

PACIFIC INSECTS

MONOGRAPH 11

**Lepidoptera of American Samoa with particular
reference to biology and ecology**

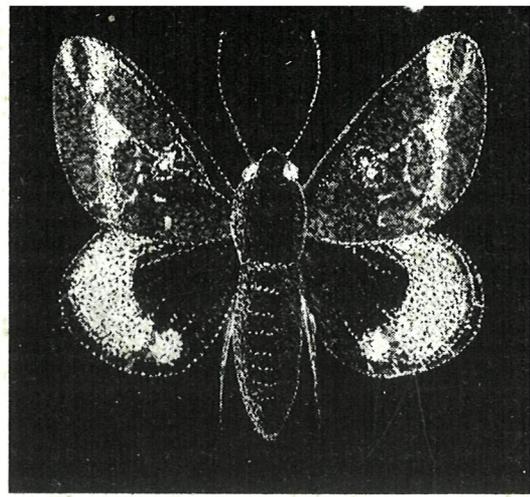
By John Adams Comstock

Published by

Entomology Department, Bernice P. Bishop Museum

Honolulu, Hawaii, U. S. A.

1966



PACIFIC INSECTS MONOGRAPHS

Published by
Entomology Department, Bernice P. Bishop Museum,
Honolulu, Hawaii, 96819, U. S. A.

Editorial Committee: J. L. Gressitt, Editor (Honolulu), S. Asahina (Tokyo), R. G. Fennah (London), R. A. Harrison (Christchurch), T. C. Maa (Honolulu & Taipei), C. W. Sabrosky (Washington, D. C.), R. L. Usinger (Berkeley), J. van der Vecht (Leiden), K. Yasumatsu (Fukuoka), E. C. Zimmerman (New Hampshire).

Assistant Editors: P. D. Ashlock (Honolulu), Carol Higa (Honolulu), Naoko Kunimori (Fukuoka), Setsuko Nakata (Honolulu), Toshi Takata (Fukuoka).

Business Manager: C. M. Yoshimoto (Honolulu). *Business Assistant:* Doris Anbe (Honolulu).

Business Agent in Japan: K. Yasumatsu (Fukuoka).

Entomological staff, Bishop Museum, 1966: Doris Anbe, Hatsuko Arakaki, P. D. Ashlock, S. Azuma, Madaline Boyes, Candida Cardenas, Ann Cutting, M. L. Goff, J. L. Gressitt (Chairman), J. Harrell, Carol Higa, Y. Hirashima, Shirley Hokama, E. Holzapfel, Dorothy Hoxie, Helen Hurd, June Ibara, Naoko Kunimori, T. C. Maa, Grace Nakahashi, Setsuko Nakata (Adm. Asst.), Tulene Nonomura, Carol Okuma, Katharine Pigue, Linda Reiniccus, T. Saigusa, I. Sakakibara, Judy Sakamoto, G. A. Samuelson, Sybil Seto, W. A. Steffan, Amy Suehiro, Grace Thompson, Clara Uchida, J. R. Vockeroth, Nixon Wilson, Mabel Yatsuoka, C. M. Yoshimoto, E. C. Zimmermann. *Field associates:* M. J. Fitzsimons, E. E. Gless, G. E. Lipfert, V. Peckham, D. S. Rabor, J. Sedlacek, M. Sedlacek, P. Shanahan, R. Straatman, J. Strong, H. M. Torrevillas, A. M. R. Wegner. *Research fellows:* R. R. Forster, Yiau-Min Huang, S. Sirivanakarn, T. W. Suman, W. J. Voss.

PACIFIC INSECTS MONOGRAPHS form an adjunct series associated with the quarterly journal PACIFIC INSECTS. The series is devoted to monographs and other works too large for the journal. The MONOGRAPHS appear irregularly and are numbered consecutively except for works which are issued in more than one installment. (See back cover for information about the journal).

Price: The MONOGRAPHS are not included in the subscription to PACIFIC INSECTS. The price of this issue is \$ 3.50 with hard cover or \$ 2.50 with paper cover (remittance to Pacific Insects, Bishop Museum Honolulu, Hawaii, 96819, U. S. A.); Japan: ¥ 1200 or ¥ 900 (remittance to Dr. K. Yasumatsu, Entomological Lab., Fac. of Agriculture, Kyushu University, Fukuoka, Japan).

PACIFIC INSECTS MONOGRAPHS

- 1A-1B. Gressitt and Kimoto: Chrysomelidae (Coleopt.) of China and Korea, Parts 1 and 2. Pp. 1-1026, 284 figs. (incl. color pl.). 1961, 1963. \$ 14.75 bound together. Part 1 (Mon. 1A): Pp. 1-299, 77 figs. 1961. \$ 4.00. Part 2 (Mon. 1B): Pp. 301-1026, 207 figs. 1 col. pl. 1963. \$ 10.00.
2. J. L. Gressitt: Problems in the zoogeography of Pacific and Antarctic insects. With appendices by T. C. Maa, I. M. Mackerras, S. Nakata and L. W. Quate. Pp. 1-127, 45 figs. 1961. \$ 2.50 bound; \$ 2.00 unbound.
3. K. Sakaguti and E. W. Jameson, Jr.: The Siphonaptera of Japan. Pp. 1-169, 66 figs. 1962. \$ 4.00 bound; \$ 3.25 unbound.
4. V. K. Gupta: Taxonomy, zoogeography, and evolution of Indo-Australian *Theronia* (Hymenoptera: Ichneumonidae). Pp. 1-142, 29 figs., 15 maps. 1962. \$ 3.50 bound; \$ 3.00 unbound.
5. T. C. Maa: A review of the Machaerotidae (Hemiptera: Cercopoidea). Pp. 1-166, 35 figs. 1963. \$ 5.00 bound; \$ 4.25 unbound.
6. T. C. Maa: Genera and species of Hippoboscidae (Diptera): types, synonymy, habitats and natural groupings. Pp. 1-186, 55 figs. 1963. \$ 4.50 bound; \$ 3.75 unbound.
7. J. L. Gressitt and Collaborators: Insects of Campbell Island. Pp. 1-663, many figs. (incl. 2 color pls.) 1964. \$ 10.00 bound; \$ 9.00 unbound.
8. C. R. Baltazar: A catalogue of Philippine Hymenoptera (with a bibliography, 1758-1963). Pp. 1-488. 1966. \$ 9.00 bound; \$ 8.00 unbound.
9. W. Hennig: The Diptera fauna of New Zealand as a problem in systematics and zoogeography. Translated from German by Petr Wygodzinsky. Pp. 1-81, 27 figs., 7 tables. 1966. \$ 4.00 bound; \$ 3.50 unbound.
10. T. C. Maa: Studies in Hippoboscidae (Diptera). Pp. 1-148, 35 figs. 1966. \$ 5.00 bound; \$ 4.00 unbound.

Printed by
Shukosha Printing Co., Fukuoka, Japan

LEPIDOPTERA OF AMERICAN SAMOA WITH PARTICULAR REFERENCE TO BIOLOGY AND ECOLOGY

By John Adams Comstock

Abstract: This monograph records the species of Lepidoptera taken on the Islands of Tutuila, Aunuu, and Swain's Island, during four months in June to early October of 1961. It includes life history and host plant notes, along with illustrations of the early stages of such individuals as could be found in the larval and/or pupal state. Included are records of species recorded for American Samoa by earlier writers, which this author failed to confirm.

The sequence of genera and species conforms in general with that of the British Museum series of publications on the Lepidoptera in *Insects of Samoa*.

INTRODUCTION

The systematics of the butterflies and moths of the Samoan Islands have been covered in *Insects of Samoa*, Fasc. 1-4, Part III, issued by the British Museum (Natural History), 1927-1935. For the separate island units of American Samoa, only studies of a few species that are of economic importance have been published. The need for further research and publication is apparent.

Tutuila, the largest island in the American group, is a volcanic uplift nearly surrounded by flats and coral reefs. It is about 29 km long, and at its widest part, 9.6 km across. A low mountain range stretches across the length of the island. The population, composed almost entirely of Polynesians, is 28,000.

Pago Pago (*Pang-o Pang-o*)—the capital of American Samoa—has a magnificent harbor which nearly bisects the island. The climate is humid and tropical with approximately 500 cm of rain a year. The other six islands of the group are small in comparison to Tutuila, having scant populations, or none. This island group is about 3700 km southwest of Hawaii.

Governor H. Rex Lee gave approval for our use of Mulinuu, the country residence of the former governor, on Cocoanut Point adjoining the village of Nu'u'uli, for four months of study—June to October 1961. Mrs Comstock and I improvised equipment and facilities for the collecting, recording, and illustrating life histories of Lepidoptera. Our particular objective was to obtain moths at light, induce the females to lay eggs, and to illustrate their metamorphoses. Much of the work was done at night under fluorescent daylight and black light illumination.

To prevent damage by molds, all mounted specimens were stored with liberal use of dichloricid crystals, in hot lockers.

Our collecting was confined to Tutuila except for one short trip to Aunuu I., and one to Swain's I. All illustrations were made by me, drawn from living material in Samoa.

Acknowledgements: From the entomological staff at the British Museum (Messrs Allan Watson, W. H. T. Tams, T. G. Howarth, P. E. S. Whalley, J. D. Bradley, D. S. Fletcher, and Dr J. W. B. Nye) help was given in identifying material. Messrs Collins, E. O. Pearson, and R. G. Fennah of the Commonwealth Institute of Entomology also cooperated.

The staff entomologists of the Hawaii Sugar Planters' Association Experiment Station (Fred A. Bianchi, Principal Entomologist, and Dr John W. Beardsley) gave assistance. Comparative material was checked in the HSPA collection, and also in the B. P. Bishop Museum in Honolulu. Marie C. Neal, Botanist of the Museum, identified most of our plants. Dr Laurence W. Quate, Dr Carl M. Yoshimoto, and Amy Suehiro of the Entomological staff extended courtesies, and Mr E. H. Bryan Jr., Curator of Collections, encouraged us.

Hahn W. Capps and E. L. Todd of the Insect Identification and Parasite Introduction Research Branch of the United States Department of Agriculture at the United States National Museum, Washington, and G. E. Tite of the Zoological Museum, Tring, Hertfordshire, England, were helpful in clearing certain taxonomic problems.

Dr Pierre E. L. Viette of the Museum National d'Histoire Naturelle, Paris, France, and also the Secretary General of the South Pacific Commission, Pentagon, Anse Vata, Noumea, New Caledonia, supplied literature that was pertinent to our project.

Dr George T. Okumura of the Bureau of Entomology, State Department of Agriculture, California, solved an economic problem.

Dr Alden D. Hinckley, Entomologist of the Principal Agricultural Station at Koroniva, Fiji, cooperated in the matter of publications.

Without the backing of Governor H. Rex Lee of American Samoa, this study could not have been carried through.

CLASSIFICATION

A number of taxonomic changes have been made since the *Insects of Samoa* was published. Some of these alter the sequence of families and genera. There is little uniformity of opinion among specialists on this point. It seems logical to follow generally the sequences used by the authors of the four numbers of *Insects of Samoa* dealing with the Lepidoptera insofar as it parallels the sequences in the McDunnough, *Check List of the Lepidoptera of Canada and the United States of America*, Part 1 (1938) and Part 2 (1939). This list is the one most likely to be in agreement with the usages familiar to entomologists concerned with the insects of American Samoa and the South Pacific islands. It requires that the Geometridae in Prout's Part III, Fasc. 3 be inserted between pages 242 and 243 of Tams' Part III, Fasc. 3. The reason is obvious. All genera after page 243 in Tams' Heterocera are listed by McDunnough (and others) as Microlepidoptera, whereas Tams excludes them as 'Micros' in the subtitle of his volume Heterocera exclusive of the Geometridae and the Microlepidoptera.

With this change, the present paper follows generally the sequences of Families in the *Insects of Samoa*, Part II, Lepidoptera, as compared with the lists most familiar to American lepidopterists.

Taxonomists are agreed that our systems of classification are in a state of flux. Much additional information on the comparative anatomy, metamorphoses, distribution, host plants, and genetics of species is needed before general agreement is possible. Notwithstanding its limited scope, we trust that this paper may be of help.

SECTION I. RHOPALOCERA

Family DANAIDAE

1. *Danaiida plexippus* (Linnaeus)

This widely distributed butterfly, commonly known as the Monarch, was originally an American species, but has spread into many lands. It was first recorded for Tutuila in 1867.

Hopkins (1927) lists it as *Danaiida archippus* (F.) and records its distribution in many of the south sea islands. Most American lepidopterists list it as *Danaus plexippus*. It is illustrated in Holland's (1931) *The Butterfly Book*, plate VII, fig. I.

The caterpillar feeds on milkweeds, and in Tutuila will be found on *Asclepias curassavica* L. and *Calotropis gigantea* (L.) Dry. The handsome green larva with black and yellow stripes may be collected and reared through the green and gold pupal stage to the boldly marked red-brown and black Monarch butterfly.

Details of its early stages have been published by many authors from the year 1797 to this date.

2. *Danaiida* (Tirumala) *melissa tutuila* Hopkins

Hopkins (1927) described and illustrated this subspecies.

Color, pale bluish-white with black stripes.

It was reported as very common at low elevations in Tutuila. We found it uncommon near the coast but abundant along the Aoloau Road at high elevations. We took a good series there in late August.

No information is available on the early stages of *Danaiida melissa tutuila*, but a close relative, *D. melissa melittula* (H. S.), found on all the islands of Western Samoa, has been recorded in full by Hopkins (1927); and notes were published by Rebel (1910).

Probably the early stages of *D. melissa tutuila* are very similar.

Its food plant is *Tylophora samoensis* A. Gr. (Asclepiadaceae).

3. *Euploea eleutho bourkei* (Poulton)

E. bourkei was the most common of all butterflies on Tutuila during our stay there. It is also found on Aunu'u I. and on Swain's I. (Swain's is an atoll some 700 km N of Tutuila.) Hopkins also reports it from Tau I., American Samoa.

The butterfly was particularly abundant in and about a large 'lilac' tree (*Messerschmidia argentea* L. f. Johnst.) near the laboratory at Mulinuu. Examples occasionally came to lights. It is recorded as frequenting the flowers of *Ageratum coryzoides* and *Stachytarpheta*.

The larval food plant is *Ficus tinctoria* Forst. We were not able to locate fig trees, but fortunately the larva is described on page 13 and illustrated on pl. IV, fig. 5, and the butterfly on pl. III, figs. 9-10 by Hopkins (1927) in *Insects of Samoa*.

Subfamily SATYRINAE

4. *Melanitis leda solandra* (Fabricius)

This subspecies is recorded by Hopkins (1927) as rather common in Tutuila. It was also included in Swezey's list of *Butterflies of the Samoan Islands* (1921) and in his *Notes on Food Habits of Lepidoptera of Samoa* (1942). It is also reported from Tau I.

No illustration of the butterfly occurs in Hopkins' work. Dumbleton records the parent species, *M. leda*, (1954) in Guam, Australia, New Guinea, New Caledonia, Fiji, Tonga, French Oceania, and Western Samoa.

Subfamily NYMPHALINAE

5. *Hypolimnas antilope lutescens* (Butler)

This butterfly was taken sparingly at moderate elevations. Hopkins reported it at Pago Pago and other localities on the south coast of the island at sea level in August 1925. He obtained eggs and larvae. These larvae died before pupation, but fortunately, we obtained a mature larva on 22 June 1961 and are able to amplify his record.

MATURE LARVA: Length, 52 mm. Head, black in region of mouth parts, changing to burnt-orange over crown and around neck. Two long black branching spines issue from crown of head—tips knobbed, bearing several diminutive spines. Body surface, velvety-black—rows of branching spines arising from tubercles. Tubercles and spines, burnt-orange. Segment 1 bears only 4 short spines. Segments 2 & 3 bear 3 spines on each side of mid-dorsal area. Remaining typical segments have an additional middorsal spine, and those segments bearing prolegs have 2 short spines at base of each proleg. Legs, glistening black. Prolegs, similarly colored, but have a heavy vestiture of dull orange setae. Pupation occurred 24 June 1961.

PUPA: Length, 23 mm; greatest width, through center of dorso-ventral area, 10 mm. The pupa hangs suspended from a silk button as in *Vanessa*. Body ground color, dull orange-yellow. There are 3 longitudinal rows of black simple spines on dorsum of each typical segment. Abdominal segments 1 & 2 have only 2 very short rows of black spines. Segment 3 has 3 spines, the middle one being short and curved cephalically. Segment 4 has 5 spines. Segment 5 has 7, and segments 6-8 have 3 spines each. On segments 9 & 10 the spines are replaced by black dots, or are absent. Venules of wings, heavily accented in black. Eyes, prominent and partially encircled ventrally with black. Spiracular openings edged with black. A black spot is placed above and below each typical spiracle. There are a few black dots and short spines on thorax. Cremaster stout, curved ventrally, and also extended as a flat black plate, mid-ventrally. Imago emerged 1 July 1961.

Butler (1874) pictures *lutescens*. Seitz' (1923) illustration does not match ours from Tutuila. It appears to be a very light aberration.

6. *Hypolimnas bolina inconstans* Fruhstorfer Pl. I, Fig. 1.

This species was taken sparingly near sea level, not far from the airport. It was abun-

dant on Aunuu I., 3 July 1961, with the males predominating. We also found it on Swain's I., 23 September 1961, with the females predominating.

At first we identified the species as *H. bolina pallescens* Butler, owing to Hopkins' (1927) statement where he discusses the race *inconstans* on Upolu and Savaii in Western Samoa and then says "Specimens from Tutuila, on the other hand, are extremely different, and are provisionally referred to the form *pallescens*." To make sure, we sent specimens to the British Museum where they were determined by T. G. Howarth as *inconstans*.

A single larva was given to us on 31 July 1961 with the statement that it was on a cabbage brought into Tutuila from Apia, Western Samoa. This was reared successfully, and produced a female that exactly matches Hopkins' colored picture. With this larva we made drawings of larva and later of pupa.

MATURE LARVA (pl. II, fig. 1A): Length, 42 mm; head width, 3.2 mm. Head, dull orange with scattered minute yellowish punctae. Ocelli on a dark field. A dark inverted V occurs on upper 1/2 of adfrontal sutures. Two prominent dark branching spines point forward and upward from crown. Short yellowish setae occur on the face. Thoracic segment 1 bears relatively short spines. Those on segments 2-11 are tall, branching, and yellow. Their number and position are accurately shown on the accompanying illustration. Spines on cauda slightly shorter. Body ground color, black, heavily sprinkled with minute yellowish dots. Legs, dull yellow. Prolegs, dull maroon. Spiracles, black-centered, narrowly rimmed with white.

This does not quite agree with Poulton's description of the Marquesan race, as quoted by Hopkins (1927), but some variation might well be expected in larvae from widely separated and isolated areas. Our larva pupated 2 August 1961.

PUPA (pl. II, fig. 1 B-C): Length, 20 mm; width through center, transverse measurement, 8 mm. Color, pale brown to mottled black. Antennae reach to wing margins. A series of relatively short spines run longitudinally on dorsum. The shortest below spiracles, the next shortest above spiracles, the third shortest, those placed middorsally, and the longest, those of dorsolateral row. Short spines, or papillae, occur on thorax. The position of these is best defined on the accompanying illustration. Spiracles relatively inconspicuous, and take the color of the surface on which they are placed. Cremaster, a heavy bar, arched ventrally, its base extending onto last caudal segment. Imago emerged 11 August 1961.

We did not secure eggs, but Hopkins describes them.

7. *Hypolimnas thompsoni* Butler

Hopkins mentions this species as occurring on Tutuila and Tau, but gives no description or illustration of it. We found no examples of the genus that varied from the 2 species previously listed.

8. *Precis villida villida* (Fabricius)

This species has been reported from the Ellice group, Tonga, Tutuila, Tau, and Swain's I. by Hopkins, and is listed as one of the most abundant and widely distributed butterflies in Australia by Waterhouse & Lyell (1914). Swezey (1941) lists it from the Tokelau Is. We took it sparingly in a few localities on Tutuila—most near the airport. Swezey re-

PLATE I

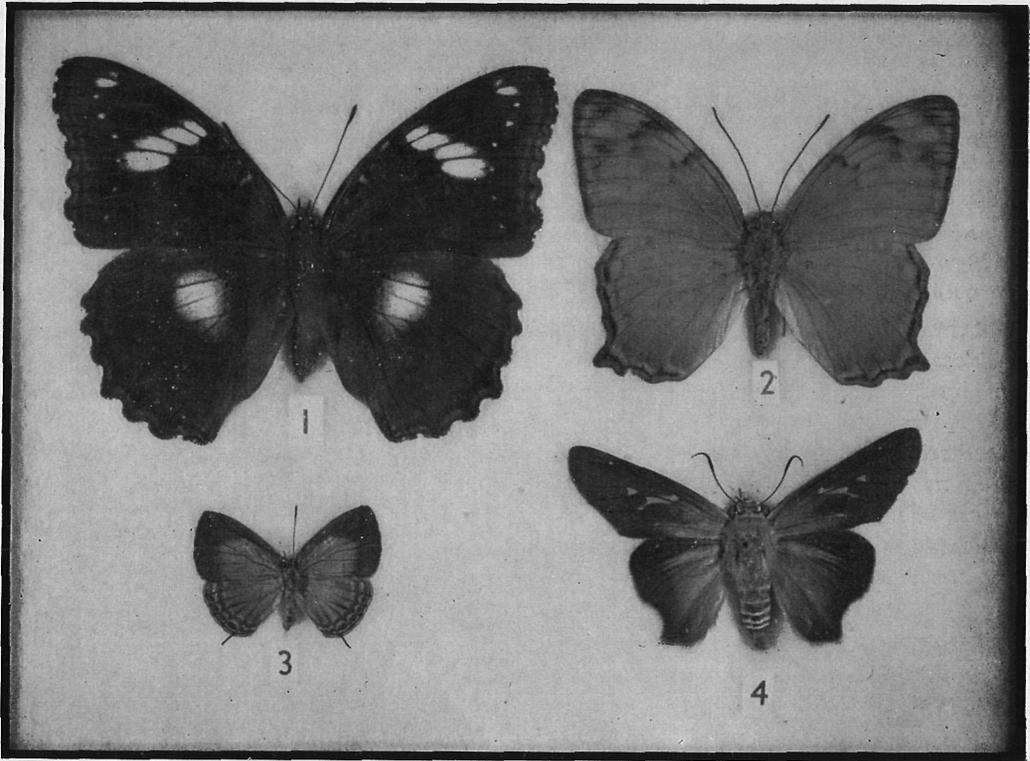


Fig. 1. *Hypolimnas bolina inconstans*.

Fig. 2. *Issoria sinha bowdenia*.

Fig. 3. *Nacaduba samoensis*.

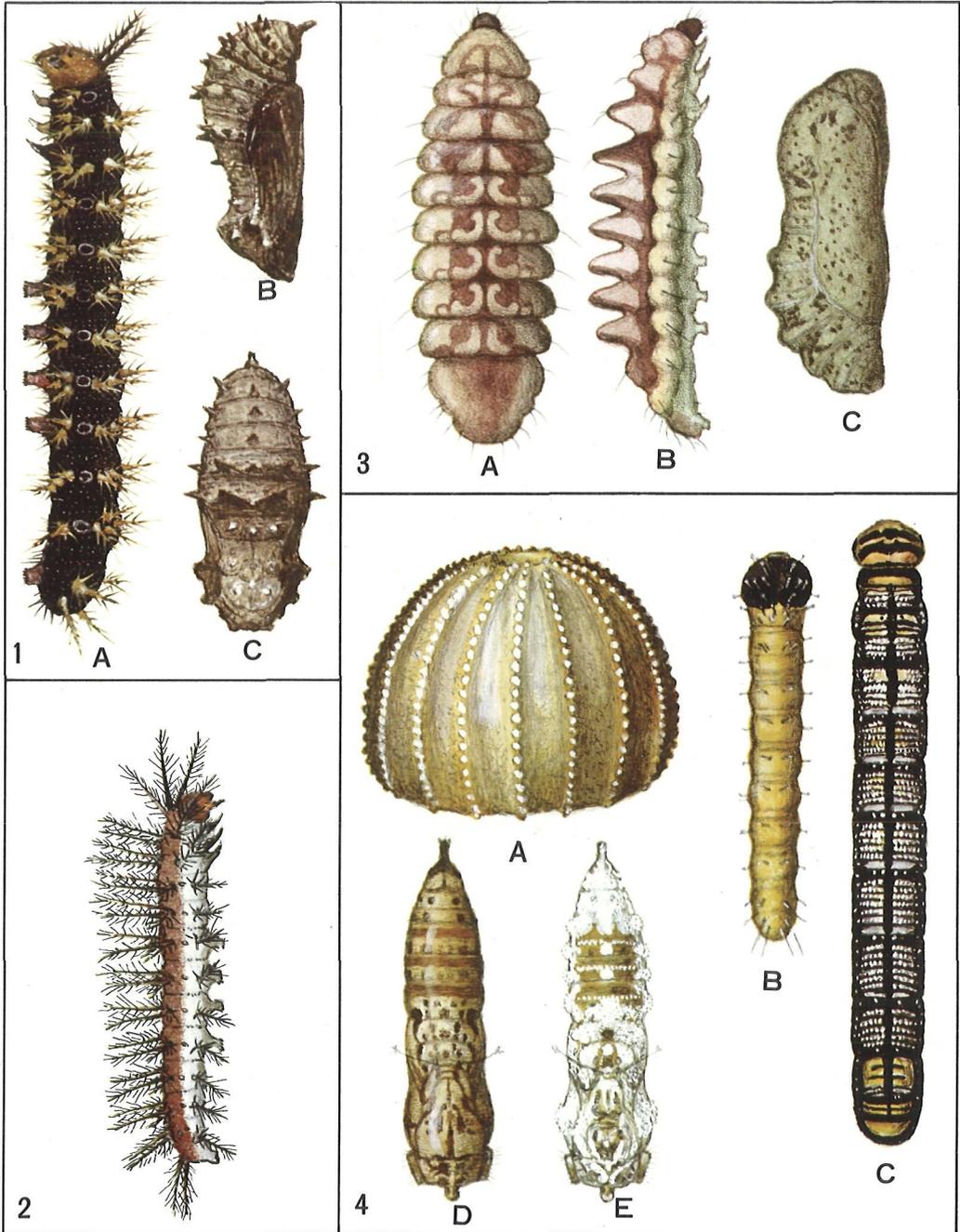
Fig. 4. *Badamia exclamationis*.

