

INSECTS OF MICRONESIA

Homoptera: Aleyrodidae

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The family Aleyrodidae is an extensive group of insects which thrive in continental tropics. In contrast, these insects are much restricted in species in oceanic islands. In fact, only eight species are now known to occur in all of Micronesia. Further collecting will no doubt reveal additional ones, but probably very few.

In 1931 the late Dr. Kuwana described *Aleurocanthus palauensis*, which was the first species to be recorded from Micronesia. I have added (1936-1942) six species based upon the collections made by Professor T. Esaki, and in 1943 Sampson [Ent. Americana, n. ser. 23(3): 210] erected the genus *Metaleyrodes* for *Aleyrodes oceanica* Takahashi from Ponape. Swezey listed *Neomaskellia bergii* (Signoret) from Guam in 1942 (Insects of Guam, B. P. Bishop Mus., Bull. 172: 231).

Among the species known from Micronesia, four are polyphagous and almost tropicopolitan and seem to be introduced species, whereas the remaining four—*Aleurocanthus palauensis* Kuwana, *A. esakii* Takahashi, *Xenaleyrodes artocarpi* Takahashi, and *Metaleyrodes oceanica* (Takahashi)—are restricted in food plants and are indigenous to this region. *Aleurocanthus* is well represented in the southeastern part of Asia, whereas *Xenaleyrodes* and *Metaleyrodes* are monotypic and are found nowhere else. The phylogenetic relationships of these two genera are not clear at present. *Aleurocanthus esakii* and *A. palauensis* are related species, but are isolated by different food plants.

The present report is based upon material from various sources, which include Bernice P. Bishop Museum, the Pacific Science Board, the United States National Museum, the United States Bureau of Entomology and Plant Quarantine at Honolulu, the Trust Territory of the Pacific Islands, Hawaiian Sugar Planters' Association, and Kyushu University.

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I wish to express my gratitude to the above-mentioned institutions and organizations for the opportunity of studying the material, and to Dr. J. L. Gressitt for his valuable help. Also, I am grateful to E. C. Zimmerman and to the University of Hawaii Press for the loan of some of the illustrations used in this paper.

Distribution of Micronesian Aleyrodidae

	ISLAND GROUPS										Other localities
	Mariana Is.				Caroline Is.						
	Pagan	Saipan	Rota	Guam	Palau	Yap	Truk	Ponape	Kusaie		
1. <i>Dialeurodes kirkaldyi</i>		×	×	×	×	×		×			circumtropical
2. <i>Metaleyrodes oceanica</i>								×			
3. <i>Bemisia gossypiperda</i>		×			×			×			almost cosmopolitan
4. <i>Aleurocanthus esakii</i>					×						
5. <i>A. palauensis</i>					×						
6. <i>A. spiniferus</i>				×			×				almost circumtropical
7. <i>Xenaleyrodes artocarpi</i>					×						
8. <i>Neomaskellia bergii</i>	×		×	×	×	×	×	×	×		circumtropical

FAMILY ALEYRODIDAE

This family is represented in Micronesia by the subfamily Aleyrodinae alone.

