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MACROLEPIDOPTERA OF FIJI AND ROTUMA : A TAXONOMIC AND BIOGEOGRAPHIC STUDY

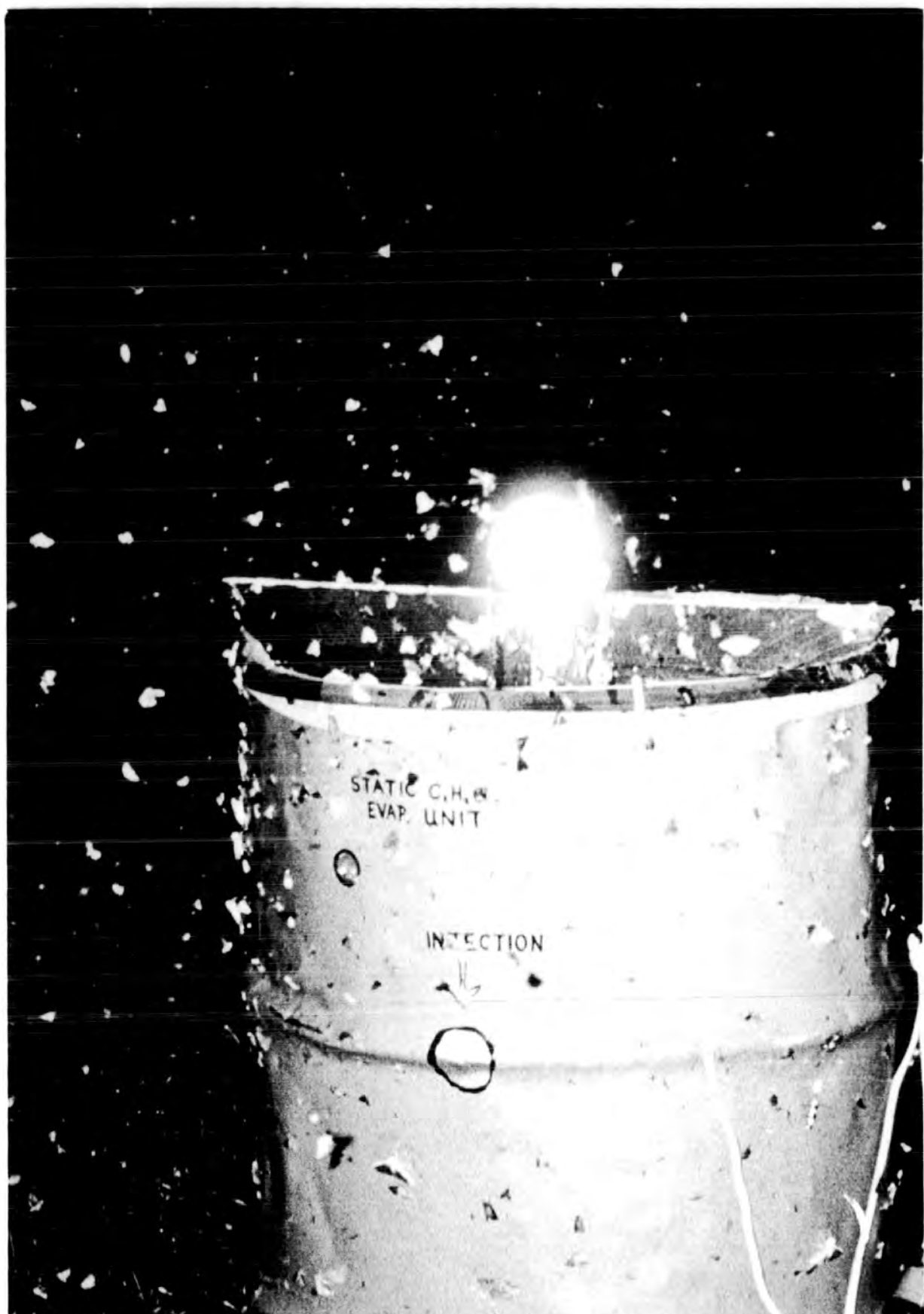
by

GADEN S. ROBINSON, B. Sc.

being a thesis presented in candidature for the degree
of Doctor of Philosophy in the University of Durham, 1974.

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Robinson trap No. 5 in operation
at Nandarivatu 21-xi-1971.



Abstract

The 400 species of Macrolepidoptera known to occur in Fiji and Rotuma (including 10 new subspecies, 72 new species and 2 new genera) are described : 11 species remain unplaced. Taxonomic treatment includes restitution of names, establishment of new combinations and establishment of new synonymy. Most species are illustrated, many are redescribed : life history and distributional information is provided where this is known.

The results of light-trapping in Fiji, the New Hebrides and on Rotuma are presented and the difficulties of measuring diversity and assessing distributions from light-trap records are pointed out. A method for processing light-trap records by computer and subjecting these records to cluster analysis to yield groups of species which possess a similar distributional pattern is presented. The method is applied to light trap samples from Fiji, the New Hebrides and Rotuma and the properties of the groups of species obtained are examined.

The Macrolepidoptera fauna of Fiji is discussed biogeographically in the context of the Pacific and the present-day distribution of species related to the geological and palaeogeographic history of the western Pacific : the latter is summarised. The distribution of species within the Fiji group is discussed in relation to vegetation types and vegetational history and the impact of man upon the fauna is examined.

Statement

This work does not constitute a publication by definition of Article 8 of the International Code of Zoological Nomenclature, 1964, and is not intended to do so.

This work does, however, constitute a manuscript intended for publication and is copyright: in this context attention is drawn to item 2 of Appendix A of the Code which has the status of a recommendation.

Acknowledgements

Throughout the period of this work my supervisor, Dr. Lewis Davies, has refrained from use of either whip or carrot but has never quite given me enough rope to hang myself: this situation, stabilised by his continued patience and good humour, has been an easy and fruitful one in which to work and I am exceptionally grateful to him.

I am most grateful to Professor D. Barker for providing facilities in the Department of Zoology, Durham, and to the Science Research Council for a studentship, during the tenure of which this research was undertaken.

The success of the programme of fieldwork, upon which this thesis is based, is due to the help and hospitality of a great many people in Fiji and the New Hebrides who showed interest and consideration both in their public and private capacities. It is impossible to record all those whose efforts contributed to this work but without the help of the staffs of the following organisations in Fiji very little could have been accomplished:

Fisheries Department, Marine Department, Posts and Telecommunications Department, Department of Lands, Mines and Surveys, Agriculture Department, Forestry Department, Immigration Department, University of the South Pacific, Pacific Lumber Co., Air Pacific, South Pacific Sugar Mills and the United Nations Transport Survey.

Special mention and thanks are due to Mr. J. Daniels (SPSM Research Station), Mr. D. Burness (Coconut Pests and Diseases Board), Mr. P. Erasito (Agricultural Officer, Rotuma), Mr. S. Ketewai, Mr. R. Lepper (Namale Estate), Mr. E. Morris (Tholoisuva), Mr. R. Mercer (Matanikavika Estate), Mr. J.A. McLean (U.S.P.), Mr. A. Ottoway (Rakiraki), Mr. J. Parham, Mr. D. Paul, Mr. A.S. Petrie, the Robertson family (Mba), Dr. J.B.D. Robinson, Mr. D.T. Saint, Cdr. G.J.B. Simeon, Mr. A. Stone, Mr. R. Stone, and Mr. M. Williams.

Miss Vimla Prasad lent valuable secretarial assistance.

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During my absence from the United Kingdom liaison with Durham was maintained by Mrs. J. Nathan and Miss S. Carr, the Departmental Secretaries.

Mr. J. Fox (Mathematics Department, U.S.P.) enabled me to use the Fiji Government's ICL 1903 computer. In Durham, Mr. D. Bell wrote the original version of BUGS3 from my flow diagrams. Mr. D. Partridge wrote BUGS1 and BUGS2 and my brother, Mid. M.M. Robinson, R.N., wrote BUGS4. I am indebted to the Computer Unit staff and IBM 360 operators for help and advice in the smooth running of programmes and plotting routines.

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Dr. J.D. Holloway has provided the stimulus for much of the "faunal element" work herein and his friendship, advice and knowledge of the Lepidoptera of Borneo, New Caledonia and Norfolk I. has been invaluable.

The enormous and tedious task of typing this thesis was undertaken by Mrs. Mavis Beddoes whose magnificent efforts are greatly appreciated and for whom it is difficult to find sufficient thanks.

The job of printing and plate-making fell to Mr. Thomas Fong whose skill in this task is self evident and to whom I am deeply grateful.

The photographs for plates 1 - 10 were taken by my brother, whose efforts speak for themselves.

Both my mother and my fiancée have suffered grass-widowhood from this enterprise : their horse-sense and support is deeply appreciated.

I thank Jo and Harry Sampson for giving me a home and a family in Durham.

My father is the moving spirit behind this work. His knowledge and love of entomology have been a profound influence upon my career and his contribution to this work has been enormous, from the workshop practicalities of light-trap construction to larval skin and genitalia preparations, fieldwork in New Guinea, the Solomon Is., Gilbert Is. and Samoa and finally the preparation of all the photographs in this thesis, supervision of typing and printing and the laborious task of proof-reading. My dedication of this work to him is a less than adequate expression of my gratitude.

CONTENTS

p.

Chapter 1:	The study of Lepidoptera in Fiji and the adjacent islands - publications and the fate of collected material.	
Chapter 2:	The natural history of Fiji	
i.	Geographical outline	7
ii.	Geology	10
iii.	Climate	15
iv.	Vegetation	18
v.	Terrestrial and fresh-water fauna	26
Chapter 3:	Methodology	
i.	The light-trapping programme	29
ii.	Treatment of material	32
iii.	Recording and processing of light trap records	33
iv.	Diversity measurement	36
Chapter 4:	Results	
i.	Light trap records: quantitative considerations	40
ii.	Light trap records: qualitative considerations	45
iii.	Cluster analysis results	
a.	Fiji: Viti and Vanua Levu	50
b.	Fiji: Viti and Vanua Levu (Logarithmic analysis)	59
c.	Fiji: Small islands and Rotuma	62
d.	Rotuma	67
e.	New Hebrides - all samples	67
f.	New Hebrides - Santo	78
g.	Survey of cluster analysis results	79
iv.	The distributional pattern of the moths of Fiji in the context of the Pacific area	
a.	The proportions of three different groups of Macrolepidoptera among certain Pacific islands	81
b.	The relationship between recorded species and island area - the question of faunal impoverishment	82
c.	The distribution of Macrolepidoptera in the western Pacific: faunal affinities	92
d.	Endemicity and radiation	95
Chapter 5:	The Macrolepidoptera of Fiji and Rotuma - a systematic account	
Part 1:	Heterocera (moths)	98
Part 2:	Rhopalocera (butterflies)	324
Chapter 6:	Discussion	338
Bibliography:		346
Maps 1 - 15		
Plate figures 1 - 350		
Text figures 1 - 173		
Index to names of Macrolepidoptera		

Chapter 1 : The study of Lepidoptera in Fiji and the adjacent islands - publications and the fate of collected material.

The early history of the collecting of Lepidoptera in Fiji parallels that of many of the Pacific islands: collections were made by casual callers at islands, often members of survey vessel crews (Perry, Walker, Mathew) and tended to be mostly of Rhopalocera. In almost all cases the material came to rest in the British Museum (Natural History) - BM (NH) - and this trend of deposition has been maintained to the present day so that the present author was fortunate to find almost all relevant type material under one roof.

The first species of moth to have been described from a Fijian specimen was perhaps Ericeia leichardtii (Koch)(q.v.) in 1865 but there is doubt as to the provenance of the type specimen. Koch gives the type locality as "N. Australia" - this is erroneous. The source of the specimen, though probably Fiji, might have been Samoa. There are no such doubts about the specimen of the endemic Macaduma corvina (q.v.) described by Felder in 1875. The butterflies got off to a better start; Xois sesara was described in 1865 and Papilio schmeltzi in 1869. Both species are endemic.

Institutions or collections which contain or have contained Fijian lepidopterous material are abbreviated in this thesis as follows:

BM(NH)	- British Museum (Natural History), London.
KRS	- Fiji Dept of Agriculture, Koronivia Research Station, Fiji.
SPSM	- South Pacific Sugar Mills (=C.S.R. Company), Lautoka, Fiji.
MNHN	- Musee Nationale d'Histoire Naturelle, Paris, France.
ZM	- Zoologisches Museum, Hamburg, Germany.
BPBM	- Bernice P. Bishop Museum, Honolulu, Hawaii.
UM	- University Museum, Oxford.
AM	- Australian Museum, Sydney, Australia.
SAM	- South Australian Museum, Adelaide, Australia.
USNM	- U.S. National Museum, Washington D.C., U.S.A.
CAS	- California Academy of Sciences, San Francisco, U.S.A.
NM	- Naturhistorisches Museum, Wien, Austria.
TWD	- Thomas W. Davies collection, San Leandro, California, U.S.A.

The better-known collectors of Lepidoptera from Fiji and relevant information are listed in alphabetical order below:

- BAHR, Dr. Philip (ca. 1910) A few specimens from Tamavua, near Suva, mostly Rhopalocera. BM(NH).
- BAXANDALE, R. (1893-94) Ovalau (mis-spelt "Obalau" on some labels) - Rhopalocera and Heterocera. BM(NH).
- BRYAN, E.H. Jr (1924) A few Lepidoptera collected but activities mostly confined to Coleoptera: examined and listed KRS and SPSM collections (Bryan, 1924). BPBM.
- CATALA, R. (1951) A small mixed collection from 20 km N of Suva (Viette 1951b). MNHN.
- CERF, 1e (?) See Viette (1950f). MNHN.

- DAVIES, T.W. (1963, 1970) Comprehensive collection of Rhopalocera and a few Heterocera from Korolevu. CAS/TWD.
- EVANS, Dr Humphrey Silvester (1922-24) District Commissioner and District Medical Officer, Vanua Mbalavu (1922), Taveuni (1924). Small collection of Rhopalocera. BM(NH).
- FILHOL (1899) Ovalau - a small collection (Viette, 1950f). MNHN.
- GARDE, P. de la (ca.1905) Navua area (S. central Viti Levu): also collected in W. Samoa (Viette, 1954). Small collection. BM(NH) Accession 1906-89. BM(NH).
- GILSON, Prof. Gustav (1899) A short visit: collected some Rhopalocera (Poulton, 1923c). ?BM(NH)
- GRAEFFE, Dr Eduard (1862) Collected for the Hamburg firm of Godeffroy & Sons. Much of his material was purchased by BM(NH) and subsequently described by Butler (1886). Some material from this accession may carry erroneous data. Graeffe's labels are "not too dependable" (Smith, 1955). BM(NH).
- GREENWOOD, William F.N. (1919-32) Employed by the Colonial Sugar Refining Company (C.S.R. - now SPSM - q.v.) as an entomologist and built up the SPSM collection (now badly neglected). A major contributor to Fijian botany (Parham, 1972). Much of Phillips' (q.v.) collection was in the SPSM collection but Phillips took this material away from C.S.R. in 1933. Greenwood sent many specimens to BM(NH) and the Imperial Institute for Entomology for identification and many duplicates of these series of his and Phillips' specimens were retained. SPSM/BM(NH).
- GUTHRIE, Dr T. (1902) A small collection at Lautoka in December. BM(NH).
- JACQUINOT (?) A small collection from "Lovouko" (Levuka, Ovalau) - see Viette (1905f). Perhaps this is Lieut. C.H. Jacquinot who visited Fiji on the "Astrolabe" with Dumont d'Urville in 1827. MNHN.
- JOANNIS, de (?) A small collection (Viette, 1950f). MNHN.
- LEVER, R.J.A.W. (1937-49) Government Entomologist. Contributed material to KRS and BM(NH): many publications on Fijian entomology, mostly in Agric. J., Fiji : see bibliography for papers on Lepidoptera. KRS/BM(NH).
- LUCAS, Dr T.P. (ca 1884) Collected during "a short winter visit to Fiji": material described by Meyrick (1886). Types were retained in the Lucas collection, now said to be in SAM. This is the only collection of Fijian Lepidoptera types of any importance outside BM(NH). SAM.
- MATHEW, Cdr. Gervase F. (ca 1880-85) Ultimately Paymaster-in-Chief of the Royal Navy. Meyrick (1886) described a quantity of Mathew's material: "Mr Mathew's collection was formed during 3 years' stay on the Australian station and was obtained on short, occasional visits to the different islands, whenever an opportunity might occur for landing". Mathew's collection was mostly of Rhopalocera but at Meyrick's request he did collect a few moths. BM(NH) Accession 87-50 was of 1,862 Lepidoptera from the Australian region from Mathew's collection. Mathew himself published two papers on life histories (1885, 1889). Labels not always dependable. BM(NH).

MOSSE-ROBINSON, Lieut. L.H. (1914) Sent Prof. E.B. Poulton a Sphingid found in the stomach of a fish caught by one of his subordinates fishing off H.M.S. "Australia" in Suva harbour - see Poulton (1916). Depository of specimen not known.

NICOLL, M.J. (ca 1905) A member of the Crawford Expedition (?). Few specimens. Published "Three Voyages of a Naturalist" (untraced) in 1908. BM(NH)

NORTH, D.A. (ca 1910-1915) A cane experimentalist with the C.S.R. Co.. A small collection of butterflies. BM(NH).

O'CONNOR, B.A. (1949-62 approx.) Government Entomologist after Lever. Maintained and added material to the KRS collection and supplied specimens to BM(NH) via the Commonwealth Institute of Entomology. KRS/BM(NH).

PAINE, R.W. (ca 1929) Worked on Levuana with Tothill et al. (see Tothill, Taylor and Paine, 1930). Some Lepidoptera collected. KRS/BM(NH).

PERRY, W. Wykeham (ca 1873-75) Commander (?) of H.M.S. "Pearl", the survey vessel. Visited Ovalau, Vanua Levu and New Hebrides (see Butler, 1874, 1875, 1875b). BM(NH).

PHILLIPS, C.S. (1920-38) Collected with his father, R.H. Phillips, at Vunindawa (see below). The father and son labelled their material either "Vunindawa" or "Lautoka" but I believe they collected in additional localities to these. BM(NH)/AM.

PHILLIPS, Richard Henry (1920-38). Phillips made by far the richest and most important contribution to our knowledge of the Lepidoptera of the Pacific with his painstaking and comprehensive collection of Fijian Lepidoptera. With the exception of a paper by Musgrave (1938), Phillips has received little or no credit or biography and I am indebted to Mr. C.S. Phillips of Bangalow, N.S.W. for the fascinating resume of his father's life reproduced below.

"My father was the second youngest son (b.1866) of the village doctor (George Marshall Phillips) of Whitwell, Hertfordshire which is now, I believe, a suburb of London. My father was educated at Brentwood while the family lived at Walden, Hitchin. At eighteen years of age he was seen by Lord Dacre (the Queen Mother's father) shooting on his estate and Lord Dacre warned my grandfather who put my father on a boat to Australia forthwith ! Dad's share of the family fortune was sent ahead to an uncle in the Queensland Police Force. Dad arrived to find Uncle recovering from a binge on his nephew's money. There was just enough left to outfit him with a dray to go wool-washing on the Murray River. Ignorance of the climate and the vagaries of rainfall miles away soon ended his hopes for a fortune for the wool was washed away in a flash flood. Having to sell the outfit to make what amends he could left him broke and he took a job on any stations offering. In this way he came to Caradgery near Forbes and Parkes and there became a jackeroo to the family of William Atwood Rae who was a surveyor with a property at Timaldra, a few miles out of Parkes. The master of the house spent long absences from home and his wife found Dad's education just what was needed. He became tutor in the morning and jackeroo in the afternoon: there were nine children in the house so he was a busy man. He cast and made his own .44 bullets and shot

kangaroos for pocket-money. When the Boer War broke out he resigned his job to enlist but was turned down because of a missing left forefinger ! He heard that work was available in Fiji and went there in 1902 (aged 36) and the same afternoon as he landed was painting the yard of Wishart's timber store in Suva. He took on managing Armstrong's store at Taurau (between Mba and Lautoka) and briefly returned to Australia to marry Amy Kate, the third daughter of W.A. Rae, his early employer. In 1905 he worked in Henry Marks' store in Suva then at the beginning of 1908 he joined the Colonial Service as a Third Boarding Officer in the Customs and Excise Department at a salary of £100 p.a. He worked his way up to Senior Customs Officer by 1927 and retired at the end of 1928, aged 63. Just prior to his retirement he had taken up moth-collecting as a hobby and as a result of this got a job with C.S.R. at Lautoka breeding a fly that was being used as a predator on some canefield pest. The 1931 hurricane put a finish to the fly-breeding sheds and the company closed the project. He came to Vunindawa where I had a farm and we jointly worked on his moth collection - there being no distractions in those days !

His private collection of Fijian moths he donated to the Sydney Museum where it was known as the Phillips collection... He had also found the largest wood-boring beetle of all time but the beetle "went astray" while in the care of the Agricultural Dept in Suva, for which crime the old man never forgave them ... Methods of collecting used were looking for and breeding out caterpillars found in the daytime and hanging out a sheet with a v-fold at the bottom with a petrol lamp above it... The British Museum badly wanted information on what these moths fed on and this request was always in our minds when walking through the bush. I did a lot of river-clearing in those days, blasting out stumps, so I did a lot of the work for him but his was the idea and most of the drive. I was raising a family and trying to be solvent at the same time: these were the Depression years you must remember.

He and Mother made one trip to Australia but returned again: but it was a wet year and he took off again and settled at Mosman in Sydney and died there in 1955 in his 90th year. He was a kindly man, always ready to go the extra mile, a pillar of the Church of England (which Church he nevertheless considered dead on its feet !), a good husband and a wonderful father; in short, an old-time English gentleman".

Phillips contributed a large amount of material to BM(NH), some specimens via Greenwood, and many of his Geometrids were described by Prout (1929c, 1930, 1934) although none of his Noctuid material was investigated. Meyrick described many of Phillips' Microlepidoptera. Phillips presented his small personal collection to the AM along with his field notebooks. The latter are still untraced despite laborious investigations by the author. The Phillips Collection in the AM contains specimens but no type material.

Phillips never published any of his observations although he presented a catalogue of his collection (including material sent to BM(NH)) to the Fiji Dept of Agriculture (Phillips, 1937). Phillips' collection is outstanding both in quantity and quality and the author has never ceased to be amazed at the species Phillips collected with the limited means at his disposal. AM/KRS/SPSM/BM(NH).

SIMMONDS, Hubert W. (1920-55) Originally employed on the Levuana project, in which his contribution was enormous (Tothill, Taylor and Paine, 1930), Simmonds made outstanding collections. During his early years he concentrated on Rhopalocera, encouraged by Poulton who used Simmonds' data and specimens in a long series of publications (1920, 1921, 1921b, 1923, 1923b, 1923c, 1924, 1925, 1927) on Danaidae, Hypolimnas spp. and mimicry. Simmonds published a number of papers, mostly in Agric. J., Fiji (see bibliography). After his retirement he made a large collection of Macrolepidoptera for BM(NH): this was sorted and examined by the author in 1972. Simmonds' major contributions to Fijian entomology were in the field of biological control and his work for Poulton: his autobiography - "My Weapons had Wings" was published in 1958. BM(NH)/KRS.

STEEL, T. (1886) Collected butterflies at Nausori (Waterhouse, 1904). ?AM.

TAYLOR, T.H.C. (1922-34) One of the Levuana team : economic entomologist. BM(NH)/KRS.

VEITCH, R. (ca 1920-25) Worked with Greenwood for C.S.R. and helped build the SPSM collection - some specimens sent to BM(NH). BM(NH)/SPSM.

WALKER, J.J. Cdr. (ca 1882-84) Casual visitor from one of the naval vessels. Collected butterflies and a few moths from many of the Pacific islands and published several papers (1883, 1884, 1884b, 1902, 1920): became President of the (now Royal) Entomological Society in 1919. Some labels unreliable. BM(NH).

WATERHOUSE, E.G. (1903) Brother of G.A. Waterhouse, the Australian entomologist and uncle of D.F. Waterhouse, now chief of the C.S.I.R.O. Division of Entomology. Collected butterflies at Mbua Bay (Vanua Levu) and Navaloa (Viti Levu): these were studied by his brother (1904): moths collected were studied by Bethune-Baker (1905) and are in BM(NH). AM/BM(NH).

WOODFORD, C.M. (1882-86) Collected extensively, not only in Fiji but also in the Solomons and Gilbert and Ellice Is. (see Woodford, 1885, 1895). Lepidoptera from Fiji worked by Butler (1884, 1885) and Herbert Druce (1888). BM(NH).

There are no publications of any size on the Lepidoptera of Fiji and with papers published before 1910 it is difficult, in some cases, to relate names used then to names in use now even discounting differences of taxonomic opinion. I have, where possible, used early papers for distributional data where the identity of the species is not in doubt. The major sources are as follows:

Bethune-Baker (1905), Bryan (1924), Butler (1874, 1875b, 1883, 1883b, 1884, 1886), Dixey (1923), Hamilton Druce (1887, 1892), Herbert Druce (1882, 1888), Lever (1943, 1946b), Mathew (1889), Meyrick (1886), Phillips (1937), Poulton (1923c, 1924, 1925), Prout (1929c, 1930, 1934), Tams (?1936), Viette (1950d, 1950f, 1951b), Waterhouse (1904).

Papers on early stages and life histories are even fewer but it has been possible to build a collection of larval foodplant records from the following sources:

Evans (1952), Greenwood (1929, 1940), Hinckley (1963), Lever (1946c, 1947), Mathew (1885, 1889), Phillips (1937), Poulton (1923c), Swain (1971), Veitch and Greenwood (1921, 1924).

Some foodplant records from nearby island groups have also been used. Larval descriptions are very few and I have relied on sources describing non-Fijian material to a great extent. Papers describing Fijian larvae are as follows:

Mathew (1885, 1889), Poulton (1923c), Robinson (1969, 1969b), Robinson and Robinson (Utetheisa - in press), Swain (1971), Tothill, Taylor and Paine (1930).

In cataloguing the Macrolepidoptera of the central and western Pacific islands (excluding the Solomons and islands to the north and north-west) the following major sources have been drawn upon:

Butler (1874, 1875, 1885), Carpenter (1942, 1953), Clarke (1971), Collenette (1928, 1934), Comstock (1966), D'Abrera (1971), Hamilton Druce (1892), Fletcher (1957), Fukushima (1947), Given (1968), Hopkins (1927), Howarth (1962), Poulton (1921b, 1927), Poulton and Riley (1928, 1934), Prout (1929, 1934b), Smithers (1970, 1971), Swezey (1942, 1942b, 1946), Tams (1935), Viette (1949, 1949d, 1950, 1950b, 1950c, 1950f, 1951, 1951c, 1954), Woodford (1885)

Hudson (1928) catalogued the Lepidoptera of New Zealand (which bear little relationship to those of Fiji): the peculiarities of the New Zealand biota have been reviewed by Gaskin (1970). A work on the Galapagos Lepidoptera is in preparation (Hayes, 197-). The Macrolepidoptera of Hawaii have been catalogued by Zimmernan (1958). The Macrolepidoptera of New Caledonia, Loyalty Is. and Norfolk I. are being studied by J.D. Holloway and his records have been included in the author's MS checklist of western and central Pacific Macrolepidoptera which also includes the author's records from the New Hebrides.

Almost all the Pacific material described in the papers above is in BM(NH) with the following exceptions:

Collenette (1934), Poulton and Riley (1934), Prout (1934b), Swezey (1942, 1942b, 1946) - BPBM.
Clarke (1971) - USNM/BM(NH)/MNHN.
Comstock (1966) - BM(NH)/BPBM (?- unstated)
Fukushima (1947) - Kyusyu University, Japan.
Given (1968) - ? private collection.
Smithers (1970, 1971) - AM
Viette (9 papers, above) - MNHN

Hawaiian material is mainly in BM(NH) and BPBM. New Zealand material is mainly in BM(NH) and New Zealand museums and private collections.

The author has examined all relevant Pacific material in BM(NH), KRS, SPSM and CAS. The BPBM collection contains some unsorted and uncatalogued Pacific material and it would have been useful but extremely time-consuming and expensive to have examined this. H.S. Robinson has examined some Fijian material in BPBM and reports it to be "poor and difficult to find". Apart from the Meyrick types in SAM and the unsorted general Pacific collections in BPBM the author is satisfied that this work takes into account all important known material and publications from Fiji and the central Pacific islands.

i. Geographical outline

The Fiji Islands (map 1) form a scattered archipelago extending from 15° to 20° S and straddling the 180° meridian from 5° to the west to 3° to the east. Within these boundaries of latitude and longitude lie nearly 250,000 square miles ($647,500 \text{ km}^2$) of water and 7,022 square miles ($18,187 \text{ km}^2$) of dry land. Derrick (1965) names 520 islands within the Fiji group : many more are unnamed. The 1946 census recorded 97 inhabited islands of which 62 had a population of less than 250.

Map 1 shows what is termed in this thesis "Fiji", encompassing the islands of the Fiji group or archipelago excluding Rotuma: attention is drawn to the following essential geographical features. The archipelago is dominated by two large islands, namely Viti Levu (map 2) of 4,010 square miles ($10,386 \text{ km}^2$) and Vanua Levu (map 4) of 2,137 square miles ($5,535 \text{ km}^2$) which constitute more than 86% of the total land area of the group. The remainder of the islands can be roughly classified into groups as follows:

- a) Yasawa Group (map 3) - running from off the W coast of Viti Levu in a roughly NE direction.
- b) Kandavu Group (map 5) - lying to the S of Viti Levu.
- c) Lau Group (maps 6 and 7) - lying E and SE of Vanua Levu.
- d) Lomaiviti Group (map 12) - in the centre of the Fiji group running S through the Koro Sea.
- e) Isolated or off-lying islands: Taveuni (map 4), Thikombia (map 5), Ovalau (map 2).

Some 375 miles (600 km) north of Viti Levu lies Rotuma (maps 1 and 11) with an area of 18 square miles (46 km^2): Rotuma is politically part of Fiji but it is as close to the southernmost of the Ellice Is. as it is to Fiji and occupies an anomalous geographical and geological position (see below).

The first European sighting of Fiji was by Abel Tasman who skirted the NE tip of the group, passing close to Thikombia. In 1774 James Cook passed through the southern Lau group and landed on Vatoa I.. In 1789 William Bligh passed through the centre of the group in an open boat after the "Bounty" mutiny : he meticulously logged Viti and Vanua Levu as he was chased out through Bligh Water by several war-canoes. In 1792 he returned in H.M.S. "Providence" and charted part of the Lomaiviti group. In 1797 Wilson in the "Duff" charted northern Lau and at the turn of the century the era of discovery ended and the years of detailed exploration and naval surveying began at the same time as did the notorious sandalwood trade. Dumont d'Urville (1827 and 1838) and the United States Exploring Expedition (1840) accurately charted most of archipelago and by 1860 Levuka (on Ovalau) was a prosperous port and there was extensive European settlement around the coast of Viti Levu. In 1874 Fiji was ceded to Great Britain and retained Colonial status until 1970 when it became an independent Dominion within the British Commonwealth.

The Fiji group has been inhabited by man for at least 2,500 years and marks the easternmost outpost of the Melanesian peoples. From early times there has been communication with the Polynesians and the seafaring Fijians of southern Lau exhibit not only some of the physical features but also a little of the culture of Polynesia. Frequent wars and a succession of decimating epidemics reduced the Fijian population to only 85,000 in 1921. Meanwhile, immigration from India raised the Indian population, most of whom were engaged in sugar cultivation, to a little over 60,000 in 1921 and by 1963 the Fijian population numbered 183,000, the Indian 220,000 and other races 38,000. Derrick (1965) discusses populations, distribution and trends in detail.*

The twentieth century has seen a flourishing of trade and agriculture in Fiji. Derrick (1965) summaries the economic history of the islands which has culminated in the establishment of major ports at Suva and Lautoka on Viti Levu, an international airport at Nandi (near Lautoka) and a relatively prosperous economy based on copra, sugar, gold, bananas and, of late, tourism.

The topography of Fiji is varied and a startling diversity of island types and land forms may be found within a small area. The reader is directed to Derrick (1965) for detailed descriptions of individual islands and geographical features. From the earliest times of European interest in the area the islands of the Pacific have been classified (perhaps misleadingly) as "low" or "high" islands. The Fiji archipelago consists of both. Viti and Vanua Levu, Taveuni, most of the Lomaiviti and Yasawa groups are "high" islands with hills of volcanic rock rising well above sea level. The "low" islands of the Pacific must once have resembled some of these but erosion has flattened them to sea level and coral growth on the rim of the central drainage-depression has produced the characteristic circular reef and sand and coral fragments have built up on this reef under the influence of wind and waves to form (the islands of) atolls. There are many circular reefs in Fiji but only two with islands which are thus true atolls - Wailangilala Atoll (N of Naitumba - map 6) and Nggelelevu (E of Vanua Levu). Several of the Lau islands are uplifted atolls; Fulanga (map 7) is obviously one such but Kambara and Ongea (map 7) are not so distinctively-shaped. Small islands of coral fragments and sand (sand-cays) build up on the fringing and barrier reefs of the large islands; examples are Nukulau and Makuluva on the reef off Suva and Leleuvia and Nasautambu on the reefs south of Ovalau. On Leleuvia (as on other large sand-cays) a percolating "lens" of fresh water in the centre of the island cements sand grains and coral fragments together forming a crumbly rock known as "beach-rock" and the island becomes more consolidated than, say, Nasautambu which is a loose pile of sand thirty or forty metres in diameter. Sand cays tend to be eroded by waves at one side while deposition of sand tends to occur at the opposite side so that the cay "creeps" along the reef. Nasautambu is thought to have moved about 100 metres in the last fifty years (R. Stone - pers. comm.). Uplift of complete reefs has occurred to form islands, in some cases very recently. On the S coast of Viwa (map 3, sites 18/19) giant clams still gaze at the sky through sparse grass which exists precariously in small pockets of soil. Older limestone islands such as Vatu Vara in northern Lau may have a thousand feet of compacted coral limestone uplifted above the sea. Sawa-i-Lau lying a few hundred yards off (volcanic) Yasawa I. (map 3 - site 15) is a 600' (180m) pinnacle of limestone honeycombed with caves, its peak a roost for hundreds of fruit-bats. In contrast to the limestone islands, not all of them "low", are the islands of volcanic origin. Viti Levu rises to

*See footnote to Section.

4,341' (1,323m.) at the summit of Mt Victoria and is a hilly island with very little flat land. Much of the interior is deeply dissected by tumbling streams which feed its five major river systems, the largest of which the Rewa R., drains almost half the island and reaches the sea via a large delta to the east of Suva. Vanua Levu rises to 3,386' (1,032m.) but, being a narrow island with a mountainous spine, its rivers are short and small. Taveuni (map 4) is a tall, extinct volcano rising to 4,072' (1,241m.) with a small lake (one of the few areas of standing water in Fiji) in the crater at 2,700' (823m.). The volcanic origins of many of these islands can be read from the stark pinnacles of basalt among the hills, remnants of volcanic plugs. Notable examples are "Joske's Thumb" overlooking Suva harbour and the "Devil's Thumb" on Ovalau. Other islands show at least some of the shape of their parental volcanoes: Taveuni's crater has already been mentioned and the fertile Lovoni valley was once Ovalau's crater; Totoya I., in the S of the Lomaiviti Group (map 12) is not a raised atoll but a partially submerged crater rim.

Rotuma (map 11) is better dealt with on its own. Its 18 square miles (46 km²) support a population of over 8,000 people who are a blend of hopelessly intermingled Melanesian, Polynesian and European with a dash of Indian in a few families. Their language is Tongan-derived with a 500-word vocabulary, each word having several meanings dependent on context. The low, rolling hills of Rotuma rise to 840' (256m.): the land is fertile and feeds its people but the declining copra industry and isolation of the island has brought problems to an expanding population and a tightening of belts. The Rotumans are not fishermen and have never exploited the rich shoal to the west of the island: the wild oranges that grow in profusion all over the island are allowed to fall and rot. Seen from the sea this flat land belies its volcanic origin but approaching the anchorage at Oinafa the bedded scoria and ash of Hauatiu I., off the NE coast and the volcanic plug that is Uea I. (860' -- 262m.) off the NW coast confirm that this is not a "low" island which has been uplifted. Only a few miles from Rotuma the sea is over 1,000 fathoms deep (1,830m.): Rotuma is a flat-topped basalt mountain rising almost sheer from the sea floor and its low hills have shallow, tell-tale craters at their crests.

Footnote: The latest available report of the Registrar-General gives the population of Fiji at 31st December, 1971, as :-

Fijians	-	231,042	
Indians	-	272,040	
Europeans	-	4,600	
Persons of mixed European & native descent	-	6,497	
Polynesians, Melanesians, Micronesians	-	6,679	
Rotumans	-	6,643	
Chinese	-	4,725	
Others	-	131	

Total Population - 535,357

ii. Geology

Great advances have been made in the last ten years in the earth sciences. Through a convergence of geophysics and geology the understanding of the history of the earth's crust since Mesozoic times has advanced enormously, earth processes now being explicable in global terms within the framework of what is now known as "plate tectonics". Readers of this thesis will be broadly aware of the emergent picture, namely that of the earth's crust consisting of a number of interlocking fragments of different sizes ('plates') that have moved, and continue to do so, relative to one another. We are able to differentiate between two crustal (and hence plate) types, thick continental crust which is relatively stable and thinner oceanic crust which is not so stable. The latter type is actively generated at mid-ocean ridges and consumed at subduction zones along oceanic trenches where the plate slides back into the mantle. Subduction involves seismic and volcanic activity and ocean trenches are usually associated with a volcanically-generated string of islands parallel to the trench, the "island arc" of which the New Hebrides and Tonga are good examples.

The geological history of the south-west Pacific is a complicated one: geologists are still disputing the nature and sequence of tectonic events in this area and much of the recent and present field-work, notably the deep-sea drilling programme (DSDP) carried out by the "Glomar Challenger", is providing data which clarify the situation and rationalise and thin out the many and often conflicting hypotheses of the evolution of the south-west Pacific. I attempt below, in the light of recent work, to summarise the geological history of Fiji within the framework of plate tectonics. Three major questions are outstanding:

- a) At what period did the more recent plate growths and movements relevant to our area occur ?
- b) How did new crust form ?
- c) What areas of land existed in the western Pacific in the past ?

The latter question is the most important from the point of view of the biogeographer.

At the beginning of the period in which we are interested, Antarctica, Australia and India formed a single intact piece of continental crust which has been named "Gondwanaland". The Gondwanaland plate fragmented: India separated first and collided with the Asian block and at this point the genesis of the south west Pacific (as we know it) began. In the Eocene Australia separated from Antarctica and moved northwards (Veevers et al., 1971; Kennett et al., 1972), the two plates moving apart as an active mid-ocean ridge generated oceanic crust between the fragments. The movement of Australia resulted in the further fragmentation of the eastern portion of Gondwanaland along what is now the eastern margin of the Australian plate and fragments of continental crust moved out into the Pacific. The eastern portion of Gondwanaland prior to fragmentation has been reconstructed by Griffiths (1971): continental crust fragments which broke off now form the southern half of New Guinea, part of the Solomon Is., New Caledonia, New Zealand and several of the submarine ridges and rises off the eastern coast of Australia and towards New Zealand. The movement of the Gondwanaland

fragments (see Griffiths & Varne, 1972) resulted in the Tasman Sea - Coral Sea region approaching its present form by the late Oligocene (Kennett et al., 1972) at which time tectonic events were still moulding the East Indies and New Guinea (Audley-Charles et al., 1972, give a detailed description of the formation of the latter area).

The movement of the Gondwanaland fragments out into the Pacific was accompanied by the production of oceanic crust between the fragments. The mode of formation of this crust is disputed and two hypotheses are current to explain it:

- a) Crust production from now-extinct mid-ocean ridges. Van der Linden (1969) proposed that the Dampier Ridge (in the Tasman Sea) is an extinct mid-ocean ridge and that several other ridges had a similar history. Oceanic crust production at these ridges forced continental crust fragments apart.
- b) Basalt extrusion at the edge of the moving Gondwanaland fragments which were propelled by mantle convection currents. Cullen (1970) disputed Van der Linden's hypothesis on the grounds that the Dampier Ridge is too thick ever to have been an active mid-ocean ridge: he proposed the above hypothesis as a more likely explanation.

In a recent and important paper, however, Hayes and Ringis (1973) produce considerable and apparently incontrovertible evidence for the creation of the Tasman Sea by seafloor spreading (oceanic crust production) from a now-extinct mid-ocean ridge (not the Dampier Ridge). They date cessation of activity of the ridge to the Eocene (60 m.y. BP).

The Fiji archipelago lies on a triangular piece of oceanic crust which is an outlier of the Gondwanaland fragments. This piece of crust is a perfectly good small plate and I hereafter refer to it as the "Fiji plate". It is bounded by three ocean trenches, to the north the Vityaz trench, to the south-east the Tonga trench and to the west the New Hebrides trench (map 15). The Tonga trench and the New Hebrides trench are active subduction zones but the Vityaz trench, not at all well-defined to the east, is doubtfully a subduction zone at the present time. It does, however, mark the boundary between the Pacific plate and the Fiji plate. It could represent an extinct subduction zone (see below) or a megashear zone where the two plates have slid relative to one another. The Pacific plate, the massive plate of oceanic crust which forms most of the floor of the Pacific Ocean, has been described and its morphology and movement summarised by Heirtzler et al. (1969) and the results of DSDP fieldwork and the inferred history of movement of the plate has been described by Heezen et al. (1973).

The spread of the fragments of Gondwanaland out into the south west Pacific, almost to the western margins of the Fiji plate, has resulted in a progressive easterly migration of the western margin of the Pacific plate which has been consumed by a moving subduction zone. The Fiji plate is an enigma: it has been formed behind the moving Pacific plate subduction zone but no author has offered a definitive account of its history.

Certain hypotheses, notably those of Raven and Axelrod (1972) and Derrick (1965) are clearly not tenable. Hayes and Ringis (1973) state in their conclusions:

"Because of their similarity in heat flow, crustal properties and a strong suggestion of lineated magnetic anomalies, it seems likely that some other marginal basins (such as the South Fiji Basin) evolved with histories parallel to that of the Central Tasman Sea."

This seems an admirable explanation for the formation of the Fiji plate but DSDP borehole 205 in the South Fiji Basin reached middle Oligocene sediments on the plate (Kennett et al., 1972) whereas borehole 203 south-east of the Lau group reached crust of Pliocene age (Kennett et al., 1972; Gill & McDougall, 1973). As the Fiji plate is not being consumed at a subduction zone it would, from these two boreholes, appear to be asymmetric and Hayes and Ringis are perhaps oversimplifying the explanation. The Fiji plate has not been proved to have been grown from a mid-ocean ridge and Cullen's hypothesis (b above), perhaps adapted to include the extrusion of basalt at the edge of a moving subduction zone, is as readily invoked as a hypothesis of at least two mid-ocean ridges. Clearly, the last word has not been said on this topic. My personal belief is that the western portion of the Fiji plate (up to and including the Lau ridge) is an oceanic crust fragment formed by the migration of the Pacific plate subduction zone contemporaneous with the final stages of spread of the Gondwanaland fragments. The sudden shift of the subduction zone and continental crust fragments might have been due to the formation of a novel mantle convection current pattern, west to east mantle flow accelerating the subduction rate of the Pacific plate beyond the rate of east to west plate movement. The formation of the north-eastern portion of the plate was, I believe, much more recent (see below).

The geological history of the Fiji archipelago subsequent to the formation of the Fiji plate can be inferred from the exposed rocks. The rocks of central southern Viti Levu are early Miocene and lower Oligocene plutonics with overlying Eocene to lower Miocene mixed volcanics. Early events producing the present Wainimala group of old volcanic rocks and Tholo group of plutonics are suggested by Houtz & Phillips (1963). These volcanic and plutonic events require crustal tension, possibly a result of compression of the Fiji plate (by its final movement outward from the "Gondwanaland fragments") against the western margin of the Pacific plate, possibly correlated with further change in the position of the subduction zone of the Pacific plate beneath the Fiji plate. Subsequent to the first Eocene pimpling of the sea floor to form part of what is now Viti Levu and uplift and further volcanism and plutonism in the Oligocene and early Miocene (forming more of Viti Levu and the Yasawas) Viti Levu was subject to yet more volcanism, erosion, submergence and sedimentation in the early to mid-Miocene to produce rocks known as the Singatoka series.

The end of the Miocene (5-6 m.y. BP) was marked by extensive and violent volcanism in Fiji correlated with another sudden shift of the Pacific plate subduction zone from the Lau-Colville ridge to its present position (Gill and McDougall, 1973). As stated above, DSDP borehole 203, south east of the Lau group shows the crust there

to be of Pliocene age. With recession of the subduction zone, the composition of magma extruded in Fiji changed from silica-rich andesite (5.7 m.y. BP) to olivine basalt (4 m.y. BP). The Lau islands, the island arc associated with the subduction zone in its proximal position, are of late Miocene volcanic rock capped, in most cases, with limestone. Crustal extension has occurred to the east of the Lau ridge: it has been recent and rapid: the means whereby it has occurred are not clear and whether we are to assume the activity of a mid-ocean ridge or "marginal extrusion" as in Cullen's hypothesis the geomorphological result must be the same. The hypothesis of marginal extrusion is an attractive one in this case.

Mio-Pliocene volcanism was responsible for the formation of the Fiji group as we know it. The rocks of Vanua Levu, the Lomaiviti and Lau groups are of late Miocene and Pliocene age: volcanism continued sporadically until recent times at least on Taveuni (Gill & McDougall, 1973). It has been suggested that isolated outcrops of rock, contemporaneous with the Wainimala series and Tholo plutonics, occur on Vanua Levu but Houtz and Phillips (1963) are understandably cautious in their appraisal of the geological history of Vanua Levu.

From the foregoing description of the geology of Fiji the following points emerge as biogeographically significant. Firstly, no rock reliably dated at more than 7 m.y. old exists from any island except Viti Levu or the Yasawas: I believe that we can assume that other land masses in the Fiji group arose de novo in the series of volcanic events at around the Mio-Pliocene boundary. Secondly, the area of the Fiji group prior to the Mio-Pliocene events was very small: There is no evidence to suggest that the old rocks of southern Viti Levu formed a continuous area of dry land before the late Miocene; indeed, the presence of late Miocene sedimentary rocks overlying these rocks suggests the opposite. Pliocene sediments, notably Vatukoro greywackes, extend to almost 4000' (1220 m.) in central Viti Levu: high altitude sediments are of late Miocene age on Vanua Levu. Thirdly, extensive and probably often explosive volcanism which continued up to 3.9 m.y. BP on Viti Levu (and until more recent times on Taveuni and probably on Vanua Levu) could hardly have offered a favourable habitat for colonisation of plants and animals and the development of forests on a large scale. I cannot visualise any more than a very small land area offering a "favourable" habitat in the Fiji area more than four million years ago.

The geological history of Rotuma is even more shrouded than that of Fiji but it is much more simple. Rotuma consists of a closely-packed group of extinct basaltic volcanoes of early Pliocene age: a rock date of 4.3 m.y. BP (S. Gill - pers. comm.) appears to be unpublished. Rotuma is one of a series of seamounts, guyots (submarine mountains, the tops of which have been levelled by erosion during periods of emergence) and shallow reefs which stretch along the northern margin of the Fiji plate parallel to the Vityaz trench (see map 15 for an illustration of those submarine features exposed by a fall in sea level in this area) and marks one of the few remaining parts of this extensive island arc. The presence of a well-defined but much eroded island arc in this position strongly suggests that the Vityaz trench was once an active subduction zone.

The area of land above water in the Fiji area since the cessation of large-scale volcanism has not been constant. If we accept the suggestion of Shephard (1961) and Quinn (1971) that the Pacific sea level was 395' (120 m.) lower than its present level during the last glaciation then the area of land surrounding Viti and Vanua Levu changes enormously. Viti Levu extends beyond the Yasawas and is separated from Vanua Levu by a channel only six miles wide in the north-west. Three large islands emerge to the east of Lakemba: Kandavu doubles its size and includes all its northern islands: several large islands emerge to the east of Vanua Levu. A reconstruction of the Fiji group during the last glaciation is shown in map 13. It must be emphasised that this map (made from Admiralty chart 2691) assumes no increase in the extent of coral reefs or depth of sediments since the last glaciation. The effect of a 120 m. fall in sea level was even more dramatic near Rotuma. Map 15 shows the present submarine features which would have been exposed by a fall in sea level: it will be seen that a relatively closely-spaced island arc extending from the Santa Cruz Is. north of the New Hebrides almost to Samoa via Rotuma is exposed. Other effects of this fall in sea level are the extension of the Tonga group, the joining of Santo and Malekula in the New Hebrides and the emergence of a large island of about 6,000 square miles mid-way between New Caledonia and the north-east coast of Australia.

The earliest known Lepidoptera are from the Baltic Amber (upper Eocene to middle Oligocene) and are apparently of extinct genera representing the more primitive families of Microlepidoptera but including representatives of all present-day suborders (Crowson et al., 1967; Laurentiaux, 1953). There are no Lepidoptera in Australian Triassic sediments (Rick, 1955). More advanced families (Geometridae, Lycaenidae, Pieridae, Hesperiidae, Papilionidae, Nymphalidae) are known from the upper Miocene and lower Oligocene but again, the genera involved are apparently extinct. The earliest fossil record of a living genus appears to be of a Vanessa species (Rhopalocera, Nymphalidae) from the upper Miocene of the U.S.S.R. (Nekrutenko, 1965). The absence of Macrolepidoptera from a long series of Baltic Amber fossils seems significant and the development of the Macrolepidoptera may perhaps be dated to the lower and middle Oligocene with many present-day genera establishing themselves by the lower Miocene. Thus when the Fiji group achieved geological stability some four million years ago the Lepidoptera were much as they are today: tectonic and volcanic activity in the south-west Pacific had all but ceased and the map would have been similar to its present form except for possibly less land in the present area of the New Hebrides and Tonga. The last glacial period would have exposed more of the Fiji group than is at present above sea level, thereby providing a larger area for plant and animal colonisation, and the other land areas mentioned above would have been exposed, offering habitats for colonisation and routes for dispersal.

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iii. Climate

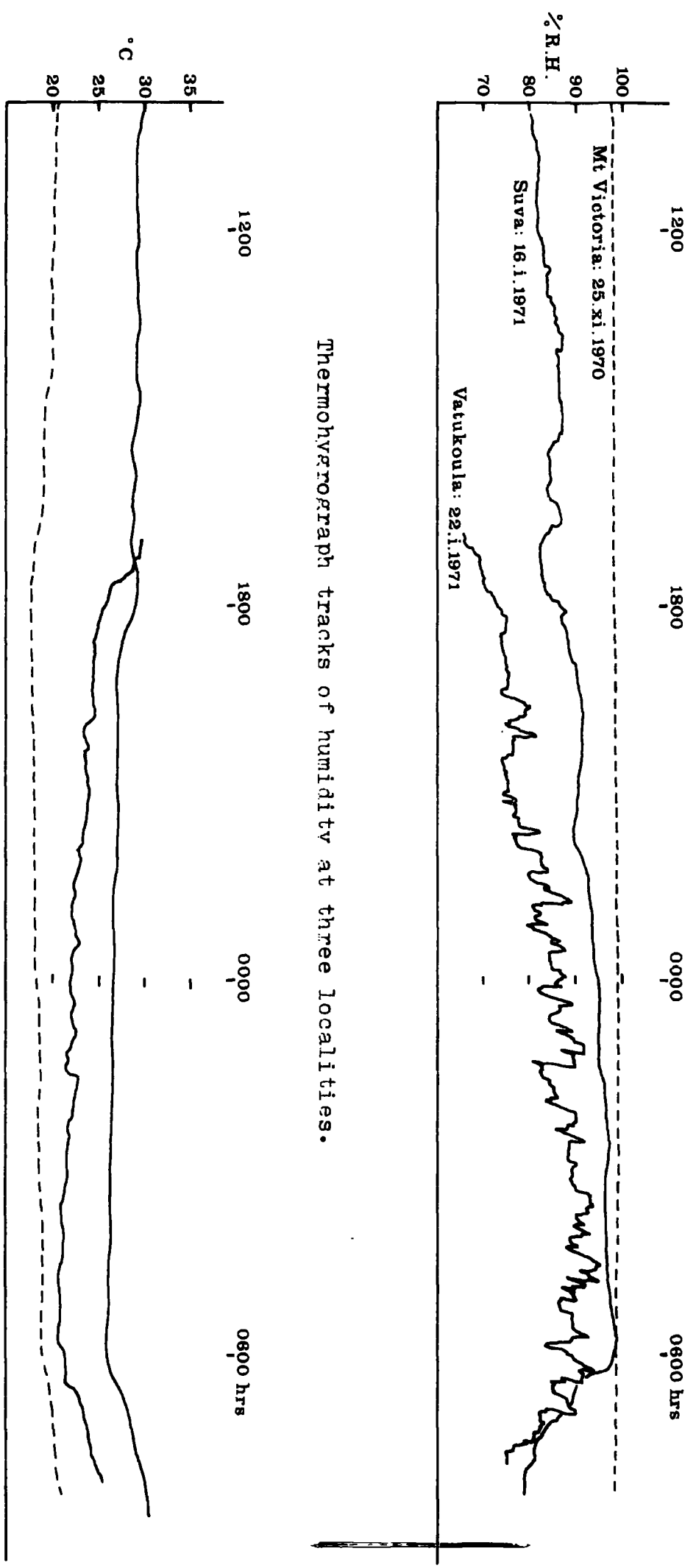
For most of the year Fiji lies in the path of the South East Trades and the climate is warm, wet, humid and tropical. On the largest islands the land area coupled with prevailing winds and high topography affect the climate, leading to much cloud formation and consequent orographic rain. Thus there is frequently a "rain-shadow effect" on the large, mountainous islands with cloud and heavy rain on the windward sides while the leeward sides of the islands have less rain and much more sunshine. In contrast to this, the small, low islands of the group experience a uniform climate. More detailed climatic description is given below.

Temperatures within the Fiji group vary little: at Suva (map 2, site 1), which may perhaps be regarded as typical, readings from 1886 to 1960 give mean monthly maxima of 79° to 86° F. (26° to 30° C.), the cooler half of the year being from May to October, and mean monthly minima from 69° to 75° F. (20.5° to 24° C.). Record maxima and minima are 98° and 55° F. (36.5° and 13° C.). On the smaller islands of the group temperatures are of a more limited range. In drier leeward areas of the larger islands clear skies favour hotter days and cooler nights.

Relative humidity is high throughout the group but is not uniform. At Suva the mean relative humidity at 8 a.m. is about 80% and 75% at 2 p.m.: the figures are about 10% less at Lautoka on the west coast of Viti Levu and mean relative humidity is 69% at 2 p.m. at Lambasa on the north coast of Vanua Levu (map 4, site 24). Humidity readings of below 60% are rare at Suva but at leeward stations and on the smaller islands may go down to 50% or even lower. At high altitudes in the cloud zone humidity is permanently high and may remain at 99% for long periods. Thermohygrograph records from the summit of Mt Victoria (4341', 1323m. - map 2, site 12) are shown below along with a typical record from Suva and a curious oscillating nocturnal humidity pattern from near Vatukoula (map 2, site 7) below the Nandarivatu escarpment nearly 100 km from Suva. The latter record is perhaps explained by turbulence patterns at the northern edge of the high ground of Viti Levu some four kilometres from the recording point.

The prevailing south-easterly trade-winds often cease during the wet season as the Intertropical Convergence Zone (the doldrums - the point at which the north-east winds of the northern Pacific and the south-east winds of the southern Pacific meet) swings south bringing periods of oppressive, humid calm and gusty, intermittent northerly winds. This period from mid-November to mid-April is known locally as the "hurricane season": although fully-fledged tropical cyclones are rare they are always expected! Spectacular and destructive hurricanes hit Fiji in 1910, 1941 and 1958 and at the end of October 1972 Hurricane Bebe swept through the Gilbert and Ellice Is., tore through the Yasawa group and across southern Viti Levu and rampaged on through the south of the Lau group to Tonga leaving a wake of destruction, defoliation, flooding, homelessness and death. Weather maps of Hurricane Bebe are shown below (map 14).

Rainfall is perhaps the most variable and important climatic factor in Fiji. Maps of rainfall distribution are given by Derrick (1965) and Parham (1965 and 1972): they are rather different in the two sources and are more speculative than factual. The windward sides and high central ranges of the larger islands experience the



Thermohygrograph tracks of humidity at three localities.

Thermohygrograph tracks of shade temperature at the same times and localities as above.

heaviest rainfall: Suva has an annual mean of 123in. (312cm) and Salialevu (Taveuni) has 214in. (544cm). Leeward localities have lower rainfall - 65 and 70in. (165 and 178cm) at Nandi and Lautoka on the west coast of Viti Levu and 83in. (211cm) at Lambasa on the north coast of Vanua Levu. Rainfall varies enormously from year to year: Suva's record extremes are 73 and 220in. (185 and 559cm). Torrential rain is frequent but rarely challenges the record 37in. (94cm) which fell during the night of 8th - 9th August 1906 in the Navai valley near Mt Victoria. Few rainfall figures are available for islands other than Viti and Vanua Levu but the 8-year average (1965-1972) for Lakemba I. (central Lau group) is 73in. (185cm). There is a well-defined wet season throughout Fiji from November to April. It is especially marked on the leeward sides of the large islands where the monthly mean is less than 7in. (17.8cm) from May to October. The wettest month in Suva is March with a mean of 15in. (38cm). Little information is available on rainfall in the interior of the large islands but a marked gradient occurs from Tavua (on the north coast of Viti Levu) southward through Nandarivatu (map 2, site 9) to Mt Victoria and the central Nandrau Plateau. At Nandarivatu the following figures are available: 1931 - 267in. (678cm), 1901 to 1907 - 130in. (330cm) mean (Gibbs, 1909) (the latter records were made by Adolf Joske - if reliable they include two incredibly dry years, 1903 with 66in. (168cm) and 1905 with 80in. (203cm)); 140in. (356cm) mean (Parham, 1972). At Koro-O, NW of Nandarivatu (map 2, site 11) the annual mean of six years' records is 133in. (338cm) but at Navai, at the foot of Mt Victoria on the Nandarivatu side, the annual mean is 187in. (475cm) (Parham, 1972). At Tavua, only 12 miles NNW of Nandarivatu the annual mean is about 80in. (203cm). Navai is only $3\frac{1}{2}$ miles on from Nandarivatu. At Nanggali (map 2, site 4) and Vunindawa (central eastern Viti Levu - see map 2) annual means are 155 and 142in. (394 and 361cm). Derrick suggests that the windward highlands of Viti Levu and Taveuni are subject to an annual rainfall of some 300 inches (760cm).

Since rainfall is the most variable climatic factor in Fiji and, as explained below, is responsible for much of the variation in vegetation it is also responsible for the distribution and size of Lepidoptera populations. To summarise, small islands and the leeward lowlands of large islands have a mean annual rainfall of 65-85in. (165-216cm): windward localities have upwards of 100in. (254cm) and the interior and highlands of the largest islands have recorded means of up to 187in. (475cm) and some localities are thought to have an annual rainfall in the region of 300in. (760cm).

Rotuma I., some 375 miles (600km) north of Viti Levu (map 1), has a more equatorial climate than the remainder of the Fiji group. The annual mean temperature is 3°F . (1.7°C .) higher than that of Suva and the annual variation in temperature is less. The mean annual rainfall is around 139in. (354cm).

iv. Vegetation

Variation in topography, rainfall and geological origins of the islands of the Fiji group has given rise to a differentiation of vegetational types. This differentiation has been subsequently modified by the activities of man.

The botany of Fiji has been well investigated. The first major work on the flowering plants was by Berthold Seemann who, with his assistant Jacob Storck, collected extensively in the Fiji group from 1860 to 1861. Seemann published "Flora Vitiensis" between 1865 and 1873 and it has remained the major diagnostic work on the Fijian flora. The twentieth century has seen the publication of outstanding contributions to the botany of Fiji by the Parham family. In 1942 B.E.V. Parham published "Fijian plant names": in 1943 Mrs H.B.R. Parham published "Fiji native plants with their medicinal and other uses": in 1959 J.W. Parham published "The weeds of Fiji" and in 1965 the definitive checklist of the flora, "Plants of the Fiji Islands" which contains a complete bibliography of Fijian botany. The latter work was extensively revised and republished in 1972: I follow Parham's nomenclature in the following account and omit authorities for scientific names - these are given by Parham. Comprehensive fieldwork carried out by A.C. Smith (now Torrey Professor of Botany at the University of Massachusetts) in Fiji in 1933, 1934, 1947, 1953, 1963, 1967 and 1969 has resulted in several major papers and will shortly come to fruition as a Flora of Fiji. There is a well-kept and comprehensive Herbarium in Suva, founded by J.W. Parham: the Ministry of Agriculture, Fisheries and Food actively encourages botanical research by its own botanists and by visiting research workers. All credit cannot, however, go to latter-day Europeans: the early Fijians had a quite astounding familiarity with their flora and certainly all common species of plants had a Fijian name. B.E.V. Parham lists 1320 Fijian names applied to 600 species of 320 genera and 140 families. The completeness of generic recognition by the Fijians may be judged from the number of phanerogam genera recorded from the Fiji group by Van Balgooy (1969) being 452. Parham (1972) records some 2000 species of flowering plant from Fiji and about 300 species of cryptogams.

The vegetation of the largest islands of Fiji may be broadly classified as follows :

A: Coastal vegetation

- i. Mangrove "swamp".
- ii. Beach forest or maritime vegetation.

B: Dry zone vegetation

- i. Talasinga (grassland)
- ii. Scrub and "dry forest".

C: Wet zone vegetation

- i. Lowland and alluvial secondary forest
- ii. Mountain rain forest
- iii. Mossy forest
- iv. Open secondary and cultivated areas and wet pasture.



Plate 1 : Dry pasture and talasinga near Tavua.

Plate 2 : Dry valley near Tavua with sugar cultivation.

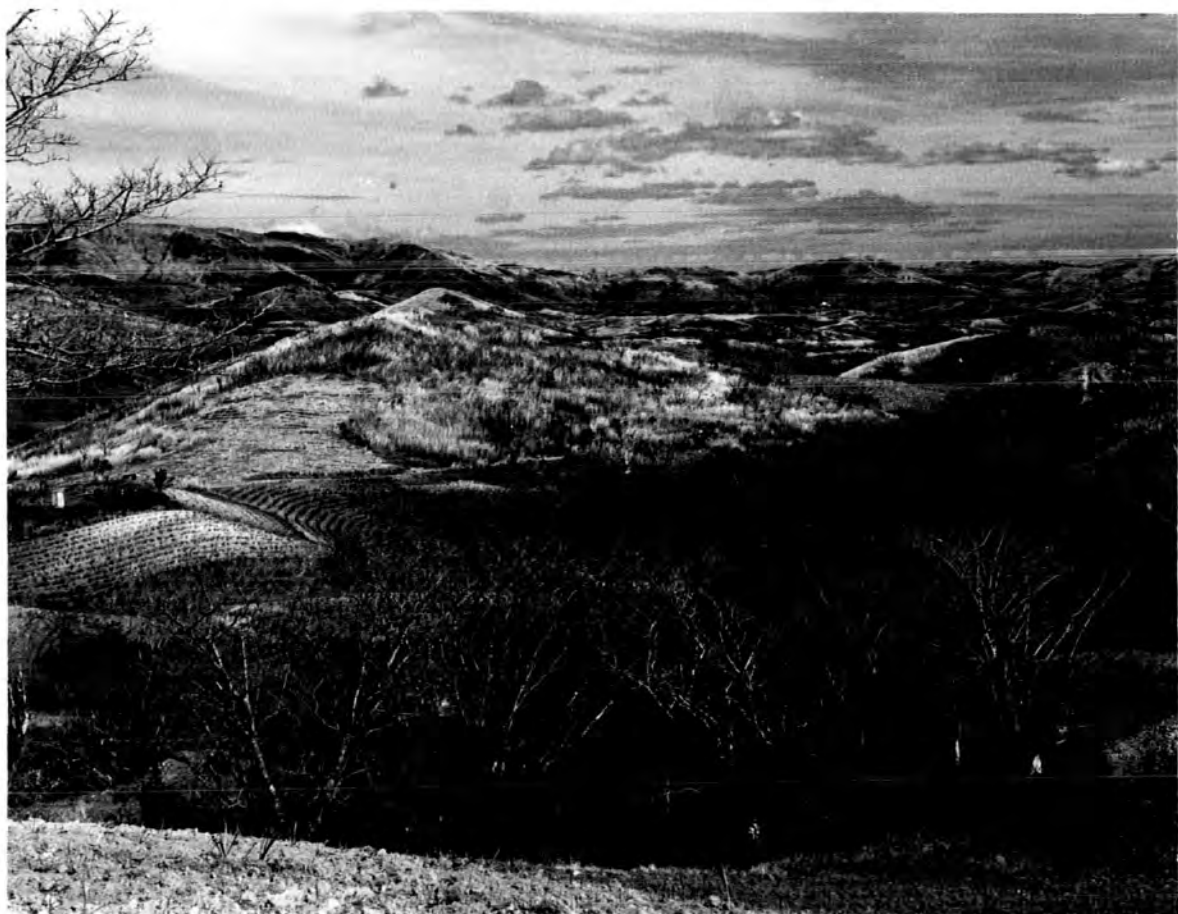




Plate 3 : Disturbed lowland rain forest near Vunindawa.

Plate 4 : Wainimbuka River valley with intermediate zone vegetation.

