based on incipient male imagoes within the pupal pelt.

Culex (Culex) banksensis Maffi & Tenorio, new species FIG. 1, 2

Culex (Culex) pacificus in part of Maffi & Ratard, 1974: 6, Tab. 4, footnote 6.

♀. *Measurements.* Labium, 2.14 mm. Palpus, 0.35 mm. Antenna, 2.04 mm. Forefemur, 2.04 mm; foretibia, 2.35 mm; midfemur, 2.04 mm; midtibia, 2.24 mm. Wing length, 3.41 mm; width, 0.75 mm. *Head.* Labium and palpi uniformly dark brown; palpus about 0.16 of labium. Vertex with dark brown upright forked scales, lighter towards median; decumbent scales narrow, pale light brown along median line of vertex and on occiput; few broad whitish scales laterally along orbital margin, lateral pale patch not evident. *Thorax.* Integument generally dark brown; mesonotum with dark brown scales, except for a small patch of lighter scales (golden brown or coppery) laterad of posterior dorsocentrals; anterior promontory with several narrow, pale brown scales; scutellum with narrow, coppery scales, darker on lateral lobes than on midlobe. Anterior pronotum with 2 or 3 dark scales on upper 1/2; posterior pronotum with sparse narrow, curved, black scales and an irregular row of about 7 bristles on upper 1/2. Pleural scale patches

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not discernable as most of the scales are rubbed off. Propleuron with at least 5 long bristles and 2 or 3 dark scales. Upper mesepimeron with 7 fine yellowish bristles; lower mesepimeron with 1 strong bristle. *Legs*: pale scaled as follows: forefemur on ventral surface; midfemur on posteroventral and ventral surfaces; hindfemur on lower 1/2; hindtibia on dorsal and lateral surfaces at apex. *Wings*: brown with dark brown scales; remigial bristles well developed; alula with widely spaced, short, slender scales; upper calypter with complete fringe of very long hair-like scales; base of cell R_2 closer to wing base than base of cell M_2 . Haltere uniformly light brown, stem and knob with pale brown scales. *Abdomen* (distorted and scaling mostly obscured): terga II-VI with distinct basolateral pale patches; III, IV with an indication of an incomplete narrow pale basal band. Sterna II-VI apparently with pale brown scales on basal 1/2, otherwise dark brown.

Pupa (FIG. 1). *Measurements*. Trumpet length, 0.80 mm; width at midlength, 0.10 mm. Abdomen, 2.85 mm. Paddle, 0.83 mm. *Cephalothorax*. Uniformly lightly pigmented. Trumpet long and slender, slightly broader at apex than width at midlength; index from 8 to 11; moderately pigmented, tracheoid darker; tracheoid to about 0.5, but not at extreme base; pinna less than 0.2. Hairs 1-3, 7, 8-C 2 b, about 0.5 of trumpet, except 1-C slightly longer; 6-C very short, 2-3 b; 9-C as long as 8-C, single. Metanotal plate (MP) with hairs 10,12-C moderately developed, 3-4 b; 11-C usually single, sometimes double, more than 1.5 of 12-C. *Abdomen*. Lightly pigmented as cephalothorax, long hairs dark. Hair 1-II range from 8 to 20 branches, more commonly between 10 and 15, generally barbed, sometimes dendritic; 1-III-IV 4 b, long, usually extending to 0.7 of segment following; 3-II,III single, barbed, longer than respective segments; 5-IV-VI double, barbed, extending to about middle of 2nd segment following; 6-V,VI double; 7,10-VI,VII single, slightly longer than 0.5 of segment following; 11-VII short, usually 2-3 b; 4-VIII single; 1-IX short, but distinct. *Paddle*. Index about 1.36; very lightly pigmented, darker on midrib, external buttress and small area surrounding hairs 1,2-P; apex somewhat produced; 1-P short; 2-P about twice as long as 1-P, usually located laterad of 1-P, sometimes caudad.

