ARADIDAE IN THE BISHOP MUSEUM, HONOLULU VII. (Hemiptera: Heteroptera)¹

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Abstract: Additional Oriental and Pacific Aradidae from Bishop Museum are treated in this installment, with following species described as new: Aneurus granuliger (New Guinea), Arbanatus grandis (N Borneo), Artabanus solomonensis (Solomon Is), Neuroctenus pygmaeus (Samoa), Proxius (Nesoproxius) constrictus and Trigonaptera scabrosa (New Guinea). A specimen belonging to Deutsches Entomologisches Institut, Neuroctenus sauteri (Taiwan), is also described as a new species. Arbanatus parallelus (Van Duzee, 1932) is redescribed.

Additional Aradidae in the collections of the Bishop Museum in Honolulu, Hawaii, and the Deutsches Entomologisches Institut in Berlin, Germany, contained 7 new species, which are described in this paper.

Of particular interest was a new species, *Neuroctenus pygmaeus*, from American Samoa. It is the easternmost record for this genus in the South Pacific. So far this genus was not recorded east of a line running from the Marianas, through New Guinea, Bismarck Arch. and the Solomon Is. East of this line it is replaced by the genus *Ctenoneurus* Bergroth, 1887.

The small, apterous genus *Trigonaptera* Matsuda & Usinger, 1957 had only 2 species, recorded from the Palau Is and the Philippines. Now a 3rd species is described from New Guinea.

The length of the abdomen in macropterous species, for convenience, was taken from the tip of the scutellum to the tip of the hypopygium, or segment IX in females, with the exception of *Trigonaptera*, where it was taken from the hind border of the metanotum to the tip of segment IX. In the ratios, the 1st figure represents the length and the 2nd the width of the measured portion (25 units=1 mm).

SUBFAMILY ANEURINAE

GENUS Aneurus Curtis, 1825

Aneurus granuliger Kormilev, new species FIG. 1-2

Q. Elongate ovate; head, pronotum and scutellum distinctly granulate.

Head slightly shorter than its width across eyes (16:17). Anterior process strong, conical, rounded anteriorly, reaching tip of antennal segment I. Antenniferous tubercles with spiniform tips exteriorly. Eyes large, facets minute and convex. Postocular tubercles conical, finely granulate, reaching outer borders of eyes. Vertex transversely rugose; infraocular callosities large, ovate, uneven. Antennae strong; antennal segments I and II, fusiform, the latter petiolate; III, subcylindrical, slightly tapering toward base, petiolate; IV, missing. Relative length of antennal segments I to III: 6.5:6.5:7:-. Labium reaching slightly beyond line connecting hind borders of eyes.

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Pronotum less than 1/2 as long as its maximum width (18:42). Collar very thin, truncate; anterolateral angles rounded and produced forward slightly beyond collar; lateral borders of fore lobe straight and converging forward; lateral borders of hind lobe parallel at humeri, rounded and converging anteriorly. Hind border widely sinuate medially, convex laterally. Fore disc with 4 (2+2) curved callosities and laterad of them with 2 (1+1) narrow, low ridges. Hind disc densely granulate, granules mostly arranged in transverse rows. *Scutellum* shorter than its basal width (16.5:28), densely and more roughly granulate than pronotum; granules arranged in transverse rows at base, concentric rows along lateral borders. *Hemelytra* reaching 1/2 of tergum VII; corium reaching 1/2 of scutellum exteriorly and only 1/4 interiorly, indistinctly separated from membrane; the latter transparent and wrinkled. *Abdomen* ovate, longer than its maximum width across segment IV (74:55); PE-angles (posteroexterior) of connexiva not protruding; paratergites very short, rounded, reaching 1/2 of truncate segment IX. Tergum VIII slightly narrower than width of head across eyes (16:17). Spiracles II and VIII lateral, III to VII ventral.

Color: reddish brown, eyes red.

Total length 5.06 mm; width of pronotum 1.68 mm; width of abdomen 2.20 mm.

Holotype Q (BISHOP 10,629), PNG: New Guinea (NE): Morobe Distr., Mt Kaindi, 2100-2200 m, 2.VII.1971, J. Sedlacek.

Aneurus granuliger, n. sp. differs from all other Oriental and Pacific species by having spiracles VII ventral and not visible from above.