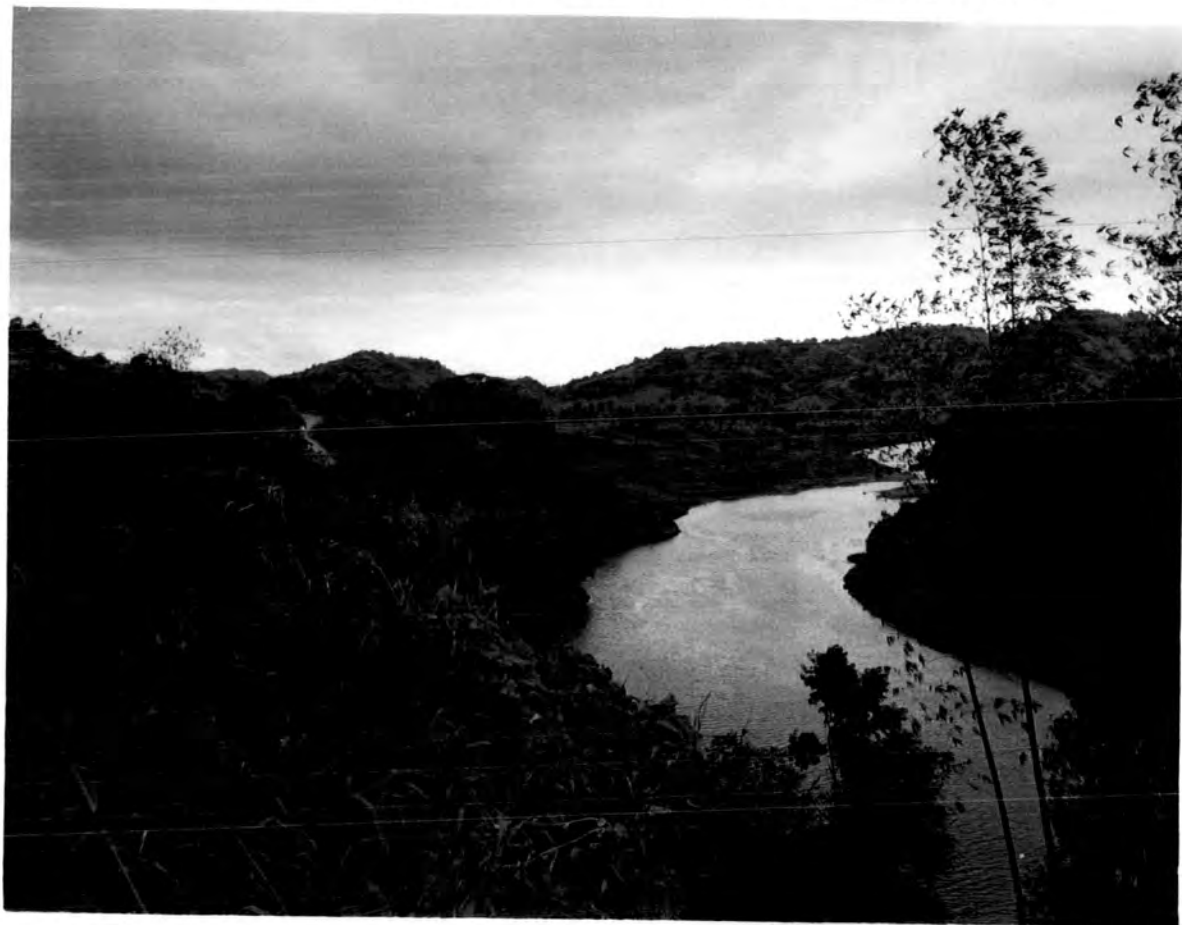




Plate 5 : Montane rain forest near Nandarivatu at about 900 metres.

Plate 6: Montane grassland on the Nandarivatu scarp at about 750 metres,
planted with Pinus caribaea.





Plate 7 : Montane rain forest near Navai about 750 metres, with Agathis, Elaeocarpus, Syzygium. This area was heavily logged about twenty years ago.

Plate 8 : Epimontane Myrtaceae forest with Cyathea, Mt Victoria, about 1,000 metres.





Plate 9 : Fringe of moss-forest on Mt Victoria, about 1,100 metres.

Plate 10 : Dense moss-forest near the summit of Mt Victoria,
about 1,300 metres



Table 1 shows the divisions recognised by other authors.

Approximate areas for gross divisions of vegetation in the Fiji group are as follows:

Cultivated land (and pasture)	: 650 sq. miles (1680 km ²)
Grassland	: 2500 sq. miles (6475 km ²)
Forest	: 3800 sq. miles (9840 km ²)
Mangrove	: 75 sq. miles (195 km ²)

(data from Sykes (1933) and Parham (1972)).

The division of vegetation into distinct types, especially in the case of forest, is not easy. Sykes (1933) said

"With the exception of littoral and alluvial formations, the forest types do not fall readily into broad zones which may be easily marked on a map. The quality factors of the locality often change with almost every yard traversed and type succeeds type with bewildering rapidity".

The vegetation of Fiji has been altered to a very great extent by the activities of man. Shifting cultivation, burning and logging has left very little of the "primary vegetation" of the islands. Gibbs (1909) states

"Seemann writes that there was no virgin forest to speak of in 1862 and certainly anyone who has travelled through Viti Levu will corroborate the justness of this observation(cultivated) patches may be seen on the highest ridges up to 3500 feet".

The author is in accordance with both Seemann's and Gibbs' views: perhaps only moss forest has been left untouched since man colonised Fiji. What man has not disturbed the flood, the hurricane or the landslide has flattened. The story is much the same in the New Hebrides where the botanists of the Royal Society Expedition found traces of old garden plots to 4500' (1370 m) on Santo and in areas of forest there appeared to be evidence of a 40-year cycle of hurricane damage. Thus the Fijian forests are a mosaic: the dissected nature of the larger islands, slope, drainage, natural catastrophe and the activities of man have conspired to vary the nature of the forest, as Sykes said, with every yard traversed.

On the leeward sides of the large islands the predominant vegetation type is talasinga. This grassland type is so called because in the dry season it takes on a distinct brownish hue: the Fijian name means "sun-burnt lands". Plate 1 shows a typical expanse of talasinga: the underlying soil is lateritic and poor. Sugarcane (plate 2) is grown successfully in talasinga areas. The plants of the talasinga on Viti Levu usually include the introduced grass Pennisetum polystachyon, the brackens Pteridium esculentum and Dicranopteris linearis and several shrubs. Small trees such as Morinda citrifolia, Alphitonia spp., Acacia richi, Sygyium richii and Casuarina equisetifolia occur sparsely and are only congregated in damp gullies. On Vanua Levu other grasses replace Pennisetum but the latter is spreading rapidly. The floral diversity of talasinga is poor: none of its plant species are endemic and it would seem that it is a plant association or formation of recent origin.

Further argument for this hypothesis is advanced later. Extensive burning of scrub and forest in historic times has perhaps increased erosion to a point where surface run-off and loss of humus occurs : baking of the soil has promoted laterite formation and forest cannot regenerate on the resultant poor, dry soil especially with repeated burning. Smith (1951), however, suggests a climatic origin for talasinga.

At the edge of the talasinga the forest intrudes into the grassland down the wetter gullies, the slopes of which may be thicketed with bamboo. The intermediate zone between talasinga and rain forest is usually a scrubby, dry forest type with obviously disturbed facies. There is no obvious dividing line between "scrub", "dry forest" and "rain forest" as Sykes (1933) suggests in his classification. The "intermediate zone" with bamboo, scrub and cultivation is shown in plate 4. "Dry forest" or "light forest" merges into rain forest toward the windward side of the larger islands. At high altitudes the merging of talasinga and rain forest may be very sudden, the grassland divided by a small grove of Metrosideros collina from a wet forest of Podocarpus spp. and Agathis vitiensis. In lowland areas all rain forest near talasinga has been much disturbed (see below). Plate 5 shows relatively undisturbed montane forest near Nandarivatu. The peak in the left-hand background is South Ridge; the mast of the radio transmitter can just be seen. Koro-O is about 2 km to the east. This is a mature, diverse forest with very little undergrowth. In parts it may consist of almost pure stands of the gymnosperms Agathis vitiensis (Kauri or ndakua) and Dacrydium nidulum (yaka). Both of these are valuable timber trees and richer areas (around Nandarivatu and Navai, Nausori Highlands) have been logged. Sykes (1933) described the results:

"Logged areas are immediately occupied by useless weeds and tree regeneration is negligible. The coniferous trees are very badly represented in intermediate stages of growth and exhaustion of the forest is inevitable if no steps are taken to replace the wood removed."

The richest stands from the forester's point of view contained up to 70% of coniferous elements in small areas : the process of felling therefore produced "holes" in the forest (plate 7). Regeneration is very slow but not non-existent as Sykes suggested. Replanting of felled areas with native hardwoods or softwoods is not practised: large areas of montane grassland have, however, been planted with Pinus caribaea (Caribbean pine) (plate 6) and 70,000 acres of forest have been line-planted with introduced mahogany. The latter has been completely ruined by Scolytid attack and has been written off. Experimental restocking with the native softwood Endospermum macrophyllum (Kauvula) has been more successful.

Apart from its coniferous element, the rain forest is so rich in Angiosperm trees as to defy brief description. Some of the commoner trees are listed by Parham (1972) and by Derrick (1965). Smith's eminently readable paper (1951) gives a good picture of forest diversity although he suggests that shifting cultivation has had little impression on the forest, a point of view with which I disagree.

Gibbs (1909) remarked that the flora was "markedly Indo-Malayan". In 1951, A.C. Smith recognised 529 adventive species and 1,266 indigenous species of which 69% were endemic. His tabulations of species and affinities are reproduced below in tables 2 - 5. The average number of species per genus is 2.85 for genera represented by indigenous species. In 1955 Smith examined the relationships of genera represented by indigenous species in Fiji, the distributions of which genera terminated in Fiji. Of the 445 indigenous genera, 101 had terminating ranges. 13 genera were endemic : of the remaining 88, 34 were widespread, 43 were Indo-Malaysian and 11 had a New Caledonian - Australian distribution. Smith summarised his findings as follows :

"It is seen, then, that nearly 23% of the phanerogam genera with indigenous species in Fiji extend no further eastward. Most of the genera terminating in Fiji are groups of forest plants, often with heavy seeds, and it may be suspected that land connections were needed to permit their forbears to reach this region. For the most part the Fijian species of these genera are endemic, indicating that the isolation of the archipelago from other remnants of the foundered Melanesian continent has been of considerable duration."

Among Smith's thirteen endemic plant genera, Vitiphoenix is now considered part of Veitchia. The remaining genera are :

Palmae

<u>Goniocladus</u>	tree	monotypic
<u>Goniosperma</u>	tree	2 species
<u>Neoveitchia</u>	tree	monotypic
<u>Taveunia</u>	tree	monotypic

Degeneriaceae

<u>Degeneria</u>	tree	monotypic, endemic monotypic family.

Simaroubaceae

<u>Amaroria</u>	tree	monotypic

Sterculiaceae

<u>Pimia</u>	?tree	monotypic - only Seemann's types known.

Rubiaceae

<u>Gillespiea</u>	tree	monotypic
<u>Hedstromia</u>	tree	monotypic
<u>Readea</u>	tree	monotypic
<u>Squamellaria</u>	epiphyte	3 species
<u>Sukunia</u>	tree	2 species

With increased altitude the character of the rain forest begins to change appreciably and at about 1000 metres a predominance of Myrtaceae, especially Metrosideros and Syzygium occurs and tree-ferns (Cyathea) become very common (plate 8). The forest undergrowth here is a mixture of ferns, Peperomia and Elatostema (plate 9). With further increase in altitude beyond the cloud-line the forest becomes more wind-blown and stunted and the undergrowth wetter and more dense. Epiphytes occur as festoons of moss, Peperomia, ferns and orchids (plate 10): this is moss-forest, a distinct forest type of very limited area restricted to the highest and wettest parts of Viti Levu and (unconfirmed) Taveuni.

In the windward lowlands of the larger islands where rainfall is high enough to permit forest regeneration the inland vegetational type is predominantly secondary forest, some types of which are the "alluvial forest" of Sykes (1933). Plate 3 shows an area of disturbed lowland rain forest where the undergrowth is characteristically impenetrable (less disturbed montane rain forest is relatively open and one can walk through it without too much difficulty). Lowland secondary forest may grade into "improved" wet pasture-land (pasture which has been seeded with high-protein introduced fodder grasses) and cultivated areas where Albizzia and Samanea are shade-trees and the rapid-growing Hibiscus tiliaceus may be seen along roadsides. Many wet pasture areas are being invaded by guava bushes which form a thick scrub if left unchecked. Towards the coast coconut plantations are encountered; these are especially extensive on Vanua Levu and Taveuni. Untended coconut plantations develop a weedy understory and gradually revert to secondary bush.

The maritime zone vegetation in Fiji is similar to that of most Pacific islands: the sand is covered by the creepers Canavalia maritima, Ipomoea brasiliensis and Vigna marina: shrubs include Messerschmidia argentea and Sophora tomentosa. Trees commonly encountered in the maritime zone are Barringtonia spp., Calophyllum inophyllum, Intsia bijuga, Terminalia spp. and Pandanus sp. Where there is mud and brackish water mangrove swamps develop, dominated by Bruguiera gymnorhiza and Rhizophora spp.. On the smallest islands and on sand cays the vegetation is predominantly maritime. The northern islands of the Yasawa group are almost all talasinga with a little cultivation while Viwa has well-developed Leucaena scrub. Some of the Lau islands are talasinga whilst others, notably the limestone islands, support a diverse, woody flora on the thin rendzina-clay soils. The tiny "mushroom-islets" of the lagoons of Fulanga and Ongea often support the palm Pritchardia thurstonii, endemic to the Lau group.

The affinities of the Fijian flora have been studied by several competent authorities, notably Gibbs (1909), Smith (1951 and 1955) and Van Balgooy (1960). Parham (1972) sums up:

"The flora of Fiji is generally considered to be an extension into the Pacific of the Malaysian province. A number of phanerogam genera originating in Malaysia appear to terminate in Fiji while many of the species thought to be endemic to Fiji have their affinities with the plants of Malaysia and of New Guinea in particular. A few are more closely related to groups which are typically New Caledonian or Australian and an even smaller number are considered to belong to strictly Pacific groups."

There is little or no radiation in the endemic plant genera. Squamellaria is notable in that its three species are "ant-house plants" : the base of the stem is tuberous and inhabited by ants. The endemic Degeneriaceae is allied to the Winteraceae and is one of the more primitive Angiosperm families.

It is upon the vegetation that Lepidoptera rely because of their foodplant specificity. Thus the distribution and quality of vegetation is of immediate effect upon the quantity and composition of a Lepidoptera fauna. This relationship in Fiji is further discussed below with the examination of Lepidoptera species distributions.

The flora of Rotuma is practically unknown. St John (1954) recorded 30 fern species from Rotuma of which 2 were endemic, 22 also found in Fiji and 6 found on Rotuma and elsewhere but absent from Fiji. The same author recorded new and endemic species of Peperomia, Dendrocide and Cyrtandra from Rotuma (1970, 1970b). Rotuman vegetation is very much disturbed : coastal areas have a typical Pacific maritime flora and inland, where not cultivated, there is young secondary bush. Rain forest is completely absent.

Coastal	-	Mangrove	Mangrove	Mangrove
	-	Beach forest	Beach vegetation	Beach vegetation
	-	Talasinga	Talasinga	Talasinga
Dry to Inter-mediate Zone	-	-	Scrub	Grasses/shrubs to
	-	-	Dry forest	light forest
	-	-	-	-
Wet Zone	Rain forest	Evergreen rain forest	-	Varieties of rain forest
	-	-	Alluvial forest	
	High forest	-	Mountain rain forest:	
			{ Valley forest	
			{ Intermediate forest	
Mossy forest	Mossy forest	Mossy forest	Ridge forest	
			-	

Table 1 : Recognition of Fijian vegetation types by different authors.

RELATIONSHIPS of the FIJIAN FLORA
(after A.C. Smith, 1951)

Table 2: Floral composition.

1 Adventive spp. (weeds, escapes, introductions)	529	(29.5%)
2 Indigenous spp.	1266	(70.5%)
a Nonendemic	392	(31%)
b Endemic	874	(69%)

Table 3: Relationships of indigenous nonendemic spp.

1 Widespread	193	(49.2%)
2 Also in Malaysia or Papuasia	69	(17.6%)
3 Fiji and New Hebrides only	14	(3.6%)
4 Also in New Caledonia and/or Australia	18	(4.6%)
5 Also in Samoa, Tonga and eastern Pacific	98	(25.0%)

Table 4: Relationships of endemic spp.

Closest relatives in...

1 Malaysia or Papuasia	799	(91.4%)
2 New Caledonia or Australia	46	(5.3%)
3 Samoa, Tonga, eastern Pacific or New Zealand	29	(3.3%)

Table 5: Relationships of genera represented by indigenous spp.

1 Both hemispheres	149	(33.5%)
2 Indo-Malayan centred	247	(55.5%)
3 Centred in New Caledonia, Australia or Africa	24	(5.5%)
4 Centred in Fiji, Polynesia or New Zealand	12	(2.7%)
5 Endemic	13	(2.8%)

v. Terrestrial and fresh-water fauna

The terrestrial and fresh-water fauna of Fiji, although only patchily known, is rich in certain groups and poor in others as is usual in oceanic island groups (Thorne in Gressitt, 1963; Zimmerman 1948). A systematic account of the known fauna will not be attempted here; only a brief outline of salient features will be given.

Microscopic animals and land and fresh-water molluscs are poorly known : oligochaete worms do not appear to have been examined. Leeches (Hirudinea) are evidently absent from the fauna. Crustacea, of which large edible prawns are the most commonly encountered, are present in lowland streams (see Derrick, 1965). King-crabs (Merostomata) are said to be present in Fiji but no specimens are available to confirm this. Arachnida are well represented by at least one species of small scorpion, numerous species of Opiliones and Acari and many spiders. Millipedes are common but represented by few species : this is also the case with centipedes.

Many groups of Fijian insects have not been studied at all and literature on other groups is scanty. The present work on the Macrolepidoptera is the only complete catalogue of a large group. In the following comments I have followed the classificatory system of "Insects of Australia" (C.S.I.R.O., 1970). Of the primitive orders allied to the Insecta only Collembola have been recorded from Fiji: Protura and Diplura are unknown. Of the Apterygota, Thysanura are known from Fiji but the Archaeognatha are unknown. The 19 orders of pterygote insects known to inhabit Fiji are listed below. Estimates of the number of species present in Fiji are based on observation and, in some cases, collection, published work and the material in the collection of the Fiji Dept of Agriculture.

1. Ephemeroptera. 2spp. collected by the author and J.A. McLean (to be described by McLean). One is probably a Pseudocloeon.
2. Odonata. 30-40spp. (Tillyard, 1923; Kimmins, 1943). Recent collections by the author and J.A. McLean are being studied in the U.S.A.
- 3-8. Orthopteroid orders (Blattodea, Isoptera, Mantodea, Dermaptera, Orthoptera, Phasmatodea) 60-100spp. of which at least a third are Orthoptera.
- 9-12. Hemipteroid orders (Psocoptera, Phthiraptera, Hemiptera, Thysanoptera) 350-400spp., probably over 300spp. of Hemiptera of which the Cicadellidae were recently revised by Linnavuori (1960): Thysanoptera were catalogued by Moulton (1944).
13. Neuroptera. 10+spp.
14. Coleoptera. ?1000spp. including 112 Cerambycidae (Dillon & Dillon, 1943); Tenebrionidae revised by Kaszab (1955), Chrysomelidae by Bryant & Gressitt (1957), Scolytidae by Schedl (1950).

15. Strepsiptera. 2spp. known (Hinckley, 1963).
16. Siphonaptera. 10+spp. As potential indigenous hosts have not been examined only 4spp. are known.
17. Diptera. 300+spp. Most groups unworked and grossly under-collected.
18. Trichoptera. 20-30spp. Collections made by J.A. McLean and the author are being studied by H.H. Ross and D. MacFarlane.
19. Lepidoptera. 1000+spp. 400spp. of Macrolepidoptera are catalogued in this work: there are probably at least 600spp. of Microlepidoptera, many listed by Phillips (1937). The only recent paper on the Microlepidoptera is by J.D. Bradley (1953). Collections of Microlepidoptera made by the author and H.S. Robinson between 1966 and 1972 and totalling about 2000 specimens are in the British Museum (Natural History).
20. Hymenoptera. 250+spp. Not well known: Turner (1918) lists only 53spp. but Hinckley (1963) lists 123spp. for which one or more insect host or prey species are known.

The total number of insect species inhabiting the Fiji group is here suggested to be in excess of 3500. This compares with over 5000 in Hawaii (Zimmerman, 1948) and nearly 54,000 in Australia (C.S.I.R.O., 1970).

Several species of freshwater fish are known from Fijian rivers and include a large perch.

The Amphibia comprise only 3spp., Bufo marinus, introduced from the U.S.A. in 1936 and abundant in lowland areas, particularly plantations and gardens, on Viti and Vanua Levu and two endemic frogs (Platymantis vitianus and Cornufer vitiensis) which are inhabitants of forest (Gorham 1965 and 1968) and mark the easternmost extension of the Amphibia across the Pacific.

Reptiles are represented in Fiji by perhaps 12 spp. of native geckos and skinks and a large green "tree-lizard" mentioned by Derrick (1965). The Banded Iguana, Brachylophus fasciata (Brongniart) is of exceptional interest, the genus Brachylophus containing only one other species, found in Tonga. In their study of this genus Avery and Tanner (1970) suggest that its ancestors rafted from South or Central America. In a conservationist article Bustard (1970), discusses the Banded Iguana, claiming it to be in imminent danger of extinction and quoting the entry in the I.U.C.N. Red Data Book which is, for the most part, arrant nonsense.

There are three Fijian terrestrial snakes, the Pacific Boa (Candoia bibroni australis (Montrouzier)) which feeds on insects, toads and rats and attains a length of 2m., the mbolo (Ogmodon vitianus Peters), an exceptionally rare Elapid (but known to Derrick, 1965) and a small, blind, burrowing Typhlops species.

The land-birds of Fiji are well-known. 53 spp. are catalogued by Mayr (1945) and the Fiji Museum has recently published a small guide-book to the birds by Robin Mercer. The birds exhibit a great deal of geographic differentiation within the Fiji group and distinct subspecies of several species are to be found on Kandavu, the Lau Islands, the Yasawas and in the Lomaiviti group. The endemic fly-catcher, Mayrornis versicolor, is of an endemic genus of uncertain placing, restricted to Ongea.

Only four mammals are indisputably native to Fiji. Three are flying foxes, Pteropus tonganus, P. nawaiensis and Notopterus macdonaldi, and the fourth is an insectivorous long-tailed bat, Emballonura semicaudata. Whether the small grey Polynesian rat, Rattus exulans, is native is debatable. Rattus rattus and R. norvegicus were unwittingly introduced with the first regular visits of European ships and Mus musculus became established this century. Dogs and pigs were introduced by man long before the advent of the European, and wild pig are a common menace. The European has brought cattle, horses, sheep, goats and cats to Fiji but the sheep have died out. The mongoose was introduced in the 1880's and has spread over most of Viti and Vanua Levu and plays havoc with chickens, reptiles and birds. It does not seem to colonise deeply forested areas and its staple diet appears to be large insects.

The introduction of animals by man into the Fiji archipelago has had an uncertain effect. The mongoose and three introduced bird species (Mynah, Hill Mynah, Red-Vented Bulbul) have a distinct effect on the distribution of native birds, having driven many species from lowland areas (where they were common in the nineteenth century) into upland forests. The giant toad has certainly affected insects in open areas. It is, however, difficult to gauge the long-term effects of these introductions and whether they have affected or will affect the Lepidopterous fauna to any appreciable extent.

The fauna of Rotuma is, to all intents and purposes, unknown. There is no running water on the island though shallow wells support at least two species of Odonata and a Dytiscid. Introduced cockroaches abound where copra is prepared as do Rattus exulans and R. norvegicus (R. rattus is absent). Mayr (1945) records eight species of land birds from Rotuma : noddies, boobies and frigate-birds breed on the off-lying islands. There is at least one species of skink and a large, dark, native gecko. I did not see bats or snakes on Rotuma. The insect fauna is unknown except for 68 spp. of Macrolepidoptera (see below) and about 15 spp. of Microlepidoptera.

As in the plants the fauna of Fiji is of western derivation with the notable exception of the iguana. The majority of zoogeographic affinities are to Melanesia and Papuasias with limited affinities to New Caledonia or Australia and a few species represent purely Pacific groups. Certain groups, notably vertebrates, aquatic and parasitic insects and insects of the orthopteroid orders are very poorly represented while strong-flying insects are well-represented as are small, light animals easily carried in air currents. The domination of the Coleoptera by the Cerambycidae may reflect a predisposition towards colonisation or rapid speciation in that group or it may only reflect a lack of collection and study of other families.

The Fijian fauna has all the hallmarks of an oceanic island fauna derived by chance dispersal across water barriers by flight or rafting : it offers little scope for theories of land-bridges and Melanesian continents.

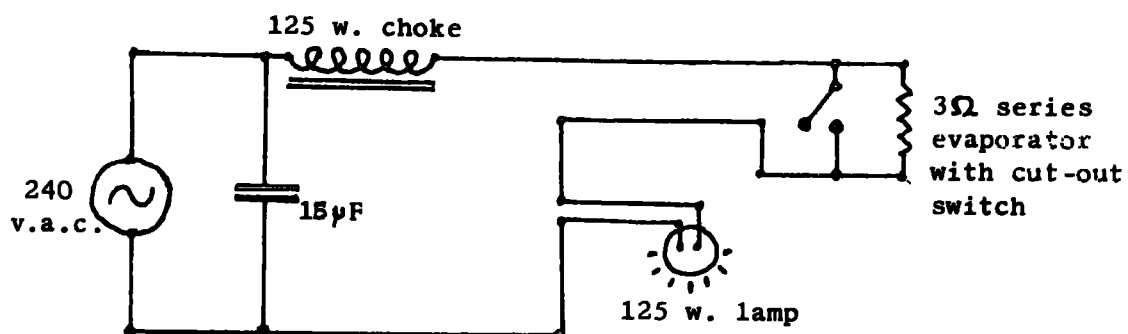
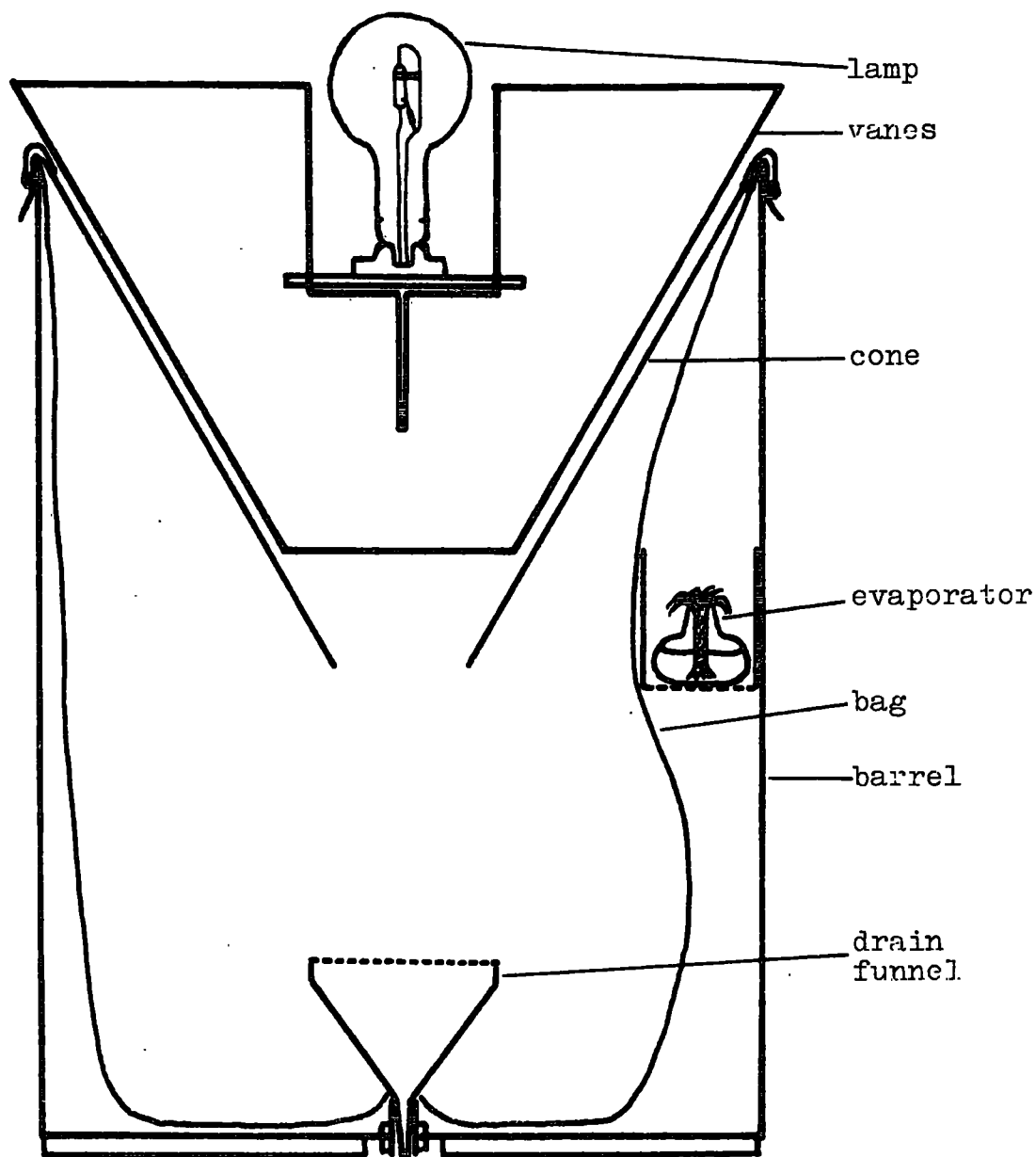
i. The light-trapping programme

Between 1966 and 1970 H.S. Robinson and I built up a collection of some 250 species of Fijian Lepidoptera collected almost exclusively using mercury-vapour light traps. Our collecting localities were restricted to Viti Levu (unless otherwise stated): a trap was operated in our garden in Suva, periodically at the water-pumping station at Savura Creek (1 km W of Tamavua, the NW suburb of Suva) on the fringe of lowland forest, and at J.W. Parham's house at Tholoisuva. We made many trips to Nandarivatu where we operated MV traps at the Forestry Dept resthouse and at the radio stations at South Ridge and Koro-O. We also collected briefly at Lautoka, Rakiraki, and Korolevu (and Namanggumanggua nearby), on Nananu-I-Ra I. and at Savusavu on Vanua Levu. In December 1969 the author trapped at four sites in the Nausori Highlands, east of Nandi (see map 2), in the Pacific Lumber Co.'s concession area. From our rough notes made during this period we estimate to have trapped, in about 200 nights, between 0.8 and 1 million Lepidoptera of which 50% were Macrolepidoptera: over half a million specimens were trapped in the Nandarivatu area.

From our limited fieldwork up to 1970 we decided that my 1970-1971 trapping programme should involve the use of Robinson pattern MV light traps of the standard type operated either from mains electricity or a portable generating set. The original design of the trap (Robinson, H.S. & Robinson, P.J.M., 1950) has been little modified since its inception. It relies on the "dazzle-and-spin" effect of a bright point source of light on night-flying insects (Robinson, H.S., 1951; 1952) and can be used in areas with a dense flying-insect population with a suitable anaesthetic (Robinson, H.S., 1952b). Providing larger catches of Lepidoptera than other designs of light trap (Williams, 1951; Williams et al., 1955), its probability of collecting rare species is higher (Robinson, H.S., 1952c). The trap collects only insects which fly of their own volition to within a short distance (about 20m.) of the trap (Robinson, P.J.M., 1960). The small commercially-produced Robinson trap (a modified design) was considered unsuitable for use in localities with a high-density flying moth population such as Nandarivatu where catches are often of the order of 40-50,000 insects per night.

We decided that my trapping programme should involve the use of two very similar types of Robinson MV trap, the two differing only in the construction of the "barrel" in which the cone/vane/light assembly is inserted. The "static trap" uses a modified 44-gallon oil drum as the barrel. The top of the drum is removed and a small hole punched in the bottom. For the barrel of the "light portable trap" we used a cardboard drum with a wooden lid and base (originally used for shipping sodium carbonate), modified in the same way as the oil drum, strengthened with three angle-brackets and varnished inside and out with polyurethane.

The usually cumbersome cone assembly was made of polythene edged with heavy cotton with an elastic rim which fitted over the edge of the barrel. The vanes were plywood and slotted together.



Above: Robinson MV moth trap.

Below: Circuit diagram (evaporator optional).

The barrel was lined with a cotton bag which could be removed with the catch. Between the bag and the barrel was the anaesthetic evaporator. Tetrachloroethane is the only suitable anaesthetic/killing agent for light traps and depending on the locality, I used either an evaporator with a long cotton wick or an electrically heated evaporator (Robinson, H.S., 1952b). The adapted design of Robinson trap is shown in the drawing below. It retains all the essential features of the original design but is lighter and more compact. During fieldwork the barrel was used as an all-purpose container. In areas where 240v. AC mains electricity was unavailable a Honda E300 portable generator was used to provide power. The light source was a 125w. MV lamp with frosted globe : the electrical circuit (see below) included a choke and $15\mu\text{F}$ capacitor for power-factor correction.

I arrived in Fiji at the beginning of November 1970 and began the trapping programme immediately. All sites sampled by light-trapping are shown on maps 1 - 7 and 11 : the notes on facing pages give dates and details of the locality : samples are listed in chapter 4. I collected in Fiji until June 1971 then joined the Royal Society and Percy Sladen New Hebrides Expedition and collected on six islands (see maps and sample list), returning to Fiji at the end of October 1971 and returning to Britain at the end of the year.

All sites sampled were accessible by vehicle or boat with the exception of Mt Victoria and a few others where portage was necessary.

At the end of 1972 I paid a brief return visit to Fiji and operated a light trap in Suva and at Robin Mercer's estate, Matanikavika, on the south coast of Vanua Levu. Matanikavika is 5km E of site 20 (Namale Estate): site characteristics are similar to those of site 20 but there is disturbed lowland forest immediately adjacent to the trap-site.

Trapping sites were located, as far as was possible, in a clearing or open space to prevent strong illumination of vegetation and buildings and thus deflection of incoming insects. Whenever possible the trap was run from sunset to sunrise although in one or two localities it was impossible to refuel the generator. Where refuelling could not be carried out the trap operated until the generator tank ran dry, usually at about 2 a.m.. By the early hours of the morning flight activity was usually very low.

ii. Treatment of material

Light traps were emptied as early in the morning as possible and normally the catch was deeply anaesthetised or dead at this stage. Where feasible, the catch was sorted immediately into separate species and the numbers of each species counted and recorded. With extremely large catches (e.g. at Ndelaikoro and Nandarivatu) a subsample was taken for sorting and counting. In some localities the catch was packed in layers of tissue paper and deep-frozen for sorting and counting later. Specimens of interest were retained from almost all the samples and I attempted to set these specimens immediately to avoid damage and colour changes. Where field-setting was impossible, specimens were packed in slightly damp tissue-paper with a few crystals of chlorocresol : in this way specimens would stay relaxed and in good condition for up to a week or could be deep-frozen and kept indefinitely.

Few difficulties were experienced with field identification in Fiji although I failed to separate Sasunaga oenistis and S. tomaniiviensis and Hypenagonia spp. Field determination of some Gymnoscelis spp. was extremely difficult and in some cases had to be corrected later. In the New Hebrides I had to rely on numbers and mnemonics for some field-recording. With hindsight, this system seems to have been entirely satisfactory.

In Fiji, the contents of setting-boards were dried in our constant-humidity room in Suva (R.H. 50%, 27°C) for about two weeks and then removed, labelled and placed in storeboxes which had been treated with a mixture of naphthalene, chlorocresol, camphor, creosote and dieldrin. Storeboxes were housed in the constant-humidity room. In the New Hebrides some difficulty was experienced at first with drying set specimens and eventually I put boxes of setting boards into a plant-drying cabinet for 24 hours. Storeboxes of set specimens were kept in an airconditioned herbarium room : this was not satisfactorily dry and slight "springing" occurred with some specimens.

The Fijian collection has now been thoroughly studied from a taxonomic point of view and the results are given later in this thesis. The collection has been donated to BM(NH) under accession number 1973-169. The New Hebrides collection has been sorted, catalogued and species identified as far as possible but many new species and at least one new genus are represented in the latter collection which awaits detailed taxonomic study.

iii. Recording and processing of light trap records

Numbers of specimens of each species from each sample were recorded in the first place in field notebooks and later tabled alphabetically in a ledger. It was intended to use these records for cluster analysis but tabulation from ledger records was found to be enormously time-consuming. Therefore the light-trapping records were put onto punch-cards and a pair of programmes written for NUMAC (the Northern Universities Multiple Access Computer) to tabulate the light-trap records. An individual punched-card record consists of three parts, an eight-letter identifier compounded of the first four letters of the generic name and the first four letters of the species name, a two-figure number indicating site or sample and the number of specimens caught. Thus "PLUSCHAL 12 247" is a record of 247 specimens of Plusia chalcites in sample number 12. These records were filed on magnetic disk: it was possible, using a file-editing programme, to alter identifications in the file and combine samples by altering sample numbers. The tabulation programmes deal with up to 24 samples: the first (BUGS1), is a filing programme. The record file is input having been sorted into alphabetical order and BUGS1 writes two files for temporary storage of the now partly tabulated group of records. The second programme, BUGS2, reads and processes the preliminary tabulation in the two files written by BUGS1. It outputs the number of different species in the samples under consideration then produces three tables. The first is a direct tabulation of number of individuals of each species in each sample, total number of individuals of each species in all samples and total number of individuals in each sample. The second table expresses the number of individuals of a species in a sample as a percentage of the total sample. The third table converts the list of percentage-of-sample figures for a species to a ratio, the elements of which total 1,000. For example, the entry in the second table for Plusia chalcites might be as follows:

PLUSCHAL 220 5/2/1/5 (18 more figures) 0/0/1457/119

The first number, 220, is an identifier (chalcites is the 220th species in the table): the following 24 numbers are % of chalcites in samples 1-24. The total number of chalcites in all samples is 1457. The total of the percentage figures is 119. In the third table this information appears as

PLUSCHAL 220 41/16/7/42 (18 more figures)...0/0/1457/119

The percentage figures have been multiplied by 1000/119 so that they total 1,000. The species identifier (220 in the above example) and the "normalised" numbers (totalling 1,000) are output on punched cards if the penultimate number (total of individuals of this species in all samples) is more than 10. This card deck generated by BUGS2 is used as input for the cluster analysis programme.

The choice of a method of cluster analysis which would group together species of similar distribution was a difficult one. Wishart's CLUSTAN package (available on NUMAC) proved difficult and slow to use. The methods available, when applied to light-trap records, seemed to produce over-discriminant clustering or chaining effects. The only previous application of cluster analysis to light trap records appears to be that by Holloway (1970b) although there is an immense literature on the use of clustering techniques in numerical taxonomy.

Holloway used single-link cluster analysis and obtained moderately good cluster separation. Single-link analysis applied to Fijian records gave excessive chaining and poor resolution. It was decided to start from scratch and write a programme for centroid cluster analysis in which the level of linkage of a species to a cluster or a cluster to a cluster depends on the average properties of all the components of that cluster. The resultant programme, BUGS3, is extremely fast and suitable for use in a time-sharing computer system with large available core storage. Input is the card deck generated by BUGS2 which consists, in effect, of the distribution of 1,000 individuals of a species among a given number of samples in the proportion revealed by trapping. BUGS3 computes a matrix of dissimilarity coefficients. The dissimilarity coefficient for the distribution of two species (say, A and B) is the sum of the differences between the pair of numbers for each species in each sample divided by 2,000. For only three samples the coefficient is computed as in the following example :

	Sample 1	Sample 2	Sample 3
SPECIES A	200	640	160
SPECIES B	120	500	380
Difference	80	140	220

Sum of differences = 440

Dissimilarity coefficient = $440/2000 = 0.22$

The coefficient matrix is set up and scanned for the lowest coefficient. The two species associated with the lowest coefficient are clustered and their average distribution calculated. The new line of "distribution values" for the cluster A(A + B) is written into the array of original records and entries for A and B deleted. Coefficients for A and B are deleted from the matrix, new coefficients for A(A + B) computed and written into the matrix and the matrix scanned again for the lowest coefficient and the cycle repeated. If A and B (above) had been clustered, 0.22 being the lowest coefficient in the matrix, then the new "distribution values" for A(A + B) would have been 160, 570, 270 derived as follows :

	Sample 1	Sample 2	Sample 3
SPECIES A	200	640	160
SPECIES B	120	500	380
sum	320	1140	540
cluster A(A + B)(sum/2)	160	570	270

but if A had been a cluster of three species already then the line would be 180, 605, 215, derived as follows :

	Sample 1	Sample 2	Sample 3
CLUSTER A(3spp.)	200(x 3)	640(x 3)	160(x 3)
SPECIES B	120	500	380
sum	720	2420	860
cluster A(A+B)(sum/4)	180	605	215

At the end of each clustering cycle the groups clustered, the level of linkage and the resultant new distribution values are printed out. Thus the distribution of the "average species" of any cluster can be read directly from the output. BUGS3 generates a card deck from which a dendrogram can be drawn on a graph plotter using Wishart's programme "PLINK" (part of the CLUSTAN package).

iv. Diversity measurement

I follow Lloyd and Ghelardi (1964) in recognising two quite distinct features in a species-abundance curve (the dominance-diversity curve of Whittaker, 1972). The first feature is diversity which I define here as the factor which, when increased, results in an increase in species number in a species-abundance curve without increase in the total of individuals. Shapes of species-abundance curves and their significance are discussed by Whittaker (1965). The use of diversity indices has been discussed by many authors, notably Whittaker (1972), Auclair and Goff (1971), Williams (1964) and Loya (1972). In the following work I have used three indices. The first Williams' alpha (Fisher et al., 1943; Williams, 1944, 1945, 1947, 1964), has frequently been applied to light trap data (e.g. Robinson, 1967) but light trap samples are not, in themselves, suitable for diversity analysis (Southwood, 1966; H.S. Robinson, 1967). The second index, the Shannon-Wiener (=Shannon-Weaver) function, $H(S)$, does not appear to have been used in light trap studies but is discussed by Southwood (1966), Loya (1972) and Whittaker (1972). $H(S)$ is the "information content" of a population or sample : its calculation is based on information theory (see Southwood, 1966) and is as follows:

$$H(S) = 3.32193 \left(\log N - \frac{1}{N} \sum_{r=1}^S n_r \log n_r \right)$$

(logs to base 10) where N is the number of individuals and S the number of species in the population or sample and n_r is the number found of the r th species. Williams' alpha is simply calculated from tables given by Williams (1947) or computed by iteration. The latter method is used in the fourth computer programme used in this work, BUGS4, which computes alpha, $H(S)$ and the third index (hereafter referred to as RS) which is the reciprocal of the slope of the species-abundance curve where x is rank and y is $\log_{10}$ number of individuals.

All indices of diversity are, to a greater or lesser extent, sample-size dependant when applied to samples from light traps. The size of a light-trap sample depends to a large extent upon the degree of flight activity of the insects it catches and upon the size of the potential flying population. The flight range of an insect increases with an increase in flight activity which is in turn governed by conditions of temperature, wind and (for nocturnal insects) moonlight (Robinson, H.S., 1952c). Thus, the greater the flight activity (at least, within certain limits), the greater the area of origin of the insects entering the trap and hence the greater the heterogeneity of the sampled habitat (Robinson, H.S., 1967). Examples of variation in diversity with increase in sample size are given in Chapter 4.

The second feature of the species-abundance curve is equitability. The term is an unfortunate one : it has been used by different authors to mean different things and is defined here as a measure of the approximation of the species-abundance curve to a MacArthur "broken-stick" distribution. The measure of equitability used here (computed by BUGS4) is that of Lloyd and Ghelardi (1964). The exemplar of population structure used for the computation of the Lloyd and Ghelardi index (hereafter referred to as "e") is the "broken-stick" model of MacArthur (1957).

In this model the abundance (n) of the r th rarest species is given by the formula

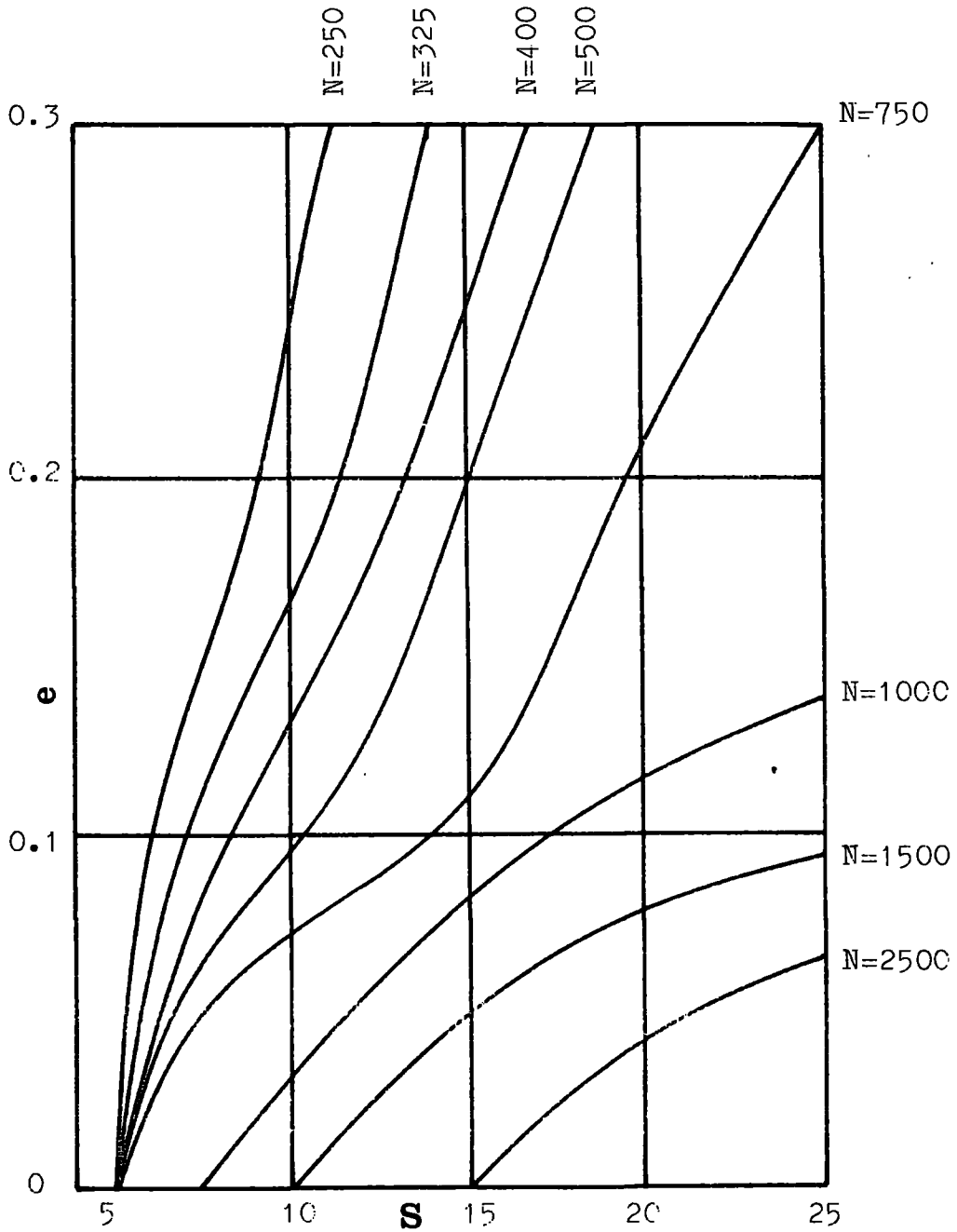
$$n = N/S \left(\sum_{i=1}^r (1/(S - i + 1)) \right).$$

where N is the number of individuals and S the number of species in the population. The construction of this model is based upon the assumption that the species in the described population occupy non-overlapping niches, in other words one species does not interfere in any way with another and interspecific competition is absent. The value of e is derived by dividing the number of species found in a MacArthur "broken-stick" population of identical $H(S)$ to that of the sample or population under consideration by the number of species actually present (Lloyd & Ghelardi, 1964; Southwood, 1966).

By definition, $e \approx 1.00$ when the sample or population under consideration conforms to the "broken-stick" model. A "broken-stick" population exhibits a species-abundance curve (when plotted with rank as x axis and $\log_{10}$ number of individuals as y axis) which is convex: curves from field data (e.g. light trap samples) are almost always concave and thus have an equitability of less than 1.00. The effect of increasing light trap sample size on equitability (e) is dramatic - the value of e falls linearly with geometric increase in sample size (see chapter 4) and species-abundance curves become more concave, deviating further from the "broken-stick" pattern. It would appear that increase in heterogeneity of the sampled habitat increases the concavity of the species-abundance curve, yielding lower values of e .

By definition, a "broken-stick" population ($e \approx 1.00$) contains species occupying separate, non-overlapping niches and equitability is maximal. The effect of niche overlap is reduction of e but in examination of samples the effect of habitat heterogeneity upon e would mask any inherent properties of e in the population under consideration.

The lability of diversity indices and e with varying sample size has prompted the separation of species by cluster analysis into "faunal elements" (Holloway, 1970b) and the application of measures of diversity and equitability to these elements using the total numbers caught of each species in an element to construct the species-abundance curves. Examination of the species-abundance curves of individual elements is a new approach, apparently first suggested by Holloway (1973). In this paper Holloway discusses richness and equitability and suggests increase in both with "ecological succession" until a point of "ecological maturity" is reached. It must be stressed here that our definitions of "equitability" are fundamentally different. I have processed Holloway's data from the 1973 paper (access to original figures is gratefully acknowledged) using BUGS4. In this paper, Holloway illustrates three species-abundance curves for Macrolepidoptera collected on Mt Kinabalu (Borneo): element separation of light-trap data was by single-link cluster analysis. The elements are "Radio Sabah element" (from the summit of the mountain), "upper montane" and "lower montane" elements: values of e are 0.85, 0.7 and 0.9 respectively. The insular nature of the montane region of Mt Kinabalu (Holloway, 1970b) is analogous to that of an oceanic island. The equitability and diversity properties of faunal elements in Fiji are discussed in chapter 4.



Graph 1: Excess value of e (over 1.00) for broken-stick populations of different values for N (number of individuals) and S (number of species) where the population has been truncated by removal of spp. represented by less than 10 individuals.

Clustering of species to form elements involves the inclusion of only species represented by more than 10 individuals among the samples used in the analysis. Thus any species-abundance curve formed from an element is truncated. A difficult problem is apparent here. If we are to equate "element" with "community" we must either assume that communities do not contain rare species or that there is a missing "tail" to our species-abundance curve. The missing "tail" makes very little difference to measurements of $H(S)$ or RS but affects α . The latter index is very sensitive to rare species and so has not been used in diversity measurements of elements. The equitability index, e , is also affected by truncation. I have plotted a graph (graph 1) showing the effect of truncation on the equitability of "broken-stick" populations of different sizes and diversities. The effect of truncation is to produce an inflated value of e (greater than 1.00): thus it is necessary to reduce the value of e obtained from BUGS4 for truncated curves. The relevant factor can be read from graph 1 for truncated samples of different numbers of individuals and species. This factor has been applied to all subsequent quotations of equitability for truncated elements.

Chapter 4:

Results

i. Light trap records : quantitative considerations.

From 1970 to 1972 a total of 36,183 Macrolepidoptera from 109 one-night MV trap samples were identified and counted. Subdivision of these totals is as follows :

Fiji (1970-1971)	:	26,274	specimens,	67	samples
New Hebrides (1971):		7,235	specimens,	33	samples
Fiji (1972)	:	2,674	specimens,	9	samples

The individual samples are listed in table 6 (below) with the date of collection (the date before midnight of the night of trap operation), N(the number of individuals) and S(the number of species) in the sample, α (the Williams index of diversity for the given values of N and S), the range of α within 95% confidence limits and e (the Lloyd-Ghelardi equitability index). In some cases the 95% confidence limits of α are too wide to permit computation. e has been calculated for Fijian samples collected up to the end of May 1971 only. Five samples from the New Hebrides and one from Fiji (Matanikavika Estate - 21-28.xii.1972) include material collected on more than one night. In these instances several small samples have been combined.

TABLE 6 : Light-trap samples 1970 - 1972. Macrolepidoptera

Site/sample	Date	N	S	α	95% confidence range of α	e
VITI LEVU, Muanikau (Suva)	5.xi.70	185	28	9.17	7.21/11.13	0.46
"	6.xi.70	231	25	7.12	5.57/ 8.67	0.31
"	7.xi.70	63	14	5.58	3.90/ 7.26	0.57
"	8.xi.70	82	14	4.85	3.37/ 6.33	0.51
"	9.xi.70	48	21	14.23	-	0.81
"	11.xi.70	65	21	10.76	8.76/12.75	0.62
"	12.xi.70	17	12	18.17	-	1.24
"	13.xi.70	26	11	7.19	-	1.10
VITI LEVU, Tholoisuva	14.xi.70	609	85	26.85	23.58/30.12	0.48
" , Muanikau	14.xi.70	93	27	12.77	10.33/15.21	0.78
" , Tholoisuva	15.xi.70	346	69	25.89	22.34/29.45	0.48
" , Muanikau	15.xi.70	77	18	7.39	5.45/ 9.33	0.85
" , "	16.xi.70	120	25	9.60	7.42/11.78	0.90
" , "	19.xi.70	66	19	8.93	6.88/10.98	0.73
" , Mt Victoria	24.xi.70	1167	59	13.11	11.47/14.75	0.16
" , "	25.xi.70	207	26	7.85	6.14/ 9.56	0.52
" , Nanggali	8.xii.70	955	93	25.47	22.65/28.30	0.36
" , Muanikau	11.xii.70	38	13	6.97	5.57/ 8.37	0.70
"	12.xii.70	28	9	4.59	3.28/ 5.90	0.93
"	16.xii.70	371	46	13.83	11.57/16.09	0.28
"	18.xii.70	45	18	11.12	-	0.75
"	20.xii.70	68	21	10.39	8.30/12.48	0.68
LELEUVIA I.	26.xii.70	113	19	6.53	4.82/ 8.24	0.24
"	27.xii.70	89	20	8.02	6.00/10.04	0.54
"	28.xii.70	79	10	3.03	1.97/ 4.09	0.31

Site/sample	Date	N	S	α	95% confidence range of α	e
VITI LEVU, Muanikau	27.xii.70	430	65	21.28	18.29/24.26	0.45
" , Korolevu	1. i.71	369	65	22.88	19.63/26.12	0.77
" , Muanikau	8. i.71	261	20	5.04	3.88/ 6.20	0.17
" , Lami (Suva)	9. i.71	137	52	30.55	30.03/31.07	0.95
" , "	10. i.71	158	51	26.10	22.99/29.22	0.86
" , Dombuilevu	20. i.71	533	55	15.39	13.15/17.63	0.58
" , Rakiraki	21. i.71	180	34	12.40	9.97/14.83	0.61
" , Vatukoula	22. i.71	790	45	10.34	8.83/11.85	0.36
" , Mba	23. i.71	2096	53	9.88	8.70/11.06	0.24
" , Muanikau	1. ii.71	260	28	7.96	6.33/ 9.59	0.34
" , "	3. ii.71	327	31	8.41	6.80/10.02	0.22
VANUA LEVU, Namale Est.	5. ii.71	247	46	16.65	13.84/19.45	0.58
" , "	6. ii.71	285	48	16.53	13.81/19.25	0.36
" , Governor's Pool	8. ii.71	611	80	24.59	21.53/27.66	0.52
" , 5km N of Savusavu	9. ii.71	193	60	29.84	26.33/33.35	1.05
" , Savundrondro Dam	10. ii.71	194	62	31.49	28.02/34.97	0.92
YASAWA I.	15. ii.71	209	48	19.50	16.35/22.65	0.86
NANUYA LAILAI I.	16. ii.71	107	31	14.64	12.02/17.25	0.91
NAUKATHUVU I.	17. ii.71	181	39	15.27	12.50/18.04	0.85
VANUA LEVU, Lambasa	23. ii.71	209	36	12.53	10.15/14.91	0.58
" , Ndelaikoro	24. ii.71	374	57	18.73	15.92/21.54	0.57
" , "	25. ii.71	2569	114	24.43	22.28/26.59	0.29
VITI LEVU, Muanikau	3.iii.71	887	54	12.66	10.95/14.37	0.09
VIWA I.	30.iii.71	3848	57	9.48	8.47/10.49	0.12
"	31.iii.71	934	31	6.16	5.16/ 7.16	0.20
ROTUMA I., Oinafa	17.iv. 71	37	13	7.13	5.86/ 8.40	1.03
" , "	18. iv.71	57	20	10.96	9.37/12.54	0.98
" , Losa Road	19. iv.71	197	31	10.33	8.22/12.44	0.76
" , Oinafa	20. iv.71	118	29	12.27	9.77/14.77	0.88
" , Fururoa	22. iv.71	147	26	9.17	7.12/11.22	0.69
" , 1km E of Solmafua	23. iv.71	83	17	6.47	4.68/ 8.26	0.76
" , Oinafa road	24. iv.71	209	33	11.02	8.84/13.20	0.54
" , "	25. iv.71	10	6	6.33	-	1.17
" , Noatau	26. iv.71	422	46	13.14	11.03/15.25	0.52
" , Oinafa	27. iv.71	26	14	12.36	-	1.17
VITI LEVU, Muanikau	19. v.71	440	49	14.11	11.91/16.31	0.15
ONGEA I.	8. vi.71	118	26	10.31	8.03/12.59	
EFATE, Vila	23. vi.71	164	30	10.76	8.51/13.00	
" , "	24. vi.71	175	32	11.47	9.15/13.79	
" , Narabut camp	1.vii.71	1172	77	18.48	16.36/20.59	
ANEITYUM, Agathis camp	19.vii.71	145	39	17.50	14.55/20.45	
" , "	20.vii.71	153	36	14.84	12.09/17.59	
" , "	21.vii.71	934	84	22.37	19.79/24.95	
TANNA, Isokoai	28.vii.71	94	35	20.21	19.00/21.42	
ERROMANGO, Nouankao R.	3.viii.71	724	60	15.53	13.44/17.62	
" , "	4-6.viii.71	384	59	19.46	16.59/22.33	
" , Ipota	10.viii.71	59	33	30.90	-	
SANTO, Camp 2	26.viii.71	375	67	23.74	20.43/27.06	
" , "	27.viii.71	224	47	18.13	15.13/21.13	
" , Nokowula	1. ix.71	240	68	31.61	27.72/35.50	
" , Tabwemasana	2. ix.71	68	32	23.58	-	
" , Nokowula creek	3-4.ix.71	207	70	37.20	33.85/40.55	
" , Camp 3	9. ix.71	538	82	26.94	23.57/30.31	
" , "	11. ix.71	268	45	15.47	12.84/18.10	
" , Malao	14-15.ix.71	477	61	18.57	15.92/21.21	
MALEKULA, Tisbel	29.ix.71	246	46	16.69	13.88/19.50	
" , Wintoua	8-11.x.71	489	75	24.71	21.48/27.95	
" , Lamdorr ridge	12. x.71	99	31	15.50	12.99/18.01	

Site/sample	Date	N	S	α	95% confidence range of α
VITI LEVU, Nandarivatu	21.xi .71	541	100	36.06	31.94/40.18
" , Korō-O	23.xi .71	536	84	27.95	24.49/31.42
" , Nandarivatu	24.xi .71	500	82	27.88	24.38/31.39
" , 2km S of Nandarivatu	27.xi .71	276	49	17.31	14.48/20.13
" , Muanikau	27.xi .71	980	99	27.48	24.51/30.45
" , "	11.xi .72	43	14	7.21	5.60/ 8.82
" , "	2.xii.72	405	41	11.39	9.47/13.30
" , "	3.xii.72	234	38	12.86	10.48/15.23
" , "	19.xii.72	22	11	8.75	-
VANUA LEVU, Matanikavika Estate	21-26.xii 1972	1970	130	31.25	28.49/34.01

Where a small and a large sample have been taken in the same locality the values of α and e are, in a number of cases, very different. Table 7 shows four examples.

TABLE 7 : Differences in α and e of pairs of samples of different sizes from the same locality.

Locality	N	α	e
Mt Victoria	1167	13.1	0.16
"	207	7.9	0.52
Ndelaikoro	2569	24.4	0.29
"	374	18.7	0.57
Viwa I.	3848	9.5	0.12
"	934	6.2	0.20
Nandarivatu	541	36.1	-
"	276	17.3	-

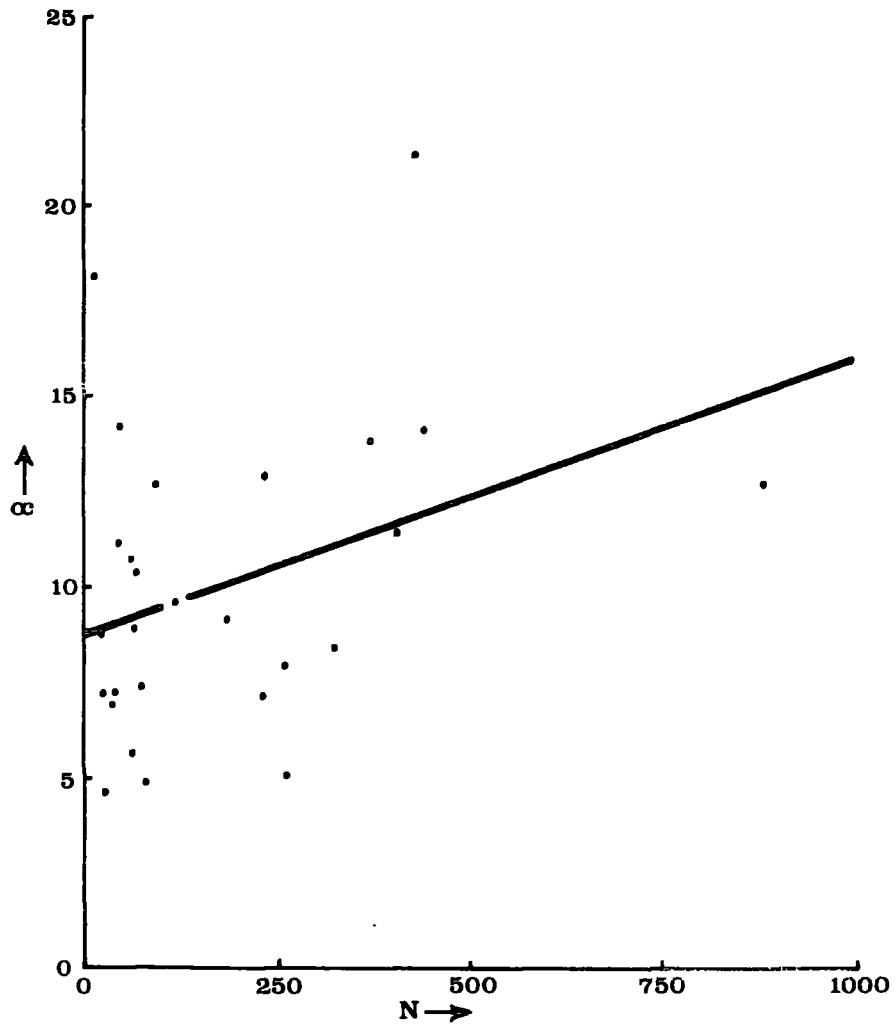
It would appear that in these samples α tends to increase with increasing sample size and that e tends to decrease. To test this observation further, graphs 2 and 3 were prepared using the series of samples taken at Suva (Muanikau). The effect of sample size on α is not well-defined. α appears to be exceptionally variable, especially in small samples, and correlation of the regression is on the margin of significance. The effect of increased sample size upon e is dramatic (graph 3) and regression correlation is highly significant.

I infer, from these observations, that use of α or e in the comparison of light trap samples within the context of this work should be treated with the utmost caution.

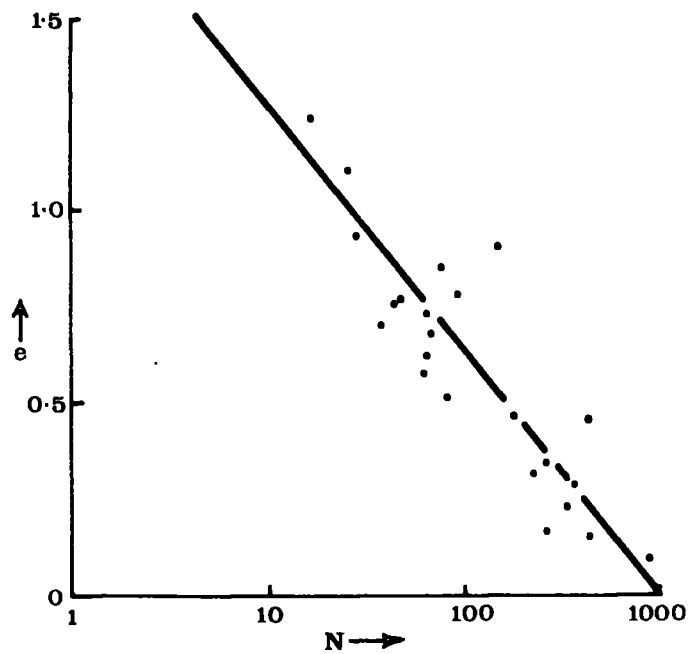
It seems, however, despite reservations as to the validity of α , that samples from forest areas tend to have a higher index of diversity than those from grassland, garden areas or small islands and that samples from the edge of forest areas (mixed vegetation) have a high index of diversity. Ranges of α in samples from these habitat types are as follows:

Small islands	: 3.0 - 19.5 (9 samples)
Dry zone grassland	: 9.9 - 12.5 (4 samples)
Forest	: 17.3 - 36.0 (14 samples)
Areas of mixed vegetation	: 16.5 - 31.3 (6 samples)

These figures are from Fijian samples, excluding Muanikau and Mt Victoria (moss-forest, α low).