Figures all natural size.

PLATE II

- Fig. 1. *Hypolimnas bolina inconstans* Fruhst. A, mature larva; B, pupa, lateral; C, pupa, dorsal.
 Fig. 2. *Issoria sinha bowdenia* (Butler), larva.
 Fig. 3. *Nacaduba samoensis* Druce. A, mature larva, dorsal; B, mature larva, lateral; C, pupa.
 Fig. 4. *Badamia exclamationis* (Fabr). A, egg; B, first instar larva; C, final instar; D, pupa; E, pupa,

PLATE II



ported *Ipomoea* as the food plant, and gave an incomplete record of its life history.

We found no larvae on the vines at Mulinuu.

The butterfly has been pictured by Waterhouse & Lyell.

9. *Issoria sinha bowdenia* (Butler). Pl. I, Fig. 2.

Syn. *I. samoana* Fruhs.

We saw this colorful deep yellow butterfly in many areas of Tutuila—from the seacoast to about 305 m elevation. It has been reported from Tutuila, Tau, Tonga (type locality), and Western Samoa, and was seen on Aunuu and Swain's Is. It visits the flowers of *Morinda citrifolia* and *Lantana*, but is more frequently seen flying around its food plant, which, in Western Samoa, is *Xylosma suaveolens* Forst.—a small tree belonging to the Flacourtiaceae. On Tutuila the food plant is *Flacourtia rukam* Zoll. & Morren. Hopkins describes the egg briefly.

LARVA (pl. II, fig. 2): A single larva was collected 8 June 1961 on *Flacourtia*, on a side roadway leading from the main Fagaso Road to a pumping or separation shed below a waterfall. The specimen measured 16 mm and was in its third or possibly fourth instar. Head width, 2.8 mm. Ground color of head, deep orange. Large black oval spot on side of each cheek. Uppermost ocellus, white, remainder black. Antennae and mouth parts, orange. Tinge of brown on mandibles. Body ground color superior to spiracles, mottled reddish brown, with darker shadings caudally and on thoracic segments. Stigmatal line, white, as was subspiracular area until it blended with hyaline venter. Larva with a heavy vestiture of branching spines. Two spines located on prothorax longest and jet black. Meso- and metathorax with 2 pairs on each side. Remaining typical segments with 3 spines on each side—6 to each segment. Shafts of these spines hyaline and branches black. Lowermost subspiracular row containing shortest spines—paler in color, tips only being black. All spines occurring dorsad to spiracles arose from black papillae. This larva died, owing to lack of food plant.

Mature larva and pupa were briefly described by Hopkins (1927) and illustrated in line drawings.

Family PAPILIONIDAE

10. *Papilio godeffroyi* Semper

This is the only swallowtail butterfly found on Tutuila. It is seen in the forested areas at high elevations and is never abundant. One male was caught 31 May 1961, at the summit of the Fagaso Road, and several others were seen flying high among the trees. A battered female was later donated by a friend who caught it for us in a wooded area at Pago Pago.

Semper, in his original description (1866) illustrated the butterfly, as did also Dr Jordan in Seitz (1927), pl. 27c. Hopkins described the egg.

No record is available of the food plant for Tutuila, and Mathew (1885) does not state the region in which the larva fed on plants of *Aralia*. Apparently this genus of plants does not occur in Tutuila.

Mathew (1885) illustrated the larva and pupa. Semper's types (1866) came from Upolu. The species is also recorded from all parts of Western Samoa.

Family PIERIDAE

11. *Catophaga jacquinotii manaia* Hopkins

The types of this subspecies were taken in Upolu. It also occurs on Savaii, Fiji, Tonga, and Tutuila. No report has been found of its presence on other islands of the American Samoa group, although its strong flight suggests that it may be found on some of them. We did not see it.

Its food plant is unknown, and the only record of its life history is a brief paragraph by Hopkins (1927).

12. *Belenois java* Sparrman

We saw only 1 specimen of a pierid on Tutuila during our stay there. This was flying too swiftly to distinguish its markings. It was conspicuously yellow, and looked like a *Terias*. The only pierid personally recorded was a single specimen of *Belenois java* taken by our friend Barbara Wilson at Pago Pago 25 May 1962, and mailed to our Del Mar address. When compared, it exactly matched the colored figure 4 on Hopkins' Plate 1 (1927).

The species, including its several races, is widely distributed from Australia throughout the Pacific islands.

Waterhouse & Lyell (1914) place it in the genus *Anaphaeis*, and list the food plant as *Capparis* (Capparidaceae). Hopkins (1927) quoted Schmeltz (1876) as saying the larva resembles, according to Dr Graeffe, that of our Cabbage White.

More specific information is needed on the life history and host plants of this butterfly.

Family LYCAENIDAE

13. *Jamides argentina* (Prittwitz)

We did not see this little 'blue' but it has been reported many times by others for Tutuila. Swezey included it in 1941 (correctly named) with the larva listed as feeding on buds and blossoms of *Vigna marina*, and in 1942 at Upolu, Western Samoa and at Utula and Breaker Point, Tutuila. It has been reported from Tau I., and doubtfully from the New Hebrides.

Hopkins (1927) lists the larval food plant as *Vigna lutea* A. Gr., and gives an account of its life history.

14. *Catochrysops lithargyrea pepe* Hopkins

This was the common tailed-blue observed from early June to late July in the coastal area, from the airport to Pago Pago, Tutuila. It is recorded for all the islands of Western Samoa. Hopkins (1927) pictures the types. He also records the food plant *Desmodium umbellatum* D. C. (Leguminosae) and states that the larva eats only the flowers.

Swezey (1942) reports rearing it from larvae collected on the same food plant at Utulei, Tutuila.

15. *Euchrysops cnejus samoa* (Herrich-Schaeffer)

Three examples of this species were netted along the East Road beyond Utumea, Tutuila,

on 14 September 1961, and many more were seen. Hopkins (1927) includes it in the genus *Catochrysops*, and does not mention its occurrence in Tutuila. Swezey (1921) lists it as *Catochrysops cnejus* (= *Lycaena samoa* H. S.) and reports it from Vanua Valava, Savaii, Satapoitea, Upolu, and Lufilufi. Vanua Valava, or Vanua Mbalavu, Fiji is the type locality. Swezey does not specifically include it for Tutuila.

Seitz (1927) calls *C. cnejus vitiensis* Butler the Fijian form and briefly describes the larva. According to Hopkins (1927) the larva is reported in Fiji as eating the inflorescences of *Crotalaria striata* D. C. (Leguminosae). He suggests that *Vigna lutea* A. Gr. may also serve as food plant.

The parent species, *Euchrysops cnejus* Fabr. ranges from India to Western Samoa.

16. *Nacaduba samoensis* (Druce) Pl. I, Fig. 3.

One of the pleasurable experiences in Tutuila is the sight of this lustrous blue butterfly in certain coastal areas. The males in particular attract the eye with their flashing color and erratic flight. The females are usually of a more subdued blue —giving protection for ovipositing.

A good series was taken at Mulinuu and by the lagoon near Tafuno in August, and a few more near Pago Pago.

The butterfly has been recorded from Tau I. in American Samoa, and from Upolu, Savaii, and Manono in Western Samoa. Presumably it occurs throughout the Western Samoa group. It has also been reported from Tonga.

Tite (1963) has demonstrated that *samoensis* is a distinct species and not a subspecies of *N. vitiensis* Butler.

The larval food plant and early stages have not heretofore been recorded. We were fortunate in observing females flying around *Terminalia catappa* L. (Samoan name Talie). Three larvae were obtained by beating the tree on 6 September 1961. They were apparently hidden in the blossoms as they were not found by searching the leaves. This tree may not be the only food plant of *N. samoensis* because the butterfly was frequently observed in areas where, apparently, *Terminalia catappa* was absent.

MATURE LARVA (pl. II, fig. 3 A-B): Length, 9 mm; greatest width, 2 mm. Slug-like in form. Head, black and retractile. Body ground color, cream with a tinge of pink. Thoracic segment 1 with a slightly greenish hue. A series of subspiracular prominences run longitudinally, one to a segment on each side. These are pale yellow, each topped by a white seta. Body separated into prominent ridges, each segment rising to a middorsal peak. Thoracic series doubled, 2 peaks to each segment, their crests topped by white setae. Complicated pattern of red-brown figures developed on these projecting peaks which is best defined in the illustration. Venter, pale yellow-green. Spiracles impossible to distinguish without considerable magnification. Legs and prolegs, concolorous with venter. Entire surface of body covered by minute granules, visible only under a lens, giving the larva a slightly frosted appearance. Pupation occurred on the stem of the blossom. The first example pupated 7 September. One of the larvae was in an earlier instar, and was entirely green.

PUPA (pl. II, fig. 3C): Length, 7 mm; greatest width, 2.5 mm. Eyes relatively small and inconspicuous. All segmental lines faint and indistinct as to be differentiated with difficulty. Abdominal segments form prominent transverse ridges at their junctures, but

these do not rise dorsally to the extent that they do in the larva. Body color, ivory — anterior 1/2 tinged with olive-green. Surface bears numerous brown dots and blotches — most noticeable on dorsal surface. Imagos emerged 14 and 16 September.

17. *Zizera labradus labradus* (Godart)

Among the many lycaenids taken in Tutuila, not one was determined as *Z. labradus* by the several specialists that examined our material. This included qualified entomologists on the staffs of the British Museum, the Zoological Museum at Tring, England, and the Bishop Museum at Honolulu. How we missed this species is inexplicable in view of the many published records of its occurrence in Tutuila.

Hopkins (1927) lists the food plants as flowers of *Indigofera anil*, *Desmodium umbellatum*, *Phaseolus adenanthus* Mey., and *Vigna catiangu* Walp. with notes on the larva and pupa.

18. *Zizina otis cheesmanae* Riley

We took a substantial series of *cheesmanae* near the Tafuno Airport 10 June; a few were secured at Mulinuu 11 to 14 July and a small number along the East Road beyond Alao 14 September 1961.

A pair was determined by T. G. Howarth as *cheesmanae*.

No information is available on its distribution or life history. It is apparently too recently described to be included in the literature available to us.

Family HESPERIDAE

Subfamily ISMENIDAE

19. *Badamia exclamationis* (Fabricius) Pl. I, Fig. 4.

It is surprising that so few skippers occur in Samoa, particularly because large numbers are native to Australia. Swezey (1921) mentions only 2, one reported by E. M. M. Fraser at Upolu, and another (1942), also at Upolu, the larva said to be feeding on leaves of young rattan palm plants. He does not mention *Badamia exclamationis*, which is now plentiful along the coast of Tutuila wherever its food plant, *Terminalia catappa* L. occurs.

This butterfly is widely distributed from India to Australia and through the South Pacific Islands to Tutuila. Its life history has been described by Hopkins (1927) and by Dr Francis X. Williams (1944). The larva, pupa, and imago were illustrated by Dr Williams, and figures of the butterfly are given in *Butterflies of Australia*.

A medium sized *Terminalia catappa* tree was growing in front of the laboratory at Mulinuu. It showed severe damage by larvae that were in all stages of development. This made possible considerable elaboration on the notes and illustrations of life histories heretofore published by other writers.

EGG (pl. II, fig. 4A): Hemispherical, with a flattened base and a well rounded top. Width, 0.65 mm; height, 0.50 mm. Top gently depressed in micropylar area. Approximately 16 ridges run from base to micropyle. Some of these stop short of the micropylar edge. All ridges arise abruptly from surface of egg, their outer edges topped by minute nodules. Floor of troughs between these ridges granular, and without horizontal striae or ridges crossing. Color of egg is at first yellow or cream, but changes to salmon pink before hatching.

The eggs are usually laid singly on the underside of young leaves, preferably near the midrib. Eggs laid 20 July hatched 24-25 July.

FIRST INSTAR LARVA (pl. II, fig. 4B): Length, 2.30 mm; head width, approximately 0.80 mm. Head color, dull black—with a granular surface. Mouth parts, paler. Short hyaline setae, sparsely scattered over face, their tips slightly swollen or expanded like terminal droplets. Body, narrower than head, and relatively short and plump. Bears short hyaline setae most of which are knobbed at tips. Color is first greenish yellow, then changes to orange-yellow. Surface covered with minute granular punctae which are apparent only under high magnification. Toward the end of the first instar, body lengthens to 4 mm and width is proportionately increased—particularly through the middle segments. Intersegmental junctures take on a red-brown tinge. At this time the larva has begun its habit of pulling the edges of a leaf around itself as a protective chamber.

SECOND INSTAR: Length, 7 mm; width of body through center segments, 1 mm; head width, 0.75 mm. Head ground color, yellow. Mouth parts, brown. Ocelli, black. Two transverse bars on face, brownish black. Body ground color, yellow. Transversely across each segmental juncture, a wide brownish black band. Legs, black, prolegs, yellow.

THIRD OR FOURTH INSTAR: Length, 19 mm; head width, 2.40 mm. Head ground color, orange. Three transverse bars crossing face, black—the 1st, a very narrow stripe next to juncture of head and prothoracic segment; the 2nd stretches nearly across the head above the apex of adfrontal sutures; the 3rd runs across front, but ends before the black ocellar patch is reached. Ocelli, black on a black field. Edges of mouth parts, black. Body ground color, lemon-yellow. Each segmental juncture with a velvety black transverse band. Between these bands each segment is crossed transversely by from 2-4 narrow black stripes, absent only on the last caudal segment. Spiracles, black—centered, with narrow yellow rims. Venter, dull yellow. Prolegs, dull yellow. True legs, black.

FINAL INSTAR (pl. II, fig. 4C): Length, approximately 40 mm; width, 4 mm, uniformly wide throughout except for narrower 1st and caudal segments; head width, 3.50 mm. Head, same rich orange color. Carries same transverse black bands. Prothoracic segment with transverse bands of alternating black and yellow. Succeeding 8 segments, predominantly black with parallel bands of very pale yellow, composed principally of yellow dots. Longitudinal black middorsal band persists, but does not include last caudal segment. Latter mostly yellow, with narrow transverse black stripes. Lateral surface black, spotted with white dots, down to tops of spiracles. From there to, and including ventral surface, color, dull yellow with white dots. Spiracles with black centers and narrow yellow rims. True legs, spotted dull yellow and black. Prolegs, dull yellow at base, white in center, bright yellow on tips. Crochets also bright yellow. There is a wide range of variation in color and markings. In some, the yellow predominates, in others the black. Our illustration is intermediate between these extremes. The first 3 examples under observation pupated 2-4 August 1961. Pupation occurred inside the protective leaf-tent.

PUPA (pl. II, fig. 4 D-E): Average length, 27 mm; greatest width approximately 5.50 mm. It is attached by a strong cremasteric button to the leaf, and also by a girdle that passes over the metathorax. When first formed, the segmental lines and structural details are clearly visible, and the color is rich burnt-orange with brown spots and dashes. In about 2 days a flocculent white secretion has been produced which gives the appearance of a covering of mildew, and largely obscures structural details. To demonstrate the dif-

ference, this white covering was removed from one example (fig. 4D) with a camels-hair brush and drawings were then made of the 2 phases. Cephalic end of pupa characterized by a small round knob extending anteriorly. Eyes protrude laterally, and bear minute vibrissae. Wing cases strongly marked with dark venules. Dorsal surface orange, with some darker transverse bands on abdominal area, and numerous spots and dashes on dorsum, arranged more or less in longitudinal rows. Ventral surface paler. Spiracles distinct. Cremaster a stout protruding arched knob, 2× length of that on head, and curving ventrally. Many of the markings are obscured after the white secretion appears. The first 2 imagos emerged 15 August 1961.

One small skipper was noted in flight at Mulinuu, but was not captured. It was yellowish, but no marks could be distinguished. This may have been the same species (undetermined) that Swezey (1921) saw at Upolu.

The larvae of *Badamia exclamationis* could very easily kill the tree by repeated defoliation were it not for a balancing ecological factor. At certain periods a large yellow vespid wasp, *Polistes macaensis* (Fabr.) appears in numbers. It is a widespread oriental species, social in habits, and a predator on various lepidopterous larvae. It is an expert in breaking open the protective leaf-tents of *Badamia* caterpillars, and making off with them. The wasp also occurs in Hawaii.

SECTION II. HETEROCERA EXCLUSIVE OF THE GEOMETRIDAE AND MICROLEPIDOPTERA

Family ARCTIIDAE

Subfamily NOLINAE

1. *Celama samoana* Hampson

We took 4 specimens of this tiny arctiid at Pago Pago in July 1961. Dr J. W. B. Nye of the British Museum confirmed our determination.

The types were taken at Apia, Western Samoa. It also was reported from Tonga. Originally described in Hampson's (1914) Lep. Phalaenae. No life history records are available.

2. *Asura uniformeola* Hampson

Recorded for Tutuila by Tams (1935), and also for Western Samoa, Upolu, and the Malay Archipelago. Hampson (1914) lists it from Borneo and the Solomon Is. Not unlikely, it is widely distributed through the South Pacific islands, but has been overlooked because of its small size.

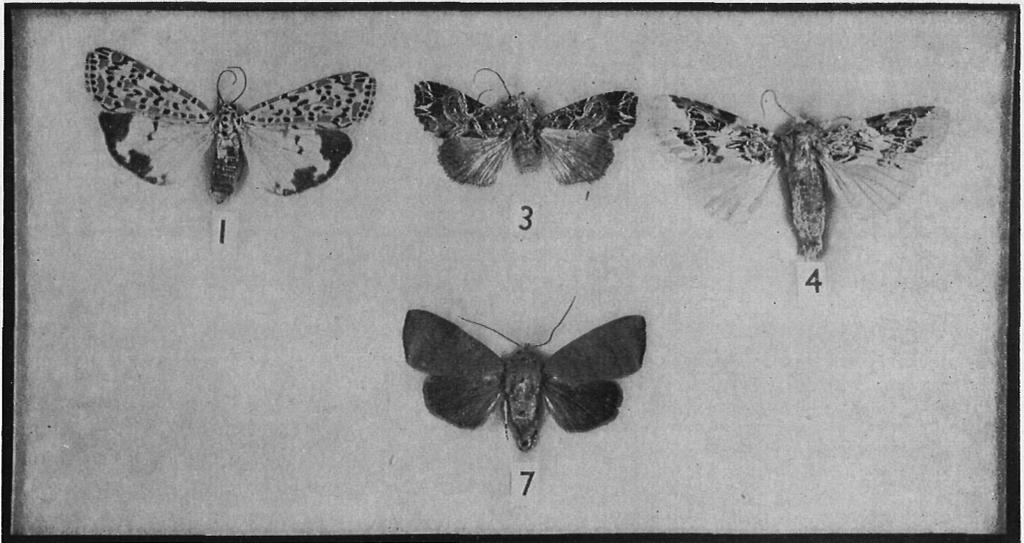
Hampson (1900) pictures the moth in color.

Subfamily ARCTIINAE

3. *Utetheisa pulchelloides* Hampson Pl. III, Fig. 1.

If we include its various subspecies and races, this moth is widely distributed throughout the South Pacific islands. It was one of the common moths at Mulinuu, feeding on the

PLATE III

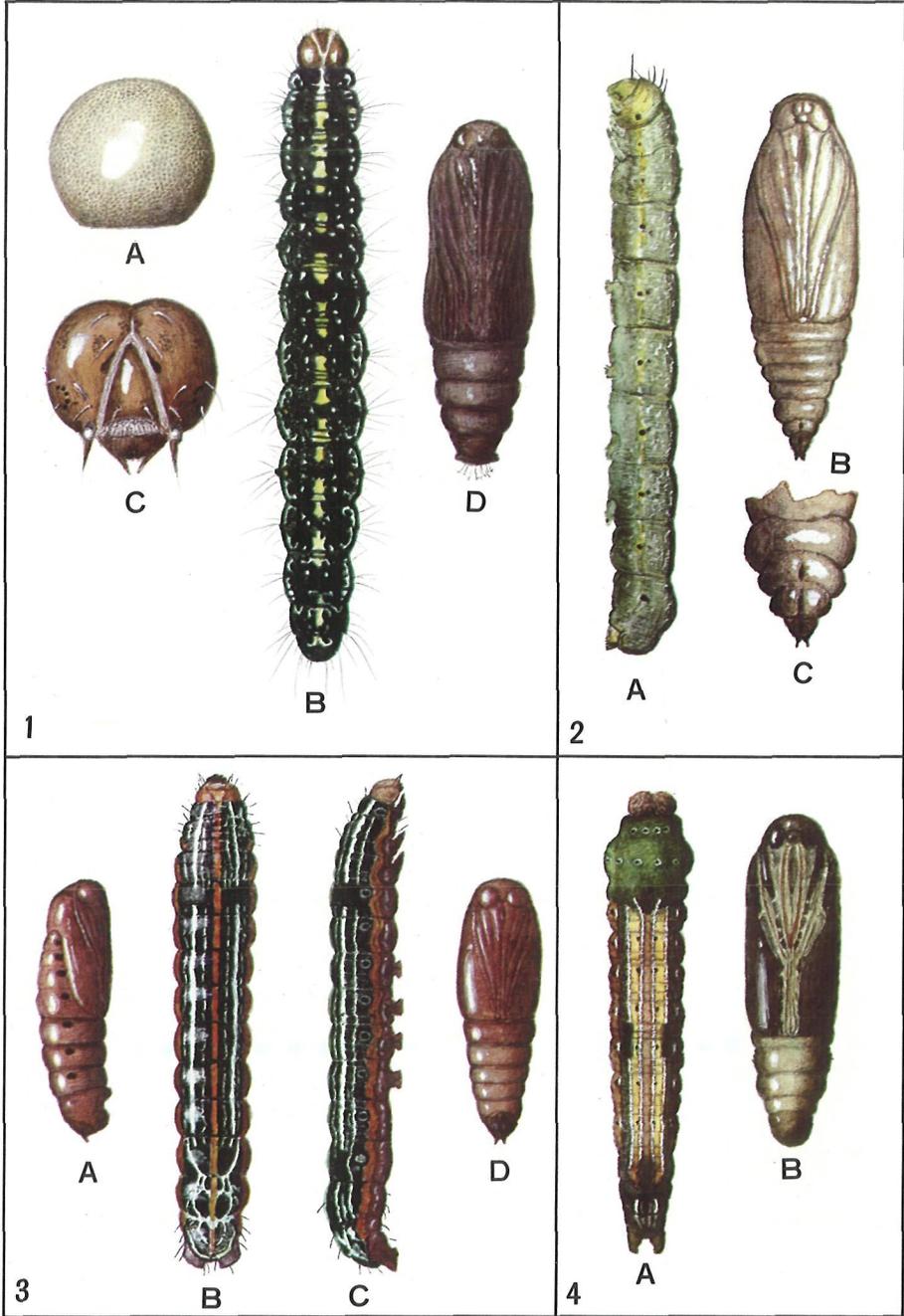


- Fig. 1. *Utetheisa pulchelloides*.
 Fig. 3. *Callopietria meridionalis nauticorum*.
 Fig. 4. *Calogramma festiva*.
 Fig. 7. *Maurilia iconica*.

PLATE IV

- Fig. 1. *Utetheisa pulchelloides* Hamps. A, egg; B, mature larva; C, head of mature larva; D, pupa.
 Fig. 2. *Callopietria meridionalis nauticorum* Tams. A, mature larva; B, pupa; C, caudal end of pupa.
 Fig. 3. *Calogramma festiva* (Donovan). A, pupa, lateral; B, mature larva, dorsal; C, mature larva, lateral; D, pupa, ventral.
 Fig. 4. *Maurilia iconica* (Walker). A, mature larva; B, pupa.

PLATE IV



leaves of the large tree *Messerschmidia argentea* (L. f.) Johnst.

The Tutuilan specimens may be the race *U. pulchelloides marshallorum* Rothschild, reported from Fiji, Tonga, Union, Society, Tuamotu and Samoan Is. by P. Viette (1950). His use of "Samoa" may refer only to the Western Samoa group, or it may include American Samoa.

We also took a series of a *Utetheisa* on Swain's I. which had a uniformly larger wingspan, and heavier red spots on the primaries than the Tutuila examples. This may well represent an unnamed race or subspecies of *U. pulchelloides*. The larvae were observed there feeding on the same tree, *Messerschmidia* (= *Tournefortia*), Samoan name Tausuni.

Dr F. X. Williams (1944) records *Utetheisa pulchelloides* form *stigmata* Rothschild "attacking various plants" in New Caledonia. According to Viette (1950) *stigmata* is a subspecies of *U. lotrix* and not of *U. pulchelloides*. We found larvae of the *Utetheisas* only on *Messerschmidia*.

Eggs laid by an imprisoned female on 24 & 25 June 1961, hatched 30 June and 1 July 1961.

EGG (pl. IV, fig. 1A): Diameter 0.75 mm. Spherical, except for small flattened base in contact with surface on which it is laid. Color, very pale yellow. Surface covered with minute hexagonal pits, visible only on magnification.

FIRST INSTAR LARVA: Body length, 2 mm; head width, approximately 0.30 mm. Head slightly wider than body segments. Head color, black, strongly bilobed. Ocelli also black. Body uniformly pale yellow, clothed with numerous black setae.

SECOND INSTAR: Only noticeable difference, head changed to pale yellow.

LARVA OF 15 MM (probably third instar): Head width, 1.4 mm. Head color, deep orange. Labrum and basal segments of antennae, white. Mandibles and ocelli, black. Body color, predominantly white. Dark markings of mature larva present, but relatively reduced in size and complexity. Black tubercles bearing setae all present, but much reduced in size compared with mature phase. Transverse orange bands more prominent but paler in color. Legs, mottled gray. Prolegs, soiled white with gray lateral shading. Venter, white.