♂ genitalia inside the pupal pelt (FIG. 1). Sidepiece with numerous long dorsolateral and lateral bristles; subapical lobe not completely formed, but hair groups *a-c*, *g* (leaf broad and well developed), and *h* (strong, about as long or longer than *g*) are definitely present; clasper with a crest near apex. Phallosome with inner division (ID) sharply bent laterally a short distance beyond midlength; tergal arm (TA) of outer division slightly slanted laterally, flared or twisted at apex, and sparsely dentate on mesal margin from about midlength to apical 1/5; lateral arm (LA) apical 1/5 bent laterally at right angle, basal 1/2 with a prominent lateral lobe just before midlength and 2 smaller lobes near base. IX tergum with a single row of about 12-14 bristles.

Larva (FIG. 2). *Measurements*. Head, 0.83 mm. Siphon, 1.41 mm. Anal saddle, 0.38 mm. *Head*. Moderately pigmented, distinctly wider than long. Mental plate (MP) with 9-11 teeth on each side of the enlarged median tooth; 1st basal tooth (furthest from median tooth) very small, sometimes absent; next 3 teeth large and widely spaced; remaining teeth, 6-7 in number, smaller and closely spaced. Hair 1-C slender, tapering to apex, but not filamentous; 3-C very short and thin; 4-C single, thin; 5,6-C near middle of capsule, slightly longer than 0.6 of head, 3-4 b; 7-C 7-8 b, slightly shorter than 5-C; 8,9-C 2 b, 10-C single, all about as long as 4-C; 11-C double, 12,13-C single, all slightly longer and stronger than 4-C; 14-C single, 15-C double, both short. Antenna about 0.5 of head, distal part distinctly narrowed, uniformly moderately pigmented, except base with distinct dark ring; strong spicules predominantly on basal 2/3, a few weaker ones distad of 1-A; 1-A inserted well beyond middle, multiple; 2,3-A inserted near apex, both single and slightly shorter than proximal part; 4-A at apex, single, as long as 2-A. *Thorax*. Hairs 1,2-P single, strongly developed, 1.5 or more of head; 3-P weaker than 1-P and less than 0.5 as long, usually 2-3 b, sometimes single but never on both sides; 4-P usually 3-4 b, sometimes as many as 6 b, about as long as 3-P; 5-P single, strongly developed, about 2 × as long as head; 6-P single, similar to 5-P but slightly shorter; 7-P 2-4 b, usually 3 b, longer and stronger than 4-P; 8-P double, about as long as 7-P; 9,10-P single, weaker and shorter than 8-P; 12-P single, strong, and much longer than 9,10-P; 14-P short, single. *Abdomen*. Hairs 1-III-VI double or triple, as long as or longer than respective segments; 6-I 3-4 b; 6-II 3-4 b, slightly shorter than 6-I; 6-III-VI double, longer than 6-I; 7-I double, about as long as 6-I; 7-II-V multiple, short; 7-VI,VII single; 13-II,VI short, multiple, dendritic;