SUBFAMILY CARVENTINAE

GENUS Proxius Stal, 1873

SUBGENUS Nesoproxius Usinger & Matsuda, 1959

Proxius (Nesoproxius) constrictus Kormilev, new species FIG. 3-4

 σ . Elongate, widening posteriorly to segment III, constricted at IV, again widening at V, then narrowing from VI. Head, pronotum, scutellum, connexivum, pleurae and venter partially incrusted and punctured on incrustation.

Head shorter than its width across eyes (12.5:14), but maximum width is across postocular projections (15.5); hind border of head truncate. Anterior process long; genae spiniform, longer than clypeus and contiguous in front of latter, reaching 1/2 of antennal segment I. Antenniferous tubercles dentiform, acute, parallel, reaching basal 1/4 of antennal segment I. Eyes small, deeply inserted in head, their outer borders reaching base of postocular projections, which are angular, forming slightly acute angle. Vertex raised, forming a continuous ridge with clypeus. Head heavily incrusted, with exceptions of clypeus, antennae, labial atrium, labial groove and labium. The latter reaches hind border of labial groove, which is closed posteriorly. Antennae 2 × as long as width of head across eyes (29:14); relative length of antennal segments I to IV: 7.5:4:9.5:8. Antennal segment I clavate, II tapering toward base, III cylindrical, petiolate, IV fusiform. Pronotum subtrapezoidal, 1/2 as long as its maximum width (16:29.5); collar not discernible; anterolateral angles rounded, anterior and lateral borders of fore lobe forming an arc; lateral borders of hind lobe subparallel, slightly sinuate; hind border truncate, but posterior angles protruding like triangular processes. Fore disc inflated medially and laterally; median ridge gibbous, narrowed and declivous posteriorly, flanked by 6 (3+3) callous spots. Lateral borders inflated, C-shaped, with 1 linear and 1 round callous spot on each side interiorly. Hind disc with scalelike, incrusted granulation, with exception of transverse streak with 3 promontories anteriorly, which is not incrusted. Scutellum subtriangular, shorter than its basal width (12.5:18), its basal border weakly sinuate, lateral borders moderately rounded, tip rounded; disc with T-shaped, incrusted median ridge, and with 2 (1+1) lateral incrusted fields, contiguous with median ridge posteriorly. Hemelytra reaching 2/3 of tergum VII; corium reaching slightly beyond fore border of connexivum IV, its basolateral border reflexed and incrusted, apical border sinuate interiorly and convex exteriorly; apical

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angle acute. Membrane large, with 7 oblique, parallel veins. *Abdomen* longer than its maximum width across segment V (57.5:39), its lateral borders convex on segments II and III, constricted at IV, again convex at V to VII; connexiva II and III fused together; PE-angles of connexiva not protruding; PE-VII rounded, forming an obtuse angle. Connexiva heavily incrusted, with exception of connexivum IV exteriorly, and round, callous spots, 4 (2+2) on each segment from III to VII. Tergum VII raised posteriorly and incrusted only anteriolaterally. Paratergites incrusted, reaching 1/2 of hypopygium. The latter caudal in position, as long as wide (7:7), strongly decliveous and with inflated median ridge on apical 1/2, which is not incrusted. Venter with a curious, lattice-shaped incrustation, leaving square, naked surfaces. Spiracles II to V ventral, remote from border; VI and VII lateral and visible from above, VIII terminal. *Legs* not incrusted.

Color: yellow-brown, incrustation ochraceous.

Total length 3.10 mm; width of pronotum 1.18 mm; width of abdomen 1.56 mm.

Holotype O (BISHOP 10,630), PNG: New Guinea (NE): Morobe Distr., Wau, Bulldog Rd, 2000-2400 m, 23.V.1967, on Sauraia, J. L. Gressitt.

Proxius (Nesoproxius) constrictus, n. sp. is related to P. (N.) hexagonalis Kormilev, 1968, but is smaller, with postocular borders diverging and angularly produced and the lateral borders of hind lobe of pronotum subparallel.