MATURE LARVA (pl. IV, fig. 1B): Length, 28 mm; greatest width through center, 4 mm; head width approximately 2 mm. Head ground color, deep orange—a darker shading low on front and near upper junctures of adfrontal sutures. Adfrontal sutures, white. Basal segments of antennae, and labrum, white. Ocelli, black. Body ground color of dorsum and lateral surfaces, black. Venter, pale yellow. Middorsal area with a band of alternate yellow and white, much broken up by large areas of black. Ornamentation varies in individuals, difficult to describe. Illustration depicts an individual in which black areas are slightly heavier than average. Many specimens show a narrow transverse band of orange across middle of each segment. Stigmata there is usually a broken longitudinal band of mixed yellow and white blotchings, dashes and spots. Several black papillae occur in this area, all of which bear white setae. Long setae arising on dorsum black. Legs, mottled black and soiled yellow. Prolegs, concolorous with white venter. Spiracles, small and black. Notes of the dates, method, and site of pupation are missing.

PUPA (pl. IV, fig. 1D): Length, 15 mm; greatest width, approximately 5.50 mm. Color, various shades of brown. Segmental lines not clearly defined. Apparently maxillae do not reach quite to margin of wings, and antennae terminate slightly short thereof. Wing

cases show slightly darker lineation over venules. Head well rounded and eyes prominent. Last caudal segment expands laterally and is somewhat flattened. No definite cremasteric protrusion. Setae with recurved tips extending caudally, not supposed to exist in the genus *Utetheisa* if we correctly interpret Edna Mosher (1916). Moths emerged from 14 July to 3 Sept. 1961.

Subfamily HYP SINAE

4. *Nyctemera baulus samoensis* Tams

Three examples were collected near the stone quarry on the Tafuna Airport road. Dr J. W. B. Nye determined the species as "*Deilemera*" *baulus* Bvd. and Tams subsequently wrote, "I accept Roepke's interpretation, and the name of the species is therefore *Nyctemera baulus*, with many subspecies, one of which is *N. baulus samoensis* Tams".

Apparently no life history records are available for *N. baulus*, but the larva of a related species, "*Deilemera*" *alba* Pagenstecher, occurring on Upolu I. was described and illustrated by Prof. P.A. Buxton in Tams (1935), *Insects of Samoa*.

One of our examples was collected as a pupa (on an unknown plant). It emerged 27 June 1961. Text fig. 2 was made of the pupal shell. From this it appears that the pupa measured approximately 16 mm in length, and that both the antennae and maxillae reached to the wing margins. Spiracles, prominent and protruding. Caudal tip carried a cluster of very short recurved spines.

The pupa was encased in a fragile cocoon on the upper side of a leaf. The species is also reported for Tau I.



Fig. 2. Pupal shell of *Nyctemera baulus samoensis*.

5. *Argina cribraria* (Clerck)

A series was reared by a friend in Pago Pago and mailed to us in November 1961 and February 1962. The moth has orange wings, with numerous black spots.

Tams lists it from Upolu and Apia, but does not mention Tutuila. He also includes the "Old World", India, the Malay Archipelago, Australia, New Guinea, and the New Hebrides as part of its range.

Family AGROTIDAE

Subfamily AGROTINAE

6. *Heliothis assulta* Guenée

Taken sparingly in the daytime along the roadsides near Tafuna Airport, and occasionally it came to light at Mulinuu. It ranges widely through the South Pacific Islands from Tutuila, Fiji, and French Oceania to Australia, thence to the Malay Archipelago, India, and the Old World.

Swezey (1942) reports the larvae as damaging tobacco, tomatoes, and the green fruits of *Physalis minima*. He also refers to it as a pest occurring "in Samoa" and not found in Hawaii.

Subfamily HADENINAE

7. *Tiracola plagiata* (Walker)

A small series was taken at light near Pago Pago in July and August 1961. Apparently no examples of the subspecies *T. plagiata samoensis* Tams were included.

The species ranges from Tutuila through Western Samoa, Tonga, New Guinea, Australia, the Malay Archipelago, and India.

Host plants, castor, sisal hemp, tobacco, tapioca, banana, lime, and rubber.

Pictured in Tams (1935) *Insects of Samoa*.

8. *Leucania loreyi* (Duponchel)

Three examples were taken at light near Pago Pago, August 1961. Determination based on specimens in the Bishop Museum, Honolulu. Not listed in Tams Heterocera, and information on range and life history is not available.

Subfamily ACRONYCTINAE

9. *Callopietria meridionalis nauticorum* Tams Pl. III, Fig. 3.

Apparently restricted in its range to the islands of American and Western Samoa, and the New Hebrides. A single larva was collected on *Microsorium scolopendria* (Burm), Copel, growing near the coast at Pago Pago, 11 June 1961, and was reared to maturity. A second example was taken at light on Swains's I. 23 September 1961. Its determination was confirmed by Dr Nye of the British Museum.

The moth is pictured by Tams (1935).

No record of the egg and early larval instars is available.

MATURE LARVA (pl. IV, fig. 2A): Length, 24 mm; width through center, 3.50 mm; head width, 2 mm—plump and cylindrical, relatively small and retractile. Head color, yellow-green with a brown tinge on mouth parts. Ocelli, black. Body color, rich green, with an irrorated or broken sinuated pattern of pale green. Segment 1 extends over and obscures upper 1/2 of face. Some segmental junctures yellow. A narrow stigmatal line of yellow, expands around black spiracles. Terminal segments of prolegs, yellow. Body bears no conspicuous setae except for those on head, but it is sparingly covered with small black punctae. Toward the end of the instar, in preparation for pupation, the body shortens and takes on a dull maroon color, with green persisting only on segmental junctures. Pupation occurred on or about June 20 1961.

PUPA (pl. IV, fig. 2B): Length, 14.50 mm; greatest width through center, 4.50 mm. Shape fusiform, head, well rounded, and posterior 1/2 tapering regularly. Pupal color, brown. Eyes, parts of head, abdominal segmental junctures, and cremaster shading to black. Surface smooth and glistening. Antennae and maxillae reach to wing margins. Spiracles,

small, black, and inconspicuous. Cremaster rounded, and when first examined in viable pupa, it was topped by a few minute recurved hooklets, and 2 larger recurved spines. The final drawing had to be made from the pupal skin, and the small hooklets had been twisted off. The 2 larger spines were represented by short stubs, each arising from a small nodule (see pl. IV, fig. 2C). The imago emerged 29 June 1961.

10. *Calogramma festiva* (Donovan) Pl. III, Fig. 4.

Several mature larvae were found 11–13 August 1961 burrowing deeply at the bases of heavy leaves of the large amaryllidaceous plant, *Crinum asiaticum*, which was still growing in the one-time garden at Mulinu. The moth ranges from India and Australia through the South Seas to Tutuila. It has a lustrous white ground color, overlaid by a distinctive pattern in red-browns and brownish blacks. Decorative as it is by comparison with others of its subfamily, it does not approximate the rich colors of its full-grown larva.

MATURE LARVA (pl. IV, fig. 3 B–C): Length, 50 mm; greatest width through center, 7 mm; head width, 3.60 mm. Head relatively small for this robust caterpillar, and partly obscured by a fold of the thoracic segment 1. Head color, uniform burnt orange. Lowermost ocelli, brown—but the majority concolorous with head. Antennae, black-tipped. Body ground color of dorsum, black. Ventral surface, dull maroon. Middorsally there is a longitudinal wide orange band, running from head to cauda. Lateral to this is a wide area extending down to lower edges of spiracles. This area has 3 well defined longitudinal white stripes traversing it. Middle stripe the widest. The other 2 are narrow, more sinuous, and frequently broken. Segment 4 with transverse saddle that is free of white stripes. Also, segment 11 has a large black patch that partially breaks white stripes. Below spiracles is a wide longitudinal band of orange, developed as a series of continuous loops that swing under spiracles. Below this the body is dull maroon. A few white dots form a broken line running longitudinally a short distance below the looped orange band. Spiracles, black-centered, with faint gray orange ringlets. Legs, black. Proximal portions of prolegs, dull maroon—but laterally on each one there is a black patch. Crochets, black, and very minute. A few setae occur on head, thorax, and cauda. Of the larval series, the first example pupated 16 August 1961. Pupation occurred in a chamber chewed out of the foodplant. Heavy infestation can cause serious damage to this giant lily. The larva can endure and thrive on more moisture than any noctuid type we have heretofore seen. It feeds in the basal white tissue of the growing leaves where the plant is constantly exuding moisture, and where rain water accumulates.

PUPA (pl. IV, fig. 3 A & D): Length, 19 mm; greatest width, approximately 5 mm. Color, rich yellow-brown. Surface texture, smooth and glistening. Maxillae reach to wing margins. Antennae fall short of this by about 1 mm. Eyes, large and prominent. Spiracles, dark brown. Cremaster, black,—bears 2 short spines.

11. *Prodenia litura* (Fabricius) Pl. V, Fig. 5.

Larva is injurious to cotton, tea, tobacco, maize, taro, tomato, potato, lantana, indigo, and many other plants. In consequence, it has been dealt with extensively in the literature. Tams (1935) discussed it briefly. Swezey (1942) called it the worst taro pest in Samoa, and recorded the larva (1941) on banana leaves and *Ipomoea pes-caprae*. He illustrated

the moth. Dale & Herring (1956) also included an excellent illustration, and designated the larva as the "Taro cut worm". (Samoan name—*anufe 'ai taro*) Hampson (1909) gave its range in detail, listing many areas in Africa, Turkey, India, Burma, Ceylon, Japan, Australia, Indo-malaya, the South Sea Is. and other points throughout this vast area.

A bunch of eggs was found in a garden at Pago Pago, 9 July 1961 on *Sesbania grandiflora*, laid in a compact mass, and covered by a mat of long scales. The young larvae entirely consumed the shells which precluded a drawing or description. We suspected that they were larvae of the Taro cut worm and could not devote the time to them that was given to lesser known species then being reared. The earlier stages were therefore neglected, but the mature larva and pupa were illustrated and described.

FIRST INSTAR: Length, 1.30 mm; head width, approximately 0.40 mm—wider than prothoracic segment. Head color, black. Body, translucent. There were several longitudinal rows of black nodules, each bearing a black seta. 15 July 1961.

MATURE LARVA (pl. VI, fig. 1A): Length, 36 mm; head width, approximately 2.50 mm—relatively small as compared with body segments. Head color, brownish black on a yellow field. Labrum, hyaline and rough. Mandibles, brown. Basal segment of antenna, pinkish white (see pl. VI, fig. 1B). Body, robust in character, predominantly dark brown above spiracles. Olive speckled with pale yellow dots, subspiracularly. There is a narrow mid-dorsal pinkish stripe. Lateral to this is a wide band of black, sprinkled with dull yellow dots. On outer edge of this band each segment bears a triangular black patch. Lateral to this is a longitudinal stripe of dull pink, bounded inferiorly by a wide band of speckled black and tan. This is edged inferiorly by a line of whitish dots and dashes. Inferior to this is a spiracular band of velvety black. Below this is a band of speckled dull pink and soiled white. Spiracles, black with narrow white rims. Legs, black. Prolegs, concolorous with venter, but margined inferiorly with yellow. Crochets, brown. Setae, small and inconspicuous.

There is wide variation in the color and width of the stripes and bands, even in individuals from a single batch of eggs. In some, the middorsal line had almost disappeared, and the entire area above the spiracles was much darker. One example collected on *Hippastrum vittatum* (Amaryllidaceae), July 20, was much paler above the spiracles, its coloration being a uniform brown. The first group of larvae accepted leaves of a wild vetch when we ran out of *Sesbania*. Several examples had pupated by July 18 1961.

PUPA (pl. VI, fig. 1C): Length, 19 mm; greatest width through center, 5 mm. Color, uniform rich red-brown throughout. Head, evenly rounded, surface texture on all segments, smooth. Maxillae terminate at wing margins. Antennae 1 mm short thereof. Cremaster consists of 2 short spines without curved tips.

12. *Spodoptera mauritia* (Boisduval)

This common pest has a wide range extending from Africa to India, Burma, China, the Indo-Malayan-Australian areas, to the South Pacific Islands, and north to Hawaii. It came to light frequently in Tutuila. No effort was made to rear specimens as its life history and habits have been treated extensively by several authors (see Swezey, 1906, and others).

It is pictured in Hampson's (1909) Vol. 8, and in Zimmerman's (1958) Vol. 7. In the latter work it is listed as a separate race—*S. m. acronyctoides* Guenee. Types of the parent

species, *mauritia*, were taken in Mauritius.

Dyar (1894) described the life history in detail under the mistaken name *Laphygma flavimaculata*, but later (1900) corrected the error. His material was reared on grasses in Hawaii. Notes on its damage to rice and other plants have been recorded by Swezey (1941-42), Williams (1944), Dumbleton (1945) and others.

The synonymy of *S. mauritia* was discussed by Fletcher (1956).

The female has the habit, in common with several noctuids, of laying its eggs in bunches, covered by fluffy scales—the egg-mass being placed on many kinds of trees or plants.

The newly hatched larvae scatter widely in search of plants such as maize, cotton, rice, sugar-cane, and grasses.

13. *Platysenta illecta* (Walker)

Ranges from India, through the Malay Archipelago, Australia, New Guinea, the Solomon Is., Fiji, and to the Pacific Islands east of the Samoas. Examples came to light in Mulinu'u and Pago Pago.

Tams (1935) lists it in the genus *Perigea* and Dr Nye (1962) of the British Museum entomological staff places it in *Platysenta*.

It is a pest of plants belonging to the Family Acanthaceae.

Hampson (1908) illustrates the moth in color.

14. *Elydna nonagrica* (Walker)

Listed by Hampson (1910) in error, as *Elydna reclusa*, with many synonyms. Tams does not specifically record it from American Samoa. He gives its food plant as tobacco.

A single example was obtained at light in Pago Pago, 22 August 1961.

Zimmerman (1958) records its host plants as *Commelina*, *Eugenia*, and *Portulaca*, and its range as widespread from India through Malaysia to southern Polynesia, and also Hawaii. He gives a full record of its life history and illustrates the moth in fig. 271.

15. *Chasmina tibialis* Fabricius Pl. V, Fig. 6.

Common at Pago Pago and Mulinu'u on Tutuila. First determined as *C. sericea* from specimens so labeled in the Bishop Museum, but Dr Nye (1962) confirmed Tam's designation with the comment that *C. sericea* Hamps. is from Ceylon and the male has a concave costa; in *tibialis* the costa is straight. Hampson (1910) figures 161-2 illustrates this difference.

The moth has a range extending from many portions of Africa, through India, Hong Kong, Indo-Malaysia, New Caledonia, New Guinea, Australia and Tahiti, to Samoa.

There is apparently no record of its life history in the literature.

On 9 July 1961 several larvae were obtained by beating a large tree, *Hibiscus tiliaceus* Linn. (native name "fau" or "fau-Tu"), which grew close to the shore at Mulinu'u.

A drawing was made of the larva, and the following notes prepared.

MATURE LARVA (pl. VI, fig. 2A): Length, 45 mm; head width, 4 mm. Head and appendages, yellow-green except for 2 or 3 of the ocelli and edges of mouth parts, which are

tipped with black. Cheeks have a pebbled surface. Body, cylindrical except for tapering on last 3 caudal segments. Widest at segment 8 where it measures 6 mm. Ground color, leaf green. There is a paired longitudinal middorsal white line bordering a darker green stripe. Lateral to this the body is green of a paler shade than the middorsal stripe. On the outer edge of this is a longitudinal wavy white line. Inferior thereto the surface of the body is yellow-green. Legs and prolegs, green. Spiracles, pale orange. Numerous setae arise from white tubercles. When ready for pupation the larva takes on a reddish tinge over the dorsum. The first example pupated 14 July 1961, in a fragile cocoon formed in gravel and dried leaves.

PUPA (pl. VI, fig. 2B): Length, 20 mm; greatest width through center, 7 mm. It is of the usual noctuid fusiform type. Maxillae reaching to wing margins, and antennae 1 mm shorter. Eyes slightly bulging. Cremaster consists of a pair of short spines without recurved tips. Surface, lustrous brownish black. Spiracles, black, conspicuous. Imagos emerged from 29 July to 17 August 1961. During this period the moths were coming to light in great numbers.

Subfamily ERASTRIINAE

(Note. J. McDunnough (1938) and W. T. M. Forbes (1954) place the following two genera in the Acontiinae. S. E. Crumb (1956) includes *Eublemma* under Lithacodiinae)

16. *Eublemma rivula* (Moore)

Not specifically listed for Tutuila by Tams—mentioned for Tau I. A small series was taken in October and November of 1961, Pago Pago. The species ranges from various areas in Africa, through India, the Malay Archipelago, Farquhar I. (Fletcher In Hampson), Australia, Fiji, and many of the Pacific Islands E of Samoa. Pierre Viette (1949) lists it for the Society Is., including Tahiti.

Apparently no published record of host plants or life history.

17. *Eublemma crassiuscula* (Walker)

A unique determined by Tams. Apparently represents first record for Tutuila. Type taken in Borneo. Range extends from the Philippine Is., Andaman Is. and Borneo through New Guinea, New Hebrides and Fiji to American Samoa.

18. *Amyna natalis* (Walker)

Two examples taken at Mulinuu in July 1961.

The species has a wide range, extending from Kashmir through India, Burma, the Malay Archipelago, Australia, and New Guinea, thence through Tonga and Fiji to American Samoa. By migration it has reached Hawaii, where Zimmerman (1958) records the food-plants as *Abutilon incanum*, *Sida cordifolia*, *Sida fallax*, *Sida rhombifolia*, and *Waltheria americana*. He also lists its parasites as *Encelatoria armigera* (Coquillet), *Hyposoter exiguae* (Viereck), and *Meteorus laphygmae* Viereck.

Hampson (1910) illustrated the moth on text fig. 131, and Zimmerman (1958) shows an enlarged halftone on fig. 290.

19. ***Amyna octo*** (Guenée)

The most widely distributed member of the genus *Amyna*. Ranges in the tropical and subtropical areas of Africa, through Asia, including eastern Siberia, China, Korea, Kashmir, India, Bengal, the Malay Archipelago, Borneo, New Guinea, Australia, and the South Pacific Islands to Hawaii. In addition, it occurs on the American Continent from the southern United States to most of South America.

Forbes (1954) reports it "occasionally" in New York, and gives brief notes on the larva. In part: "Prolegs absent on A3 and 4, head granulose, ... proleg hooks appendiculate ... Plain green, sometimes with a darker suprastigmatal line."

Hampson (1910) records a long list of synonyms, and illustrates the moth in a line cut. Holland (1903) pictures it in color.

Foodplants reported are *Chenopodium* and *Sida*.

Two examples came to light at Mulinuu in July 1961.

20. ***Eustrotia ritsemae*** (Snellen)

Common in grassy open spaces throughout Tutuila. More widely distributed through the South Pacific area than might be expected for so fragile an insect.

Range, as presently recorded, is Borneo, Amboina, Celebes, New Hebrides, Solomon Is., Australia (New South Wales), Cook Is., Tahiti, American Samoa, and probably occurs in many other islands of the South Pacific.

Apparently nothing has been published on its life history and host-plants.

Subfamily EUTELIINAE

21. ***Phlegetonia delatrix*** (Guenée)

Recorded for "Samoa" by O'Connor, in Tams (1935), which may refer either to Western or American Samoa. We took only one typical *delatrix* in Tutuila, and a pair of "*Phlegetonia* sp. not *delatrix*", captured near Pago Pago in August 1961—the latter so determined by Dr J. W. B. Nye of the British Museum. *Delatrix* ranges from India to Australia, and eastward to "Samoa." The larva is "Green, paler at sides, subdorsal line slender, whitish; a lateral series of small spots." The "pupa in a slight cocoon under leaves and excrement."

22. ***Anigraea rubida*** Walker

A single example taken near Pago Pago was determined by Dr Nye and placed in the British Museum collection. It has not heretofore been recorded for American Samoa. Its reported range is North India, Singapore, Philippines, the Malay Archipelago and Borneo.

Illustrated in Hampson's (1912) fig. 37.

Nothing is known of its habits, host-plants or metamorphosis.

23. ***Paectes canescens*** Tams

First described by Tams (1935) from examples taken in Malololelei, Upolu, at 610 m elevation.

We did not find it on the coast in Tutuila, but a small series was taken above Pago Pago in September and October 1961.

Tams (1935) illustrates it in color, plate VI, fig. 14. Nothing is known of its life history.

Subfamily STICTOPTERINAE

24. *Stictoptera hepatica* Rebel

A series was taken at Pago Pago in June and July 1961, and a few came to light at Mulinuu. Later, in October and November a small number was obtained in the hills above Pago Pago. Tams records it only for Upolu and "Samoa".

The moths are notably variable in their markings and spottings on the primaries. Life history unknown, but Hampson (1912) shows a picture of the larva of another species (*subobliqua*) which may give a hint of what to look for. Unfortunately nothing is recorded of foodplant.

25. *Nigramma lapidaria* (Walker)

A single example was taken on Tutuila. Determination was made by Dr Nye and the specimen placed in the British Museum collection.

Not recorded for Samoa by Tams, and habitat listed by Hampson (1912) is limited to India. Illustrated on Hampson's text fig. 59.

26. *Gyrtona hopkinsi* Tams

Four examples were taken between 12 August and 3 September 1961 on Tutuila. Two specimens sent to the British Museum and were identified by Dr Nye as *Gyrtona hopkinsi*. The types were taken at Upolu. More complete records of its range and habits are needed.

Tams (1935) described it, but his illustration on plate XII, fig. 11 is mislabeled *Gyrtona buxtoni*.

27. *Gyrtona divitalis* Walker

Another species in the genus *Gyrtona* which Tams lists only for Upolu in his text, but his distribution table, p. 177, gives its range as India, Malay Archipelago and Pacific Islands E of Samoa, to which Hampson (1912) adds Andaman Is., Selangor, Singapore, and Borneo. We took it at Mulinuu in July and August of 1961.

Pictured on Hampson's plate CLXXX, fig. 1.

28. *Nanaguna breviscula* Walker

Three examples were taken at light near Pago Pago. One was sent to the British Museum and determined by Dr Nye as *N. breviscula*.

The species ranges from India, through Ceylon, Borneo, New Guinea, Australia, the Solomons and probably many other islands of the South Pacific, to Tutuila.

Hampson's illustration (1912), fig. 90, will help to determine it. Apparently nothing is known of its habits, host plants, or metamorphosis.

Subfamily SARROTHRIPINAE

29. **Barasa rebeli** Tams

Described from Upolu (holotype and allotype) and from a series of paratypes, 3 of which came from Pago Pago. Our small series was taken at Mulinuu and Pago Pago.

Pictured by Tams (1935), plate VII, fig. 2.

Apparently nothing is known of its life history.

30. **Mniothripa lichenigera** (Hampson)

We did not take this in Tutuila, where according to Tams it occurs. Hampson (1912) lists it for Sierra Leone and Nigeria in Africa, Sikkim in India, and Singapore in the Malay States. He pictures it on fig. 95.

More information is needed on its range in the South Pacific, and on its life history.

Subfamily WESTERMANNIINAE

31. **Earias luteolaria** Hampson

Several examples of this small yellow moth came to light in Pago Pago during July 1961.

Its range extends from India, through the Malay Archipelago to Australia, and the South Pacific Islands to American Samoa. Apparently no records are available of its life history.

31a. **Maceda mansueta** Walker

Apparently a rare species on Tutuila. A few were taken at Mulinuu and Pago Pago in early August 1961.

Hampson (1912) says range is from Ceylon, through the Andaman Is., Straights Settlements, Borneo, Celebes and New Guinea, to Australia. Tams (1935) includes India and Solomon Is. Its presence on Tutuila and in Western Samoa suggests that it may occur in other South Sea islands.

Hampson (1912) illustrates it on fig. 217.

32. **Maurilia iconica** (Walker) Pl. III, Fig. 7.

Came to light in numbers at Mulinuu during June and September 1961. Larvae were found on *Terminalia catappa* L. Characteristically it was concealed between 2 leaves, united by strands of silk, and ventured forth to feed only at night.

Tams gives its range as India, the Malay Archipelago, Australia, New Guinea, Western Samoa, and Tutuila. Hampson (1912) includes China, Burma, Ceylon, and Singapore.

MATURE LARVA (pl. IV, fig. 4A): Length, 24 mm; greatest width, through thoracic area, 5 mm. Head strongly bilobed. Ground color, dull yellow, much obscured by streaks and dots of black. Segments 1-3 of body expanded into a large globular bulge, green with 4 minute black dots ringed with white, placed transversely near anterior margin of bulge, and 6 similar dots occur across widest part of expanded area. This portion of larva varies considerably in individuals. With some, the green is a mottled gray-green, sprinkl-

ed with numerous white dots. With others there is a mottled brown surface. Dorsally, from segments 4-11 are series of longitudinal yellow bands, margined with white. First of these is middorsally placed, and dull yellow. On each side of this is a band of bright yellow with narrow white margin. This margin is complete except for a dark patch on part of segments 7 & 8. Segment 11 has a pair of large papillae rising dorsally, and forming a hump. Each papillus bears a long seta. Lateral to yellow dorsal band is a longitudinal brown stripe margined with white. Below this is a wide longitudinal orange band on lower margin of which the spiracles are placed. Inferior to this occurs another band of speckled brown. In some examples these bands are not clearly defined, and tend to break up into a series of dashes. Venter, dull yellow. Legs, predominantly yellow with black tips. Prolegs, bright yellow, each with a large oval black patch on its lateral surface. There are numerous black setae arising from small black nodules.

COCOON: On 29 August the first larva had constructed a compact white cocoon between 2 leaves. Length, 26 mm.

PUPA (pl. IV, fig. 4B): Length, 15 mm; greatest width, 5.5 mm. Head and cauda well rounded. Maxillae and antennae reached to wing margins. Appendages of thorax mottled in such manner as to make it difficult to see segmental lines. Wings, brownish black. Abdominal segments, red-brown on venter, shading to blackish brown on dorsum. Thorax, dark brown. Spiracles, concolorous with body and inconspicuous. Cauda, brownish black, with no cremasteric hooks or rugosities. Produced a perfect imago 7 Sept. 1961.

Subfamily CATOCALINAE

33. *Lagoptera miniacea* Felder

This large moth with bright orange secondaries is apparently a rare species on Tutuila. We took only 2. It has been recorded from the Solomon Is., Fiji, Western Samoa, and Tutuila.

Nothing is known of its early stages.

34. *Anua coronata* (Fabricius)

Rivaling *L. miniacea* in size and beauty, *A. coronata* is widely distributed. Ranges from Madagascar (type locality) through India, Burma, Singapore, Ceylon, Java, the Philippines, Australia, the Gilbert Is., Western Samoa, and Tutuila. Also reported from Tau I., American Samoa.