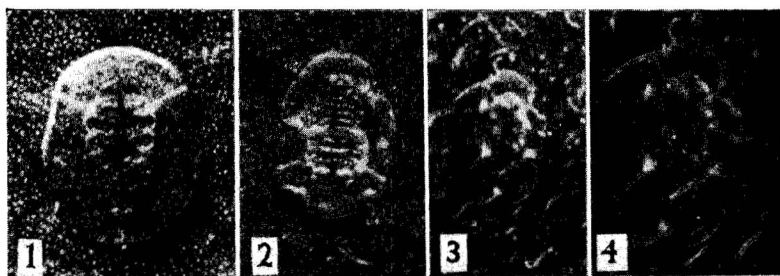
KEY TO MICRONESIAN GENERA

1. Pupa case with many long slender setae arranged in a row on submarginal area around body; its vasiform orifice short, much broader than long, with lingula stout and broader than long. Adult with claspers rounded apically; last antennal segment not narrowed distally and blunt at tip; forewings with dark patches.....**Neomaskellia**
- Pupa case without long slender setae arranged in a row around body, its vasiform orifice subcordate, subcircular or triangular, with lingula much longer than wide, or concealed under operculum and not visible. Adult with claspers pointed apically, its last antennal segment slender, narrowed or tapering apically; forewings various (adult unknown in *Metaleyrodes*)..... 2
- 2(1). Pupa case with many prominent spinelike submarginal tubercles arranged in a row around body. Adult with last antennal segment much narrowed and tapering on more than the distal one-third and provided with a long stout seta which arises from basal stout part and reaches apex of segment; wings whitish.....**Xenaleyrodes**
- Pupa case without such submarginal tubercles in a row around body. Adult lacking such a long stout seta on last antennal segment..... 3

- 3(2). Pupa case with many prominent spines on dorsum and with prominent marginal teeth. Wings mostly or entirely blackish or dark brownish....**Aleurocanthus**
Pupa case without such spines on dorsum, with small or indistinct marginal teeth. Wings whitish..... 4
- 4(3). Pupa case with distinct tracheal pores, its seventh abdominal tergite nearly as long as sixth, its vasiform orifice subcordate, with lingula concealed.....
..... **Dialeurodes**
Pupa case without tracheal pores, its seventh abdominal tergite shortened or obscured at median part, much shorter than sixth; its vasiform orifice triangular, with lingula exposed..... 5
- 5(4). Pupa case with vasiform orifice elongated and distinctly longer than wide; its lingula large, with distal knobbed part elongated and pointed at posterior end; its caudal ridges usually well developed..... **Bemisia**
Pupa case with vasiform orifice not elongated; its lingula shorter, with distal knobbed part almost globular and not pointed at posterior end; its caudal ridges never developed..... **Metaleurodes**



a



b

FIGURE 1.—a, *Dialeurodes kirkaldyi*: pupal cases on leaf of *Morinda citrifolia* (after Zimmerman, 1948, *Insects of Hawaii* 5: fig. 17). b, *Dialeurodes kirkaldyi*: 1, pupa of normal form on a smooth-leaved jasmine; 2-4, pupae with deformed margins growing among the hairs of a hairy-leaved jasmine [after Swezey, 1943, *Hawaiian Ent. Soc., Proc.* 11 (3): 269].