GENUS Trigonaptera Matsuda & Usinger, 1957

Trigonaptera scabrosa Kormilev, new species FIG. 5

Q. Apterous. Elongate, widening posteriorly until segment IV, then narrowing again until posteroexterior angles of connexivum VII; hind border of tergum VII and connexiva VII together forming a sinus. Pro-, meso- and metanotum, laterally, and connexivum, with irregular pattern of thin, twisted ridges and excavations, looking scabrous. Antennal segment I, postocular borders, exterior borders of notum and connexivum, femora and tibiae, very finely and sharply serrate. Body covered with brown incrustation. Anterior process of head reaching 1/5 of antennal segment I; labium not reaching hind border of a shallow, closed posteriorly, labial groove. Tergum I completely fused with central mesometanotal plate, and badly discernible. Terga II to VI forming a pentagonal central dorsal plate (tergal plate of Matsuda & Usinger); terga II and III completely fused, forming a hump, which is deeply punctured; terga IV to VI raised medially and sloping laterally, having usual pattern of ridges and callous spots. Exterior borders of connexiva II to VI slightly convex, VII sinuate; PE-VII forming almost a right angle. Tergum VII slightly raised posteriorly, scabrous. Tergum VIII placed on a lower level; paratergites protruding and slightly converging, reaching 1/2 tricuspidate segment IX. Spiracles II to VII lateral and visible from above; VIII dorsolateral. Venter scabrous.

Measurements: head 18:17; relative length of antennal segments I and II (III and IV missing): 15:6:-:-; pronotum 11:28; width of mesonotum 36; width of metanotum 44; abdomen 60:53 across segment IV; width of tergum VIII, 17.

Color: brown; antennae and legs yellow brown, but color of the body concealed under brown incrustation. Total length 4.32 mm; width of pronotum 1.12 mm; width of abdomen 2.12 mm.

Holotype Q (BISHOP 10,631), IRIAN: New Guinea (NW): Distr. Wisselmeren, Enarotadi, 1950-1900 m, 4.VIII.1962, J. Sedlacek.

Similar to *Trigonaptera glabra* Matsuda & Usinger, 1957, but slightly larger; connexiva II and III fused together. Matsuda and Usinger say (1957: 139): "This new genus is remarkable in having a pentagonal tergal plate, and in the fusion of the first three connexival segments." This is an error: only connexiva II and III are fused together, which is



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the case in the new species. On the drawing by Matsuda & Usinger (1957:138, Fig. 5b) it is clearly visible that connexiva III and IV are separated.

SUBFAMILY MEZIRINAE

GENUS Artabanus Stål, 1865

Artabanus solomonensis Kormilev, new species FIG. 6-7

or. Elongate ovate; fore lobe of pronotum with 1 rounded lobe anteriorly and 2 large, flat teeth anterolaterally. Body covered with sparse, short, curled hairs.

Head much longer than width across eyes (50:38); anterior process long, tapering and deeply cleft apically, genae much longer than clypeus, forming 2 prongs, reaching almost tip of antennal segment I. Antenniferous tubercles long, acute, bending outward and reaching basal 1/3 of antennal segment I. Eyes strongly protruding. Postocular borders converging backward in straight lines. Vertex raised and with a V-shaped row of fine granules. Infraocular callosities large, ovate. Antennae long, more than 2.5 × as long as width of head across eyes (106:38); relative length of antennal segments I to IV: 29:24:37:16. Labium not reaching hind border of labial groove, which is closed posteriorly. Pronotum less than 1/2 as long as maximum width (46:98). Collar carinate and sinuate anteriorly, separated laterally from anterior, rounded lobes by deep incisures. Anterolateral borders expanded and flattened, forming 6 (3+3) promontories: 2 (1+1) inner ones forming rounded lobes, mentioned previously; middle and outer promontories forming flat, acute teeth. Interlobal depression shallow, lateral notch rounded. Lateral borders of hind lobe rounded and slightly raised, hind border almost straight. Fore disc with 2 (1+1) ovate, flattened ridges, each bearing 2 curved callosities; laterad 2 (1+1) semiobliterated, elongate ridges. Hind disc finely granulate and $4 \times (2+2)$ depressed. Scutellum shorter than basal width (45:62); all borders carinate, lateral sinuate before apex, the latter rounded. Disc with thin median ridge, transversely rugose laterad. Hemelytra reaching 3/4 of tergum VII; corium reaching hind border of connexivum IV, basolateral border straight, carinate; apical border deeply sinuate interiorly, rounded exteriorly; apical angle acute. Membrane large, with raised, anastomosed veins. Abdomen slightly shorter than maximum width across lobes of segment VI (133:136). Lateral borders widening from II to VI, then abruptly narrowing. PE-angles of connexiva II to V progressively protruding, VI forming rounded lobes; VII terminating into narrow, apically rounded lobes. Tergum VII raised posteriorly for reception of a large, cordate hypopygium. Paratergites long, rounded apically and divaricating, reaching 2/3 of hypopygium; the latter shorter than maximum width (18:40), deeply sinuate at base, with a strong median ridge, produced posteriorly. Spiracles II to V ventral, placed far from border; VI sublateral, but not visible from above; VII dorsolateral and VIII lateral. Stridulation apparatus consisting of 1 long, sharp, raised carina on sternum IV, flanked by 2 (1+1) thinner and lower carinae and by 2 short carinae mesad of long carinae. Legs: hind femora with a strong tooth; other legs unarmed.