Graph 2: Relationship between α and N (sample size) for 27 one-night Macrolepidoptera samples from Muanikau, 1970-1972. Regression significance: $p = 0.05$.



Graph 3: Relationship between e and N for 23 one-night Macrolepidoptera samples from Muanikau, 1970-1971. Regression significance: $p < 0.001$.

It would appear from these figures that, within the broad margin of error demonstrated, the diversity of samples of Macrolepidoptera from Fiji follows to some extent the diversity of vegetation in the area in which the sample was taken, the highest diversities being encountered in forest and on the fringes of forest and the lowest diversities being encountered in dry zone grassland (talasinga) and on small islands.

Variation in α seems to be due to a variety of causes, predominant among which are the effect of increasing the heterogeneity of the sampled habitat by increasing sample size (see chapter 3) and the effect of adverse weather conditions (rain and wind) on the smaller Lepidoptera whose flight is inhibited. The latter effect is exemplified by the sample from Nandarivatu taken on 27.xi.1971: steady wind and light rain persisted throughout most of the night. The resultant sample contained 12 Gnathothlibus erotus, 43 Leucocosmia nonagricola, 91 Hypocala australiae and 15 Plusia chalcites, these four species accounting for 58% of the total sample. In a sample taken six days earlier these four large species comprised only 12% of the total catch. In the sample taken in wind and rain the light-bodied species of the genera Nola, Chloroclystis, Cleora and Gymnoscelis comprised less than 4% of the total sample whereas in the sample taken in still, dry conditions they formed nearly 25% of the sample. The majority of Fijian Macrolepidoptera species are small and weak-flighted and wind and rain bring about a dramatic reduction in their representation in light trap samples which are, under these conditions, dominated by a few strong-flighted Noctuid and Sphingid species.

Variation in e appears to be almost entirely due to sample size : the explanation of this would seem to be that increasing sample size involves capture of more of the already abundant species and the capture of new rare species thereby increasing the concavity of the species-abundance curve. In some large samples e remains fairly high (e.g. Korolevu, 1.i.1971 : $N = 369$, $S = 65$, $\alpha = 22.9$, $e = 0.77$) and this appears to be due to the high diversity and lack of well-defined dominant species in the sample.

ii. Light trap records : qualitative considerations.

It is very difficult, examining the samples in Table 6, to pick out salient features of samples in relation to the locality of collection. The locality records of all known Fijian species of Macrolepidoptera are given in chapter 5 and this simple "presence or absence" information can be misleading. Detailed processing of light trap records is laborious - the records from Fiji cover 130 ledger pages - and this alone is reason enough to justify classification of commoner species into discrete groups with common distributional patterns using cluster analysis. It is these commoner species whose "presence or absence" information is misleading : rare species' records are more informative because they are select. Spodoptera mauritia has been collected from almost every Fijian locality examined : the distributional records of Lasioceros aroa vitiensis (see chapter 5) show it clearly to be a forest species. The loss of information in the last statement is enormous with regard to mauritita : although a widespread species, cluster analysis indicates its belonging to a group of species primarily associated with dry scrub and grassland (talasinga) localities. It is the dominant species of samples from Suva, comprising 56% of all samples from Muanikau : although present at Koro-O it accounts for less than 0.2% of all samples.

In many samples the dominant species and, in some cases, the subdominant species are particularly well-defined. The samples listed below contain markedly dominant species which comprise more than 10% more of the sample than the next most abundant species of the sample. The three most abundant species and their % contribution to the sample are given.

FIJI : VITI LEVU I.

Suva (Muanikau) - all samples			
Spodoptera mauritia	56%		
Spodoptera litura	5%		
Plusia chalcites	5%	N=4190	
Tholoisuva - all samples			
Nola fijiensis	27%		
Progonia micrastis	10%		
Hypenagonia spp.	5%	N= 955	
Mt Victoria - all samples			
Chloroclystis nina	49%		
Tiracola plagiata	17%		
Sasunaga spp.	9%	N=1374	
Koro-O - all samples		MF	
Plusia chalcites	25%		
Leucocosmia nonagrica	10%		
Hypocala australiae	8%	N=1036	
2km S of Nandarivatu		MF	
Hypocala australiae	35%		
Leucocosmia nonagrica	8%		
Tiracola plagiata	8%	N= 980	
Vatukoula		DZ	
Rhesala albizziae	37%		
Leucocosmia nonagrica	16%		
Gnathothlibus erotus (S)	9%	N= 790	

Mba	DZ		
Maliattha ritsemae		38%	
Rhesala albizziae		22%	
Plusia chalcites		10%	N=2096
FIJI: VANUA LEVU I.			
Governor's Pool			
Platysenta illecta		23%	
Spodoptera mauritia		9%	
Leucocosmia nonagricola		6%	N= 611
Savusavu (Namale)			
Rhesala albizziae		32%	
Spodoptera mauritia		15%	
Nola fijiensis		6%	N= 532
Lambasa	DZ		
Maliattha ritsemae		27%	
Gnathothlibus erotus (S)		17%	
Progonia micrastis		9%	N= 209
FIJI : LELEUVIA I. - all samples			
Nola fijiensis		69%	
Anisodes decolorata		4%	N= 281
FIJI : NANUYA LAILAI I.			
Eublemma rivula		21%	
Maliattha melanesiensis		10%	
Gathynia yasawa		7%	N= 107
FIJI : VIWA I.			
Hydrillodes surata		41%	
Nola fijiensis		40%	
Anomis flava		3%	N=3848
ROTUMA I. : (all samples)			
Nola samana		22%	
Rivula polynesiensis		9%	
Microthrips buxtoni		8%	N=1306
NEW HEBRIDES : EFATE I.			
Narabut camp			
Hydrillodes surata		55%	
Ericeia levuensis		7%	
Amyna punctum		6%	N=1172
NEW HEBRIDES : ANEITYUM I.			
Agathis camp			
Bulonga sp.		30%	
Oxymacaria sp.		19%	
Cleora psychastis		7%	N= 934
NEW HEBRIDES : ERROMANGO I.			
Nouankao R. camp			
Daphnis hypothous (S)		54%	
Stictoptera sp.		11%	
Nyctemera pellex		5%	N= 724
NEW HEBRIDES : SANTO I.			
Camp 3 - 950' station			
Tiracola plagiata		62%	
Ericeia levuensis		4%	
Theretra nessus (S)		4%	N= 268

NEW HEBRIDES : MALEKULA I.

Tisbel

<i>Euproctis dolichocera</i>	38%	
<i>Nola</i> sp.	5%	
<i>Nola tornotis</i>	5%	N= 246

Wintoua

<i>Tiracola plagiata</i>	21%	
<i>Theretra nessus</i> (S)	11%	
<i>Spodoptera mauritia</i>	10%	N= 489

Other samples exhibit less well-defined dominance: examples are given below.

FIJI : VITI LEVU I.

Nandarivatu - all samples MF

<i>Hypocala australiae</i>	12%	
<i>Leucocosmia nonagricola</i>	8%	
<i>Plusia chalcites</i>	5%	N= 817

Rakiraki DZ

<i>Gnathothlibus erotus</i> (S)	21%	
<i>Maliattha ritsemae</i>	17%	
<i>Plusia chalcites</i>	16%	N= 180

FIJI : VANUA LEVU I.

Ndelaikoro MF

<i>Tiracola plagiata</i>	19%	
<i>Plusia chalcites</i>	14%	
<i>Leucocosmia nonagricola</i>	12%	N=2569

FIJI : NAUKATHUVU I.

<i>Eublemma rivula</i>	18%	
<i>Maliattha ritsemae</i>	9%	
<i>Maliattha melanesiensis</i>	9%	N = 181

FIJI : ONGEA I.

<i>Nola fijiensis</i>	14%	
<i>Hypocala australiae</i>	14%	
<i>Hippotion velox</i> (S)	9%	N= 118

NEW HEBRIDES : SANTO I.

Camp 2 - sample from forest

<i>Plusia illuminata</i>	10%	
<i>Tiracola plagiata</i>	8%	
<i>Theretra nessus</i> (S)	7%	N= 375

Camp 2 - sample from river-bed (200m. from above sample)

<i>Theretra nessus</i> (S)	20%	
<i>Tiracola plagiata</i>	16%	
<i>Plusia illuminata</i>	10%	N= 224

Malao

<i>Theretra nessus</i> (S)	17%	
<i>Daphnis hypothous</i> (S)	11%	
<i>Gnathothlibus erotus</i> (S)	10%	N= 477

All localities for which samples with N > 100 are available are included in the list above with the following exceptions: Lami, Nanggali, Korolevu, Dombuilevu, Matanikavika, 5km. N of Savusavu, Savundrondro Dam, Yasawa I., Vila, Nokowula and Nokowula Creek.

Certain trends may be picked out from these figures:

- a) Predominance of Tiracola plagiata, Leucocosmia nonagrica, Hypocala australiae and Plusia chalcites in samples from montane forest in Fiji (marked 'MF' in the list above).
- b) Nola fijiensis in Fiji in lowland disturbed forest (Tholoisuva, Savusavu) and on limestone islands (Leleuvia, Viwa, Ongea).
- c) Maliattha spp. and Rhesala albizziae in dry zone areas (marked 'DZ' in list above) are often dominant or subdominant.
- d) Spodoptera mauritia occurs where there is wet zone grassland or pasture.
- e) Hydrillodes surata in raised-reef limestone areas (Viwa and Narabut) but not on Ongea or Leleuvia in large numbers.
- f) Commonness of Sphingidae in New Hebrides localities with disturbed vegetation (Sphingidae marked 'S' in list above).
- g) Effect of moving light-trap a short distance is to alter dominance pattern (compare Santo camp 2 samples).

Very high levels of dominance as observed at Suva, Mt Victoria, Viwa, Nouankao R., Santo camp 3, Tisbel and Narabut are, in some cases, easily explained. In Suva, the predominant vegetation is grass and the dominant species feeds on grass in wet zone localities. On Mt Victoria a similar "monoculture" condition pertains: a blanket of moss covers almost all the vegetation but the biology of Chloroclystis nina is unknown. On Viwa and at Tisbel the raised-reef limestone is vegetated with thickets of Leucaena: at the Nouankao River recently logged areas are blanketed with Merremia peltata, almost certainly the foodplant of Daphnis hypothous. High levels of dominance at Santo camp 3 and Narabut are not so easily explained: these localities have no particularly dominant plant species.

Low levels of dominance seem to occur in localities where vegetation is diverse and there is no obviously dominant plant species.

In the New Hebrides the dominance of large, strong-flying species is apparent in almost all localities except where the trap was "buried" in forest (Tisbel, Agathis camp). In almost all samples Sphingidae and large Noctuids such as Tiracola plagiata are very common. This feature is also observed, but to a lesser extent, in many of the Fijian samples. Conditions of temperature wind and moonlight were generally poor in the New Hebrides (with the exception of the periods spent at Narabut and Agathis camps) and low temperatures wind and moonlight inhibit flight and/or capture of small, slow-flying species. As observed in the two samples from Santo camp 2, moving the trap from forest on river alluvium to the rocky bed of the stream affects the composition of the sample. The open river bed offers a clear flight-path for large fast-flying species such as Theretra nessus. Fully to substantiate even these simple

observations much larger samples, spread over a longer period of time, need to be taken in localities with different plant associations.

One is forced to the conclusion that the use of light trap samples of this type to provide a basis for inference of comparative diversity, distribution and dominance of Lepidoptera species is fraught with difficulties. Section iii of this chapter offers a different and, apparently, more informative approach.

iii. Cluster analysis results

a) Fiji : Viti and Vanua Levu.

For this analysis samples from the same locality were pooled to yield large samples for each of 20 sites. These were as follows:

1. Suva (Muanikau)
2. Tholoisuva
3. Mt Victoria
4. Nandarivatu
5. Koro-O
6. Nanggali
7. Korolevu
8. Dombuilevu
9. Rakiraki
10. Vatukoula
11. Mba
12. Lami
13. 2km S of Nandarivatu
14. Governor's Pool
15. Ndelaikoro
16. Savusavu (Namale Estate)
17. Matanikavika Estate
18. 5km N of Savusavu
19. Savundrondro Dam
20. Lambasa

Pooling and tabulation was done by BUGS1 and BUGS2 (see chapter 3): the twenty samples contained 21,206 individuals representing 273 species.

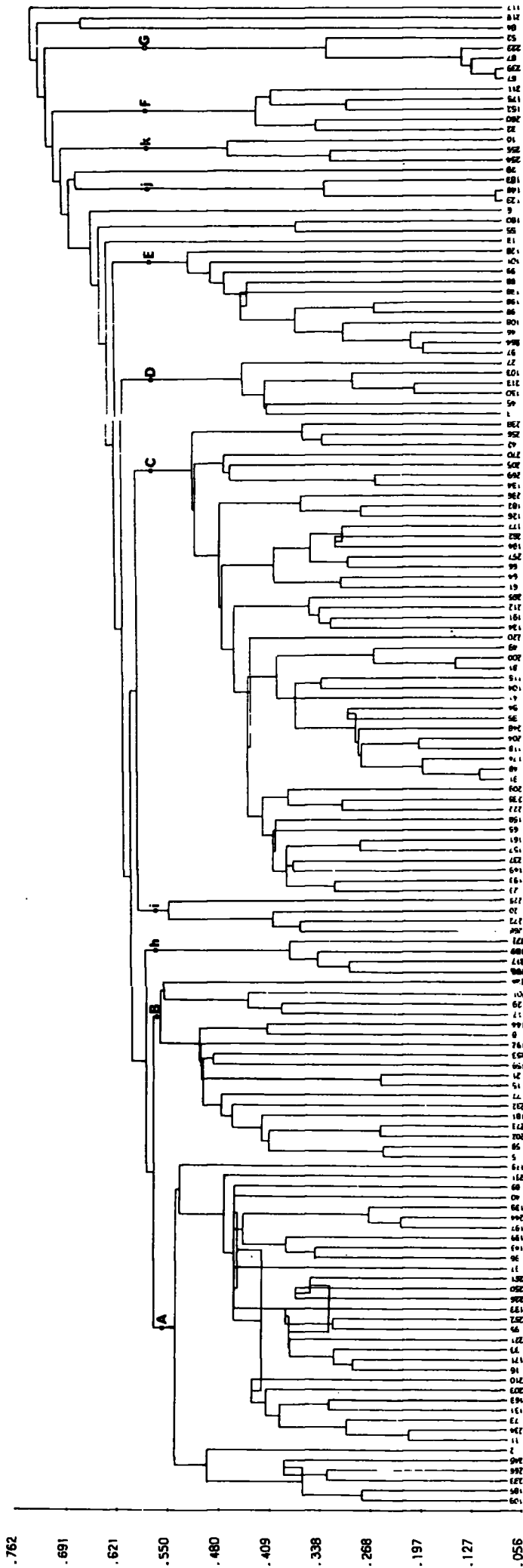
Species represented by 10 or more individuals totalled 148 : these were subjected to cluster analysis by the programme BUGS3 to yield a dendrogram (dendrogram 1). The identities of the dendrogram stalks are given in table 8.

In dendrogram 1 seven major clusters of five or more species can be recognised (clusters A - G): there are four clusters of three or four species (h - k) and eight species come into the complete cluster at very high levels of dissimilarity (two of these, 14 and 213, cluster together at a low level). The arbitrary line of division of cluster is taken at a level of dissimilarity of 0.555.

The distribution of 1000 specimens of the "average species" of each cluster (from BUGS3 - see chapter 3) is given in table 9.

Cluster characteristics and arbitrary names given to clusters are as follows:

- A: (34 spp) Widespread but rare in talasinga localities and in montane and moss forest : peak occurrence is in localities with secondary bush. SECONDARY BUSH element.
- B: (18 spp.) Widespread but commonest in open grassland areas, especially in the dry zone. TALASINGA element.



Dendrogram 1:- 148 spp. from 20 samples on Viti and Vanua
Levu clustered by BUGS3. Identities of stalks are
given in table 8.

TABLE 8: STALK IDENTITIES OF DENDOGRAMS 1 & 2

STALK	SPECIES	N	CLUSTER	
			1	2
0 = OUTLIER				
2	ACHAEA SERVA	11	A	A
3	ACRITOCERA NEGLIGENS	83	D	B
5	AGRIUS CONVULVULI	139	B	B
6	AGROTIS IPSILON	60	D	D
8	AMYNA OCTO	68	B	B
10	ANIGRAEA PECTINATA	10	K	A
11	ANISODES COMPACTA	16	A	C
13	ANISODES SAMOANA	18	O	H
15	ANOMIS FLAVA	55	B	B
16	ANOMIS NIGRITARSIS	10	I	G
17	ANOMIS REVOCANS	24	B	B
20	ANOMIS VULPINA	10	I	G
21	ANTICARSIA IRRORATA	24	B	B
23	ANUA TONGAENSIS	19	C	B
27	ASOTA WOODFORDI	17	D	E
28	ATHETIS STRIOLATA	21	O	O
31	BLENINA VATU	17	C	F
32	BOCANA MANIFESTALIS	12	F	H
33	PALAEOCOLEUS SYPNOIDES	111	A	C
35	BULONGA PHILLIPSI	43	C	F
37	CALLOPISTRIA MERIDIONALIS	128	A	B
40	CAREA ALBIPICTA	16	A	F
41	CASBIA ALPHITONIAE + AEDOEAE	40	C	F
42	CATEPHIA SERICEA	32	C	E
45	CHASMINA CANDIDA	11	D	E
46	CHASMINA TIBIALIS	16	E	D
48	CHLOROCLYSTIS ENCTETA	15	C	F
49	CHLOROCLYSTIS LEPTA	28	C	F
52	CHLOROCLYSTIS NINA	676	G	F
53	CHLOROCLYSTIS LINDA	14	O	A
59	GNATHOTHLIBUS EROTUS	559	B	B
61	CLEORA DIVERSA	92	C	F
64	CLEORA LANARIS	17	C	A
65	CLEORA MUNDITIBIA	222	C	B
66	CLEORA NAUSORI	283	C	B
67	CLEORA OCHRICOLLIS	30	G	F
68	CLEORA SAMOANA	11	E	D
73	DASYCHIRA FIDJIENSIS	27	A	C
77	DAPHNIS PLACIDA	110	B	B
81	EARIAS FLAVIDA	17	C	F
84	EARIAS VITELLA	18	O	B
87	EOASTHENA QUILLA	14	G	F
89	EPIPLEMA CRETOSA	13	A	B
94	ERICEIA LEICHARDTII	33	C	F
95	ERICEIA LEVUENSIS	312	A	B
96	EUBLEMMA BACCALIX	12	A	G
97	EUBLEMMA COCHYLOIDES	19	E	D
98	EUBLEMMA CRASSIUSCULA	110	E	D
99	EUBLEMMA PUDICA	27	E	C
101	EUBLEMMA RIVULA	42	E	B
103	EUCHROMIA VITIENSIS	22	D	E
104	EUPITHECIA EUPITHECIATA	35	C	F
108	CHARACOMA NILOTICA	17	E	D
109	GATHYNIA CYTHERA	25	A	C
115	GYMNOSCELIS CONCINNA	49	C	F

TABLE 8 CONT. 1

117	GYMNOSCELIS IMPARATALIS	12	O	O
118	GYMNOSCELIS SARA	15	C	F
123	GYRTONA DIVITALIS	22	J	F
124	GYRTONA HOPKINSI	19	C	F
126	HARITA NODYNA	21	C	F
128	HELICOVERPA ARMIGERA + ASSULTA	23	E	D
129	HIPPOTION CELERIO	22	B	B
130	HIPPOTION VELOX	40	D	E
131	HORISME CHLORODESMA	54	A	C
133	HYDRILLODES SURATA	485	A	B
134	ECHANELLA HIRSUTIPENNIS	141	C	A
138	HYPENA LACERATALIS	20	E	D
139	HYPENAGONIA SPP.	129	A	C
143	INDETERMINATE SPECIES (HYPENINAE)C	54	A	C
144	HYPENA ROBUSTALIS	10	B	O
148	HYPOCALA AUSTRALIAE	597	J	F
149	HYPOSPILA SIMILIS	118	C	B
152	IDAEA RHIPISTIS	15	F	H
157	LEUCOCOSMIA NONAGRICA	1104	C	B
158	LEUCANIA PSEUDOFORMOSANA	61	C	B
159	LEUCANIA SEPARATA	112	B	B
161	LEUCANIA YU	58	C	B
163	BEGGINA MEDIOPUNCTATA	18	A	C
171	LUCERIA OCULALIS + SCHRANKIA VITIENSIS	338	A	B
174	MACADUMA MONTANA	12	C	F
175	MACADUMA STRIATA	17	F	H
177	MACEDA SAVURA	28	C	A
179	MACROGLOSSUM HIRUNDO	35	A	F
180	MALIATTHA MELANESIENSIS	213	O	B
181	MALIATTHA RITSEMAE	1119	B	B
182	MAURILIA ICONICA	12	C	G
183	CATADOIDES FIJIENSIS	14	J	O
185	MESURODES ERICHLORA	14	A	H
188	MOCIS FRUGALIS	39	H	B
189	MOCIS TRIFASCIATA	45	H	B
191	NANAGUNA ALBISECTA	30	C	F
192	NANAGUNA BREVIUSCULA	62	B	B
193	NEOGABARA PLAGIOLA	91	C	B
194	NIGRAMMA ACUTIPENNIS	11	C	A
197	NOLA FIJIENSIS	789	A	B
198	NOLA INSULARUM	30	E	D
199	NOLA LICHENOSA	68	A	C
200	NOLA TRANSVERSATA	35	C	F
201	NYCTEMERA BAULUS	34	B	B
202	ORUZA CARIOSA	152	B	B
203	OTHREIS FULLONIA	21	A	C
204	OTHREIS PAULII	12	C	F
205	OXYODES SCROBICULATA	73	C	A
209	PARALLELIA PRISCA	12	C	A
210	PARALLELIA VITIENSIS	24	A	C
211	PARILYRGIS CONCOLOR	11	F	H
212	PETELIA AESYLA	83	C	F
213	PHILAGRIA ENTELLA	15	D	E
217	PLATYSENTA ILLECTA	443	H	B
218	PLUSIA ACUTA	21	O	B
220	PLUSIA CHALCITES	1457	C	B
221	PLUSIA ILLUMINATA	104	A	B
222	PLUSIODONTA DIMORPHA	11	C	F
223	POECILASTHENA LEUCYDRA	75	G	F
224	POLYDESMA BOARMOIDES	11	B	O
225	POLYCLYSTA GONYCROTA	60	I	F
226	PROGONIA MICRASTIS	379	A	B

TABLE 8 CONT. 2

231	PYRRHORACHIS PYRRHOGONA	25	A	F
232	RHESALA ALBIZZIAE	1350	B	B
233	RIVULA DIPTERYGOSOMA	12	A	C
234	RIVULA POLYNESIANA	54	A	C
235	RUTTELERONA PRESBYTICA	71	C	B
236	SARBANISSA BOSTRYCHONOTA	12	C	F
237	SASUNAGA DENISTIS	156	C	B
238	SASUNAGA TENEBROSA	156	C	B
239	SASUNAGA TOMANIIVIENSIS	201	G	F
244	SCOPULA EPIGYPSA	139	A	B
245	SCOPULA HOMODOXA	14	A	C
248	SERRODES CAMPANA + MEDIOPALLENS	38	C	F
250	SIMPLICIA CAENEUSALIS	85	A	B
252	SPODOPTERA LITURA	388	A	B
253	SPODOPTERA MAURITIA	2888	B	B
254	STENOPTERYGIA NAUSORIENSIS	57	K	A
255	STICTOPTERA DESCRIBENS	39	K	A
256	STICTOPTERA STYGIA	52	C	E
257	STICTOPTERA VITIENSIS	417	C	B
260	SYMMIMETIS MERCERI	17	F	H
261	THALASSODES CHLOROPIS	152	A	B
262	THALASSODES FIGURATA	16	C	A
264	THALASSODES PILARIA	11	E	D
265	THALASSODES FIONA	14	C	F
266	THERETRA PINASTRINA	19	A	C
268	THYAS MINIACEA	17	I	G
269	TIBIOCILLARIA MAGNIFICA	10	C	A
270	TIRACOLA PLAGIATA	1190	C	B
271	TRIGONODES CEPHISE	18	H	B
272	URAPTEROIDES ANERCES	12	I	G
273	UTETHEISA LOTRIX	56	B	B

- C: (47 spp.) Commonest in areas of montane forest : rare in grassland areas. MONTANE FOREST element.
- D: (6 spp.) Rare and patchy occurrence on almost all sites but abundant at Korolevu. KOROLEVU element.
- E: (11 spp.) Patchy distribution: generally uncommon, rare or absent from forest areas, abundant at Lami. LAMI element.
- F: (5 spp.) A group of uncommon species with peak occurrence at Matanikavika. MATANIKAVIKA element.
- G: (5 spp.) Peak occurrence on Mt Victoria, present in montane forest, sporadic occurrence at lowland forest sites. MOSS FOREST element.
- h: (4 spp.) Patchy distribution, peak occurrence at Governor's Pool. GOVERNOR'S POOL group.
- i: (4 spp.) Patchy distribution, peak occurrence at Tholoisuva. THOLOISUVA group.
- j: (3 spp.) Montane forest localities with peak occurrence in mahogany plantations 2 km S of Nandarivatu. MAHOGANY group.
- k: (3 spp.) Species almost entirely restricted to Vanua Levu forests with peak occurrences at Ndelaikoro. NDELAIKORO group.

The numerical properties, diversity and equitability measurements of the seven clusters are given in table 10.

Table 9: Distribution of 1000 specimens of the 'average species' among 20 sites in 11 clusters from cluster analysis of light trap records from Viti and Vanua Levu, Fiji.

Site	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	26	96	5	28	16	77	32	34	14	11	9	31	29	42	14	37	99	206	174	21
B	90	18	5	15	14	13	58	117	68	80	81	65	13	42	10	85	37	53	14	121
C	13	54	45	193	162	54	43	13	11	21	5	16	113	40	132	6	30	12	25	13
D	14	14	0	35	20	12	566	5	0	3	7	48	48	16	17	73	32	28	60	0
E	101	51	2	50	7	2	40	0	32	4	5	551	17	0	5	23	23	52	0	36
F	101	0	0	22	0	24	59	0	0	0	0	0	19	104	0	0	672	0	0	0
G	0	15	728	39	89	8	0	0	0	0	0	0	15	0	107	0	0	0	0	0
h	46	8	0	4	9	6	14	26	3	6	42	9	9	523	13	40	83	63	37	61
i	13	486	76	5	35	87	86	0	0	26	0	0	54	30	40	0	23	0	40	0
j	0	0	1	161	80	1	0	0	9	0	1	2	699	0	45	1	0	0	0	0
k	7	16	0	0	0	0	0	0	0	0	0	0	0	140	693	0	5	82	56	0

991
9905
1001
1008
1002
1001
1000
1000

Table 10: N, S, diversity (RS and H(S)) and equitability of seven elements defined by BUGS3 for Viti and Vanua Levu (e difficult to compute for element F).

Element	N	S	RS	H(S)	e
A Secondary bush	4140	34	18.6	4.07	0.70
B Talasinga	6816	18	7.9	2.55	0.45
C Montane forest	6478	47	26.1	3.86	0.42
D Korolevu	188	6	6.1	2.20	0.85
E Lami	326	11	12.7	3.05	0.86
F Matanikavika	72	5	18.9	2.30	?1.33
G Moss forest	996	5	2.4	1.37	0.66

The small groups (h - k) and the four clusters D - G contain species abundantly represented at only one locality. These species may either have a patchy or "clumped" distribution or be associated with a particular specialised vegetation type, trapping in which was limited to one locality. The latter is certainly the case with cluster G but the association of the species of clusters D, E and F is not explicable in this way. Cluster D is represented throughout wet zone vegetation: its separation from cluster A is apparently due to clumping at Korolevu. Cluster E is large : it has a patchy distribution with its peak at Lami and possibly represents species with clumped distributions. Cluster F contains a group of rare species collected almost exclusively in the Matanikavika sample and its formation may be due to the size of the Matanikavika sample compared with other lowland samples from similar types of locality. Groups h to k seem to represent species with sporadic, clumped occurrences although group j contains Hypocala australiae, a common montane species, which nevertheless had its peak occurrence 2 Km S. of Nandarivatu. Clusters A, B, C and G represent groups of species in specific association, the cluster distribution following that of a major vegetation type and I believe these clusters to represent communities of species associated with the vegetation types suggested above.

The largest and most diverse element defined for the two largest islands of Fiji is that associated with montane forest: this element contains more species (a very rough measure of diversity in this case) and has a greater value of RS than any other element although H(S) is less than that for element A (secondary bush). Its equitability is the lowest observed and I tentatively suggest that this feature indicates a degree of niche overlap although we may,

in this regard, be observing habitat heterogeneity. The equitability value of element C is similar to that of element B (talasinga) but markedly lower than those of element A (0.70) and G (0.66). Element diversities appear to follow the diversities of their vegetation; talasinga diversity is low and so is the diversity of element B; rich montane forest is matched by the highly diverse element C. Moss forest is moderately diverse but windswept, wet and of small area and "moss-forest specialists" (element G) are few: their species-abundance curve is steep and of low diversity. We are now, I believe, in a position to define the dominant species of four vegetation types as the occupants of the upper portion of the species-abundance curves of elements A, B, C and G. Taking the five commonest species of each element the "dominant species" list is as follows:

A: Secondary bush

Nola fijiensis
Hydrillodes surata
Spodoptera litura
Progonia micrastis
Luceria oculalis + *Schrankia vitiensis*

B: Talasinga

Spodoptera mauritia
Rhesala albizziae
Maliattha ritsemae
Gnathothlibus erotus
Oruza cariosa

C: Montane forest

Plusia chalcites
Tiracola plagiata
Leucocosmia nonagricola
Stictoptera vitiensis
Cleora nausori

G: Moss forest

Chloroclystis nina
Sasunaga tomaniiviensis
Poecilasthena leucydra
Cleora ochricollis
Boasthena quilla

The degree of endemism within each major element associated with a vegetation type is illuminating. Table 11 gives the number of endemic species and percentage of the total species in the elements which are endemic to the Fiji group.

Table 11: Number and percentage of endemic species in four major elements from Viti and Vanua Levu, Fiji.

	<u>Element</u>	<u>S</u>	<u>S(endemics)</u>	<u>% endemic</u>
A	Secondary bush	34	12	35
B	Talasinga	18	0	0
C	Montane forest	47	23	49
G	Moss forest	5	5	100

I believe it can be accepted that a high level of endemism among the species of an element is suggestive of that group of species being long-established. The complete absence of endemic species within the talasinga element strongly suggests a recent origin for that element and thus a recent origin for its "parental" vegetation type.

b) Fiji: Viti and Vanua Levu (logarithmic analysis)

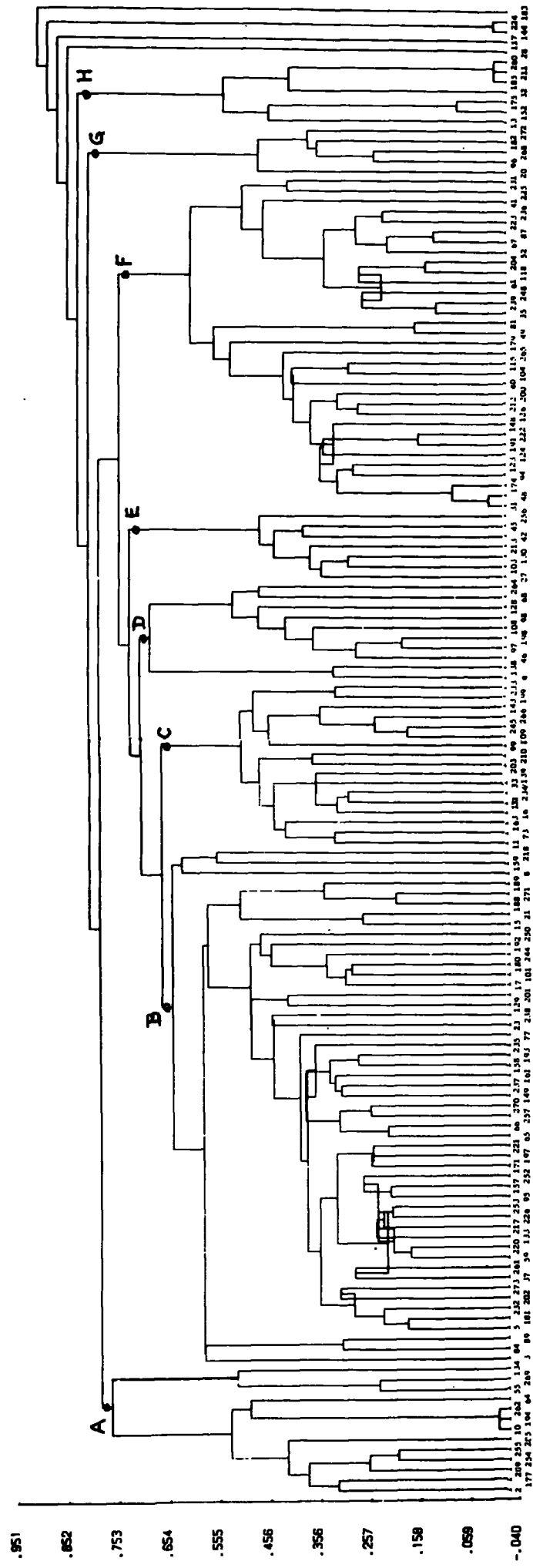
This analysis was undertaken out of sheer curiosity to ascertain the effect of beginning the tabulation and preparation of figures for cluster analysis using $\log_{10}(n+1)$ where n is the number of individuals of a particular species collected in one locality or sample. The same records were used as for analysis (a) and the same procedure followed. Cluster analysis by BUGS3 yielded dendrogram 2 in which eight clusters (A-H) may be recognised. Identities of dendrogram stalks are given in table 8.

The distribution of 1000 specimens of the "average species" of each cluster is given in table 12.

Cluster characteristics are as follows:

- A: (13 spp.) An element occurring in most montane forest samples with a pronounced peak presence at Ndelaikoro.
- B: (51 spp.) A widespread element without marked peak occurrences.
- C: (17 spp.) An element with its peak occurrences at Tholoisuva, Matanikavika, 5 km N. of Savusavu and Savundrondro Dam, sites in or near secondary bush or forest.
- D: (10 spp.) Peak occurrence at Lami closely followed by Suva. Includes many of the species of element E in the analysis (a) above.
- E: (7 spp.) Peak occurrence at Korolevu. Includes most of the species of the Korolevu element in (a), above.
- F: (33 spp.) Peak occurrences in montane forest: contains element G and many species of element C in (a) above.
- G: (5 spp.) Most numerous at Tholoisuva. Corresponds in part to group i in analysis (a).
- H: (7 spp.) Peak occurrence at Matanikavika : corresponds to element F in (a) but has two additional species.

Five species come into the complete cluster at high levels of dissimilarity (two of these, 144 and 224, cluster together at a low level). The arbitrary line of division of clusters is taken at a level of dissimilarity of 0.590 but outlying groups of three and two species have been added to clusters A and D. Numerical properties, diversity and equitability measurements of the elements are given in table 13.



Dendrogram 2 :- 148 spp. from 20 samples on Viti and Vanua Levu clustered by BUGS3:
the numbers of a species in a sample were input in the form $\log_{10}(n+1)$.
Identities of stalks are as in dendrogram 1.

Table 12: Distribution of 1000 specimens of the "average species" in 8 clusters among 20 sites from cluster analysis of light trap records from Viti and Vanua Levu, Fiji (original figures logarithmic).

Cluster	Site	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	42	29	0	0	25	43	123	0	11	0	0	0	0	53	125	531	0	18	0	0	0
B	63	35	18	39	32	48	53	64	47	67	82	46	40	78	38	83	51	32	31	52	
C	59	108	4	18	8	74	15	11	0	0	0	35	7	27	6	7	132	272	218	0	
D	226	60	24	36	9	5	46	0	42	0	15	454	54	0	15	0	14	0	0	0	
E	76	45	0	51	20	0	489	0	0	0	0	0	109	0	129	21	60	0	0	0	
F	16	51	208	188	187	47	8	3	6	5	2	0	159	3	68	10	19	4	10	6	
G	150	563	0	0	49	59	0	0	0	0	0	0	47	0	108	0	24	0	0	0	
H	168	0	0	0	65	0	0	0	0	0	0	0	0	59	0	0	708	0	0	0	

Table 13: N, S, diversity (RS and H(S)) and equitability of eight elements defined by BUGS3 for Viti and Vanua Levu using log input (e difficult to compute for elements E, G and H).

Element	N	S	RS	H(S)	e
A Ndelaikoro	439	13	11.0	3.07	0.72
B Widespread	16,432	51	26.2	4.53	0.62
C Secondary bush	742	17	16.3	3.72	0.98
D Lami	317	10	10.4	2.86	0.84
E Korolevu	189	7	8.9	2.62	?1.01
F Montane forest	2,422	33	24.6	3.65	0.47
G Tholoisuva	63	5	21.7	2.30	?1.33
H Matanikavika	104	7	27.2	2.79	?0.90

Table 14 gives the number and percentage of species endemic to the Fiji group within the eight elements.

Table 14: Number and percentage of endemic species in all elements recognized for Viti and Vanua Levu using log input in cluster analysis.

Element	S	S(endemics)	% endemic
A Ndelaikoro	13	9	69
B Widespread	51	8	16
C Secondary bush	17	8	47
D Lami	10	0	0
E Korolevu	7	2	29
F Montane forest	33	21	64
G Tholoisuva	5	2	40
H Matanikavika	7	4	57

The effect of processing log data in this analysis is to reduce the degree of differentiation obtained in a normal analysis by reducing the difference in abundance between species in the same sample, thereby approaching an analysis run on "presence-absence" criteria. This method is exceptionally discriminant for groups of species occurring, in the main, at only one site or in only one sample (vide elements A, D, E, G, H in table 12). While not valid as a method for defining faunal elements it is valid as a method for confirming them: the montane forest element (F) closely corresponds to element C of the first analysis and element B to elements A + B of the first analysis. The moss forest element G of the first analysis is combined with the montane forest element here: equitability and diversity measurements of the montane forest element are comparable in both analyses. Endemicity is high in montane forest elements (A and F) as in the first analysis. Element C in this analysis corresponds to a portion of element A of the first analysis: the included species are associated with secondary bush or forest which is maturing and represents an advanced stage in secondary vegetation succession. The high level of endemicity and equitability of this specialised portion of the "secondary vegetation species" is noteworthy: their habitat was maintained perhaps by hurricane effects before the advent of man but has now been enormously enlarged and is perhaps unsaturated (therefore *e* is high).

c) Fiji: Small islands and Rotuma.

For this analysis samples from the same locality were pooled to yield samples for seven islands, the two large samples from Viwa being kept separate: the eight localities/samples were as follows:

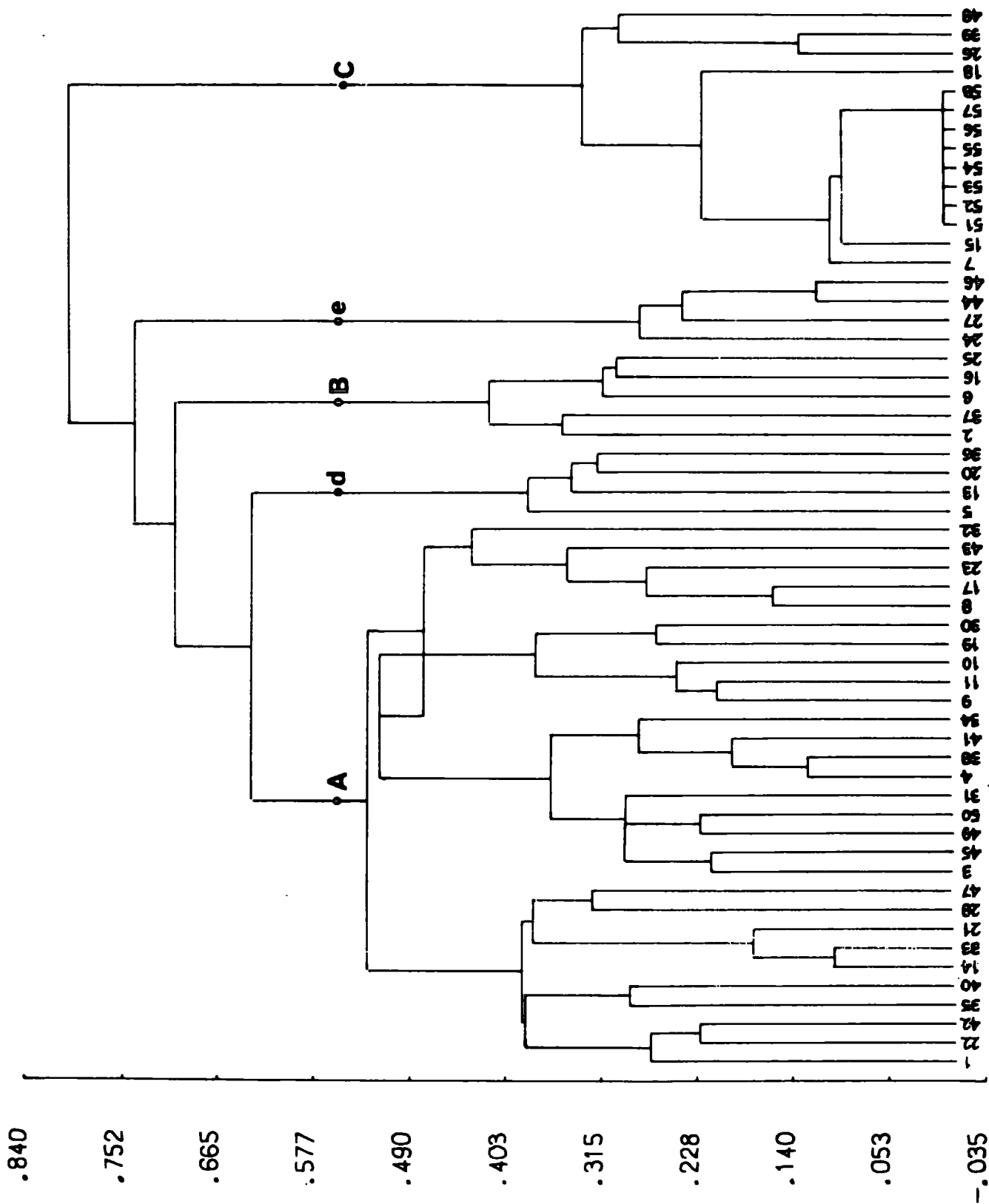
1. Leleuvia I.
2. Yasawa I.
3. Nanuya Lailai I. ✓
4. Naukathuvu I. ✓
5. Viwa I. (30.iii.1971) ✓
6. " (31.iii.1971) ✓
7. Ongea I. (Low Gp)
8. Rotuma I.

Pooling and tabulation were done by hand. Species represented by 10 or more individuals among all the samples considered totalled 56: these were subjected to cluster analysis by the programme BUGS3 to yield dendrogram 3. The identities of the dendrogram stalks are given in table 15.

Separating clusters at an arbitrary level of dissimilarity of 0.555 yields three clusters (A-C) and two groups of four species (d and e).

The distribution of 1000 specimens of the "average species" of each cluster (from BUGS3 - see chapter 3) is given in table 16. Cluster characteristics are as follows:

- A: (29 spp.) Widespread but commonest on the three islands of the Yasawa group. YASAWA element.
- B: (5 spp.) Commonest on Viwa, well-represented on Rotuma. VIWA element.



Dendrogram 3:- 56 spp. from 8 samples on 6 small islands of the Fiji group and Rotuma clustered by BUGS3. Identities of stalks are given in table 15.

TABLE 15: STALK IDENTITIES FOR DENDOGRAM 3.

0=OUTLIER

STALK	SPECIES	N	CLUSTER
1	ACRITOCERA NEGLIGENS	63	A
2	AGRIUS CONVULVULI	15	B
3	AMYNA NATALIS	35	A
4	AMYNA OCTO	56	A
5	ANISODES DECOLORATA	20	D
6	ANOMIS FLAVA	201	B
7	ANOMIS NIGRITARSIS	20	C
8	ANOMIS VITIENSIS	16	A
9	HYPOSPILA SIMILIS	30	A
10	ANTICARSIA IRRORATA	18	A
11	CALLOPISTRIA MERIDIONALIS	40	A
13	NOLA FIJIENSIS	2051	D
14	NOLA INSULARUM	19	A
15	NOLA LICHENOSA	67	C
16	GNATHOTHLIBUS EROTUS	100	B
17	DICHROMIA QUINQUALIS	41	A
18	EARIAS HUEGELI	15	C
19	EARIAS VITELLA	14	A
20	EPIPLEMA INSTABILATA	16	D
21	GATHYNIA YASAWA	10	A
22	EUBLEMMA RIVULA	167	A
23	HELICOVERPA ASSULTA	26	A
24	HIPPOTION VELOX	44	E
25	HYDRILLODES SURATA	2034	B
26	HYPENA GONOSPILALIS	36	C
27	HYPOCALA AUSTRALIAE	24	E
28	LEUCANIA SCOTTII	54	A
30	MACROGLOSSUM HIRUNDO	14	A
31	MALIATTHA RITSEMAE	56	A
32	MOCIS TRIFASCIATA	43	A
33	ATHETIS STRIOLATA	25	A
34	NYCTEMERA BAULUS	12	A
35	ORUZA CARIOSA	83	A
36	PANTYDIA METASPILA	18	D
37	PARALLELIA VITIENSIS	13	B
38	PLUSIA CHALCITES	119	A
39	PLUSIA ILLUMINATA	34	C
40	PROGONIA MICRASTIS	75	A
41	PLATYSENTA ILLECTA	32	A
42	MALIATTHA MELANESIENSIS	47	A
43	SCOPULA HOMODOXA	36	A
44	SIMPLICIA CAENEUSALIS	11	E
45	SPODOPTERA LITURA	39	A
46	SPODOPTERA MAURITIA	77	E
47	IDAEA RHIPISTIS	34	A
48	THALASSODES CHLOROPIS	55	C
49	UTETHEISA LOTRIX	10	A
50	UTETHEISA PULCHELLOIDES	11	A
51	NOLA SAMOANA	288	C
52	CLEORA SAMOANA	12	C
53	GIAURA TETRAGRAMMA	95	C
54	GYMNOSCELIS CONCINNA	12	C
55	MICROTHRIPA BUXTONI	108	C
56	RIVULA POLYNESIANA	123	C
57	TIRACOLA PLAGIATA	15	C
58	SCHRANKIA FUROROA	22	C

- c: (14 spp.) Rare in all samples except Rotuma. Contains taxa endemic to Rotuma. ROTUMA element.
- d: (4 spp.) Major representation is on Leleuvia: also well represented on Viwa and Ongea : these are the three limestone islands. LIMESTONE group.
- e: (4 spp.) Very common on Ongea : moderately common on Rotuma. ONGEA group.

Numerical properties, diversity and equitability measurements of these elements are given in table 17.

Table 16: Distribution of 1000 specimens of the "average species" among 8 sites/samples in 5 clusters from cluster analysis of light trap records from the smaller islands of the Fiji group and Rotuma.

Site	1	2	3	4	5	6	7	8
A	58	277	214	203	79	31	52	78
B	26	15	4	24	335	398	31	167
C	30	9	0	7	21	7	32	893
d	571	0	70	22	108	75	103	52
e	6	20	16	46	12	16	758	127

Table 17: N, S, diversity (RS and H(S)) and equitability of three elements defined by BUGS3 for the small islands of the Fiji group and Rotuma.

	Element	N	S	RS	H(S)	e
A	Yasawa	1227	29	27.0	4.48	0.99
B	Viwa	2363	5	1.8	0.77	0.42
C	Rotuma	902	14	9.8	3.13	0.80

Only 8 endemic species are involved in this analysis and their distribution among the elements does not appear to warrant discussion: they are represented by stalks numbered 1, 42, 33, 21, 47, 13, 15 and 58 in dendrogram 3.

The number of samples involved in this analysis is woefully small and any suggestions made or conclusions drawn at this stage are clearly tentative. Cluster A appears to represent a group of species capable of colonising most small islands and perhaps associated with dry secondary vegetation as found in the Yasawa group. Cluster C amply

demonstrates, I think, the anomalous position of Rotuma from a faunal point of view when considered as part of the Fiji group: the composition of its Macrolepidoptera fauna appears to have little in common with that of the smaller Fijian islands. The distinct group of 5 species associated with Viwa I. again suggests a distinct character in this recent limestone outlier of the Fiji group. The separation of group d suggests perhaps that the four species involved are associated with a calcicole flora.

I do not consider that the diversity and equitability values obtained for these elements have any real meaning: the samples used are widely separated both in space and time.

d) Rotuma.

The insular nature of the Rotuman Macrolepidoptera indicated in the last analysis prompted cluster analysis of the Rotuman species. Samples from the same locality were pooled to yield samples from six sites which were as follows:

1. Oinafa (4 samples, N=238)
2. Oinafa feeder road (2 samples, N=219)
3. Losa road (1 sample, N=197)
4. Furorua (1 sample, N=147)
5. E. of Solmafua (1 sample, N=83)
6. Noatau (1 sample, N=422)

Pooling and tabulation were done by hand: species represented by 10 or more individuals among all the samples totalled 25: these were subjected to cluster analysis by BUGS3 to yield dendrogram 4. The identities of the dendrogram stalks are given in table 18.

Distinct separation of clusters is not apparent: 21 species form a single cluster at a level of dissimilarity of less than 0.50. Four species enter this cluster at very high levels of dissimilarity. The major cluster has an "average species" with an even, widespread distribution among the sites. The "outliers" are as follows:

- 21 Scopula homodoxa
- 23 Spodoptera mauritia
- almost entirely restricted to Oinafa;
- 12 Gymnoscelis concinna
- peak occurrence E of Solmafua (endemic subspecies);
- 19 Progonia micrastis
- peak occurrence on Losa road.

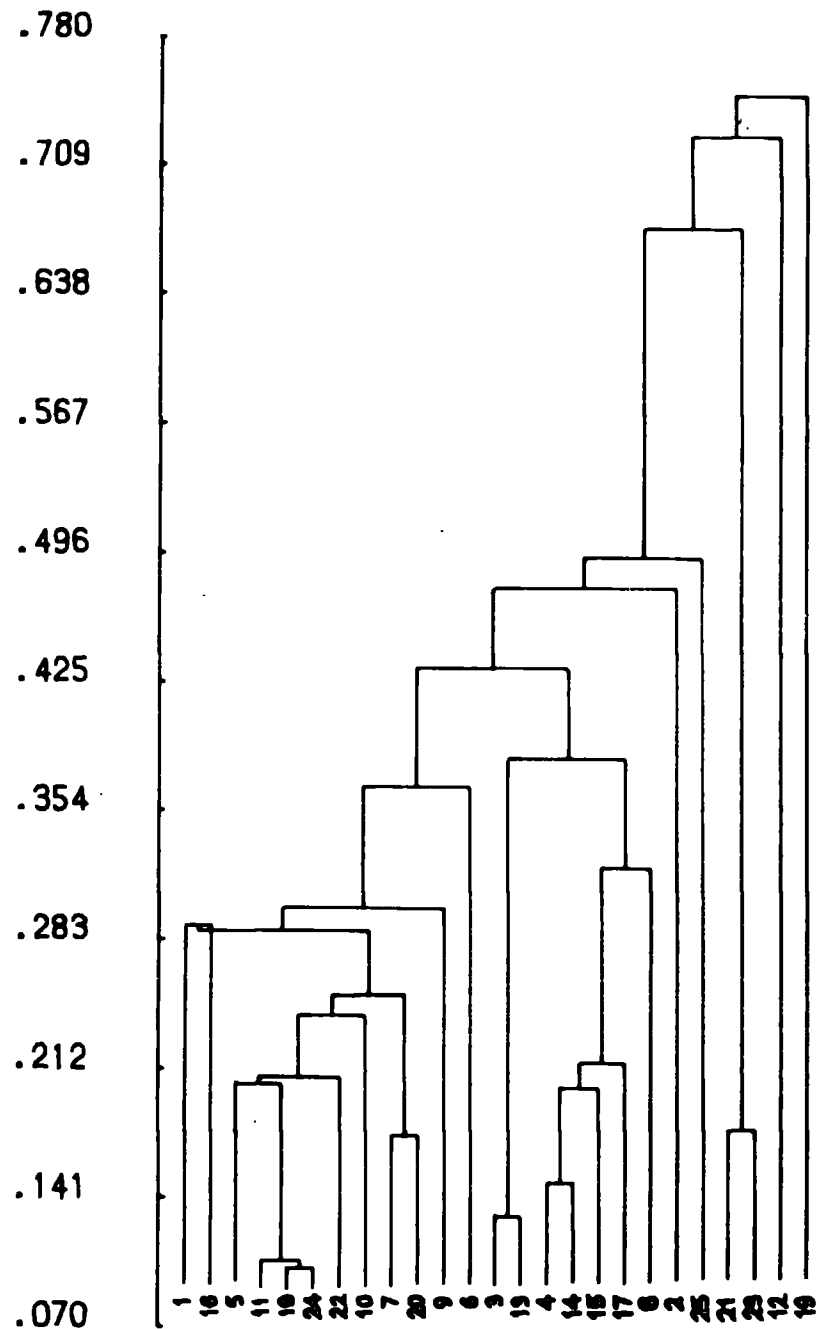
The results of this analysis suggest a uniformity of the distribution of Macrolepidoptera on Rotuma in marked contrast with the separate elements demonstrated for the largest islands of the Fiji group. This analysis appears to support the previous analysis in demonstrating a large element of widespread species on small islands, an element which is consistent within the Fiji group but is very different on Rotuma. This large element is complemented in both analyses by a hard core of very few species which do, apparently, have a specialised habitat requirement. Numerical characteristics of the large Rotuman cluster are as follows:

N = 1066,	S = 21,	RS = 15.1,
H(S)=3.59,	e = 0.72.	

e) New Hebrides - all samples.

For this analysis samples from the same locality were pooled to yield 15 large samples for 14 sites. The samples/sites were as follows (see maps 1, 8 - 10):

1. Aneityum (all samples)
2. Nouankao R., Erromango, 3.viii.1971.
3. " " 4+5+6.viii.1971.
4. Vila, Efate (both samples)
5. Narabut, Efate



Dendrogram 4:- 25 spp. from 6 samples on Rotuma clustered by BUGS3. Identities of stalks are given in table 18.

TABLE 18: STALK IDENTITIES FOR DENDOGRAM 4.

0 = OUTLIER

STALK	SPECIES	N	OUTLIER
1	ANOMIS FLAVA	11	
2	ANOMIS NIGRITARSIS	17	
3	HYPOSPILA SIMILIS	10	
4	CALLOPISTRIA MERIDIONALIS	18	
5	NOLA SAMOANA	288	
6	NOLA LICHENOSA	66	
7	GNATHOTHLIBUS EROTUS	13	
8	CLEORA SAMOANA	12	
9	EARIAS VITELLA	11	
10	EUBLEMMA RIVULA	102	
11	GIAURA TETRAGRAMMA	95	
12	GYMNOSCELIS CONCINNA	12	0
13	HIPPOTION VELOX	17	
14	HYPENA GONOSPILALIS	34	
15	SCHRANKIA FUROROA	22	
16	MACROGLOSSUM HIRUNDO	12	
17	MICROTHRIPA BUXTONI	108	
18	PLUSIA ILLUMINATA	30	
19	PROGONIA MICRASTIS	19	0
20	RIVULA POLYNESIA	123	
21	SCOPULA HOMODOXA	13	0
22	SPODOPTERA LITURA	16	
23	SPODOPTERA MAURITIA	51	0
24	THALASSODES CHLOROPIS	46	
25	TIRACOLA PLAGIATA	15	

6. Wintoua, Malekula (all samples)
7. Tisbel, Malekula (all samples)
8. Camp 2, Santo (forest sample)
9. " " (river-bed sample)
10. Nokowula, Santo
11. Tabwemasana, Santo
12. Nokowula Creek, Santo
13. Camp 3, Santo (1000' station : forest)
14. " " (950' station : river-bed)
15. Malao, Santo.

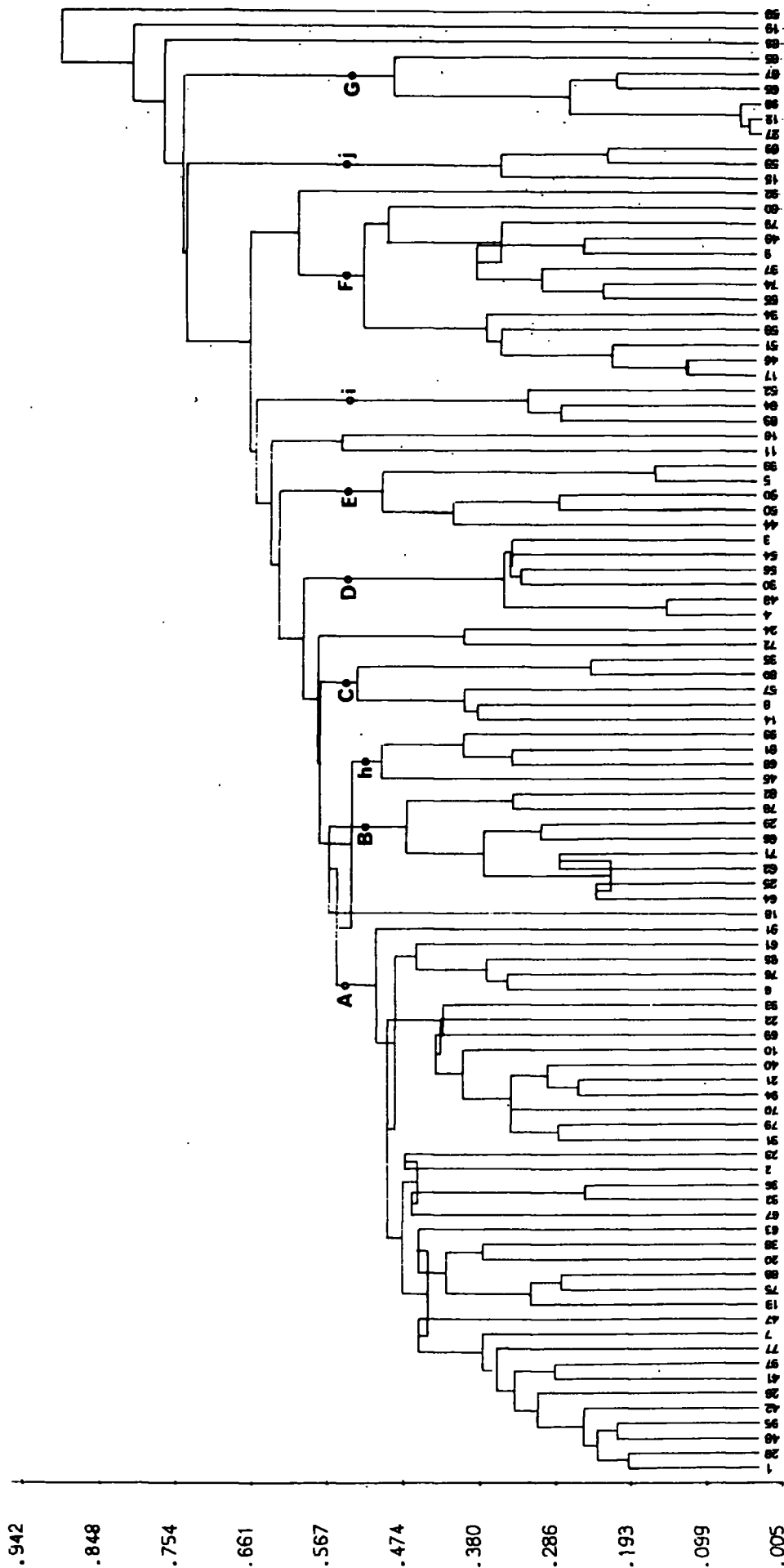
All samples were of more than 200 specimens with the exception of sample 11 (68 specimens). Pooling and tabulation were done by hand. Species represented by 10 or more individuals totalled 98: these were subjected to cluster analysis by BUGS3 to yield dendrogram 5. The identities of the dendrogram stalks are given in table 19: the provisional nature of these identifications must be stressed.

Taking the arbitrary level of division of clusters at 0.555, seven major clusters (A - G) of five or more species can be separated. In addition there are three groups (h - j) of 3 or 4 species: nine species are "outliers".

The distribution of 1000 specimens of the "average species" of each cluster (from BUGS3 - see chapter 3) is given in table 20. Cluster characteristics are as follows:

- A: (37 spp.) A widespread element best represented in the lowland forest of Santo: probably associated with mature secondary forest.
- B: (8 spp.) An element with its peak occurrence at the Nouankao R. but well represented in open areas with secondary vegetation: includes a number of large, strong-flying species.
- C: (5 spp.) A group of species moderately well represented on the southern islands, rare on Santo and abundant at Tisbel, perhaps associated with Leucaena scrub on limestone.
- D: (6 spp.) A fairly widespread element with peak occurrence at Malao.
- E: (5 spp.) A group of species with peak occurrence at Narabut.
- F: (12 spp.) An element associated with high forest on Santo.
- G: (6 spp.) Species occurring almost exclusively on Aneityum.
- h: (4 spp.) A group represented in most forest samples but with a peak of occurrence on Tabwemasana.
- i: (3 spp.) A group associated with open sites with grass: peak occurrence at Vila.
- j: (3 spp.) Species associated with the Santo samples from Camps 2 and 3: absent from almost all other samples.

Numerical properties, diversity and equitability measurements of these clusters are given in table 21.



Dendrogram 5:- 98 spp. from 15 samples on 5 islands in the
New Hebrides clustered by BUGS3. Identities of
stalks are given in table 19.

TABLE 19: STALK IDENTITIES FOR DENDOGRAM 5.

0 = OUTLIER

STALK	SPECIES	N	CLUSTER
1	ADRAPSA ABLUALIS	12	A
2	AGAPE LEONINA	21	A
3	AGRIUS CONVULVULI	66	D
4	AMYNA NATALIS	14	D
5	AMYNA PUNCTUM	75	E
6	ANIGRAEA DELETOIDES	10	A
7	ANOMIS NIGRITARSIS	65	A
8	?APISTOSIA CHIONORA	40	C
9	ASOTA ALIENATA	63	F
10	ASOTA CARICAE	25	A
11	BOCANA MANIFESTALIS	12	D
12	BULONGA SP. N.	284	G
13	CALLOPISTRIA MERIDIONALIS	22	A
14	CALLOPISTRIA RETICULATA	16	C
15	CALLOPISTRIA A	10	J
16	CALLOPISTRIA B	15	O
17	CASBIA SP.	12	F
18	CATEPHIA SERICEA	10	O
19	CATORIA CAMELARIA	22	O
20	GNATHOTHLIBUS EROTUS	197	A
21	CLEORA BUXTONI	44	A
22	CLEORA CHEESMANAE	33	A
23	CLEORA PSYCHASTIS	162	A
24	COMIBAENA INDUCTARIA	33	O
25	DAPHNIS HYPOTHOUS	732	B
26	DIACRISIA SP.	84	A
27	DIRADES SP.	18	G
28	EILEMA SP.	60	A
29	LEUCOCOSMIA NONAGRICA	52	B
30	EPIPLEMA CONFLICTARIA	17	D
31	ERCHEIA KEBEAE	12	A
32	ERICEIA GONIOSEMA	78	A
33	ERICEIA LEVUENSIS	159	A
34	EUCHROMIA RUBRICOLLIS	38	F
35	EUPROCTIS DOLICHOCERA	145	C
36	FELENIA PRECEDENS	21	A
37	GYRTONA DIVITALIS	24	F
38	HIPPOTION VELOX	31	A
39	HYDRILLODES SURATA	699	E
40	AVATHA DISCOLOR	26	A
41	HYPENA DISUALIS	24	A
42	HYPENA GONOSPILALIS	35	A
43	HYPENA NR. ABYSSINIALIS	10	D
44	IDAEA CARNEARIA	11	E
45	LACERA ALOPE	10	H
46	LEUCANIA PSEUDOFORMOSANA	21	F
47	MACADUMA SP.	28	A
48	MACEDA MANSUETA	27	A
49	SASUNAGA OENISTIS	36	F
50	SASUNAGA TENEBROSA	13	E
51	MALIATTHA INCONCISA	26	F

TABLE 19 CONT.