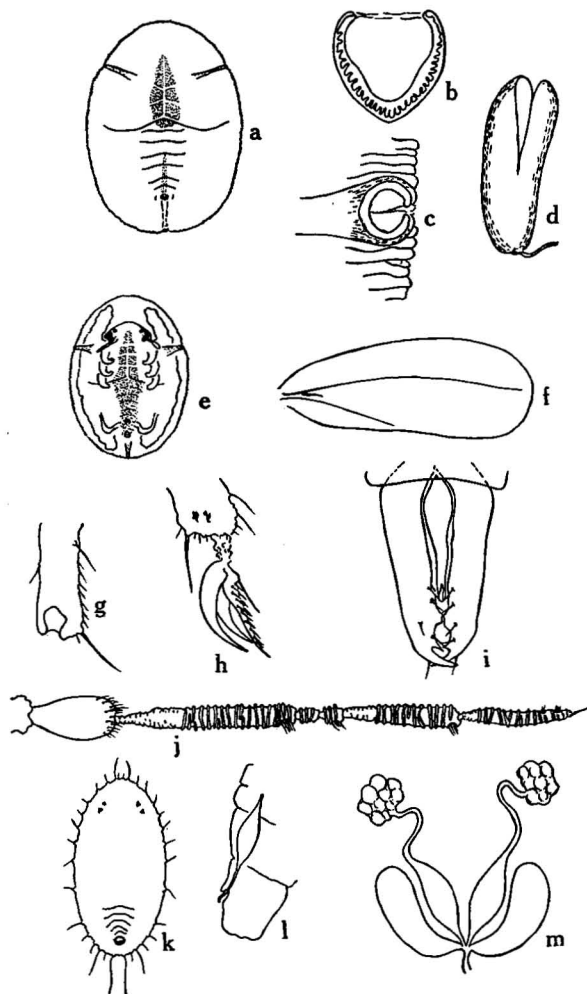


FIGURE 2.—*Dialeurodes kirkaldyi*: a, pupa; b, vasiform orifice; c, thoracic tracheal pore; d, egg; e, pupa with developing adult showing through; f, forewing; g, apex of tarsus of adult; h, claw of adult; i, male genitalia; j, antenna; k, first instar nymph; l, vasiform orifice of male showing rectum; m, internal reproductive organs of male. (After Zimmerman, 1948, *Insects of Hawaii* 5: fig. 18, redrawn from Quaintance and Baker, 1917.)

Genus **Dialeurodes** Cockerell1. **Dialeurodes kirkaldyi** (Kotinsky). (Figures 1, 2.)

Aleyrodes kirkaldyi Kotinsky, 1907, Bd. Comm. Agric. and Forestry, Div. Ent., Hawaii, Bull. 2: 95.

Dialeurodes kirkaldyi, Quaintance and Baker, 1914, U. S. Dept. Agric., Bur. Ent., Techn. Ser. 27 (2): 98.—Takahashi, 1936, *Tenthredo* 1 (2): 110; 1939, *Tenthredo* 2(3): 235; 1941, *Tenthredo* 3(3): 209.

This species superficially resembles *Dialeurodes citri* (Ashmead), but it can be differentiated from that species by the absence of a median tubercle in the vasiform orifice near the hind end and by the location of the eighth abdominal seta laterad of midlength of the vasiform orifice.

DISTRIBUTION: Micronesia, Hawaii, Formosa, Malaya, India, Egypt, British Guiana.

S. MARIANA IS. SAIPAN: Garapan, on jasmine and *Morinda citrifolia*, July 1939, T. Esaki. ROTA: South coast, Feb. 1936, Esaki. GUAM: Piti, on *Jasminum sambac*, July 1936, Swezey; Mt. Alutom, May, and Talofofu, June, on *Morinda citrifolia*, 1946, Townes; Pt. Oca, June 1945, G. Bohart and Gressitt; Santa Rita, Apr. 1946, and Yigo, Aug. 1952, on *Morinda*, Krauss.

PALAU. KOROR: On *Plumeria acuminata*, Jan. 1938, Esaki; many larvae on *Morinda*, Feb. 1953, many pupa cases on *Premna integrifolia*, July 1953, and on *Morinda*, Feb. 1936, Beardsley. NGERKABESANG (Arakabesan): On *Morinda*, July 1946, Townes.

YAP. YAP: Okao, on an undetermined plant, Sept. 1939, Esaki.

PONAPE: Colonia, on *Morinda*, Jan. 1938, Esaki.

HOSTS: *Morinda citrifolia*, *Plumeria acuminata*, *Premna integrifolia*, jasmine, *Beaumontia grandiflora*, *Hiptage madablota*, *Terminalia* sp., and other plants.

Genus **Metaleyrodes** Sampson2. **Metaleyrodes oceanica** (Takahashi). (Figure 3.)

Aleyrodes oceanica Takahashi, 1939, *Tenthredo* 2(3): 235.

Metaleyrodes oceanica, Sampson, 1943, Ent. Americana, n. ser. 23(3): 210.

"Pupa case: In dried specimens, pale yellowish brown, paler on the marginal area, lacking secretion. Broadly elliptic, or subcircular, a little longer than wide, flattened, thin, not constricted, distinctly indented at the hind end, broadest at the middle. Mid-thoracic suture not reaching the margin; meso- and metanota distinctly defined on the median area; suture between the thorax and abdomen far from reaching the margin; abdominal segments distinct on the median area, each with 4 small circular pores; the 7th segment with a pair of transverse sclerotised parts nearly at the middle. Dorsum a little more sclerotised around the vasiform orifice and along the caudal furrow, wanting long setae and papillae, with some very small circular pores scattered, many irregular lines running mesad from the margin, and with corrugations [a footnote states, "not discernible in some specimens"] except on the median area, which form indistinct reticulations on the submarginal area; a pair of very small setae present near the vasiform orifice as usual, a pair of very short setae nearly at the hind end. Thoracic tracheal folds not discernible, with no cleft and