Hampson (1913) illustrates it in text fig. 101 and credits Moore in Lep. Ceylon, III, p. 159, pl. 166, fig. 5 with description of larva. Food-plant, *Quisqualis indica*.

35. *Anua tongaensis* Hampson

Described from specimens taken in the Friendly Is. (Tonga) and later reported by Tams (1935) from Upolu in Western Samoa and Tutuila in American Samoa.

A few came to light in August 1961 and additional numbers were collected near Pago Pago in November by Barbara Wilson.

Pictured in color on Hampson's (1913) plate 214, fig. 11.

Nothing is known of early stages.

36. *Achaea serva* (Fabricius)

Came to light in considerable numbers at Pago Pago in June and at Mulinu'u in August 1961.

As with *Anua coronata*, it ranges from Madagascar through India to Australia, thence to Tutuila.

In spite of its abundance, no larvae were found. If its life history is known, neither Tams or Hampson mention it. The larva is reported on *Palaguium* and *Ficus*, and it may feed on *Ricinus* (Castor oil plant) as do several of its relatives.

Pictured by Hampson (1913: fig. 123).

37. *Achaea janata* (Linnaeus) Pl. V, Fig. 8.

Even more plentiful in Tutuila than *A. serva*. Ranges from India to Australia, through the South Pacific islands to Tutuila, and has reached Hawaii as an immigrant.

Hampson (1913) lists it as *Achaea mercatoria* Fabr., with *A. melicerta* Cramer (nec Drury) as a synonym. Viette (1948-50-53) lists *Achaea janata* with *A. mercatoria* Fabr. and *A. melicerta* Dru. as synonyms. Zimmerman (1958) illustrates it and lists the larval food plants as *Acacia farnesiana*, Chili pepper, *Codiaeum*, cowpea, *Croton*, daikon radish, *Desmanthus virgatus*, *Euphorbia bifida*, *E. geniculata*, *E. hirta*, *Leucaena glauca*, *Macadamia*, *Pedilanthus tithymaloides* (slipper plant), Philippine pole bean, *Poinsettia*, *Prosopis chilensis*, *Ricinus communis* (Caster oil plant), Rose, *Terminalia catappa*, and "wong bok" cabbage. He questionably includes *Polypodium*. Other listed plants are tea, pomegranate and *Albizia*. From this plant list it will be noted that the moth is of major economic importance.

Viette (1949) gives detailed distribution of it in French Oceania, and mentions *Ricinus communis* L. as the food plant.

A note on larva, pupa, and food plant, published by Hampson (1913), under *A. mercatoria*. No illustrations.

We obtained several larvae on three occasions in Tutuila during June and early July. Most were mature. A few apparently in penultimate instar. No marked distinction evident between these and mature examples.

There was great variation in color and markings ranging from nearly black individuals with narrow orange stripes and dashes to pale spotted brown and pink forms.

Pale pinkish larva described first, melanic variety, second.

MATURE LARVA (pl. VI, fig. 3B): Length, 40 mm; head width, 3.5 mm. Head, (pl. VI, fig. 3 C-D) conspicuously marked with rich red-brown on which white dots and spots are superimposed. Two large ovoid white spots occur, 1 on each side of cheeks. Three smaller spots occur on each side of central suture of crown. One arrow-shaped white spot placed on outer side of each adfrontal suture. Latter sutures composed of paired red lines. Front pale pinkish brown, bisected by a wide brownish black band. Labrum, mandibles, and antennae, pinkish white. Body ground color, apparently pinkish brown, due to a dense covering of minute spots of this color. Actually these spots rest on a pale cream-pink base, tending to run in longitudinal lines.

Segmental juncture 5 shows a velvety black line when back is arched, but when extended, this entirely disappears. Segment 11 bears a dorsal hump, topped by a pair of bright

PLATE V

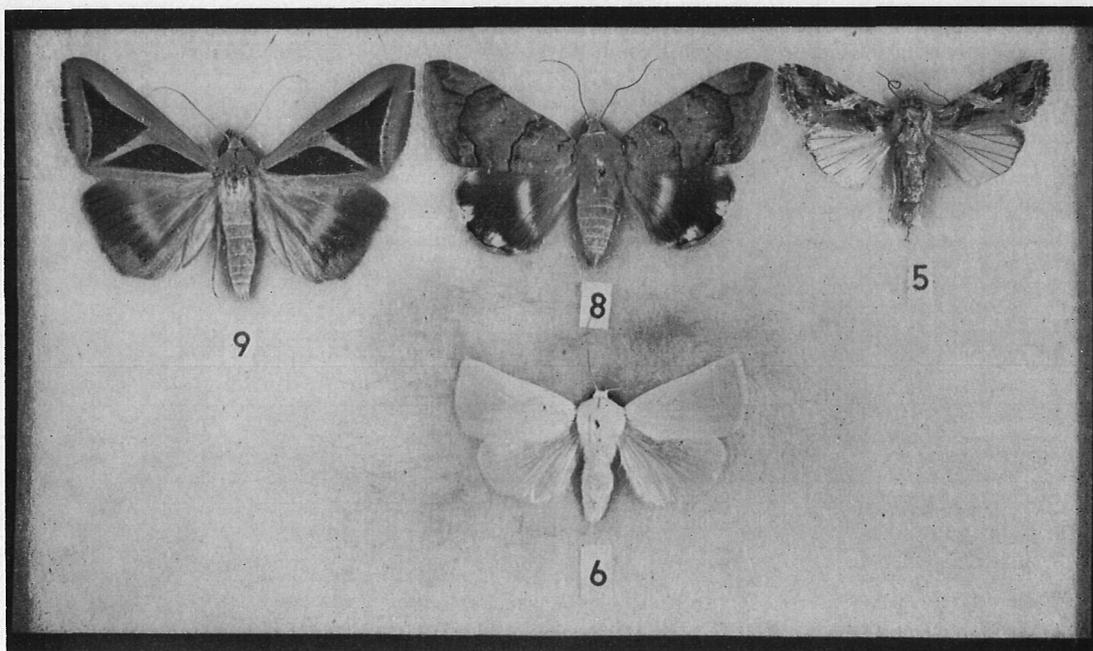


Fig. 5. *Prodenia litura*.
 Fig. 6. *Chasmina tibialis*.
 Fig. 8. *Achaea janata*.
 Fig. 9. *Chalciope cephise*.

red papillae, each having 3 dots on surface. Legs, pinkish. Prolegs, proximally marked like body surface, but distally each has a large and a small white spot on outer surface. First pair abortive. Spiracles, pink. Larva formed a pupal chamber at the base of the food plant in rearing jar.

MELANIC LARVA (pl. VI, fig. 3A): All measurements correspond to those of the pale phase. Head (pl. VI, fig. 3D): Conspicuously black over most of surface. Large white spots present. Labrum, mandibles, and antennae, dull white. Adfrontal sutures, orange. Body: Dorsum velvety black. Subdorsally, a longitudinal band of orange-red, wavy in character, margined above by yellow spots, dashes, and narrow broken lines. Spiracles, orange-red.

Substigmatally, a wide band of black. Legs, dull maroon.

Prolegs have large white blotches laterally. Paired papillae on top of segment 11, same color and character as in pale larva.

Venter, orange, with a broken yellow marginal line. Dark larva has finely spotted surfaces only on venter.

PUPA (pl. VI, fig. 3E): Length, 21.5 mm; greatest width through area of abdominal

PLATE VI

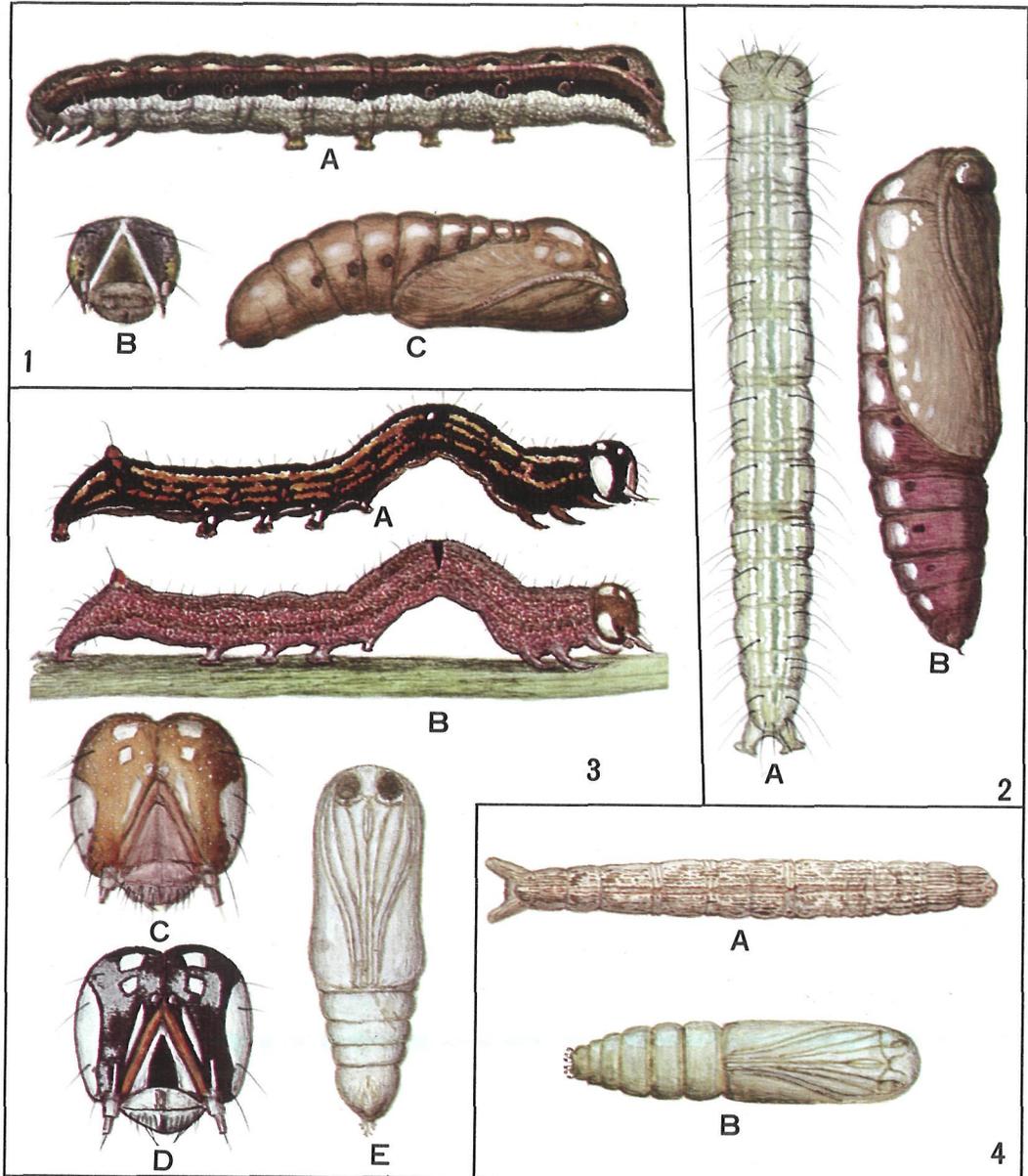


Fig. 1. *Prodenia litura* (Fab.). A, mature larva; B, larval head; C, pupa, lateral view.

Fig. 2. *Chasmina tibialis* Fab. A, mature larva; B, pupa.

Fig. 3. *Achaea janata* (Linn.). A, mature larva, dark form; B, larva, pale form; C, head of larva, pale form; D, head, dark form; E, pupa.

Fig. 4. *Chalciope cephise* (Cr.). A, mature larva; B, pupa.

segment 4, 7 mm. Head and thorax, relatively wide, anterior portion, evenly rounded. Antennae and maxillae reach nearly to wing margins. Ground color, brown, but almost entire surface covered with a bluish white bloom—only movable segmental junctures of abdomen and cremaster free of this powdering. Cremaster, a rounded low knob, top bearing a cluster of recurved hooklets, buried in network of fragile cocoon. The latter is spun on the concave surface of a leaf of the host foodplant, and is translucent. Duration in pupal stage, 10 to 12 days.

Our first larva taken on *Codiaeum variegatum* (L) Blume. Other examples reported on "croton", which is used in the Island as an ornament. The variegated color of this plant furnishes ideal camouflage for larvae of *Achaea janata*.

38. *Achaea fulminans* Rebel

One specimen of this moth was taken near Pago Pago 31 July. Tams recorded it for Western Samoa and Tutuila. Apparently rare.

39. *Parallelia prisca* (Walker)

Type locality, Navigator's I. Occurs in New Hebrides and Loyalty Is., Western Samoa and American Samoa.

A few examples came to light near Pago Pago. Apparently nothing is known of early stages.

Illustrated by Hampson (1913: plate CCXIX, fig. 10).

40. *Chalciope cephise* (Cramer) Pl. V, Fig. 9.

Ranges widely through the islands of the South Pacific from American Samoa to the Solomons and New Guinea, thence through the Malay Archipelago to Burma and India.

Occurred abundantly in small grass-grown clearings on Tutuila.

Single larva collected by beating, from *Vigna marina* growing close to the shore line on Mulinuu, 25 July 1961.

MATURE LARVA (pl. VI, fig. 4A): Length, 58 mm; greatest width at segment 9, 6 mm; head width, 3.5 mm. Head ground color, creamy-tan. Front marked by a brown dash in center, continues onto clypeus. Frontal suture, pale brown. Forepart of cheek with 8 longitudinal wavy stripes of dark brown. Side of cheek with 5 such stripes of a paler brown. Under edge of cheek, black. Ocelli, brown. Tip of antenna, white. Body ground color similar to that of head. 1st segment with all stripes of the head are continued. On 2nd and all subsequent segments stripes tend to separate, most of them break up into a series of dots and dashes rather than unbroken stripes. The only continuous stripe is a double one, middorsally placed, red-brown in color. Spiracles, creamy-tan, with black central lips and a narrow black circlet. Legs, longitudinally striped brown and tan. Only 2 pair of prolegs and anal pair are functional. These are striped laterally with paired wiggly brown lines. Few short inconspicuous setae colorless.

PUPA (pl. VI, fig. 4B): Length, 26 mm; greatest width, 6 mm.

Subfusiform, head evenly rounded and cauda tapering to a somewhat squared tip bearing 6 short recurved cremasteric hooklets. Four of these arch laterally and the 2 outer-

most curve medially. Eyes, small and inconspicuous. Maxillae reach to wing margins, and antennae nearly so. Entire pupal surface uniformly smooth. Ground color, brown, but a covering of bluish white powdering obscures this. Powdering can be rubbed off. Absent on segmental lines. Pupa gave forth an imago on 12 August 1961.

Hampson (1913: Vol. 13, page 30, fig. 6).

41. *Mocis frugalis* (Fabricius)

Ranges from the Ethiopian region, the Indo-Australian area, and the Pacific Islands to the Marquesas Is., and the Tuamotu Archipelago, according to Viette (1950).

Plentiful along roadsides in Tutuila. One example taken on Swain's I.

Hampson (1913) records larva. Food-plant, Zingiberaceae. Moth pictured on his fig. 23, p. 88. Tams (1935) lists rice, maize, sorghum, and millet as host plants.

42. *Mocis trifasciata* (Stephens) Pl. VII, Fig. 10.

Even more common in Tutuila than *Mocis frugalis*. Netted abundantly near or in grassy areas. Ranges from American and Western Samoa southward to New Guinea and Australia.

A single larva was found on cultivated string beans near Pago Pago 16 June 1961 and was reared to maturity.

MATURE LARVA (pl. VIII, fig. 1A): Length, 38 mm. Head, (pl. VIII, fig. 1B), relatively large; width, 3 mm. Central suture a narrow brick-red line bifurcating inferiorly to form part of adfrontal suture which is composed of paired brick-red lines. Around all of these is a basal white area. Cheeks crossed longitudinally by 2 white bands between which is an area of brown and white stripes. A similar striped area occurs supero-medially to this, although in the latter the stripes are paired in a somewhat different manner. Mouth parts banded white and brown. Antennae, white. Ocelli, small and dark. Body, cylindrical, with tapering cauda. General coloration a mixture of longitudinally striped bands, dots and dashes of browns, tans, and yellows. Closer examination reveals a series of definite stripes and dots disposed in a complicated pattern. Middorsally there is a broad band of tan, overlaid by numerous fine black wavy lines, stripes and dots. Outer edge with a series of round black dots, 4 to a segment, each bearing a short seta. These dots slightly raised and some with white pupils. Lateroinferior to this area are numerous longitudinal wavy lines and dots, varying in color from red-brown to black, all on a pale cream ground. Below spiracles there is a relatively wide longitudinal band of pale yellow, margined above by a brick-red stripe and below by a black stripe. Venter, dark olive, streaked with lines and dashes of dark slaty-brown. Spiracles have a central dark dash and narrow outer circlet of black, surrounding a cream colored center. Legs and prolegs concolorous with venter.

PUPA (pl. VIII, fig. 1C): Caterpillar rolls edge of leaf and spins a fragile cocoon in which to pupate. Length of pupa, 21.5 mm; greatest width, 6 mm. Color, uniform chestnut-brown throughout. Segmental lines clearly defined but very narrow. Maxillae and antennae reach to margins of wing cases. Cremaster, a gently elevated and slightly convex platform from center of which arise 7 or 8 straight spines with recurved tips. Chrysalis (pl. VIII, fig. 1C) has a suggestion of bluish bloom or powdering which rubs off in spots

if the pupa turns actively when disturbed. Imago emerged 8 July 1961.

Moth pictured in color on Hampson's (1913) plate CCXXIII, fig. 23.

43. **Anomis nigratarsis xanthochroa** (Butler)

Two examples taken in August at Mulinuu. Determined by John W. Beardsley of the HSPA Experiment Station as *A. n. xanthochroa*.

Not included in Tams' (1935) list of Samoan Heterocera; not in Hampson Catalog. Lepid. Phalaenae. Apparently no published record of life history or food plant.

Subfamily PLUSIINAE

44. **Plusia chalcites** (Esper) Pl. VII, Fig. 11.

Commonly called "The Garden Looper". Distributed over the greater part of the Old World and throughout most of the Indo-Malayan and South Pacific islands. Zimmerman (1958) reports it for the Hawaiian Is.

Larvae nearly omnivorous. Taken on most of the edible plants useful to man.

Many life history accounts published in Europe and elsewhere. Swezey (1906) gave thorough account of egg, larva, and pupa, which Zimmerman (1958) abstracted.

A mature larva was found 29 June 1961 in Pago Pago feeding on *Cosmos sulphureus* Cav. It was raised to maturity.

MATURE LARVA (pl. VIII, fig. 2A): Length, 34 mm. Cylindrical through body, but tapering to a considerably smaller head. Ground color, leaf green. Head slightly yellowish. Middorsally, a conspicuous dark green stripe, edged with white. Lateral to this is a longitudinal white stripe which, during its course, expands to encircle white dots. Parallel and lateral to this is another similar stripe. These 2 stripes rest on a pale green base. Lateroinferior to this is a wide band of darker green, edged below by a white stripe. Inferior to this is a stigmatal white band. Body surface below this is uniform pale green except for a few flecks and dashes of white. Legs and prolegs, green. Spiracles, yellow. Setae, pale yellow. Larva pupated 10 July 1961, in a fragile white cocoon, through which the chrysalis was clearly visible.

PUPA (pl. VIII, fig. 2B): Length, 23.5 mm; greatest width 6 mm. Fusiform, with a well rounded head. Maxillae terminating in a knob, slightly beyond wing margins. Antennae ending about 1 mm short thereof. Entire pupa, green, except for some red-brown segmental transverse bars on dorsum. Knob of cremaster, pink, with apparently only 2 short recurved brown hooklets. Imago hatched 17 July 1961.

Hampson (1913) lists the species as *Phytometra chalcytes*, and illustrates the moth on fig. 122, p. 484.

Subfamily OPHIDERINAE

45. **Felinia filipalpis** (Walker)

This species was taken by Steffany in Pago Pago in 1923. We found no specimens on Tutuila during four months of collecting. Tams records it from Fiji, Australia, New Guinea, the Malay Archipelago, and India.

46. **Catephia sericea** (Butler)

This black and white moth is limited in range to Tutuila, the Pacific Islands E of Samoa, Fiji, and Tonga. Large triangular white spots on lower wings makes it conspicuous when it comes to light. Apparently no record of food plant or early stages.

47. **Ericeia inangulata** (Guenée)

Taken at light near Pago Pago. Ranges from New Guinea through Australia, the Malay Archipelago to India, and the Old World. Its capture in Tutuila suggests that it may have been overlooked on islands to the S of American Samoa. Not mentioned in Hampson's Catalogue.

48. **Ericeia leichardtii** (Koch)

Reported for Ellice I., Tonga, Fiji, the Pacific Islands E of Samoa, Western Samoa, and Tutuila. Not seen by us.

49. **Serrodes campana callipepla** Prout

Listed for Fiji and American Samoa. Did not show up in our collecting on Tutuila. Apparently a rarity. Nothing is known of early stages or host plants.

50. **Hypocala guttiventris** Walker

Reminds one of a small *Catocala* with its rich orange and black secondaries. Came to light near Pago Pago between 15 June and 16 August 1961. Determined by comparison with others in the Bishop Museum, through courtesy of Dr John W. Beardsley. Tams (1935) states that Revel records a male labeled Samoa, collected by Mr Julius Henniger, and speaks of it as an Australian species.

51. **Hypocala deflorata** (Fabricius)

Syn. *australiae* Butler.

Zimmerman (1958) after examining material in the British Museum gave this synonymy. If he is correct the species ranges from India to Australia, through many of the Pacific Islands to American Samoa. It reached Hawaii many years ago. Larval food-plants listed as *Diospyros*, *Maba sandwicensis* and *Sapota*.

Swezey (1909) published description of larva. Zimmerman reprinted it in his *Insects of Hawaii* and also pictured the moth in fig. 329.

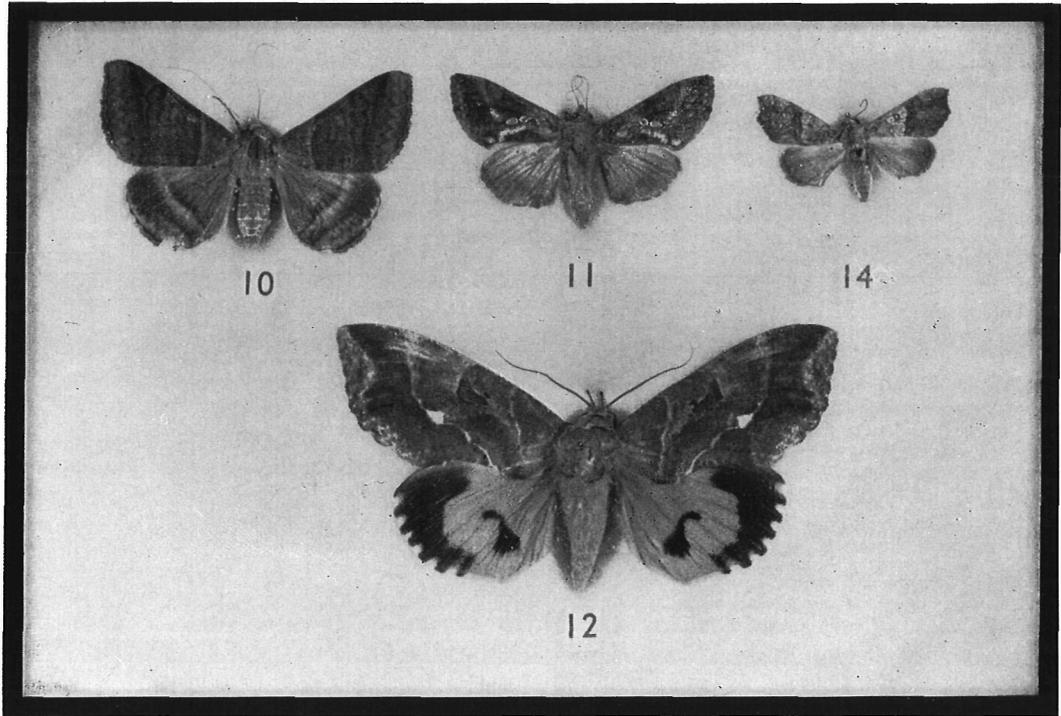
52. **Rivula polynesiana** Hampson?

Reported for Pago Pago by Tams with the statement that he considered the specimen on which de la Garde (1896) based his record, represented a hitherto undescribed species. We took no examples of the genus *Rivula* on Tutuila.

53. **Othreis fullonia** (Clerck) Pl. VII, Fig. 12.

Not mentioned in Hampson's Catalogue Lepidoptera Phalaenae, notwithstanding its wide distribution through tropical areas of Africa, Asia, Melanesia, Australia, and the South Pacific islands.