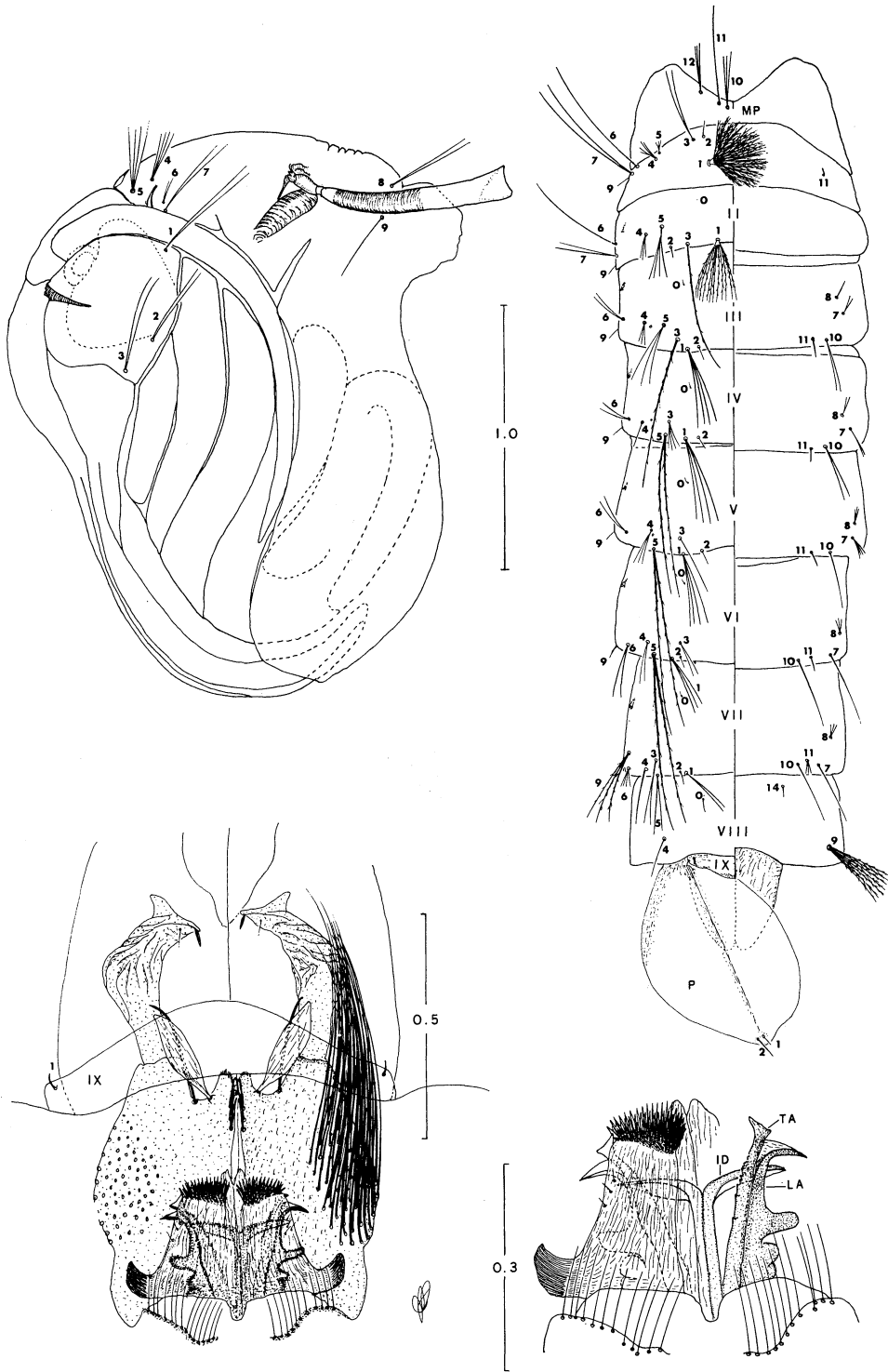


FIG. 1. *Culex (Culex) banksensis*, n. sp.: Pupa. Male genitalia within pupal pelt.