pore, but with many minute dots. Caudal furrow very narrow, distinct, not expanded basally, much longer than the vasiform orifice, with no distinct markings. Marginal teeth small, indistinct, very shallow, rounded, much wider than long, irregular in shape and size, about 14 of them occupying a space of 0.092 mm. Vasiform orifice triangular, nearly as long as wide, not rounded on the lateral side, slightly notched at the hind end, not thickened on the margin, lacking teeth, with sculptures, the anterior marginal area not defined from the 8th abdominal segment. Operculum short, much wider than long, rounded on the side, truncate at the hind margin, occupying less than half the orifice. Lingula somewhat knobbed, not reaching the hind end of the orifice, the knobbed part longer than wide, rounded at the tip, not constricted. Venter with a pair of very large groups of minute dots on the middle part and with many similar dots on the median caudal part.

"Pupa case 0.92 mm. long, 0.808 mm. wide, vasiform orifice 0.055 mm. long, caudal furrow 0.12 mm. long, operculum 0.04 mm. wide, median segmented area of abdomen about 0.28 mm. wide at most." (Original description.)

DISTRIBUTION: Caroline Is.

PONAPE: Ninoani [Nghneni], on an undetermined plant, Jan. 1938, Esaki.

HOST: Unknown.

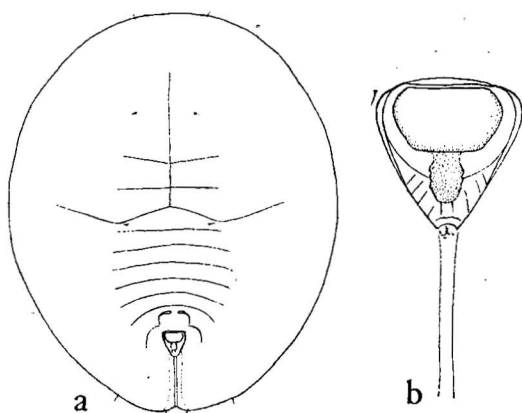


FIGURE 3.—*Metaleyrodes oceanica*: a, pupa case; b, vasiform orifice and caudal furrow of pupa case.

Genus *Bemisia* Quaintance and Baker

3. *Bemisia gossypiperda* Misra and Lamba (fig. 4).

Bemisia gossypiperda Misra and Lamba, 1929, Agric. Res. Inst. India, Bull. 196.

Bemisia tabaci Takahashi (not of Gennadius), 1936, Tenthredo 1(2): 110.

Dorsal setae of pupa case vary greatly in length in this species but are very small in all the specimens examined from Micronesia.

DISTRIBUTION: Micronesia, Japan, Formosa, Malaya, Sumatra, India, Mauritius, Madagascar, Africa.

S. MARIANA IS. SAIPAN: Garapan, on *Brassica oleracea*, Feb. 1936, Esaki.

PALAU. KOROR: Many pupa cases and adults on *Brassica oleracea*, Jan. and Mar. 1954, Beardsley.

PONAPE: Colonia, some pupa cases on sweet potato, Nov. 1953, Beardsley.

HOSTS: *Brassica oleracea*, sweet potato, soybean, eggplant, cotton, *Hibiscus*, and other plants.

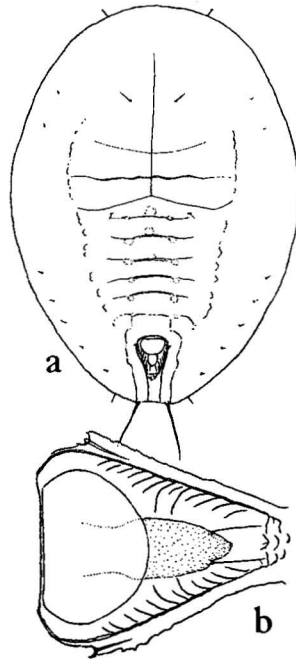


FIGURE 4.—*Bemisia gossypiperda*: a, pupa case; b, vasiform orifice.