PLATE VII

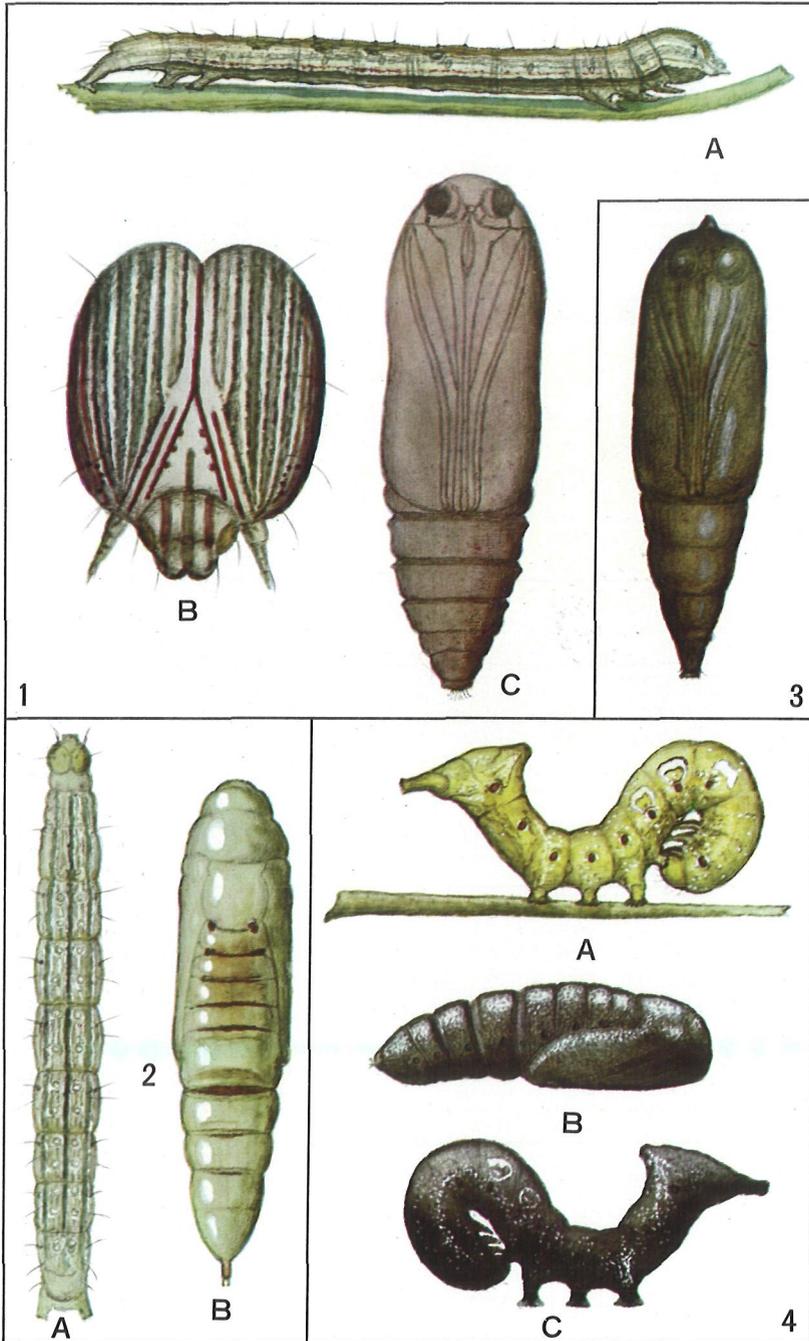


- Fig. 10. *Mocis trifasciata*.
 Fig. 11. *Plusia chalcites*.
 Fig. 12. *Othreis fullonia*.
 Fig. 14. *Cosmophila flava flava*.

PLATE VIII

- Fig. 1. *Mocis trifasciata* (Stephens). A, mature larva; B, head, front view; C, pupa.
 Fig. 2. *Plusia chalcites* (Esper.). A, mature larva; B, pupa.
 Fig. 3. *Cosmophila f. flava* (Fab.), ventral aspect of pupa.
 Fig. 4. *Othreis fullonia* (Clerck.). A, mature larva, pale form; B, pupa; C, larva, dark form.

PLATE VIII



Pierre Viette (1948) published an account of range, habits, anatomy, biology, and economic importance, mentioning particularly the moth's habit of piercing the skin of many tropical fruits with its rigid tongue, thereby introducing fungi that destroys the fruit. We published a paper on its life history in 1963.

Larval food-plant is *Erythrina* of various species. In India it feeds on *Timospora cordifolia* Miers according to Sevastopulo (1941).

Recorded as damaging citrus fruit, mangos, papayas, guavas, bananas, and tomatoes.

MATURE LARVA (pl. VIII, fig. 4 A & C): Length, 41-50 mm; width at segment 5, 8 mm.

Two color forms—green and black. White lunules on segments 4-6. In green form only spiracles are red-centered and black-rimmed. Posture in resting attitude here illustrated.

PUPA (pl. VIII, fig. 4B): Length, 28 mm; greatest width, 10 mm. Color glistening brownish black. Surface texture, punctate or rugose. Antennae reaching to wing margins. Cremaster, a short rosette of stout black recurved hooklets. Illustration of moth, fig. 13.

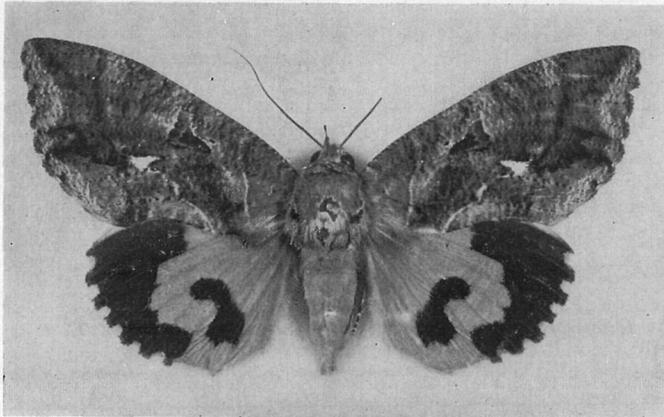


Fig. 13. *Othreis fullonia*, moth, natural size.

54. *Cosmophila flava flava* (Fabricius) Pl. VII, Fig. 14.

Common at Pago Pago and Mulinu.

Ranges widely through the Pacific Islands to New Guinea, the Malay Archipelago, India, and the Old World. Dumbleton (1954) lists larval food-plants as *Gossypium* spp. *Hibiscus manihot*, *H. tiliaceus*, and *Lycopersicum esculentum*. Swezey (1941) lists *Hibiscus rosasinensis* for Samoa, and *Sida rhombifolia* for Upolu. Tams includes cotton and cow-pea.

We took many larvae on hollyhock in Pago Pago during June.

MATURE LARVA: Length, 33 mm; greatest width, 3.5 mm. Form, cylindrical. Head color, yellow-green. Body ground color, deep green, matching small hollyhock stems. There is a narrow dark green longitudinal middorsal band on which is a line of white dots. Lateral to this is a longitudinal line composed of white dots and dashes, bordered by a narrow dark green edging. Between this and the equivalent line on opposite side are 4 white dots on each segment. Immediately above the spiracles is another longitudinal

Subfamily HYPENINAE

62. *Simplicia lautokiensis* Prout

Found by Swezey (1942) on a felled tree at Utulei, Tutuila, 210 m elevation.

Zimmerman (1958) reports it feeding on dead leaves of chayote vine in Hawaii. Introduced there about 1877 from Fiji. Illustrated on Zimmerman's fig. 340.

Several specimens taken at light at Mulinuu and Pago Pago, Aug. Sept. 1961.

63. *Hydrilodes surata* Meyrick

Taken near Pago Pago in Aug. 1961. Occurs in American and Western Samoa, Fiji, and Tonga. Pictured by Tams (1935) on plate 10, fig. 1.

64. *Hydrilodes sigma* Tams

Type locality, Eupola, Western Samoa.

Listed for Tutuila by Tams. We took no specimens.

65. *Bocana manifestalis* Walker

Ranges widely through the South Pacific islands to New Guinea and India.

It is another example that has reached Hawaii as an immigrant. Zimmerman (1958) pictures it on fig. 294. Lists larval food-plants as grasses and weeds.

A single specimen was taken near Pago Pago in May 1962.

66. *Hypena obfuscalis* Hampson

Two specimens taken at Mulinuu. Determined by Dr Nye with a notation that it ranges through New Guinea, Amboina, Nicobar and Ceylon.

67. *Hypena sylpha* Butler

Taken in Tutuila and sent to Dr Nye for identification. Ranges from E. Australia to the Solomon Is. with this single record for American Samoa.

68. *Ophiuche ferriscitalis* (Walker)

Series taken near Pago Pago.

Swezey (1942) gives a brief note on larva and reports food-plant in Apia as leaves of *Commelina nudiflora*.

Subfamily HYBLAEINAE

69. *Hyblaea sanguinea* Gaede Pl. IX, Fig. 15.

Came to light in numbers at Mulinuu from June to September.

Range limited from Tonga and Fiji to Tutuila.

Larvae obtained on three occasions feeding on *Premna taitensis* Schaver (Samoan name "alo alo") and *Ficus scabra* Forst. (Samoan name "mati"). Larva unites leaves as protective covering. Feeds at night.

line of white dots. Still another faint line of similar character runs substigmatically. All of these decorations are not apparent to the untrained eye. The larva might pass as an all green worm. Spiracles, pale yellow, rimmed with narrow black margins. Crochets, tinged with pale yellow-brown. Pupation occurs among the rolled or tied leaves of the food-plant.

PUPA (pl. VIII, fig. 3): Length, 15 mm; greatest width, 3.75 mm. Cephalic end evenly rounded except for a papilliform tubercle anteriorly at base of antennae. Caudal end tapers evenly to cremaster. Color, rich red-brown, shading to black over thorax. Spiracles concolorous with abdomen. Maxillae extend to wing margins. Antennae terminate 1 mm short thereof. Cremaster ends in a squared knob with a few small recurved hooklets.

55. **Tiridata samoana** (Butler)

Credited solely to Samoa. Taken sparingly at Mulinuu. Tams (1935) pictures it on plate VIII, figs. 4-5. Swezey (1942) reports caterpillars as abundant on a shrubby burrweed in Upolu.

56. **Hyperlopha cristifera** (Walker)

Dr Nye of the British Museum identified the single specimen we took at Mulinuu with the comment that it occurs in Ceylon, Borneo, Malaya and the Moluccas. Our capture extends range to American Samoa.

57. **Hyospila similis** Tams

Described by Tams (1935) from Upolu, Savaii, and Pago Pago and illustrated in color on his plate VI, fig. 18.

We took no specimens.

58. **Anticarsia irrorata** (Fabricius)

Widely distributed. Ranges from the Old World, through India, the Malay Archipelago, and many of the South Pacific Islands to Tutuila.

Came to light at Pago Pago and Mulinuu.

Larval food-plant, Sword beans.

59. **Anticarsia bolinoides** (Guenée)

Taken at light at Mulinuu and Pago Pago. Not included in Tams' list.

60. **Lacera alope** (Stoll)

One specimen taken at Mulinuu 12 July 1961.

Tams reports it for Upolu. Gives range as extending from the Old World, through India and the Malay Archipelago to New Guinea and to Fiji.

There is apparently no record of early stages.

61. **Oxyodes ochreatea samoana** Tams

Type locality is Pago Pago. Taken sparingly there and at Mulinuu. The subspecies, *samoana*, is apparently limited to the Samoan Is. The parent species, *ochreatea*, is reported by Dumbleton (1954: 55), as feeding on *Nephelium lappaceum* in Australia and New Guinea.

MATURE LARVA (pl. X, fig. 2A): Length, 22-27 mm; width through segment 6, 6 mm; head relatively small; width, 2.5-2.75 mm. Head surface rugose, brownish black to black, occasionally tinged with dull yellow-green on center of face. Ocelli, brownish black. Antennae, white. Setae, long, yellow-brown. Body ground color, yellow-green. Segment 1, black, mottled with white, dull green and brown. Middorsally a wide longitudinal band of orange-green (varying in individuals) bordered laterally by a discontinuous white band. Lateroinferior to this, a wide band, yellow-green in some specimens, varying to almost black in others. Below this is a narrow band of paler green, the spiracles on its lower edge touching a narrow white border. Spiracles, olive-green center, rimmed in black. Legs, dull yellow. Prolegs, translucent yellow, concolorous with venter. Setae, white, long, in 4 longitudinal rows with others scattered over body. Wide variation in color of longitudinal bands. One younger larva of 13 mm length, had a solid black head, a paler mid-dorsal band, numerous round black papillae scattered over the body, and black legs. The yellow anal prolegs were spotted with black. Our first example pupated 2 Aug. 1961, in a chamber formed of 2 leaves united with strands of silk.

PUPA (pl. X, fig. 2B): Length, 21 mm; greatest width, 6 mm. Color, rich chestnut-brown, with tinges of orange-brown over the thorax and black on cremaster. Texture, smooth and glistening. Head, well rounded. Eyes small and relatively close together. Antennae terminating 3 mm short of wing margins. Maxillae slightly longer. Spiracles concolorous with body. Cremaster a short straight process topped by a cluster of minute hooklets. The most noticeable feature is a series of fine parallel transverse lines in a groove over center of each abdominal segment—developed only on dorsal surface.

70. *Hyblaea puera* (Cramer)

Ranges throughout Old World, New World, India, Solomon Is., Fiji, to Tutuila.

Ian F. B. Common (1964) in litt., records larva on *Vitex trifolii*. Cites A. S. Turner (1902) as authority. Dyar's (1923) notes on larva report *Catalpa longissima* (Jacq) Sims as food-plant. Tams (1935) records Teak, *Bignonia* and *Millingtonia*. Holland (1908) illustrates it on plate 30, fig. 8.

We did not see the species in Tutuila. Steffani took it in Pago Pago October, 1923.

Family SPHINGIDAE

Subfamily ACHERONTIINAE

71. *Herse convolvuli* (Linnaeus)

Ranges from the Old World to Solomon Is., New Hebrides, Fiji, Pacific Islands E of Samoa, Guam and American Samoa.

Considered a synonym of *Herse cingulata* by Zimmerman (1958).

Larva commonly known as sweet potato hornworm. Larvae feed on sweet potato, sunflower, *Ipomoea*, *Alocasia*, and *Colocasia*.

Three examples taken at Mulinuu show much paler markings than Zimmerman's *cingulata* from Hawaii.

PLATE IX

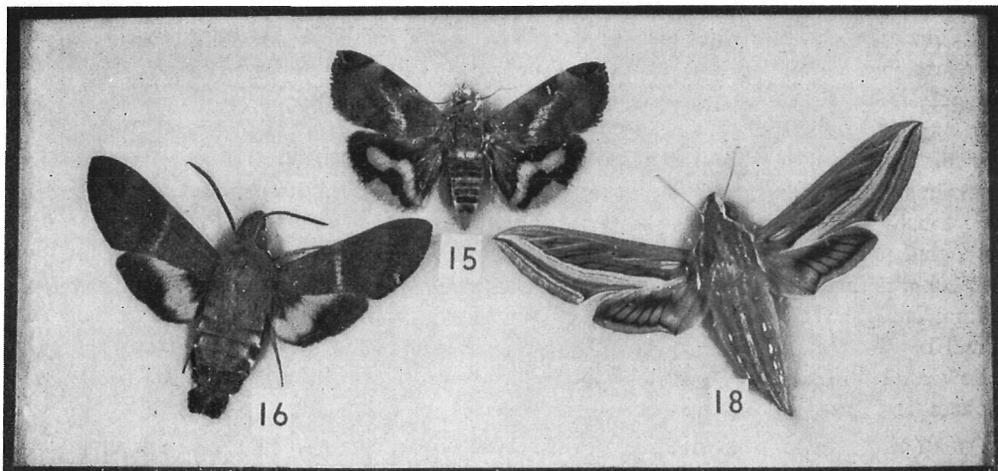


Fig. 15. *Hyblaea sanguinea*.

Fig. 16. *Macroglossum hirundo samoanum*.

Fig. 18. *Hippotion celerio*.

PLATE X

Fig. 1. *Macroglossum hirundo samoanum* R. & J. A, egg, top view; B, larva, possibly 2nd instar; C, mature larva, green form; D, pupa.

Fig. 2. *Hyblaea sanguinea* Gaede. A, mature larva; B, pupa.

Fig. 3. *Macroglossum hirundo samoanum* R. & J. A, mature larva, dark form; B, pupa.

Fig. 4. *Hippotion celerio* (Linn.). A, mature larva; B, pupa.

Subfamily PHILAMPELINAE

72. *Chromis erotus eras* (Boisduval)

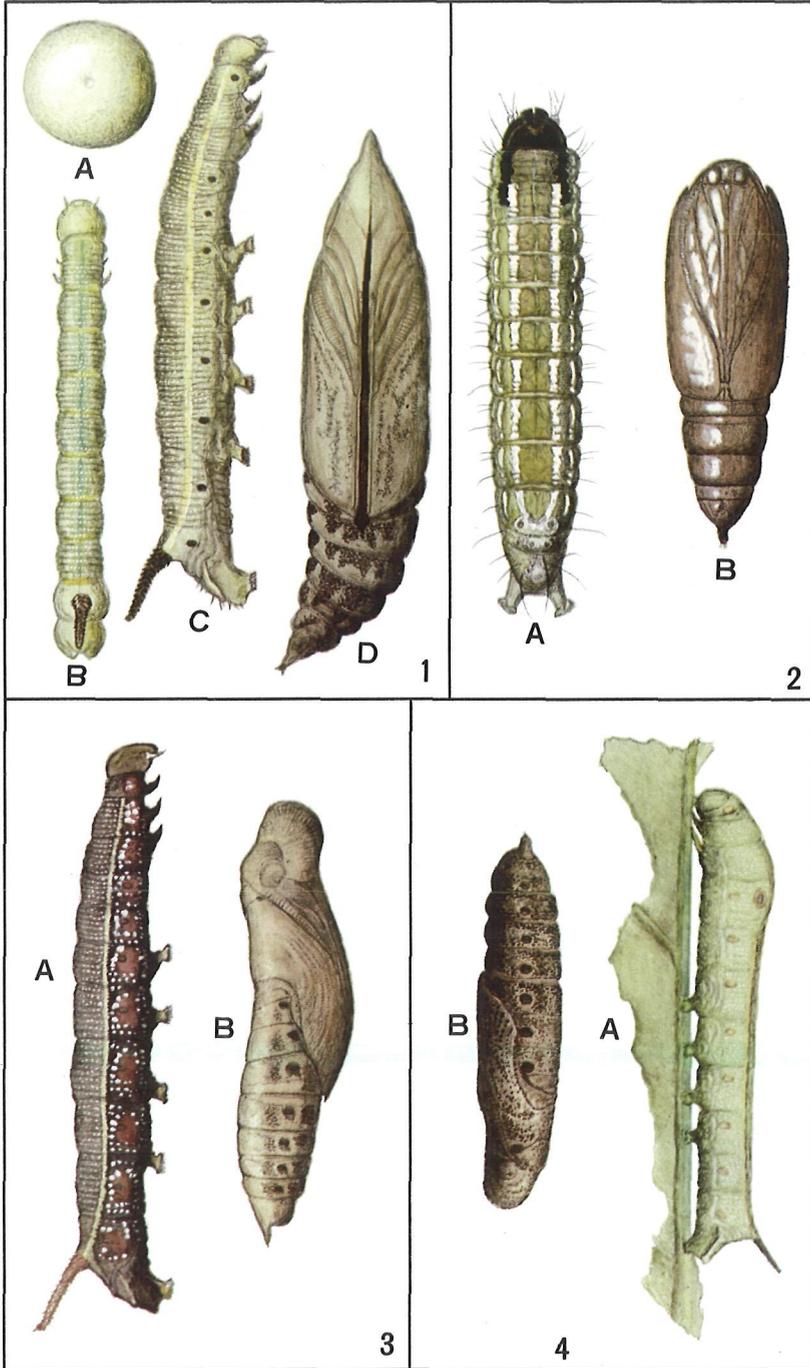
Most abundant Sphinx at Mulinuu, May to August 1961.

Ranges from Australia, New Guinea, the Solomons, Loyalty Is., New Hebrides, Ellice I. to Tonga, the Pacific Islands E of Samoa, and thence to American Samoa.

Swezey (1941) collected caterpillars feeding on leaves of *Morinda citrifolia* Linnaeus at Utulei.

We were unable to find larvae.

PLATE X



73. *Deilephila placida steffanyi* Clark.

Largest and most distinctively marked Sphinx taken in Tutuila. Apparently limited in range to Western Samoa and American Samoa. Described by B. P. Clark (1927) from 3 specimens: 1 female (the type) and 1 male taken at Apia, and a 2nd female (cotype) taken at Pago Pago by Capt. Joe Steffany, October 1923. The type is in the Bishop Museum.

Nothing is known of early stages or food-plants.

74. *Macroglossum hirundo samoanum* Rothschild & Jordan Pl. IX, Fig. 16.

Came frequently to light at Mulinu during July 1961. Range apparently restricted to American and Western Samoa.

An egg and 5 larvae were taken on *Morinda citrifolia* Linnaeus. Egg did not hatch, but presumably was of the same species as the associated larvae.

EGG (pl. X, fig. 1A): Spherical. 1.4 mm in diameter. Color, pale yellow, with a pearly luster giving the impression of a smooth surface, but magnification reveals a fine hexagonal grill covering the entire surface, including the small, slightly depressed micropyle.

LARVA (possibly second instar) (pl. X, fig. 1B): Length, measured from head to tip of caudal horn, 19 mm; width, 2.25 mm; head width, approximately 1.5 mm. Head color, yellow, mouth parts tinged pale brown. Body ground color, bright yellow-green. Broad middorsal dark green stripe—edges not clearly defined. A similar, but less distinct band runs spiracularly. Caudal horn relatively long, dark brown with reddish brown tinge at base, its surface covered with minute sharp spines. Legs and prolegs, green. Spiracles, green.

LARVA (possibly third instar): Length, 26 mm; head width 2.3 mm. Larva similar to prior instar except: Head, concolorous with body. Longitudinal middorsal green band less evident. A dorsolateral longitudinal stripe appears. Spiracles, red-brown.

MATURE LARVA (green phase) (pl. X, fig. 1C): Length at beginning of instar, 35 mm; at end of instar, 50 mm; head width, 3 mm. Middorsal green stripe obsolescent except for a small dark triangle at forward edge of 4th to 9th segmental joints. Suprastigmatal yellow stripe well defined, extending caudally to base of caudal horn, the latter yellow-brown with multiple minute darker spines. Legs, mottled brown with black centers on proximal joints. Prolegs have a pink band above brown crochets. Each body segment ridged transversely by numerous folds along which are rows of greenish yellow dots. Spiracles, red-brown, with narrow yellow rims. Two of the 5 original larvae were in earlier instars when found.

Much to our surprise these developed melanic properties in their later instars, instead of maintaining the green coloration until they pupated. One (pl. X, fig. 3A) was particularly dark: Head, soft brown, with a faint suggestion of 4 longitudinal lines, 2 on each cheek. Ocelli, concolorous with head. Body ground color of dorsum, rich brown. Lateral surface, brownish black. Middorsal stripe, black. Lateral area, blackish, edged superiorly by a narrow discontinuous yellow stripe. Spiracles, burnt-orange, each surrounded by an areola of the same color. Legs, black. Proximal segment of each proleg, blackish brown, distal 2/3 yellow. Each segment of larva thrown into numerous transverse ridges, with lines of

white dots running on top of each ridge. Caudal horn, orange-red, tip black. Venter, blackish brown with very little spotting. The 2nd melanic example varied from this in having several large white spots grouped around burnt-orange patches surrounding each spiracle.

PUPA (pl. X, figs. 1D & 3B): Length, 29 mm; greatest width through center, 8 mm; head markedly keel-shaped. Antennae reaching only 1/2 distance toward wing margins. Maxillae extending to wing margins, the inner contacting edges carrying a black line that terminates in a spear-point. Body ground color, brown-olive, with various black markings produced by black dots—heaviest on ventral abdominal segments. Spiracles, large, black, and surrounded by a dark area. There is a dark line middorsally on thorax, which continues to cauda as a faint line, produced by numerous small black dots. Cauda ending in a sharp point, terminating in a pair of short straight spicules. Pupation occurs in ground litter, in a chamber formed of dried leaves and twigs, united by a few strands of silk. All of our pupae had emerged on or before 28 July 1961.

Subfamily CHAEROCAMPINAE

75. *Hippotion celerio* (Linnaeus) Pl. IX, Fig. 18.

Ranges through the Old World, India, Malay States, Australia, New Hebrides, Ellice I., Tonga, Fiji, Pacific Islands E of Samoa, and American Samoa.

Illustrated by F. X. Williams (1944).

Causes widespread damage to a variety of plants. Tams (1935) lists sweet potato, grape vine, cotton, taro, *Calocasia*, and tobacco. J. S. Dugdale (in litt) mentions *Vitis vinifera*, *Garium varum*, *Fuschia*, and *Ampelopsis*. I. F. B. Common (in litt) adds *Boerhaavia diffusa* and Virginia creeper.

We collected many larvae at Agricultural Farm near Taputimu in July. Only 2 instars were in this number. Most were final instar, measuring 36–37 mm; head width, 3 mm. Remainder were penultimate instar. Body length 29 to 33 mm; head width, 2 mm. Little variation in color and markings.

MATURE LARVA (pl. X, fig. 4A): Head, uniform green throughout. Body ground color, green. Segments 1–5 uniform green. Caudal segment, green. Those in between flecked with little dashes of darker green, barely distinguishable. Suggestion of a middorsal longitudinal dark green stripe. A dorsolateral yellow stripe, starting on segment 5 and terminating at base of caudal horn. Caudal horn straight, pink at base, merging to black at tip. Spiracles, orange. Legs, greenish at base, merging into pink at tips. Prolegs, green with dark brown crochets. A pair of oval spots occurs dorsolaterally on segment 4, having dark green centers margined with yellow. Prior to pupation larva becomes darker. One example assumed this darker color at the beginning of the instar. Wide dorsal green band became deep chocolate, with numerous short black dashes running regularly through it. The bordering band was a faint tan, except where it approached the caudal horn and on thoracic segments 1–3, where it was orange. Large yellow eyespots on segment 4 circled with black and with black centers. Lateral surface, pale brown, with black dashes on its upper portion; white dots below. Legs, deep orange. Our first example pupated 2 August 1961.

PUPA (pl. X, fig. 4B): Length, 45 mm; greatest width through center, 10.5 mm. Color,

tan with numerous dots of dark brown disposed on body, particularly on ventral surface. Antennae extend $2/3$ distance toward wing margins, and maxillae 0.3 mm beyond wing tip. Wing venules accented by rows of black dotted lines. Spiracles, large, black, and very conspicuous. Cremaster, a single black tapering spine ending in 2 short spines extending at nearly right angles with shaft, and not recurved. There are traces of a few short simple spines at base of shaft.

The important structural features are clearly shown in illustration.

FAMILY URANIIDAE

Subfamily EPIPLEMINAE

76. *Phazaca kellersi* Tams.

Apparently limited in range to Tutuila where types were taken.

Tams (1935) illustrated it on plate 18, fig. 14. We did not see this species.

SECTION III. GEOMETRIDAE

Subfamily HEMITHEINAE

1. *Thalassodes chloropis* Meyrick

Occurred in numbers at Pago Pago and Mulinuu, July–August 1961.

Range: Upolu, Fiji, Tonga, French Oceania, and American Samoa. Swezey (1942) reports a larva on *Rhus taitensis*.