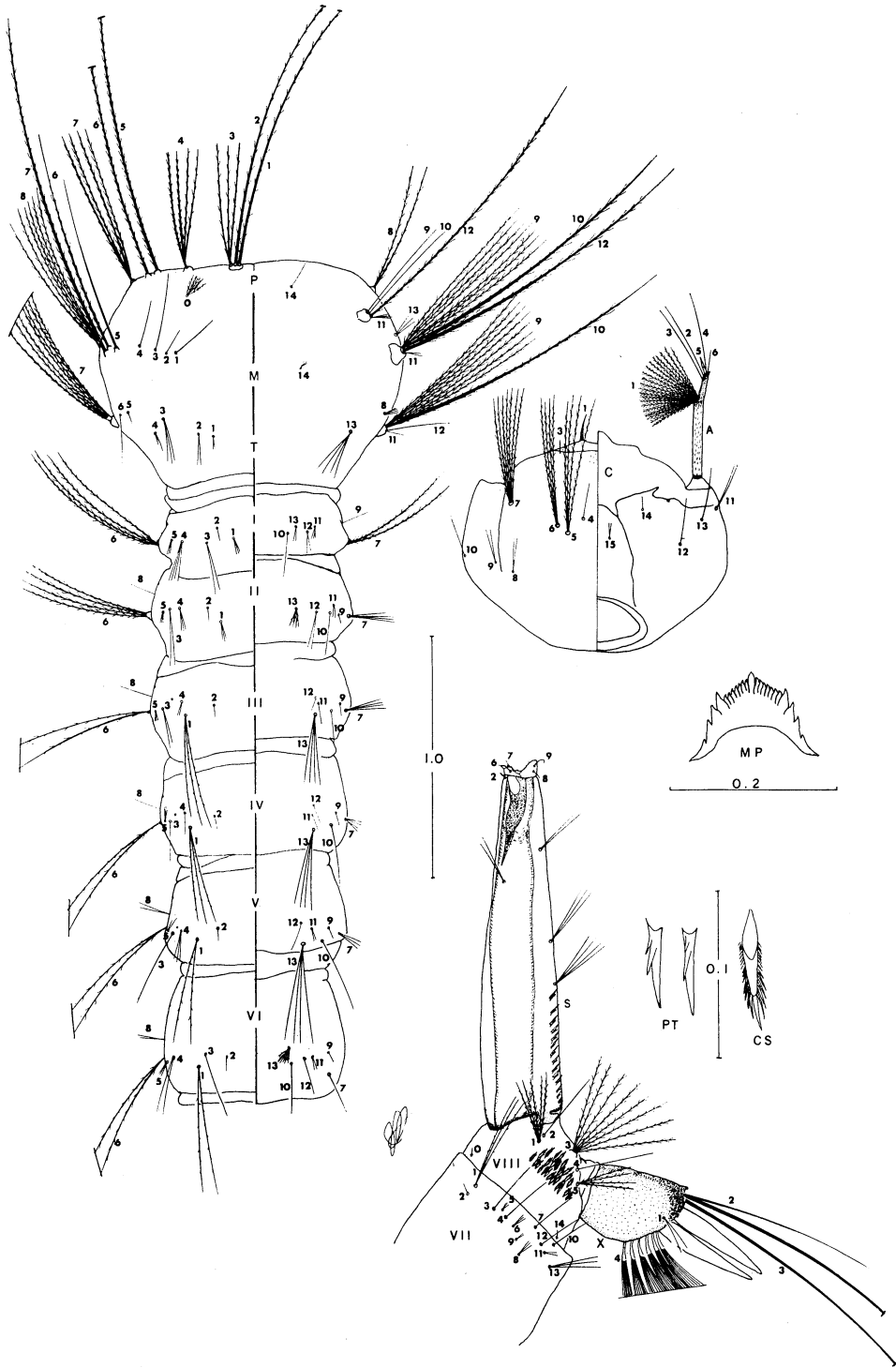


FIG. 2. *Culex (Culex) banksensis*, n. sp.: Larva.