Genus *Aleurocanthus* Quaintance and Baker

KEY TO MICRONESIAN SPECIES

1. Pupa case with posterior three submarginal spines on each side duplicated, without a median pair of spines on second and third abdominal tergites..... 2
2. Pupa case with submarginal spines not duplicated, with a median pair of spines on each of three basal abdominal tergites; wings blackish, with white patches.....
.....**spiniferus**
2. Pupa case with very long and slender submarginal spines, fifth and sixth abdominal tergites without a submedian pair of spines; wings dark throughout, without markings.....**palauensis**
- Pupa case with shorter submarginal spines, fifth and sixth abdominal tergites with a submedian pair of spines; adult unknown.....**esakii**

4. *Aleurocanthus esakii* Takahashi (fig. 5).

Aleurocanthus esakii Takahashi, 1936, *Tenthredo* 1(2): 111, fig. 1.

"Pupa case: Black, a little shining, strongly sclerotized, with much white wax only on the margin. Broadest on the 3rd abdominal segment, a little narrowed towards the front margin, not constricted, with many dorsal spines, many minute submarginal knobbed setae scattered, and 3 pairs of very short submarginal simple setae, as shown in the figure; the submarginal long dorsal spines blackish on the basal large and distal small parts, sharply pointed, stiff, very slightly widened basally, very long, obliquely notched on the distal part, the last 3 pairs usually doubled; the shorter dorsal spines on the median area broadened towards the base, stout, sharply pointed, curved, black; the knobbed submarginal setae stout, a little broadened towards the base, arising from very small circular dusky spots, paler on the distal part, the knobbed part much wider than long, truncate on the apex. Mid-thoracic suture reaching the margin; cephalothorax with no transverse suture; transverse suture between the thorax and abdomen not reaching the margin, produced anteriorly at the middle narrow part and pointed at the middle; abdominal segments faintly discernible, but the 7th segment distinct. Thoracic tracheal folds and clefts or pores, and caudal furrow absent. Marginal teeth small, in 2 rows; the upper teeth as long as or shorter than wide, slightly broadened towards the base, broadly rounded on the

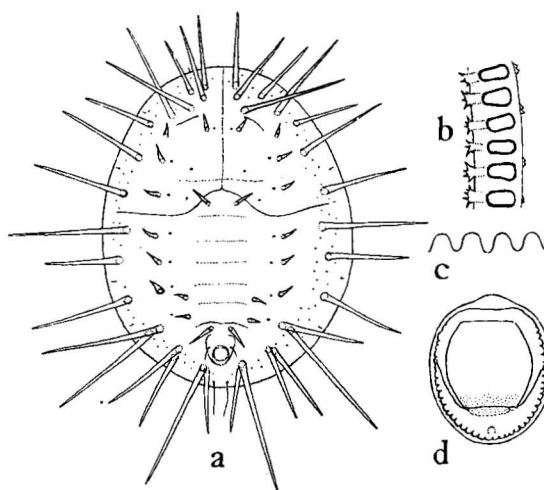


FIGURE 5.—*Aleurocanthus esakii*: a, pupa case; b, margin (venter); c, marginal teeth; d, vasiform orifice.

distal margin, distinctly separated from each other, variable in size, 7-10 teeth occupying a space of about 0.092 mm., spaces between the apices of the teeth as wide as the teeth; the lower teeth pointed apically, mostly wider than long, as large as the upper ones, mostly with some very small pointed spines, in some individuals directed mesad and on the venter of pupa case. Vasiform orifice eminently protruding, rounded, not notched, not thickened on the margin, as long as or very slightly longer than wide, with many minute pointed triangular teeth on the inner margin except on the anterior part; the anterior marginal area a little widened at the middle. Operculum occupying over two-thirds of the orifice. Lingula not exposed. Distance between the orifice and the hind end of pupa case as long as the orifice, when seen from above.