2. *Thalassodes pilaria* Guenée

Not taken by us. Reported by several authors to Fiji, Manua, Tutuila, and Tau. Also listed by Viette (1949) for the Society Is., Tahiti, Bora Bora, and Pitcairn I.

Food-plants: *Ricinus communis*, *Rosa* sp., *Inocarpus edulis*, *Mangifera indica* and *Eugenia indularis*.

Subfamily STERRHINAE

3. *Symmactra solidaria baptata* (Warren)

The parent species, *S. solidaria*, is widely distributed from Burma, India, West China, through the Malay Peninsula to Queensland, and Guadalcanal I. The subspecies *baptata* is apparently restricted to Western and American Samoa.

4. *Anisodes (Xenoprora) samoana* (Warren) Pl. XI, Fig. 1.

Taken infrequently at Mulinuu and Pago Pago. It also occurs in Western Samoa, Fiji, the Society Is., and the New Hebrides.

A small larva was found at Pago Pago, 29 June 1961, on *Cosmos sulphureus* Cav. It pupated before notes could be made. The plant was determined by Marie C. Neal, Botanist, Bishop Museum.

PUPA (pl. XII, fig. 1): Length, 13 mm; greatest width across cephalic end, 3.2 mm. Antennae extending to wing margins. Ground color throughout, leaf green, except for a

wide stigmatal band which begins at cauda and runs to outer angle of head where it turns abruptly and runs as a ridge across crown. Band and ridge, with a marginal stripe of brown on dorsal edge which thins out caudally. There is a marginal stripe of yellow on ventral edge which is widest caudally. Yellow spiracles placed on central white portion of this encircling band. Last 2 caudal segments white dorsally, with tip and cremaster shading to brown. Segmental lines faint and indistinct. Pupa suspended at cauda by a silk button. Silken thread woven over dorsum. Imago emerged 7 July 1961.

5. **Anisodes (Perixera) obliuaria** Walker

Distributed widely from India to Australia and through many South Pacific Islands to Tutuila. We did not see it.

6. **Sterrhia rufula** (Warren)

Reported from Pago Pago by Steffany (Prout 1928). Ranges westward to New Guinea.

Subfamily LARENTIINAE

Chiefly characteristic of temperate climates, which may account for the small number of species found by us in the coastal areas. Collecting in higher altitudes should prove more productive.

7. **Collix lasiospila** (Meyrick)

Recorded for Pago Pago and Fiji by Prout (1928).

8. **Chloroclystis lepta** (Meyrick)

Steffany collected this species in Pago Pago, and Meyrick (1886) reported it from Tonga and the Marshall Is.

9. **Chloroclystis** near **enctata** Prout

A small series was taken at Mulinuu and Pago Pago in July and August 1961. Tentative determination made by Dr John Beardsley, based on material in B. P. Bishop Museum.

10. **Gymnoscelis erymna** (Meyrick)

Reported by Prout from Tutuila, Tonga, Western Samoa, and Pitcairn I. Our single example from Tutuila was determined in the Bishop Museum by Dr Beardsley, who also identified all of the following geometrids.

11. **Ziridava dysorga** Prout

Not listed for American Samoa by Prout. He described the holotype from Malololelei, Upolu (elev. 610 m), and illustrated it in color plate VI, fig. 7 of fasc. 4, Part III, *Insects of Samoa*. Our record of a specimen from Mulinuu extends its range from Western to American Samoa.

12. **Sauris mellita** Prout

Taken by Prout in the highlands of Western Samoa. Not heretofore reported from American Samoa. Pictured on the same plate as the preceding species (fig. 4). Our

small series taken at Mulinuu and Pago Pago, definitely fix it for Tutuila.

13. **Poecilasthena leucydra** Prout

A generous series was taken at light at Mulinuu during July 1961, establishing the species for Tutuila. Not included in Prout's Geometridae (1928). W. H. T. Tams identified the species.

Subfamily GEOMETRINAE

14. **Cleora samoana** (Butler)

Most abundant of all moths during period of our collecting. Also the most variable in maculation (as noted by several authors). Prout (1928) illustrated this variability, plate V, p. 169, showing 18 specimens, each distinct from one another.

Our search for larvae was unavailing. Swezey (1942) reported a single larva collected on *Eugenia* sp., at Upolu.

15. **Orsonoba clelia** (Cramer)

Ranges from India, Burma, Ceylon, Java, Penang, and Hainan, to Queensland, the Solomon Is., Western and American Samoa.

Brief note on larva by Prout (1928). Food-plant said to be various Convolvulaceae.

16. **Nadagara hypomerops** Prout

Previously listed for Western Samoa. Our series extends its range to American Samoa. Specimens collected in the winter of 1961 and spring of 1962 near Pago Pago, by Barbara Wilson. Illustrated in color on Tams' (1935) plate VI, fig. 2.

SECTION IV. MICROLEPIDOPTERA

In order to facilitate comparisons with the sequence of families used in the British Museum's *Insects of Samoa*, part III, fasc. 2 by Meyrick, and Fasc. 4 by Tams, we start with the family Psychidae (Tams, p. 242) and carry through to the Hepialidae. From that point on the Microlepidoptera list of Meyrick is followed.

Family PSYCHIDAE

1. **Mahasena corbeti** Tams

Reported only for Pago Pago in Tutuila. We did not see it.

Tams (1935) pictures a poor example on plate XII, fig. 3. According to Dumbleton (1954) it feeds on oil palm, areca nut, tuba, *Citrus* sp. et cetera. *Cocos nucifera* is questionable.

Family PYRALIDAE

Subfamily THYRIDINAE

2. **Striglina lithophora** Tams

Heretofore listed only for Western Samoa. We took 2 examples near Pago Pago which

extends its range to American Samoa. Pictured by Tams (1935), plate XI, fig. 6.

3. **Striglina anthina** Tams

Commonest species of the genus in Tutuila. Occurs also in Western Samoa. Figured on Tams' (1935) plate XI, fig. 5.

4. **Striglina inversa** Gaede.

Synonym *S. oecia* Tams

Occurs in Western Samoa; and was reared by us from a larva found at Pago Pago on *Erythrina variegata* v. *orientalis* (L.) Merr. (Samoan name Gatae).

FINAL INSTAR: Length, 20 mm. Head relatively small and black. Body robust, with outwardly rounded segments. Color, dull yellow. Spiracles small and dark. Larva a leaf roller. Pupation occurred 22 August 1961, between 2 leaves in a lightly constructed cocoon.

PUPA (pl. XIII, fig. 1): Length, 14 mm; greatest width across wing margins, 5.5 mm. Very stout. Texture of entire surface apparently smooth, but under high magnification, covered by fine transverse ridges over most areas. Color, uniform black, tinged with dark brown in highlights, and so glistening as to largely obscure structural details. Antennae reaching to margins of wing cases. Spiracles relatively large and protruding. Cremaster topped by a brush of 8 straight parallel spines with minute recurved brown tips. A perfect imago emerged 30 August 1961. It was unusually resistant to cyanide gas.

5. **Betousa hemicycla** (Meyrick)

Range: Western Samoa, Fiji, and American Samoa.

Pictured by Tams (1935), plate XI, fig. 8.

6. **Rhodoneura plagifera** (Butler)

Range: Tonga to Western and American Samoa.

7. **Rhodoneura sericatalis** Rebel Pl. XI, Fig. 2.

Occurs in Western and American Samoa. In Pago Pago and Mulinuu, abundant at light from June to September.

It is a leaf roller on *Terminalia catappa* L. The 'roll' is conical, and formed on the edge of a leaf.

MATURE LARVA (pl. XII, fig. 2A): Length, 12 mm; greatest width through segment 9, 2.75 mm. Head, glistening yellow throughout. Body ground color, olive-green above spiracles, translucent pale green below. Faint suggestion of a darker green middorsal stripe. A narrow white stripe spiracularly, spiracles black and minute, strongly contrasting with white stripe. Segment 1 bears a large dark cervical shield, cleft in middorsal line. Dorsolaterally on the segments 1-3, 2 dark tubercles bearing setae. Segments 4-11 with 3 of the dark tubercles on each side, arranged as shown in fig. 2A. Longitudinal row of similar tubercles runs substigmatally. Each tubercle bears a long white seta. Legs and prolegs, translucent pale green.

PUPA (pl. XII, fig. 2B): Length, 7 mm; greatest width, 2.75 mm. Eyes prominent. An-

PLATE XI

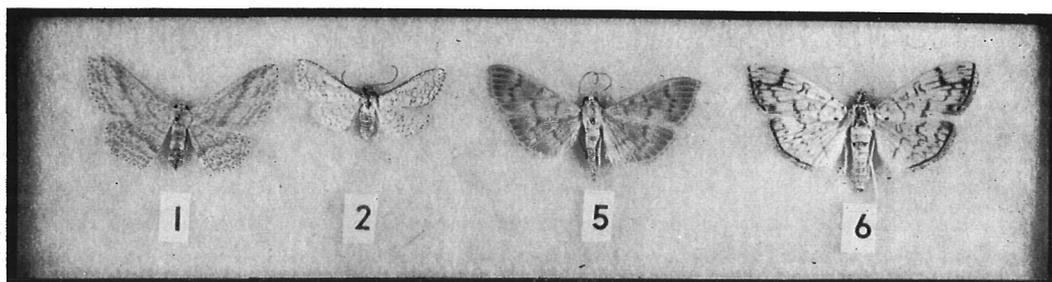


Fig. 1. *Anisodes (Xenoprora) samoana*.

Fig. 2. *Rhodoneura sericatalis*.

Fig. 5. *Sylepta sabinusalis*.

Fig. 6. *Sylepta derogata*.

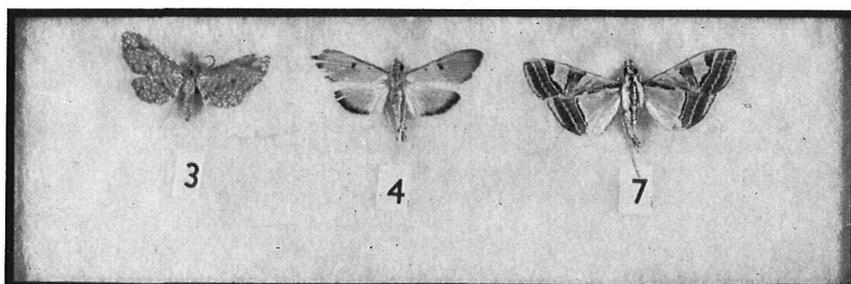


Fig. 3. *Brixia dialitha*.

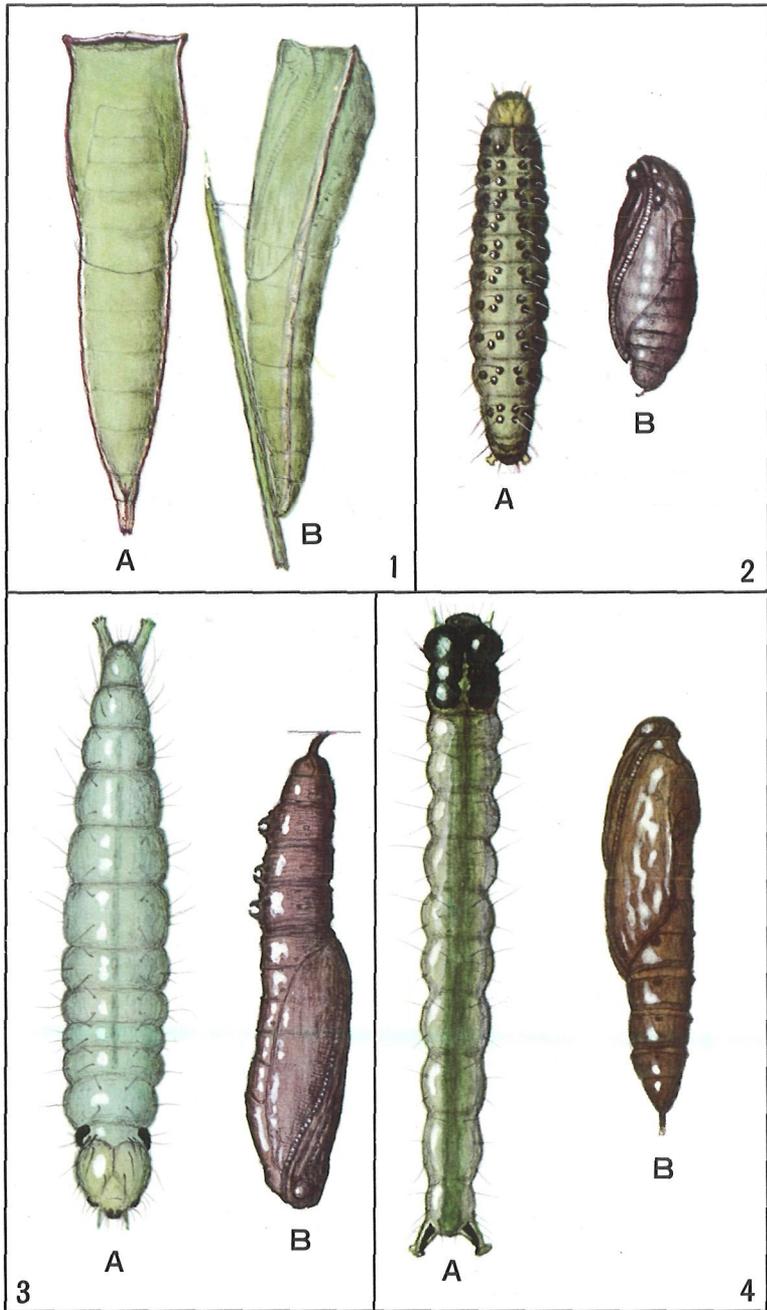
Fig. 4. *Dracaenura agramma*.

Fig. 7. *Margaronia samoana*.

PLATE XII

- Fig. 1. *Anisodes (Xenoprora) samoana* (Warren). A, pupa, dorsal; B, pupa, lateral.
 Fig. 2. *Rhodoneura sericatalis* Rebel. A, larva, dorsal aspect; B, pupa, lateral aspect.
 Fig. 3. *Sylepta sabinusalis* (Walker). A, mature larva, dorsal aspect; B, pupa, lateral aspect.
 Fig. 4. *Sylepta derogata* (Fab.). A, mature larva, dorsal aspect; B, pupa, lateral aspect.

PLATE XII



tennae reaching wing tips. Spiracles inconspicuous. Cauda well rounded, topped by a small cluster of hooklets arching ventrally. Color, deep chestnut-brown. Head and thoracic appendages, darker.

8. **Brixia dialitha** Tams Pl. XI, Fig. 3.

Apparently occurs only on Tutuila. Pictured on Tams' plate XI, fig. 7. A leaf roller on *Macaranga* and *Hibiscus tiliaceus* L.

Larvae collected 20 June 1961 and carried through to emergence of moths 3 July 1961 and later.

MATURE LARVA: Length, 12.5 mm; head width, 1.6 mm. Color of head, black.

Body ground color, pale olive-green. Body robust, segments bulging. A middorsal longitudinal dark green stripe. Dorsum of segment 1 covered by a black cervical shield, cleft medially by a narrow gray stripe. Narrow spiracular white line bears small black spiracles. Legs, yellow-brown. Prolegs, pale olive-green.

Numerous short white setae scattered over body, each rising from a small dark tubercle.

PUPA (pl. XIII, fig. 2): Length, 8 mm. Head rounded. Eyes, black and prominent. Maxillae and antennae extending slightly beyond wing margins. Body robust, with an extremely short post-abdominal portion caudad of antennal tips. Cremaster, a black pyramidal cone topped by 4 red-brown recurved hooklets, 2 placed centrally, the other 2 laterally. Body of pupa rich brown. Head and cremaster darker.

Subfamily GALLERIINAE

9. **Ceratothalama argosema** Meyrick

The pair of specimens taken in Pago Pago match Tams' (1935) plate VI, fig. 25. The species also occurs in Fiji and Western Samoa.

10. **Tirathaba complexa** Butler

Listed by Tams as *T. trichogramma* Meyrick.

Range: New Hebrides, Tonga, Fiji, and American Samoa.

A series came to light at Pago Pago and Mulinuu. Feeds on *Cocos nucifera*.

Subfamily ANERASTIINAE

11. **Rhinaphe nigricostalis** (Walker)

An Old World species recorded from India, the Malay Archipelago, Fiji, and American Samoa.

PLATE XIII

Fig. 1. *Striglina inversa* Gaede, pupa.

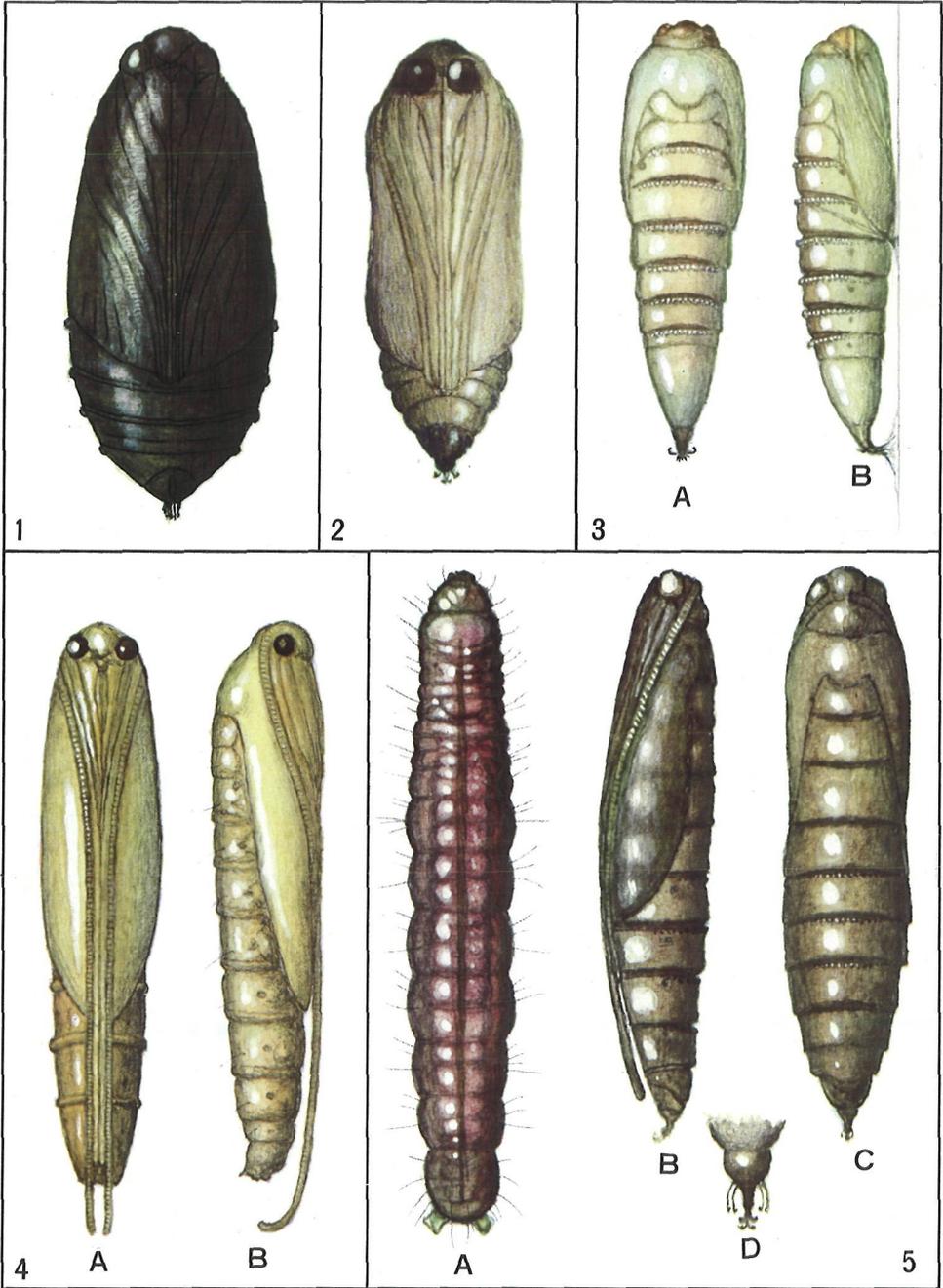
Fig. 2. *Brixia dialitha* Tams, pupa.

Fig. 3. *Dracaenura agramma* Meyrick. A, pupa, dorsal; B, pupa, lateral.

Fig. 4. *Limnoecia* sp. A, pupa, ventral; B, pupa, lateral.

Fig. 5. *Margaronia samoana* Swinhoe. A, mature larva, dorsal aspect; B, pupa, lateral; C, pupa, dorsal; D, cremaster.

PLATE XIII



Subfamily PHYCITINAE

12. ***Ephestia cautella*** (Walker)

Widely distributed over much of the world as a result of its feeding on grain, seeds, nuts, and dried fruit, and transportation by commerce.

Specimens hatched from seed in a ula which was given to us by a native Chief in Mulinu. Moths emerged after our return to the States.

Pictured by Zimmerman (1958: fig. 318) and Holland (1908: 414).

13. ***Homoeosoma ephestidiella*** Hampson

Range: Malay Archipelago, Fiji, the Pacific Islands E of Samoa, and American Samoa. Swezey (1942: 207), reports the larva feeding on *Ageratum conyzoides*.

14. ***Thylacoptila gonylasia*** Tams

Apparently restricted to Western and American Samoa. Tams (1935) plate XIV, fig. 2.

15. ***Nephopteryx ceratistes*** Tams

Examples taken at Mulinu extend its range from Western Samoa to American Samoa. Pictured by Tams, color plate VI, fig. 24.

16. ***Cryptoblabes proleucella*** Hampson

Occurs in India and the Malay Archipelago. Reported also from Upolu, Western Samoa, and Tau I. and Tutuila in American Samoa.

Swezey (1942: 208), found several larvae feeding on the sugar cane aleurodid, *Neomaskellia bergii* (Sign.). Other members of the genus have been recorded as feeding on sugar cane and various other plants, usually where infestations of aphids and mealy bugs occur.

17. ***Cryptoblabes trabeata*** Meyrick

Range: Fiji, Western Samoa, American Samoa.

18. ***Etiella zinckenella*** (Trietschke)

Commonly known as the Lima-bean Pod Borer.

Range: Old World, New World, India, Malay Archipelago, Australia, Guam, Marianas, Carolines, Fiji, Western and American Samoa.

Larva illustrated by Peterson (1948: 207), and numerous other authors.

Feeds within the pods of lima beans, field peas, vetches, and other legumes. Dumbleton (1954: 62), also lists it for South Pacific Territories, feeding on *Phaseolus* spp.

19. ***Hypsiphyla swezeyi*** Tams

Occurs in Western and American Samoa.

Dumbleton (1954: 63), reports it feeding on *Theobroma cacao* and Swezey (1941: 34); lists the seeds of cacao, and calls the larva very plump and white.

Subfamily EPIPASCHINAE

20. *Locastra* near *semialba* Meyrick

Three examples taken in August near Pago Pago. Determination made by P.E.S. Whalley of the British Museum, with the comment that it may represent a new species.

Subfamily ENDOTRICHINAE

21. *Endotricha mesenterialis* (Walker)

Reported by Tams (1935) from India, Malay Archipelago, Australia, New Hebrides, Fiji, and Western Samoa, to which Viette (1949: 324), adds the Society and Austral Is. We took a long series near Pago Pago.

22. *Endotricha plinthopa* Meyrick

Occurs only in Western and American Samoa. Not common.

23. *Latagognoma dacryodes* Tams

Recorded for Western and American Samoa. Forewing pictured by Tams (1935), plate XVIII, fig. 15.

Subfamily PYRALINAE

24. *Pyralis manihotalis* Guenée

Reported from Samoa without designating which islands. Since its range is widespread throughout most of the world (including Africa, India, Ceylon, China, Formosa, Malaya, Philippines, Australia, the Americas including the West Indies, Hawaii, and Samoa), and the larval food includes chicken droppings, dried fruit, stored grain, meal, and chocolate, it will doubtless be found on Tutuila if one searches in its (often) unsavory habitat.

Pictured by Zimmerman (1958: fig. 217).

25. *Herculia* sp. near *tenuis* Butler

A single example taken near Pago Pago was given this designation by Dr Nye of the British Museum.

Subfamily HYDROCAMPINAE

26. *Baeoptila ellipes* Tams

Recorded for Tutuila by Swezey in Tams (1935). We did not see it. Pictured by Tams (plate XVII, fig. 5).

27. *Ambia tendicularis* Rebel

Range: Fiji, Western and American Samoa.

We took no members of this genus.

28. *Ambia schistochoeta* Tams

Apparently restricted to Tutuila. Illustrated by Tams (1935: plate XV, fig. 8).

29. **Oligostigma villidalis** Walker

Range: Malay Archipelago, Australia, Fiji, Western and American Samoa.

30. **Parthenodes eugethes** Tams

Range: Restricted to Western and American Samoa. We took a single example at Pago Pago. Illustrated by Tams (1935: plate XV, fig. 7).

31. **Dracaenura agramma** Meyrick Pl. XI, Fig. 4.

Range: Tonga, Western and American Samoa.

We took a larva on *Clerodendron fragrans* Vent., (Verbenaceae), about half way to the summit of the Aoloau Road, 16 August 1961. This changed to a pupa, in a folded leaf, before notes of larva could be made.

PUPA (pl. XIII, fig. 3): Length, 10 mm; greatest width, 2.8 mm. Texture, smooth and glistening. Color, green on wings and mesothorax, shading to brown on head. Yellow-brown on dorsal portion of abdomen. Black on cremaster. Most of segmental junctures on dorsal surface are deep and wide, the posterior edge of each being topped by a transverse row of small tubercles. Cremaster with a pair of large recurved brown hooklets (one on each side) pointing laterally. There is apparently a cluster of small hooklets at the cremasteric shaft, pointing ventrally, and deeply imbedded in the large silk button end previously spun by the larva. Spiracles, relatively small, dark, and inconspicuous. Silk loop arches over abdomen at about abdominal segment 3. Imago emerged 22 August 1961.

We took 3 specimens on Aunuu I. 3 July 1961. One has the margins of the wings suffused with fuscous, and may represent the aberration *dolia*, mentioned by Tams.