52	MALIATTHA RITSEMAE	22	I
53	MIMEUSEMIA CENTRALIS	11	J
54	MOCIS TRIFASCIATA	12	D
55	NANAGUNA ALBISECTA	14	F
56	NOLA MAJOR	37	D
57	NOLA TORNOTIS	60	C
58	NOLA NR. PURA	12	O
59	NOLA NR. SAMOANA	21	F
60	NOLA NR. PUMILA	52	F
61	NOLA A	14	A
62	NYCTEMERA PELLEX	58	B
63	PHILAGRIA ENTELLA	109	A
64	OTHREIS FULLONIA	12	B
65	OXYMACARIA SP.	214	G
66	OXYODES SCROBICULATA	47	B
67	PARALLELIA PRISCA	19	A
68	PARALLELIA REDUNCA	16	H
69	PARALLELIA SOLOMONENSIS	16	A
70	PETELIA MEDARDARIA	48	A
71	PHYLLODES IMPERIALIS	28	B
72	PLECOPTERA VIOLACEA	12	O
73	PLUSIA CHALCITES	12	F
74	PLUSIA SP.	37	F
75	PLUSIA ILLUMINATA	143	A
76	PROGONIA B	42	A
77	PLATYSENTA ILLECTA	41	A
78	PSILOGRAMMA MENEPHRON	14	B
79	PYRRHORACHIS PYRRHOGONA	10	A
80	SCOPULA A	18	C
81	SERRODES CAMPANA	31	H
82	SIMPLICIA CAENEUSALIS	37	B
83	SPODOPTERA LITURA	19	I
84	SPODOPTERA MAURITIA	109	I
85	STICTOPTERA ANAEMIA	16	G
86	STICTOPTERA VITIENSIS	95	O
87	THALASSODES CHLOROPIS	79	G
88	THERETRA NESSUS	235	A
89	THERETRA PINASTRINA	23	J
90	THYAS MINIACEA	15	E
91	TIRACOLA PLAGIATA	482	A
92	TIRACOLA SP.	10	O
93	TOLMERA SP.	17	H
94	TRIGONODES CEPHISE	13	A
95	ULIOCNEMIS WOODFORDI	21	A
96	UROLITHA BIPUNCTIFERA	13	A
97	?HERMINIA SP.	37	A
98	OPHIDERINAE 999	16	G

Table 20: Distribution of 1000 specimens of the "average species" among 15 samples/sites in 10 clusters from cluster analysis of light trap records from the New Hebrides.

Cluster	Site	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	57	57	20	44	25	42	45	37	148	103	59	15	60	214	73	57
B	20	281	301	72	44	50	50	7	1	97	25	0	16	23	9	54
C	19	52	90	21	66	92	92	537	41	4	0	0	24	17	9	28
D	7	3	11	28	22	65	65	44	93	39	5	0	0	30	5	648
E	36	42	5	18	625	113	113	33	76	0	0	0	0	51	0	0
F	23	2	16	26	24	45	45	22	23	16	358	173	223	16	12	20
G	793	20	11	5	59	48	48	0	5	0	7	0	0	10	42	0
h	191	18	117	0	25	0	0	0	44	102	32	381	30	12	48	0
i	1	44	22	576	41	182	182	64	0	0	0	0	0	0	0	69
j	0	0	0	0	0	9	9	0	355	326	37	0	0	20	255	0

Table 21: N, S, diversity (RS and H(S)) and equitability of seven elements defined by BUGS3 for the New Hebrides.

Element	N	S	RS	H(S)	e
A Secondary forest	2419	37	26.6	4.37	0.75
B Secondary	980	8	5.1	1.48	0.45
C Tisbel	279	5	4.1	1.86	0.96
D Malao	156	6	6.2	2.22	0.90
E Narabut	813	5	2.3	0.79	0.42
F Santo montane	356	12	15.3	3.40	1.07
G Anetyum	627	6	3.4	1.84	0.77

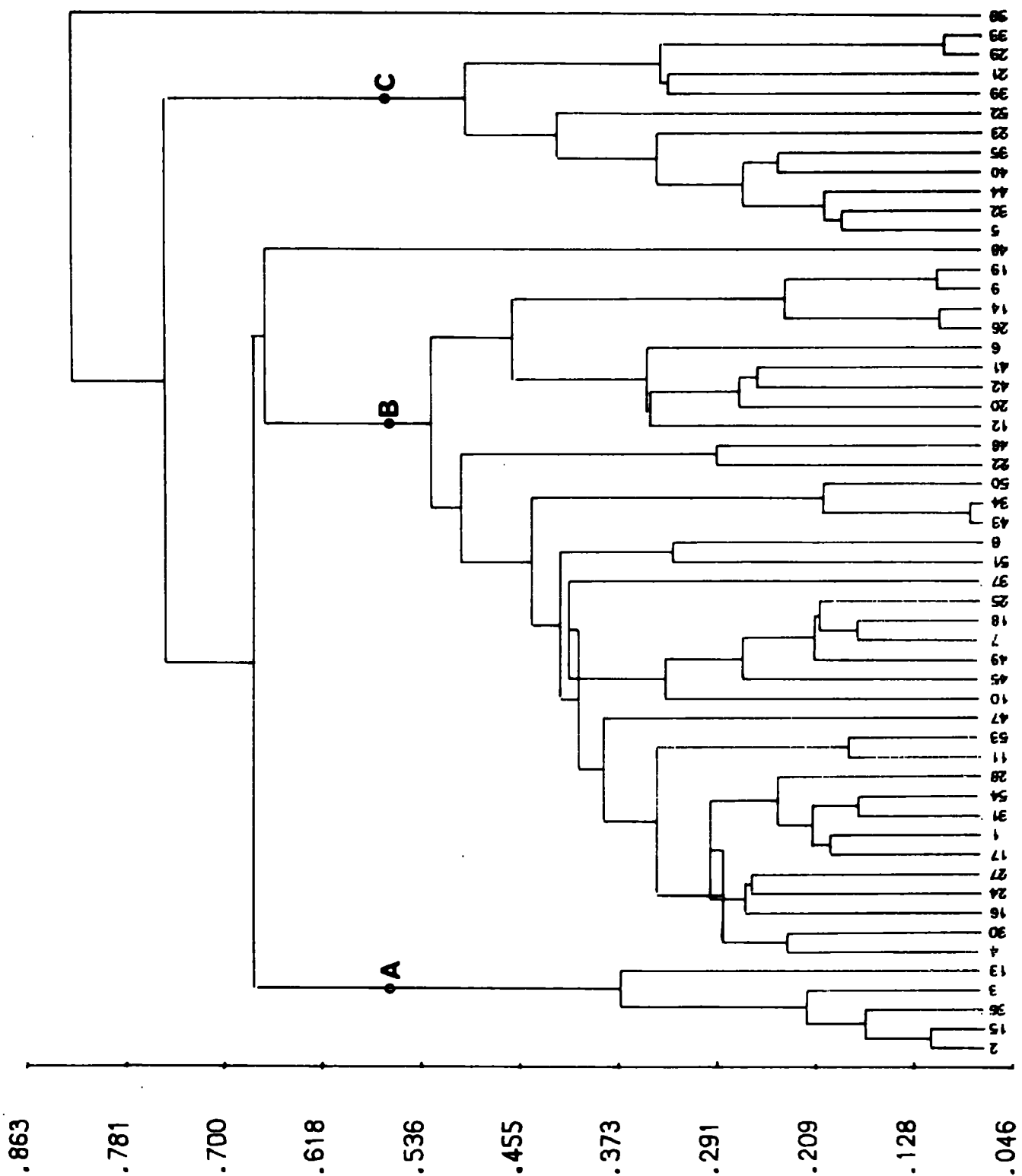
Although the islands studied in this analysis are all rather different and the analysis is, generally, of rather small samples, some conclusions and comparisons can be drawn at this stage. Clusters C, D, E, and G reflect not only differences between islands but also specific habitat requirements among the more local species. Cluster B is apparently associated with very recent widespread forest damage as observed in logging operations around the Nouankao R. camp. The species of element C include three New Hebridean endemics whereas element D contains widespread secondary vegetation species such as Agrius convolvuli and Mocis trifasciata. Element E contains forest species with a fairly broad Melanesian distribution. Four of the six species of element G are undescribed taxa and three of these range no further north through the group than to Efate. Element A here is perhaps comparable with element A of the Viti and Vanua Levu analysis: both are associated with secondary bush and disturbed forest. Diversities and equitabilities of the two elements are similar:

NEW HEBRIDES RS = 26.6, H(S) = 4.37, e = 0.75.
VITI & VANUA LEVU RS = 18.6, H(S) = 4.07, e = 0.70.

Of the 37 spp. in New Hebridean element A seven are also found in the Fijian element A (of analysis a) or represented by a very closely related species. Of the large (47 spp.) montane forest element defined for Fiji 15 species are present (or represented by closely related species) in the New Hebridean analysis; their distribution among the New Hebridean elements is as follows: A : 3 spp., B: 2 spp., E: 1 sp., F: 5 spp., G: 1 sp., h: 1 sp., outliers: 2 spp. Thus it appears that of the New Hebridean elements, the Santo montane element (F) is comparable to Fijian element C. However, the diversity of the Santo element is much lower and the equitability higher than that of the Fijian element:

NEW HEBRIDES RS = 15.3, H(S) = 3.40, e = 1.07
VITI & VANUA LEVU RS = 26.1, H(S) = 3.86, e = 0.42

but the montane samples from Santo are few and very small.



Dendrogram 6:- 54 spp. from 8 samples on Santo I., New Hebrides, clustered by BUGS3. Identities of stalks are given in table 22.

TABLE 22: STALK IDENTITIES FOR DENDOGRAM 6.

0 = OUTLIER

STALK	SPECIES	N	CLUSTER
1	ADRAPSA ABLUALIS	12	B
2	AGRIUS CONVULVULI	45	A
3	AMYNA NATALIS	12	A
4	ANOMIS NIGRITARSIS	43	B
5	ASOTA ALIENATA	34	C
6	ASOTA CARICAE	17	B
7	CALLOPISTRIA MERIDIONALIS	12	B
8	CALLOPISTRIA A	10	B
9	CATORIA CAMELARIA	16	B
10	GNATHOTHLIBUS EROTUS	77	B
11	CLEORA BUXTONI	36	B
12	CLEORA CHEESMANAE	23	B
13	CLEORA PSYCHASTIS	28	A
14	COMIBAENA INDUCTARIA	17	B
15	DAPHNIS HYPOTHOUS	64	A
16	DIACRISIA SP.	72	B
17	EILEMA SP.	60	B
18	EPIPLEMA CONFLICTARIA	17	B
19	ERICEIA GONIOSEMA	18	B
20	ERICEIA LEVUENSIS	51	B
21	EUCHROMIA RUBRICOLLIS	17	C
22	EUPROCTIS DOLICHOCERA	47	B
23	GYRTONA DIVITALIS	23	C
24	?HERMINIA SP.	27	B
25	HIPPOTION VELOX	11	B
26	AVATHA DISCOLOR	23	B
27	HYPENA DISUALIS	24	B
28	HYPENA GONOSPILALIS	27	B
29	LEUCANIA PSEUDOFORMOSANA	15	C
30	MACADUMA SP.	13	B
31	MACEDA MANSUETA	25	B
32	SASUNAGA OENISTIS	16	C
33	MALIATTHA INCONCISA	15	C
34	MIMEUSEMIA CENTRALIS	11	B
35	NANAGUNA ALBISECTA	12	C
36	NOLA MAJOR	28	A
37	NOLA TORNOTIS	21	B
38	NOLA NR. PURA	12	O
39	NOLA NR. SAMOANA	20	C
40	NOLA NR. PUMILA	23	C
41	PARALLELIA SOLOMONENSIS	12	B
42	PETELIA MEDARDARIA	29	B
43	PHILAGRIA ENTELLA	38	B
44	PLUSIA SP.	37	C
45	PLUSIA ILLUMINATA	109	B
46	PROGONIA B	42	B
47	PLATYSENTA ILLECTA	32	B
48	SIMPLICIA CAENEUSALIS	10	O
49	THERETRA NESSUS	167	B
50	THERETRA PINASTRINA	22	B
51	TIRACOLA PLAGIATA	338	B

f) New Hebrides - Santo.

Santo is the northernmost large island of the New Hebrides (see maps 1 and 8) and is the only island in the New Hebrides from which a large number of samples is available.

This analysis was carried out using the eight samples from Santo included in the previous analysis. These were as follows:

1. Camp 2, Apouna R., 450' - forest.
2. Camp 2, Apouna R., 450' - river bed.
3. Nokowula, 3700'.
4. Tabwemasana, 4500'.
5. Nokowula Creek 3500'.
6. Camp 3, Apouna R., 1000' - forest.
7. Camp 3, Apouna R., 950' - river bed.
8. Malao, coast.

Species represented by 10 or more individuals totalled 54: these were subjected to cluster analysis by BUGS3 and yielded dendrogram 6. The identities of the dendrogram stalks are given in table 22.

Taking the arbitrary level of division of clusters at 0.555, three clusters (A - C) can be separated: two species (48 & 38) are outliers. The distribution of 1000 specimens of the "average species" of each cluster is given in table 23. Cluster characteristics are as follows:

- A: (5 spp.) A small group of species almost entirely restricted to Malao: three of these are widespread secondary vegetation species but 13 and 36 are localised and generally uncommon.
- B: (36 spp.) A large group of species associated with the disturbed tropical lowland forest of the Apouna River valley: poorly represented at high altitudes and at Malao.
- C: (11 spp.) Montane forest element from the three highest samples.

Table 23: Distribution of 1000 specimens of the "average species" of each of three clusters among 8 sites from cluster analysis of light trap records from Santo.

Site	1	2	3	4	5	6	7	8
A	80	37	27	0	0	63	17	776
B	194	165	67	24	70	270	108	103
C	27	14	397	264	230	24	19	24

Numerical properties, diversity and equitability measurements of these clusters are given in table 24.

Table 24: N, S, diversity (RS and H(S)) and equitability of three elements defined by BUGS3 for Santo.

Element	N	S	RS	H(S)	e
A Malao	177	5	6.0	2.14	71.18
B Apouna forest	1531	36	32.3	4.42	0.77
C Montane	222	11	19.4	3.35	0.98

This analysis "confirms" three of the faunal elements identified in the previous analysis, A, B, and C of this analysis corresponding to D, A and F of the previous analysis. It is noteworthy that element B here has an RS diversity value higher than any other observed in this work although H(S) is exceeded by that of the rather mixed element B of analysis (b). Element C here has a lower diversity and a higher equitability than the Fiji montane element reflecting perhaps the very limited montane area in Santo.

g) Survey of cluster analysis results.

1. A ~~method~~ centroid cluster analysis method applied to light trap records has provided separation of groups of species which, for records from Viti and Vanua Levu, Fiji, and Santo, New Hebrides, are apparently associated with specific vegetation types.
2. In general, examination of these elements shows that their equitability is higher than that of an "untouched" light trap sample from a similar vegetation type to that with which the element is associated. Equitability of elements does not appear to be sample-size dependant.
3. The significance of the equitability values obtained is obscure: values range from 0.42 to 1.07 for elements associated with specific vegetation types and are shown below:

	FIJI (a)	N.HEB.(e)	SANTO(f)
SECONDARY BUSH/FOREST	0.70	0.75	0.77
TALASINGA	0.45	-	-
LOGGED FOREST (Nouankao)	-	0.45	-
MONTANE FOREST	0.42	1.07	0.98
MOSS FOREST	0.66	-	-
MONTANE FOREST (Aneityum)	-	0.77	-

Both the talasinga and the Nouankao forest have recently experienced extreme damage: talasinga is highly susceptible to drought and fire and the Nouankao area was badly damaged by logging operations. Yet the Fijian montane forest is relatively undisturbed. It has already been argued that low equitability may be indicative of a mature environment in which interspecific competition occurs and this could certainly be the case with Fijian montane forest.

The very opposite is the case with talasinga and the Nouankao River area: here niches are few and ephemeral and unlikely to offer a situation in which saturation and competition occur. On the other hand, these habitats offer one or two plant species in abundance and perhaps permit extreme dominance among one or two Lepidoptera species whose numerical superiority very much influences the value of e.

4. The diversities of the vegetation - associated Lepidoptera elements appear to reflect not only the richness of the associated habitats but also their size: values of RS for several elements are given below.

	FIJI (a)	N.HEB.(e)	SANTO(f)
SECONDARY BUSH/FOREST	18.6	26.6	32.3
TALASINGA	7.9	-	-
LOGGED FOREST (Nouankao)	-	5.1	-
MONTANE FOREST	26.1	15.3	19.4
MOSS FOREST	2.4	-	-
MONTANE FOREST (Aneityum)	-	3.4	-

5. The proportion of endemic species in the Fijian elements appears to be indicative of the age and maturity of the associated vegetation types.
6. The separation of New Hebridean elements suggests a moderate faunal difference between the northern and southern islands of the group (separation of montane elements F and G in analysis e).
7. The smaller islands of the Fiji group possess a large element of widespread "waif" species and this is complemented, in many cases, by a small group of species whose composition differs from island to island. The Rotuman fauna is markedly different from that of the smaller Fijian islands.
8. The fauna of Rotuma could not be separated into discrete elements: its species (with a few exceptions) are apparently widespread on the island.

- iv) The distributional pattern of the moths of Fiji in the context of the Pacific area.
- a) The proportions of three different groups of Macrolepidoptera among certain Pacific islands.

During this work a checklist of the Macrolepidoptera of the western and central Pacific islands was compiled: this has been used to provide the information used in the following discussion. Lists of species are available from the checklist for the following islands or groups of islands:

Austral Is.	Cook Is.
Kermadec Is.	Fiji
Gilbert & Ellice Is.	Guam
Loyalty Is.	Marquesas
Micronesia	New Caledonia
New Hebrides	Niue I.
Norfolk I.	Rapa I.
Rotuma I.	Samoa
Society Is.	Tonga

In addition one or two species of Lepidoptera have been recorded from Easter I., Henderson I., Pitcairn I., Tokelau Is., Tuamotu Is. and the Gambier Is. but these are not considered further here.

From the checklist the number of species of each of three groups of Lepidoptera recorded from each island or island group was counted. The three groups were

- a) Heterocera A - generally a group of large strong flying moths of the families Ctenuchidae, Arctiidae, Hypsidae, Nolidae, Agaristidae, Noctuidae, Lymantriidae and Sphingidae.
- b) Heterocera B - generally smaller, weaker-flying species than the preceding: the families Notodontidae, Geometridae, Saturniidae, Epiplemidae, Uraniidae, Cossidae, Limacodidae, Zygaenidae.
- c) Rhopalocera - the butterflies.

Table 25 shows the number of species of each group present in each island or island group and the area of land in each case.

Table 25: No. of spp. of 3 groups of Macrolepidoptera recorded from 18 islands or island groups.

Number (graphs 4-10)	Island/group	Area(km ²)	Heterocera	Heterocera	Rhopal-
			A	B	ocera
1.	Austral Is.	137	11	1	1
2.	Cook Is.	228	4	0	5
3.	Kermadec Is.	32	22	5	4
4.	Fiji	18272	232	121	42
5.	Gilbert & Ellice Is.	1026	17	2	5
6.	Guam	533	38	8	15

Number (graphs 4 - 10)	Island/group	Area (km ²)	Heterocera A	Heterocera B	Rhopal- ocera
7.	Loyalty Is.	5500	59	21	45
8.	Marquesas	1165	25	11	5
9.	Micronesia	2388	90	9	15
10.	New Caledonia	16705	227	115	62
11.	New Hebrides	11400	219	79	60
12.	Niue I.	259	15	1	5
13.	Norfolk I.	40	63	17	11
14.	Rapa I.	36	27	4	2
15.	Rotuma I.	47	51	10	11
16.	Samoa	3124	122	35	26
17.	Society Is.	1683	35	7	10
18.	Tonga	697	49	9	20

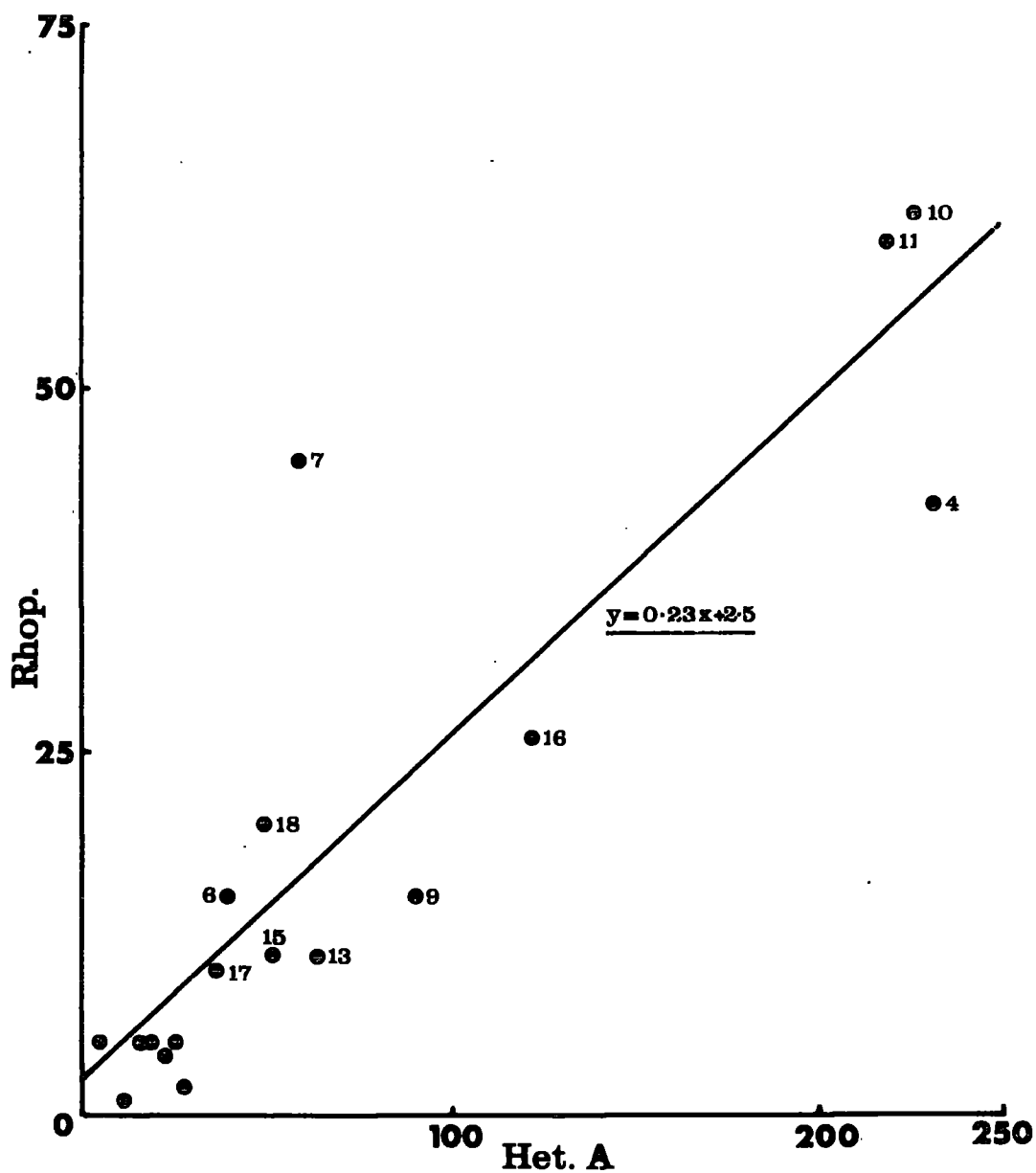
Graphs 4, 5 and 6 indicate the numerical relationship between the numbers of species of each of the three divisions on the eighteen islands. Butterflies have been well-collected on most island groups since the end of the last century: graph 4 suggests a linear relationship between the number of species of butterfly and the number of species of heterocera A but indicates that the moths of localities 7, 10 and 11 (Loyalty Is., New Caledonia and New Hebrides) are under-collected, the paucity of Heterocera A recorded from the Loyalty Is. being particularly noticeable, and that moths are also probably under-collected on Tonga (18) and Guam (6). Graph 5 suggests that Heterocera A and Heterocera B may not have a linear relationship: Fiji (4) and New Caledonia (10) have been well-collected for all groups of Macrolepidoptera but, as suggested earlier in this chapter, the Geometridae of the New Hebrides (Het. B) are probably under-collected owing to prevalent weather conditions during the trapping period. Graph 6 tends to confirm the insinuation of graph 5 and suggests that not only is there a non-linear relationship between Heterocera B and the two other groups but that the islands or island groups suggested in graph 4 as under-collected are almost certainly so: Fiji, even with these factors taken into account, is apparently remarkably rich in group B Heterocera and rather poor in Rhopalocera in comparison with the other islands and island groups included here.

- b) The relationship between recorded species and island area - the question of faunal impoverishment.

The relationship between the number of species of a particular group present on an island and the area of the island has been demonstrated and discussed in detail by a number of authors, notably MacArthur and Wilson (1967). The relationship is expressed by the formula

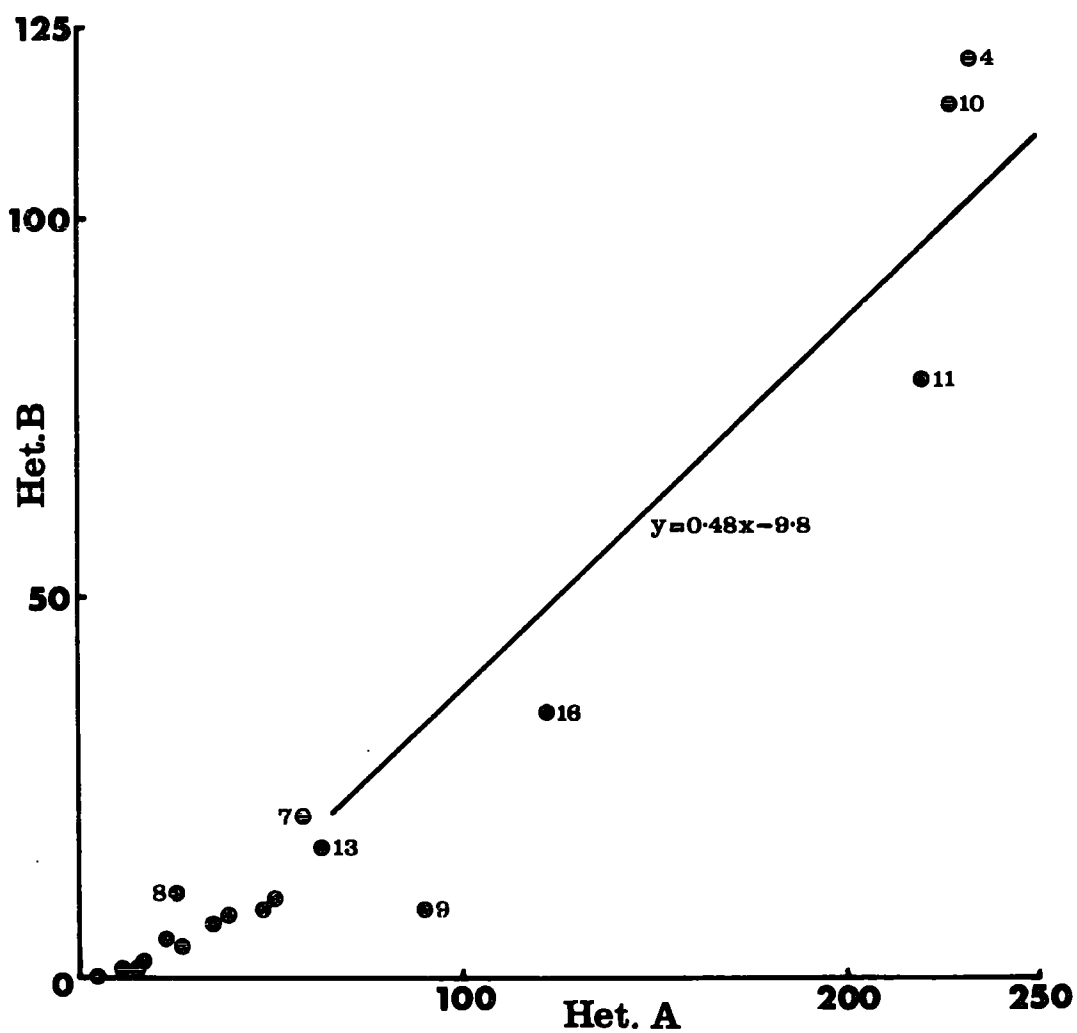
$$S = CA^z$$

where S is the number of species, C a constant (the value of which is dependant upon the taxon and area in question) and z a constant which varies empirically usually within the range 0.20 to 0.35. The value of z has been determined theoretically by MacArthur and Wilson (1967) as 0.27, its computation based upon the assumption that the whole population of a particular group of animals on an island conforms (in its distribution of individuals among species) to Preston's (1962) lognormal distribution and that there is a fixed number of individuals which may inhabit a given area of an island. The theoretical value

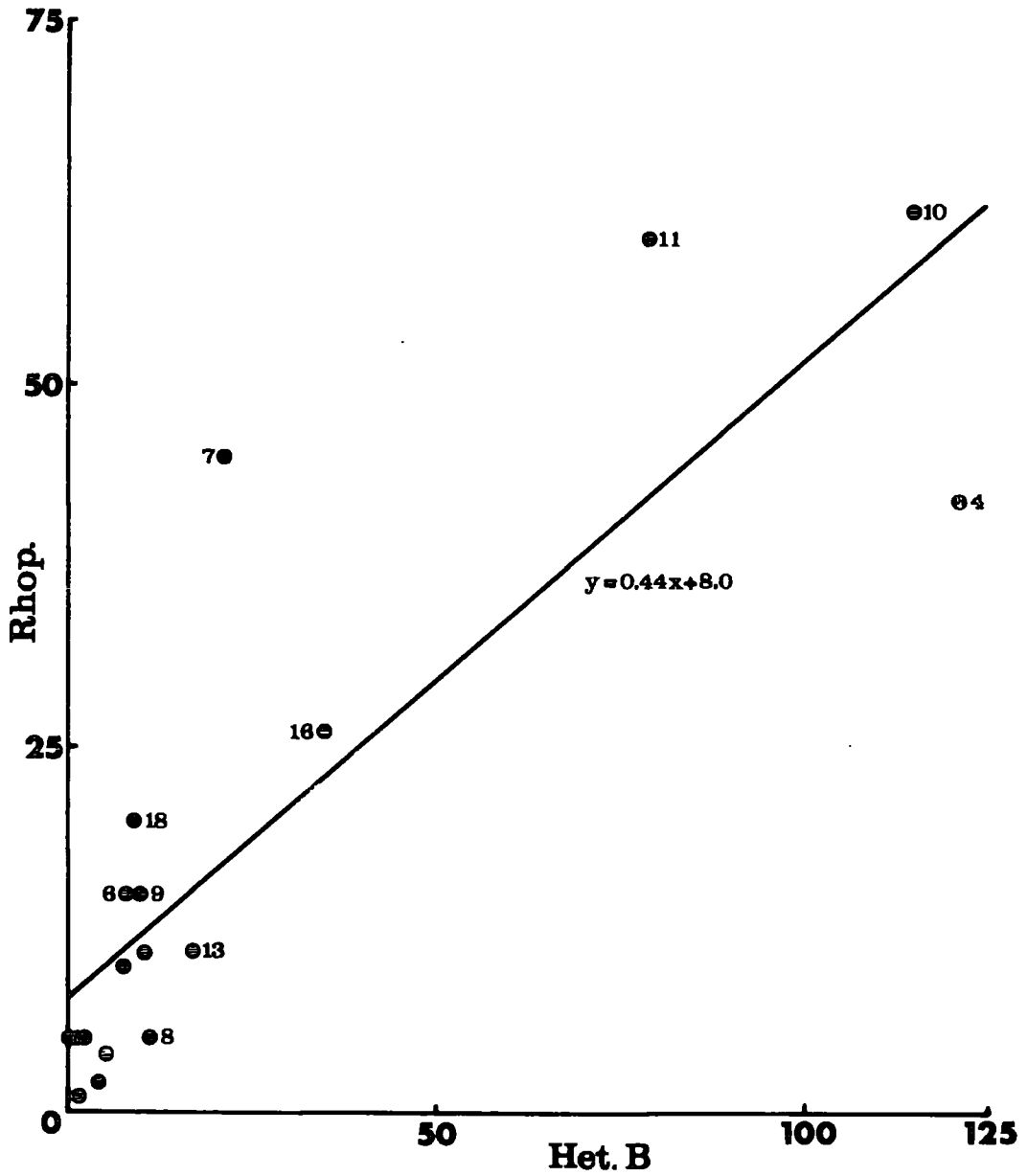


Graph 4

Number of Rhopalocera spp. plotted against number of Heterocera A spp. recorded from 18 Pacific islands or island groups.



Graph 5 Number of Heterocera B spp. plotted against number of Heterocera A spp. recorded from 18 Pacific islands or island groups.



Graph 6 Number of Rhopalocera spp. plotted against number of Heterocera B spp. recorded from 18 Pacific islands or island groups.

of z is somewhat lower than most empirically-determined values. Furthermore (MacArthur & Wilson, 1967:18)

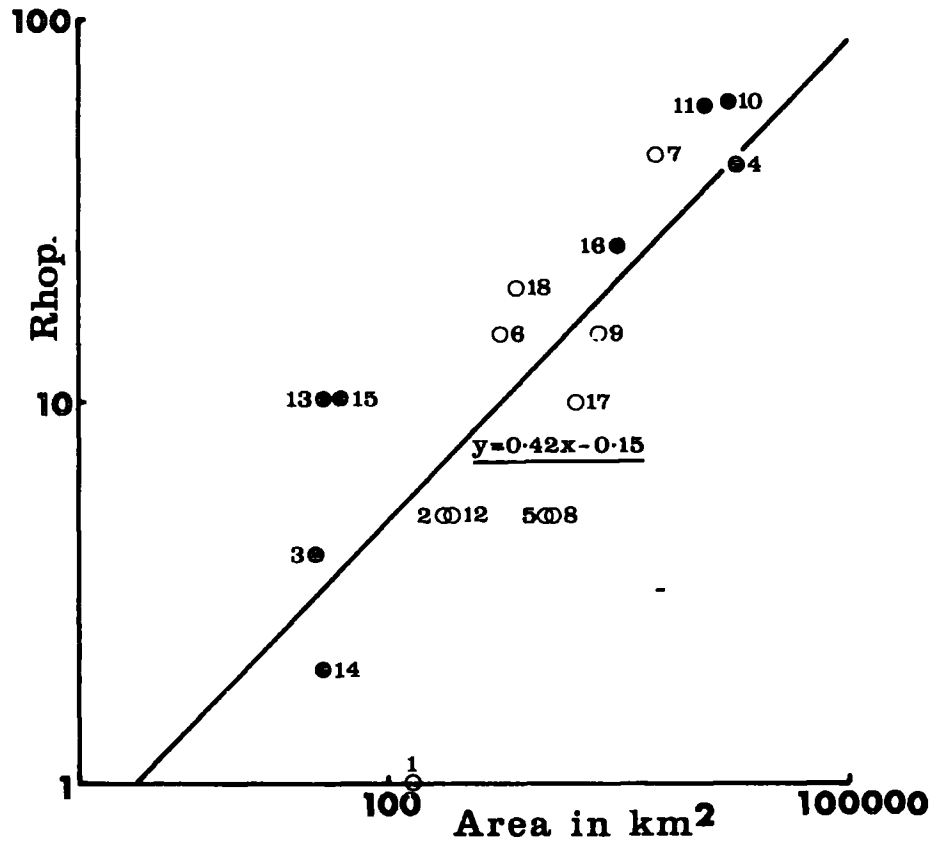
"When, however, the species counts are made from sample plots of increasing size on the same island or continent, the z values are smaller, usually falling between 0.12 and 0.17. This deviation can be at least partly explained as the result of flooding of small sample plots by transient species that maintain themselves in ecologically different areas nearby - an exchange that is drastically reduced among islands due to the barriers that separate them. The opposite deviation, an increase in z above 0.27, can be explained as the outcome of the breaking up of biotas of large islands into semi-isolated communities due to the increase in topographic barriers and environmental variation on such islands."

MacArthur and Wilson also draw attention to the situation in isolated small islands and archipelagos (e.g. the islands of the central Pacific) where both empirical observation and theoretical prediction from their model of immigration/extinction equilibrium indicate that the logarithms of the species numbers increase with area more rapidly (i.e. z is higher) than on islands close to a faunal source. On the latter type of island C would be higher than on an isolated island or archipelago.

From these considerations, taking the islands of the western and central Pacific, we would expect that a graph of the logarithms of species numbers against the logarithms of the islands' areas would show several points at the top of the scatter falling in a line with a slope of at least 0.27: these would be islands closer to the faunal source. If the islands involved in this series of "peak points" exhibited increasing habitat heterogeneity with increase in area, z would tend to be greater than 0.27. Small, isolated islands would also show a steep slope but their curve would fall below that of the islands near to the faunal source as C would be lower due to impoverishment.

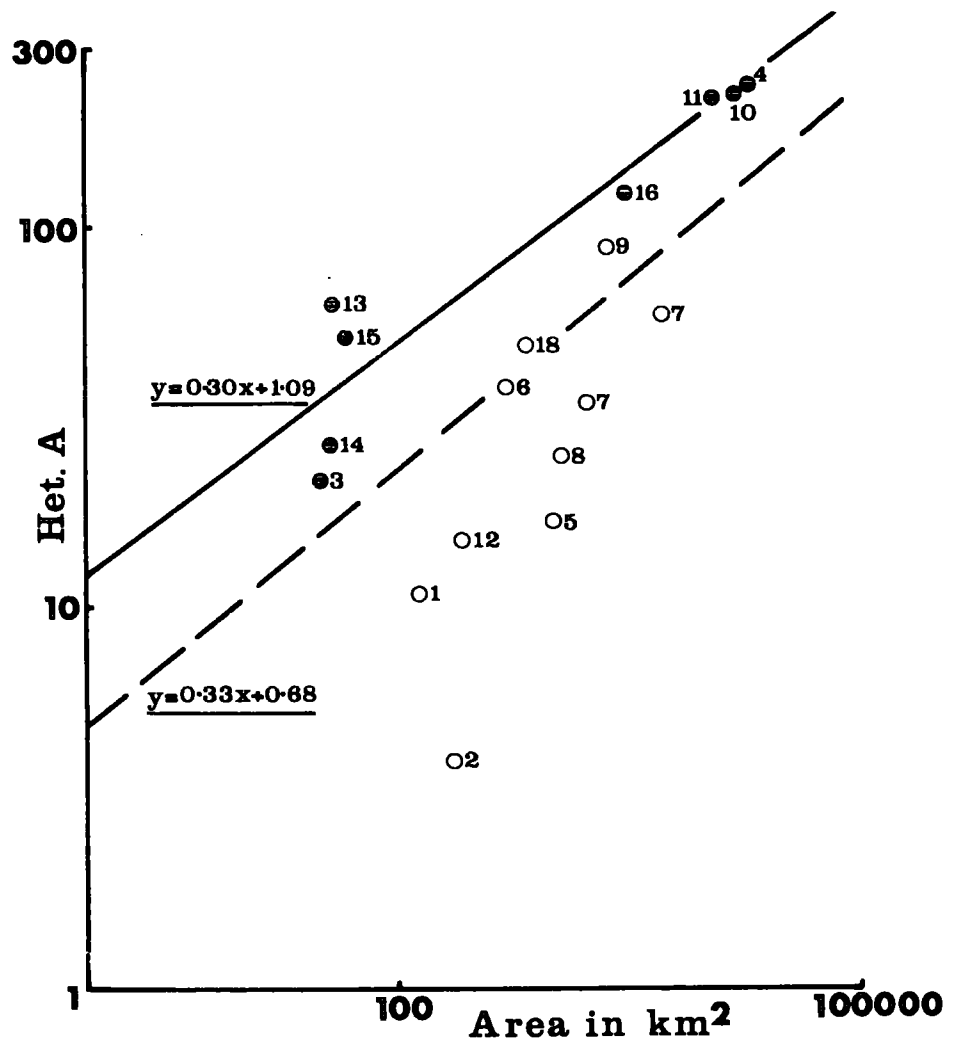
Graphs 7 - 10 utilise the figures in table 25: the slope of the curve described by the points corresponds to z . Of the islands and island groups listed in table 25, on only 8 have Heterocera been reasonably well-collected; these are the Kermadec Is., Fiji, New Caledonia, New Hebrides, Norfolk I., Rapa I., Rotuma I. and Samoa. In graphs 7 - 10 points representing islands or island groups suspected of being under-collected are indicated by an open circle. In graphs 8 - 10 the solid regression line in each case has been computed using records from the 8 well-worked localities: the broken line has been computed using all 18 points.

Considering firstly graph 7, a plot of *Rhopalocera* spp. against island area, it will be seen that the z value from regression of all points is 0.42 - very high. The "peak points" (13, 15, 11, 10) have a z of 0.31. Several islands and groups are apparently impoverished, notably the Austral Is. (1), Rapa I. (14), Kermadec Is. (3), Niue and the Cook Is. (12, 2), Gilbert & Ellice Is. and Marquesas (5, 8), Micronesia (9) and the Society Is. (17). Fiji, Samoa, Tonga and Guam would seem to have fewer butterfly species than expected.



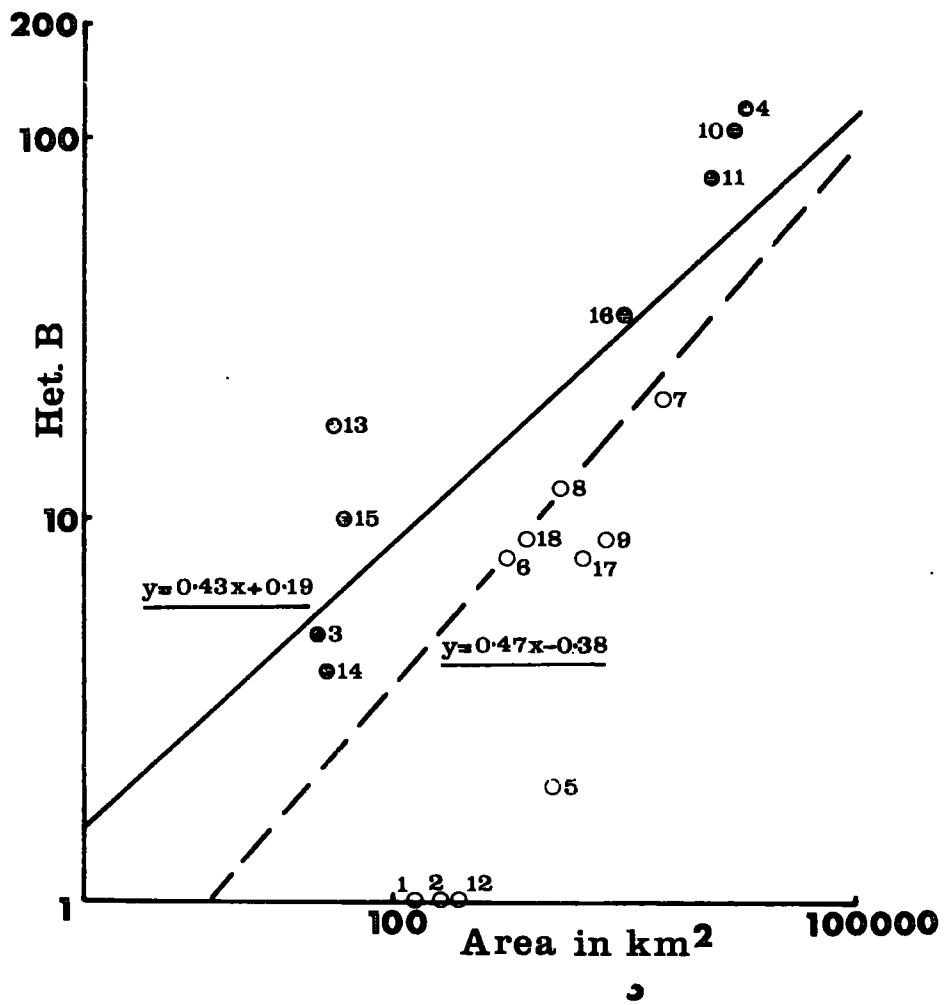
Graph 7

Number of Rhopalocera spp. recorded from 18 Pacific islands or island groups plotted against island or group area (scales logarithmic - regression using logs in base 10).



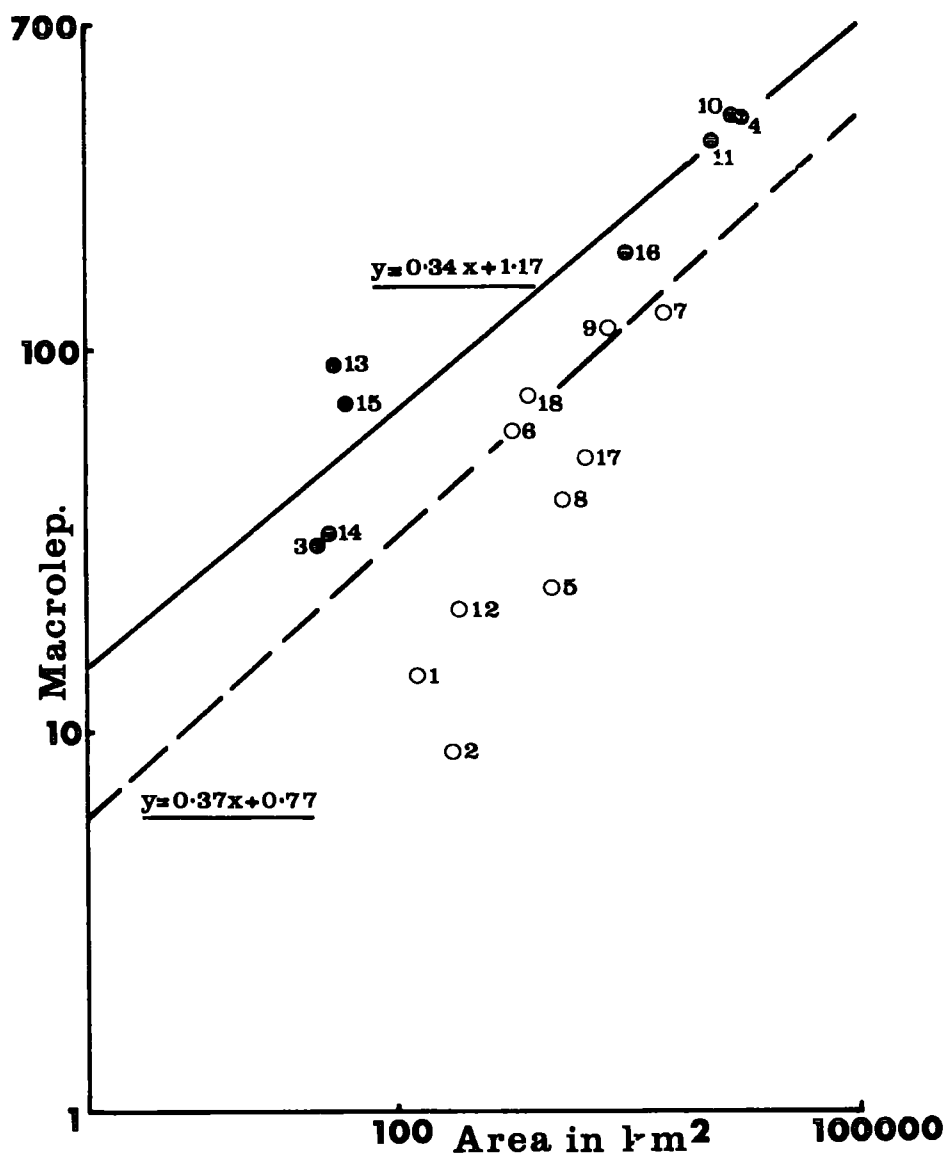
Graph 8

Number of Heterocera A spp. plotted as in graph 7:
broken regression line for all points, solid
line for "well-worked areas" (solid dots).



Graph 9

Number of Heterocera B spp. plotted as in graph 8.



Graph 10

All Macrolepidoptera spp. recorded from 18 Pacific islands or island groups plotted against island or group area: scales logarithmic; regression using logs in base 10 - solid line for "well-worked areas" (solid dots), broken regression line for all points.

Curiously, both Norfolk I. and Rotuma which, although close to the Papuan faunal source area, are very isolated do not appear to suffer from faunal impoverishment.

In graph 8 both values of z are much closer to the theoretical value than for Rhopalocera: the "peak points" have an extremely low z value, in the region of 0.23. Under-collection makes recognition of impoverished areas rather difficult but it would appear that the Kermadec Is. (3) and Rapa I. (14) are impoverished. Efficiency of collection on the Kermadec Is. is known to be good but is probably by no means complete. Norfolk I. (13) is perhaps, if anything over-collected: its faunal list contains several species which are migrants from eastern Australia (J.D. Holloway - pers. comm.).

Graph 9 reflects the comparatively poor dispersive ability of Heterocera B. Values of z are high: the "peak points" (13,10,4) have a z value of 0.31. Among the well-worked islands impoverishment is apparent on the Kermadec Is. (3), Rapa I. (14), and Rotuma (15): even Samoa (16) has rather fewer species than expected. The apparent impoverishment of Samoa may, however, be due to lack of collecting at high altitudes on Savaii, the westernmost island of the group.

In graph 10, all Macrolepidoptera species are considered: the "peak points" have a z value in the region of 0.27 and among the well-worked islands the Kermadec Is., Rapa I. and (to a limited extent) Samoa show evidence of faunal impoverishment.

In the above discussion the included islands are populated by Macrolepidoptera whose faunal affinities are either to Papua and the East Indies or to Australia and New Zealand. Islands in the latter category are Norfolk I. and New Caledonia (the latter has a mixed Australian and Melanesian-derived fauna - J.D. Holloway ² pers. comm.) and the Kermadec Is. The Galapagos Is. (7700 km²) have 86 spp. of Heterocera A (A.H. Hayes - pers. comm.) and 14 spp. of Heterocera B (Rindge, 1973) all of apparently Neotropical origin: on graphs 8 and 9 the Galapagos Is. would appear to be very much impoverished, but differences in faunal origin make any firm₂ conclusions in this respect very suspect. Hawaii (16000 km²) has 99 Heterocera A, 59 Heterocera B and 10 Rhopalocera. On graphs 7 - 10 Hawaii would rate as impoverished and, taking area into account, its recorded species are on a par with the Galapagos Is. with the exception of Heterocera B in which it is very much richer apparently through endemic radiation.

Although the information used here is sketchy it would appear that there is a pronounced degree of faunal impoverishment in all Macrolepidoptera to the east of a line running to the east of Guam, between Rotuma and the Ellice Is., north of Samoa, curving south and westward between Tonga and the Cook Is. and running west of the Kermadec Is. The central "lump" in this line, accommodating Fiji, Samoa and Tonga is truncated to a point between Fiji and Samoa if only Heterocera B (the group of families dominated by Geometridae) are considered. Critical treatment restricted to Rhopalocera would require shift of the line to the west of Guam and Micronesia and inclusion of Fiji, Samoa and Tonga in the "impoverished area".

Viewing the Macrolepidoptera of Fiji and Rotuma in the context of the western Pacific, the fauna of neither area seems to be impoverished: however, separating the three components of the Macrolepidoptera, it would seem that the butterfly fauna of Fiji is somewhat poor as are the Heterocera B (mainly Geometridae) of Rotuma.

c) The distribution of Macrolepidoptera in the western Pacific: faunal affinities.

Tables 26, 27 and 28 indicate the number of species on Fiji, Rotuma and Samoa conforming to particular distributional patterns among neighbouring islands and island groups. Distributions are taken as being those of subspecies where these are defined and in common usage. Dubious subspecific differentiation as, for example, in Doleschallia bisaltide (Nymphalidae) has been ignored.

Table 26: The distribution of the Macrolepidoptera of Fiji among neighbouring island groups.

	N.Hebrides & N. Melanesia	N. Caledonia	Fiji	Samoa	N	%
1	X	X	X	X	77	19
2	X		X	X	24	6
3	X	X	X		42	11
4	X		X		31	8
5		X	X		11	3
6		X	X	X	5	1
7			X	X	15	4
8			X		182	46
9		Australia + Fiji			5	1
10		Migrants and introductions			3	1
					<u>395</u>	

7 spp. in category 3, 1 in 4 and 1 in 5 "bypass" Samoa and occur on islands east of Samoa.

Table 27: The distribution of the Macrolepidoptera of Rotuma among neighbouring island groups.

S. + N. Melanesia	Fiji	Rotuma	Samoa	N	%
X	X	X	X	49	68
X	X	X		8	11
X		X	X	2	3
	X	X	X	1	1
	X	X		4	6
		X	X	2	3
		X		6	8
				<u>72</u>	

Table 28: The distribution of the Macrolepidoptera of Samoa among neighbouring island groups.

S. + N. Melanesia	Fiji	Samoa	E. of Samoa	N	%
X	X	X	X	48	26
X	X	X		58	32
X		X		9	5
	X	X	X	2	1
	X	X		13	7
		X		49	27
	Rotuma + Tonga			1	1
	Rotuma			1	1
	Australia (?+New Guinea)			1	1
	Tonga + E. of Samoa			1	1
				<u>183</u>	

The most marked feature of table 26 is the very large proportion of the Fijian Macrolepidoptera which are endemic to the Fiji group at subspecific or specific level. Many of these taxa are described as new in chapter 5 and their closest apparent allies given. It will be seen that in almost all cases the affinities of these taxa are to species in the Asian - Indonesian - Papuan - Melanesian area rather than to species of the Australian - southern Pacific region (Australia, New Zealand, Norfolk I., Kermadec Is.). Notable exceptions here are Chloroclystis nina (affinities to Australia and New Zealand) and Gathynia yasawa (Australian affinities). 30% of Fijian species have a range which extends to Samoa: a further 2% "bypass" Samoa and occur in islands further east. A large proportion (83%) of the 213 nonendemic Fijian species also occur in the New Hebrides and/or northern Melanesia and 68% of these "Melanesian" species also occur in New Caledonia. Only 4% of the total fauna (8% of the non-endemics) occurs in New Caledonia but not in the New Hebrides or N. Melanesia. Species with a "southern range" (i.e. New Caledonia and/or Australia) thus make a very small contribution to the Fijian Macrolepidoptera fauna: only about a third of these range further east to Samoa. 4% of the total of Fijian species are restricted to Fiji and Samoa, again, a very small contribution.

It would appear that the bulk of the Fijian Macrolepidoptera fauna has originated from Papuan sources: less than 6% of the recorded Fijian species have distributions or close allies which unequivocally suggest a south - western origin. A good proportion (60% of non-endemic spp.) of Fiji's species range further eastward into the Pacific, most of these occurring on Samoa.

Table 27, showing the distributional pattern of the Macrolepidoptera of Rotuma, gives a very different picture: the proportion of endemic species (or subspecies) is very small and the bulk of the species are of wide range, extending further east to Samoa. Four species are shared only with Fiji, two with Samoa: eight species terminate their range eastward on Fiji and Rotuma. One species is restricted to Rotuma, Samoa and Fiji while two are Melanesian, their distributions by-passing Fiji and extending to Samoa. Fiji is about half the distance from Rotuma that Samoa and the northern islands of the New Hebrides are: the high degree of faunal affinity between Rotuma and Samoa and Rotuma and the New Hebrides - Solomons area is therefore rather surprising. The significance of this is discussed later.

The distributions of the Samoan species among neighbouring island groups are given in table 28. The proportion of endemic species is fairly high (27%) as is that of widespread species which range from S. and N. Melanesia to Samoa or further east. 66% of the Macrolepidoptera are also found in Fiji (900 km from Samoa) and 63% are also found in N. and/or S. Melanesia (at least 2000 km distant). The affinity to Melanesia (86% of the non-endemic species occurring there) seems to me to be surprisingly high as is the number of species which bypass Fiji (5% of the total). Only 27% of the Samoan species extend their ranges any further to the east.

In summary, the fauna of Fiji, Samoa and Rotuma is of Papuan derivation and has strong affinities with the fauna of northern Melanesia. The "southern element" (species with Australian-New Caledonia distributions) is not at all well-developed and only

five "southern" species reach Samoa. The fauna of Rotuma exhibits strong affinities with Samoa, N. Melanesia and Fiji. The fauna of Samoa is, to some extent, an extension of that of Fiji but several of its Melanesian species do bypass Fiji and two of these are found on Rotuma. A very large number of species terminate their eastward distributions in Fiji or Samoa but only 4% of Fijian species terminate their westward distribution in Fiji (all of these occur in Samoa and some further east). No Samoan species terminates its westward distribution in Samoa. Thus there is only a very small "Pacific element" of species apparently originating in Fiji, Samoa or islands to the east. Both Fiji and Samoa have a large number of endemic species. Only 17% of Rotuma's species terminate their eastward distribution there: 8% of Rotuman species are endemic and these will be discussed later in this work.

The remaining islands of the Pacific, of which at least some of the Macrolepidoptera species are known, often have a faunal list dominated by widespread species of Papuasian origin which are found almost throughout the Pacific. Brief comments follow on the Macrolepidopterous fauna of several groups in which these species are simply referred to as "widespread". Their distributions follow the first line of tables 26 - 28 (above).

Kermadec Is. : About half the spp. widespread, the other half of southern (New Zealand/Australia/Norfolk I./New Caledonia) origin.

New Caledonia & Loyalty Is. : Widespread spp., many endemics of Papuasian-Melanesian affinities and a large, well-defined southern element. A detailed biogeographic analysis is to be published by J.D. Holloway.

Norfolk I. : Predominantly widespread spp. but also a well-defined southern (Australia-New Zealand) element: a detailed biogeographic analysis is to be published by J.D. Holloway.

Austral Is. : All widespread spp.

Cook Is. : All widespread spp.

Gilbert & Ellice Is. : All widespread spp. except for Nagia hieratica Hampson which is of Micronesian-Papuan affinity and allied to N. homotima Tams from Samoa. Nagia appears to follow a Papua-Micronesia-central Pacific route comparable with that of Utetheisa (see Robinson, 1971b).

Guam I. : Many widespread spp. but also a few spp. of probably Philippine origin.

Marquesas Is. : Mainly widespread Pacific spp. but endemic Vagrans, Libythea, Lambula, Callopistria, Achaea, Hypena, Macroglossum, Scopula, Chloroclystis and Cleora spp. of Papuasian-Melanesian origin.

Micronesia : Comments as for Guam.

New Hebrides : Fauna predominantly of Papuan-Melanesian origin with about 30% endemism : a few spp. of southern origin. Detailed taxonomic investigation has yet to be carried out.

Niue I. : All widespread spp.

Rapa I. : Mostly widespread spp. but endemic Euplexia, Hydrillodes, Chloroclystis, Cleora spp. and one Hypena sp. also in Marquesas. All spp. of Papuan-Melanesian affinity except for Vanessa itea F. (southern) and Euplexia (see Clarke, 1971).

Society Is. : Several endemic butterfly subspecies, endemic Hydrillodes sp., endemic Hypenid genus (Fautaua), 2 endemic Cleora spp.; fauna of Papuan-Melanesian-Pacific origin.

Tonga : All spp. also found in Fiji, mostly widespread. Gymnoscelis erylone Meyrick apparently endemic.

Galapagos Is. : Fauna of Neotropical origin - many endemic spp.: two spp. (Agrotis epsilon and Characoma nilotica) which occur through the Pacific.

Hawaii : See Zimmerman (1948, 1958); a very large number of endemic spp.. Sphingidae are of Nearctic derivation, Geometridae of Papuan/Asian origin (Zimmerman suggests "south Pacific" but this seems unlikely in a number of cases), Noctuidae of Asiatic, Pacific, Oriental and Nearctic affinities, butterflies of Nearctic and Asian derivation.

d) Endemism and radiation.

Perhaps no other island group in the world matches Hawaii in the development of endemic Macrolepidoptera. Of its 46 genera, 12 are endemic and 18 contain only endemic species. The average number of species in an endemic Hawaiian genus is 5.28, in a non-endemic genus 1.28. The 132 endemic species (79% of the total species) have apparently been derived from only 19 or 20 ancestral invasions (Zimmerman, 1958) and there has been amazing radiation, the most spectacular examples being Scotorythra (35 spp.) and Agrotis (26 spp.). The overall average number of species per genus is 3.65.

The only endemic genus developed among the Pacific islands east of Samoa is Fautaua (2 spp.) on the Society Is. where the average number of species per genus is 1.13. Single endemic species have been derived from single ancestral species on several other Island groups (see above) and it is possible that the pairs of Cleora spp. on Rapa, the Marquesas and Society Is. might have been developed from a common ancestor.

Samoa possesses five endemic monotypic genera:

Chrysaeglia (Arctiidae, Lithosiinae)
Anomocala (Noctuidae, Catocalinae)
Cymodegma (Noctuidae, Catocalinae)
Machaeropalpus (Noctuidae, Hypeninae)
Mormecia (Noctuidae, Hypeninae)

The remaining endemic Samoan species are single derivatives from a single ancestor; the overall average number of species per genus is 1.44.

The situation in Fiji is very different from that in Samoa. Seven named genera are endemic and a further eight undescribed species may represent endemic monotypic genera. These genera are as follows :

- Xois (Satyridae - 1 sp.)
- Lophocoleus (Noctuidae, Hypeninae - 6 spp.)
- Palaeocoleus (Noctuidae, Hypeninae - 1 sp.)
- Tholocoleus (Noctuidae, Hypeninae - 1 sp.)
- Mesurodes (Geometridae, Geometrinae - 1 sp.)
- Acratocera (Cossidae - 1 sp.)
- Levuana (Zygaenidae, Procrinae - 1 sp.)
- (1) indeterminate sp. (Noctuidae, Acronictinae)
- (2) indeterminate spp. (Noctuidae, Ophiderinae)
- (4) indeterminate spp. (Noctuidae, Hypeninae)
- (1) indeterminate sp. (Geometridae, Geometrinae)

The only example of endemic radiation in Fiji occurs in Lophocoleus but the following genera also show radiation, apparently from a single ancestral species:

- Hypenagonia (5 spp.) (Noctuidae, Hypeninae)
- Dasychira (3 spp.) (Lymantriidae)
- Eoasthena (6 spp.) (Geometridae, Larentiinae)
- Beggina (6 spp.) (Limaecodidae)
- Sauris (4 spp.) (Geometridae, Larentiinae)

Beggina and Eoasthena have their centres of radiation in Fiji, both being represented by only one species otherwise, in the Solomons and Samoa respectively. All other Fijian endemic species are apparently derived singly with the possible exceptions of Idaea bathromyses and dicenea. The average number of species per genus in Fiji is 1.92.

The New Hebrides possess one well defined monotypic endemic genus which is undescribed : the insect in question is a large Catocaline. Four indeterminate Ophiderine species might possibly represent endemic monotypic genera. The remainder of the New Hebridean endemics are single derivatives with no close sympatric ally. The average number of species per genus in the New Hebrides is 1.83.

The Macrolepidoptera of New Caledonia are being studied at present by J.D. Holloway : there is at least one endemic, monotypic genus and a genus (or endemic subgenus) with 11 species apparently derived from a single ancestor. In possibly two other genera two or three species have been derived from a single ancestral species. The average number of species per genus is 1.83.

Rotuma has only one endemic species, apparently of Melanesian (?Solomons) derivation. This is Schrankia furor. Of five endemic subspecies, four are related to subspecies of the same species in Fiji and Samoa and one is a subspecies of a Fijian species. Three of the endemic subspecies are darker (more greyish)

than their counterparts on Fiji and Samoa and two of these are also smaller. The average number of species per genus is 1.38

In summary, Fiji has more endemic genera and more endemic radiation than any other Pacific island group except for Hawaii. Fiji also has fractionally more species per genus than any other territory considered. The degree of radiation, however, is not great, no more than six species having apparently descended from a single ancestral species. Subspeciation within the Fiji group is almost entirely absent with the exception of certain Danaid butterflies (see Poulton, 1923c, and Euploea and Danaus in chapter 5) and Cleora munditibia which has a distinct subspecies on Ongea I..

Chapter 5: The Macrolepidoptera of Fiji and Rotuma -
 a systematic account.

Part 1:

HETEROCERA (moths)

- the families

Ctenuchidae	p.99
Arctiidae	p.101
Hypsiidae	p.105
Nolidae	p.108
Agaristidae	p.111
Noctuidae	p.112
Lymantriidae	p.141
Sphingidae	p.244
Saturniidae	p.309
Epiplemae	p.310
Uraniidae	p.315
Cossidae	p.316
Limacodidae	p.317
Zygaenidae	p.321

The following account, with plate figures and text figures describes the species of Macrolepidoptera known to inhabit Fiji and Rotuma. All material examined, including types and specimens herein described as new are in the collection of the British Museum (Natural History), London except where otherwise stated (see Chapter 1).

Generic usage conforms to that of Nye (The generic names of the Noctuidae, Agaristidae and Nolidae of the world. I.W.B. Nye. Bull. Br. Mus. nat. Hist., Suppl. 24, in press); references follow Nye and the World List of Scientific Periodicals.

Measurements of "expanse" are the maximum width of a specimen set in conventional fashion and are in millimetres throughout.

Genitalia preparations are in BM(NH), the numbered series being as follows:

BMAGSN	-	BM Arctiid Genitalia Slide Number
BMNGSN	-	BM Noctuid Genitalia Slide Number
BMGGSN	-	BM Geometrid Genitalia Slide Number

FAMILY: CTENUCHIDAE

Genus: Euchromia Hubner, 1819, Verz. Bekannter Schmett.(8)121.

Euchromia creusa (L.)

Sphinx creusa Linnaeus, 1758, Syst. nat. (edn 10)1:494

Type not examined - identity not in doubt.

Male: Face white, a small patch of blue scales dorsally. Head black with an iridescent deep turquoise 'cap'. Antennae and thorax black; thorax dorsally deep turquoise. Legs black, coxae deep turquoise ventrally. Abdomen black, dorsally with three anterior deep turquoise bands and five posterior crimson bands. Abdomen ventrally crimson for posterior two thirds with some black intersegmental scaling. Forewing black with transparent lunules, reniform and a basal streak extending distally and posteriorly to one third, deep iridescent turquoise. Hindwing black with transparent lunules, some iridescent turquoise scaling at the costa.