"Length of pupa case—about 1.02 mm., width of pupa case—about 0.73 mm., diameter of vasiform orifice excluding margin—about 0.065 mm., length of longer submarginal spine—about 0.37 mm., shorter median spine—about 0.07 mm., width of base of longer submarginal spine—about 0.019 mm., length of submarginal knobbed seta—0.009-0.0095 mm." (Original description.)

DISTRIBUTION: Caroline Is.

PALAU. KOROR: Arumizu-Arakasao [Ngarmid-Ngarekesauaol], Feb. 1936, Esaki; Aug. 1939, Esaki.

HOST: *Parinarium glaberrimum*.

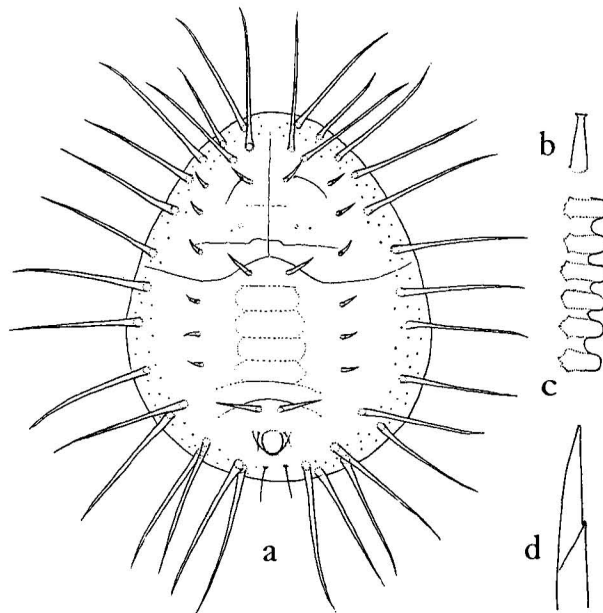


FIGURE 6.—*Aleurocanthus palauensis*: a, pupa case; b, submarginal minute seta; c, margin (venter); d, distal part of submarginal spine.

5. *Aleurocanthus palauensis* Kuwana (fig. 6).

Aleurocanthus palauensis Kuwana, 1931, Zool. Mag., Tokyo 43: 656, 659.

—Takahashi, 1939, Tenthredo 2(3): 237.

"Pupa case of female black, shiny; broadly oval. Submarginal area with seventeen pairs of very long, whip-like spines; spines on dorsum are short. Vasiform orifice prominent, being on a tubercle; operculum almost entirely fills the orifice obscuring the lingular." (Original description.)

Esaki's material and later material from Koror differ from Kuwana's description in the submarginal spines, which are stiff, sharply pointed apically, with a slight notchlike structure near the apex, and are not filiform distally.

DISTRIBUTION : Caroline Is.

PALAU. BABELTHUAP (Babeldaop) : Ngiwal, on *Barringtonia racemosa*, Feb. 1938, Esaki; Ulimang, one female, Dec. 1947, Dybas. KOROR : On breadfruit, Feb. 1936, Esaki; many larvae on breadfruit leaves, Feb. 1953, many pupa cases on breadfruit, Jan. 1953, and a few larvae and adults on a native shrub, Jan. 1954, Beardsley.

HOSTS : *Artocarpus incisus* (*communis*), *Barringtonia racemosa*.

Genus *Neomaskellia* Quaintance and Baker

8. *Neomaskellia bergii* (Signoret). (Figures 9, 10.)

Aleyrodes bergii Signoret, 1867, Soc. Ent. France, Ann. IV, 8: 395.

Neomaskellia bergii, Quaintance and Baker, 1914, U. S. Dept. Agric., Bur. Ent., Techn. Ser. 27(2) : 104.—Takahashi, 1936, Tenthredo 1(2) : 110; 1939, Tenthredo 2(3) : 235; 1941, Tenthredo 3(3) : 209; 1942, Tenthredo 3(4) : 349.—Gressitt, 1954, Insects of Micronesia 1: 186, 187.