32. **Hymenoptychis sordida** Zeller

Not heretofore recorded for Samoa. A single example taken near Pago Pago, determined by Dr Nye with notation of range as Madagascar, Seychelle Is., Natal, Calcutta, Ceylon, Nicobar I., Singapore, Borneo, New Guinea, Marshall Is., Port Sudan, Moluccas, and Fiji.

33. **Bradina semnopa** (Meyrick)

Range: Fiji, Western and American Samoa. Common at all times at Mulinuu and Pago Pago.

34. **Bradina acropila** (Meyrick)

Range: Tonga, Fiji, Western and American Samoa.

Swezey (1942: 208), records the larvae as leaf rollers on *Wedelia biflora*, and a green *Coleus*.

35. **Bradina neuralis** Hampson

Recorded for Western and American Samoa. Swezey took it on the Afono Trail in Tutuila.

36. **Piletocera cyclopila** (Meyrick)

Apparently restricted to Western and American Samoa.

We obtained a good series near Pago Pago.

37. *Piletocera steffanyi* Tams

Restricted to Western and American Samoa. The holotype was taken at Pago Pago by Steffany. Apparently rare, as we took only 2 examples. Illustrated by Tams (1935: plate XVII, figs. 1-2).

38. *Piletocera rechingeri* Tams

Occurs in Western and American Samoa. Pictured in Tams' plate XVII, fig. 3.

39. *Piletocera signiferalis* (Wallengren)

Range: Reported by Tams as islands E of Samoa, American and Western Samoa, Fiji, Ellice I., Loyalty I., and Australia. Viette (1949: 322), records it for the Marquesas Is. It also occurs in New Hebrides.

We found it common at light in Mulinuu.

40. *Piletocera xanthosoma* (Meyrick)

Occurs in Western and American Samoa, including Tau I.

Family PYRAUSTINAE

41. *Sufetula hemiophthalma* (Meyrick)

Recorded by Tams (1935) for the Malay Archipelago, Australia, Fiji, the Pacific Islands E of Samoa, Western and American Samoa. We did not see it on Tutuila.

42. *Hymenia recurvalis* (Fabricius)

Common name of larva, Hawaiian Beet Webworm.

Range: India, Malay Archipelago, Australia, New Guinea, New Hebrides, Fiji, Pacific Islands E of Samoa, Western and American Samoa, according to Tams. To this list, Dumbleton (1954: 62), adds Guam, Solomon Is., New Caledonia, and French Oceania, giving as the larval food-plants, *Beta vulgaris* (Beet) and *Spinacia oleracea* (Spinach). Swezey (1942: 208) reports larva on *Borreria ocimoides*, and earlier (1905) says that the moth is very abundant in cane fields, and that its larvae feed on an Amaranth-like weed (*Euxolua*). Zimmerman (1958: 52-56), still further extends the range and lists many additional food-plants. He pictures the moth on fig. 38, and describes the larva and pupa, p. 56. Peterson (1948) describes and pictures the larva, p. 211, fig. L 50 A-C. Cohic (1950: 20), discusses its damage to beets in the Wallis Is.

Dr McDunnough (1939), #5354 lists *H. recurvalis* as a synonym of *Hymenia fascialis* Cramer.

We took a small series on Tutuila.

43. *Eurrhparodes tricoloralis* (Zeller)

Range: Old World, India, Malay Archipelago, Australia, Solomon Is., Fiji, Pacific Islands E of Samoa, Western and American Samoa, and Guam. Leaf rollers on "yerbas babue" according to Swezey (1946).

A single example, taken by us on Tutuila, was identified by comparison with one in

the Bishop Museum from Guam.

44. ***Ercta ornatalis*** (Duponchel)

Range: New World, Old World, India, Malay Archipelago, New Hebrides, Fiji, Pacific Islands E of Samoa, Western and American Samoa. Dumbleton (1954: 62), adds French Oceania. Swezey (1941, 1942) mentions the small green larva feeding on *Ipomoea pes-caprae*, *I. bananox* and other Morning Glories.

We took 2 examples at Mulinuu.

45. ***Cnaphalocrocis medinalis*** (Guenée)

Range: Old World, India, Malay Archipelago, Australia, New Guinea, New Caledonia, New Hebrides, Western and American Samoa, according to Tams. A single example sent to the British Museum was identified by Dr Nye as *medinalis*, with additional range given as Ceylon, Hong Kong, Java and Singapore. Dumbleton (1954: 61) adds Netherlands New Guinea, and gives the food-plant as *Oryza sativa* (rice plant), and maize.

46. ***Marasmia venialialis*** (Walker)

Range: Old World, India, Malaya, Japan, Borneo, Australia, New Guinea, Solomon Is., Fiji, Western and A. Samoa, and the Pacific Islands E of Samoa. Viette (1949: 322), specifically mentions Tahiti and Bora Bora in the Society Is., and Hiva Oa, Fatu Hiva, Nuka Hiva and Tahuata in the Marquesas. Dumbleton (1954: 63), lists French Oceania and gives larval food-plants as *Oryza sativa*, *Zea mays* (Indian corn) and Gramineae. Swezey (1946: 179) calls it a leaf roller on various grasses. We did not find the species on Tutuila.

47. ***Marasmia trebiusalis*** (Walker)

Range: Much the same as *M. venialialis*, except for apparent absence in Australia, French Oceania, and the Pacific Islands E of Samoa. Swezey (1942: 209), reports leaf rolling larvae abundant on grass, *Oplismenus compositus* in Western Samoa. We took a good series in Mulinuu and Pago Pago.

48. ***Marasmia trapezalis*** Guenée

Range: New World, Old World, India, Malay Archipelago, Guam, Australia, Ellice I., Tonga, Fiji, Pacific Islands E of Samoa, Western and American Samoa. Viette (1949) lists the Society and Austral Is. Swezey (1942: 209), mentions this leaf roller as found on *Miscanthus japonicus*, a species of grass at Pago Pago, and in 1946 discussed its larval habits on Guam. The larvae also feed on sugar cane, maize, sorghum, and millet.

We took a small series at Mulinuu and Pago Pago.

49. ***Syngamia floralis*** (Zeller)

Range: Old World, India, Malay Archipelago, Australia, New Guinea, New Hebrides, Pacific Islands E of Samoa, Western and American Samoa.

We failed to find the species on Tutuila.

50. ***Phostria oconnori*** Tams

Range: Tams lists Upolu in Western Samoa for the holotype and allotype, and Samoa

for the paratypes taken in Samoa by O'Connor. No specific island is named by O'Connor.

Some members of this genus are destructive to bananas, others to legumes, palms or lilies. It is important to know whether or not it occurs in Tutuila. We did not see it.

Colored illustration by Tams (1935: plate VI, fig. 23).

Zimmerman (1958) uses the generic name *Hedylepta* for the many other members of the group found in the Hawaiian Is.

51. *Nacoleia diemenalis* (Guenée)

Range: From Africa through the Pacific to southeastern Polynesia according to Zimmerman (1958: 64). We took a series at Pago Pago and Mulinuu. It is a leaf roller on cultivated beans, peas, ground nut, indigo, and *Flemingia strobilifera*.

Zimmerman also includes this species in *Hedylepta*.

Two additional species of *Nacoleia* or *Hedylepta* were taken on Tutuila, which we were unable to identify. One of these was found on a wild vetch.

52. *Nacoleia octasema* (Meyrick)

Common name Banana scab moth.

Range: Malay Archipelago, Australia, New Guinea, Solomon Is., New Hebrides, New Caledonia, Tonga, Wallis Is., Western and American Samoa.

It is destructive to bananas as noted by Swezey, (1941: 30). Williams (1944: 99-100), briefly describes the larva, and pictures it on fig. 5. Dumbleton (1954: 63), under *Lamp-rosema octasema* lists its food-plants as *Musa sapientum* (banana), *M. textilis*, and *Pandanus* spp. Swezey (1941: 30-31), discusses its depredations and pictures it on fig. 18. Cohic (1950: 13) discusses its depredations in the Wallis Is.

53. *Botyodes asialis* Guenée

Range: Africa, India, Siam, Ceylon, Philippines, New Guinea and Malaya. We took it in good series on Tutuila, where it may have been lately introduced, as Tams does not include it for the Samoan areas.

54. *Meroctena tullalis* (Walker)

Range: Ceylon, Java, Sariba I., Milne Bay, and Mt Makilling, Luzon. Roepke also records it from India.

A single example was taken at Pago Pago, 3 Sept. 1961. This is probably an introduction. Nothing known of life history.

55. *Sylepta sabinusalis* (Walker) Pl. XI, Fig 5.

Range: Old World, India, Malay Archipelago, New Guinea, Australia, Solomon Is., Fiji, Western and American Samoa.

Swezey (1942: 209-10), records larvae common (leaf rollers) on *Cypholophus macrocephalus*, *Pipturus* sp. and *Musa textilis* (Manila hemp), and mentions parasites.

We took numerous larvae on 7 June 1961 feeding on *Pipturus argenteus* (Forst) Wedell. They were found on a roadway branching off from Reservoir Road above Pago Pago.

LARVA: Length, 15 mm; head width, 1.5 mm. Head, pale yellow; mouth parts edged with brown. Ocelli, black. Body, hyaline pale green with a deeper green through middorsum, suggesting an alimentary tract filled with chlorophyll. Glistening cervical shield with a black lunate spot on each outer margin. Numerous hyaline setae scattered over body. Legs and prolegs concolorous with venter.

LARVA (apparently final instar, pl. XII, fig. 3A): Length, 23 mm; head width, 2 mm. Head color as in prior instar. Body ground color, pale green, slightly mottled. Lunules on cervical shield more prominent. Dark green middorsal stripe. Spiracles, yellow. Legs tinged with yellow. Prolegs, concolorous with body. Setae, yellow. Pupation occurred 10-11 June 1961, within a rolled leaf.

PUPA (pl. XII, fig 3B): Length, 13 mm; greatest width through center, 2.5 mm. Lanceolate in form. Cephalic end rounded and caudal 1/3 regularly tapering. Antennae reaching tips of wing cases. Color, rich red-brown throughout. Distinctive feature of pupa is a series of double hook-like processes on abdominal segments 6-8 in middorsal line. Hooks face each other, a pair on dorsum of segmental junctures as in illustration. Cremaster, an elongate ventrally curved shaft. There are apparently no setae on any portion of the pupa.

56. *Sylepta derogata* (Fabricius) Pl. XI, Fig. 6.

Range: Equivalent to that of *S. sabinusalis*, to which Dumbleton (1954: 64), adds Guam, and lists food-plants as *Hibiscus cannabinus*, *H. esculentus*, *H. manihot* and *Manihot utilissima*. Swezey (1941: 35), reports it on *Hibiscus rosa-sinensis*. It also attacks cotton and hollyhock.

Abundant on Tutuila. We took several of the leaf rolling larvae on the Fagaso Road, elevation about 305 m, 25 August 1961, feeding on *Hibiscus tiliaceus* L. (Samoan name fau tu).

MATURE LARVA (pl. XII, fig. 4A): Length, 28 mm; head width, 2.25 mm. Head color, glistening black. Body—dorsal 1/2, translucent olive-green, with darker green of alimentary tract showing through. Ventral 1/2, pale yellow-green. Large black cervical shield on segment 1, divided in median area by a green space. Legs, black. Prolegs and anal prolegs, concolorous with venter except for anal pair, which have an elongate black band on their superior surfaces. This band is the distinguishing feature on the larvae.

PUPA (pl. XII, fig 4B): Length, 14.5 mm; greatest width, 4 mm. Color, uniform rich brown. Surface texture smooth and glistening. Eyes not prominent. Antennae and maxillae reach wing tips. Spiracle on abdominal segment 4, large and protruding, others relatively inconspicuous. Wing cases thrown into several irregular ridges. Cremaster, a short straight cylindrical shaft, topped by a cluster of minute recurved hooklets.

Imagos began emergence 5 Sept. 1961.

57. *Sylepta commotes* Tams

Apparently restricted to Western and American Samoa. We took only 2 examples. Illustrated by Tams (1935), plate XVI, fig. 6.

58. **Chloauges laceritalis** (Kenrick)

Two examples taken at Mulinuu, July 1961. Identified by comparison with specimens in Bishop Museum, Honolulu.

59. **Margaronia mysteris** (Meyrick)

Range: New Hebrides, Western and American Samoa.

Came to light sparingly at Mulinuu and Pago Pago, July 1961.

Swezey (1942: 210), found a pupa between webbed leaves of *Strongylodon lucidus*.

60. **Margaronia indica** (Saunders)

Range: Old World, India, Malay Archipelago, Australia, New Guinea, Solomon Is., Fiji, Pacific Islands E of Samoa, Western and American Samoa. Dumbleton (1954: 63), adds Guam, Marianas, Caroline Is., New Hebrides, New Caledonia and French Oceania. Swezey (1941: 33), adds Africa.

It is a pest on Cucumbers, Melons, Cotton and *Hibiscus*.

61. **Margaronia diplocyma** (Hampson)

Range: Tonga, Fiji, Western and American Samoa.

We took it sparingly at Mulinuu and Pago Pago.

62. **Margaronia oceanitis** Meyrick

Range: New Hebrides, Fiji, Western and American Samoa.

63. **Margaronia samoana** Swinhoe Pl. XI, Fig. 7.

Endemic to Western and American Samoa.

Several larvae were collected from an unidentified plant on the coastal road east of Pago Pago, 28 August 1961. They were leaf tiers in various instars.

LARVA (intermediate instar): Length, 19 mm. Head, dull yellow. Ocelli black. Mouth parts, brown. Body ground color, green. A longitudinal stripe of yellow subspiracularly. Segment 1 bears 2 large lunate black spots, 1 on each side, close to anterior margin. Venter, pale yellow-green. Legs and prolegs, concolorous with venter. Many long white setae scattered over body. Those on head shorter.

MATURE LARVA (pl. XIII, fig. 5A): Length, 22 mm; head width 1.85 mm. Head color, rose, slightly tinged with green. Body ground color above infrastigmatal fold, deep rose, below and on venter, greenish yellow. Faint suggestion of a longitudinal middorsal greenish stripe. Subspiracular stripe of earlier instars had disappeared. Caudal area slightly tinged with green. Legs and prolegs, greenish yellow. Spiracles, yellow, small and inconspicuous. Four examples pupated by 1 September 1961 within a curled and folded leaf lined sparingly with silk.

PUPA (pl. XIII, fig. 5 B-C): Length, 15 mm; greatest width, 3.5 mm. Sublanceolate in form, relatively narrow, with tapering cauda. Color, red-brown. Head and wings slightly tinged with green. Antennae extend an entire segment beyond margin of wings. Max-

illae extend 3 segments beyond wing tips. Spiracles, small, conspicuous. Minute setae arising from body in close proximity to spiracles. Cremaster (pl. XIII, fig 5D), formed of a tapering shaft, topped by 4 short, stout spines, curving laterally, and 2 pair of spines arising from base of shaft, curving medially. The first imago emerged 7 Sept. 1961.

M. samoana came to light sparingly at Mulinuu.

64. **Margaronia buxtoni** Tams

Endemic to Western and American Samoa.

Pictured by Tams (1935), plate XVI, fig. 4.

Several came to light at Mulinuu, and it was also taken at Pago Pago.

65. **Margaronia deliciosa** (Butler)

Range: Malaya, New Guinea, Solomon Is., New Hebrides, and American Samoa. Not unlikely it may be found on other South Pacific Islands.

66. **Margaronia multilinealis** (Kenrick)

Range: India, Malay Archipelago, New Guinea, New Hebrides, Fiji, Pacific Islands E of Samoa, Western and American Samoa.

It was taken sparingly at light near Pago Pago and at Mulinuu.

67. **Margaronia virginalis** (Rebel)

Range: Apparently restricted to Western and American Samoa. Rare at Mulinuu.

68. **Margaronia juvenalis** (Rebel)

Range: Fiji, Western and American Samoa.

We took it infrequently near Pago Pago.

69. **Heortia vitissoides** Moore

Range: India, Ceylon, Sumatra, Hong Kong.

Tams does not list it for Samoa.

A single specimen was taken near Pago Pago 15 November 1961. Possibly it was recently introduced.

70. **Epipagis cancellalis** (Zeller)

Range: Old World, India, Malay Archipelago, Australia, Solomon Is., Fiji, Western and American Samoa.

A good series came to light on Tutuila.

71. **Terastia meticulosalis** Guenée

Range: New World, Old World, Malay Archipelago, Australia, New Hebrides, Fiji, Western and American Samoa. A tropical and subtropical species, probably distributed wherever Coral Trees (*Erythrina* spp.) are native.

Dyar (1901) described the larva from Florida examples and listed the food-plant as *Erythrina herbacea*.

Zimmerman (1958) mentions that it was taken in Hawaii on *Erythrina monosperma*, and illustrates it on fig. 29.

We (1959) illustrated and described the pupa from specimens taken in Arizona on *Erythrina flabelliformis*.

In 1961 we took a small series on Tutuila.

The larvae feed in the seed pods and bore into small twigs of *Erythrina*.

72. ***Hyalobathra wilderi*** Tams

Endemic to Western and American Samoa.

We took 2 specimens near Pago Pago.

Nothing is known of the early stages or food-plant.

Colored illustration by Tams (1935) plate VI, fig. 22.

73. ***Hyalobathra*** sp.

A pair came to light in July 1961, but we were unable to identify them specifically.

74. ***Maruca testulalis*** (Geyer)

Range: New and Old Worlds, to Australia and New Guinea, Fiji, Western and American Samoa and the Pacific Islands E of Samoa.

Common name, Bean-pod Borer. This is one of the most destructive moths to the bean family in the South Pacific, and Hawaii, where it was first noted by Swezey (1924).

Larval food-plants, *Cajanus indicus*, cow pea, garden beans, garden peas, *Gliricidia sepium*, Hyacinth bean, lima beans, *Mucuna urens*, pigeon peas, *Sesbania grandiflora*, *S. tomentosa*, and probably many other legumes.

Illustrated by Zimmerman (1958: fig. 42).

Not uncommon at Mulinuu and Pago Pago.

75. ***Psara licarsisalis*** (Walker)

Range: India to New Guinea, Tonga, Fiji, Western and American Samoa, and Pacific Islands E of Samoa.

We did not find it on Tutuila, but a good series was obtained on Swain's I. 21-23 Sept. 1961.

76. ***Psara stultalis*** (Walker)

Range: India, Malay Archipelago, Australia, New Guinea, Western and American Samoa, according to Tams (1935). Swezey (1941) adds China, Marquesas, and Guam. He further states (1942) that larvae were common in webbed leaves of *Coleus* at Malolelei, Upolu. Viette (1949: 324), places it in the genus *Pachyzancla*. A long series was taken near Pago Pago, 1961.

77. **Noorda apiensis** Rebel

Listed only for Upolu in Apia and New Hebrides by Tams.

We took 2 specimens at Mulinuu.

More careful search on adjacent islands may extend its range.

Family HEPIALIDAE

Members of this family occurring in North America are known as Ghost Moths. They are usually placed at the end of the Microlepidoptera. For convenient reference we retain the one species listed by Tams in the sequence he has used.

78. **Phassodes vitiensis** Rothschild

Recorded only for Fiji and Western Samoa. Two specimens taken by us at Pago Pago extend its range to American Samoa. Pictured by Tams (1935), plate XII, fig. 1.

MICROLEPIDOPTERA listed for American Samoa by Meyrick (1927) plus a few additional records from other sources. Sequence of genera corresponds to that used by Meyrick:

Family PTEROPHORIDAE

79. **Sphenarches anisodactylus** Walker

Range: Brazil, French Guiana, central and east Africa, Mauritius, Maldive I., Burma, Malay Archipelago, Philippines, Japan, China, New Guinea, Tonga, Western and American Samoa.

A single example taken at Mulinuu 25 July 1961.

Larva of a related species feeds on Cucurbitaceae and Leguminosae.

We took 2 other plume moths on Tutuila—one a *Pterophorus*, the other an *Oxyptilus*, which could not be specifically identified.

Family TORTRICIDAE

80. **Procalyptis** sp.

A small series taken at Mulinuu July to August 1961. A pair sent to the British Museum was reported to be the same as an undescribed species in the British Museum collection labeled "*Procalyptis nephadelpha*, from Fiji." This is a manuscript name awaiting publication when an adequate series can be obtained.

81. **Adoxophyes libralis** Meyrick

Listed for Western Samoa and Tutuila.

We did not see it.

82. **Adoxophyes** near **fasciculana** Walker

A single yellow pupa was found at Pago Pago 16 August 1961, in a folded leaf of

Erythrina variegata f. *orientalis*. The moth emerged 17 August 1961. Two additional leaf-tiers of apparently the same species were found on a vetch at Mulinuu.

83. **Cryptophlebia rhynchias** (Meyrick)

Range: India, Pacific Islands, Australia, American Samoa.

Series taken near Pago Pago.

84. **Cryptophlebia vitiensis** Bradley

Previously reported from Fiji.

We took a single specimen at Mulinuu 7 July 1961.

Family EUCOSMIDAE

85. **Spilonota cryptogramma** Meyrick

Range: Fiji, West Pacific Islands, American Samoa.

One example came to light at Mulinuu 15 July 1961.

86. **Polychrosis xylistis** (Lower)

Range: Queensland, Western and American Samoa. Probably introduced from Australia.

We did not take it.

87. **Argyroploce rhynchias** (Meyrick)

A single specimen came to light at Mulinuu. Determined by comparison in the Bishop Museum.

88. **Argyroploce aprobola** Meyrick

Range: India, Ceylon, Seychelles, Tonkin, Java, Formosa, New Guinea, and American Samoa.

Larval food-plants, *Mangifera*, *Cassia*, *Lantana*, *Nephelium*, etc.

Family CHILIDANOTIDAE

89. **Trymalistis cataracta** Meyrick

Range: Siam, Ceylon, Australia, Southwest Pacific, American Samoa.

Identified by Tams.

We took it at Mulinuu and near Pago Pago.

Family GELECHIIDAE

90. **Thiotricha oxyopsis** Meyrick

Range: Solomon Is., New Hebrides, Western and American Samoa.

Swezey (1942: 211), described the larval habits, and listed the food-plant as *Macaranga*.

A case-bearer.

We found the cases on *Hibiscus tiliaceus*.

91. **Thiotricha** sp.

A different case-bearer was found at Mulinuu on *Terminalia catappa* L. (Samoan name talie), which we were unable to identify. We collected 47 cases.

Average length of case, 7 mm; subcylindrical, widest at top, tapering to caudal end. The cases show that the larva first fed on unopened blossoms, using buds of progressively larger size in constructing the case. The top element is a large single blossom in most cases, but a few showed blossom fragments throughout, and a small number used only buds.

92. **Stoerberhinus testacea** Butler

Range: New Hebrides, Fiji, Rapa, Western and American Samoa, Marquesas, Society Is., Hawaii, and probably many other South Pacific Islands.

The larvae feed on dead grass, and not unlikely other dry vegetable wastes.

We did not find this species on Tutuila.

93. **Autosticha banausopa** (Meyrick)

Range: New Hebrides, and the Southwest Pacific.

A single specimen was taken at Mulinuu 10 July 1961.

Family COSMOPTERYGIDAE

94. **Cosmopteryx mimetis** Meyrick

Range: India, Mauritius, Egypt, Seychelles, Borneo, New Guinea, eastern Australia, Tonkin, Fiji, Western and American Samoa, South America and Bermuda.

Swezey (1942: 212), briefly described the larva, and reported it damaging sugar cane. We did not see it.

95. **Labdia argyropla** Meyrick

This and the 5 ensuing species are all reported from American Samoa by Meyrick (1927), but were not seen by us. Apparently there is no record of their early stages or food-plants.

96. **Labdia deianira** Meyrick

97. **Labdia eugrapta** Meyrick

98. **Labdia triformis** Meyrick

99. **Labdia properans** Meyrick

100. **Labdia hastifera** Meyrick

This species also occurs on Fiji and Tonga.

101. **Persicoptila aesthetica** Meyrick

Range: Upolu, Apia, Vailima, Aleipata, Lalomanu and Tutuila.

Swezey records it as a leaf-miner on *Ipomoea*. We did not take it.

102. **Limnoecia** sp.

Three pupae were collected on the Aoloau Road, elevation 366 m 22 August 1961. They were rolled in leaves of *Erythrina variegata* f. *orientalis* (L) Merr. (Samoan name natae or gatae).

PUPA (pl. XIII, fig. 4): Length, 6 mm; Long and slender. Widest through wing section, tapering to cauda. Ground color, yellow. Eyes, dark brown. Head evenly rounded. Antenna extending 1 mm beyond caudal tip, ends recurved. Spiracles relatively conspicuous. Segmental junctures of abdomen bear prominent transverse ridges along anterior lips. Cremaster flattened, with a small dorsal spur. The most distinguishing feature is the long curved antennae. A single imago emerged, which we were unable to determine as to species.

Family CARPOSINIDAE

103. **Meridarchis zymota** Meyrick

Range: New Guinea, north Australia, Western Samoa and Tutuila according to Meyrick. We did not take it.

Family HELIODINIDAE

104. **Hieromantis praemiata** Meyrick

Range: Fiji, Western and American Samoa.

105. **Pachyrhabda antinoma** Meyrick

Range: India, Ceylon, east Australia, Kermadec Is., Western and American Samoa.

Meyrick suggests that it is an artificial introduction on cultivated ferns.

106. **Pachyrhabda amianta** Meyrick

Range: Western and American Samoa.

Swezey (1941) recorded it as reared on the spores of *Asplenium nidus*, the bird's-nest fern.

Family ETHMIIDAE

107. **Ethmia colonella** Walsingham

Two examples were taken near Pago Pago. Identified by comparison with specimens in Bishop Museum.

Meyrick (1927) does not include it for Samoa.

Family GLYPHIPTERYGIDAE

108. **Irianassa uranopa** Meyrick

Meyrick records 4 examples taken at Pago Pago, November and December.

109. **Imma chelacma** Meyrick

Apparently endemic to Western and American Samoa. We took 1 specimen at Mulinuu, July 1961. Four examples were taken at Pago Pago.

110. **Brenthia trimachaera** Meyrick

Indigenous to American Samoa.

Swezey (1942: 214) reports the larvae on "*Trema orientalis viridis?*", with numerous white spindle-shaped cocoons, at Utulei, and also Pago Pago.