Female: (Plate fig.1) Similarly patterned to the male.

Diagnosis: Larger (expanse 50-53mm.) and the wings less lunulate than in Euchromia vitiensis Hampson (compare plate figs.1 and 2). First abdominal segment not banded with deep orange. The closest apparently of this species is Euchromia shortlandica Swinhoe (Ann. Mag. nat. Hist.(7)15:496, 1905) from the Solomon Islands in which the first abdominal segment is banded with orange-yellow.

World distribution: New Guinea, E. Australia, New Hebrides, New Caledonia. Apparently replaced by shortlandica in the Solomons.

Fiji distribution:- VITI LEVU: Suva, 5km. W of Namboro Prison (15km. W of Suva). VANUA LEVU: Savusavu. KORO. OVALAU.

Remarks: Day-flying, rarely taken at light but attracted to dried twigs of Heliotropium. Moderately common at Savusavu, otherwise local and rare.

Euchromia vitiensis Hampson

Euchromia vitiensis Hampson, 1903, Ann. Mag. nat. Hist.(7)11:340.

Type examined.

Male: (Plate fig.2) Face white, head black speckled dorsally with iridescent deep turquoise scales. Antennae black. Thorax black, dorsally iridescent deep turquoise. Legs black, coxae of forelegs white ventrally, coxae of mid and hindlegs deep iridescent turquoise. Abdomen black, the first segment deep orange dorsally. Second and third abdominal segments dorsally with a medial and two lateral iridescent turquoise spots, ventrally with a pair of lateral iridescent turquoise spots. Fourth abdominal segment deep orange dorsally and ventrally, antero-dorsally some black scaling. Fifth, sixth and seventh segments patterned as the second and third. Eighth tergite black with a dorso-medial iridescent turquoise spot. Forewing black with transparent lunules, reniform and two basal spots iridescent turquoise. Hindwing black with transparent lunules.

Female: Similarly patterned to the male.

Diagnosis: Expanse 33-40mm.. The characteristic abdominal pattern serves to distinguish this species from E. creusa (L.)(q.v.). The fore coxae of creusa are iridescent turquoise, not white. The closest apparently of this species is Euchromia oenone Butler (J. Linn. Soc. Lond., Zool. 12:365, 1876) from the Solomon Islands which is smaller and lacks the deep orange colouring of the first abdominal segment. The dorsal turquoise abdominal markings form a continuous band in this species - in vitiensis they form dorsal and paradorsal spots.

Fiji distribution:- VITI LEVU: Suva, Korolevu, Nandarivatu, Lautoka, Koro-O. VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro.

Remarks: Endemic to the larger islands of the Fiji group; a fairly common species in a variety of habitats. Never observed flying by day and frequently taken at light.

FAMILY: ARCTIIDAE

Subfamily: Lithosiinae

Genus: Macaduma Walker, 1866, List Specimens Lepid. Insects Colln Br. Mus. 35:1704.

Macaduma corvina (Felder)

Cisthene corvina Felder, 1875, Reise Ost. Fregatte Novara, Zool. 2(Lepid.)2:pl.138, fig.63. Type examined.

Male: (Text fig.11) Head, antennae, thorax, legs and abdomen black, the thorax dorsally with an iridescent greenish sheen. Forewings and hindwings black with some bluish iridescence on the forewings. There is a patch of elongate scales on the forewing costa at one half. The left valve is illustrated in text fig.2.

Female: Similarly patterned to the male but lacking the costal patch of elongate scales.

Diagnosis: Expanse 18mm.. The only Macaduma species which is black all over, corvina is readily separable from all other members of the genus. The closest apparent ally of this species is Macaduma montana sp. n. (q.v.) from which corvina is differentiated by its being black all over and in the dorsal process of the left valve at two thirds being less elongate than in montana, (compare text figs.2 and 1).

Fiji distribution:- Known only from VITI LEVU - Nandarivatu (750m.) and Koro-O (1000m.).

Remarks: An extremely rare species endemic to Viti Levu. In five years H.S. Robinson and I have collected only four specimens: a male from Nandarivatu, a female from Koro-O and one male and one damaged specimen - sex indeterminate - which are labelled only "Fiji".

Macaduma montana sp. n.

Male: (Text fig.10) Head, thorax, antennae and abdomen deep smoky brown, paler beneath. Forewing deep smoky brown with darker striations as in text fig.10. Forewing with a characteristic patch of elongate scales at one half of the costa. Hindwing pale mustard-yellow. Paratypes exhibit a range of variations of shade of forewing; one individual has a brownish cream antero-medial fascia, another a cream forewing with a basal fuscous suffusion and a black terminal band extending proximally for one third the length of the forewing. The hindwing may be suffused with grey and in one male specimen the subterminal fascia is suffused with fuscous. The left valve is illustrated in text fig.1.

Female: Similarly patterned to the male (though without the elongate costal scales) and showing a similar range of variation.

Diagnosis: Expanse 18-21mm.. Easily differentiated by wing pattern from M. corvina (Felder)(q.v.). The male is distinguishable from that of M. striata sp.n.(q.v.) in that it possesses a fringe of elongate scales at one half of the costa. Wing pattern serves to differentiate the females of montana and striata and female montana are usually the larger of the two species. The dorsal process of the male valve of montana is more elongate than that of corvina or striata.

Fiji distribution: Type localities.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 15-17.viii.1969, H.S. & G.S. Robinson.



Paratypes: 4♂♂, 3♀♀, data as holotype.

2♂♂, 2♀♀, as holotype but 27-30.ix.1968.

2♂♂, as holotype but 21.xi.1971.

2♂♂, FIJI, Viti Levu, Koro-O, 23.xi.1971, H.S. & G.S. Robinson.

♂, FIJI, Vanua Levu, Ndelaikoro VHF Sta., 940m., 24-25.ii.1971, G.S. Robinson.

Remarks: Rare and local; restricted to montane rain forest.

Macaduma striata sp. n.

Male: (Text fig.9) Head and prothorax greyish brown; antennae, thorax, abdomen and legs fuscous yellow; mesothorax dorsally black; legs black externally. Forewing white patterned with black and brown as in text fig.9. Hindwing mustard yellow with a faint subterminal fuscous band. Paratypes exhibit a range of variation, in most cases involving the degree of suffusion of brown in the forewing. One male is so dark as to resemble superficially M. montana. The left valve is illustrated in text fig.3. The dorsal process at two thirds the length of the valve, characteristic of M. montana and M. corvina is represented by only a slight swelling of the margin of the valve.

Female: Similarly patterned to the male.

Diagnosis: Expanse 16-20mm.. Differs from M. montana and M. corvina in that the male costa is not angled and does not bear a patch of elongate scales. The wing pattern of this species is diagnostic as is the shape of the valve in the male. The closest apparent ally of this species is Macaduma samoensis Tams (1935, Ins. Samoa 3:189, plate6, fig.10) from which striata is distinguished by the lack of an extruded "tail". The dorsal swelling of the left valve of striata distinguishes it from samoensis which has no dorsal swelling. The right valve of samoensis is swollen dorsally but that of striata is not. The proximal process of the uncus in samoensis is elongate, short in striata and montana.

Fiji distribution: As that of the type series; also VITI LEVU: Koro-levu.

Holotype: ♂, Fiji, (Viti Levu) Savura Creek, 17-20.vii.1969, H.S. & G.S. Robinson.

Paratypes: 2♂♂, Fiji, 1966-67, H.S. Robinson.

Fiji, (Viti Levu), Suva, :3♂♂, ♀, 1968; ♂, viii.1969; ♂, 20.xii.1971;

3♂♂, 19.v.1970; ♂, v.1970, H.S. & G.S. Robinson.

♂, Fiji, (Viti Levu), Nandarivatu, 12-14.ix.1969, H.S. & G.S. Robinson.

Remarks: A small (expanse 15mm..) somewhat worn ♀ from Viwa I.

(W. Yasawa group) is provisionally placed with this species as is a ♂ from Vanua Levu, Savusavu, but neither is allotted paratypic status. This species seems to be replaced by M. montana in montane rain forest where M. striata is exceedingly rare.

Genus: Philagria Kirby, 1892, Synonymic Cat. Lepid. Heterocera 1:336.

Philagria entella delia (F.)

Phalaena entella Cramer, 1779, Uitlandsche Kapellen 3(18):27, pl.208, fig.D. Noctua delia Fabricius, 1787, Mantissa Insect. 2:140. Types not examined - identity not in doubt.

Male: (Plate fig.3) Head and abdomen orange-yellow, antennae and dorsal posterior half of thorax metallic blue-black. Coxae and femora proximally orange-yellow to one half. Distal half of femur, tibiae and tarsi metallic blue-black but hind tarsi ventrally ochreous and hind tibia with an ochreous yellow streak extending from one third to the spine at two thirds. Forewing orange-yellow patterned with blue-black. Hindwing bright yellow. Viette (1950c) figures the male and

and female genitalia.

Female: Similarly patterned to the male.

Diagnosis: Expanse 41-51mm.. The wing pattern of this species is entirely diagnostic.

World distribution: India to Formosa and Malaya (P. entella entella (Cramer)), Borneo, New Guinea, Australia, Solomon Is., New Hebrides, Samoa, (P.e. delia (F.)).

Fiji distribution:- VITI LEVU: Suva, Nanggali, Nandarivatu, Koro-O, Nausori Highlands, Korolevu, Vunindawa. VANUA LEVU: Governor's Pool, Ndelaikoro.

Biology: Larva ochreous yellow, black dorsally, laterally pale brown with brown and grey hair tufts arising from orange-yellow and carmine tubercles. Pupa in a spun leaf. Foodplants: Cuscuta campestris Yuncker, Flacourtia spp., Ficus spp. and lichens.

Remarks: Fairly common at light, especially in montane forest.

Subfamily: Arctiinae

Genus: Utetheisa Hubner, 1819, Verz. Bekannter Schmett.(11)167.

The author reviewed and revised the south western Pacific representatives of Utetheisa in 1971 (Robinson, 1971a) and the following notes are intended as an addendum to this paper. H.S. Robinson is preparing a paper on the larvae and habits of Pacific Utetheisa.

Utetheisa clareae Robinson

Utetheisa clareae Robinson, 1971, Entomologist's Rec. J. Var. 83:124, pl.5, fig.1.

A female is illustrated in plate fig.4. This endemic species is found only on the south coast of Vanua Levu where it inhabits a stretch of coastline from Savusavu Bay to a point at least ten miles to the east, the larvae feeding on the strand tree Messerschmidia argentea (Linn. f.). Sternite VII of a female genitalia preparation is illustrated in text fig.14.

Utetheisa pulchelloides marshallorum Rothschild

Utetheisa pulchelloides Hampson, 1907, Ann. Mag. nat. Hist.(7)19:239.
Utetheisa pulchelloides marshallorum Rothschild, 1910, Novit. zool. 17:182, No.52.

A male is illustrated in plate fig.6. This subspecies ranges across the Pacific from Guam to the Gambier Is.. It is locally common in Fiji, feeding on Messerschmidia argentea (Linn. f.). There is a large colony of this species on the south coast of Viti Levu at Singatoka. The author has also collected marshallorum on the following islands of the Yasawa Group: Yasawa I., Nanuya Lailai I., Viwa I., and there is a specimen in colln Koronivia Research Station, Fiji, from Makuluva I., a sand cay 2km. off Suva Point. The species is inexplicably absent from Leleuvia I. and from Rotuma. It was originally collected from Savusavu (Vanua Levu) but it has not been seen there since the first observation of its presence (Robinson, 1971a). Sternite VII of a female genitalia preparation is illustrated in text fig.23.

Utetheisa lotrix stigmata Rothschild

Phalaena lotrix Cramer, 1777, Uitlandsche Kapellen 2(10):20 & 149, pl.109, figs. E & F.

Utetheisa pulchelloides stigmata Rothschild, 1910, Novit. zool. 17:182, No. 48.

A female is illustrated in plate fig.5. This subspecies inhabits Fiji, the New Hebrides and New Caledonia and Samoa. It is very common in grassland areas and was recorded from the following localities in 1970 and 1971:- VITI LEVU: Suva, Korolevu, Dombuilevu, Vatukoula, Mba, Nandarivatu, Tavua, Lautoka. VANUA LEVU: Savusavu, Lambasa. YASAWA. NANUYA LAILAI. VOMO. The larva feeds on several species of Papilionaceae which are listed in the 1971 paper. Sternite VII of a female genitalia preparation is illustrated in text fig.22. In the 1971 paper the illustrations of the sternite of U. p. marshallorum and U. clareae were drawn from descaled specimens. Text figures 23 and 24 show the differences in dissected specimens to be not nearly so apparent, though U. l. stigmata is distinctly different from the other two species.

FAMILY: HYPSIDAE

Genus: Argina Hubner, 1819, Verz. Bekannter Schmett. (11)167.

Argina cribraria (Clerck)

Phalaena cribraria Clerck, 1764, Icones Insectorum Rariorum 2: pl.54.
Type not examined, identity not in doubt.

Male: Head, thorax, abdomen, legs and wings bright yellow, in fresh specimens inclining to orange, patterned with black, the black spots of the forewing ringed by pale yellowish-cream scales.

Female: (Plate fig.7) Similarly patterned to the male.

Diagnosis: Expanse 35-45mm.. The wing pattern is completely diagnostic in this species.

World distribution: Indian region to Malaysia, New Guinea, Australia, New Hebrides, New Caledonia, Samoa, Micronesia.

Fiji distribution:- VITI LEVU: Suva, Lami, Mba, Lautoka, Nandarivatu, Korolevu, Vunindawa. VANUA LEVU: Savusavu. YASAWA.

Biology: The ovum is spherical, pale apple-green when laid, soon becoming yellow. Ova are laid in a line of three to fifteen down the midrib on the upperside of a young leaf of the foodplant - either Crotalaria mucronata Desv. or C. retusa L.. Young larvae feed on leaves but probably in the third instar begin to feed on the seed-pods of the plant, cutting a hole in the pod and feeding on the seeds with the hind end of the body always outside the hole. A fully grown larva is 50mm. long; head reddish brown, legs black. The body is black with white transverse intersegmental bands each enclosing a pair of intermittent black transverse lines. The white bands are preceded by a transverse white stripe dorsally on abdominal segments 1 to 6 and the transverse white dorsal stripes in turn preceded by a white dorsal dot on abdominal segments 3 to 6. The prothorax bears a white dorsal longitudinal line. On the abdominal segments the black spiracle is surrounded by an orange patch, this patch reduced on the thoracic segments and extending on to the anal claspers. Each segment carries a number of spines arising from blue-black raised tubercles. Ventrally the larva is dark greenish brown, segments 1,2,7,8 and 9 bearing a pair of tiny hairs arising from black tubercles. Each proleg is preceded by a black hairless tubercle. The pupa is black, segmentally yellow-brown, each segment with four black spots and a large black dorsal patch. Wing cases are striped with yellow-brown, legs and antennae are yellow-brown. The ovum stage lasts about three days, the larval stage about fifteen days and the pupal stage about five days. Emergence is always at about 1500 hrs. in Fiji with an hour either way the limit of variation observed. Inflation and drying of wings is exceptionally rapid. Cribraria often defoliates isolated Crotalaria plants and larvae under these conditions often die, apparently from starvation. The author has never found parasitised larvae.

Remarks: A moderately common species in areas of wasteland and secondary vegetation. Cribraria is frequently taken at light and is sometimes seen flying in the late afternoon.

Genus: Asota Hubner, 1819, Verz. Bekannter Schmett. (11)164.

Asota woodfordi (Druce)

Hypsa woodfordi Druce, 1888, Proc. zool. Soc. Lond.:221,pl.13, fig.2.
Type examined.

Male: (Plate fig.8) Head pale orange-brown, antennae and tip of palps black. Thorax pale orange-brown, paler ventrally, cream below patagia which have a metallic blue-black anterior spot. Legs cream, flecked and banded at articulations with black. Abdomen orange-yellow, marked with black, cream ventrally, marked with black. Forewing cream with basal markings of black and pale orange-brown. Postmedial fascia chocolate-brown streaked with white costally. Hindwing cream marked with black.

Female: Similarly patterned to the male.

Diagnosis: Expanse 47-56mm.. The highly distinctive wing pattern distinguishes this species from all other members of the genus.

World distribution: New Caledonia.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Savura Creek, Nanggali, Korolevu, Nandarivatu, Lautoka, Nausori Highlands, Vunindawa.
VANUA LEVU: Savusavu area, Ndelaikoro.

Remarks: A rare species, usually collected only in areas of lowland and montane forest.

Genus: Lasioceros Bethune-Baker, 1904, Novit. zool. 11:380.

Lasioceros aroa vitiensis subsp. n.

Lasioceros aroa Bethune-Baker, 1904, Novit. zool. 11:381.
Type not found - identity not in doubt.

Male: (Plate fig.155) Head, thorax and abdomen silvery white, head and thorax pale purple-brown above. Abdomen olivaceous grey above with a posterior tuft of brownish-black hairs. Legs greyish-white flecked with purple-brown. Fore tibia proximally with a tuft of yellow-brown elongate scales. Antenna swollen and tufted from one to five sixths with black hairs. Forewing silvery white patterned with mauve-brown and black. Hindwing cream distally suffused with grey.

Female: Similarly patterned to the male but the antenna is filiform and the wing pattern somewhat darker overall. The posterior abdominal and foreleg tufts are absent.

Diagnosis: Expanse 47-52mm.. Facies unmistakable and somewhat reminiscent of a Notodontid, in which family Lasioceros was originally placed. 4 ♂♂ Lasioceros aroa from Fak-Fak, Dutch New Guinea in colln BMNH have an expanse of from 38 to 40mm. and the reniform in these specimens is suffused with black and is better defined than in Lasioceros aroa vitiensis which is a consistently larger subspecies than nominotypical aroa.

World distribution: Nominotypical aroa is only known from New Guinea.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, summit of Mt. Victoria, Nausori Highlands, Tholoisuva, Savura Creek. VANUA LEVU: Savusavu area, Ndelaikoro.

Remarks: The type of Lasioceros aroa is apparently lost; it was a male with an expanse of 42mm. from Upper Aroa R., New Guinea, collected by Pratt and was in colln Tring Mus.. I am in no doubt as to the identity of the specimens of aroa in BMNH. Lasioceros aroa vitiensis is a rare species at light in rain forest.

Holotype: ♂, Fiji, (Viti Levu), Nandarivatu, 12-14.ix.1969, H.S. & G.S. Robinson.

Paratypes: ♂, as holotype but 27-30.ix.1968.

2♂♂, as holotype but 27-30.vi.1968.

♂, ♀, as holotype but 15-17.viii.1969.

♂, Fiji, (Viti Levu), Koro-O, 6.ix.1967, H.S. Robinson.

♂, Fiji, 1966-67, H.S. Robinson.

♀, Fiji, (Viti Levu), Tholoisuva, viii.1968, H.S. & G.S. Robinson.

Genus: Nyctemera Hubner, 1820, Verz. Bekannter Schmett. (12)178.

Nyctemera baulus (Boisduval)

Leptosema baulus Boisduval, 1832, Voyage de Decouvertes de L'Astrolabe, Ent. 1:200. Type not examined, identity not in doubt.

Male: (Plate fig.9) Head, thorax and abdomen bright yellow, paler ventrally, patterned with black. Legs and patagia cream with black patterning. Antennae black. Forewing brownish black patterned with creamy white, the pattern somewhat variable.

Female: Similarly patterned to the male.

Diagnosis: Expanse 37-44mm.. A characteristically patterned common species, there is no possibility of confusing this with any other Fijian species, even in flight.

World distribution: From south-east Asia to New Guinea, Australia, Solomon Is., New Hebrides, New Caledonia and Samoa.

Fiji distribution:- VITI LEVU: Nandarivatu, summit of Mt Victoria, Suva, Tholoisuva, Nanggali, Lami, Dombuilevu, Vatukoula, Mba, Lautoka, Nandi, Rakiraki, Korolevu, Nausori Highlands. VANUA LEVU: Savusavu area, Governor's Pool, Lambasa, Ndelaikoro. TAVEUNI. KANDAVU. ONO (Kandavu). KOMO. FULANGA. ONGEA. OVALAU. YASAWA. NANUYA LAILAI. NAUKATHUVU. VIWA.

Biology: The larva feeds on the leaves of Brassica oleracea L., Emelia sonchifolia (L.) and Crassocephalum crepidioides. The following larval description is based on a fully grown specimen preserved in alcohol. Length: 24mm.. Head pale orange-brown with six lateral black ocelli. Body yellowish cream with a broad dorsal brownish-black transverse band on each segment. Mesothorax with a pair of hair pencils, the hairs 6mm. long. Each segment with two heavily sclerotised protuberances dorsal to the spiracle bearing black hairs and a few pale hairs 1-3mm. long (with the exception of the mesothoracic paradorsal protuberances which carry the hair pencils) arising from jet-black setae. Ventral to the spiracle two similar protuberances with hairs on the thoracic segments, three protuberances on abdominal segments 1-6, four protuberances on 7 and 8, the extreme ventral protuberance of 7 and 8 small and lightly sclerotised with only six to eight hairs. Abdominal segment 9 with three sclerotised lateral protuberances; a crescentic sclerotised protuberance with hairs posteriorly and dorsal to the anal clasper. A dark larva (dark colour-phase larvae are of fairly regular occurrence in Fiji - H.S. Robinson pers. comm.) also in alcohol has a wide paradorsal stripe running the length of the body and the dorsal transverse bands are extended ventrally beyond the spiracle.

Remarks: A common species especially in areas of secondary vegetation. Often flies by day.

FAMILY: NOLIDAE

Genus: Nola Leach, 1815, Brewster's Edinburgh Encycl. 9(1):135.

Nola fijiensis sp. n.

Male: (Text fig.16) Head, thorax, legs and abdomen silky white flecked with pale brown. Forewings silky white patterned with brown and blackish brown, the pattern very variable. Hindwing white flecked with pale brown marginally. Valves (text fig.5) dilated; vesica with a single cornutus one fifth the length of the aedeagus. Ventral abdominal spines arising from an elongate base with a deep medial emargination between them (text fig.18).

Female: Similarly patterned to the male.

Diagnosis: Expanse 13-18mm.. Wing pattern characteristic though could be confused with N. samoana (Hampson)(q.v.) and N. insularum (Collenette) (q.v.). The cornutus is smaller than in insularum and the valves lack the small basal digitate process. The ventral abdominal spines are highly distinctive. The valves are simple, thus distinguishing this species from N. tornotis Meyrick (Proc. Linn. Soc. N.S.W. 2:923, 1875) to which it bears a superficial resemblance and in which the valve is dorsally emarginate with two digitate processes on the ventral lobe.

Fiji distribution: VITI LEVU: Nandarivatu, summit of Mt Victoria, Koro-O, Tholoisuva, Nanggali, Suva, Lami, Korolevu, Dombuilevu. VANUA LEVU: Savusavu area, Governor's Pool, Lambasa, Ndelaikoro. LELEUVIA. ONGEA. VIWA. NAUKATHUVU.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 15-17.viii.1969, H.S. & G.S. Robinson. BMAGSN 1601.

Paratypes: 3♂♂, 4♀♀, data as holotype.

Remarks: A common species though absent from dry zone vegetation with the exception of Viwa I.. A recurrent form of this species has a broad grey medial transverse band in the forewing.

Nola insularum (Collenette) comb. n.

Celama insularum Collenette, 1928, Trans. ent. Soc. Lond.:469. Type examined.

Male: (Text fig. 13) Head, thorax, legs and abdomen creamy white flecked with ochreous. Forewings cream patterned with ochreous brown. Hindwings silky white, greyish towards the margin. Valve (text fig.6) dilated basally, with a small digitate process. Vesica with a single cornutus one third the length of the aedeagus. Abdominal spines illustrated in text fig.19.

Female: Similarly patterned to the male.

Diagnosis: Expanse 13-16mm.. Superficially similar to N. fijiensis sp. n. (q.v.) but wing pattern very different. The abdominal spines of the male are good differentiating characters - compare text fig. 19 with 17, 18, 20 and 21, and see diagnostic remarks for N.fijiensis. The closest apparent ally of this species is Nola pumila Snellen (Tijdschr. v. ent. 18:65, pl.6, fig.4, 1875) from Assam - see remarks.

World distribution: Rapa I. (~~Marsa~~) and Tahiti (Society Is.).

Fiji distribution:- VITI LEVU: Suva, Lami, Tholoisuva, Nandarivatu.
NANUYA LAILAI. NAUKATHUVU. VIWA.

Remarks: N. insularum is very closely related to N. pumila Snellen and in the few Fijian specimens examined the dorsal abdominal spines are a little more close-set than those of the type of insularum (from Rapa I.), approaching those of N. pumila. The distributional gap between pumila and insularum is such that further collecting may prove insularum to be no more than a geographical race of pumila. In view of the paucity of material, I prefer to consider the two species as distinct and to ally Fijian material with insularum for the present.

Nola lichenosa sp. n.

Male: Head, thorax, abdomen and legs silky white, the palps outwardly flecked with grey-brown, the forelegs patterned with black dorsally. Forewing silky white patterned with pale orange-brown and black. Hindwing silky white. Valves (text fig.7) bifurcate almost to the base, the ventral lobe with a bidentate process directed dorsally at one quarter; a protuberance at the base of the valves with minute spines. Vesica apparently without ornamentation. Ventral spines with a v-shaped medial emargination (text fig.20).

Female: (Text fig.14) Similarly patterned to the male.

Diagnosis: The smallest Fijian Nola (expanse 11-13mm.), the lichen pattern of lichenosa makes this a highly distinctive species. The valves are different from all other Fijian species and the abdominal spines are reminiscent of N. samoana (Hampson) (q.v.) but smaller and the ventral spines are much shorter than in samoana. The closest apparent ally of this species is Nola pura (Fletcher) comb. n. (Nat. Hist. Rennell I., Br. Solomon Is. 2:35, figs. 21,22,27,88, 1957) in which the valves are bifurcate to one half and the vesica carries four short cornuti. In lichenosa the valve is bifurcate to three quarters and the vesica is without ornamentation. The wing patterns of the two species are somewhat different.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, Nanggali, Lami, Tholoisuva. VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro. NAUKATHUVU. ROTUMA.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 16-20.xii.1968, H.S. & G.S. Robinson.

Paratypes: ♂, (BMAGSN 1605), ♂, 3♀♀, data as holotype.

Remarks: A locally common species restricted to rain forest on Viti Levu and Vanua Levu but found in secondary vegetation on Naukathuvu and Rotuma.

Nola samoana (Hampson) comb. n.

Celama samoana Hampson, 1914, Cat. Lepid. Phalaenae Colln Br. Mus. Suppl. 1:397, pl.22, fig.23. Type examined.

Male: (Text fig.12) Head, thorax, abdomen and legs creamy white, flecked with purple-brown scales. Forewing ground-colour cream, patterned with drab purplish brown, the pattern somewhat variable. Hindwing greyish white with some pale brown scaling towards the margin. Left valve figured in text fig.8 and dorsal and ventral abdominal spines in text fig.21. Vesica with a single cornutus one fifth the length of the aedeagus.

Female: Similarly patterned to the male.

Diagnosis: Expanse 12-15mm.. Wing pattern is sufficiently diagnostic to differentiate samoana from the other Fijian Nola species though it is superficially similar to N. insularum (Collenette)(q.v.): in the male, however, the dorsal lobe of the valve does not taper as in insularum and the ventral abdominal spines do not have a medial emargination. The cornutus of insularum is one third the length of the aedeagus. The ventral abdominal spines and the valves differ from those of N. fijiensis (q.v.) - compare text figs. 18 and 21, 5 and 7 - though the aedeagus is similar.

World distribution: Samoa, Tonga. The type is from Apia, Western Samoa.

Fiji distribution:- ROTUMA. As far as is known, this species is absent from the remainder of the Fiji group.

Remarks: Moderately common on Rotuma.

Nola transversata sp. n.

Male: Head, thorax, abdomen and legs silky white, fore tibia black dorsally, legs otherwise flecked with blackish brown dorsally. Forewing ground colour white patterned with black and brown, the transverse median line distinctive. Hindwing silky white flecked with pale brown toward the margin. Valves (text fig.4) with a triangular beaked process at one third. Aedeagus short, vesica apparently without ornamentation. Abdominal spines set widely apart (text fig.17).

Female: (Text fig.15) Similarly patterned to the male.

Diagnosis: The distinctive narrow medial transverse line across the forewing of this large (expanse 15-17mm.) species differentiates it from all other members of the genus occurring in Fiji. No known species of Nola seems to be a particularly close ally of this species.

Fiji distribution:- VITI LEVU: Nandarivatu, Tholoisuva, Korolevu, Koro-O.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 16-20.xii.1968, H.S. & G.S. Robinson. BMAGSN 1600.

Paratypes: 3♀♀, data as holotype, ♂, as holotype but 15-17.viii.1969.

Remarks: Moderately common at Nandarivatu, otherwise scarce.

FAMILY: AGARISTIDAE

Genus: Sarbanissa Walker, 1865, List Specimens Lepid. Insects Colln Br. Mus. 33:746.

Sarbanissa bostrychonota (Tams) comb. n.

Seudyra bostrychonota Tams, 1929, Entomologist 62:252. Type examined.

Male: (Plate fig.10) Head, antennae and thorax purple-brown flecked with white; thorax clothed with long yellowish white hairs beneath. Legs purple-brown flecked with white, banded with white at articulations; coxae and femora clothed with long purple-brown and white hairs. Abdomen bright yellow with a narrow longitudinal dorsal black line terminating on segment IV; paler beneath. Forewing purple-brown patterned with white and grey; hindwing yellow, terminal band black, fringes white, a white apical spot.

Female: (Plate fig.11) Differs from the male in having a more rounded forewing; the deep purple suffusion in the postmedial fascia and the postero-medial area of the male forewing is replaced by grey. The white spot below the reniform in the male is infilled with steel-grey in the female. The female prothorax is clothed dorsally with long lichen-green scales forming a "collar".

Diagnosis: Expanse 51-56mm.. Wing pattern of both sexes highly and exclusively diagnostic.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, summit of Mt Victoria, Tholoisuva, Nanggali, Savura Creek, Lautoka, Nausori Highlands, Vunindawa. VANUA LEVU: Ndelaikoro.

Remarks: An uncommon rain forest species, bostrychonota is occasionally taken in large numbers at Nandarivatu at the start of the wet season (October or November).

Biology: Mc Farlane (pers. comm.) found Agaristid larvae defoliating Leucosyke corymbulosa (Wedd.) at Nandarivatu in 1967. Subsequent to this the author searched Leucosyke bushes in most months of the year but found nothing. Mc Farlane was not able to breed the larvae and based determination on preserved specimens. Sarbanissa bostrychonota is the only Agaristid known to occur in Fiji. Mc Farlane has worked extensively with Agaristids in Australia and I do not doubt his determination.

FAMILY: NOCTUIDAE

Subfamily: Noctuinae

Genus: Agrotis Ochsenheimer, 1816, Die Schmett. von Eur. 4:91.

Agrotis ipsilon aneituma (Walker)

Phalaena ipsilon Hufnagel, 1767, Berl. Mag. 3:416

Noctua aneituma Walker, 1865, List Specimens Lepid. Insects Colln Br. Mus. 32:701. Type examined.

Male: (Plate fig.12) Head, thorax and abdomen dark brownish grey; prothorax with a dorsal collar of deep purple-brown scales; legs brownish grey, paler at articulations; antennae deep brown. Forewing creamy grey to russet brown marked with black and fuscous, often suffused medially with deep charcoal-grey. Hindwing white suffused with grey, darker distally.

Female: Similarly patterned to the male.

Diagnosis: Differentiated from Agrotis munda Walker (q.v.) by its larger size (expanse 36-48mm.) and in not having the veins of the forewing outlined with grey in the male and in having grey-suffused hindwings.

World distribution: Nominotypical ipsilon is cosmopolitan but does not seem to overlap distributions with ipsilon aneituma which is recorded from Australia, New Zealand, New Guinea, Norfolk and Lord Howe Is., Solomons, New Hebrides, New Caledonia, Samoa, Tonga, Gilbert and Ellice Is., Marquesas Is., Galapagos, Kermadec Is.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, summit of Mt Victoria, Tholoisuva, Nanggali, Suva, Lautoka, Nandi, Rakiraki, Nausori Highlands, Vunindawa.

Remarks: An uncommon species recorded from a wide variety of localities. Common (1958) discusses this species in detail. Aneituma differs from nominotypical ipsilon in that the hindwing is suffused with grey: in ipsilon ipsilon the hindwing is suffused with grey only at the margin.

Biology: Zimmerman (1957) describes the larva and pupa of ipsilon ipsilon in detail. Agrotis ipsilon aneituma is recorded as feeding on the following species of Fijian plants: Colocasia esculenta (L.), Solanum tuberosum L., Manihot utilissima Pohl, Nicotiana tabacum L., Daucus carota L., Zea mays L., Brassica oleracea L., Solanum melongena L., Lactuca sativa L., Sonchus asper L., Lycopersicum esculentum Mill., Saccharum officinarum L., Ipomoea batatas (L.). Agrotis ipsilon is classified as a pest species although in Fiji at least it is very uncommon and is not recorded as causing significant damage to economic crops, but see Swain (1971:133, 188, 280).

Agrotis munda Walker

Agrotis munda Walker, 1856, List Specimens Lepid. Insects Colln Br. Mus. 10:358. Type examined.

Male: (Plate fig.13) Head, thorax and abdomen brownish grey, antennae dark grey-brown. Legs brownish-grey, darkened distally to deep brown, white at articulations. Forewing pale greyish russet, marked with black and dark brown; veins black outlined with grey. Hindwing silky white suffused with grey subterminally. Expanse of ♂ 34-37mm..

Female: Similar to the male but the forewing is more square and is suffused almost uniformly with charcoal-grey, most of the pattern being obliterated. Expanse 38-40mm..

Diagnosis: Usually smaller than A. ipsilon (Hufnagel) (q.v.) which does not have a white hindwing.

World distribution: Australia, New Zealand, Norfolk I., New Caledonia, Cocos-Keeling Is., Tonga.

Fiji distribution:- VITI LEVU: Lautoka. VIWA. YASAWA. NAUKATHUVU. MOTHE.

Remarks: Common (1958) discusses this species at length and reviews its turbulent taxonomic history. A. munda was previously recorded as Agrotis (or Euxoa) radians Guenee in MS lists of Fijian material. It is a rare species in Fiji, associated with very dry conditions; however, on Mothe it was found to be common although only females were collected.

Subfamily: Heliothidinae

Genus: Helicoverpa Hardwicke, 1965, Mem. ent. Soc. Canada 40:9.

Helicoverpa armigera conferta (Walker)

Noctua armigera Hubner, 1808, Samml. eur. Schmett. 4, pl.9, fig.370.

Heliothis conferta Walker, 1857, List Specimens Lepid. Insects Colln Br. Mus. 11:690. Type examined.

Male: (Plate fig.14) Head and thorax olive-khaki, abdomen greyish yellow. Legs greyish yellow sometimes suffused with pink. Forewing olive-khaki patterned with grey varying to russet brown in some specimens. Hindwing ochreous, suffused with grey towards the anal angle, with a black terminal fascia; veins outlined with fuscous. The genitalia are figured by Common (1953) and Hardwicke (1965).

Female: Head, thorax and forewing ground-colour light reddish ochre to deep red-brown patterned with dark russet grey to black. Hindwing more heavily suffused with grey than in the male.

Diagnosis: Larger (expanse 32-38mm.) than H. assulta Guenee (q.v.), the subterminal line in the forewing not dentate.

World distribution: Nominotypical armigera occurs through the tropical and subtropical Old World and is replaced by armigera conferta in New Guinea, Australia, New Zealand, the Indonesian islands, Solomon Is., New Hebrides, New Caledonia, Samoa, Tonga, Ellice Is., Micronesia, Kermadec Is.

Fiji distribution: VITI LEVU: Suva, Lautoka, Nandarivatu, summit of Mt Victoria. VANUA LEVU: Savusavu area. MUNIA.

Biology: Gardner (1941) describes the larva of armigera armigera. It is of variable colour, either green with a yellowish lateral stripe or pinkish or purplish brown with a yellowish stripe on the sides and a light dorsal stripe, sometimes with light raised dots on the side. It is recorded as feeding on the following Fijian species of plant: Citrus spp., Lycopersicum esculentum Mill., Nicotiana tabacum L., Lactuca sativa L., Zinnia elegans Jacq., Tagetes spp., Zea mays L., Coffea spp., Gossypium spp., Antirrhinum majus L. (buds and flowers), Coleus aromaticus Benth., Pisum sativum L. (pods). It is an agricultural pest; see Swain (1971; 111, 121, 260).

Remarks: Probably more widely distributed in Fiji than the above records indicate as I was unable to distinguish this species from the next until early 1971. It is somewhat scarcer than assulta which seems to have a wider range in Fiji.

Helicoverpa assulta (Guenee)

Heliothis assulta Guenee, 1852, Hist. nat. Insectes Lepid. 6: 178. Type not examined - identity not in doubt.

Male: (Plate fig.15) Head and thorax yellowish grey to olive khaki, antennae ochreous. Abdomen greyish-yellow. Legs greyish yellow suffused with purple-brown on bitia and tarsi. Forewing ochreous yellow with distinct markings in shades of grey and russet brown. Hindwing ochreous yellow with a broad black fascia. Common (1953) and Hardwicke (1965) figure the genitalia.

Female: Similarly patterned to the male but the forewing ground-colour more russet and with darker markings; hindwing terminal fascia broader and darker than in the male.

Diagnosis: Smaller (expanse 26-31mm.) than H. armigera conferta (q.v.), the subterminal line of the forewing markedly dentate on M3, Cu1 and Cu2.

World distribution: Tropical Asia through the East Indies to New Guinea and Australia, Solomon Is., New Hebrides, Samoa, Society Is. and Micronesia.

Fiji distribution:- VITI LEVU: Suva, Lautoka, Rakiraki, Nandarivatu. VANUA LEVU: Savusavu. LELEUVIA. YASAWA. NAUKATHUVU. VIWA. NAMUKA. TAVEUNI.

Biology: Assulta is recorded as attacking the following species of Fijian plants: Nicotiana tabacum L. (seed pods), Cardiospermum halicacabum L. (eats through green fruits and feeds on seeds - Greenwood, 1929), Physalis angulata L., Physalis minima L., Lycopersicum esculentum Mill., Tithonia diversifolia (Hemsl.). It is an agricultural pest though perhaps an overrated one; it is "rarely a tobacco pest in Samoa" (Hopkins, 1927b). Hardwicke (1965) deals extensively with the biology and early stages of this and the preceding species. See also Swain (1971: 283, 396).

Remarks: Common revised and characterised the Australian representatives of Heliothis in his 1953 paper and Hardwicke (1965) gives extensive revisionary treatment to the genus Helicoverpa.

Subfamily: Hadeniinae

Genus: Leucania Ochsenheimer, 1816, Die Schmett. von Eur. 4:91.

Leucania loreyi (Duponchel)

Noctua loreyi Duponchel, 1827, Hist. nat. Lepid. Fr. 7:81, pl.105, fig.7. Type not examined, identity not in doubt.

Male: (Plate fig.16) Head, antennae, thorax and legs brownish-grey; abdomen silver-grey. Forewings purplish-buff striated grey and brown. Reniform conspicuous, a white speck. Hindwing immaculate white, veins pale brown, six small black dots at the termen. The right valve is figured in text fig.27.

Female: Similarly patterned to the male.

Diagnosis: Expanse 38-41mm.. The white hindwing and white-speck reniform serve to distinguish this species from other Fijian Leucania. The male genitalia are highly distinctive.

World distribution: Widely distributed through the tropical and subtropical regions of the Old World to Australia but not recorded from New Guinea. In the Pacific, known from Samoa, Rapa I. and Micronesia.

Fiji distribution:- VITI LEVU: Suva, Lautoka, Nandarivatu.
VANUA LEVU: Savusavu area. YASAWA.

Biology: The larva is recorded as attacking Oryza sativa L., Saccharum officinarum L., Zea mays L. and probably feeds on many species of Gramineae. It is a pest in some areas. Gates Clarke (1971) records finding a pupa in Cyathea fronds on Rapa. Loreyi is found reasonably frequently in montane forest in Fiji where Gramineae are scarce if not almost absent and Cyathea is plentiful: it is perhaps worth bearing Cyathea in mind as a possible foodplant.

Remarks: A somewhat rare species though found in a variety of habitats. Three specimens were taken at light on a boat 300m. off the shore of Yasawa I.; loreyi is renowned as a migrant. Calora (1966) reviews the Philippine species of Leucania and gives useful details of morphology and life histories.

Leucania pseudoformosana sp. n.

Male: (Plate fig.21) Head and legs greyish-white, the fore-tibia inwardly streaked with black. A greyish-white dorsal prothoracic collar with a black edge; thorax fuscous cream with a few black scales at the outer edge of the patagia. Abdomen cream. Forewing yellowish-cream, the veins paler but outlined with fuscous. Reniform black, touching the pale cream line from the base following Cu. A black dentate antemedial and postmedial line are sometimes present. Hindwing silky white suffused postero-terminally with purple-brown; six terminal black dots. In one particularly well-marked specimen before me there are black postmedial dots on R2, M3, Cu1 and Cu2. The right valve is figured in text fig.29.

Female: Similarly patterned to the male. Genitalia figured in text fig.32.

Diagnosis: Expanse 34-40mm. Differentiated from other Fijian Leucania species by its purplish hindwing suffusion and by the form of the male genitalia. Differentiated from Leucania formosana (Butler) (Aletia formosana Butler, 1880, Proc. zool. Soc.:675) by the reniform touching the pale line on Cu whereas in formosana the reniform and its yellow surround are separate from the

line. The male valve of pseudoformosana is swollen from the base to one half the valve length - in formosana it is swollen to two thirds. The club-shaped termination of the valve of formosana has a spur-like projection directed dorsally; this is absent in pseudoformosana. The right valve of formosana is illustrated in text fig.33. Pseudoformosana is closely related to Leucania semicana Pagenstecher sp. rev. (Zoologica 12:75, pl.2, fig.37, 1900) known only from 3♂♂, one from 'New Pomerania' (New Britain) (Type), one from Sud-est I., and one from Vulcan I.. The genitalia of the Sud-est I. specimen (BMNGSN 6892) are illustrated in text fig.31; the genitalia of a Fijian specimen of pseudoformosana are illustrated for comparison in text fig.32.

World distribution: Singapore, Borneo, New Guinea, Guadalcanal and Florida I. (Solomon Is.), New Hebrides, New Caledonia.

Fiji distribution:- VITI LEVU: Nandarivatu, summit of Mt Victoria, Korolevu, Dombuilevu, Vatukoula, Mba, Koro-O. VANUA LEVU: Savusavu area, Governor's Pool, Lambasa, Ndelaikoro.

Holotype: ♂, FIJI, Viti Levu, Dombuilevu, 20.i.1971, G.S. Robinson, BMNGSN 6839.

Paratypes: 2♂♂, 8♀♀, FIJI, (Viti Levu), Nandarivatu, 16-20.xii.1968, H.S. & G.S. Robinson. (BMNGSN 6860 ♀).

Remarks: The Leucania formosana (Butler) complex consists of three species. Formosana ranges from Okinawa to Formosa (type locality) and has been taken in Borneo (J.D. Holloway, pers. comm.) and India. It also occurs in Australia.

Leucania adusta Moore (1881, Proc. zool. Soc.:335) is a synonym of this species and Warren (in Seitz 11:94, 1913) applied the name conferta to an 'aberration' of this species. The type of conferta is very similar to that of formosana. The second species, Leucania pseudoformosana sp. n. is widely distributed from Singapore through the East Indies to Papua and thence to Fiji. In Fiji and the New Hebrides it is moderately common in a variety of habitats. A single specimen from New Caledonia exhibits a different vesical ornamentation to Fijian specimens and with examination of further material the New Caledonian race may prove to be a separate sub-species. Finally, Leucania semicana Pagenstecher has only been collected from the islands to the east of New Guinea.

Leucania scottii Butler

Leucania scottii Butler, 1886, Trans. ent. Soc. Lond.:391.
Type examined.

Male: Head and thorax cream to pale creamy brown. Legs creamy brown speckled with brown; forelegs charcoal inwardly. Abdomen creamy white. Forewings creamy brown, a narrow line of dark brown scales extending from the base to below the reniform and 1mm. beyond; orbicular sometimes present as a black point. Reniform a black dot, a suffused black line extending from a little beyond the reniform to the termen. Hindwing silky white, veins creamy brown, suffused with pale grey to greyish brown terminally. Right valve figured in text fig.25.

Female: (Plate fig.17) Similarly patterned to the male.

Diagnosis: The smallest Fijian Leucania (expanse 23-26mm.). The wing pattern and male genitalia are diagnostic.

World distribution: New Guinea, Australia, New Hebrides, New Caledonia, Hawaii (?non-resident introduction).

Fiji distribution:- VITI LEVU: Nandarivatu, Lautoka, Rakiraki, Mba. NANANU-I-RA. VIWA. YASAWA. NAUKATHUVU. NANUYA LAILAI.

Remarks: Specimens taken at Nandarivatu are thought to have come from talasinga grasslands nearby; apparently a species restricted to dry areas. It was found to be very common on Viwa I. at Naimbalembale Village but was not taken in Leucaena scrub 400m. N of the village.

Leucania separata Walker

Leucania separata Walker, 1864, List Specimens Lepid. Insects Colln Br. Mus. 32:626. Type examined.

Male: (Plate fig.18) Head, thorax and abdomen pale olivaceous grey to pale russet grey, abdomen a little paler. Fore tibiae and tarsi dark grey inwardly. Forewing pattern very variable, ochreous to olivaceous to pale russet, speckled with black. Reniform white, adjacent to an inner black point and distally a suffusion of black scales; a postmedial line of black specks meets a suffused grey line from the apex at one third. Hindwing suffused with grey, lighter anteriorly, the veins darker. The right valve is figured in text fig.30.

Female: Similarly patterned to the male.

Diagnosis: Expanse 34-46mm.. The only Fijian Leucania with the hindwing overall suffused with grey. The forewing pattern and male genitalia are diagnostic.

World distribution: Tropical Asia through the East Indies to New Guinea and Australia, New Zealand, New Hebrides and Samoa.

Fiji distribution:- VITI LEVU: Suva, Nandarivatu, Koro-O, summit of Mt Victoria, Tholoisuva, Dombuilevu, Rakiraki, Vatukoula, Mba, Lautoka, Nausori Highlands. VANUA LEVU: Ndelaikoro.

Biology: Recorded as attacking Brachiaria mutica (Forsk.), Oryza sativa L., Saccharum officinarum L., Zea mays L.. Agricultural pest; see Swain (1971: 111, 121, 160).

Remarks: For many years this species was confused with Leucania unipuncta (Haworth) until Franclemont (1951) revised the genus Pseudaletia in which he placed the "unipuncta group." I can find no recent larval description of separata although Zimmerman (1957:305) describes the larva and life history of unipuncta which may be similar. Hinckley (1964) lists eleven parasites of separata in Fiji. Moderately common in a wide variety of localities in Fiji though found most frequently in cane-growing areas. Lever (1969) suggests that in Fiji outbreaks of this pest follow periods of exceptionally heavy rainfall.

Leucania venalba Moore

Leucania venalba Moore, 1867, Proc. zool. Soc. Lond.:48. Type examined.

Male: (Plate fig.19) Head and thorax pale purple-brown, sometimes olivaceous, the thorax cream below with a silver-grey dorsal prothoracic 'collar' and a medial white streak. Abdomen pale greyish cream. Forewing purple-brown striated with cream and pale purplish brown; a cream line from the base to five eighths. Hindwing silky white suffused terminally with fuscous grey. Veins fuscous-grey. Right valve figured in text fig.26.

Female: Similarly patterned to the male.

Diagnosis: A small (expanse 30-34mm.) narrow-winged species. The white line in the forewing differentiates this species from other Fijian Leucania species; the male genitalia are diagnostic.

World distribution: South-East Asia, East Indies, Australia.

Fiji distribution:- VITI LEVU: Suva, Lautoka.

Biology: Larva feeds on Oryza sativa L.. Pest of rice in Ceylon.

Remarks: Not uncommon in Suva but rare elsewhere. Calora (1966) discusses this species in his review of Philippine Leucania.

Leucania yu Guenee

Leucania yu Guenee, 1852, Hist. nat. Insectes Lepid. 5:78.

Type not examined - identity not in doubt.

Male: Head, thorax and legs greyish cream; legs flecked with black, fore tibiae and tarsi inwardly marked with black. Abdomen cream. Forewings cream suffused to a varying degree with black or dark brown. Reniform a black dot; a white line, conspicuous in some specimens, runs from the base to below the reniform with a grey or brown posterior suffusion forming a parallel adjoining streak, strongly defined basally. A dark grey line from the apex meets an ill-defined grey postmedial band. Hindwing silky white with a variable amount of fuscous suffusion terminally; six black dots at the termen. The right valve is figured in text fig.28.

Female: (Plate fig.20) Similarly patterned to the male.

Diagnosis: A large species (expanse 33-40mm.). Best distinguished from Leucania pseudoformosana sp. n. (q.v.) to which it is superficially similar by the dark basal streak in the forewing, the vague, suffused pattern (that of pseudoformosana being well-defined and striate) and by the form of the male genitalia.

World distribution: Eastern Asia through the East Indies; New Hebrides, Tonga.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, summit of Mt Victoria, Tholoisuva, Nanggali, Rakiraki, Vatukoula, Mba, Suva, Nausori Highlands. VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro. OVALAU.

Biology: Larva feeds on Saccharum officinarum L. but is not apparently a pest. Gardner (1946b:242) describes the larva. Moderately common at light in most parts of Fiji but apparently absent from the smaller islands. Calora (1966) includes this species in his review of the Philippine Leucania.

Tiracola plagiata (Walker)

Agrotis plagiata Walker, 1857, List Specimens Lepid. Insects Colln Br. Mus. 11:740. Type examined.

Male: (Plate fig.23) Head thorax and legs pale ochreous yellow to dark purple-brown; abdomen grey, lateral tufts the colour of the thorax. Forewings cream to purple-brown with a conspicuous reniform, variously marked with grey to deep purple-brown, transverse lines often obsolete. Hindwing suffused overall grey.

Female: A striking form is illustrated in plate fig.22; females seem to be even more variable than the males.

Diagnosis: A large (expanse 50-57mm.) strong-flighted species which despite its variability of pattern is readily recognisable. The close relative T. rufimargo samoensis Tams (Ins. Samoa 3:199, pl.8, fig.9, 1935) apparently does not occur in Fiji; it differs from plagiata in the proximal two thirds of the hindwing not being grey and the antemedial line being markedly dentate on Cu.

World distribution: South-East Asia through the East Indies to New Guinea and Australia; Solomons, New Hebrides, Tonga, Samoa, Society Is., Marquesas, Micronesia, Kermadec Is.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, summit of Mt. Victoria, Tholoisuva, Nanggali, Korolevu, Dombuilevu, Vatukoula, Mba, Rakiraki, Suva, Vunindawa, Nausori Highlands. NANANU-I-RA. OVALAU. VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro. VANUA MBALAVU. LAKEMBA.

Biology: Larva dull purple-brown dusted with grey with a dorsal row of grey triangular blotches. Sublateral stripes pale, 12th. segment dorsally humped. Dorsum with a few fine hairs. Length about 35mm.. Gardner (1946b:250) gives a more detailed larval description. Recorded foodplants occurring in Fiji are: Theobroma cacao L., Manihot utilissima Pohl, Ricinus communis L., Citrus aurantifolia (Christm.), Emelia sonchifolia (L), Nicotiana tabacum L., Musa nana Lour., Agave sisalina Perrine, Ageratum houstonianum.

Remarks: A widespread and often very common species in Fiji.

It is especially common in montane forest at the beginning of the wet season (September - October) when a light trap may collect twenty thousand specimens of this species in one night. The coremata of this species are spectacular - a pair of membraneous tubes between the mid- and hindlegs and four elongate hairy tubes at the base of the genitalia are easily eversible when the abdomen is artificially inflated with air.

Subfamily: Acronictinae

Genus: Athetis Hubner, 1821, Verz. bekannter Schmett.:209.

Athetis striolata (Butler) comb. n.

Caradrina striolata Butler, 1886, Trans. ent. Soc. Lond.:393.
Type examined.

Male: (Plate fig.34) Head, thorax and abdomen pale ochreous grey. Forewings pale ochreous grey indistinctly patterned in black. Reniform black, an indistinct blackish streak arising below and extending to the base of the wing. Orbicular a faint brownish-cream ring; postmedial line of black dots; apex suffused with black. Hindwing silky white suffused with pale brownish grey apically. Genitalia illustrated in text fig.44; uncus absent, valves with a sinuate projection at two thirds and a basal digitate process. Vesica with a single claw-like cornutus (text fig.45).

Female: Similarly patterned to the male but the forewing suffused overall with brownish black. Hindwing suffused with grey apically, the suffusion extending to the base. Genitalia (text fig.46) with a pair of trichose nodules at either side of the vaginal wall posteriorly; bursa without signum.

Diagnosis: The closest apparent ally of this species is Athetis reclusa (Walker) comb. n. (Prodenia reclusa Walker, 1862, J.Linn. Soc. 6:185) the genitalia of which are figured by Fletcher (1957). In striolata the distinct pattern of pale transverse lines evident in reclusa is absent and the wings are more rounded. Striolata has a single elongate cornutus on the vesica; reclusa has a bunch of a dozen or more thin, elongate spines. Striolata is a little smaller than reclusa - expanse 23-30mm.. It is possible that Nitocris acallis (Turner) (Caradrina acallis Turner, 1903, Trans. R. Soc. S. Aust. 27:4) is closely allied to this species; the external facies of the two species are similar.

Fiji distribution:- VITI LEVU: Suva, Dombuilevu, Vatukoula, Mba, Nandarivatu, Koro-O. VANUA LEVU: Ndelaikoro. NANUYA LAILAI. NAUKATHUVU. VIWA. TAVEUNI.

Remarks: A fairly common species especially at Vatukoula and on the southern islands of the Yasawa group. It is found sporadically at Nandarivatu and specimens collected there may be vagrants from talasinga areas nearby.

Genus: Callopietria Hubner, 1821, Verz. Bekannter Schmett. (14)216.

Key to Fijian species of Callopietria Hubner

- 1a Antenna filiform 2
- b Antenna 'kinked' and swollen for part of its length 4
- 2a Distinct white or pinkish wedge from the subterminal to the termen at one half in the forewing 3
- b Subterminal forewing fascia uniformly dark brown at one half argyrosemastis ♀
- 3a Expanse less than 25mm, antemedial line bowed distally below orbicular reticulata ♂, ♀
- b Expanse greater than 26mm, antemedial line straight, directed postero-proximally meridionalis ♀ 5
- 4a Antenna 'kinked' and swollen proximally at one third meridionalis ♂ 5
- b Antenna 'kinked' and swollen distally at two thirds argyrosemastis ♂

- 5a Locality Rotuma; ♀♀ small (23-28mm), fw suffused dark purple-brown and pattern indistinct; ♂♂ 27-28mm expanse meridionalis rotumensis
- b Locality Fiji group; ♀♀ 27-31mm, white fw markings distinct; ♂♂ expanse 29-33mm meridionalis nauticorum.

Callopietria argyrosemastis (Hampson)

Eriopus argyrosemastis Hampson, 1918, Novit. zool. 25:135

Type examined.

Male: Forewing deep brown patterned with white similarly to the female but transverse lines edged with white and more distinct. Hindwing white suffused with greyish brown postmedially. Antenna swollen and 'kinked' at two thirds. Only two males are known; both are very worn specimens. Expanse: 27, 28mm.

Female: (Plate fig.24) Head, antennae and thorax deep red-brown, the thorax paler beneath. Antenna filiform. Legs red-brown, hind tibia cream. Abdomen fuscous, paler below. Forewing red-brown, postmedial line black, serrate, indistinct. At the base of the antemedial line a silver triangle. Reniform elongate, a silver dot and a silver streak directed proximally and costally; a pale red-brown streak distad to the silver streak. Some white scales on and distad to the subterminal line from the costa to one fifth. Hindwing white suffused with smokey grey distally from one third. Expanse: 26-31mm.

Diagnosis: The female is easily distinguished from other members of the genus by its striking wing pattern. The male may be distinguished from meridionalis subspp. (q.v.) by the antenna being expanded and kinked distally at two thirds and by the forewing being more elongate costally giving an apical angle of about fifty degrees.

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Nandarivatu, Koro-O, Vunindawa, Nanggali.
VANUA LEVU: Ndelaikoro, Savusavu area.

Remarks: A rare species found only in the Fiji group, usually in primary forest. The males are exceptionally rare.

Callopietria meridionalis Collenette

Callopietria meridionalis Collenette, 1929, Trans. ent. Soc. Lond. 76:471. Type examined.

subsp. nauticorum Tams

Callopietria meridionalis nauticorum Tams, 1935, Ins. Samoa 3:199, pl.12, fig.8. Type examined.

Male: (Plate fig.25) Head, thorax and legs purple-brown flecked with lilac, paler beneath. Antenna 'kinked' and swollen at one third. Abdomen fuscous grey, red-brown dorsal tufts on the first three segments. Forewing purple-brown patterned with white, black and lilac, the reniform and antemedial line posteriorly suffused with pink. Hindwing white suffused with pale brownish grey in the anal angle and from one third. Expanse 29-33mm.

Female: Similarly patterned to the male but more dull in appearance. Antenna filiform. Expanse 27-31mm.

Diagnosis: The closest Fijian ally of this species is C. reticulata (Pagenstecher) (q.v.) in which the male antenna is filiform and the antemedial line is bowed distally below the orbicular. Differs from the typical subspecies in that the postmedial line bows only slightly proximally in the posterior half of the forewing: in meridionalis meridionalis there is a marked proximal 'kink'.

World distribution: Samoa, Tonga, New Hebrides, Kermadec Is. (m. nauticorum) Austral Is., Rapa I. (~~Marquesas~~) (m. meridionalis). The type of nauticorum is from Samoa, that of meridionalis from Rapa I.. Swezey (1946) records C. m. nauticorum from Guam (Micronesia) but I have not examined this material.

Fiji distribution: VITI LEVU: Nandarivatu, Koro-O, summit of Mt Victoria, Tholoisuva, Nanggali, Suva, Lami, Korolevu, Dombuilevu, Vatukoula, Mba, Rakiraki, Lautoka, Nausori Highlands, Singatoka, Vunindawa. VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro. YASAWA. NAUKATHUVU. VIWA. LELEUVIA. MOTHE. TAVEUNI.

subsp. rotumensis subsp. n.

Both males and females of this subspecies are smaller (expanse of males 27-28mm., of females 23-28mm.) and more dull and darkly patterned than the other subspecies of C. meridionalis. In the female the forewing markings are almost completely obsolete (plate fig.326).

Distribution: Rotuma only.

Holotype: ♀, FIJI, Rotuma, Furoroa, 22.iv.1971, G.S. Robinson.

Paratypes: 3♀♀, 6♂♂, FIJI, Rotuma, G.S. Robinson, as follows:

♂, Oinafa feeder road, 24.iv.1971.

♂, Oinafa feeder road, 25.iv.1971.

♂, Oinafa, 18.iv.1971.

♂, 3♀♀, Noatau, 26.iv.1971.

2♂♂, data as holotype.

Biology: The larva of C. m. nauticorum feeds on ferns and is recorded as feeding on Adiantum hispidulum Swartz and Lygodium reticulatum Schkuhr. in Fiji. The author bred a single specimen of nauticorum from Nephrolepis biserrata (Swartz) in the New Hebrides.

Remarks: Both nauticorum and rotumensis are very common and widely distributed. Nauticorum is the only species of Lepidopteron known to feed on ferns in Fiji.

Callopietria reticulata (Pagenstecher)

Eriopus reticulata Pagenstecher, 1884, Jb. Nassau. Ver. Naturk. 37: 226, pl. 6, fig.7. Colour photograph of type ♂ in Wiesbaden Mus. examined.

Male: Head, thorax and legs olivaceous fuscous; mid- and hindlegs clothed with long hairs, black on the tarsi. Hindlegs with black hairs on the tibia. Abdomen grey-brown. Antenna filiform. Forewings brownish black with a fine reticulate creamy grey pattern reminiscent of that of C. meridionalis nauticorum Tams (q.v.) with the veins white. Hindwing uniformly suffused with dark grey. Expanse 23-24mm.

Female: (Plate fig.26) Similarly patterned to the male, the legs not hirsute. The hindwing is brownish black and the forewing suffused with brownish black such that the pattern is fainter than in the male. Expanse 20-22mm.

Diagnosis: The only Fijian Callopietria in which the antenna of the male is filiform. The female is superficially similar to that of C. meridionalis rotumensis subsp. n. (q.v.) but the hindwing is much blacker.

World distribution: India and Ceylon to China and Formosa; south east Asia, East Indies (material from New Guinea not seen), Solomons, New Hebrides.

Fiji distribution:— VITI LEVU: Nandarivatu, Mba (!).
VANUA LEVU: Ndelaikoro.

Remarks: A rare species in Fiji restricted to montane rain forest; a singleton from Mba is almost certainly a vagrant. Specimens of reticulata from the New Hebrides, Solomons and islands to the east of New Guinea are much paler and brighter than Fijian and typical material and this difference seems to be consistent. These pale specimens, brighter and larger than typical reticulata, appear to be referable to Callopietria insularis Butler (Ann. Mag. nat. Hist. (5)10:230, 1882) which I consider to be probably no more than a form of reticulata.

Unfortunately the genitalia of Callopietria spp. do not seem to offer diagnostic characters at specific and subspecific levels.

Genus: Calogramma Guenee, 1852, Hist. nat. Insectes Lepid. 5:165

Calogramma festiva (Donovan)

Phalaena festiva Donovan, 1805, Epitome nat. Hist. Insects New Holland, pl.36. Type not found — identity not in doubt.

Male: (Plate fig.27) Head, thorax and legs reddish purple streaked with cream. Abdomen cream to ochreous. Forewing cream, vividly patterned with black and reddish purple. Hindwing silky white with a pale pink suffusion at the apex and anal angle.

Female: Similarly patterned to the male.

Diagnosis: A large (expanse 43–53mm.) species with a very characteristic bright wing-pattern which is completely diagnostic.

World distribution: Tropical Asia and the East Indies to Australia and New Guinea, Solomons, New Hebrides, New Caledonia, Samoa, Micronesia.

Fiji distribution:— VITI LEVU: Suva, Nandarivatu. VANUA LEVU: Savusavu area. VIWA. ONGEA. OVALAU. VANUA MBALAVU.

Biology: The larva feeds on Crinum asiaticum L. and the early stages are described by Comstock (1966), Gardner (1946b) and Swain (1971:224). A fully grown larva is 55mm. long, brown with black and white irrorations, dorsal and subspiracular yellow lines, a large transverse black dorsal patch on the first abdominal segment, purple ventrally. Eggs are laid in a hair-covered clump on the underside of a leaf. First instar larvae feed as a group, only on the underside of the leaf, stripping the tissues so as to leave only the upper epidermis and cuticle of the leaf. Second and third instar larvae feed in similar fashion, moving progressively closer to the stem of the plant and apparently after the second moult bore into the stem and feed internally. Pupation is in the stem of the plant. Plants which have been attacked by stem-boring larvae appear to be susceptible to fungal attack and often rot internally and eventually collapse and die. On Viwa I. Crinum is used to make squid-mimic fishing lures and the author's attention was drawn by local fishermen to Crinum plants which were

in varying stages of damage and decay, and which were swarming with Calogramma larvae. Hand-picking of early-instar larvae from leaves seemed a suitable control measure. Calogramma must occupy a unique position as a pest of the fishing industry.

Remarks: With the exception of Viwa I. festiva is an uncommon and local species.

Genus: Chasmina Walker, 1856, List Specimens Lepid. Insects Colln Br. Mus. 9:146.

Key to Fijian species of Chasmina Walker

- 1a Costa of forewing bowed posteriorly; wing apex acute-angled; forewing with terminal line of black dots (plate fig.29); corema of male sparsely haired, brownish pink tibialis.
- b Costa straight or with slight anterior bowing distad; wing apex right-angled; terminal line of black dots absent 2
- 2a Forewing pale apple-green; fringe orange-yellow; sometimes three or four black dots on the termen posteriorly (plate fig.30); corema of male a pair of pinkish-yellow brushes viridis.
- b Forewing immaculate white; fringe white; no terminal black dots (plate fig.28); corema of male a pair of mint-green "powder-puffs" candida.

Chasmina candida (Walker)

Arbasera candida Walker, 1865, List Specimens Lepid. Insects Colln Br. Mus. 32:638. Type examined.

Male: (Plate fig.28) Head, thorax, abdomen, fore- and hindwings immaculate white. Palps tipped with yellow. Legs white, fore femora, tibiae and tarsi yellow above with a black streak the length of the femora, two black dots on the tibia and four black dots on the tarsus, the distal two small and faint, often obsolete. Costa straight or curved slightly outward from one third; wing apex right-angled. Corema a pair of bright mint-green "powder-puffs" paradorsally from the base of tergite 8.

Female: Similarly patterned to the male.

Diagnosis: Expanse 40-44mm., the forewing white and lacking black terminal dots. The wing has a square appearance. The corema is exclusively diagnostic - see key to Chasmina species.