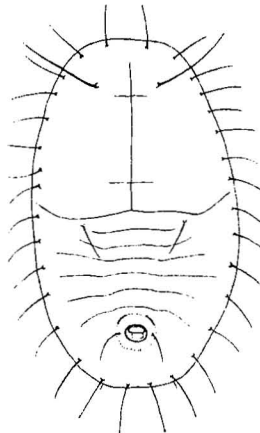


FIGURE 9.—*Neomaskellia bergii*, pupa case.

Pupa case: Elongate, elliptical, with 32 long setae arranged in a row along the body margin, and with long dorsal setae; its vasiform orifice distinctly protruding, much broader than long, with the operculum short and setose, its lingula stout, setose, exposed; caudal furrow and tracheal pores wanting. Wing markings very variable.

DISTRIBUTION : Micronesia, Fiji, Samoa, Java, Philippines, Formosa, Ryukyu, Malaya, India, Ceylon, Mauritius, Africa, San Thome.

N. MARIANA IS. PAGAN : Many adults on sword grass, July 1951, R. M. Bohart.

S. MARIANA IS. TINIAN : Camp Churo, on Napier grass, June 1946, Oakley. ROTA : Tatacho, Teteto-Sonson, 1937, Esaki. GUAM : Pago, Mt. Alifan, Mata, Sumay Road, 1936-1945; Mt. Tenjo, on *Miscanthus*, Dec. 1947, Dybas.

PALAU. BABELTHUAP: Ulimang, Arumonogui [Ngaremlengui], Ngarrard, Airai [Irrai], 1936-1948. KOROR: On ornamental grass, July 1946, Oakley; Nov. 1947, Dybas. NGERKABESANG (Arakabesan): On coarse grass, July 1946, Townes.

YAP. GAGIL-TOMIL: Gatzapar, Gagil, 1939-1952; Gagil, on sugar cane, July 1946, Oakley.

CAROLINE ATOLLS. LAMOTREK: Lamotrek I., on sugar cane, Feb. 1953, Beardsley. NUKUORO: Nukuoro I., on sugar cane, Aug. 1946, Townes.

TRUK. WENA (Moen, Wela): Mt. Teroken, 70-80 m. TONOAS (Dublon, Toloas): Erin, 1935-1953. FEFAN: On *Sorghum* and *Paspalum*, May 1946, Townes.

PONAPE. Jokaji [Sokehs], Ronkiti-Paliker, Peipalap Pk., 1937-1950.

KUSAIE. Malem River, 1953, Clarke.

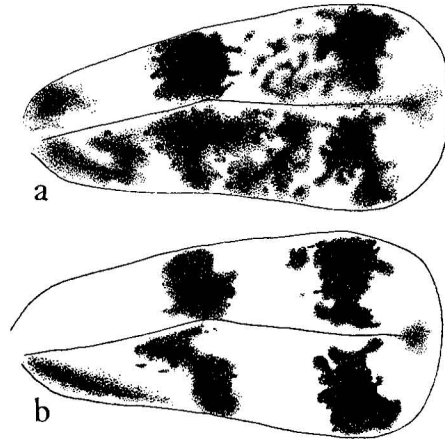


FIGURE 10.—*Neomaskellia bergii*, variation in patches of forewing.

Numerous larvae and adults on sugar cane, *Paspalum conjugatum*, sword grass, *Sasa*, and undetermined grasses: Esaki (1936-1939), K. Yasumatsu and S. Yoshimura (1940), Z. Ono (1936), J. L. Gressitt (1945, 1953), Dybas (1947-1948), P. A. Adams (1950), R. J. Goss (1950), R. M. Bohart (1951), Krauss (1952), J. F. G. Clarke (1953), J. W. Beardsley (1953).

HOSTS: Sugar cane and other Gramineae.

This species is the most widely spread and by far the most common in Micronesia.