Color: brown, antennae yellow-brown.

Total length 11.00 mm; width of pronotum 3.92 mm; width of abdomen 5.44 mm.

Holotype O (BISHOP 10,632), SOLOMON IS: Santa Isabel: Maringe Distr., Tamatahi Molao, 30.VI.1966, C. W. O'Brien.

FIG. 1-13. 1-2, Aneurus granuliger, n. sp., Q: 1, head, pronotum and scutellum; 2, tip of abdomen from above. 3-4, *Proxius (Nesoproxius) constrictus*, n. sp., O: 3, head, pronotum and scutellum; 4, tip of abdomen from above. 5, *Trigonaptera scabrosa*, n. sp., Q, tip of abdomen from above. 6-7, Artabanus solomonensis, n.*sp., O: 6, pronotum; 7, tip of abdomen from above. 8, Neuroctenus pygmaeus, n. sp., Q, tip of abdomen from above. 9-10, Neuroctenus sauteri, n. sp., Q: 9, head and pronotum; 10, tip of abdomen from above. 11-13, Arbanatus grandis, n. sp.: 11, O, head and pronotum; 12, O, tip of abdomen from above. 13, Q, tip of abdomen from above.

Pacific Insects

Artabanus solomonensis, n. sp. is related to A. sinuatus Stål, 1873 [=A. doreicus (Walker, 1873) (both these species are conspecific and both were published in 1873, but I was unable to find out which of them has priority?)], but may be separated by different shape of pronotum and posterior 1/2 of abdomen.

GENUS Neuroctenus Fieber, 1861

Neuroctenus pygmaeus Kormilev, new species FIG. 8

Q. Elongate, widening until segment IV, then narrowing.

Anterior process of head reaching tip of antennal segment I; antenniferous tubercles blunt; postocular robust, blunt, reaching, or slightly passing, outer borders of eyes. Fore lobe of pronotum very finely punctured, with a minute median sulcus; hind lobe finely, transversely rugose medially. Anterolateral angles rounded and carinate, not produced; lateral notch shallow, forming an obtuse angle; lateral borders of hind lobe slightly convex and minutely crenulate. Basal 1/3 of scutellum minutely, longitudinally striate, apical 2/3 obliquely striate; median ridge narrow and low, transversely rugose. Abdomen elongate ovate; PE-angles of connexiva barely protruding, PE-VII angular; exterior borders minutely serrate from V to VII, on II to IV almost obliterated. Connexiva II and III fused. Paratergites large, subtriangular, rounded apically; segment IX minute, rounded apically.

Measurements: head longer than width across eyes 15:16; relative length of antennal segments I to IV: 4.5:4.5:5:7.5; pronotum 10:27; scutellum 13:17.5; abdomen 57.5:32; width of tergum VIII 14; segment IX 2:5.

Color: yellow-brown to testaceous; eyes dark brown, membrane white, pellucid.

Total length 4.00 mm; width of pronotum 1.08 mm; width of abdomen 1.28 mm.

Holotype ♀ (BISHOP 10,633), AMERICAN SAMOA: Tutuila, Mulinau, 8.XII.1963, T. C. Maa.