World distribution: India and Ceylon through south-east Asia and the East Indies to New Guinea, the Solomons, New Hebrides, New Caledonia, Samoa and Tonga.

Fiji distribution:- VITI LEVU: Suva, Korolevu, Mba, Namanggumangua (Serua), Savura Creek, Nandarivatu. VANUA LEVU: Savusavu area. NANANU-I-RA. NAVUTU-I-RA. MOTHE. ROTUMA.

Remarks: A widely distributed and moderately common species found in areas of secondary vegetation. Clinophlebia sericea Hampson, 1893, (Illust. typical Specimens Lepid. Heterocera Colln Br. Mus. 9:29, pl.161, fig.7) is a much-used synonym of this species as pointed out by Fletcher (1957).

Chasmina tibialis (F.)

Bombyx tibialis F., 1775, Syst. ent.:578. Type not examined - identity not in doubt.

Male: (Plate fig.29) Head, thorax, abdomen, fore- and hindwings immaculate white. Palps tipped with yellow. Legs white, fore femora, tibiae and tarsi yellow above with two black dots on the tibia; four black dots on the tarsus, the distal three most often obsolete. Costa curved posteriorly from the base; wing apex rounded. Termen of forewing with a line of black dots between the veins. Corema a sparse pinkish "powder-puff" at the base of the valves.

Female: Similarly patterned to the male.

Diagnosis: Expanse 41-47mm.. The terminal black dots, the shape of the forewing, the colour of the corema and the lack of a black stripe on the fore femur distinguish this species from C. candida (Walker) (q.v.).

World distribution: India through south-east Asia and the East Indies to New Guinea and Australia, the Solomons, New Hebrides, New Caledonia, Samoa, Tonga, Society Is., Marquesas Is. and Micronesia.

Fiji distribution:- VITI LEVU: Suva, Nandarivatu, Nausori Highlands, Rakiraki, Tholoisuva, Koro-O. VANUA LEVU: Savusavu area, Ndelaikoro.

Biology: The larva feeds on Hibiscus tiliaceus L. in the Pacific and the life history is described by Comstock (1966). Gardner (1946a) describes the larva from India and records Grewia as the foodplant. In Fiji, tibialis is fairly common and often collected at light in primary forest, unlike candida.

Chasmina viridis sp. n.

Male: Head and thorax pale apple-green, palps tipped with yellow. Legs white; fore femora, tibiae and tarsi orange-brown above with two brownish-black dots on the tibia and four on the tarsus. Forewing pale apple-green with an orange-yellow fringe; three or four black dots on the termen posteriorly. Costa approximately straight from one third, giving the wing a square appearance. Hindwing immaculate white. Corema a pair of pinkish-yellow brushes arising paradorsally from the base of tergite 8.

Female: (Plate fig.30) Similarly patterned to the male, the forewing slightly more rounded.

Diagnosis: Expanse 43-49mm.. The wing pattern of this species differentiates it immediately from C. candida (Walker) and C. tibialis (F.) (q.v.). The corema is distinctive, similar to that of tibialis but less sparse and apparently forming two pencils of hair rather than a single "powder-puff". The dark upperside to the forelegs distinguishes this species from candida and tibialis. The closest apparent ally of this species is C. candida (Walker).

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, South Ridge. VANUA LEVU: Ndelaikoro.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 27-30.ix.1968, H.S. & G.S. Robinson.

Paratypes: 10♂♂, 9♀♀, data as holotype.

1♂, 5♀♀, as holotype but 16-20.xi.1968.

Remarks: Frequently taken to light in montane rain forest during the rainy season.

Genus: Dyrzela Walker, 1858, List Specimens Lepid. Insects Colln Br. Mus. 15:1758.

Dyrzela trichoptera sp. n.

Male: (Plate fig.209) Head and thorax pale lilac-grey above, dull ochreous yellow below; palps purple-brown. Legs dull brown above, grey-buff below, the mid- and hind tibiae clothed with elongate dull ochreous yellow hairs. Antennae purple-brown, pectinate to two thirds. Forewing silver-grey flecked with medium brown scales with three ill-defined brown oblique transverse lines; subterminal line of small black dots; a basal black spot. The postmedial fascia is occupied anteriorly by a zone of elongate hair-like scales, each 1.5 to 2.0mm. long. Towards the costa these scales form a definite humped protuberance. Hindwing brownish cream with a faint brown stigma and a fold in the anal angle containing elongate yellow scales. Genitalia figured in text fig.69; valves with two medial sclerotised processes and a basal digitate process; anellus expanded basally. Aedeagus (text fig. 70) with an elongate spined bar at the base of the vesica and a cluster of perhaps forty needle-like cornuti.

Female: Face and forelegs dull brownish grey. Head and thorax lilac grey above, grey-buff below. Abdomen dull brownish grey. Antennae filiform. Forewings silver-grey flecked with brownish black scales; three dark brown transverse lines; basal black spot. Subterminal fascia a little paler than the remainder of the wing; subterminal line of black dots. Hindwing dull brownish grey, paler basally. Genitalia illustrated in text fig.71; lamella postvaginalis heavily sclerotised; appendix bursae large, hardly separate from the corpus bursae.

Diagnosis: The closest apparent ally of this species is Dyrzela plagiata Walker (1858, List Specimens Lepid. Insects Colln Br. Mus. 15:1758) from Ceylon, India, south east Asia, Borneo, Celebes and New Guinea (type ♂ from Burma, Moulmein, examined). Male plagiata are similarly patterned to trichoptera females (female plagiata are similarly patterned to the male) but the antenna is pectinate to two thirds and there is a large white-margined chocolate-brown semi-circle at the forewing costa bounded by the subterminal line distally and extending posteriorly for one half the width of the forewing, the margin of the semicircle rejoining the costa at one half its length. In plagiata there is a postmedial line of three dark brown dots and two faint brown oblique medial transverse lines. The male genitalia are smaller in plagiata than in trichoptera, the vesica bearing a single thorn-like cornutus and the valve with a single medial sclerotised process and a basal digitate process. The anellus is only slightly expanded basally. Males of plagiata lack the elongate forewing scales and elongate yellow-buff leg hairs of trichoptera.

Fiji distribution:- VITI LEVU: Vunindawa (Phillips - one female), Nausori Highlands (one female from site 2 - 2000', Robinson). VANUA LEVU: Governor's Pool, Ndelaikoro.

Holotype: ♂, FIJI, Vanua Levu, Ndelaikoro VHF Sta., 940m., 24-25.ii.1971, G.S. Robinson.

Paratypes: ♂, BMNGSN 6955, data as holotype.

700, BMNGSN 6959, data as holotype.

♂, FIJI, Vanua Levu, Governor's Pool, 8.ii.1971, G.S. Robinson.

Remarks: An extremely rare and local species; apart from Phillips' specimen, known only from montane rain forest. The collection of the first males of this species from Ndelaikoro, showing the bizarre development of secondary sexual characteristics but giving precise placement on genital characters, was most exciting.

Genus: Leucocosmia Butler, 1886, Trans. ent. Soc. Lond.:394. gen. rev.

Leucocosmia nonagrica (Walker)

Curgia nonagrica Walker, 1364, J. Linn. Soc., Zool.7:166.

Male: (Plate fig.31) Head, thorax and legs ochreous; prothorax with a blackish-brown dorsal collar; abdomen blackish-brown above, pale ochre beneath. Fore- and hindwings suffused basally with ochreous yellow; forewing distally greyish brown patterned with paler markings. Hindwing distally suffused with brownish grey. Genitalia illustrated by Zimmerman (1958). Expanse 29-33mm..

Female: Similarly patterned to the male but the dark prothoracic collar is absent and the thorax and abdomen are unicolorous. The basal ochreous yellow suffusion of fore- and hindwings is absent, the distal wing pattern of the male is continued to the base of the wings. Expanse 30-34mm..

Diagnosis: The male facies are highly distinctive although a worn female specimen might be confused with Athetis striolata (Butler) (q.v.) in which, however, the hindwing is paler, the forewing pattern is never composed of pale lines and the expanse attained in striolata never seems to be greater than 29mm..

World distribution: South east Asia through the East Indies to New Guinea and Australia, Solomons, New Hebrides, New Caledonia, Kermadec Is., Samoa, Society Is. and ~~Marquesas~~ Rapa I. .

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, summit of Mt Victoria, Tholoisuva, Nanggali, Suva, Korolevu, Dombuilevu, Rakiraki, Vatukoula, Mba, Lautoka, Nausori Highlands.
VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro.
OVALAU. YASAWA.

Biology: Zimmerman (1958) describes the early stages of this species. The larva feeds on Commelina pacifica Vahl, Syzygium malaccense (L.), Portulaca, Ipomoea batatas (L.), Nicotiana tabacum L., "grass" and "beans".

Remarks: This is an exceptionally common species and has been collected in large numbers at all localities examined on Viti Levu and Vanua Levu with the exception of Lambasa. At Nandarivatu nonagrica comprise up to twenty per cent of the macrolepidoptera collected in light traps and a large sample might contain five thousand specimens of this species. Boursin (1964) included Leucocosmia among nine genera synonymised with Athetis Hubner (q.v.). The forms of the male genitalia of the type species of the two genera are sufficiently different to warrant the restitution of Leucocosmia Butler. In L. nonagrica (Walker) (ceres Butler, type species of Leucocosmia, is a junior subjective synonym of nonagrica (Walker)) the uncus, as in Athetis, is absent but the valve is expanded and swollen at the sacculus with a scobinate ventral zone bearing modified non-deciduous scales and with a sickle-shaped subterminal process. The juxta is present and is heavily sclerotised. In Athetis furvula (Hubner, Samml. eur. Schmett. 4, pl.83, fig.390, 1808), type species of Athetis, the valve is simple, narrow and carries a bifid subterminal process. The juxta is not apparent. Boursin's agglomeration of species and genera in Athetis appears unsatisfactory and Athetis in its present form requires revision.

Genus: Plagideicta Warren, 1914, in Seitz, Macrolepid. World 11:339.

Plagideicta sp. nr. leprosticta Hampson

Euplexia leprosticta Hampson, 1906, J. Bombay nat. Hist. Soc. 17:469. Type examined.

A single very worn female specimen of a species near leprosticta Hampson was captured at MV light at VITI LEVU, Nandarivatu, 27-30.vi.1968 by H.S. & G.S. Robinson.

Expanse: 49mm.; forewings light brown (? faded) with a bluish white mottled pattern (almost completely erased). Hindwing very pale buff suffused with pale grey-brown at the apex.

Specimens of this genus are apparently very rare and little material is available. In the event of further material becoming available generic revision would be required to place this specimen which I suspect of being a migrant.

Genus: Platysenta Grote, 1874, 6th. Rep. Peab. Acad. Sci.:28.

Platysenta conducta (Walker) comb. n.

Caradrina conducta Walker, 1857, List Specimens Lepid. Insects Colln Br. Mus. 10:296. Type examined.

Male: (Plate fig.327) Head, thorax and legs grey flecked with purple-brown, paler beneath. Tibiae and tarsi black above ringed with white at articulations. Abdomen greyish cream above, paler beneath; three or four anteriodorsal tufts of elongate scales on the first three or four abdominal segments, the scales distally charcoal grey tipped with white, proximally greyish cream. Forewing greyish, flecked with black, purple-brown and white. Hindwings greyish white suffused with grey distally and on the veins. Valve (text fig.50) narrow, a simple narrow digitate process at one half. Vesica with a small scobinate patch and two groups of short cornuti (text fig.49).

Female: Similarly patterned to the male.

Diagnosis: Smaller (expanse 24-28mm.) and more drab in appearance than P. illecta (Walker) (q.v.). The male genitalia separate the two species (compare text figs. 49 and 50 with 47 and 48). Could be confused with Amyna octo (Guenee) (q.v.) but in octo the grey suffusion of the hindwing is uniform.

World distribution: South and east Africa to Ceylon, India and south east Asia. Recorded from the Marquesas and Society Is. by Collenette (1928) but specimens not seen.

Fiji distribution: VITI LEVU:- Suva. VANUA LEVU: Savusavu area.

Remarks: This species has been overlooked by the author for some time and is probably more widely distributed in Fiji than suggested above.

Platysenta dolorosa (Walker) comb. n.

Mamestra dolorosa Walker, 1865, List Specimens Lepid. Insects Colln Br. Mus. 32:667. Type examined.

Male: Not known from Fiji. Similarly patterned to the female.

Female: (Plate fig.328) Head, thorax and legs brownish black flecked with white, pale grey-buff beneath. Abdomen pale buff. Forewing blackish brown, patterned with brownish cream, white and jet-black. Hindwing white suffused with pale grey-brown distally. Bursa copulatrix bilobed, asiginate; colliculum narrow.

Diagnosis: A large species (expanse 33-35mm.), larger and darker than P. illecta and P. conducta (q.v.) which are never brownish black. The conspicuous white dissected reniform of dolorosa is diagnostic as are the two distinct white flecks on the subterminal line at three eighths of its length from the costa.

World distribution: Ceylon, India and Christmas I., south east Asia, East Indies, New Guinea, Australia, Solomons, New Caledonia.

Fiji distribution:- VITI LEVU: Suva.

Remarks: Overlooked by the author and thus only known from a female from Suva, September 1966 (H.S. Robinson) and two females in BMNH labelled "Fiji" collected by Mathew. It is probably fairly common. P. dolorosa appears to be replaced by Platysenta praesecta (Walker) comb. n. in the New Hebrides.

Platysenta illecta (Walker)

Perigea illecta Walker, 1865, List Specimens Lepid. Insects Colln Br. Mus. 32:684. Type examined.

Male: (Plate fig.36) Head, thorax and legs purple-brown above flecked with black and white; thorax ventrally pinkish cream. Legs inclining to white ventrally. Tibiae and tarsi black above, banded with white at articulations. Abdomen pale grey, paler beneath; anterior four segments with dorsal tufts of elongate scales, the anterior two tufts coloured as the thorax, the posterior two with pale greyish brown scales distally black tipped with white. Forewing purple-brown patterned with orange-brown, black and white scales. Hindwings greyish white suffused with grey distally and on the veins. Valve (text fig.48) wide, thickly spined dorsally and with a large dorsally directed process at one half. Aedeagus short; vesica with an extensive scobinate area and two heavily sclerotised spined plates at the base (text fig.47).

Female: Similarly patterned to the male. Bursa copulatrix simple, large, with a pair of opposed scobinate signa; colliculum convoluted, fairly narrow throughout its length.

Diagnosis: larger (expanse 29-34mm.) and more brightly coloured than P. conducta (Walker) (q.v.). Could be confused with Amyna octo (Guenee) (q.v.) but in octo the hindwing is uniformly suffused with grey. The male genitalia are highly distinctive and readily separable from those of P. conducta (compare text figs.47 and 48 with 49 and 50).

World distribution: India and Ceylon through south east Asia to Australia, New Hebrides, New Caledonia, Kermadec Is., Samoa, Tonga, Rapa I. (~~Marquesas~~)

Fiji Distribution:- VITI LEVU: Suva, Tholoisuva, Nanggali, Korolevu, Dombuilevu, Rakiraki, Vatukoula, Mba, Nandarivatu, Koro-O. VANUA LEVU: Savusavu area, Governor's Pool, Lambasa, Ndelaikoro. YASAWA. NANUYA LAILAI. NAUKATHUVU. VIWA. ONGEA. OVALAU. ROTUMA. FULANGA. TAVEUNI.

Remarks: The above locality records for Fiji are all thought to refer to this species. It is widespread and common: it was exceptionally

abundant at Governor's Pool, over twenty per cent of the light trap sample consisting of this species.

? Platysenta INDETERMINATE SPECIES

Female: (Plate fig.329) Head, thorax and legs brick-red above flecked with dark grey; pale grey beneath. Abdomen buff-grey. Forewing dark brick-red, suffused and a faint pattern marked out in dark brownish grey. Hindwing pale grey, darker distally. Bursa copulatrix small, rotund, asignate. Colliculum wide posteriorly, funnel-shaped.

Diagnosis: Expanse 29,32mm.. Facies reminiscent of Platysenta illecta (Walker) (q.v.) but the costa straight, the forewing narrower. The hindwing is more uniformly suffused with grey than in other Platysenta species. The bursa copulatrix is much smaller than in other Fijian Platysenta species.

Remarks: Known only from two females, FIJI, (Viti Levu), Nandarivatu, 16-20.xii.1968 and 12-14.ix.1969.

Genus: Prospalta Walker, 1857, List Specimens Lepid. Insects Colln Br. Mus. 13:1114.

Prospalta caerulea Robinson

Prospalta caerulea Robinson, 1969, Entomologist's Rec. J. Var. 81;191. Type examined.

Male: Head, thorax and legs olivaceous to russet brown, abdomen pale ochreous grey. Forewing reddish brown patterned with olive, orange-brown and black. Terminal fascia flecked with pale pastel blue. Hindwing suffused with pale greyish brown.

Female: (Plate fig.35) Similarly patterned to the male.

Diagnosis: Expanse 34-40mm.. Wing pattern highly distinctive, especially the bluish-white subterminal streak in the posterior angle of the forewing.

Fiji distribution:- VITI LEVU: Tholoisuva, Nausori Highlands, Nandarivatu, Koro-O. VANUA LEVU: Governor's Pool, Ndelaikoro.

Remarks: A moderately rare species only known from primary forest on the two largest islands of the Fiji group.

Genus: Sasunaga Moore, 1881, Proc. zool. Soc.:342.

Sasunaga oenistis Hampson

Sasunaga oenistis Hampson, 1908, Cat. Lepid. Phalaenae Br. Mus. 7:56, pl.109, fig.8. Type examined.

Male: (Plate fig.332) Frons and palps cream below, flecked with purple-brown, purple-brown above. Thorax, legs and abdomen purple-brown below, thorax and legs deep purplish brown above, abdomen reddish-ochre above. Forewings deep purple-brown patterned with black and cream. Hindwings reddish-ochre. Expanse 42-46mm.. Right valve and aedeagus illustrated in text figs. 37 and 38 respectively.

Female: (Plate fig.331) Forewings with greater predomination of cream patterning than in the male, the wings broader, patagia cream. Hindwing rounded, the anal angle not elongate. Expanse 38-41mm.. Bursa copulatrix, ductus bursae and colliculum illustrated in text fig. 36.

Diagnosis: Smaller than S. tomaniiviensis (q.v.), the male aedeagus and female genitalia significantly different (compare text figs. 36, 37 and 38 with 34, 35, 39 and 40). The male hindwing is extended at the anal angle, the female slightly so whereas the hindwing of S. tomaniiviensis and S. tenebrosa (q.v.) is rounded. The hindwings are reddish, never so in S. tenebrosa.

World distribution: East Indies, New Guinea, New Hebrides, Micronesia.

Fiji distribution:- VITI LEVU: Suva, Nanggali, Korolevu, Rakiraki, Vatukoula, Nandarivatu, Koro-O, summit of Mt Victoria, Vunindawa, Lautoka, Nausori Highlands. VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro. LELEUVIA. OVALAU. NAVUTU-I-RA.

Remarks: Widespread and often fairly common but not so in montane forest where S. tomaniiviensis is abundant.

Sasunaga tomaniiviensis sp. n.

Male: (Plate fig.330) Head, thorax and legs deep purple-brown above, paler below. Abdomen reddish-ochreous above, purple-brown below. Forewings dark purple-brown patterned with black, reniform and orbicular paler. Hindwing suffused greyish brown. Two paratypes with a white basal dot in the forewing. Expanse 45-49mm.. Right valve and aedeagus illustrated in text figs. 39 and 40 respectively.

Female: (Plate fig.32) Similarly patterned to the male but forewing with partial patterning of brownish cream. Patagia white, laterally extended into a basal streak on the forewing. Genitalia figures in text figs. 34 and 35. Expanse 42-48mm., two dwarfs (ex Nausori Highlands) 33, 31mm..

Diagnosis: The closest apparent ally of this species is S. oenistis Hampson (q.v.) from which it can be differentiated as follows. The female genitalia are different (compare text figs. 34 and 35 with 36), the sclerotised colliculum being one third as long as in S. oenistis. The aedeagus of this species is much larger than that of oenistis (compare text figs. 40 and 38). The palps of this species are not cream below as in oenistis and wing pattern and shape is obviously different - compare illustrations.

Fiji distribution: Known only from the localities of the type material and from Ndelaikoro, VANUA LEVU.

Holotype: ♂, FIJI, Viti Levu, Mt Victoria (summit - 1323m.) 25.xi.1970, G.S. Robinson.

Paratypes: 2♂♂, 4♀♀, data as holotype.

2♂♂, Fiji, iv.1966, H.S. Robinson.

♀, Fiji, 26.iv.1966, H.S. Robinson.

♂, Fiji, (Viti Levu), Nandarivatu, 27-30.vi.1968, H.S. & G.S. Robinson.

2♀♀, Fiji, (Viti Levu), Nausori Highlands, Site 1 - 2200', 16-20.xii.1969, G.S. Robinson.

Remarks: The specimens with no more data than 'Fiji' were probably taken at Savura Creek, about 8km. north of Suva, in lowland rain forest. This is an extremely common species in montane forest but was confused with S. oenistis by the author for some years and accurate distributional data are not available. The female genitalia illustrated in text fig.34 are those of one of the dwarf specimens from the Nausori Highlands.

Sasunaga tenebrosa (Moore)

Hadena tenebrosa Moore, 1867, Proc. zool. Soc. Lond.:59. Type not found; identity not in doubt.

Male: (Plate fig.33) Head and thorax ochreous grey, abdomen grey-brown above, lilac-brown below. Forewing olive-brown patterned with dark brown and black, in some specimens a white basal streak to one third the length of the forewing, in some specimens the forewing suffused and streaked overall with charcoal-grey. Hindwing blackish-brown.

Female: Similarly patterned to the male.

Diagnosis: Smaller (expanse 31(dwarf) to 42mm.) and never with the reddish appearance of S. oenistis (q.v.).

World distribution: India through south east Asia and the east Indies to New Guinea, Australia, Solomons, New Hebrides.

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Nanggali, Korolevu, Dombuilevu, Vatukoula, Mba, Nandarivatu, Koro-O, summit of Mt Victoria, Nausori Highlands, Lautoka, Rakiraki.
VANUA LEVU: Savusavu area, Lambasa, Ndelaikoro.
NANANU-I-RA. VIWA. FULANGA.

Biology: Larva described by Gardner (1946b). Larva on Ventilago in India.

Remarks: A widespread species, often common in Suva; it was also numerous at Ndelaikoro.

Genus: Spodoptera Guenee, 1852, Hist. nat. Insectes Lepid. 5:153.

Spodoptera litura (F.)

Noctua litura F., 1775, Syst. ent.:601. Type not examined - identity not in doubt.

Male: Head, thorax and legs brownish cream, the abdomen similar tinged with purple-brown. Forewing purplish ochreous patterned with cream, black and violet-grey. Hingwing silky white suffused with charcoal grey on the veins distad and at the apex.

Female: (Plate fig.37) Similarly patterned to the male but duller, the forewing pattern in shades of grey and brown.

Diagnosis: Expanse 35-42mm.. Separable from S. mauritia (q.v.) by wing pattern (compare plate figs. 37 and 38); the distally-directed oblique medial line from the costa is distinctive.

World distribution: Europe to south east Asia, East Indies, New Guinea, Australia, Solomons, New Hebrides, New Caledonia, Kermadec Is., Micronesia, Samoa, Tonga, Gilbert Is., Society Is., Marquesas, Austral Is..

Fiji distribution:- VITI LEVU: All localities. VANUA LEVU: All localities. NANANU-I-RA. OVALAU. YASAWA. NANUYA LAILAI. NAUKATHUVU. VIWA. ONGEA. ROTUMA. TAVEUNI.

Biology: The early stages are described by Comstock(1966) and the larva is described by Gardner (1941, 1946b). The larva is recorded as feeding on the following species of Fijian plants: Cassythia filiformis L., Rosa damascena Mill., Inocarpus fagiferus (Parkinson) (fruit), Acacia farnesiana (L.)(flowers), Mimosa pudica L., Canavalia maritima (Aubl.), Sesbania grandiflora (L.), Indigofera tinctoria L., Mucuna aterrima (Piper & Tracy), Fleurya interrupta(L.), Boerhaavia diffusa L., Passiflora quadrangularis L., Cucurbita pepo L., Begonia spp., Triumfetta procumbens Forst. f., Theobroma cacao L., Gossypium spp., Sida rhombifolia L., Euphorbia atoto Forst. f., Camellia sinensis (L.), Psidium guajava L., Geniostoma insularis Smith & Stone, Lantana camara L., Piper spp., Brassica oleracea L., Basella rubra L., Daucus carota L., Dahlia pinnata Cav., Helianthus annuus L., Lactuca sativa L., Synedrella nodiflora (L.), Zinnia elegans Jacq., Lycopersicum esculentum Mill., Nicotiana tabacum L., Solanum melongena L., S. torvum Swartz, S. tuberosum L., Ipomoea alba L., I. aquatica Forsk., I. batatas L., I. pes-caprae L., Musa nana Lour., Canna indica L., Asparagus plumosus Baker, Alocasia indica (Roxb.), Colocasia esculenta (L.), Eucharis grandiflora Planch. & Linden, Dioscorea spp., Lepturus repens (Forst. f.), Saccharum officinarum L., Thuarea involuta (Forst. f.), Zea mays L.. The larva is an almost omnivorous pest and Hinckley (1964) records several of its parasites in Fiji. See also Swain (1971:44,67, 147, 154, 182, 278).

Remarks: A widespread and common species especially in cultivated wet zone localities.

Spodoptera mauritia acronyctoides Guenee

Hadena mauritia Boisduval, 1833, Nouv. Ann. Mus. Hist. nat. Paris 2:240, pl.13, fig.9.

Spodoptera acronyctoides Guenee, 1852, Hist. nat. Insectes Lepid. 5:154. Types not examined - identity not in doubt.

Male: (Plate fig.38) Head, thorax and legs deep purple-brown, abdomen grey. Forewing purplish black or purplish brown patterned with black and pale mauve. Orbicular stigma yellowish. Hindwing silky white suffused with grey apically and on the veins.

Female: Similarly patterned to the male but head, thorax and legs greyish, the forelegs without hair-fans. Forewing pattern diffuse, greyish-brown.

Diagnosis: Expanse 29-40mm., darker and with a less striking wing pattern than S. litura (Guenee) (q.v.).

World distribution: Europe and Africa to south east Asia, the East Indies, New Guinea, Australia, Solomons, New Hebrides, New Caledonia, Samoa, Tonga, Society Is., Marquesas, Hawaii, Micronesia. Recorded as a migrant from New Zealand.

Fiji distribution:- VITI LEVU: All localities examined except the summit of Mt Victoria. VANUA LEVU: All localities. NANANU-I-RA. OVALAU. MOTHE. ONEGEA. YASAWA. VIWA. ROTUMA. TAVEUNI.

Biology: Gardner (1941) describes the larva and (1946b) the larval mouthparts. Rothschild (1969) describes the biology of this species and gives an extensive bibliography. Lever (1969) considers outbreaks of this species on Viti Levu in relation to rainfall pattern. Hinckley (1964) lists three parasites of this species. Often described as an 'omnivorous' species, mauritiae has a much narrower foodplant spectrum than litura and with the exception of Solanum melongena L. is only recorded as feeding on Gramineae in Fiji, attacking the following species: Axonopus compressus (Swartz), Brachiaria mutica (Forsk.), Ischaemum indicum (Houtt), Oryza sativa L., Panicum maximum Jacq., Saccharum officinarum L., Zea mays L.. See also Swain (1971:254).

Remarks: A very common species in wet areas where grass is plentiful. It is not common and may well be a vagrant in forest areas. Fletcher (1956) discusses the identity of this species.

Genus: Stenopterygia Hampson, 1908, Cat. Lepid. Phalaenae Br. Mus. 7:61.

Stenopterygia nausoriensis sp. n.

Male: (Plate fig.208) Head, thorax and legs purplish brown, paler beneath. Abdomen greyish ochreous tinged with purple laterally, paler beneath. Forewing dark brown patterned with ochreous and black and flected with white scales. Hindwing purplish brown, paler proximad. Right valve and aedeagus illustrated in text figs. 42 and 43.

Female: Similarly patterned to the male. Genitalia illustrated in text fig.41.

Diagnosis: Expanse 31-39mm.. The closest apparent ally of this species is Stenopterygia kebeae (Bethune-Baker, 1906, Novit. zool. 13:221 as Alibama kebeae), the male type of which is from Mt Kebea (6000'), New Guinea and in BMNH, BMNGSN 6649. The hindwing of nausoriensis is paler than that of kebeae and the black medial patch below the reniform and at the base of the posterior margin of the forewing in nausoriensis are not apparent in kebeae. In nausoriensis there is a triangular cornutus on the vesica which is represented by an elongate spine in kebeae. The process at the base of the valve is bifurcate in nausoriensis, simple in kebeae and the valve is wider in the former than in the latter species.

Fiji distribution: Type locality, also VANUA LEVU: Ndelaikoro, Governor's Pool, Savusavu area, Lambasa.

Holotype: ♂, FIJI, (Viti Levu), Nausori Highlands, Site 1 - 2200', 16-20.xii.1969, G.S. Robinson.

Paratypes: 2♂♂, 2♀♀, data as holotype.

♀, as holotype but "Site 2 - 2000' ".

♀, as holotype but "Site 3 - 1950' ".

Remarks: Rare and local in montane forest but fairly common at Ndelaikoro.

INDETERMINATE SPECIES (Acronictinae)

Male: (Plate 340) Head and thorax creamy buff, heavily flecked with deep purple-brown scales; abdomen pale grey-brown; legs as head and thorax proximally, grey-brown distally. Antenna bipectinate (text fig.76), pale grey-buff. Forewing creamy buff patterned with purple-brown and deep olivaceous brown; reniform yellow posteriorly. Hindwing dull grey, paler basally. Fore- and hindwing venation illustrated in text fig. 75. Male genitalia illustrated in text fig.77; aedeagus illustrated in text fig.74; vesica with about ten curved, stout cornuti.

Female: Unknown.

Fiji distribution: Known from two males, one from VITI LEVU, Vunindawa (Phillips)- the specimen illustrated - and one from 'FIJI' (H.S. Robinson). The abdomen of the Phillips specimen is missing. The Robinson specimen, probably collected at Savura Creek, VITI LEVU, is in very poor condition and was used to provide the following slide preparations: BMNGSN 6954 (genitalia), 6957 (wings), 6958 (antenna).

Subfamily: Acontiinae

Genus: Amyna Guenee, 1852, Hist. nat. Insectes Lepid. 5:406.

Amyna natalis (Walker)

Berresa natalis Walker, 1858, List Specimens Lepid. Insects Colln Br. Mus. 16:214. Type examined.

Male: (Plate fig. 39) Head, thorax and abdomen pale dull greyish brown, paler beneath. Forewing pale dull greyish brown with white and blackish brown scales making up an indistinct pattern. The cell is modified, containing a concavity which is thinly scaled and, to the naked eye, having the appearance of a bubble. Beneath there is a group of large plate-like scales arising from the base of the cell and forming an oblique 'roof' for one half the length of the cell 'bubble'. Hindwing suffused with grey, a white lunule marginally in the anal angle. Vesica with two scobinate areas and a sclerotised zone with thorn-like projections.

Female: Similarly patterned to the male but without the 'bubble' in the cell and with the costa only slightly bowed.

Diagnosis: Smaller (expanse 16-22mm.) and more drab than Amyna octo (Guenee) (q.v.) which does not have a forewing cell bubble in the male which has the costa only slightly bowed.

World distribution: Tropical Asia to the East Indies, Australia, New Hebrides, Samoa, Tonga, Gilbert & Ellice Is., Rapa I. (~~Marquesas~~)

Fiji distribution:- VITI LEVU: Suva, Mba, Lautoka, Rakiraki, Dombuilevu. VANUA LEVU: Savusavu area. NANANU-I-RA. KOMO. VIWA. YASAWA. ROTUMA. ONGEA. TAVEUNI.

Biology: The larva is described by Gardner (1941) and is recorded as feeding on the following Fijian plants: Amaranthus spp., Sida rhombifolia L., Waltheria americana L., Malvastrum coromandelianum (L.). Natalis is a moderately common species in talasinga areas.

Amyna octo (Guenee)

Perigea octo Guenee, 1852, Hist. nat. Insectes Lepid. 5:233. Type examined.

Male: (Plate fig.40) Head, thorax, legs and abdomen drab ochreous brown, paler beneath. Forewings bright russet brown, transverse markings of dark brown edged with cream. Reniform figure-8 shaped, the lower half of the '8' sometimes infilled with white. Hindwing pale brownish grey with an indistinct darker medial line and a white streak marginally in the anal angle. Vesica with an extensive scobinate area, the cornuti elongate, more so than in A. natalis (Walker) (q.v.).

Female: Similarly patterned to the male.

Diagnosis: Larger (expanse 20-27mm.) and brighter than A. natalis (Walker) but smaller than A. punctum (F.). The figure-8 reniform is distinctive, especially when infilled with white.

World distribution: Africa through tropical Asia and the East Indies to New Guinea and Australia, Solomons, New Hebrides, New Caledonia, Tonga, Samoa, Gilbert Is., Marquesas, Society Is., Micronesia, central America.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Dombuilevu, Rakiraki, Mba, Nandarivatu, Lautoka. VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro. NANANU-I-RA. YASAWA. MOTHE. NANUYA LAILAI. NAUKATHUVU. VIWA. ONGEA. ROTUMA.

Biology: Larva described by Gardner (1941) and recorded as feeding on the following species of Fijian plants: Cardiospermum halicacabum L., Parasponia andersonii (Planch.), Amaranthus viridis L., Chenopodium ambrosioides L., Sida sp..

Remarks: A moderately common species associated with secondary vegetation.

Amyna punctum (F.)

Noctua punctum F., 1794, Syst. ent. 3:34. Type not examined - identity not in doubt.

Male: Head, thorax, legs and abdomen dark greyish brown, paler beneath. Legs banded with white at articulations. Forewing dark greyish brown flecked with white; transverse lines black. Hindwing dark grey with a darker medial line edged distally with pale grey brown.

Female: (Plate fig. 41) Similarly patterned to the male.

Diagnosis: Larger (expanse 29-33mm.) and darker than A. octo (Guenée) (q.v.) and A. natalis (Walker) (q.v.). The male has an elongate coremata tube at the base of each valve and this feature is apparently absent in both octo and natalis.

World distribution: Tropical Africa and Asia to the East Indies. New Hebrides.

Fiji distribution:- VITI LEVU: Lautoka, Rakiraki, Nausori Highlands. FULANGA.

Remarks: In the New Hebrides this species is associated with mature secondary vegetation on limestone. On Fulanga it is common in this habitat type. On Viti Levu it is an extremely rare species but it was abundant in the west of Viti Levu after one of the severest droughts in living memory, in December 1969.

Genus: Araeopteron Hampson, 1893, Illust. typical Specimens Lepid. Heterocera Colln Br. Mus. 9:136.

Araeopteron griseata Hampson

Araeopteron griseata Hampson, 1907, J. Bombay nat. Hist. Soc. 17:670. Type examined.

There is a single specimen of this species in BMNH collected by R.H. Phillips at Lautoka (VITI LEVU) on 5.viii.1931. As no further specimens of this species have come to light it is probably an introduction. The geographical range of this species is from India to the East Indies.

Genus: Eublemma Hubner, 1821, Verz. bekannter Schmett. (16)256.

Eublemma anachoresis (Wallengren)

Xanthoptera anachoresis Wallengren, 1863, Wien. ent. Monatschr. 7:148. Type not examined - identity not in doubt.

Male: Head, thorax and legs very pale yellow, abdomen yellow. Forewing basally bright pale yellow, medial transverse line dark brown, distad to this a narrow purple fascia. Postmedial

fascia orange-brown, darker distally. Sumbarginal line white with black points on the veins. Hindwing yellowish grey flecked with orange in the anal angle.

Female: (Plate fig. 42) Similarly patterned to the male.

Diagnosis: Expanse 11-15mm., wing pattern completely diagnostic.

World distribution: Africa and India to the East Indies and Australia, New Hebrides, Micronesia.

Fiji distribution:- VITI LEVU: Rakiraki, Lautoka.
NAUKATHUVU.

Biology: Larva undescribed but recorded as feeding on the leaves of Waltheria americana L. in Fiji.

Remarks: A rare species restricted to dry talasinga grassland areas.

Eublemma baccalix (Swinhoe)

Mestleta baccalix Swinhoe, 1886, Proc. zool. Soc. Lond.:452, pl.40, fig.7. Type examined.

Male: Head, thorax, legs and abdomen orange-brown, paler beneath. Forewings orange-brown marked with dark brown. Hindwings pale yellow, reddish towards the margins.

Female: (Plate fig. 43) Similarly patterned to the male.

Diagnosis: Expanse 16-19mm.. Superficially similar to Eublemma crassiuscula (Walker) (q.v.) but without transverse lines in the hindwing.

World distribution: Central Africa through tropical Asia to Formosa. Specimens from East Indies, New Guinea or Solomons not seen.
New Hebrides.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Savura Creek, Lautoka, Nandarivatu, Mba, Rakiraki. VANUA LEVU: Savusavu area.
NANUYA LAILAI.

Remarks: A widespread species but one which is rarely seen - it is never common and is easily overlooked.

Eublemma cochylioides (Guenee)

Micra cochylioides Guenee, 1852, Hist. nat. Insectes Lepid.6:245. Type not examined - identity not in doubt.

Male: (Plate fig.44) Head, thorax, legs and abdomen cream; forewings cream with a faint brown oblique medial line. Postmedial fascia flecked with bright purple; a posterior submarginal brown streak. Apex fringed with blackish brown. Hindwing cream suffused with pale greyish brown distally.

Female: Similarly patterned to the male.

Diagnosis: Expanse 13-17mm.. In worn specimens the purple flush of the forewing may not be apparent and such specimens could be confused with Eublemma rivula (Moore) (q.v.) which has a distinct postmedial line and with Eublemma ragusana (Freyer) (q.v.) which has a distinctive black dot in the forewing apex.

World distribution: Africa through India to south east Asia, East Indies, Australia, Tonga.

Fiji distribution:- VITI LEVU: Suva, Lautoka, Vunindawa.
VANUA LEVU: Savusavu area. YASAWA. NAUKATHUVU.

Biology: Recorded as feeding on flower heads of Lactuca sativa L. and on Vigna sinensis (L.) in Fiji but the larva does not appear to have been described.

Remarks: A fairly common species associated with secondary vegetation.

Eublemma crassiuscula (Walker)

Thermesia crassiuscula Walker, 1864, J. Proc. Linn. Soc., Zool. 7:186. Type examined.

Male: (Plate fig.45) Head, thorax, legs and abdomen ochreous cream flecked with orange, the legs dorsally flecked with brownish black. Forewings yellow patterned with red-brown and black; hindwing pattern of similar colour.

Female: Similarly patterned to the male.

Diagnosis: The largest Fijian Eublemma (expanse 21-24mm.). Readily separable from the other Pacific Eublemma species by its pair of transverse brown or black medial lines in the hindwing. The wing pattern generally is diagnostic.

World distribution: South east Asia, East Indies, New Guinea, New Hebrides, Samoa.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nanggali, Korolevu, Nandarivatu, Vunindawa, Nausori Highlands. VANUA LEVU: Savusavu area, Ndelaikoro.

Remarks: A common species in areas of cultivation and secondary vegetation.

Eublemma pudica (Snellen)

Thalpochares pudica Snellen, 1880, Tijdschr. Ent. 23:63, pl.5, fig. 5. Type not examined - identity not in doubt.

Male: (Plate fig.46) Head and prothorax pale orange-brown, paler beneath. Meso- and metathorax, abdomen and legs white, the legs tinged with pale orange-brown dorsally. Forewings white patterned with orange-brown and black with a pale rose flush in the postmedial fascia. Hindwing white with an orange-brown triangle toward the posterior margin at one half; two black dots in the tornus; hindwing suffused distally with pale grey.

Female: Similarly patterned to the male.

Diagnosis: Expanse 14-16mm.. The oblique medial orange-brown band in the forewing and the triangular mark in the hindwing are exclusively diagnostic.

World distribution: South east Asia, East Indies, Samoa.

Fiji distribution:- VITI LEVU: Suva. VANUA LEVU: Savusavu area.

Remarks: Locally common in areas of cultivation and secondary vegetation.

Eublemma ragusana (Freyer)

Anthophila ragusana Freyer, 1844, Neuere Beitr. Schmett. 5:92, pl.437, fig.1. Type not examined, identity not in doubt.

Male: Head, prothorax and legs pale orange-brown, white ventrally. Meso- and metathorax and abdomen white. Forewing white flushed with pale brownish and pale rose distally; four ill-defined pale brown transverse lines; three black crescents at

the costa; subterminal line white with six minute black dots; apex with a conspicuous black dot. Hindwing very pale yellow suffused with pale orange-brown toward the margin.

Female: (Plate fig.47) Similarly patterned to the male.

Diagnosis: Expanse somewhat variable: 15-20mm.. The unmarked hindwing and black apical spot in the forewing are diagnostic.

Fiji distribution:- VITI LEVU: Suva, Korolevu, Mba, Lautoka.

VANUA LEVU: Savusavu area. YASAWA. NANUYA LAILAI. NAUKATHUVU.

Remarks: Locally common in areas of secondary vegetation.

Eublemma rivula (Moore)

Thalpochares rivula Moore, 1882, Descr. new Indian Lepid. Insects Colln Atkinson:140. Type examined.

Male: Head, thorax, legs and abdomen white. Forewing white with an orange-brown antemedial band flecked distally with black. Medial fascia white flecked with black postero-distally. Reniform black. Postmedial fascia suffused with pale orange-brown, a black dot towards the tornus; a black subapical spot; apex flecked with brown, terminal line white. Fringes elongate, pale orange-brown. Hindwing pale grey, paler distad.

Female: (Plate fig.48) Similarly patterned to the male.

Diagnosis: The smallest Pacific Eublemma - expanse 10-13mm.. Fresh specimens appear olivaceous but soon fade. The wing pattern is diagnostic.

World distribution: Africa and India through south east Asia and the East Indies to Australia, New Hebrides, Samoa, Micronesia and the Society Is.. Not known from New Guinea or the Solomons but probably overlooked.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Mba, Lautoka.

VANUA LEVU: Savusavu area. NANANU-I-RA. LELEUVIA. YASAWA.

NANUYA LAILAI. NAUKATHUVU. ROTUMA.

Biology: Larva recorded as feeding on flower heads of Vernonia cinerea (L.) in Fiji.

Remarks: A common species in areas of secondary vegetation but easily overlooked by dint of its size.

Genus: Maliattha Walker, 1863, List Specimens Lepid. Insects Colln Br. Mus. 27:86.

Maliattha melanesiensis sp. n.

Male: (Plate fig.144) Head, thorax and abdomen white dorsally, pale buff ventrally. Legs pale buff. Forewings white flecked with sepia scales, sepia colouration concentrated at the termen and in the apex of the forewing to form an oblique band from the apex almost to the base of the reniform. Reniform represented by a minute anterior and slightly larger posterior black dot. Hindwing white flecked with sepia, the colour concentrated at the termen. Genitalia illustrated in text fig. 88; aedeagus 1.2mm. in length; vesica finely scobinate basally.

Female: Similarly patterned to the male.

Diagnosis: Expanse 16-20mm.. Lacks the conspicuous brown bands present in the forewing of M. ritsemae (Snellen) (q.v.) but allied with ritsemae on grounds of similarity in the male

genitalia. The flap-like process directed dorsally from the base of the sacculus in the left valve is one and a half times as wide as that in ritsemae and the process from the dorsal margin of the left valve is distinctly bifurcate in ritsemae. The process from the dorsal margin of the right valve of ritsemae is swollen medially and elbowed, directed sharply ventrally from one half.

Fiji distribution: VITI LEVU: Suva, Tholoisuva, Nanggali, Korolevu, Dombuilevu, Nandarivatu, Nausori Highlands. VANUA LEVU: Savusavu area. NANANU-I-RA. YASAWA. NANUYA LAILAI. NAUKATHUVU. VIWA. ONGEA.

Holotype: ♂, FIJI, (Viti Levu), Suva, 1968, H.S. & G.S. Robinson.

Paratypes: 2♂♂, as holotype but dated 13.xi.1970 and 1968.

6♀♀, as holotype but dated 11.xi.1970 (1), 14.xi.1970 (3) and 1968 (2).

Remarks: A common species especially in wet zone localities with secondary vegetation.

Maliattha ritsemae (Snellen)

Erastria ritsemae Snellen, 1880, Tijdschr. Ent. 23:57.

Type not examined - identity not in doubt.

Male: (Plate fig.49) Head pale yellow, white above, palps ochreous grey. Prothorax pale yellow, meso- and metathorax white. Legs pale ochreous yellow; forelegs ochreous grey above. Abdomen pale yellow. Forewings white patterned with dark orange-brown and black. Hindwings white suffused with grey-brown towards the termen.

Female: Similarly patterned to the male.

Diagnosis: Expanse 17-19mm.. Wing pattern highly characteristic and completely diagnostic.

World distribution: East Indies, New Guinea, Australia, Solomons, New Hebrides, New Caledonia, Samoa, Tonga, Society Is., Austral Is..

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Dombuilevu, Rakiraki, Vatukoula, Mba, Lautoka, Nausori Highlands, Nandarivatu, Koro-O. VANUA LEVU: Savusavu area, Governor's Pool, Lambasa, Ndelaikoro. YASAWA. NANUYA LAILAI. NAUKATHUVU. VIWA.

Biology: Larva recorded as feeding on Brachiaria mutica (Forsk.) in Fiji.

Remarks: An exceptionally common species in areas of secondary vegetation and especially numerous in dry zone localities, this species accounting for 38% of Macrolepidoptera trapped at Mba and 27% of Macrolepidoptera trapped at Lambasa.

Genus: Oruza Walker, 1862, List Specimens Lepid. Insects Colln Br. Mus. 24:1089

Oruza cariosa (Lucas)

Thermesia cariosa Lucas, 1894, Trans. nat. Hist. Soc. Qd. 1:8.

Type not examined, identity not in doubt.

Male: Head, prothorax and legs pale yellow above, white beneath; meso- and metathorax and abdomen white. Forewing white with basal, antemedial, postmedial subterminal and terminal bands of pale ochreous cream. Reniform black, a smaller black dot

anterior to the reniform. Admarginal line of black dots. Hind-wing white with a pair of medial black dots and basal, antemedial, postmedial and subterminal bands of pale ochreous cream and an admarginal line of black dots.

Female: (Plate fig. 50) Similarly patterned to the male.

Diagnosis: Expanse 16-19mm.. Very reminiscent of a Eublemma but the pale (often almost obsolete) ochreous cream transverse bands and small black reniform stigma distinguish this species from all other Pacific Eustrotiinae.

World distribution: Australia, New Guinea, Samoa.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nanggali, Korolevu, Dombuilevu, Vatukoula, Mba, Nandarivatu, Lautoka, Savura Creek.

VANUA LEVU: Savusavu area, Governor's Pool, Lambasa. NANUYA
LAILAI. NAUKATHUVU. VIWA.

Remarks: A moderately common species in talasinga areas comprising up to 6% of light trap samples.

Subfamily: Euteliinae

Genus: Anigraea Walker, 1862, J. Proc. Linn. Soc. Lond., Zool. 6:139.

Anigraea ochrobasis Hampson

Anigraea ochrobasis Hampson, 1912, Cat. Lepid. Phalaenae Br. Mus. 11:95, pl.176, fig.12. Type examined.

Male: (Plate fig. 52) Head, thorax, abdomen and legs pale reddish brown, paler beneath. Prothoracic dorsal 'collar' with a pair of dark purple-brown 'eyes'. Forewing grey-brown above streaked with reddish. Reniform diffuse, charcoal-grey; a faint white subterminal line; a diffuse black subapical spot and a pale triangle in the anal angle. Hindwing white suffused with blackish-brown distally. Genitalia superficially similar to A. pectinata sp. n.(q.v.) but much smaller, vesica with two thorn-like cornuti, a scobinate patch and two oval sclerotised plates.

Female: Similarly patterned to the male.

Diagnosis: Smaller (expanse 35-37mm.) than A. pectinata, the male with filiform antennae. The wing pattern of this species is diagnostic.

World distribution: Australia, New Guinea, Solomons, New Hebrides, Samoa.

Fiji distribution:- VITI LEVU: Suva, Lautoka. VANUA LEVU: Savusavu area. NANANU-I-RA.

Biology: Phillips reared a larva of this species on Anacardium occidentale L. at Lautoka. Gardner (1948) gives descriptions of Euteliine larvae including Anigraea.

Remarks: Apparently very rare but possibly often overlooked.

Anigraea pectinata sp. n.

Male: (Plate fig. 51) Head, thorax, legs and abdomen reddish-brown, prothorax with a yellow-brown dorsal collar with black anterior transverse paradorsal lines. Metathorax black postero-dorsally. First abdominal segment black dorsally; abdomen dorsally suffused with grey and black, ventrally with charcoal-grey. Antennae pectinate to one half. Forewing pattern russet-brown streaked with cream and black, olivaceous distally. Hindwing white suffused with olive-grey distally and streaked with red-brown towards the anal angle. Genital armature small, closely appressed to a relatively immense aedeagus (text fig. 52); valves reduced (text fig. 51); vesica with two sclerotised plates (text fig.52). Ejaculatory duct with a small sclerotised plate (text fig.53).

Female: Similarly patterned to the male, the antenna filiform.

Diagnosis: A large species (expanse 28-34mm.). At rest the forewings are rolled after the manner of certain Epiplemae. Larger and more russet-coloured than A. ochrobasis Hampson (q.v.) and without a black subapical dot in the forewing. Differs from all other Anigraea species in that the male antenna is pectinate to one half. Closest apparent ally is A. deletoides (B.-B.) (Eutelia deletoides Bethune-Baker, 1906, Novit. zool. 13:230) from New Guinea in which the male antenna is filiform; also closely related to A. rufibasis Warren (Novit. zool. 21:278, 1914) from the Solomon Islands (male antennae filiform).

Fiji distribution:- VITI LEVU: Savura Creek, Nandarivatu, Koro-O, summit of Mt Victoria. VANUA LEVU: Ndelaikoro.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 15-17.viii.1969, H.S. & G.S. Robinson.

Paratypes: 4♂♂, 3♀♀, same data as holotype.

Remarks: An uncommon species frequently encountered in montane rain forest.

Genus: Bombotelia Hampson, 1912, Cat. Lepid. Phalaenae Br. Mus. 11:6.

Bombotelia dinawa (Bethune-Baker)

Penicillaria dinawa Bethune-Baker, 1906, Novit. zool. 13:231.
Type examined.

Male: (Plate fig. 53) Head, thorax; abdomen and legs dark purple-brown, thorax and legs white beneath. Forewing dark purple-brown flushed with russet at the apex; antemedial band dark grey; reniform and postmedial line dark grey; subterminal line white, discontinuous. Hindwing white, stigma grey, suffused with grey-brown from one half. Valves extend beyond the uncus (text fig.54); vesica with a single short cornutus (text fig.55).

Female: Similarly patterned to the male.

Diagnosis: Smaller (expanse 19-23mm.) than B. jocosatrix (Guenee) (q.v.) and the dark suffusion of the hind wing more extensive (compare plate figs. 53 and 54). The valves extend beyond the uncus (do not reach the uncus in jocosatrix - text fig.56) and the cornutus is short (wide, elongate cornutus and a triangular sclerotised plate in jocosatrix - text fig. 57). In jocosatrix there is a distinct postmedial line in the forewing.

World distribution: New Guinea, Samoa.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva. VANUA LEVU: Ndelaikoro.

Remarks: An uncommon species associated with primary forest; B. jocosatrix tends to be more common and widespread in talasinga areas.

Bombotelia jocosatrix (Guenee)

Penicillaria jocosatrix Guenee, 1852, Hist. nat. Insectes Lepid. 6:304. Paralectotype examined.

Male: Head, thorax, legs and abdomen purple-brown, the thorax and legs cream below. Forewing dull purple with an indistinct white antemedial line and a pale brown postmedial line. Reniform dark greyish purple, indistinct. Postmedial line edged antero-proximally with dark reddish-brown, the suffusion continued antero-distally to the white subterminal line. Hindwing with a grey stigma, suffused with dark purple from two thirds. Valves not extending beyond the uncus (text fig.56); vesica with an elongate stout cornutus and a sclerotised triangular plate (text fig.57).

Female: (Plate fig.54) Similarly patterned to the male.

Diagnosis: Generally larger (expanse 21-30mm.) than B.dinawa (B.-B.) and overall more purple in appearance (see diagnostic remarks for dinawa).

World distribution: India and south east Asia, East Indies, New Guinea, Australia, New Hebrides, Hawaii (introduced), Micronesia.

Fiji distribution:- VITI LEVU: Suva, Rakiraki, Vatukoula, Mba, Lautoka, Nausori Highlands, Nandarivatu, Koro-O. VANUA LEVU: Savusavu area, Governor's Pool.

Biology: Larva described by Gardner (1948); feeds on Mangifera indica L. in Fiji.

Remarks: Widespread in areas of secondary vegetation, especially talasinga, but always uncommon.

Genus: Paectes Hubner, 1818, Zutrage Samml. Exot. Schmett. 1:21.

Paectes cristatrix (Guenee)

Ingura cristatrix Guenee, 1852, Hist. nat. Insectes Lepid. 6:313, pl.14, fig.10. Type examined.

subsp. fijiensis subsp. n.

Male: (Plate fig. 55) Head, prothorax orange-brown above, paler beneath. Meso- and metathorax and abdomen silver-grey, paler beneath. Legs silver-grey above, greyish white below. Forewing silver-grey patterned with orange, brown and black with a rose flush in fresh specimens. Hindwing white suffused with grey-brown. Vesica with five long cornuti and one very small thorn-like cornutus and a sclerotised band (text fig.61).

Female: Similarly patterned to the male.

Diagnosis: A medium-sized species (expanse 32-36mm.) with a very characteristic wing-pattern. Fijiensis differs in the ornamentation of the vesica from the nominotypical subspecies in which there are only two long cornuti. The type locality of c. cristatrix is Java.

World distribution: (nominotypical subspecies) Formosa, Philippines, East Indies, New Guinea, Solomons; replaced in Samoa by P. canescens Tams.

Fiji distribution: (cristatrix fijiensis) VITI LEVU: Nandarivatu, Koro-O, Lautoka (vagrant singleton). VANUA LEVU: Ndelaikoro. OVALAU.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 27-30.ix.1968, H.S. & G.S. Robinson.

Paratypes: 2♂♂, 7♀♀, data as holotype.

♂ (BMNGSN 6910), ♀, as holotype but 27-30.vi.1968.

Remarks: Frequently encountered in light trap samples from montane rain forest but uncommon.

Genus: Pataeta Walker, 1858, List Specimens Lepid. Insects Colln Br. Mus. 15:1748.

Pataeta carbo (Guenee)

Phlegetonia carbo Guenee, 1852, Hist. nat. Insectes Lepid. 7:302. Type examined.

Male: (Plate fig. 56) Head, thorax, legs and abdomen brownish black, pale ochreous grey below, the legs flecked with white and banded with white at articulations. Fore femur with elongate purple scales inwardly. Forewing brownish-black with a few

white flecks; transverse lines jet-black. Hindwing white suffused with brownish black terminally.

Female: Similarly patterned to the male but fore femur without elongate purple scales.

Diagnosis: Expanse 33mm; wing pattern entirely diagnostic.

World distribution: East Indies, New Guinea, Australia, New Caledonia.

Fiji distribution: Known only from a single perfect male collected at light in Suva, VITI LEVU, in 1968. I believe this specimen to have been an introduction.

Genus: Phlegetonia Guenee, 1852, Hist. nat. Insectes Lepid. 6:301.

Phlegetonia barbara sp. n.

Male: (Plate fig.57) Head, thorax and legs olive, tinged with purple; thorax purplish pink ventrally. Abdomen light olive-grey, paler beneath. Forewings ochre patterned with medium brown, purple-brown and black; subterminal fascia suffused with charcoal grey. Hindwing grey-brown, paler basally, black spot in the anal angle; fringes purplish pink. Overall appearance olivaceous when fresh but the greenish tint soon fading. Aedeagus 2mm. long; vesica with three elongate cornuti (text fig.78).

Female: Probably similarly patterned to the male but the single paratype is faded to pale lilac-brown and the pattern is almost worn away. The dark chocolate-brown reniform, oblique creamy brown apical line and white anterior subterminal line enclosing three black streaks and postero-antemedial chocolate fascia are the only distinctive elements of pattern remaining on the forewing. Bursa copulatrix with a pair of opposed scobinate signa and two anterior dilations; colliculum broad, elongate, compressed dorsolaterally, scobinate posteriorly, with a small medial emargination ventrally. Expanse 27mm..

Diagnosis: Superficially similar in wing pattern to Phlegetonia apicifascia (Hampson) (Eutelia apicifascia Hampson, 1894, Moths India 2:394) but the vesica of apicifascia (text fig.72) bears three rows of fine spinose cornuti basally; in barbara there are three elongate terminal cornuti (text fig.78). A specimen collected by Comstock near Pago Pago, American Samoa, August 1961, has a similarly ornamented vesica to barbara (text fig.73) and is referable to this species. P. delatrix (Guenee) (q.v.) does not possess the distinctive oblique pale apical line of this species.

World distribution: Samoa.

Fiji distribution: Type localities; also one specimen in coll. Koronivia Research Sta., Suva, Fiji, from VITI LEVU, Vunindawa, 19.ii.1933, (R.H. Phillips).

Holotype: ♂, FIJI, Vanua Levu, Governor's Pool, 8.ii.1971, G.S. Robinson. BMNGSN 6983.

Paratype: ♀, FIJI, (Viti Levu), Savura Creek, 17-20.vii.1969, H.S. & G.S. Robinson. BMNGSN 6956.

Remarks: Extremely rare; probably restricted to lowland primary forest.

Phlegetonia delatrix (Guenee)

Penicillaria delatrix Guenee, 1852, Hist. nat. Insectes Lepid. 6:304. Type examined.

Male: Head, thorax and legs purple-brown, paler below; tarsi darker, banded with white at articulations. Abdomen pale ochreous mauve with dorsal tufts on segments 1 and 2. Forewing purple-brown patterned with lilac, mauve and black, the pattern somewhat variable and often faded. Hindwing suffused with pale grey-brown with indistinct darker transverse bands terminating in dark brown flecks at the anal angle.

Female: (Plate fig.58) Similarly patterned to the male and equally as variable.

Diagnosis: Expanse 27-35mm.. An unmistakeably-patterned species which could only be confused with the 'P. apicifascia (Hampson) group' (q.v.). It is differentiated from apicifascia and its allies by its lacking the conspicuous transverse line across the apex of the forewing (compare plate figs. 58 and 57).

World distribution: South east Asia, East Indies, New Guinea, New Hebrides, Samoa, Society Is., Marquesas, Micronesia, Hawaii (introduced).

Fiji distribution:- VITI LEVU: Suva, Nandarivatu, Vunindawa, Lautoka, Nausori Highlands, Korolevu. VANUA LEVU: Ndelaikoro.

Biology: The larva of this species is described by Gardner (1948); in Fiji its foodplants are Myrtus vitiensis (A.Gray), Syzygium jambos (L.), Syzygium malaccense (L.). See also Swain (1971:286).

Remarks: A widespread species but never very common; despite its spread to the eastern islands of the Pacific it is not known from any of the smaller islands of the Fiji group.

Genus: Tibiocillaria Bethune-Baker, 1906, Novit. zool. 13:231.

Tibiocillaria magnifica sp. n.

Male: (Plate fig.59) Head, thorax, legs and abdomen rich purple-brown; antennae pale ochre. Forewing purple-brown, suffused basally and in the subterminal fascia with blue-black; sub-terminal line bluish. Hindwing white suffused with grey at the apex, with purple-brown towards the anal angle. Anal angle with a pale yellow diffuse dot. Genitalia illustrated in text fig. 62; vesica with two thorn-like cornuti and a small sclerotised plate (text fig. 63).

Female: Similarly patterned to the male.

Diagnosis: The closest ally of this species is Tibiocillaria pratti Bethune-Baker (Novit. zool. 13:231, 1906) from New Guinea. Magnifica is larger (expanse 38-43mm.) than pratti and more reddish in appearance; the brownish black triangle in the forewing apex of pratti is not evident in magnifica. Pratti has a single elongate cornutus on the vesica with a small sclerotised plate.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Vunindawa, Nanggali, Nandarivatu, Koro-O, summit of Mt Victoria, Nausori Highlands. VANUA LEVU: Governor's Pool, Ndelaikoro.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 16-20.xii.1968,
H.S. & G.S. Robinson, BMNGSN 6911.

Paratypes: 3♂♂, 3♀♀, data as holotype.

Remarks: A moderately common species usually encountered in primary forest.

Subfamily: Stictopterinae

Genus: Gyrtona Walker, 1863, List Specimens Lepid. Insects Colln Br. Mus. 27:89.

Gyrtona divitalis Walker

Gyrtona divitalis Walker, 1863, List Specimens Lepid. Insects Colln Br. Mus. 27:91. Type examined.

Male: Head, Thorax and legs mauve-brown, paler beneath; prothoracic 'collar' purple-brown. Abdomen greyish brown, paler beneath. Forewing mauve-brown patterned with rust-brown and black, a bluish tinge postmedially. Hindwing suffused grey, basally opalescent.

Female: (Plate fig. 62) Similarly patterned to the male.

Diagnosis: A small species - expanse 18-22mm.. The basal area of the hindwing with its opalescent sheen is a useful distinguishing character for this genus and Nigramma (q.v.) but it is not immediately obvious. Size and wing pattern should provide immediate placement of this species.

World distribution: East Indies, New Guinea, New Hebrides, New Caledonia, Samoa, Society Is..

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, Nausori Highlands. VANUA LEVU: Ndelaikoro. LELEUVIA (!).

Remarks: A moderately rare species restricted to montane rain forest. A single specimen from Leleuvia is almost certainly a vagrant.

Gyrtona hopkinsi Tams

Gyrtona hopkinsi Tams, 1935, Insects Samoa 3:206, pl.12, fig.11. Type examined.

Male: (Plate fig.60) Head, thorax and legs dark purple-brown flecked with black; beneath and on the abdomen greyish cream. Forewing yellow-brown suffused and patterned with dark purple-brown and black. Basally a raised membraneous 'lens' on A1, thinly scaled but not conspicuous as in Amyra natalis (Walker) (q.v.). Hindwing somewhat opalescent basally, brownish cream, suffused with grey distally.

Female: Sometimes similarly patterned to the male but very variable; forewing often paler and with conspicuous black markings as in plate fig.61, sometimes with a freckled pattern of blue-black dots on an ochreous ground-colour, often with a postmedial black spot at the inner margin of the forewing.

Diagnosis: The male 'lens' on A1 is highly diagnostic; it is absent in Fijian Nigramma spp. (q.v.) and in Gyrtona purpurea sp. n. (q.v.). The female is similar to that of purpurea but the forewing ground-colour of the latter is always greyish white; in the palest female hopkinsi it is pale ochre. Expanse 32-36mm..

World distribution: New Hebrides, Samoa.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, Tholoisuva, Nanggali, Nausori Highlands, Savura Creek. VANUA LEVU: Ndelaikoro.

Remarks: An uncommon species restricted to primary forest.

Gyrtona purpurea sp. n.

Male: Head, thorax and legs purplish grey above; abdomen mauve-cream; ochreous cream ventrally. Forewing greyish white suffused and patterned with purple-brown, flecked with white. Hindwing basally with an opalescent sheen, ochreous, suffused with grey distally. Genitalia reminiscent of Nigramma acutipennis sp. n. (q.v., text fig. 58) with a basal process one quarter the length of the ventral lobe of the valve. Vesica with a short thorn-like cornutus and a semicircular sclerotised plate. Expanse 41, 42mm..

Female: Smaller than the male (expanse 32-37mm.), the forewing ground colour greyish white with a more definitive pattern than the male in grey, black and purple-brown (plate fig.333). Hindwing somewhat darker than in the male.

Diagnosis: A large species, the male with a characteristic purple-brown hue which is usually apparent in the female. Closely allied on the basis of genitalia with G. hopkinsi Tams (q.v.) but the basal process of purpurea is shorter. Purpurea is a much larger, more brightly-coloured species than hopkinsi which is overall a blackish-ochreous insect.

Fiji distribution:- VITI LEVU: Nanggali. VANUA LEVU: Ndelaikoro. Type localities.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 27-30.vi.1968, H.S. & G.S. Robinson.

Paratypes: ♀, as holotype but 27-30.ix.1968.

2♀♀, as holotype but 16-20.xii.1968.

2♀♀, as holotype but 15-17.vii.1969.

♀, as holotype but 7.ii.1970.

♂, 2♀♀, FIJI, (Viti Levu), Savura Creek, 17-20.vii.1969, H.S. & G.S. Robinson.

♀, as above but Suva, v.1968.

♀, FIJI, (Viti Levu), Nausori Highlands, Site 1 - 2200', 16-20.xii.1969, G.S. Robinson.

2♀♀, FIJI, Viti Levu, Mt Victoria (summit - 1323m.), 24.xi.1970, G.S. Robinson.

Remarks: Females are frequently encountered in light trap samples from areas of primary forest but males are somewhat rare.

Genus: Lophoptera Guenee. 1852, Hist. nat. Insectes Lepid. 7:54.

Lophoptera hemithyris (Hampson)

Stictoptera hemithyris Hampson, 1905, Ann. Mag. nat. Hist. (7)16:534. Type examined - identity doubtful.