13-III-V 4 b, about as long as 1-III-V. *Segment VIII*: comb scales in 3 irregular rows, range in number from 19-30, usually 23-27; fringe of scales distinctly strong, spine-like towards apex, central apical spine strongly differentiated. *Siphon*. Index about 4.8, with variations between 3.7 to 5.5; base with darkly pigmented ring; acus distinct, but not pigmented, attached to siphon. Pecten teeth usually 13-16 in number on basal 0.4 of siphon; larger teeth with 2 denticles, basal one small. Subventral hair tufts in 4 pairs, 1st 2 pairs slightly shorter than width of siphon at point of insertion; 1st pair 3-4 b, inserted slightly beyond pecten; 2nd pair also 3-4 b; 3rd or subapical pair 2 b, distinctly out of line; apical pair 2-3 b. *Anal segment*. Saddle complete, generally moderately pigmented, with distinct spicules on dorsal and caudal margin; 1-X single or double, about 0.5 width of saddle; 2-X usually double, rarely triple; 3-X single and strong; ventral brush (4-X) in 6 pairs, multiple, all on grid; gills about as long as or longer than saddle.

MATERIAL EXAMINED. 1 ♀ reared from a pupa, 11 pupae (P), 2 pupal skins (p), and 92 larvae (L).

Holotype ♂ pupa (BISHOP 10,726), NEW HEBRIDES: Banks Islands: Gaua I, Qeteqavit, 18.VIII.71, collected in small treehole in forest, shade, M. Maffi (MM-710818/6, slide 7). Paratypes, all from NEW HEBRIDES: Banks Islands, collected in August 1971 by M. Maffi (MM) and a single collection of 11 October 1975 by E. Wurvegqeat (EW), technician, National Malaria Service, New Hebrides: 1 p, 14 L, Vanua Lava I, Vetiboso, 12.VIII.71, ample hole on mango stump, sun-shade (MM-710812/1); 1 P, 11 L, Vanua Lava I, Sola, 13.VIII.71, small hole on tree stump, sun-shade (MM-710813/2); 5 L, Mota I, Tugetap, 14.VIII.71, coconut husk (MM-710814/2); 2 L, Gaua I, Namasari-Lempot path, 16.VIII.71, basin-shaped block of lava, sun (MM-710816/3); 14 L, same locality and date as preceding, treehole of *Artocarpus* sp., sun-shade (MM-710816/4); 2 P, 6 L, Gaua I, Ontar-Qeteqavit path, 17.VIII.71, treehole in forest, shade (MM-710817/2); 23 L, Gaua I, Qeteqavit, 18.VIII.71, small treehole in forest, shade (MM-710818/6); 6 P, 7 L, same locality and date as preceding, ample hole on coconut stump, sun-shade (MM-710818/7); 1 ♀ with associated pupal skin, 5 L, same data as MM-710812/1, except 11.X.75, E. Wurvegqeat (EW-751011/1); (all material deposited in Bishop Museum).

SYSTEMATICS. The female of *Cx. banksensis* keys out to *pipiens* group according to Belkin's key (1962: 185), but will not go further than to *Cx. atriceps* Edwards in the key by Mattingly & Rageau (1958: 248). It superficially resembles *Cx. pacificus* Edwards, but differs in lacking complete pale tergal abdominal bands and in having a small patch of light golden brown or coppery scales laterad of posterior dorsocentrals on mesonotum.

Based on genitalic characters of incipient male imagoes within the pupal pelt, *Cx. banksensis* fits the *trifilatus* subgroup of the *pipiens* group, as defined by Belkin (1962: 198). The genitalia are most similar to those of *Cx. pacificus*, but can easily be differentiated as follows: clasper with a crest near apex; inner division (ID) of phallosome more angled in *Cx. banksensis* and tergal arm (TA) of outer division sparsely dentate on inner margin. The IX tergum has a single row of bristles, while there are 2 or 3 rows in *Cx. pacificus*.

The pupa would key out to *atriceps* group in Belkin's key (1962: 187) by having abdominal hair 3-II, III single; however, in *Cx. banksensis*, this hair is distinctly longer than its

TABLE 1. Collection data of *Culex (Culex) banksensis*, n. sp.