Closely related to *Neuroctenus minusculus* Kormilev, 1971, from Borneo and Java, but smaller; female is only 4.00 mm long. The labium is relatively longer, and is distinctly produced beyond line connecting hind borders of eyes. Spiracles II to VII are ventral and are placed close to margin, but are not visible from above. Those of segment VIII are lateral and visible from above. The paratergites are longer, almost reaching tip of segment IX.

Neuroctenus sauteri Kormilev, new species FIG. 9-10

Q. Elongate ovate, roughly and densely granulate.

Head as long as width across eyes (24:24); anterior process robust, constricted laterally, widening and rounded anteriorly, produced slightly beyond tip of antennal segment I. Antenniferous tubercles strong, acute, divaricating. Eyes small, protruding. Postocular tubercles minute, acute, not reaching outer borders of eyes. Vertex raised and granulate, infraocular carinae formed by a row of granules. Antennae thin and short, $1.4 \times as$ long as width of head across eyes (34:28); relative length of antennal segments I to IV: 10:7:10:8. Labium not reaching hind border of labial groove, which is closed posteriorly. *Pronotum* 1/2 as long as maximum width (21:43). Collar sinuate anteriorly and granulate; anterolateral angles rounded, not produced forward and only slightly sideways; lateral notch weak, sinuate; lateral borders of hind lobe convex, rounded, converging anteriorly; hind border evenly sinuate. Fore lobe with 4 (2+2) poorly developed ridges; both lobes densely granulate. *Scutellum* shorter than basal width (19:26); all borders carinate, lateral weakly sinuate before tip; tip rounded. Disc densely granulate; median ridge cross-shaped, poorly developed. *Hemelytra* not reaching hind border of tergum VI; basolateral borders of corium straight, reflexed; apical border 2×sinuate; apical angle acute; disc of corium densely granulate. *Abdomen* ovate, longer than maximum width across segment IV (66:53); PE-angles of connexiva II to VI slightly protruding, PE-VII rounded. Paratergites subtriangular, reaching 3/4 of segment IX. Spiracles II to VI ventral, VII and VIII lateral and visible from above. Venter convex.

Color: ferrugineous, corium darker; membrane light brown with piceous veins and ochraceous at base. Total length 5.32 mm; width of pronotum 1.72 mm; width of abdomen 2.12 mm.

Holotype Q (Deutsches Entomologisches Institut, Berlin), TAIWAN (Formosa): Pilam, I.1908, H. Sauter.

This species is dedicated to the memory of H. Sauter, who collected many new species of Aradidae in Taiwan early in this century.

Neuroctenus sauteri, n. sp. is related to N. dybasi Kormilev, 1971, from the Palau Is, but antennal segment I is distinctly longer than II and as long as III; paratergites reaching 3/4 of segment IX.

GENUS Arbanatus Kormilev, 1955

Arbanatus grandis Kormilev, new species FIG. 11-13

σ. Elongate ovate; head, antennae, pronotum, hypopygium and femora granulate; scutellum roughly, transversely rugose; connexiva V to VII progressively sinuate exteriorly, exterior borders look sinuous.

Head shorter than width across eyes (17.5:19). Anterior process conical, truncate anteriorly, genae as long as clypeus, reaching 1/2 of antennal segment I. Antenniferous tubercles with pointed tips, divaricating. Eyes. large. Postocular borders rounded. Vertex raised and granulate, infraocular callosities large, ovate. Antennae strong, 2× as long as width of head across eyes (39:19); antennal segment I clavate, II and III tapering toward base, IV fusiform. Relative length of antennal segments I to IV: 10:7:12:10. Labium reaching hind border of labial groove, which is open posteriorly. Pronotum about 1/2 as long as maximum width (22.5:43). Collar thin, truncate anteriorly; anterior borders laterad of collar straight, anterolateral angles rectangular; lateral borders of fore lobe parallel, lateral borders of hind lobe subparallel at humeri, strongly converging anteriorly; hind border truncate. Fore disc deeply depressed medially, depression not reaching collar, flanked by 2 (1+1) subovate ridges, bearing ovate callosities; another 2 (1+1) callosities placed anterolaterad of ridges and touching them. Hind disc roughly granulate, roundly raised medially and laterally. Scutellum shorter than basal width (15:23); all borders carinate; median ridge high, cross-shaped; disc roughly, transversely rugose. Hemelytra reaching hind border of tergum VII; corium reaching beyond hind border of connexivum II, its basolateral border carinate, straight; apical angle extended into a point, apical border 2 × sinuate. Membrane large, with anastomosed veins. Abdomen ovate; connexiva II and III fused; PE-angles of connexiva IV to VI slightly protruding, PE-VII forming an obtuse angle. Paratergites clavate, reaching basal 1/3 of a conical hypopygium; the latter as long as maximum width (11:11). Spiracles II lateral and visible from above, III to VII ventral, progressively nearer border; spiracles VII slightly visible from above; VIII lateral. Legs unarmed.