There is a singleton male of this species collected at Lautoka by H. Phillips on 9.v.1931 in BMNH. The specimen was reared from a larva feeding on Glochidion. The expanse of this specimen is 16.5mm., much smaller than other specimens of L. hemithyris and I am doubtful as to its identity; its placing as hemithyris is thus provisional.

Head, thorax and legs deep ochreous brown, paler beneath; abdomen grey-brown above, paler beneath. Forewing ochreous brown, suffused with dark grey basally and in the subterminal fascia. Hindwing hyaline basally, distally suffused with dark grey, the suffusion extending basally along the inner margin of the hindwing.

The range of hemithyris is from south east Asia through the East Indies to New Guinea, Australia and the New Hebrides.

Genus: Nigramma Walker, 1863, List Specimens Lepid. Insects Colln Br. Mus. 27:77.

Nigramma acutipennis sp. n.

Male: (Plate fig. 64) Head and thorax russet-brown above; paler, ochreous ventrally. Legs pale ochreous brown flecked with medium brown and grey-brown. Abdomen grey-brown dorsally; ochreous ventrally. Forewing russet-brown patterned with black and ochreous cream. Hindwing opalescent and subhyaline basally, suffused with grey distally. Genitalia figured in text fig.58.

Female: Similarly patterned to the male but paler, the russet-brown of the head and thorax and forewings replaced by creamy ochre.

Diagnosis: Superficially similar to Nigramma perstrialis Hampson (q.v.) but the markings of the male much darker, the palps more elongate in both sexes and the forewing with a distinct and characteristic pale subterminal line. The two lobes of the valve are of approximately equal length in this species; in perstrialis the dorsal lobe is shorter than the ventral. The basal digitate process is one half the length of the dorsal lobe of the valve in this species; in perstrialis it is less than one fifth. Expanse 27-29mm..

Fiji distribution:- VITI LEVU: Tholoisuva, Nandarivatu, Koro-O. VANUA LEVU: Ndelaikoro.

Holotype: ♂, FIJI, Vanua Levu, Ndelaikoro VHF Sta., 940m., 24-25.ii.1971, G.S. Robinson.

Paratypes: 2♂♂, ♀, data as holotype, BMNGSN 6921♂, 6917♀. ♂, FIJI, (Viti Levu), Nandarivatu, 15-17.viii.1969, H.S. & G.S. Robinson.

♀, similar but 27-30.ix.1968.

♂, 2♀♀, FIJI, (Viti Levu), Tholoisuva, 15.xi.1970, H.S. & G.S. Robinson.

Remarks: A rare species, apparently restricted to primary forest.

Nigramma perstrialis Hampson

Nigramma perstrialis Hampson, 1918, Novit. zool. 25:192. Type examined.

Male: (Plate fig.63) Head, thorax and legs khaki-cream patterned with dull reddish brown, paler beneath. Legs flecked with charcoal-grey above. Abdomen greyish cream, paler beneath. Forewings longitudinally striated with dull reddish brown, black and cream, a distinct longitudinal medial pale line; overall appearance of forewing somewhat olivaceous. Postmedial and subterminal lines of black dots ill-defined. Hindwing proximally hyaline, opalescent, distally suffused with grey. Genitalia figured in text fig.60.

Female: Similarly patterned to the male but the overall appearance of the forewing tending toward mauve-grey, pale longitudinal streaks not apparent.

Diagnosis: Expanse 24-29mm., wing shape similar to that of N. acutipennis sp. n. (q.v.) but without the distinct oblique dark postmedial line and pale subterminal line. Hindwing

basally more hyaline than in other Fijian Nigramma species. Dorsal lobe of valve two thirds the length of the ventral; basal digitate process short, less than one fifth the length of the dorsal valve (text fig. 60).

World distribution: Islands off the east coast of New Guinea (Lousiade, D'Entrecasteaux, etc.), Samoa.

Fiji distribution:- VITI LEVU: Suva, Lautoka. NANANU-I-RA. LELEUVIA. NAUKATHUVU.

Remarks: A rare species restricted to coastal localities.

Nigramma rotundipennis sp. n.

Male: (Plate fig. 334) Head, thorax and legs dark purple-brown above, pale ochreous grey ventrally. Palps short, inconspicuous. Abdomen grey-brown above, ventrally paler. Forewing dark purple-brown flecked with red-brown and irrorated with black, sometimes a black dot postero-basally. Hindwing suffused dark grey; subhyaline and opalescent basally. Genitalia figured in text fig. 59; lobes of valves of approximately equal length, two short basal digitate processes.

Female: Facies similar to the male but forewing ground-colour olivaceous grey, irrorated deep purple-brown with some flecks of white, the pattern very variable.

Diagnosis: Expanse 25-27mm., the wings narrower and more rounded than in the two other Fijian Nigramma species. The short, inconspicuous palps are a useful diagnostic feature. The closest apparent ally of this species is N. perstrialis Hampson (q.v.) but in perstrialis the male genitalia are significantly different, the dorsal lobe of the valve being two thirds the length of the ventral and there being only one digitate process basally.

Fiji distribution:- Known only from the localities of the type series.

Holotype: ♂, FIJI, (Viti Levu), Nausori Highlands - Site 2: 2000', 16-20.xii.1969, G.S. Robinson.

Paratypes: 2♀♀, one as holotype, the other similar but Site 1 - 2200'. ♂, FIJI, (Viti Levu), Lautoka, SPSM Res. Sta., 14-15.xii.1969, H.S. & G.S. Robinson. BMNGSN 6922. ♂, 2♀♀, FIJI, (Viti Levu), Nandarivatu, 15-17.viii.1969, H.S. & G.S. Robinson. BMNGSN 6920♀.

Remarks: Very rare; apart from the Lautoka specimen only collected from primary montane rain forest. A quantity of undescribed material from New Guinea and the East Indies in BMNH could be placed near this species.

Genus: Stictoptera Guenee, 1852, Hist. nat. Insectes Lepid. 7:51.

This genus is in need of extensive revision; preliminary work by A.H. Hayes (BMNH) has enabled me to place the three Fijian Stictoptera species with some degree of certainty as to the correct specific name for each.

Wing pattern is no guide as to identity: S. vitiensis Hampson has seven major wing pattern morphs with several colour varieties of each morph and the situation is similarly confusing in the two other species.

Key to Fijian species of Stictoptera Guenee

- 1a Hindwing greyish black with three small white streaks in the centre of the hw separated by grey-black veins and a basal streak (plate fig. 65). No hyaline, opalescent area at the base of the hw describens.
- b Hindwing with an extensive opalescent hyaline basal area as in plate figs. 66 and 67 2
- 2a Expanse less than 39mm.; forewing with a distinct dark apical dash, often with a distinct oblique medial line as in plate fig. 66. Male with finely scobinate basal area on vesica stygia.
- b Expanse greater than 40mm.; apical dash rarely present, if so ill-defined; never with a distinct oblique medial line in the fw as in plate fig. 66. Male with three basal groups of elongate spines on the vesica vitiensis.

Stictoptera describens (Walker)

Aegilia describens Walker, 1857, List Specimens Lepid. Insects Colln Br. Mus. 13:1139. Type examined.

Male: Forewing variously patterned, the costa concave to three quarters, the forewing wide distally and triangular in appearance. Hindwing dark grey with three white streaks separated by dark grey veins in the centre of the wing and a basal white streak. Hindwing fringe grey.

Female: (Plate fig. 65) Similarly patterned to the male but the hindwing fringe white, the eyes smaller than in the male.

Diagnosis: The hindwing pattern and forewing shape of this species are diagnostic. Expanse 39-45mm..

World distribution: South east Asia, East Indies, New Guinea, New Hebrides, Micronesia.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nandarivatu, Nausori Highlands. VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro. TAVEUNI.

Remarks: An uncommon species, usually encountered in areas of primary forest.

Stictoptera stygia Hampson

Stictoptera stygia Hampson, 1912, Cat. Lepid. Phalaenae Br. Mus. 11:168, pl.178, fig.10. Type examined.

Male: Forewing variously patterned, the costa convex, the forewing square in appearance, often with an oblique medial line. Apical dash conspicuous. Hindwing hyaline, opalescent basally, suffused with grey distally. Vesica with a finely scobinate area at the base.

Female: (Plate fig.66) Similarly patterned to the male, the eyes smaller.

Diagnosis: Smaller (expanse 34-39mm.) and the forewing more square than S. vitiensis Hampson (q.v.) which has no apical dash or else it is ill-defined. The vesica of vitiensis has three basal groups of fine elongate spines.

World distribution: New Guinea, Solomon Is., New Hebrides (probably differs subspecifically from the type).

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nanggali, Korolevu, Nandarivatu, Koro-O, summit of Mt Victoria.
VANUA LEVU: Savusavu area, Lambasa, Ndelaikoro. OVALAU.
NAVUTU-I-RA. FULANGA.

Biology: The larva is recorded as attacking Calophyllum inophyllum L. in Fiji, the larval duration being 15 days and the pupal duration 10-12 days.

Remarks: An uncommon species encountered in areas of secondary scrub (wet zone) and primary forest.

Stictoptera vitiensis Hampson

Stictoptera vitiensis Hampson, 1912, Cat. Lepid. Phalaenae Br. Mus. 11:159. Type examined.

Male: Forewing variously patterned, the costa slightly convex, the forewing appearing elongate, acute-angled at the apex. Hindwing hyaline and opalescent basally, suffused with grey distally. Vesica with three groups of elongate spines at the base.

Female: (Plate fig. 67) Similarly patterned to the male, the eyes smaller.

Diagnosis: Larger (expanse 40-47mm.) than S. stygia Hampson (q.v.) and lacking the apical dash in the forewing. The forewing of vitiensis appears more elongate and more acutely angled apically than that of stygia. The vesica of stygia does not have spines; instead there is a finely scobinate basal area.

World distribution: Uncertain - genus needs revision. Material from Samoa and the New Hebrides may be conspecific with this species.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nanggali, Korolevu, Dombuilevu, Mba, Lautoka, Korovou, Nausori Highlands, Nandarivatu, Koro-O, summit of Mt Victoria. VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro. OVALAU. VIWA (one only - vagrant?).

Remarks: A very common species, especially in primary and secondary forest areas, comprising up to 8% of light trap samples in primary forest areas.

Subfamily: Sarrothripinae

Genus: Apothripa Hampson, 1907, J. Bombay nat. Hist. Soc. 17:653.

Apothripa vailima Tams

Apothripa vailima Tams, 1935, Insects Samoa 3:208, pl.12, fig.10.
Type examined.

Male: (Plate fig.335) Head and thorax olive-buff, paler beneath. Legs light buff, tinged with olive and black above, the foreleg strongly so. Abdomen creamy buff above, paler beneath. Forewing drab olive patterned with creamy buff and grey. Distinctive proximal 'kink' in the postmedial line posteriorly. Hindwing greyish cream suffused distally with grey. The pattern is somewhat variable.

Female: Similarly patterned to the male but the forewing suffused with grey and the pattern indistinct.

Diagnosis: A small species (expanse 16-20mm.) with the facies of a Nanaguna; the kinked postmedial line and drab olive colouring are distinctive and serve to separate this species from Nanaguna vittalis (Walker) (q.v.) which is a brighter shade of olive and in which the postmedial line is not kinked posteriorly.

World distribution: Samoa.

Fiji distribution:- VITI LEVU: Suva.

Remarks: With adequate generic characterisation within the Sarrothripinae vailima might be found to fit well in Nanaguna. The author has overlooked this species for six years and its distribution in Fiji is probably much wider than suggested.

Genus: Barasa Walker, 1862, J. Proc. Linn. Soc. Lond., Zool. 6:192.

Barasa triangularis sp. n.

Male: (Plate fig.336) Head, thorax and legs white above with a few black flecks, ventrally dusted with grey-black. Abdomen cream antero - dorsally, suffused with grey-brown postero-dorsally; ventrally suffused grey-brown. Forewing white patterned with red-brown and black, the pattern very variable; a conspicuous red-brown triangle bounded on two sides by the costa and the antemedial line. Hindwing white, faintly dusted with red-brown at the apex, sometimes overall suffused with grey. Expanse 19-24mm..

Female: Similarly patterned to the male but larger (expanse 23-29mm.).

Diagnosis: Allied to Barasa acronyctoides Walker (1862, J. Proc. Linn. Soc. Lond., Zool. 6:192) from Sarawak but smaller and lacking the tuft of elongate black hairs on the underside of the male forewing. The male genitalia of the two species are very dissimilar. In triangularis the genital armature is small (approximately 2mm. in length) and simple; the valves are constant in width throughout their length with a small digitate process arising from the sacculus at one half. The vesica apparently lacks ornamentation. In acronyctoides the valves are expanded distally and are wing-like; there is a digitate process at one third. The genital armature is approximately 3.5mm. long and 6mm. wide with the valves folded outward. The anal tube has two bulbous anterior diverticuli and the peniculus is expanded. The vesica lacks ornamentation.

Fiji distribution:- VITI LEVU: Suva (Simmonds), Vunindawa (Phillips), Tholoisuva, Nandarivatu, Koro-O, Nausori Highlands.
VANUA LEVU: Governor's Pool.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 16-20.xii.1968, H.S. & G.S. Robinson.

Paratypes: ♂, ♀, data as holotype, BMNGSN 6945♀.

♂, ♀, as holotype but 15-17.viii.1969.

♀, as holotype but 27-30.ix.1968.

♂, as holotype but 12-14.ix.1969. BMNGSN 6944.

2♂♂, FIJI, (Viti Levu), Tholoisuva, viii.1968, H.S. & G.S. Robinson.

♂, ♀, FIJI, (Viti Levu), Nausori Highlands - Site 2: 2000', 16-20.xii.1969, G.S. Robinson.

Remarks: A rare species of primary rain forest. Simmonds' record of this species from Suva is a little doubtful. Rather than erect a monotypic genus to accommodate this species I place it in Barasa on grounds of moderate affinity despite the disparity in genital morphology between it and B. acronyctoides Walker, the type species of Barasa.

Genus: Blenina Walker, 1857, List Specimens Lepid. Insects Colln Br. Mus. 13:1214.

Blenina vatu sp. n.

Male: Head, thorax and legs pale mauve-grey to pale lichen-green, flecked with black, paler beneath. Abdomen buff, paler beneath. Forewing white patterned with lichen-green, mauve-grey, brown and black, the pattern very variable. Hindwing pale grey-brown, darker distally. Expanse 25-29mm..

Female: (Plate fig. 68) Similarly patterned to the male but the forewing paler, the ground-colour lichen-green patterned with purplish-black. Expanse 30-34mm..

Diagnosis: Closely allied to Blenina lichenopa (Meyrick) (Ceparcha lichenopa Meyrick, 1897, Trans. ent. Soc. Lond.:374) from Queensland and inseparable from it by examination of wing pattern alone. The sickle-shaped dorsal process at the base of the valve in the male is smaller and straighter in vatu than in lichenopa and the circular sclerotised area at the base of the vesica of the latter species is absent in vatu. In vatu the juxta bears a narrow postero-dorsal sclerotised bar which is present as a wider and more elongate plate in lichenopa. Blenina solomonis Swinhoe (Ann.Mag. nat. Hist. (7)16:151, 1905) is closely allied to lichenopa but the hindwing is uniformly suffused with grey-brown. The genitalia of solomonis and lichenopa are similar but the posterior sclerotised extension of the juxta is narrower in the former than in the latter.

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Tholoisuva, Nausori Highlands, Nandarivatu, Koro-O, summit of Mt Victoria.
VANUA LEVU: Savusavu area, Ndelaikoro.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 27-30.vi.1968, H.S. & G.S. Robinson. BMNGSN 6927.

Paratypes: 2♂♂, as holotype but 16-20.xii.1968.

3♂♂, ♀, as holotype but 15-17.viii.1969.

♀, as holotype but 27-30.ix.1968.

Remarks: A moderately common species most often encountered in primary forest, especially montane forest.

Genus: Calathusa Walker, 1858, List Specimens Lepid. Insects Colln Br. Mus. 15:1645.

Calathusa sp. near basicunea Walker

Calathusa basicunea Walker, 1858, List Specimens Lepid. Insects Colln Br. Mus. 15:1645. Type examined.

Male: (Plate fig.338) Head, thorax and legs steel grey above, pale grey beneath. Abdomen pale grey. Antennae pectinate. Forewing plae steel-grey patterned with dark russet-brown. Hindwing pale cream.

Female: Similarly patterned to the male but the antennae filiform, the forewing suffused with grey and the hindwing pale ochreous brown.

Diagnosis: Expanse 23-26mm.. A narrow-winged small species with somewhat Phycitine-like facies. The pectinate male antennae and narrow grey wings are adequate diagnostic features.

Fiji distribution: Overlooked for a long period by the author and thus known only from Lautoka (Phillips) and Suva (Simmonds).

Remarks: The majority of Calathusa species are Australian and were described by Turner; the author has been unable to examine the types of these species and thus this species is not placed. A series of a similar species to this was collected by the author at Ipota, Erromanga, New Hebrides on 11.viii.1970.

Genus: Characoma Walker, 1863, List Specimens Lepid. Insects Colln Br. Mus. 27:106.

Characoma nilotica (Rogenhofer)

Sarrothripa nilotica Rogenhofer, 1882, Verh. zool.-bot. Ges. Wien 31:26. Type, loaned from NM Vienna, examined.

Male: Head, thorax and legs grey-buff, paler beneath. Abdomen pale greyish buff, paler beneath. Forewing reddish brown patterned with cream and keep purplish black. Hindwing pale creamy grey suffused with grey-brown towards the margin.

Female: (Plate fig. 70) Similarly patterned to the male.

Diagnosis: The smallest Fijian Sarrothripine excluding the Rotuman Microthripa (q.v.); expanse 13-17mm.. The wing shape and pattern of this species are distinctive: often the forewing is suffused with purplish black basally.

World distribution: North and south America, Africa, Middle East, India, south east Asia, East Indies, Australia, New Guinea, New Hebrides, Guam (Micronesia), Samoa, Galapagos Is..

Fiji distribution:- VITI LEVU: Suva, Rakiraki, Mba, Lautoka. ROTUMA.

Remarks: A moderately common species, most often encountered in dry zone localities where talasinga grassland predominates, but easily overlooked on account of its size.

Genus: Etanna Walker, 1862, J. Proc. Linn. Soc. Lond., Zool. 6:118.

Etanna mackwoodi (Hampson)

Dendrothripa mackwoodi Hampson, 1902, J. Bombay nat. Hist. Soc. 14:211. Type examined.

Male: (Plate fig. 69) Head and thorax ochreous to olive, paler beneath; palps short, densely scaled, purple. Legs ochreous pink, the fore tibia with a tuft of elongate deep purple scales inwardly, the third fore-tarsal segment black above. Abdomen ochreous pink, streaked ventrally with brownish black. Forewing olivaceous patterned with white, black and deep purple-brown. Hindwing creamy pink, darker distally. Underside of forewing with a tuft of elongate yellow scales. Hindwing with a deep nick in the margin: at rest the hindwing folds at the nick forming a pocket enclosing a tuft of elongate scales on the underside of the hindwing costal margin. Valves reduced to two stubby digitate processes tipped with spines; juxta scobinate; vesica scobinate basally.

Female: Unknown.

Diagnosis: A small species (expanse 18-19mm.) with the facies of a Nanaguna; the short densely scaled palps and the folded and nicked hindwing are diagnostic.

World distribution: India, south east Asia, New Guinea.

Fiji distribution:- VITI LEVU: Nandarivatu.

Remarks: The male of Nanaguna albisecta Hampson is unknown; females are moderately common at Nandarivatu. It is possible that Etanna mackwoodi (Hampson) and Nanaguna albisecta Hampson (q.v.) are males and females of the same species for which the applicable name would be Nanaguna (or Etanna) mackwoodi (Hampson). I prefer to consider the two as separate species for the time being. Mackwoodi is very rare in Fiji - only three specimens have been collected.

Genus: Giaura Walker, 1863, List Specimens Lepid. Insects Colln Br. Mus. 28:434.

Key to Fijian species of Giaura Walker

- 1a Subterminal line black, straight; hindwing silky white suffused with grey at the apex 2
- b Subterminal line dentate or serrate; hindwing silky white suffused with grey at the apex, else hindwing uniformly grey 3
- 2a Forewing suffused with grey-buff, pattern indistinct; specimens from Rotuma tetragramma simeoni
- b Forewing silver-grey patterned with purple-brown and black; specimens from Fiji group excluding Rotuma t.tetragramma
- 3a Hindwing silky white suffused with grey at the apex sokotokai
- b Hindwing grey, darker at the outer margin spinosa

Giaura sokotokai Robinson

Giaura sokotokai Robinson, 1969, Entomologist's Rec. J. Var. 81:192. Type examined.

Male: Head, thorax and legs grey above flecked with black and rufous, silver-grey beneath. Abdomen brownish grey above, silver-grey beneath. Forewings silver-grey patterned with dark grey and rufous; subterminal line dark grey, serrate, edged distally with pale grey. Hindwings silky white suffused with grey at the outer margin. Elongate process from the base of the valve narrow, slightly expanded at the tip which bears

a row of fine spines. Eighth tergite small, H-shaped. Eighth sternite with sclerotisation at the edges forming a trestle-shape, the anterior edge lightly sclerotised (text fig. 66).

Female: (Plate fig. 71) Similarly patterned to the male.

Diagnosis: Expanse 22-28mm.. The only Giaura species with a serrate subterminal line and a silky white hindwing suffused with grey at the outer margin. The male eighth terga and sterna are highly diagnostic.

Fiji distribution: VITI LEVU: Nanggali, Nandarivatu, Koro-O, summit of Mt Victoria.

Remarks: Remarks regarding the genitalia of this species and G. tetragramma tetragramma (Hampson) in the original description were transposed; the expanded and flattened process from the base of the valve with the greater area of black spines occurs in tetragramma and not sokotokai. Sokotokai is found fairly frequently in montane rain forest on Viti Levu.

Giaura spinosa sp. n.

Male: (Plate fig. 339) Head, thorax and legs dull silver-grey flecked with black, greyish-white beneath. Forewing white patterned with varying shades of grey and black; subterminal line serrate. Hindwing pale grey, a little darker towards the margin. Eighth tergite small with a pair of elongate posteriorly-directed spines. Eighth sternite shaped like a broad 'H' (text fig. 67).

Female: Similarly patterned to the male.

Diagnosis: Expanse 20-25mm.. The closest apparent ally of this species is G. sokotokai Robinson (q.v.). Spinosa is more dully coloured than sokotokai which has a purplish-rufous appearance as opposed to lilac-grey in spinosa. The hindwing of sokotokai is white basally and the eighth tergite and sternite are different in the two species - compare text fig. 66 (sokotokai) with 67 (spinosa).

Fiji distribution:- VITI LEVU: Nandarivatu, Nausori Highlands, Savura Creek, Dombuilevu, Vatuvula (5km. N of Tholoisuva).

Holotype: ♂, FIJI, (Viti Levu), Waimanu R., Vatuvula, 18.vii.1969, H.S. & G.S. Robinson.

Paratypes: ♂, FIJI, (Viti Levu), Dombuilevu, 20.i.1971, H.S. & G.S. Robinson. BMNGSN 6933.

♂, 2♀♀, FIJI, (Viti Levu), Savura Creek, 17-20.vii.1969, H.S. & G.S. Robinson. BMNGSN 6937♂.

♂, FIJI, (Viti Levu), Nandarivatu, 21.xi.1971, H.S. & G.S. Robinson.

♀, similar but 27-30.vi.1968. BMNGSN 6939.

♀, FIJI, (Viti Levu), Nausori Highlands, Site 2 - 2000', 16-20.xii.1969, G.S. Robinson.

♀, similar but Site 1 - 2200'.

Remarks: An uncommon species apparently associated with primary forest. Not known from Vanua Levu; this is also the case with sokotokai.

Giaura tetragramma (Hampson)

Barasa tetragramma Hampson, 1905, Ann. Mag. nat. Hist. (7)16:549. Type examined.

subsp. tetragramma (Hampson)

Male: (Plate fig. 72) Head, thorax, abdomen and legs cream flecked with grey, paler beneath. Forelegs and palps tinged with mauve-pink. Forewing pale lilac-white patterned with grey and russet-brown. In some specimens, the forewing suffused with purple brown inward of the basal line. Subterminal line black, straight. Hindwing silky white suffused with grey at the apex. Eighth tergite and sternite illustrated in text fig.68.

Female: Similarly patterned to the male.

Diagnosis: Expanse 20-27mm.. Closely allied to G. rebeli (Tams) (Barasa rebeli Tams, 1935, Insects Samoa 3:208, pl.7, fig.2) in which the subterminal line of the forewing is serrate and the hindwing is pale ochreous grey, darker at the outer margin. The eighth tergite of tetragramma is larger than that of rebeli, the sternite not laterally emarginate (compare text fig.68 with 64).

World distribution: Solomon Is. (slight morphological differences - probably Solomons specimens represent a distinct subspecies).

Fiji distribution:- VITI LEVU: Suva, Nanggali, Tailevu, Vunindawa, Lautoka, Nandarivatu. VANUA LEVU: Governor's Pool, Lambasa. TAVEUNI.

Remarks: A moderately common species in areas of disturbed forest. subsp. simeoni subsp. n.

Male: (Plate fig.337) Similarly patterned to typical tetragramma from Viti Levu but head, thorax, abdomen and forewings uniformly suffused with ochreous grey. There appears to be no significant difference between the eighth tergite and sternite of this subspecies (text fig.65) and those of typical tetragramma (text fig.68).

Female: Similarly patterned to the male.

Diagnosis: Smaller (expanse 18-25mm.) and the forewing and body suffused with ochreous grey and thus lacking the pale lilac-white forewing ground-colour of typical tetragramma.

Distribution: Only known from Rotuma where it is a very common species.

Holotype: ♂, FIJI, Rotuma, Losa Rd., 19.iv.1971, G.S. Robinson.

Paratypes: 3♂♂, 5♀♀, data as holotype, BMNGSN 6934♂.

Remarks: This species is named after Cdr. G.J.B. Simeon to whom the author is indebted for providing the opportunity to collect on Rotuma.

Genus: Microthripa Hampson, 1912, Cat. Lepid. Phalaenae Br. Mus.11:226.

Microthripa buxtoni Tams

Microthripa buxtoni Tams, 1935, Insects Samoa 3:207, pl.7, fig.3. Type examined.

Male: Head, thorax, legs and abdomen ochreous buff, paler beneath. Forewing dull ochreous buff patterned with blackish brown; reniform conspicuous, a black dot. The apex of the forewing is downturned giving the forewing the appearance of being truncated apically. Hindwing suffused with pale ochreous buff, darker distally.

Female: (Plate fig. 78) Similarly patterned to the male.

Diagnosis: The downturned forewing apex of this small species (expanse 10-12mm.) is very characteristic as are the indistinct pattern and conspicuous reniform. The only other Microthripa species, Microthripa baeota (Turner) (Dendrothripa baeota Turner, 1902, Proc. Linn. Soc. N.S.W. 27:93) from Queensland is a larger species without a downturned forewing apex.

World distribution: Solomons, New Hebrides, Samoa.

Fiji distribution: Rotuma only.

Remarks: A very common species in all localities worked on Rotuma.

Genus: Mniothripa Hampson, 1912, Cat. Lepid. Phalaenae Br. Mus. 11:260. ,

Mniothripa bradleyi Fletcher

Mniothripa bradleyi Fletcher, 1957, Nat. Hist. Rennell Is., Br. Solomon Is. 2:42, figs.32-34, 84-86. Type examined.

Male: Head, thorax, legs and abdomen purplish grey. Forewing brownish grey patterned with very dark purple-brown, sometimes with a postero-basal suffusion of deep brown or a similar suffusion of the medial fascia. Hindwing dark greyish brown, thinly scaled and a little paler proximally.

Female: (Plate fig. 73) Similarly patterned to the male.

Diagnosis: A small species (expanse 17-22mm.) with a sombre colour-pattern, the palps shorter and more squat than in Mniothripa lichenigera (Hampson) (Giaura lichenigera Hampson, 1905, Ann. Mag. nat. Hist. (7)16:543) from Singapore and the wing pattern not so distinct. Fletcher (1957) illustrates the differences between the genitalia of the two species.

World distribution: Solomons, New Hebrides. Material from New Guinea, New Ireland and the Bismarck Archipelago can possibly be associated with this species.

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Lautoka, Nandarivatu, Koro-O. VANUA LEVU: Savusavu area.

Remarks: A scarce species, usually encountered in montane rain forest.

Genus: Nanaguna Walker, 1863, List Specimens Lepid. Insects Colln Br. Mus. 27:85.

Nanaguna albisecta Hampson

Nanaguna albisecta Hampson, 1905, Ann. Mag. nat. Hist. (7)17:583. Type examined.

Male: Unknown.

Female: (Plate fig. 74) Head, thorax and legs olivaceous grey, creamy white beneath. Abdomen pale ochreous, creamy white ventrally. Forewing lilac-grey streaked with olivaceous and patterned with white and dark brown; a distinct longitudinal white streak from the apex to join the costa at the basal line, the streak sometimes interrupted at the postmedial line. The pattern is very variable, the forewing colour ranging from pale tan to blue-grey, the white streak sometimes completely or almost obsolete. Hindwing white suffused with greyish pink terminally.

Diagnosis: Smaller (expanse 16-20mm.) and with narrower wings than other Fijian Nanaguna species. The postmedial line is bowed outward regularly and posteriorly from the costa; in N. breviuscula Walker (q.v.) it is concave. Female N. vittalis (Walker) (q.v.) are much larger, more olivaceous and the longitudinal white streak arises posterior to the forewing apex.

World distribution: Ceylon and India through south east Asia and the East Indies, New Hebrides.

Fiji distribution:- VITI LEVU: Suva, Vatuvula (5km. N of Tholoisuva), Nandarivatu, Koro-O. VANUA LEVU: Lambasa (!). NANUYA LAILAI (!).

Remarks: An uncommon species most often found in areas of primary forest. The male of this species is probably Etanna mackwoodi (Hampson) (q.v.).

Nanaguna breviuscula Walker

Nanaguna breviuscula Walker, 1863, List Specimens Lepid. Insects Colln Br. Mus. 27:85. Type examined.

Male: (Plate fig.75) Head, thorax, legs and abdomen ochreous fuscous, pale reddish ochreous beneath. Abdomen with a terminal tuft of black scales ventrally. Forewing ochreous fuscous tinged olivaceous, patterned with brownish black. Hindwing white suffused with greyish pink at the termen; a patch of elongate purple scales on the hindwing costa, normally hidden beneath the forewing.

Female: Similarly patterned to the male but without the ventral black tuft on the abdomen and elongate purple scales on the hindwing.

Diagnosis: A small species (expanse 17-22mm.) with a somewhat wider forewing than other Nanaguna species; the male postero-ventral black abdominal scale-tuft and elongate purple scales on the hindwing costa are exclusively diagnostic.

World distribution: Ceylon and India through south east Asia to New Guinea and Australia, Solomons, New Hebrides, Samoa.

Fiji distribution:- VITI LEVU: Suva, Nanggali, Korolevu, Dombuilevu, Mba, Nandarivatu, Lautoka, Vunindawa. VANUA LEVU: Savusavu area.

Biology: The larva is described by Swain (1971:210) and is recorded as feeding on flowers of Desmodium umbellatum DC and Mangifera indica L. in Fiji.

Remarks: A common species especially in dry areas of secondary vegetation.

Nanaguna vittalis (Walker)

Tamusida vittalis Walker, 1866, List Specimens Lepid. Insects Colln Br. Mus. 35:1733. Type examined.

Male: Head, thorax and legs pale olivaceous ochreous, creamy white beneath. Abdomen grey-brown, creamy white beneath. Forewing olivaceous ochreous patterned with brownish black, a scallop in the termen at two thirds posteriorly. Hindwing fuscous grey, paler basally.

Female: (Plate fig.76) Similarly patterned to the male but without the brownish-black anterior streak in the postmedial fascia. Posterior half of forewing suffused with reddish brown; a longitudinal medial line from the termen at one half to the base. A scallop in the termen at two thirds posteriorly with a white dot on the termen adjacent to the scallop. Hindwing pale fuscous grey, paler basally.

Diagnosis: The largest Fijian Nanaguna species, expanse 22-26mm..

The scallop in the forewing termen distinguishes vittalis from all other Nanaguna species.

World distribution: Sumatra, Borneo through the East Indies to the Celebes and New Guines.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O.

Remarks: Rare and restricted to montane rain forest on Viti Levu.

The depth of the forewing scallop varies a good deal both in one locality and geographically. In specimens from the Celebes it is almost obsolete and represented only by an indentation in the scales of the fringe. A specimen from Fiji (♂, Nandarivatu, abdomen missing) with no scallop is provisionally placed here.

Genus: Symitha Walker, 1866, List Specimens Lepid. Insects Colln Br. Mus. 35:1731.

Symitha indicatana (Walker)

Tortrix indicatana Walker, 1863, List Specimens Lepid. Insects Colln Br. Mus. 28:333. Type examined.

Male: Head, thorax and legs silver-grey flecked with brown, paler beneath. Abdomen pale buff-grey dorsally, paler beneath.

Forewing silver-grey patterned with black and russet-brown. Hindwing pale buff-grey, a little paler proximally.

Female: (Plate fig. 77) Similarly patterned to the male.

Diagnosis: A fairly small species (expanse 16-20mm.) with elongate palps. In life the forewing apex is downturned giving the forewing a truncated appearance as in Microthripa buxtoni Tams (q.v.).

World distribution: Ceylon, India, Burma (indicatana indicatana (Walker)); Java (i. parvella Walker); Singapore (i. microdonta Hampson); Solomons (i. ferrugana Fletcher).

Fiji distribution: Known only from two females, one from Suva (Simmonds) and one from Nandarivatu.

Remarks: With only two females it is impossible to place Fijian material subspecifically.

Subfamily: Chidephorinae

Genus: Carea Walker, 1856, List Specimens Lepid. Insects Colln Br. Mus. 10:474.

Carea albipicta Hampson

Carea albipicta Hampson, 1905, Ann. Mag. nat. Hist. (7)16:599.
Type examined.

Male: (Plate fig. 79) Head, thorax and legs dark bluish purple above, head and thorax suffused dorsally with dark orange; below, pale silver-grey. Abdomen dark grey above, buff-grey below. Forewing bright bluish purple patterned with dark orange. Hindwing uniformly dark grey. Expanse 21-22mm.

Female: Head, prothorax and legs dark bluish purple above, suffused with dark orange dorsally, meso- and metathorax purplish silver: silver-grey below. Abdomen white. Forewing purplish silver patterned with dark bluish purple and dark orange. Hindwing silky white, a few flecks of grey at the termen apically. Expanse 24-28mm.

Diagnosis: No very close ally of this species is at present known though it does bear superficial similarities to Carea obliquifascia Prout (Sarawak Mus. J. 3:498, 1928) from Sarawak in which the forewing pattern is diffuse and does not consist of distinct transverse stripes and the male hindwing is pale fuscous grey suffused distally with pinkish orange. The wing pattern of both sexes of this species is characteristic.

Fiji distribution:- VITI LEVU: Suva, Vunindawa, Tholoisuva, Nanggali, Nandarivatu, Nausori Highlands, Korolevu. VANUA LEVU: Savusavu area, Lambasa, Ndelaikoro.

Remarks: A widespread species, never common, usually encountered in primary forest.

Genus: Barias Hubner, 1825, Verz. Bekanntter Schmett.:395.

Barias flavida Felder

Barias flavida Felder, 1861, Sber. Akad. Wiss. Wien., abt.1, 43:34.

LECTOTYPE: ♀, here designated, "Barias flavida Feld." (in C. Felder's handwriting), Rothschild bequest B.M. 1939-1. In B.M.(N.H.).
Plate fig. 342.

Male: Palps, antennae and upperside of legs dull purple. Thorax bright greenish yellow, silky white below. Abdomen bright yellow. Forewing bright yellow sometimes tinged with pale green: indistinct ante- and postmedial lines of dull purple dots. Reniform large, dull purple, posteriorly a medial blotch of dull purple. Hindwing silky white tinged with bright yellow distally.

Female: (Plate fig. 82) Similarly patterned to the male but the reniform smaller, the medial dull purple blotch posterior to the reniform absent.

Diagnosis: Expanse 22-25mm.. Differs from E. luteolaria Hampson (q.v.), the closest apparent ally, in that the forewing fringe is not purple-brown and there is no subterminal line in the forewing. The palps of luteolaria are pale rosy purple, not dull purple as in flavida. The ventrally directed spine at the base of the male valve is not so deeply curved as in luteolaria; the ventral apex

of the valve is elongate and pointed (rounded in luteolaria); the digitate process on the ventral margin of the valve is more elongate than in luteolaria.

World distribution: India, East Indies, New Guinea and adjacent islands, E. Australia, Solomons, Samoa, Tonga.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nandarivatu, Nausori Highlands, Koro-O. VANUA LEVU: Savusavu area, Ndelaikoro.

Remarks: Felder's original description is in a catalogue of new species of Lepidoptera from Amboina, Molluccas. The locality of collection of the lectotype specimen is unknown. A second female Felder specimen of flavida in the Rothschild collection labelled 'Lorquin' (P.J.M. Lorquin - collector) was in all probability collected after Felder had described flavida as Lorquin's collections in the East Indies were made from 1860-1865. Flavida is a moderately common species in Fiji and is usually encountered in primary forest.

Barias huegeli Rogenhofer

Barias huegeli Rogenhofer, 1870, Verh. Zool.-Bot. Ges. Wien 20:872. Type not found - possibly in Natural History Museum, Vienna, but identity not in doubt.

Male: Head and thorax pale greenish yellow, silky white below. Abdomen silky white. Forewing pale greenish yellow patterned with grey and dull olive. Hindwing silky white suffused with grey-brown towards the margin.

Female: (Plate fig. 81) Similarly patterned to the male.

Diagnosis: Superficially similar to Barias vitella (F.) (q.v.) but smaller (expanse 15-22mm.). The forewing has faint olivaceous ante- and postmedial and subterminal lines which are not apparent in vitella.

World distribution: Australia, New Caledonia, Samoa, Society Is., Marquesas, Austral Is., Gilbert & Ellice Is..

Fiji distribution:- VITI LEVU: Suva, Rakiraki, Lautoka, Nandi, Korolevu, Nandarivatu. VANUA LEVU: Savusavu area. NANANU-I-RA. YASAWA. VIWA. ROTUMA.

Biology: The larva is recorded as feeding on Gossypium arboreum L. and G. barbadense L., Urena lobata L., Triumfetta rhomboidea Jacq.:

Remarks: Moderately common on Rotuma and Viwa, otherwise rarely encountered.

Footnote: I have recently examined a photograph of Rogenhofer's type of huegeli in NM Vienna. Clearly the type of this species is nothing to do with the material described here and is perhaps a form of B. vitella (F.) (q.v.). The species described here and in Seitz as huegeli is apparently undescribed: J.D. Holloway intends to publish a name and a description shortly.

Barias luteolaria Hampson.

Barias luteolaria Hampson, 1891, Illust. typical Specimens Lepid. Heterocera Colln Br. Mus. 8:46, pl.139, fig.16. Type examined.

Male: (Plate fig.80) Tip of palps and base of antennae deep rose-pink; upper surface of forelegs, mid- and hind tarsi and antennae deep purple. Head and thorax bright yellow, cream below.

Abdomen pale yellowish cream. Forewing bright yellow with ill-defined purple basal, ante-, and postmedial lines. Fringe of forewing deep purple. Hindwing silky white suffused with yellow at the apex.

Female: Similarly patterned to the male but the forewing ground-colour deeper and the markings denser and better-defined.

Diagnosis: Expanse 19-22mm.. The forewing fringes of this species are always purple and this character, coupled with the possession of at least traces of a subterminal line differentiate luteolaria from E. flavida Felder (q.v.). See also diagnosis for flavida. The forewing of luteolaria is narrower and more square-ended than that of flavida. In faded specimens the bright forewing colour may be reduced to pale lemon-yellow and much of the pattern lost.

World distribution: India, Ceylon, Andamans, Celebes, Solomons, New Hebrides, New Caledonia, Samoa, Tonga.

Fiji distribution:- VITI LEVU: Suva, Korolevu, Rakiraki, Lautoka, Nandarivatu, Nausori Highlands. YASAWA. ROTUMA.

Biology: Larva described by Gardner (1947) and recorded as feeding on Grewia (Tiliaceae) in India; described and recorded attacking Hibiscus tiliaceus L. in Fiji by Swain (1971:101).

Remarks: An uncommon but widespread species apparently associated with secondary vegetation.

Earias vitella (F.)

Tinea vitella F., 1794, Ent. Syst. 3(2):293. Type not examined but identity not in doubt.

Male: Head, thorax and legs pale apple-green, whitish beneath.

Abdomen white, tinged dull olivaceous dorsally. Forewing bright apple-green with paler longitudinal streaks, the anterior third of the wing pale apple-green often tinged with pinkish. Hindwing silky white suffused distally with pale brownish grey.

Female: (Plate fig. 83) Similarly patterned to the male.

Diagnosis: Larger (expanse 18-24mm.) than E. huegeli Rogenhofer (q.v.) and the forewing lacking the transverse intermittent greyish-green bands present in huegeli.

World distribution: India through south east Asia and the East Indies to New Guinea, Solomons, Australia, New Hebrides.

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Tholoisuva, Nandarivatu, Rakiraki, Mba. VANUA LEVU: Savusavu area, Governor's Pool. NANANU-I-RA. TAVEUNI. YASAWA. VIWA. ROTUMA.

Biology: Larva described by Gardner (1947) as E. fabia (Stoll).

Larva recorded as feeding on Gossypium arboreum L. and G. barbadense L., Hibiscus diversifolius Jacq., H. esculentus L., H. rosa-sinensis L., H. tiliaceus L. and Malvastrum coromandelianum (L.). On Guam it feeds on Malachra capitata. A pest of Malvaceae - see Swain (1971 : 98,127).

Remarks: This species has been known for many years as Earias fabia (Stoll in Cramer). It is a moderately common species in wet areas with secondary vegetation.

Genus: Gabala Walker, 1865, List Specimens Lepid. Insects Colln Br. Mus. 34:1220.

Gabala australiata Warren

Gabala australiata Warren, 1916, Novit. zool. 23:212. Type examined.

Male: (Plate fig. 87) Head and thorax reddish brown patterned with pale yellow and dark yellow, white beneath. Legs pale yellow. Abdomen pale yellow, white beneath. Forewing chocolate brown patterned with yellow and white. Hindwing pale yellow, paler basally with an orange-brown spot at the termen.

Female: Similarly patterned to the male.

Diagnosis: A very distinctively patterned small species, expanse 20-22mm.. Australiata is very closely related to G. flavimargo Warren (Novit. zool. 23:213, 1916) from Bali, G. quadrinigrata Warren (ibidem, p.212) from the Kei Is. and G. hilaris Warren (ibidem, p.213) from Tambora. The four species differ only slightly from each other in forewing pattern and are perhaps no more than subspecies: this genus is in need of revision when more material is available.

World distribution: Australia, New Hebrides, Solomons (see remarks).

Fiji distribution:- VITI LEVU: Vatukoula, Nausori Highlands.

Remarks: An extremely rare species in Fiji, known only from three specimens and thought to be associated with talasinga grassland. Two specimens from Honiara, Guadalcanal, British Solomon Is. Protectorate, coll J.D. Bradley (8-18.ix.1953) and H.S. Robinson (20-25.vi.1971) have a more extensive and dense area of dark patterning in the forewing and are provisionally placed with australiata: the Bradley specimen in particular is larger and brighter than other specimens of australiata.

Genus: Maceda Walker, 1857, List Specimens Lepid. Insects Colln Br. Mus. 13:1140.

Maceda mansueta Walker

Maceda mansueta Walker, 1857, List Specimens Lepid. Insects Colln Br. Mus. 13:1141. Type examined.

Male: Head, thorax and legs olive-brown above, white beneath. Abdomen dark grey above, white beneath. Forewing various shades of olive-brown or red-brown patterned with black, dark purple and sometimes cream. Hindwing suffused dark grey, white medially and terminally.

Female: (Plate fig. 84) Similarly patterned to the male.

Diagnosis: Expanse 28-37mm.. Closely allied to M. savura Robinson (q.v.) but without the distinctive antero-medial and terminal white spots of savura (compare plate fig. 84 with 85).

World distribution: Ceylon and India through south east Asia and the East Indies to New Guinea, Australia, New Hebrides and Samoa.

Fiji distribution:- VITI LEVU: Suva, Dombuilevu, Rakiraki, Nausori Highlands, Tholoisuva. VANUA LEVU: Savusavu area, Ndelaikoro. ROTUMA.

Remarks: An uncommon species encountered in primary forest and secondary bush.

Maceda savura Robinson

Maceda savura Robinson, 1968, Entomologist's Rec. J. Var. 80:249, pl.14. Type examined.

Male: (Plate fig. 85) Head, thorax and legs olivaceous, sometimes tinged with russet, white below. Abdomen dark grey-brown, white ventrally. Forewing olivaceous brown, sometimes tinged with russet, patterned with purple-brown and black, sometimes with cream. Hindwing brownish black with an antero-medial and a marginal white spot.

Female: Similarly patterned to the male.

Diagnosis: Expanse 33-40mm., larger than M. mansueta Walker (q.v.) and with the characteristic large white spots on the hindwing which separate the two species.

World distribution: New Hebrides, New Caledonia (specimens from New Caledonia have a slightly different hindwing pattern to Fijian and New Hebridean specimens, the white spots being larger).

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Nandarivatu, Koro-O, Nausori Highlands. VANUA LEVU: Ndelaikoro. LELEUVIA (!).

Remarks: A moderately uncommon species usually associated with primary forest.

Genus: Maurilia Moeschler, 1884, Verh. Zool.-Bot. Ges. Wien 33:298.

Maurilia iconica (Walker)

Anomis iconica Walker, 1857, List Specimens Lepid. Insects Colln Br. Mus. 13:992. Type examined.

Male: Head, thorax and legs reddish purple, white flecked with dull purple below. Upperside of fore tibia white. Palps elongate, obtect, dull purple-brown. Forewing brick red to olive-purple patterned with deep dull purple and sometimes blue-black, the pattern extremely variable. Hindwing dull grey-brown becoming thinly scaled, almost subhyaline, basally.

Female: (Plate fig. 86) Similarly patterned to the male but the forewing ground colour bright brick red, the hindwing suffused with pale brick red antero-distally.

Diagnosis: Expanse 32-37mm. Very reminiscent of Maceda spp. (q.v.) but the palps are more elongate and there is no trace of white in the hindwing.

World distribution: Ceylon and India through south east Asia and the East Indies to New Guinea, New Hebrides, New Caledonia and Samoa.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nanggali, Nandarivatu, Koro-O, Nausori Highlands, Vunindawa, Rakiraki, Lautoka. VANUA LEVU: Savusavu area, Ndelaikoro. NAVUTU-I-RA.

Biology: Comstock (1966) describes the early stages of this species and Gardner (1941) describes the larva. The only recorded larval foodplant is Terminalia catappa L. (Samoa).

Remarks: An uncommon species widespread on the larger islands of the Fiji group.

Genus: Xanthodes Guenee, 1852, Hist. nat. Insectes Lepid. 6:209.

Xanthodes congenita (Hampson)

Acontia congenita Hampson, 1912, Cat. Lepid. Phalaenae Colln Br. Mus. 11:657, pl.191, fig.16. Type examined.

Male: (Plate fig. 343) Top of head and prothorax white; remainder of head, meso- and metathorax and abdomen pale yellow, thorax and abdomen paler below. Forewing yellow suffused with yellow-brown in a wedge-shaped longitudinal mark from one half to the termen; flecks of yellow-brown in traces of a subterminal line; brown point at anterior tip of reniform, brown points ante- and postmedially on the costa. Hindwing pale yellow apically, creamy white basally.

Female: Not known from Fiji - in Australia similarly patterned to the male.

Diagnosis: Expanse 34-40mm.. Closely allied to X. intersepta Guenee (Hist. nat. Insectes Lepid. 6:212, 1852) but the hindwing is uniformly rich yellow in intersepta.

World distribution: Australia, Loyalty Is..

Fiji distribution: "FIJI", MANGO I..

Remarks: Hampson cites his types as follows: "Hab. N. AUSTRALIA, Alexandria, (Stalker), 1♂, 1♀ type; QUEENSLAND, Cooktown, (Lyell), 1♂; FIJI, Mango I., (Matthew) (sic) 1♂. Exp. 42-46 millim." The specimen labelled by Hampson as the type is the Stalker male; the female specimen is unlabelled. Apart from the material listed above by Hampson, the following specimens of this extremely rare species are known:

♂, "FIJI, 145, sp.?", "145", "Rothschild Bequest B.M.1939-1".

♀, "W. AUSTRALIA, Perth - Guildford, 13.iii.-15.vi.1955, A.M. Morley, B.M.1955-717."

♀, "LOYALTY IS., Lifu", "Rothschild Bequest B.M.1939-1".

This is an exceptionally rare species; only seven specimens are known; I have never collected it.

Subfamily: Catocalinae

Genus: Achaea Hubner, 1823, Verz. Bekannter Schmett.: 269.

Achaea janata (L.)

Phalaena (Geometra) janata L., 1758, Syst. nat. (edn. 10)1:527.

Male: (Plate fig. 344) Head, thorax and legs pale buff-grey, paler beneath. Abdomen pale greyish buff. Forewings buff-grey patterned with red-brown and black, the pattern and density of colouration somewhat variable. Hindwing charcoal grey, paler basally, marked with white.

Female: Similarly patterned to the male.

Diagnosis: Smaller (expanse 46-55mm.) than A. serva (F.) (q.v.) and with the medial white fascia in the hindwing always continuous, not divided into two parts as in serva (compare plate fig. 344 with 88).

World distribution: India through south east Asia and the East Indies to New Guinea and Australia, Guam and Micronesia, New Hebrides, Solomons, New Caledonia, Kermadec Is., Samoa, Tonga, Gilbert Is., Ellice Is., Society Is., Marquesas, Rapa I., Gambier Is., Tokelau Is., Henderson I., Easter I., Wallis and Futuna, New Zealand (Migrant).

Fiji distribution:- VITI LEVU: Suva, Namanggumangua (Serua), Vunindawa, Rakiraki, Lautoka, Nandarivatu, Korolevu, Dombuilevu, Rakiraki, Vatukoula, Mba. VANUA LEVU: Savusavu area, Governor's Pool. YASAWA. VIWA. ROTUMA. NASAUTAMBU.

Biology: Comstock (1966), Gardner (1941) and Swezey (1946) describe the early stages and life history of this species. Comstock illustrates the larvae in colour. Janata is recorded as feeding on the following species of Fijian plants: Codiaeum variegatum (L.), Euphorbia hirta L., Punica granatum L., Ricinus communis L., Camellia sinensis (L.), Albizia spp., Palaquium spp., Rosa damascena Mill., Acacia farnesiana (L.), Desmanthus virgatus (L.), Croton spp., Euphorbia spp., Leucaena spp., Macadamia tetraphylla Johnson, Euphorbia pulcherrima Willd., Terminalia catappa L., Pemphis acidula Forst. The author found larvae defoliating Euphorbia atoto on Nasautambu, a sand cay 30m. in diameter some 10km. south of Ovalau, in December 1970. See also Swain (1971:379).

Remarks: A fairly common species not often taken to light but often kicked up from low herbage by day with Mocis spp..

Achaea serva (F.)

Noctua serva F., 1775, Syst. ent.:593. Type not examined, identity not in doubt.

Male: (Plate fig. 88) Head, thorax and legs olive-brown, paler beneath. Abdomen buff-grey. Yellow hair-fans on mesothorax. Forewing warm brown patterned with black and suffused to varying extents with buff-cream. Hindwing grey-black marked with white.

Female: Similar to the male but the forewing not suffused with buff-cream, the pattern faint, the forewing ground-colour varying from olivaceous grey to red-brown.

Diagnosis: Expanse 64-69mm.. Hindwing pattern distinctive and separating this species from A. janata (L.) (q.v.). This species is very closely allied to A. pentasema Prout (Ann. Mag. nat. Hist. (9)3:181, 1919) but there are minor differences between the two in the male genitalia.

World distribution: South east Asia through the East Indies to New Guinea and Australia, New Hebrides, New Caledonia, Loyalty Is., Micronesia, Guam, Samoa, Tonga.

Fiji distribution:- VITI LEVU: Suva, Nandarivatu, Savura Creek, Nausori Highlands, Namanggumanggua (Serua). VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro. NANANU-I-RA. LAKEMBA. ONGEA.

Biology: The larva is recorded as feeding on the following species of Fijian plant: Palaquium spp., Ficus spp., Ricinus communis L..

Remarks: A widespread but uncommon species. A. pentasema Prout is apparently no more than a local race of serva, which species requires revision at subspecific level, hence the inclusion of New Caledonia and the Loyalty Islands in the range of serva.

Genus: Anua Walker, 1858, List Specimens lepid. Insects Colln Br. Mus. 15:1788.

Anua coronata (F.)

Noctua coronata F., 1775, Syst. ent.:596. Type not examined, identity not in doubt.

Male: (Plate fig. 89) Head, thorax and legs deep russet-brown, paler beneath; tarsi deep grey. Abdomen bright orange-yellow banded with black dorsally. Forewing deep russet brown patterned with darker brown, pattern somewhat variable. Hindwing bright orange-yellow patterned with brownish black.

Female: Similarly patterned to the male but the forewing rather more greyish brown than russet brown.

Diagnosis: A large, powerful species, expanse 80-95mm.. The wing pattern is entirely diagnostic.

World distribution: India through south east Asia to New Guinea and Australia, New Hebrides, New Caledonia, Micronesia, Guam, Gilbert Is., Samoa, Society Is..

Fiji distribution:- VITI LEVU: Suva, Vunindawa, Nandarivatu, Mba, Nausori Highlands. VANUA LEVU: Savusavu area. NANANU-I-RA. NAVITI. NANUYA LAILAI. YASAWA. ONGEA.

Biology: Gardner (1941) describes the larva of this species. The recorded Fijian larval foodplants are: Quisqualis indica L., Storckia vitiensis Seem., Terminalia catappa L. and T. litoralis. The author has collected larvae from T. litoralis on Naviti I. (Yasawa Group).

Remarks: An uncommon but widespread species; this is a spectacular insect to breed - the larva is a stick-mimic and grows up to 12 cm. in length. Breeding seems to be the only way to obtain adults in perfect condition.

Anua fijiensis Robinson

Anua fijiensis Robinson, 1969, Entomologist's Rec. J. Var. 81:193. Type examined.

Male: Head and thorax rich greenish yellow above, orange-brown beneath. Legs orange-brown; tibiae and tarsi dark grey, tibiae with a tuft of orange-brown scales. Abdomen bright yellow. Forewing rich greenish yellow patterned with orange brown and purplish brown. Hindwing bright yellow, in a very few specimens patterned with a black postmedial blotch.

Female: (Plate fig. 90) Similarly patterned to the male.

Diagnosis: Expanse 67-75mm.. The completely yellow hindwing (occasionally with a small black blotch) and forewing pattern distinguish this from other Fijian Anua species: the closest apparent ally of this species is Anua kenricki (Bethune-Baker) (Ophiura kenricki B.-B., 1906, Novit. zool. 13:259) from New Guinea but fijiensis lacks the brown-suffused area in the forewing apex and has a much smaller orbicular stigma than kenricki. Fijiensis is also closely allied to A.samoensis Tams (Insects Samoa 3:215, 1935) from Samoa but has a marked 'kink' in the subterminal line and the forewing markings more distinct than in samoensis.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O. VANUA LEVU: Ndelaikoro.

Remarks: An uncommon species restricted in its distribution to primary montane rain forest on Viti and Vanua Levu. Tams (Insects Samoa 3: 215, 1935) suggests that A. samoensis may only be an aberration of A. tongaensis Hampson (q.v.) but I consider samoensis to be a good species, the Samoan representative of the kenricki-fijiensis species group.

Anua tongaensis Hampson

Anua tongaensis Hampson, 1913, Cat. Lepid. Phalaenae Colln Br. Mus. 12:434, pl.214, fig.11. Type examined.

Male: (Plate fig. 91) Head and thorax ochreous buff above; beneath, orange-yellow. Tibiae and tarsi dark brownish grey, tibiae with some elongate orange-brown hairs; remainder of legs orange-yellow. Forewings ochreous buff to orange-brown patterned with brown, purple-brown and black. Hindwing bright orange-yellow suffused with brownish black in the postmedial fascia.

Female: Similarly patterned to the male.

Diagnosis: Expanse 68-76mm.. Duller than A. fijiensis Robinson (q.v.) and with a large black mark in the hindwing. Very closely allied to A. indiscriminata (Hampson) (Minucia indiscriminata Hampson, 1893, Illust. typical Specimens Lepid. Heterocera Colln Br. Mus. 9:111) from Ceylon but the forewing subterminal line is almost obsolete in the latter species and tongaensis is, in general, more heavily marked than indiscriminata.

World distribution: Guam (specimen not seen), New Hebrides, New Caledonia, Samoa, Tonga.

Fiji distribution:- VITI LEVU: Suva, Vunindawa, Korolevu, Vatukoula, Mba, Nandarivatu, Koro-O, Savura Creek. VANUA LEVU: Savusavu area. NAVUTU-I-RA.

Biology: The life history of this species on Guam is described by Swezey (1946). The larva is recorded as feeding on Eucalyptus and Psidium guajava L. in Fiji.

Remarks: An uncommon but widespread species.

Genus: Avatha Walker, 1857, List Specimens lepid. Insects Colln Br. Mus. 13:1106.

Avatha discolor (F.)

Noctua discolor F., 1794, Ent. Syst. 3(2):50. Type not examined, identity not in doubt.

Male: Head, thorax and legs pale buff to deep brown, the face darker, paler beneath. Abdomen buff to dull brown, always darker and duller than the thorax. Forewings creamy buff to purple-brown marked with darker shades of brown and usually with characteristic medial and basal black marks: these are, however, sometimes obsolete. Hindwing dull greyish brown, a little paler basally; fringe white at the apex and posteriorly.

Female: (Plate fig. 96) Similarly patterned to the male and equally as variable.

Diagnosis: A moderate-sized species (expanse 34-41mm.) with superficial similarities to Pantylidia metaspila (Walker) (q.v.) but without a straight, pale postmedial line in the forewing nor a pale postmedial fascia in the hindwing. Closely allied to Avatha noctuoides (Guenée) (Hypaetra noctuoides Guenée, 1852, Hist. nat. Insectes Lepid. 7:259) from Java in which the black medial mark is never present in the forewing and the hindwing fringe is uniformly dull brown. The subterminal line of the forewing of noctuoides is finely serrate; in discolor it is obscured and coarsely dentate.

World distribution: East Africa through India, south east Asia and the East Indies to New Guinea, New Hebrides, New Caledonia, Cook Is., Marquesas and Society Is..

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Nandarivatu, Nausori Highlands, Lautoka, Rakiraki. VANUA LEVU: Savusavu area. NANANU-I-RA.

Biology: Recorded as feeding on Guioa capillacea A.C. Smith in Fiji.

Remarks: A rare but apparently widespread species: specimens from the Marquesas are larger than typical discolor and have a distinct pale medial fascia in the forewing which is not consistently present in discolor from other localities.

Genus: Chalciope Hubner, 1823, Verz. Bekannter Schmett.:268.

Chalciope alcyona (Druce)

Grammodes alcyona Druce, 1888, Proc. zool. Soc. Lond.:225, pl.13, fig. 5. Type examined.

Male: Head, thorax and legs deep olivaceous grey-brown, paler beneath. Abdomen buff-grey. Forewing lilac-brown in the anterior fascia, lilac in the terminal fascia. Dark markings rich brownish black edged with cream; oblique line cream. Hindwing grey-buff, a small greyish-white patch posteriorly.

Female: (Plate fig. 92) Similarly patterned to the male.

Diagnosis: Wing pattern distinctive; expanse 30-35mm.. Closest apparent ally is Chalciope mygdon (Cramer) (Phalaena (Noctua) mygdon Cramer, 1777, Uitlandsche Kapellen 2:94, pl.156, fig.G) from India and south east Asia in which the oblique line in the forewing is steeper, arising subcostally at one fifth the length of the costa whereas in alcyona it arises almost at the base of the forewing.

World distribution: New Guinea, Australia (N. Territory and Queensland), Samoa, Micronesia, New Caledonia.

Fiji distribution:- VITI LEVU: Suva, Vunindawa, Savura Creek, Dombuilevu, Nandarivatu, Lautoka. VANUA LEVU: Savusavu area. NAUKATHUVU. VIWA.

Biology: The larva of this species is recorded as feeding on Oryza sativa L..

Remarks: A rare but apparently widespread species.

Genus: Ercheia Walker, 1857, List Specimens lepid. Insects Colln Br. Mus. 13:1107.

Ercheia kebeae Bethune-Baker

Ercheia kebeae Bethune-Baker, 1906, Novit. zool. 13:249. Type examined.

Male: Head, thorax and legs buff-brown; abdomen grey-buff. Fore tibia with a pair of black dots dorsally. Forewing pale buff-brown patterned with dark brown and black. Hindwing dull greyish brown marked with white and buff-white. In some fresh specimens the head, thoracic and forewing ground colour may be bluish or olivaceous. The pattern is somewhat variable.

Female: (Plate fig. 94) Similarly patterned to the male but darker and more dull, the forewing often suffused with deep dull brown.

Diagnosis: A distinctive species with a characteristic wing shape, the posterior margin of the forewing produced posteriorly such that there is a small 'flap' over the hindwing. Allied to Ercheia multilinea Swinhoe (Ann. Mag. nat. Hist. (7)9:84, 1902) from Malaya and the East Indies in which the posterior margin of the forewing is normal and the forewing pattern of the female of which consists of longitudinal cream stripes separated by bands of brown and black. Expanse 43-52mm..

World distribution: Borneo through the East Indies to New Guinea and Australia.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, summit of Mt Victoria, Nausori Highlands, Savura Creek.

Remarks: An uncommon species apparently restricted to primary forest on Viti Levu.

Genus: Grammodes Guenee, 1852, Hist. Nat. Insectes Lepid. 7:259.

Grammodes oculicola Walker

Grammodes oculicola Walker, 1858, List Specimens lepid. Insects Colln Br. Mus. 14:1446. Type examined.

Male: (Plate fig. 95) Head and thorax deep brownish black above, abdomen a little paler; greyish white below. Forewing blackish brown crossed by two cream stripes; a black dot in the posterior angle edged with white and surrounded by pale ochre scales, this dot giving the appearance of one of a pair of eyes when the insect is at rest. Hindwing dark grey-brown with a medial white stripe and two white marks on the fringe.

Female: Similarly patterned to the male.

Diagnosis: Expanse 33-35mm.. Forewing pattern very distinctive and diagnostic. Closely allied to Grammodes pulcherrima Lucas (Proc. Linn. Soc. N.S.W. (2)7:258, 1892) from Australia but lacking the white submarginal line at the costa and with the course of the pale postmedial line almost straight past the posterior angle 'eye' whereas in pulcherrima the line turns through a right angle in a steady curve round the 'eye'.

World distribution: Australia, New Caledonia, Loyalty Is., New Guinea, New Hebrides, Tonga, Austral Is., Cook Is..

Fiji distribution:- VITI LEVU: Nandarivatu, Lautoka, Rakiraki, Mba, Nandi, Nausori Highlands, Singatoka. VIWA. OVALAU.

Biology: The larva is recorded as feeding on Phyllanthus and Glochidion spp. but does not appear to have been described.

Remarks: A rare species most frequently encountered at Nandarivatu.

Genus: Mocis Hubner, 1823, Verz. Bekannter Schmett.:267.

Mocis frugalis (F.)

Noctua frugalis F., 1775, Syst. ent.:601. Type not examined, identity not in doubt.

Male: Head, thorax, legs and abdomen pale dull brownish grey, a little paler beneath and on the abdomen; hindlegs clothed with elongate pale dull brownish grey hairs. Forewing pale dull brownish grey with an oblique brown postmedial line and darker grey suffusion in the postmedial fascia. Subterminal line of dark grey dots edged proximally with lilac. Hindwing pale dull brownish grey with a diffuse grey postmedial line and diffuse grey suffusion in the subterminal fascia.

Female: (Plate fig. 98) Similarly patterned to the male but brighter, the forewing postmedial line red-brown edged inwardly with yellow, the forewing often with a tinge of yellow or dull lilac.

Diagnosis: Expanse 37-41mm.. Closely allied to M. vitiensis Hampson (q.v.) but much more dull, the postmedial and subterminal line in the forewing divergent posteriorly and the hindwing pattern less distinct.

World distribution: West and East Africa and Madagascar through India and Ceylon, south east Asia, the East Indies and New Guinea to Australia, Solomon Is., New Hebrides, New Caledonia, Loyalty Is., Kermadec Is., Ellice Is., Micronesia, Samoa, Tonga, Austral Is., Marquesas, Rapa I., Society Is., Tuamotu Arch., Gilbert Is., Cook Is..

Fiji distribution:- VITI LEVU: Suva, Vunindawa, Nandarivatu, Lautoka, Nausori Highlands, Tholoisuva, Dombuilevu, Mba, Koro-O. VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro, Lambasa. NANANU-I-RA. OVALAU. TAVEUNI. KOMO. FULANGA. ROTUMA. VIWA. N.B. These records are based on field notes and will probably include specimens of M. vitiensis Hampson (q.v.).