DATE & (CODE)	ISLAND & LOCALITY	BREEDING SITE	<i>Cx. (Cux.) banksensis</i>				ASSOCIATED SPECIES OF CULICIDAE			
			♀	L	P	p	<i>Cx. annu- lirostris</i>	<i>Ae. aobae</i>	<i>Ae. hebrideus</i>	<i>Tp. mela- nesiensis</i>
12.VIII.71 (710812/1)	Vanua Lava: Vetiboso	Large hole on mango stump; sun-shade		14	1	1		1♀*		13L, 6P
11.X.75 (751011/1)	Vanua Lava: Vetiboso	same site	1*	5		1		1L		5L, 4P
13.VIII.71 (710813/2)	Vanua Lava: Sola	Small hole on stump; sun-shade		11		1			5L, 4P	7L, 4P
14.VIII.71 (710814/2)	Mota: Tugetap	Coconut husk		5					1L	
16.VIII.71 (710816/3)	Gaua; Nemasari- Lempot	Basin-shaped lava block; sun			2**					
16.VIII.71 (710816/4)	Gaua: Nemasari- Lempot	Treehole, <i>Artocarpus</i> sp.; sun-shade		14						7L, 1P
17.VIII.71 (710817/2)	Gaua: Ontar- Qeteqavit	Treehole in forest; shade		6	2			2L		1♀*, 28L, 1p
18.VIII.71 (710818/6)	Gaua: Qeteqavit	Small treehole in forest; shade		23	1		1L			1♀*, 13L, 2P, 1p
18.VIII.71 (710818/7)	Gaua: Qeteqavit	Large hole on coconut palm stump: sun-shade		7	6					1♀*, 4P

*Rared specimens.

**3rd instar.

respective segment, shorter in *atriceps* group. In addition, the characteristically long and slender trumpet would immediately differentiate *Cx. banksensis* pupae from any species in the *atriceps* group, as well as from any other species in subgenus *Culex* of the South Pacific. The shape of the paddle in *Cx. banksensis* resembles that of *Cx. atriceps*.

Mattingly & Rageau (1958: 248, 249) and Belkin (1962: 188, 192) pointed out the significance of the strong median denticle of the comb scales in differentiating *Cx. pacificus* from other species. In this respect, *Cx. banksensis* larva resembles *Cx. pacificus*, but the fringe hairs towards the apex of each comb scale are better developed in *Cx. banksensis*. The chaetotaxy is also similar to *Cx. pacificus*, but can readily be differentiated as follows: thoracic hair 3-P 2-3 b and markedly shorter than 1-P, 4-P 3-4 b subequal to 3-P; comb scales fewer in number (19-30, usually 23-27; more than 30 in *Cx. pacificus*); and pecten teeth with never more than 2 basal denticles (sometimes 3 in *Cx. pacificus*).

There seems no doubt that *Cx. banksensis* is a distinct species. While it possesses substantial characters which align it with members of the *pipiens* group, more specifically with the *trifilatus* subgroup by male genitalia, it also has some characters which are reminiscent of the *atriceps* group. Morphology and habitats strongly indicate a close relationship with *Cx. pacificus*, an aberrant member of the *trifilatus* subgroup (Belkin 1962: 189) of the *pipiens* group. In view of this, we are placing *Cx. banksensis* in the *trifilatus* subgroup until more is known of the subgenus *Culex* of the South Pacific.

BIONOMICS (TABLE 1): *Cx. banksensis* is predominantly a treehole breeder. It has been found in association with *Aedes aobae* Belkin, *Ae. hebrideus* Edwards, and *Tripteroides melanesiensis* Belkin, most frequently with the latter species; an association with a single larva of *Cx. annulirostris* Skuse is probably accidental. On one occasion, larvae (3rd instar) were collected in a basin-shaped block of lava stone with clear water in the open, and on another occasion, in a coconut husk. Adults were never captured and probably do not attack man.

DISTRIBUTION. Known only from the Banks Islands in New Hebrides (Gaua I, Mota I, and Vanua Lava I).

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