Color: piceous.

Total length 5.20 mm; width of pronotum 1.72 mm; width of abdomen 2.12 mm.

Q. Similar to σ . Anterolateral angles of pronotum slightly obtuse, lateral borders of fore lobe slightly converging. Paratergites angular, reaching 1/3 of a tricuspidate segment IX. *Measurements*: head shorter than width across eyes (20:22), relative length of antennal segments I to IV: 11:7.5:13:12, pronotum (26:53), scutellum (20:29), width of abdomen 60.

Total length 6.12 mm; width of pronotum 2.12 mm; width of abdomen 2.40 mm.

Holotype & (BISHOP 10,634), BORNEO (SABAH): Tenompok, 12.II.1959, light trap, T. C. Maa; allotype Q (BISHOP), Tenompok, 48 km E of Jesselton, 1460 m, 10-19.II.1959, T. C. Maa; paratype, 1 &, collected with allotype (Kormilev collection).

1978

Arbanatus grandis, n. sp. is one of the largest species in this genus; it is related to A. *inermis* Kormilev, 1955, from Fukien, China, but is slightly larger, antennal segment IV is relatively longer (as long as I), the lateral borders of pronotum are sinuate, and the exterior borders of connexiva V to VII are also sinuate.

Arbanatus parallelus (Van Duzee, 1932)

Ctenoneurus parallelus Van Duzee, 1932, Bull. Bishop Mus. 98: 178.

Pictinellus parallelus: Usinger & Matsuda, 1959, Class. Aradidae, p. 290.

Pictinellus telmae Kormilev, 1966, Proc. Ent. Soc. Wash. 68(4): 306.

Arbanatus parallelus: Kormilev, 1971, Pac. Ins. Mon. 26: 152.

Original description of Van Duzee is a little vague, so I am giving a redescription. This species is rather variable.

 σ (redescription). Anterior process of head conical, reaching 1/2 of antennal segment I; antenniferous tubercles strong, acute, divaricating; postocular borders rounded. Anterolateral angles of pronotum produced forward, angular; lateral borders weakly sinuate; hind border widely sinuate; posterior angles slightly produced, rounded. Fore disc with a deep median sulcus, flanked by 2 (1+1) subtriangular ridges, and further laterad by 2 (1+1) narrow, longitudinal ridges, each with a row of fine granules. Hind disc granulate. Scutellum transversely rugose; median ridge narrow, cross-shaped; tip subacute. Hemelytra not reaching hind border of tergum VII; basolateral borders of corium straight, reflexed; apical angle acute, reaching slightly beyond connexivum II; apical border almost straight, barely sinuate interiorly. Abdomen with subparallel borders; PE-angles of connexiva II to IV not protruding, V to VI slightly protruding; PE-VII rounded. Connexiva II and III fused; exterior borders of connexiva VI and VII slightly sinuate. Paratergites short, clavate; hypopygium obovate, with short, strong, median ridge. Spiracles II lateral and visible from above; III to VII ventral, placed moderately close to margin; VIII terminal.

Measurements: head shorter than width across eyes 11:12; relative length: antennal segments I to IV, 7:3:7.5:7.5; pronotum, 13:27.5; scutellum, 14:16; abdomen, 45:31; hypopygium, 5:7.5.

Color: light ferrugineous to testaceous; membrane brown.

MATERIAL EXAMINED. 1 °, MARQUESAS IS, Uapou I, Vaikokoo, Paaumea Valley, 1850 ft (564 m), 30.XI.1931, in log of *Hibiscus tiliaceus*, Le Brounec (Pacific Entomological Survey).

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