111. **Brenthia catenata** Meyrick

Range: India, Ceylon, Sumatra, Java, Philippines, Western and American Samoa.

Meyrick (1927: 104) says larvae probably introduced in Samoa on its food-plant, *Erythrina*. Swezey (1942: 214), found it on a wild bean vine above Aua, Tutuila.

Family BLASTOBASIDAE

112. **Blastobasis tarda** Meyrick

Range: Western and American Samoa. Also in east Australia where, according to Meyrick (1927: 104), it was doubtless introduced. Larva probably feeds on seeds or dry refuse.

Family HYPONOMEUTIDAE

113. **Anticrates difflua** Meyrick

Range: Western and American Samoa.

We did not take this or any of the following 4 species.

Family GRACILARIIDAE

114. **Acrocercops phaeodeta** Meyrick

Apparently indigenous to Western and American Samoa.

Habits unknown, but larvae probably leaf-miners, since Swezey (1942: 214-15), lists 4 other members of the genus (species undetermined) that were leaf-miners.

Family LYONETIIDAE

115. **Diachalastis tetraglossa** Meyrick

Range: Fiji, American and probably Western Samoa. The type locality is Fiji.

116. **Pisistrata trypheropa** Meyrick

Range: Society Is., Western and American Samoa.

117. **Decadarchis perfumata** Meyrick

Listed by Meyrick only from Pago Pago.

118. **Decadarchis simulans** Butler

Range: Fiji, Western and American Samoa, Ellice Is. and Hawaii. Viette (1949: 316), adds Society and Marquesas Is. where the species has been artificially introduced. Larvae feed on dead wood and bark. We took a small series during July and August 1961 at Mulinuu.

BIBLIOGRAPHY

- Butler, A. G. 1874 List of the diurnal Lepidoptera of the South Sea Islands. *Proc. Zool. Soc. Lond.* **1874**: 274-91, pl. XLIV, fig. 3.
- Clark, Benjamin Preston 1927 Description of twelve new Spingidae and remarks upon two other species. *Proc. New Eng. Zool. Club.* **9**: 106-7.
- Cohic, F. 1950 Insect pests in the Wallis Islands and Futuna. *S. Pac. Commi., Tech. Pap.* **8**.
- Common, Ian F. B. 1964 *In litt.*
- Comstock, John Adams 1927 Butterflies of California. pp. 1-334, 84 text figs., 63 colored plates. McBride Printing Co., Los Angeles, California.
- 1959 Brief notes on four Arizona moths. *Bull. S. Calif. Acad. Sci.* **58** (1): 40-41, pl. 13b.
- 1963 A fruit-piercing moth of Samoa and the South Pacific Islands. *Canad. Ent.* **95** (2): 218-22, figs. 1-2.
- Crumb, S. E. 1956 Larvae of the Phalaenidae. *U. S. Dept. Agr. Tech. Bull. No.* **1135**: 263-64.
- Dale, P. S. & J. L. Herring 1956 Pest control in Samoa. pp. 1-15, figs. 1-13. Dept. Agr. For. Fish., Western Samoa.
- Druce, Hamilton H. 1892 A list of the Lycaenidae of the South Pacific Islands east of the Solomon group, with the description of several new species. *Proc. Zool. Soc. Lond.* **1892**: 434-46.
- Dumbleton, L. J. 1954 A list of insect pests recorded in South Pacific Territories. *S. Pac. Comm. Tech. Pap.* **79**: 1-202. Noumea, New Caledonia.
- Dyar, Harrison G. 1894 Preparatory stages of *Laphygma flavimaculata* Harv., and other notes. (*Spodoptera mauritia*). *Canad. Ent.* **26** (1): 65-66.
- 1900 Larvae from Hawaii—a correction. *Canad. Ent.* **32** (6): 156-57.
- 1901 *Terastia meticulosalis*, larva. *J. N. Y. Ent. Soc.* **9** (1): 21.
- 1901 Notes on the winter Lepidoptera of Lake Worth, Florida. *Proc. Ent. Soc. Wash.* **4**: 463.
- 1923 *Ins. Ins. Menstruus.* **II**: 148.
- Ehrlich, Paul R. & Anne H. 1961 How to know the butterflies. pp. 1-262, 525 figs. Wm C. Brown Co., Dubuque, Iowa.

- Fletcher, D. S. 1956 *Spodoptera mauritia* (Boisduval) and *S. triturrata* (Walker), two distinct species. *Bull. Ent. Res.* **47** (2): 215-17, pl. 6.
- Forbes, W. T. M. 1954 Lepidoptera of New York and neighboring states. *Mem. Cornell Univ. Agr. Exp. Sta.* **329**: 1-433.
- Fruhstorfer, H. 1910-1923 *In* Seitz, Macrolepidoptera of the world **9**: 119-90 (Pieridae); 191-284 (Danaiidae); 285-401 (Satyridae); 453-766 (Nymphalidae).
- Gillogly, G. M. & L. R. 1953 *Trichogramma minutum* in monarch butterfly eggs. *Pan Pac. Ent.* **29** (3): 110-11, fig. A.
- Hampson, George F. 1900 Catal. Lepid. Phalaenae, British Mus. **2**: 464, pl. 31, fig. 7 (*Asura uniformeola*).
- 1908 *Ibid.* **7**: 332-33, pl. 116, fig. 20 (*Platysenta illecta*).
- 1909 *Ibid.* **8**: 256-58, fig. 66 (*Spodoptera mauritia*).
- 1910 *Ibid.* **9**: 164-65 (*Elydna nonagrica*); 353-54 (*Chasmina tibialis*).
- 1910 *Ibid.* **10**: 462, fig. 131 (*Amyna natalis*).
- 1912 *Ibid.* **11**: 82-83, fig. 30 (*Phlegetonia delatrix*); 101, fig. 37 (*Anagraea rubida*); 141, fig. 47 (*Stictoptera subobliqua*); 201, fig. 59 (*Nigramma lapidaria*); 217, pl. 180, fig. 1 (*Gyrtona divitalis*); 252, fig. 90 (*Nanaguna breviscula*); 261, fig. 95 (*Mniothripa lichenigera*); 569, fig. 217 (*Maceda mansueta*).
- 1913 *Ibid.* **12**: 428, fig. 101 (*Anva coronata*); 521, fig. 123 (*Achaea serva*); 522-23 (*Achaea janata*).
- Holland, W. J. 1908 The Moth Book. pp. 1-479. Doubleday, Page & Co., New York.
- 1931 The Butterfly Book (revised edition). pp. 1-424, 77 pls. Doubleday, Doran & Co., Garden City, N. Y.
- Hopkins, G. H. E. 1927 Insects of Samoa and other terrestrial Arthropoda. Part III, Lepidoptera, Fasc. **1**: 1-64. Brit. Mus. (Nat. Hist.) Lond.
- Jordan, K. 1927 *In* Seitz, Lepidoptera of the world **9**: 11-118 (Papilionidae).
- Klots, Alexander B. 1951 Field guide to the butterflies. pp. 1-350, 479 figs. Houghton Mifflin Co., Boston, Mass.
- Mathew, G. F. 1885 Life history of three species of Western Pacific Rhopalocera. *Trans. Ent. Soc. Lond.* **1885**: 357-67, pl. X.
- McDunnough, J. H. 1938 Check list of the Macrolepidoptera of Canada and the United States of America. *Mem. S. Calif. Acad. Sci.* **1**: 107.
- 1939 Check list of the Lepidoptera of Canada and the United States of America. *Mem. S. Calif. Acad. Sci.* **2** (10): 1-171. Los Angeles, Calif.
- Meyrick, Edward 1886 Descriptions of Lepidoptera from the South Pacific. *Trans. Ent. Soc. Lond.* **1886**: 189-296.
- 1927 Insects of Samoa. Part III, Lepidoptera, Microlepidoptera **2**: 65-116.
- Mosher, Edna 1916 A classification of the Lepidoptera based on characters of the pupa. *Bull. State Lab. Nat'l. Hist.* **12**: 119.
- Nye, J. W. B. 1962 *In litt.* June 4, 1962.
- Peterson, Alvah 1948 Larvae of insects, Part I. pp. 1-315. Ohio State University, Columbus, Ohio.
- Prout, Louis B. 1928 Insects of Samoa. Lepidoptera. Fasc. 3. Geometridae pp. 117-68. British Mus. (Nat. Hist.), Lond.
- Rebel, H. 1910 Botanische und zoologische Ergebnisse einer wissenschaftlichen Forschungsreise nach den Samoaninseln dem Neuguinea-Archipel und Solomoninseln. Denk-

- schr. K. Akad. Wissensch. Wien **85**: 412-33, pl. 18.
- Schmeltz, J. D. E. 1876 Ueber polynesische Lepidopteren: Verh. des Ver. für Naturw. Unter h., Hamburg. **11**: 173-92.
- Seitz, A. 1909-1927 Lepidoptera of the world. Rhopalocera, Indo-Australia. **9**: 1197.
- Semper, G. 1866 Description of *Papilio godeffroyi* n. sp. *Trans. Ent. Soc. Lond.* **11**: 469-70, pl. XXIV.
- Sevastopulo, D. G. 1941 The early stages of Indian Lepidoptera, Part VI. *Bombay Nat. Hist. Soc. J.* **42** (2): 290.
- Swezey, O. H. 1905 Observations on insects during a recent trip to Hawaii. *Proc. Hawaii. Ent. Soc.* **1**: 17.
- 1906 Life history notes and observations on three common moths. *Proc. Hawaii. Ent. Soc.* **1** (2): 53-58.
- 1909 Notes on *Hypocala andremona* and *Hypocala velans*. *Proc. Hawaii. Ent. Soc.* **2** (2): 85-87.
- 1921 The butterflies of the Samoan Islands. *Proc. Hawaii. Ent. Soc.* **4** (3): 601-5.
- 1924 *Proc. Hawaii. Ent. Soc.* **5** (3): 341.
- 1941 Observations on insect pests in Samoa which are not yet known to occur in Hawaii. *Hawaii. Planters' Rec.* **45** (1): 25-38, fig.
- 1942 Notes on food habits of Lepidoptera in Samoa. *Proc. Hawaii. Ent. Soc.* **11** (2): 202-16.
- 1946 Insects of Guam. **2**: 179. Bernice P. Bishop Museum.
- Tams, W. H. T. 1935 Insects of Samoa, Part III, Lepidoptera, Fasc. **4**: 169-290. Brit. Mus. (Nat. Hist.), Lond.
- Tite, G. E. 1963 A synonymic list of the genus *Nacaduba* and allied genera (Lepidoptera: Lycaenidae). *Bull. Brit. Mus. Nat. Hist. Ent.* **13** (4): 87.
- Turner, A. J. 1902 New genera and species of Lepidoptera belonging to the family Noctuidae. *Proc. Linn. Soc. N. S. Wales* **27**: 136.
- Viette, Pierre E. L. 1948 Les Ophidères du Pacifique. *Rev. Francaise d'Ent.* **XV** (4): 213-16.
- 1949 Catalogue of the Heterocerous Lepidoptera from French Oceania. *Pacific Sci.* **3** (4): 315-37.
- 1950 Les Lithosiidae de Nouvelle-Caledonie et des Nouvelles-Hebrides. *Ann. Soc. Ent. France* **119**: 85.
- 1950 The Noctuidae Catocalinae from New Caledonia and the New Hebrides (Lepidoptera). *Pacific Sci.* **4** (2): 139-157.
- 1953 Lépidoptères récoltés aux Iles Gilbert. *Ann. Soc. Ent. France* **122**: 123-30.
- Waterhouse, G. A. & George Lyell 1914 The butterflies of Australia. 239 pages, 41 pls. Angus & Robertson Ltd., Sydney, Australia.
- Williams, Francis Xavier 1944 A survey of insect pests of New Caledonia. *Hawaii. Planters' Rec.* **47** (2): 202-16.
- 1944 A survey of insect pests of New Caledonia. *Hawaii. Planters' Rec.* **48** (2): 93-124.
- Zimmerman, Elwood C. 1958 Insects of Hawaii. Macrolepidoptera. **7**: 1-542. University of Hawaii Press, Honolulu.
- 1958 Insects of Hawaii. Lepidoptera: Pyraloidea. **8**: 1-456. University of Hawaii Press, Honolulu.

ADDENDUM

The following was received too late to include in the monograph. It should be inserted after "40. *Chalciope cephise* (Cramer)" on page 31.

40a. ***Euclidisema alcyona*** (Druce)

Rare. Three specimens taken near Pago Pago, July. Range: New Guinea, Queensland, Fiji to American Samoa.

GENERAL INDEX

- Acherontiinae 39
 Acontiinae..... 22
 Acronyctinae.....18
 acropila.....54
 aesthetica 65
 agramma 48, 50, 54
 AGROTIDAE 17
 Agrotinae 17
 alba..... 17
 alcyona 70
 alope 37
 amianta 65
 Anaphaeis 9
 Anerastiinae 50
 anisodactylus.....62
 anthina 47
 antilope lutescens..... 4
 antinoma.....65
 apiensis 62
 aprobola.....63
 archippus..... 3
 ARCTIIDAE.....13
 Arctiinae.....13
 argentina 9
 argosema 50
 argyropla 64
 asialis 57
 assulta.....17
 australiae 33
 banausopa..... 64
 baulus.....17
 baulus samoensis.....17
 BLASTOBASIDAE.....66
 bolina inconstans5, 6
 bolina pallescens 5
 bolinoides 37
 brevisuscula.....24
 buxtoni 60
 campana callipepla..... 33
 cancellalis 60
 canescens 23
 CARPOSINIDAE 65
 cataracta.....63
 catenata 66
 Catocalinae 26
 cautella 52
 celerio 40, 43
 cephise 28, 29, 30
 ceratistes.....52
 Chaerocampinae 43
 chalcites (Phytometra)..... 32
 chalcites (Plusia)..... 32, 34
 chelacma.....66
 CHILIDANOTIDAE..... 63
 chloropis.....44
 cingulata.....39
 clelia 46
 cnejus (Catochrysops) 10
 cnejus (Euchrysops) 10
 cnejus samoa 9
 cnejus vitiensis.....10
 colonella.....65
 commotes 58
 complexa.....50
 convolvuli 39
 corbetti 46
 coronata 26, 27
 COSMOPTERYGIDAE.....64
 crassiuscula 22
 cribraria..... 17
 cristifera..... 37
 cryptogramma 63
 cyclospila 54
 dacryodes 53
 DANAIDAE 3
 deflorata..... 33
 deianira 64
 delatrix 23
 deliciosa..... 60
 derogata 48, 58
 dialitha.....48, 50
 diemenalis..... 57
 difflua 66
 diplocyma 59
 divitalis 24
 dolia.....54
 dysorga 45
 eleutho bourkei..... 3
 ellipes..... 53
 enc tata..... 45
 Endotrichinae 53
 ephestidiella 52
 Epipaschiinae 53
 Epipleminae 44
 Erastrinae..... 22
 erotus eras.....40
 erylma 45
 ETHMIIDAE 65
 EUCOSMIDAE 63
 eugethes..... 54
 eugrapta..... 64
 Euteliinae 23
 exclamationis.....6, 11, 13
 fascialis 55
 fasciculana.....62
 ferriscialis..... 38
 festiva 14, 19
 filipalpis..... 32
 flava flava 34, 36
 flavimacula.....21
 florldalis..... 56
 frugalis 31
 fullonia..... 33, 34, 36
 fulminans 30
 Galleriinae.....50
 GELECHIIDAE 63
 GEOMETRIDAE.....44
 Geometrinae..... 46
 GLYPHIPTERYGIDAE ... 66
 godeffroyi.....8
 gonylasia 52
 GRACILARIIDAE..... 66
 guttiventris.....33
 Hadeninae 18
 hastifera..... 64
 Hedylepta 57
 HELIODINIDAE.....65
 hemicycla 47
 hemiophthalma.....55
 Hemitheinae..... 44
 hepatica 24
 HEPIALIDAE..... 62
 HESPERIDAE..... 11
 HETEROCERA 13
 hirundo.....40, 42
 hopkinsi..... 24
 Hyalobathra 61
 Hyblaeinae.....38
 Hydrocampinae 53
 Hypeninae..... 38
 hypomerops 46
 HYPONOMEUTIDAE 66
 Hypsinae.....17
 iconica 14, 25

illecta	21	multilinealis	60	Pyralinae.....	53
inangulata	33	mysteris	59	Pyraustinae.....	55
indica	59	natalis.....	22	rebeli	25
inversa.....	47, 50	neuralis	54	rechingeri	55
irrorata	37	nigricostalis	50	recurvalis	55
ISMENIDAE.....	11	nigritarsis xanthochroa.....	32	rhynchias (Argyroploce)...	63
jacquinotii manaia.....	9	Nolinae	13	rhynchias (Cryptophlebia)..	63
java.....	9	nonagrica	21	ritsemæ	23
janata.....	27, 28, 29, 30	obfuscalis	38	rivula	22
juvenalis.....	60	oliviaria (Anisodes)	45	rubida.....	23
kellersi.....	44	oliviaria (Perixera).....	45	rufula	45
labradus labradus	11	oceanitis.....	59	sabinusalis	48, 57
laceritalis	59	ochreate samoana	37	samoana	10
lapidaria.....	24	oconnori.....	56	samoana (Anisodes) ..	44, 48
Larentiinae.....	45	octasema (Lamprosema) ...	57	samoana (Celama).....	13
lasiospila.....	45	octasema (Nacoleia)	57	samoana (Cleora)	46
lautokiensis	38	octo.....	23	samoana (Margaronia).....	
leda.....	4	oecia.....	47	.....	48, 50, 59
leda solandra.....	4	Ophiderinae	32	samoana (Tiridata).....	37
leichardtii	33	ornatalis.....	56	samoana (Xenoprora).....	44
lepta.....	45	otis cheesmanae	11	samoensis.....	6, 10
leucydra	46	oxyopis	63	sanguinea.....	38, 40
libralis.....	62	perfumata	67	Sarrothripinae	25
licarsisalis.....	61	Perigea.....	21	Satyrinae	4
lichenigera.....	25	phaeodeta	66	schistochaeta.....	53
Limnoecia sp.....	50, 51, 65	Philampelinae	40	semialba.....	53
Lithacodiinae.....	22	Phycitinae.....	52	semnopa.....	54
lithargyrea pepe.....	9	pilaria.. ..	44	sericatalis.....	47, 48
lithophora.....	46	placida steffanyi ..	42	sericea (Catephia)	33
litura.....	19, 28, 29	plagiata samoensis.....	18	sericea (Chasmina).....	21
loreyi	18	plagiata (Tiracola).....	18	serva.....	27
lotrix stigmata.....	16	plagifera.....	47	sigma	38
luteolaria	25	Platysenta	21	signiferalis.....	55
LYONETIIDAE	66	plexippus (Danaida).....	3	similis.....	37
manifestalis	38	plexippus (Danaus).....	3	simulans.....	67
manihotalis	53	plinthopa	53	sinha bowdenia.. ..	6, 8
mansueta.....	25	Plusiinae.....	32	solidaria.....	44
mauritia	20	polynesiiana	33	solidaria baptata.....	44
medinalis	56	praemiata	65	sordida.....	54
melicerta.....	27	prisca	30	SPHINGIDAE.....	39
melissa melittula	3	Procalyptis sp.....	62	steffanyi ..	55
melissa tutuilae.....	3	proleucella.....	52	Sterrhinae.....	44
mellita.....	45	properans	64	Stictopterinae.....	24
mercatoria.....	27	PSYCHIDAE	46	stigmata.....	16
meridionalis nauticorum...		PTEROPHORIDAE	62	stultalis ..	61
.....	14, 18	puera	39	subobliqua.....	24
mesenterialis.....	53	pulchelloides marshallorum		surata	38
meticulosalis.....	60	.....	16	swezeyi ..	52
MICROLEPIDOPTERA ...	46	pulchelloides (Utetheisa)...		sylpha.. ..	38
mimetis	64	.....	13, 14	tarda.. ..	66
miniacea.....	26	PYRALIDAE	46	tendicularis.....	53

tenuis	53	trapezalis.....	56	villida villida	5
testacea	64	trebiusalis	56	villidalis.....	54
testulalis.....	61	tricoloralis.....	55	virginalis.....	60
tetraglossa.....	66	trifasciata.....	31, 34	vitiensis (Cryptophlebia)...	63
Thiotricha sp.	64	triformis.....	64	vitiensis (Phassodes).....	62
thompsoni	5	trimachaera	66	vitissoides	60
Thyridinae.....	46	trypheropa.....	67	Westermanniinae.....	25
tibialis	21, 28, 29	tullalis.....	57	wilderi.....	61
Tirumala	3	uniformeola	13	xanthosoma	55
tongaensis	26	URANIIDAE	44	xylistis.....	63
TORTRICIDAE	62	uranopa	66	zinckenella.....	52
trabeata	52	venilialis.....	56	zymota.....	65

PLANT INDEX

Abutilon incanum	22	chocolate.....	53	.....	47, 63, 65
Acacia farnesiana.....	27	Citrus	36, 46	Eugenia	21, 46
Acanthaceae	21	Clerodendron fragrans	54	indularis.....	44
Ageratum conyzoides.....	52	Cocos nucifera	46, 50	Euphorbia bifida.....	27
Albizzia	27	Codiaeum	27	geniculata	27
Alocasia.....	39	variegatum.....	30	hirta.....	27
Amaryllidaceae.....	20	Commelina.....	21	Euxolua ..	55
Ampelopsis	43	nudiflora.....	38	fern, cultivated.....	65
Aralia.....	8	Coleus	54, 61	Ficus	27
Areca nut	46	Convolvulaceae.....	46	scabra	38
Asclepiadaceae	3	coral tree	60	field peas	52
Asclepias curassavica	3	Cosmos sulphureus.....	32, 44	Flacourtiaceae.....	8
Asplenium nidus.....	65	cotton ...	19, 21, 36, 43, 58, 59	Flemingia strobilifera.....	57
banana	19, 36, 57	cowpea	27, 36, 61	Fuschia	43
bark	67	Crinum asiaticum	19	Garium varum.....	43
beans.....	57, 61	Crotalaria striata.....	10	Gliricidia sepium.....	61
beets.....	55	croton	27, 30	Gossypium spp.	36
Beta vulgaris.....	55	cucumbers	59	grain..	52, 53
Bignonia.....	39	Cucurbitaceae	62	Graminaceae.....	56
bird's-nest fern.....	65	Cypholophus macrocephalus.....	57	grape vine	43
Boerhaavia diffusa.....	43	daikon radish	27	grasses.....	21, 38, 56, 64
Borreria ocimoides.....	55	dead leaves	38	ground nut.....	57
cacao	52	dead wood.....	67	guava	36
Cajanus indicus	61	Desmanthus virgatus.....	27	Hibiscus.....	59
Calocasia	39	Desmodium umbellatum.....	9, 11	cannabinus.....	58
Calotropis gigantea	3	Diospyros	33	esculentus	58
Capparidaceae.....	9	dried fruit	52, 53	manihot	36, 58
Capparis	9	Erythrina	36, 60, 61, 66	rosa-sinensis	36, 58
Cassia	63	flabelliformis.....	61	tiliaceus.....	36, 50, 58, 64
castor oil plant.....	27	herbacea.....	61	Hippeastrum vittatum.....	20
Catalpa longissima.....	39	monosperma.....	61	hollyhock.....	36, 58
Chenopodium	23	variegata orientalis.....		hyacinth bean	61
chili pepper	27				

indigo	19, 57	Oplismenus compositus.....	56	slipper plant.....	27
Indigofera anil.....	11	Oryza sativa.....	56	Sorghum.. ..	31, 56
Inocarpus edulis.....	44	Palaguium.....	27	spinach.....	55
Ipomoea.....	8, 39, 65	palms	57	Spinacia oleracea.....	55
bananox.....	56	Pandanus.....	57	string beans	31
pes-caprae	19, 56	papaya.....	36	Strongylodon lucidus.....	59
lantana.....	8, 19, 63	peas.....	61	sugar-cane.....	21, 52, 56, 64
Leguminosae.....	9, 10, 62	Pedanthus tithymaloides...	27	sunflower	39
Leucaena glauca	57	Phaseolus spp.	52	sweet potato	39, 43
lilies.....	57	adenanthus.....	11	sword beans.....	37
lima beans	52, 61	Philippine pole bean.....	27	taro	19, 43
Lycopersicum esculentum..	36	Physalis minima.....	18	tea.....	19, 27
Maba sandwicensis.....	33	pigeon peas	61	teak.....	39
Macadamia.....	27	Pipturus sp.	57	Terminalia catappa.....	
Macaranga	50, 63	argenteus.....	58	.....	10, 11, 25, 27, 47, 64
maize.....	19, 21, 31, 56	Poinsettia	27	Theobroma cacao.....	52
Mangifera	44, 63	Polypodium	27	Timospora cordifolia.....	36
mango.....	36	pomegranate.....	27	tobacco	18, 19, 21, 43
Manihot utilisissima.....	58	Portulaca.....	21	tomatoes	18, 19, 36
Manila hemp.....	57	potato	19	Trema orientalis viridis.....	66
melons.....	59	Premna taitensis	38	tuba.....	46
Messerschmidia.....	16	Prosopis chilensis	27	Tylophora samoensis	3
argentea.....	3, 16	Quisqualis indica.....	26	Verbenaceae	54
Microsorium scolopendria..	18	Rhus taitensis	44	Vigna catiang	11
milkweeds	3	rice.....	21, 31	lutea	9, 10
millet	31, 56	Ricinus	27	marina	9, 30
Millingtonia	39	communis	27, 44	Virginia creeper	43
Miscanthus japonicus.....	56	Rosa sp.....	44	Vitex trifolii.....	39
Morinda citrifolia	8, 42	rose.....	27	vinita	43
morning glory.....	56	Sapota.....	33	Waltheria americana	22
Mucuna urens	61	seeds.	52	Wedelia biflora.....	54
Musa sapientum	57	Sesbania grandiflora	61	weeds	37, 38
textilis.....	57	tomentosa	61	“wong bok” cabbage.....	27
Nephelium.....	63	Sida.....	23	Xylosma suaveolens.....	8
lappaceum.....	37	cordifolia	22	“yerbas babue”.....	55
nuts	52	fallax	22	Zea mays	56
oil palm.....	46	rhombifolia.....	36, 22	Zingiberaceae	31