Biology: This species is recorded as feeding on the following species of Gramineae in Fiji: Brachiaria mutica (Forsk.), Eleusine coracana (L.), Oryza sativa L., Sorghum vulgare Pers., Zea mays L.. It is not certain how many of these records refer to M. vitiensis Hampson. Gardner (1941 and 1947) describes the larva of this species.

Remarks: A fairly common species; the exact distributions of this and M. vitiensis are unknown so no conclusion can be reached as to its habitat preference.

Mocis trifasciata (Stephens)

Catephia trifasciata Stephens, 1829, Illust. Brit. Ent., Haust. 3:128. Type examined.

Male: (Plate fig. 99) Head, thorax, legs and abdomen dull brownish grey; beneath and on the abdomen a little paler. Forewing dull brownish grey patterned with olivaceous black or purplish brown. Hindwing greyish ochreous with a diffuse dull grey medial band and a grey postmedial fascia. Wing pattern is variable though distinctive.

Female: Similarly patterned to the male and the wing pattern also variable. A bred specimen from Rotuma has the forewings suffused with rich purple-brown.

Diagnosis: Expanse 40-46mm.. Closely allied to M. undata (F.) (Noctua undata F., Syst. ent.:600, 1775) from Africa and Asia but the antemedial line arises at right angles to the posterior margin of the forewing in trifasciata whereas in undata the angle between the posterior margin and the antemedial line is acute proximally.

World distribution: East Indies, New Guinea, N. Australia, Solomon Is., New Hebrides, New Caledonia, Samoa, Tonga, Micronesia, Austral Is., Marquesas, Society Is..

Fiji distribution:- VITI LEVU: Suva, Vunindawa, Rakiraki, Lautoka, Nandi, Nandarivatu, Nausori Highlands, Korolevu, Savura Creek. VANUA LEVU: Savusavu area, Governor's Pool, Lambasa, Ndelaikoro. NANANU-I-RA. OVALAU, LELEUVIA. YASAWA. NAVITI. NANUYA LAILAI. NAUKATHUVU. VIWA. TAVEUNI. ONGEA. ROTUMA.

Biology: Larva recorded as feeding on the following species of Fijian plant: Brachiaria mutica (Forsk.), Oryza sativa L., Vigna sinensis (L.), Pueraria thunbergiana (Sieb. & Zucc.). The early stages of this species are described by Comstock (1966).

Remarks: A common species often kicked up from grass; it appears to be ubiquitous.

Mocis vitiensis Hampson

Mocis vitiensis Hampson, 1913, Cat. Lepid. Phalaenae Colln Br. Mus. 13:89, pl.223, fig.22. Type examined.

Male: (Plate fig.345) Head, thorax and legs pale greyish buff, paler, yellowish beneath. Abdomen pale yellowish ochre. Hind legs clothed completely with elongate pale pinkish yellow hairs. Forewing pale yellow-buff with a postero-basal black spot and a black spot posterior to the reniform; dark brown postmedial line with pale brown and grey shading in the postmedial fascia. Subterminal line of dark grey dots. Hindwing pale yellow-buff, a grey post-medial line and grey subterminal fascia.

Female: Similarly patterned to the male but sometimes a little more reddish in colour. The forewing pattern is not quite as bright as in the male and the hindlegs are not clothed with elongate hairs.

Diagnosis: Expanse 33-41mm.. Lighter coloured than M. frugalis (F.) (q.v.) in which the black dot below the reniform in the male is not apparent and in which the postmedial line and subterminal line in the forewing diverge posteriorly. The postmedial line in the hindwing is narrow and distinct; in frugalis it is wide and diffuse. The vestiture of the male hindlegs is thicker and paler coloured than in frugalis.

Fiji distribution:- Specimens seen from: VITI LEVU: Suva. OVALAU. NANANU-I-RA. (See distribution for M. frugalis).

Remarks: This species was confused with M. frugalis for some years and I did not separate specimens of the two species until 1972. It is thus not possible to give an accurate picture of the distributions of the two species.

Genus: Parallelia Hubner, 1818, Zutrage Z. exot. Schmett. 1:15.

Parallelia arctotaenia (Guenee)

Ophiusa arctotaenia Guenee, 1852, Hist. nat. Insectes Lepid. 7:272.
Type not examined, identity not in doubt.

Male: Head, thorax and legs brownish black; abdomen grey-brown; paler beneath. Forewing brownish black patterned with white, termen suffused with pale lilac. Hindwing brownish black patterned with white; termen suffused with pale lilac.

(Plate fig. 100)

Female: [^]Similarly patterned to the male.

Diagnosis: Expanse 39-47mm.. Very closely allied to Parallelia analis (Guenee) comb. n. (Ophiusa analis Guenee, 1852, Hist. nat. Insectes Lepid. 7:271) from India, south east Asia and Java but the medial white band in the forewing is not suffused with brown anteriorly and not appreciably widened at the costa. The anal angle of the hindwing is without a conspicuous black submarginal spot edged inwardly with white. The white medial hindwing band is wider in arctotaenia than in analis.

World distribution: South east Asia through the East Indies to New Guinea, Queensland, New Hebrides.

Fiji distribution:- VITI LEVU: Suva, Vunindawa, Nandarivatu, Nausori Highlands. VANUA LEVU: Savusavu area, Governor's Pool.

Remarks: A rare species apparently associated with secondary vegetation, arctotaenia appears to be restricted to the two largest islands of the Fiji group.

Parallelia duplicata sp. n.

Male: Head, thorax and legs dull orange-brown tinged with purple; pale greyish buff below. Abdomen dull buff-grey. Forewing cream suffused to varying extents with purple-brown. Dark markings purplish-black. Hindwing dull brownish grey with some cream scales in brownish black patch at the anal angle subterminally. Termen suffused with lilac. Basidorsal process of valve trifurcate (text fig. 79). Vesica with a row of thirteen large spine-like cornuti and seven to nine small thorn-like cornuti.

Female: (Plate fig. 101) Similarly patterned to the male.

Diagnosis: Expanse 46-52mm.. Closely allied to Parallelia vitiensis (Butler)(q.v.) but the doubly reflexed postmedial line is reminiscent of P. dentilinea (B.-B.) (Ophiusa dentilinea Bethune-Baker, 1906, Novit. zool. 13:257) from the Loyalty Is. and several associated undescribed species. The genitalia are, however, closer to vitiensis than to dentilinea and its allies. The dorsal process at the base of the valve is similar to that of vitiensis though the differences are immediately obvious (compare text figs. 79 and 80) and there are at least twenty cornuti on the vesica of duplicata and only eleven on that of vitiensis (this is variable - q.v.).

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, summit of Mt Victoria, Nausori Highlands. VANUA LEVU: Governor's Pool, Ndelaikoro.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 15-17.viii.1969, H.S. & G.S. Robinson. BMNGSN 6972.

Paratypes: ♂, 2♀♀, data as holotype. BMNGSN 6974♀.

♂, as holotype but 12-14.ix.1969.

♂, as holotype but 27-30.vi.1968.

♂, FIJI, 1966/67, H.S. Robinson.

2♂♂, FIJI, (Viti Levu), Nausori Highlands, Site 2 - 2000',
16-20.xii.1969, G.S. Robinson, BMNGSN 6973.
♀, FIJI, Viti Levu, Mt Victoria (summit-1323m.), 25.xi.1970,
G.S. Robinson.

Remarks: A moderately common species in primary montane forest.

Parallelia hicanora (Turner)

Thyas hicanora Turner, 1903, Trans. R. Soc. S. Aust. 27:9.
Type not examined, identity not in doubt.

Male: Head, thorax, legs and abdomen warm buff, paler beneath. Forewing warm buff patterned with darker shades of brown and suffused with lilac in the subterminal fascia. Hindwing black, brownish basally, marked with white, a small lilac patch at the posterior margin.

Female: (Plate fig. 104) Similarly patterned to the male but the body and forewings somewhat darker, more purplish than in the male.

Diagnosis: Expanse 41-48mm.. The wing pattern of this species is completely diagnostic: it has no particularly close allies.

World distribution: Queensland, New Guinea.

Fiji distribution:- VITI LEVU: Rakiraki, Lautoka, Nausori Highlands.

Remarks: This species was taken in moderate numbers at light in grassland areas in December 1969 after one of the worst droughts in living memory. It has never been seen in Fiji before or since December 1969.

Parallelia koroensis Robinson

Parallelia koroensis Robinson, 1969, Entomologist's Rec. J. Var. 81:193. Type examined.

Male: (Plate fig. 102) Head, thorax, legs and abdomen orange-brown, the tarsi purplish black, tibial spines black and white. Abdomen pale orange-brown dorsally. Forewing orange-brown patterned with lilac and dark purple-brown. Hindwing buff suffused with grey distally and with subterminal spots black surrounded by lilac scales.

Female: Similarly patterned to the male.

Diagnosis: Expanse 51-60mm.. No particularly close ally of this species is known but it is clearly related to Parallelia mediifascia Wileman & South (Entomologist 53:273, 1920) from the Philippines in which the postmedial fascia is pale lilac brown rather than deep purple-brown as in koroensis.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, summit of Mt Victoria. VANUA LEVU: Ndelaikoro.

Remarks: A moderately common species restricted to primary montane rain forest.

Parallelia prisca (Walker)

Ophisma prisca Walker, 1858, List Specimens lepid. Insects Colln Br. Mus. 14:1385. Type examined.

Ophisma anetica Felder, 1875, Reise Ost. Fregatte Novara, Zool. 2 (Lepid.)2:pl.116, fig. 11. Type examined.

Male: (Plate fig. 105) Head and thorax red-brown above; lilac-grey below and on the abdomen. Forewings purple-brown patterned with

white and shades of brown and suffused with lilac at the termen. Hindwing dark grey-brown with a faint lilac medial line, suffused with lilac at the margin.

Female: Similarly patterned to the male but often the forewings darker, purple-black in some examples, white or cream markings often obsolete.

Diagnosis: Wing pattern very characteristic: closely allied to P. serratilinea (Bethune-Baker) (Ophiusa serratilinea B.-B., 1906, Novit. zool. 13:257) from New Guinea but the chocolate-brown forewing apical mark without a white margin encompassing it and the margin not smoothly rounded posteriorly as in serratilinea. Expanse 52-66mm..

World distribution: New Hebrides, New Caledonia, Samoa, Tonga.

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Tholoisuva, Vunindawa, Rakiraki, Nandarivatu, Koro-O, Lautoka, Nausori Highlands, Mba River, Namanggumangua (Serua).

VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro.

OVALAU. TAVEUNI. ROTUMA.

Biology: The larva of this species is recorded as feeding on Myrtus vitiensis (A. Gray) in Fiji.

Remarks: A moderately common species associated with primary and secondary forest but also taken rarely in grassland.

Parallelia vitiensis (Butler)

Ophiusa vitiensis Butler, 1886, Trans. ent. Soc. Lond.:414.
Type examined.

Male: Head, thorax, legs and abdomen greyish-brown, paler beneath and on the abdomen. Forewing purple-brown patterned with cream and lilac and deep purple-brown. Hindwing deep grey-brown with a medial white line and traces of a brownish cream subterminal line at the anal angle; some lilac scales at the margin; fringe partly white. Valve with a basidorsal process as in text fig. 80. Vesica with seven large and two small cornuti.

Female: (Plate fig. 103) Similarly patterned to the male.

Diagnosis: Expanse 41-48mm.. Closely allied to Parallelia joviana (Stoll) (Noctua joviana Stoll, 1782, Uitlandsche Kapellen 4:237, pl. 399, fig.B) which is an unrevised species complex in need of major revision containing apparently many species and subspecies distinguishable only by genitalic characters and with few available names. Vitiensis is the Fijian representative of the "joviana complex". Typical joviana from Ceylon is distinguishable from vitiensis in that instead of having up to nine free cornuti on the vesica as in vitiensis there is a semicircular sclerotised plate on the vesica bearing four sawtooth-like projections from the edge. The basidorsal process is terminally elongate in joviana, bearing a sickle-shaped projection at the tip.

World distribution: Not known - revision required to show this but probably Fiji only with a closely related species in the New Hebrides.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nanggali, Korolevu, Nandarivatu, Lautoka, Nausori Highlands. VANUA LEVU: Savusavu area, Governor's Pool, Lambasa. OVALAU. VANUA MBALAVU. VIWA. ROTUMA. (See remarks).

Biology: Larva recorded as feeding on Eucalyptus (introduced) in Fiji. Joviana feeds on Phyllanthus in India and the larva is described by Gardner (1947).

Remarks: A specimen from Lomaloma, Vanua Mbalavu (N. Lau group) has a slightly differently shaped basidorsal process to typical vitiensis from Viti Levu (text fig. 81 - compare with 80) and the vesica carries only three cornuti. In a specimen from Viwa, the basidorsal process is essentially similar to typical vitiensis though slightly shorter and more squat caudally. Again, there are only three cornuti. Unfortunately, not enough material is available to ascertain whether or not these differences are consistent and are indicative of the existence of recognisable geographical races within the Fiji group. No males of this species are known from Rotuma so I am not certain whether material from this island is correctly associated with vitiensis. The specimens of vitiensis recorded by Tams (1935) from Samoa are female. I have not examined the material on which Fukushima's (1947) record of vitiensis from Micronesia is based.

In Fiji, vitiensis is a moderately common species where there is secondary vegetation in wet zone areas.

Genus: Thyas Hubner, 1824, Samml. Exot. Schmett. 2: pl.(203).

Thyas miniacea (Felder)

Lagoptera miniacea Felder, 1875, Reise Ost. Fregatte Novara, Zool. 2(Lepid.)2:pl.116, fig.8. Type not examined, identity not in doubt.

Male: (Plate fig. 97) Head and thorax red-brown, slightly olivaceous above; below and on the abdomen orange-red tinged with rose. Legs purple-brown above clothed with orange-red hairs on the coxae and femora. Forewing sandy brown to purple-brown with a variable pattern in darker shades of brown and black. Hindwing orange-red distally suffused to a varying extent with black.

Female: Similarly patterned to the male.

Diagnosis: A large species (expanse 75-90mm.); the red hindwing is highly diagnostic. Closely allied to Thyas regia Lucas (Proc. Linn. Soc. N.S.W.(2)8:151, 1894) from Australia and New Guinea but smaller and darker and the hindwing black markings extending parallel to the posterior margin in most examples seen. The hindwing ground colour of regia is not as bright as that of miniacea.

World distribution: New Hebrides, New Caledonia, Samoa.

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Tholoisuva, Nanggali, Vunindawa, Nandarivatu, Nausori Highlands. VANUA LEVU: Governor's Pool, Savusavu area, Ndelaikoro. LAKEMBA.

Biology: The larva of this species is recorded as feeding on Quisqualis indica L. and Terminalia catappa L. in Fiji.

Remarks: A moderately common species in lowland forest but exceptionally common at certain times of the year in the Waimanu River valley, about 4km. N of Tholoisuva.

Genus: Trigonodes Guenee, 1852, Hist. nat. Insectes Lepid. 7:281.

Trigonodes cephise (Cramer)

Noctua cephise Cramer, 1779, Uitlandsche Kapellen (3)19:59, pl.227, fig.C. Type not examined - identity not in doubt.

Male: (Plate fig.106) Front of head reddish brown, top of head pale lilac; remainder of head, thorax and abdomen dull buff, legs somewhat darker below. Forewing pale dull ochreous buff, with centred in the wing, a large dark chocolate-brown triangle surrounded with white and traversed by an oblique medial cream line; subterminal line of small black dots. Hindwing pale dull ochreous buff extensively suffused with grey-brown, leaving a diffuse pale medial fascia and terminal fascia.

Female: Similarly patterned to the male but the chocolate-brown forewing fascia containing a brownish cream concave-sided triangle instead of an oblique medial line.

Diagnosis: A large species (expanse 48-54mm..) with a very distinctive wing pattern. It has no particularly close allies.

World distribution: India through south east Asia and the East Indies to New Guinea, Solomons, New Hebrides, New Caledonia, Micronesia, Samoa and Tonga.

Fiji distribution:- VITI LEVU: Suva, Vunindawa, Nandarivatu, Lautoka, Mba. VANUA LEVU: Savusavu area, Governor's Pool.

Biology: Early stages described by Comstock (1966). The larva feeds on Vigna marina (Burm.).

Remarks: An uncommon but widespread species associated with secondary vegetation.

Trigonodes hyppasia (Cramer)

(Phalaena) hyppasia Cramer, 1779, Uitlandsche Kapellen 3(21):99.
Type not examined - identity not in doubt.

Male: Head, thorax and abdomen pale dull ochreous buff, the head and thorax flecked with grey-brown above. Forewing dull ochreous buff containing a chocolate-brown triangle bounded distally and posteriorly by a narrow cream line and traversed by a white bar. Pale sub-terminal line edged proximally with black. Hindwing dull ochreous buff suffused with grey to form a diffuse dark medial line and sub-terminal fascia.

Female: (Plate fig.210) Similarly patterned to the male but sometimes a little darker.

Diagnosis: Smaller (expanse 33-37mm..) than T. cephise (Cramer) (q.v.), the pale line in the chocolate triangle of the forewing meeting the hypotenuse of the triangle at right angles - in cephise males the transverse line meets the hypotenuse at an acute angle.

World distribution: Africa, Ceylon, India, Indian Ocean islands, south east Asia, East Indies, New Guinea, Australia, New Hebrides, New Caledonia, Norfolk I..

Fiji distribution:- VIWA.

Remarks: Of almost 5000 Lepidoptera trapped on Viwa only 9 were hyppasia and all were taken on 30.iii.1972. These specimens might have been part of a migration but I think it unlikely. The reason for the restriction of hyppasia to the westernmost island of the Fiji group is unclear.

Subfamily: Plu siinae

Genus: Plusia Ochsenheimer, 1816, Die Schmett. von Eur. 4:89.

* Key to Fijian species of Plusia Ochsenheimer *

- 1a Forewing with at least one bright gold or silver central spot...2
- b Forewing grey with a yellow or white oblique streak...albostrata
- 2a Abdomen with a conspicuous tuft of black or dark grey hairs.....
- illuminata ♂
- b Abdomen without a conspicuous dark terminal hair tuft.....3
- 3a Abdomen with terminal or lateral hair tufts or both (males).....4
- b Abdomen without conspicuous hair tufts (females).....5
- 4a Lateral hair tufts dull greyish brown; forewing ground colour
 pale bronze with a greenish tinge.....acuta ♂
- b Lateral hair tufts bright yellowish ochre; forewing ground colour
 purplish brown with traces of pale copper.....chalcites ♂
- 5a Hindwing uniform grey-brown; forewing ground-colour dark purple-
 brown tinged with pale copper.....chalcites ♀
- b Hindwing ochreous grey, paler basally; forewing ground colour
 lilac-grey tinged with pale greenish bronze and a few flecks of
 copper.....6
- 6a Forewing with a small gold^{sh} 'comma' half way between the large distal
 gold spot and the costa.....acuta ♀
- b No gold mark anterior to the distal forewing gold spot..illuminata ♀

Plusia acuta Walker

Plusia acuta Walker, 1857, List Specimens Lepid. Insects Colln Br. Mus. 12:922. Type examined.

Male: (Plate fig.107) Head, thorax and legs ochreous buff, paler beneath. Abdomen with pale greyish brown lateral hair tufts and a terminal tuft of pale grey-buff hairs. Forewing lilac-grey and silver-grey marked with gold and pale greenish bronze; antero-medially marked with deep bluish purple. Hindwing ochreous grey, paler basally. Valves narrowed basally; vesica elongate, three times the length of the aedeagus, bearing a double or treble row of small elongate cornuti from one tenth to two thirds of its length: at five sixths a single very small thorn-like cornutus and from nine tenths to the tip of the vesica a precisely arranged line of about eighteen tooth-like cornuti (text fig. 83).

Female: Similarly patterned to the male but without abdominal hair tufts.

Diagnosis: Expanse 32-35mm.. Somewhat sharper-winged than the other Fijian Plusia species (excluding P. albostriata B. & G. (q.v.)); easily confused with P. illuminata Robinson (q.v.) but without black or dark grey abdominal hair tufts in the male and with a gold "comma" half way between the distal gold spot on the forewing and the costa. The cornutal pattern of the vesica is diagnostic - compare text fig. 83 with 82, 84, and 85.

World distribution: Africa through India, Ceylon, south east Asia and the East Indies to New Guinea and Australia.

Fiji distribution:- VITI LEVU: Suva, Dombuilevu, Rakiraki, Mba, Lautoka.

Remarks: A rare species occurring, in the main, in talasinga areas.

Plusia albostriata Bremer & Grey

Plusia albostriata Bremer & Grey, 1853, Beitr. Schmett. N. China:18. Type not examined, identity not in doubt.

Male: (Plate fig. 108) Head, thorax and legs lilac-grey, paler beneath. Abdomen pale grey, paler beneath, with a pair of yellow-brown lateral hair tufts. Forewings lilac-grey with a mottled purple-brown pattern and a brownish cream oblique streak sometimes reduced or even obsolete. Hindwing pale grey-brown, slightly paler basally. Valves with a row of stout spines on the ventral margin; a corema is present on the membranes attached to the genital armature. Vesica a little longer than the aedeagus with a single stout terminal cornutus (text fig.82).

Female: Similarly patterned to the male but lacking the abdominal hair tufts.

Diagnosis: Expanse 28-35mm.. Wing pattern, general facies and male genitalia distinctive - especially the aedeagus: compare text fig. 82 with 83, 84 and 85.

World distribution: Eastern Asia through the East Indies to New Guinea and Australia, New Hebrides, New Caledonia, Norfolk I., Rapa I.. ~~(Marquesas)~~

Fiji distribution:- VITI LEVU: Suva. YASAWA. NANUYA LAILAI.

Biology: The larva is recorded as feeding on the following species of plants which occur in Fiji: Aster spp., Elephantopus mollis H.B. & K., Dichrocephala latifolia DC and Erigeron. The latter species is the foodplant on Rapa; the Rapa species of Erigeron does not occur in Fiji though other members of the genus are listed for Fiji. Gardner (1947) describes the larval mouth parts.

Remarks: A rare species normally but found to be quite common on Yasawa I..

Plusia chalcites (Esper)

Phalaena Noctua chalcites Esper, 1789, Nat. Eur. Schmett. 4:774, pl.141, fig.3. Type not examined, identity not in doubt.

Male: (Plate fig. 109) Head, thorax and legs purple-brown tinged with pale copper, buff below. Abdomen buff with dull gold lateral hair tufts and a yellow-buff terminal hair tuft. Forewing dull purple-brown patterned with gold and pale copper. Hindwing grey-brown. Valves tapering; vesica one and a half times the length of the aedeagus with a basal sclerotised strip bearing seven to nine spines, a medial sclerotised strip bearing three spines and a longitudinal row extending from one half to the tip of the vesica of about eleven elongate cornuti arising from sclerotised wart-like protuberances (text fig. 84).

Female: Similarly patterned to the male but lacking the abdominal hair-tufts.

Diagnosis: Expanse 32-38mm.. A little larger and with a darker and more reddish appearance than either P. acuta Walker (q.v.) or P. illuminata Robinson (q.v.). The dull gold lateral hair tufts on the male abdomen are diagnostic as are the facies of this species and the male genitalia, especially the aedeagus (compare text fig. 84 with 82, 83 and 85.).

N.B. The lateral abdominal hair tufts are not always apparent in this species - they can usually be everted in a fresh specimen by gentle pressure on the abdomen.

World distribution: Cosmopolitan but not recorded from the New World. Mediterranean region through N. Africa and central Asia, India, Ceylon, S.E. Asia, East Indies to New Guinea and Australia, Solomon Is., New Hebrides, New Caledonia, Loyalty Is., Kermadec Is., Norfolk I., New Zealand, Micronesia and Guam, Gilbert Is., Samoa, Tonga, Austral Is., Marquesas and Rapa I., Society Is., Easter I. and Hawaii.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Vunindawa, Nanggali, Dombuilevu, Rakiraki, Mba, Korolevu, Lautoka, Nandi, Nandarivatu, Koro-O, summit of Mt Victoria, Nausori Highlands.

VANUA LEVU: Savusavu area, Governor's Pool, Lambasa, Ndelaikoro.

OVALAU. TAVEUNI. YASAWA. NANUYA LAILAI. NAUKATHUVU. NAVITI.

VIWA, ONGEA. MOTHE. FULANGA. ROTUMA.

Biology: The early stages of this species are described by Comstock (1966), Zimmerman (1958) and Gardner (1941 and 1947). The Fijian larval foodplants are as follows: Clitoria ternatea L., Phaseolus calcaratus Roxb., P. coccineus L., P. lunatus L., P. vulgaris L., Pueraria thunbergiana (S. & Z.), Vigna sinensis L., Pipturus sp., Cucumis sativus L., Cucurbita pepo L., Theobroma cacao L., Gossypium spp., Sida spp., Sesamum indicum L., Lantana camara L., Brassica oleracea L., Adenostemma lavenia (L.), Ageratum conyzoides L., Cosmos sulphureus Cav., Emelia sonchifolia (L.), Helianthus annuus L., Lactuca sativa L.,

Sonchus asper (L.), Synedrella nodiflora (L.), Xanthium pungens Wallr., Datura sp., Lycopersicum esculentum Mill., Solanum melongena L., S. torvum Swartz, S. tuberosum L., Ipomoea batatas (L.), Angelonia augustifolia Benth., Coleus aromaticus Benth., Ocimum basilicum L., Mentha viridis L., Salvia spp., Canna indica L., Dioscorea spp., Spathoglottis spp., Panicum spp., Setaria spp., Zea mays L.. See also Swain (1971:68,194,281).

Remarks: A widespread and common species with a catholic taste in larval foodplants, chalcites is often quoted as an agricultural pest. With Spodoptera litura F. (q.v.) it is one of the few truly polyphagous species, restricting its interests, however, to low herbs. Adults are especially common in talasinga areas where this species may comprise up to 15% of the individuals in a light trap. A single sample from Koro-O is 40% chalcites.

Plusia illuminata Robinson

Plusia illuminata Robinson, 1968, Entomologist's Rec. J. Var. 80:250, pl.14. Type examined.

Male: (Plate fig. 110) Head and thorax olivaceous buff flecked with pale lilac, paler beneath. Legs pale buff flecked with black and white. Abdomen pale buff with brownish black hairs on the fifth and sixth segments dorsally and a conspicuous black or charcoal-grey terminal hair-tuft. Forewing white tinged with lilac and patterned with gold and silver and pale bronze. Hindwing ochreous grey, paler basally. Valves somewhat angular, tapered. Vesica about three times the length of the aedeagus with a group of about nine stout cornuti at one sixth and a group of some eleven small thorn-like cornuti at the tip (text fig. 85); a dark corema on the membranes at the base of the genital armature.

Female: Similarly patterned to the male but lacking the abdominal hair tufts.

Diagnosis: Pattern and male genitalia diagnostic; separable from P. acuta Walker (q.v.) in that there is no tiny gold 'comma' between the medio-distal golden mark in the forewing and the costa. Expanse 38-44mm..

World distribution: New Guinea, New Ireland, Solomon Is., New Hebrides, New Caledonia.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nanggali, Korolevu, Dombuilevu, Rakiraki, Vatukoula, Mba, Nandarivatu, Koro-O, Nausori Highlands. VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro. NANANU-I-RA. LELEUVIA. VIWA. ONGEA. ROTUMA.

Remarks: A moderately common and widespread species. Nothing is known of its life history and I suspect it may often have been mistaken for P. chalcites (Esper) (q.v.) in the past.

Subfamily: Ophiderinae

Genus: Aedia Hubner, 1823, Verz. Bekannter Schmett. (17):260.

Aedia leucomelas (L.)

Phalaena Noctua leucomelas L., 1758, Syst. nat. (Edn 10):518.

Type not examined, identity not in doubt.

Catephia acronyctoides Guenee, 1852, Hist. nat. Insectes Lepid. 7:47. Syn. n.

Male: Palps, head, prothorax and legs purple-brown, the top of the head and the prothorax dorso-caudally flecked with white. Remainder of thorax and abdomen grey, thorax flecked with purple-black. Yellow-buff hair pencils antero-laterally on the abdomen, black hair tuft caudally. Forewing deep purple-brown patterned with black, deep red-brown, steel grey and lilac-cream. Hindwing basally silky white, distally charcoal grey with white patches at the termen. Valves simple, a few fine spines at the tip. Anellus with a band of thorn-like spines (catena of Roepke - see below). Aedeagus short, the vesica is finely scobinate basally and bears terminally a group of fine needle-like cornuti.

Female: (Plate fig. 120) Similarly patterned to the male but the forewing generally lighter-coloured, the body rather duller, abdomen without hair-pencils and terminal tuft.

Diagnosis: Expanse 40-43mm.. Closely allied to A. funesta (Esper) (Noctua funesta Esper, 1787, Die Schmett. 4(1):72, pl.88, fig.6) but the catena more strongly developed and without medial processes on the valves. This species and funesta have been discussed by Roepke (Zoologische Mededelingen 23: 13-30, pls. 1 and 2, 1941). A. sericea (Butler) (q.v.) lacks the conspicuous mottling of the forewing seen in leucomelas.

World distribution: Europe through tropical Asia to the East Indies, New Guinea and Australia, Guam (Micronesia), New Hebrides, New Caledonia, Samoa.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Savura Creek.

Remarks: A rare species apparently restricted to lowland forest. A specimen from the New Hebrides, Santo, Mt Tabwemasana, Nokowula Village, 3700', with similar external facies to leucomelas has the valves with a basicaudal digitate process and the vesica with a sclerotised corrugated band for two thirds of its length and apparently represents an undescribed species.

Aedia sericea (Butler)

Anophia sericea Butler, 1882, Ann. Mag. nat. Hist. (5)10:230. Type examined.

Male: Head, thorax and legs purple-brown, the thorax mauve-cream ventrally. Abdomen grey with a pair of antero-lateral yellow-buff hair pencils and a caudal tuft of black hairs. Forewing purple-brown patterned with very deep purple-brown and black, an oblique fine yellow-brown line below the reniform. Hindwing black and white.

Female: (Plate fig.122) Similarly patterned to the male but lacking hair pencils and a black tuft on the abdomen.

Diagnosis: A little smaller (expanse 34-39mm.) than A. leucomelas (L.) (q.v.), the forewing much darker and less variegated and the black fascia on the hindwing somewhat wider (compare plate figs. 122 and 120).

World distribution: New Guinea, Solomon Is., New Hebrides, Samoa, Tonga, Austral Is..

Fiji distribution:- VITI LEVU: Suva, Vunindawa, Nanggali, Korolevu, Nandarivatu. VANUA LEVU: Savusavu area, Ndelaikoro. TAVEUNI. ROTUMA.

Biology: The larva of this species is recorded as feeding on Ipomoea batatas (L.) in Fiji. See Swain (1971:161).

Remarks: A moderately common species usually associated with secondary vegetation but found in some numbers at Ndelaikoro.

Genus: Anomis Hubner, 1821, Verz. Bekannter Schmett. (16):249(sensu lato - see note below).

Key to Fijian species of Anomis Hubner

- 1a Expanse less than 32mm. 2
- b Expanse greater than 32mm. 3
- 2a Forewing ground-colour yellow or orange-yellow.....flava
- b Forewing ground-colour brown.....vitiensis
- 3a Expanse less than 38mm.: hindwing grey; Forewing rich purple-brown often tinged with yellow figlina
- b If expanse less than 38mm., forewing is brown flecked with black and hindwing is grey suffused with pink at the fringes 4
- 4a Postmedial line straight or slightly concave proximally posterior to the reniform.....5
- b Postmedial line sinuate below the reniform.....6
- 5a Underside of hindwing with a distinct postmedial line in the anterior half of the wing separating a purplish proximal fascia from a yellowish distal fascia.....samoana
- b Forewing brown or red-brown; underside of hindwing flecked with purple-brown anteriorly with no distinct postmedial line..vitiensis
- 6a Postmedial line on forewing running proximally for about 2mm. from the base of the reniform before turning toward the posterior margin, bowing slightly distad after 2mm. then running straight, joining the posterior margin at right angles. Postmedial line on underside of hindwing serrate.....nigritarsis xanthochroa
- b Postmedial line on forewing running toward the posterior margin from the postero-proximal corner of the reniform; postmedial line on underside of hindwing dentate or straight 7
- 7a Hindwing pale pinkish cream proximally, pale purplish grey distad. Postmedial line meeting posterior margin of forewing at about forty-five degrees..... vulpina
- b Hindwing uniformly purplish grey. Postmedial line meets posterior margin of forewing at about eighty degrees..... revocans

Note: I use here the generic name Anomis Hubner in a very wide sense, incorporating the following genera:

Cosmophila Boisduval, 1833, Nouv. Ann. Mus. Hist. nat.(Paris) 2(2):242.

Gonitis Guenee, 1852, Hist. nat. Insectes Lepid. 6:403.

Rusicada Walker, 1857, List Specimens Lepid. Insects Colln. Br. Mus. 13:1006.

Tiridata Walker, 1865, ibidem, 33:870.

The assemblage of species thus produced are apparently closely allied, clearly exhibiting similar superficial facies though preliminary examinations suggest that a number of basic genitalic types are to be found amongst them. This group of species is in need of major revision and the present generic divisions above seem to have little basis in reality and to obscure rather than clarify relationships.

within the group. I adopt the name Anomis Hubner on the suggestion of Mr. W.H.T. Tams who in his 1924 paper (Trans. ent. Soc. Lond., 1924, pp.20-24) expressed doubts about his own adoption of Cosmophila for flava (F.) (q.v.) and referred to the "Anomis group" although he did not define its content.

Anomis figlina Butler

Anomis figlina Butler, 1889, Illust. typical Specimens Lepid. Heterocera Colln Br. Mus. 7:91, pl.81, fig. 7. Type examined.

Male: (Plate fig.111) Head, thorax and legs brownish purple above, cream below, tinted with mauve. Abdomen grey, paler below and tinted with mauve. Forewing brownish purple with a slight orange suffusion, patterned with black and deep purple; sometimes with a postero-medial orange suffusion. Hindwing grey, fringes tipped with lilac-white. Each valve with a single coremata projection at the base; aedeagus with two cornuti at the base of the vesica partially attached to the aedeagus. Anellus without ornamentation.

Female: Similarly patterned to the male.

Diagnosis: Expanse 33-36mm.. Wing pattern entirely diagnostic.

World distribution: India and Ceylon through south east Asia and the East Indies to New Guinea, Solomon Is. and New Hebrides.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O. VANUA LEVU: Savusavu area.

Biology: The larva of this species is described by Gardner (1947) who characterises the larvae of the Anomis group in detail (ibidem: 78). The foodplant is Grewia (Tiliaceae) in India.

Anomis flava (F.)

Noctua flava F., 1775, Syst. ent.:601.

Male: (Plate fig. 112) Head and thorax light brown dusted with orange, cream flecked with pale brown below. Abdomen light buff-brown. Forewing yellow flecked with orange-brown; beyond the medial line suffused with purplish brown, the suffusion extending along the posterior margin to the base; patterned with dark brown and flecked with lilac distally. Hindwing grey-brown, paler proximally. Each valve with a membranous coremata process, a medial sclerotised process and an elongate wide basal process curved inward distally. Anellus scobinate with two sclerotised bars. Aedeagus basally scobinate, apparently with a single elongate cornutus.

Female: Similarly patterned to the male but the forewing not distally suffused with purplish brown but uniformly yellow, patterned with brown and flecked with lilac anteriorly in the postmedial fascia.

Diagnosis: A characteristically-patterned small species (expanse 25-30mm.). The close allies of this species are discussed by Tams (1924).

World distribution: Africa through India and south east Asia, East Indies, New Guinea, Australia, New Zealand (?migrant), Solomon Is., Micronesia (and Guam), New Hebrides, New Caledonia, Norfolk I., Kermadec Is., Samoa, Tonga, Society Is., Marquesas, Rapa, Hawaii (introduced).

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Dombuilevu, Rakiraki, Mba, Nandarivatu, Lautoka. VANUA LEVU: Savusavu area, Governor's Pool, Lambasa, Ndelaikoro. NANANU-I-RA. OVALAU. TAVEUNI. YASAWA. NAUKATHUVU. VIWA. ROTUMA.

Biology: Comstock (1966) describes the early stages of this species. Swezey (1946) gives details of rearing flava on Guam. The larva feeds on the following species of Fijian plant: Hibiscus esculentus L., H. rosa-sinensis L., H. tiliaceus L., Ipomoea batatas (L.), Gossypium spp., Lycopersicum esculentum Mill., Sida rhombifolia L., Vigna sinensis (L.). See also Swain (1971:125,193).

Remarks: A widely distributed species, especially common on dry islands such as Viwa.

Anomis nigritarsis (Walker)

Rusicada nigritarsis Walker, 1857, List Specimens Lepid. Insects Colln Br. Mus. 13:1006. Type examined.

subsp. xanthochroa (Butler)

Gonitis xanthochroa Butler, 1886, Trans. ent. Soc. Lond.:409. Type examined.

Male: (Plate fig. 113) Head and thorax light orange-brown above, cream tinged with purplish pink below. Legs proximo-ventrally the colour of the thorax but darker distally; tarsi black, a white streak extending from the base of the tibia to the end of the first tarsal segment outwardly. Abdomen light grey-brown with a purple tinge, a little paler ventrally. Forewing light orange-brown patterned with dark grey-brown. Orbicular a white point. Hindwing light greyish purple; postmedial line on underside of hindwing dentate. Juxta modified, extending anteriorly, biramous, digitate. Anellus highly modified with scobinate lobe-like projections. Aedeagus with a single sinuate cornutus, the vesica sclerotised basally with two basal protuberances.

Female: Similarly patterned to the male.

Diagnosis: Closely allied to A. revocans (Walker) (q.v.) but generally rather darker in appearance and somewhat larger (expanse 47-52mm. - Fiji, 42-47mm. - Rotuma). The postmedial line runs towards the base of the wing from the postero-proximal corner of the reniform for about 2mm. before turning towards the posterior margin whereas in revocans the line runs directly towards the posterior margin from the postero-proximal corner of the reniform. The aedeagus of revocans has two stout carinae, the juxtal processes are shorter and stouter than in xanthochroa and there is an elongate sclerotised process from the anellus bearing spines at the tip.

World distribution: Ceylon (n. nigritarsis), Molluccas (n. amboinensis), Solomons, New Hebrides, New Caledonia, Samoa, Tonga (n. xanthochroa).

Fiji distribution:- VITI LEVU: Suva Tholoisuva, Nanggali, Korolevu, Rakiraki, Vatukoula, Lautoka, Nandi, Nausori Highlands.

VANUA LEVU: Savusavu area. NANANU-I-RA. OVALAU. TAVEUNI. LAKEMBA. FULANGA. MOTHE. VIWA. ROTUMA.

Biology: Larva recorded as feeding on Hibiscus tiliaceus L. in Fiji.

Remarks: The complex of species closely allied to nigritarsis requires lengthy and extensive revision: the world distribution of nigritarsis and its subspecies can only be guessed at present. In Fiji, this is a fairly common species usually found in areas of secondary vegetation in the lowlands. Specimens from Rotuma are smaller and brighter than typical xanthochroa from Viti and Vanua Levu, but no significant structural differences are apparent between the two races.

Anomis revocans (Walker)

Gonitis revocans Walker, 1858, List Specimens Lepid. Insects Colln Br. Mus. 15:1794. Type examined.

Male: (Plate fig. 115) Head and thorax bright brownish orange above, paler below. Legs light greyish purple, forelegs darker, fore tibia and first fore-tarsal segment white outwardly. Abdomen light purplish grey, a little paler ventrally. Forewing bright brownish orange patterned with purple-brown and grey-brown. Orbicular a white point. Hindwing pale greyish purple, paler basally. Postmedial line on underside of hindwing smoothly curved. Juxta modified, extending anteriorly, biramous, digitate. Anellus highly modified with an elongate digitate projection spined at the tip. Aedeagus with two stout carinae, the base of the vesica sclerotised and with a blunt cornutus, the sclerotisation of which is continuous with that of the vesica.

Female: Similarly patterned to the male.

Diagnosis: Smaller (expanse 40-44mm.) than A. nigratarsis xanthochroa (Butler) (q.v.) from Viti and Vanua Levu though comparable in size with xanthochroa from Rotuma. The male genitalia are significantly different (see diagnosis of xanthochroa) and the postmedial line in the forewing runs toward the posterior margin from the postero-proximal corner of the reniform without the 2mm. proximal 'kink' below the reniform as in xanthochroa (compare plate figs. 113 and 115). Generally brighter in appearance than xanthochroa though xanthochroa from Rotuma are as brightly patterned as Fijian revocans.

World distribution: East Indies, New Guinea, Australia, Solomons, New Caledonia.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nanggali, Dombuilevu, Vatukoula, Nandarivatu, Savura Creek, Nausori Highlands.
VANUA LEVU: Savusavu area. VIWA. ROTUMA.

Biology: Reared from larvae on Hibiscus tiliaceus L. in New Caledonia by Holloway (pers. comm.).

Remarks: A moderately common species associated with secondary vegetation.

Anomis samoana (Butler)

Gonitis samoana Butler, 1886, Trans. ent. Soc. Lond.:407. Type examined.

Male: Head and thorax orange-buff to red-brown, pale buff-cream below. Legs dull purple flecked with lilac, fore tibiae white outwardly. Abdomen pale greyish buff; beneath orange-brown flecked with purple anteriorly. Forewing orange-buff to dull purple-brown patterned with darker shades of brown and flecked with lilac. Hindwing light greyish purple, paler proximally. Male genitalia somewhat unspecialised with coremata at the base of the valves. Aedeagus and anellus unspecialised; vesica with a small hook-like cornutus.

Female: (Plate fig.114) Similarly patterned to the male.

Diagnosis: Expanse 39-45mm.. A very variable species with several striking wing-pattern aberrations. The postmedial line in the forewing of this species is highly diagnostic: anteriorly it curves smoothly from the reniform to the costa; posterior to the reniform it runs straight to the posterior margin. Beneath the hindwing there is a distinct medial line dividing the anterior half of the wing into a proximal purplish fascia and a distal yellow

fascia flecked with purple-brown. In A. vitiensis (Butler) (q.v.) the anterior half of the hindwing underside is flecked uniformly with purple-brown.

World distribution: Samoa.

Fiji distribution: VITI LEVU: Tholoisuva, Nandarivatu, Koro-O, Nausori Highlands. VANUA LEVU: Ndelaikoro.

Remarks: An uncommon species restricted to primary forest and most often encountered in montane habitats. Butler's male type of this species is a dwarf and very faded: the hindwing underside pattern is not well developed. The genitalia, however, precisely match those of specimens from Fiji, described above.

Anomis vitiensis (Butler)

Gonitis vitiensis Butler, 1886, Trans. ent. Soc. Lond.:408.
Type examined.

Male: Head, thorax and legs light chocolate brown, paler beneath. Abdomen pale grey-brown tinged with purple ventrally. Forewing chocolate brown flecked and patterned with black, the postmedial line often edged outwardly with white: shade of ground-colour and pattern rather variable. Hindwing light grey tinged with purplish pink at the fringes; underside of hindwing speckled with purple-brown in the anterior half. Genitalia rather unspecialised; anellus scobinate, vesica scobinate basally.

Female: (Plate fig. 116) Similarly patterned to the male.

Diagnosis: Size very variable in both sexes: expanse 27-45mm..

Shape of postmedial line in forewing similar to that of A. samoana (Butler) (q. v.) but hindwing underside without a conspicuous medial line dividing the anterior half of the hindwing. Closely related to A. sabulifera (Guenée) (Gonitis sabulifera Guenée, 1852, Hist. nat. Insectes Lepid. 6:404, type ♀ from Abyssinia in MNHN, Paris) and allied species. This latter complex requires revision before the differentiating characteristics of the component taxa can be defined.

World distribution: New Guinea, New Hebrides, New Caledonia, Norfolk I., Society Is., Rapa I., Austral Is.. Possibly ranges further westward but revision required to determine this. Migrant to New Zealand.

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Vunindawa, Nandarivatu, Rakiraki, Mba, Lautoka, Korolevu. VANUA LEVU: Savusavu area. NANANU-I-RA: LELEUVIA, YASAWA. NAUKATHUVU. VIWA. MOTHE. ROTUMA.

Biology: The fully-grown larva is 32mm. in length, deep grass-green, ventrally bluish green, the skin rather transparent: tubercles white with black centres, each bearing a short black seta. Spiracles olive-green edged with black, each surrounded by a brownish area. Legs and prolegs deep grass-green, the latter (except on the third abdominal segment) tipped with brown. Head yellow-green, mouthparts orange-brown. Recorded Fijian foodplants are Triumfetta rhomboidea Jacq., Hibiscus tiliaceus L., Urena lobata L..

Remarks: A common species on the dry western islands of the Fiji group, otherwise widespread but uncommon.

Anomis vulpina (Butler)

Gonitis vulpina Butler, 1886, Trans. ent. Soc. Lond.: 408.

Type examined.

Male: (Plate fig. 117) Head, thorax and legs dark red-brown, paler beneath. Fore tibia white outwardly. Abdomen pale grey with pink-tinged elongate hairs laterally. Forewing red-brown with a conspicuous large white orbicular stigma; postmedial line edged with a few white scales distally. Forewing patterned with dark red-brown and grey-brown. Hindwing pale cream tinged pinkish proximally, purplish grey distally. Genital armature simple; anellus scobinate; vesica with sclerotised patches basally; paired coremata lobes at base of valves.

Female: Similarly patterned to the male but head, thorax and forewing paler, orange-brown, the orbicular smaller and not conspicuous.

Diagnosis: Somewhat blunter-winged than other Fijian Anomis species and the males richer-coloured, the orbicular distinctive. Females are reminiscent of A. revocans (Walker) (q.v.) but the postmedial line meets the posterior margin of the forewing at a more acute angle. A large species, expanse 45-50mm..

World distribution: Probably endemic to the Fiji group; material from Ceylon, Burma, Formosa and Java has been allied with vulpina in the BMNH collection. Tams (1935) records vulpina from Samoa but I have not examined this material.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nanggali, Korolevu, Korovou, Nandarivatu, Nausori Highlands.

Biology: Larva recorded as feeding on Hibiscus tiliaceus L., Urena lobata L. and Gossypium barbadense L. in Fiji.

Remarks: An uncommon species, widely distributed on Viti Levu, but most often encountered in lowland primary forest.

Genus: Anticarsia Hubner, 1818, Zutrage Z. exot. Schmett. 1:26.

Anticarsia irrorata (F.)

Noctua irrorata F., 1781, Spec. Ins. 2:506. Type not examined, identity not in doubt.

Male: (Plate fig. 119) Head, thorax, legs and abdomen light grey-brown, the legs tinged with purple proximally, the abdomen paler than the thorax dorsally; ventrally thorax and abdomen of the same shade, a little paler than the abdomen ventrally. Forewing and hindwing pale grey-brown with a distinct narrow red-brown postmedial line; other markings dark grey. Scales of fringes tinged with pink basally.

Female: Similarly patterned to the male but instead of grey-brown the wings and body are yellowish ochre sometimes tinged with pink.

Diagnosis: A common medium-sized (expanse 33-41mm.) species, the wing pattern of which is completely diagnostic.

World distribution: Africa, India, Ceylon, south east Asia, East Indies, New Guinea, Solomons, New Hebrides, New Caledonia, Kermadec Is., Norfolk I., Samoa, Tonga, Society Is., Marquesas (and Rapa I.), Pitcairn I., Guam.

Fiji distribution:- VITI LEVU: Suva, Dombuilevu, Rakiraki, Mba, Vunindawa, Nandarivatu, Lautoka, Nausori Highlands.
VANUA LEVU: Savusavu area, Governor's Pool, Lambasa, Ndelaikoro.
OVALAU. LELEUVIA. YASAWA. VIWA. MBULIA. KOMO. FULANGA. ROTUMA.

Biology: Gardner (1948) describes the larva of this species which feeds on Canavalia ensiformis (L.), Phaseolus calcaratus Roxb. and Saccharum officinarum L. in Fiji.

Remarks: A moderately common species most often encountered in lowland areas with secondary vegetation.

Genus: Arcte Kollar, 1844, Kaschmir und das Reich der Siek 4:477.

Arcte coerula (Guenée)

Cocytodes coerula Guenée, 1852, Hist. nat. Insectes Lepid. 7:41.
Type not examined, identity not in doubt.

Male: (Plate fig. 93) Head, thorax and legs deep purple-brown above. Head, thorax, anterior half of abdomen and legs off-white ventrally. Abdomen blue-grey with a conspicuous strigil on the sixth tergite. Forewing dark brown patterned with blue-black and black and flecked with light blue scales. Hindwing brownish black patterned with pale blue; fringe white at the apex, elongate hairs at the proximal margin.

Female: Similarly patterned to the male but without the strigil and elongate hairs on the hindwing margin.

Diagnosis: A large species (expanse 70-95mm.) of spectacular appearance and one which is immediately recognisable. It is closely allied to Arcte papuensis Warren (Novit. zool. 19:49, 1912) from New Guinea and Ceram in which the blue patterning of the hindwing is reduced in comparison with coerula and the medial fascia of the forewing is partly suffused with white.

World distribution: Ceylon, India, south east Asia, East Indies, New Guinea, New Hebrides, New Caledonia and Loyalty Is., Samoa.

Fiji distribution:- VITI LEVU: Nandarivatu.

Biology: Gardner (1948) describes the larva which feeds on Girardinia and Debregeasia in India. The author found larvae on Espiritu Santo, New Hebrides, on the Apouna R. at 600' defoliating Cypholophus molluccanus (Urticaceae). The larvae are 50-60mm. long, black with red legs and prolegs and anal claspers and orange spiracles, pale orange ventrally. When disturbed the larvae rear up, holding on to the plant with anal claspers and the hindmost two pairs of prolegs and shake themselves violently from side to side. Three or four larvae are able to shake a Cypholophus plant in most eerie fashion.

Remarks: In Fiji coerula is a rare species restricted to montane rain forest on Viti Levu. In the New Hebrides a single male coerula was taken on the coast of Malekula at MV light and larvae were found to be common on Cypholophus at 600' on Espiritu Santo.

Genus: Arsacia Walker, 1865, List Specimens Lepid. Insects Colln. Br. Mus. 34:1259.

Arsacia rectalis (Walker)

Midea rectalis Walker, 1863, List Specimens Lepid. Insects Colln. Br. Mus. 27:21. Type examined.

Male: (Plate fig. 134) Head and thorax orange-brown, ochreous buff below. Abdomen grey-brown above, ochreous buff below. Forewing proximally olive-brown suffused with pink costally; transverse line blue-black. Distal fascia iridescent dull purple flecked with blue-black scales. Hindwing grey-brown.

Female: Similarly patterned to the male.

Diagnosis: Expanse 16-19mm.. One of the smallest Fijian Ophiderinae, much resembling a Eublemma species (q.v.) but with a sinuate posterior margin to the forewing. The general facies and wing pattern are diagnostic.

World distribution: Africa through India and south east Asia to the East Indies, New Guinea and the Solomon Is..

Fiji distribution:- VITI LEVU: Suva, Vunindawa, Lautoka, Mba, Korolevu, Nausori Highlands. VANUA LEVU: Savusavu area.

Remarks: An uncommon species most often found in dry areas with secondary vegetation.

Genus: Attonda Swinhoe, 1919, Ann. Mag. nat. Hist. (9)4:123.

Attonda adspersa (Felder)

Felinia adspersa Felder, 1874, Reise Ost. Fregatte Novara, Zool.2 (Lepid.) 2:pl.117, fig. 23. Type examined.

Male: Palps and top of head dull grey; remainder of head and thorax orange-brown; abdomen orange-brown merging to grey caudally. Body light buff-cream ventrally. Forewings and hindwings orange-brown patterned with deep purple and dark grey. Postmedial line with tiny white spots. Terminal line of small black dots.

Female: (Plate fig.153) Similarly patterned to the male.

Diagnosis: A small species, expanse 30-34mm.. The wing pattern is diagnostic though a little variable; this species has no very close allies.

World distribution: Africa through India and Ceylon, south east Asia, East Indies, New Guinea, Australia, Solomons.

Fiji distribution:- VITI LEVU: Rakiraki, Lautoka, Nausori Highlands.

Remarks: The type of adspersa from the Celebes is larger and brighter than specimens from Fiji and adspersa may be a species complex. Some nine specific names are at present in subjective synonymy with adspersa and critical examination of these types and associated material will be required to clarify the situation when further material becomes available. Like Parallelia hicanora (Turner)(q.v.) this species was moderately common during and at the end of the 1969 drought. It has not been collected in Fiji since then. There are several specimens of adspersa in the SPSM collection, taken by Phillips at Lautoka in the late 1920's.

Genus: Avitta Walker, 1857, List Specimens Lepid. Insects Colln Br. Mus. 15:1674.

Avitta lunifera (Druce)

Toxocampa lunifera Druce, 1888, Proc. Zool. Soc. Lond.:575. Type examined.

Male: Top of head and prothorax brownish black. Remainder of body and legs light grey dorsally and ventrally; ventrally the thorax a

little paler. Forewing light grey patterned with darker shades of grey. Reniform and anterior third of postmedial fascia brownish black. Hindwing dark grey, basally and the fringes paler.

Female: (Plate fig.121) Similarly patterned to the male.

Diagnosis: A medium-sized species, expanse 36-45mm., with a very characteristic wing pattern. Closely related to A. ophiusalis (Walker) (Bocana ophiusalis Walker, 1858, List Specimens Lepid. Insects Colln Br. Mus. 16:173) from Ceylon and south east Asia in which the reniform is represented only by small anterior and posterior black points.

World distribution: ?Ceylon (specimens approaching ophiusalis), south east Asia, East Indies, New Guinea, Solomon Is., New Hebrides, New Caledonia.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O. VANUA LEVU: Ndelaikoro.

Remarks: A rare species restricted to montane rain forest.

Genus: Chrysopera Hampson, 1914, Fauna Br. India Moths 2:xx,493.

Chrysopera combinans (Walker)

Achaea combinans Walker, 1858, List Specimens Lepid. Insects Colln Br. Mus. 14:1399. Type not examined, identity not in doubt.

Male: Head, thorax and legs brownish black above. Antennae bipectinate. Abdomen dark brownish grey; body grey-buff ventrally. Forewing deep brownish black with a bluish sheen; apical mark light brown. Reniform and traces of ante-, postmedial and medial lines black. Hindwing dull brownish black with a bright yellow apical fascia.

Female: (Plate fig.123) Similarly patterned to the male; antennae filiform.

Diagnosis: A medium-sized species (expanse 40-45mm.), somewhat reminiscent of an Avitta species when at rest. The brilliant yellow apical fascia on the hindwing is highly distinctive and this species could not easily be confused with any other.

World distribution: India and Ceylon through south east Asia and the East Indies, New Guinea, Australia, Solomon Is..

Fiji distribution: VITI LEVU: Lautoka (20.i.1929* - Phillips), Nandarivatu (16-20.xii.1968 - Robinson). OVALAU (1.v.1901 - Baxandale). VANUA LEVU: Ndelaikoro (25.ii.1971 - Robinson).

Biology: An inflated larval skin in the Rothschild collection from Queensland is yellow-brown, darker dorsally. Spiracles black with a yellow ring and a peripheral dark brown field. Head and body marked with a network of pale yellow-brown lines, the pattern roughly repeated on each abdominal segment. Length 34mm..

Remarks: An extremely rare species in Fiji - I have only collected it from montane forest. The Phillips specimen from Lautoka is in the SPSM collection and the other three known Fijian specimens are in BMNH.

Genus: Diomea Walker, 1857, List Specimens Lepid. Insects Colln Br. Mus. 13:1079,1109.

Diomea fenella Robinson

Diomea fenella Robinson, 1969, Entomologist's Rec. J. Var. 81:194. Type examined.

Male: (Plate fig. 124) Head, thorax, legs and abdomen deep purple-brown densely flecked with black and lightly with white; legs white at articulations; body a little paler ventrally. Forewings and hindwings deep purple-brown patterned with ochreous cream (or dull red-brown as in the paratype).

Female: (Single specimen provisionally placed here) Similarly patterned to the male but the fore- and hindwings paler giving an overall darkly ochraceous appearance rather than purple-black as in the male.

Diagnosis: Expanse of males 35-39mm.; of the supposed female, 32mm.. A medium-sized dark species with a characteristic wing pattern. Could be confused with Scotocyma miscix Prout (q.v.) but without the well-marked transverse lines in the fore- and hindwing and the hind tarsi with spines. Closely allied to D. rotundata Walker (List Specimens Lepid. Insects Colln Br. Mus. 13:1110, 1857) but without the white postmedial costal mark of rotundata (and see the original description of fenella). Rotundata ranges from India and Ceylon to New Guinea.

Fiji distribution:- VITI LEVU: Suva (Savura Creek), Nandarivatu, Nanggali.

Remarks: An extremely rare species: four males are known, two (holotype and paratype) from Savura Creek, one from Nandarivatu and one from Nanggali. There is a female, apparently of this species, in BMNH labelled 'Fiji' which was purchased with other specimens from the Australasian Region from the Godeffroy Museum in 1887. The terminal segment of the palps are more elongate in this female than in the known male specimens.

Genus: Briceia Walker, 1857, List Specimens Lepid. Insects Colln Br. Mus. 13:1078, 1089.

Briceia leichardtii (Koch)

Villosa leichardtii Koch, 1865, Indo-Austral. Lepid. Fauna: 108, pl.1. Type not examined, identity not in doubt.

Male: (Plate fig. 125) Head, thorax and abdomen light grey-brown, the abdomen a little paler beneath. Legs (with the exception of the tarsi) and underside of thorax clothed with dense, elongate yellow-buff hairs. Forewing grey-brown with a slight purplish tinge, patterned with dark grey: a conspicuous black dot 2mm. from the posterior margin on the antemedial line; a folded 'flap' on the posterior margin of the forewing. Hindwing grey-brown patterned with deep brown and charcoal grey. Aedeagus finely rugose caudally. Vesica medially with an extensive area of fine, short, needle-like spines; terminally with an area of very small, stout thorn-like spines. Expanse 50-55mm..

Female: Larger (expanse 54-57mm.) and lighter coloured than the male and often with a brown subterminal band in the fore- and hindwing with a conspicuous black spot in the postmedial band of the forewing 3mm. from the posterior margin. The wing pattern is somewhat variable.

Diagnosis: Males are easily recognised by their hirsute underside and angled hindwing termen. In E. levuensis Prout (q.v.) the hairs on the legs are less elongate and the hindwing termen is rounded; there is no 'flap' on the posterior margin of the forewing. Females of the two species are sometimes difficult to differentiate; generally speaking, leichardtii females are larger with a distinct black spot on the subterminal line towards the posterior margin of the forewing.

World distribution: Tonga.

Fiji distribution:- VITI LEVU: Suva, Vunindawa, Lautoka, Nandarivatu, Koro-O, summit of Mt Victoria, Nausori Highlands. VANUA LEVU: Savusavu area, Ndelaikoro. OVALAU. TAVEUNI.

Remarks: An uncommon species most often encountered in montane rain forest. Records of this species from Samoa and the Gilbert and Ellice Is. (Tams, 1935) refer to material incorrectly identified. Koch's excellent colour plate leaves no doubt as to the identity of this species but the given type-locality is north Australia which I consider is probably erroneous.

Ericeia levuensis Prout

Ericeia levuensis Prout, 1929, Ann. Mag. nat. Hist.(10)3:597.

Type examined.

Male: (Plate fig. 126) Head, thorax, legs and abdomen buff-brown; on the abdomen and ventrally a little paler. Forewings and hindwings buff-brown flecked with black with a diffuse pattern of grey and purple-brown transverse lines. The pattern is very variable: sometimes it is distinct and black but in some examples there is a bluish white reniform and a subterminal band of bluish white scales on the fore- and hindwing. Aedeagus finely spined caudally: vesica with a tightly compressed group of about twenty small thorn-like cornuti basally, distally with an extensive area of short, fine, needle-like spines.

Female: Similarly patterned to the male and equally as variable; the forewings are a little broader and less apically acute than those of the male; legs not hirsute.

Diagnosis: Generally smaller (expanse 45-52mm.) than E. leichardtii (Koch) (q.v.), the male with the legs only moderately hirsute and lacking the postero-basal black spot and posterior margin 'flap' in the forewing of that species. The female lacks the postero-subterminal black dot of leichardtii and the posterior margin of the forewing is straight whereas in leichardtii it is curved. Closely related to Ericeia pertendens iopolia Fletcher (1957:50, figs. 64, 65) but the subterminal fascia of the male much straighter, not proximally concave posteriorly.

World distribution: New Hebrides, ?New Caledonia, Samoa.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nanggali, Korolevu, Dombuilevu, Rakiraki, Vatukoula, Mba, Nandarivatu, Koro-O, summit of Mt Victoria, Nausori Highlands. VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro. NANANU-I-RA. OVALAU. TAVEUNI. LAKEMBA.

Biology: The larva feeds on Cassia fistula L. in Fiji. Gardner (1947) describes the larva of E. inangulata Guenee, a close relative, which feeds on Mimosa and Dalbergia in India. The adult can be collected at rotting fruit (Phillips, MS).

Remarks: A common and widely distributed species in Fiji with no apparent habitat preference.

Genus: Eudocima Billberg, 1820, Enumeratio Insect. Mus. G.J.
Billberg:85.

Eudocima salaminia (Cramer)

Noctua salaminia Cramer, 1779, Uitlandsche Kapellen 2(15):117, pl.174, fig.A. Type not examined - identity not in doubt.

Male: (Plate fig. 127) Head, forelegs and prothorax grey-brown dorsally. Thorax dorsally light olive-green surrounded laterally and caudally by grey-tipped scales. Underside of thorax light ochre and yellow-buff. Abdomen yellow, light ochre below. Forewing dark iridescent green with a wide lilac-cream costal and terminal fascia, costally and basally this fascia flecked with pale olive-grey and olive-green. A thin red line runs through the postero-distal dark green fascia. Hindwing yellow patterned with black; white dots at the termen.

Female: Similarly patterned to the male.

Diagnosis: A large (expanse 83-95mm.) and beautiful insect reminiscent in both habits and appearance of Othreis spp. (q.v.), the hindwing pattern of salaminia and of O. fullonia (Clerck) (q.v.) being almost identical. The striking forewing pattern of salaminia differentiates it from its allies in Othreis.

World distribution: India through south east Asia and the East Indies to New Guinea and Australia, Solomon Is., New Hebrides, New Caledonia, Samoa, Tonga.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O.

Biology: The early stages of this species are not known but the adult is a renowned fruit-piercer and attacks Citrus spp., Musa nana Lour., Carica papaya L. and Lycopersicum esculentum Mill..

Remarks: A rare species in Fiji, only collected at light in and around Nandarivatu. In the New Hebrides this species was common on the coast of Erromanga at Ipota, feeding on pawpaw (Carica) which had previously been damaged by flying foxes. On Malekula it was again common at the coast at Tisbel, feeding on pawpaw and flying into the store-tent and piercing holes in bananas. Despite these overt signs of its presence I never collected this species at light in the New Hebrides.

Genus: Felinia Quenee, 1852, Hist. nat. Insectes Lepid. 7:322.

Felinia precedens (Walker)

Briarda precedens Walker, 1857, List Specimens Lepid. Insects Colln. Br. Mus. 13:1098. Type examined.

Ansa filipalpis Walker, 1858, ibidem 15:1731. Syn. n. Type examined.

Male: (Plate fig.128) Head, thorax and legs brownish black above, buff-grey beneath. Legs hirsute, fore femora with ochreous yellow fair-fans. Abdomen brownish black, buff-grey beneath. Forewing buff-brown strongly suffused with black antero-distally and with a diffuse irrorate pattern. Hindwing charcoal grey, basally dull buff; fringes pale ochre with a terminal brown mark about 3mm. long.

Female: Similarly patterned to the male but much lighter in colour; head, thorax and abdomen light ochreous dorsally, the abdomen flecked with grey. Forewing light ochreous patterned with purple-brown and black. Hindwing lighter coloured than in the male with two indistinct pale medial lines.

Diagnosis: Expanse 36-44mm.. Closely allied to F. antecedens (Walker) (Briarda antecedens Walker, 1857, ibidem 13:1099) from Singapore and Malaya in which the forewing is more elongate and the abdomen of the male bears lateral tufts of elongate black hairs whereas the abdomen of precedens has ventral tufts of rather shorter ochraceous hairs.

World distribution: Ceylon and India through south east Asia and the East Indies to New Guinea and Australia, Solomon Is., New Hebrides, Samoa.

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Nandarivatu, Nausori Highlands, Rakiraki, Lautoka, Vunindawa.
VANUA LEVU: Governor's Pool. ONGEA.

Remarks: The types of precedens and of filipalpis are a female and a male respectively, both from Ceylon. This species is uncommon though widely distributed: it is most often encountered in forest areas in Fiji.

Genus: Hyperlopha Hampson, 1895, Fauna Brit. India Moths 3:19.

Hyperlopha cristifera (Walker)

Ephyrodes cristifera Walker, 1865, List Specimens Lepid. Insects Colln Br. Mus. 33:1071. Type examined.

Male: Head, thorax and abdomen lilac flecked with red-brown, the abdomen lacking the red-brown flecks anteriorly; ventrally lilac thinly flecked with red-brown. Antennae pectinate. Palps elongate. Forelegs red-brown above with a few lilac flecks, bands of white at articulations. Mid- and hindlegs lilac flecked with red-brown. Forewings lilac patterned with red-brown and charcoal grey. Hindwings lilac patterned with dull red-brown and suffused with grey terminally.

Female: (Plate fig. 129) Similarly patterned to the male but the red-brown patterning much reduced, the forewing appearing greyish lilac and often with a crescentic dull red-brown mark on the subterminal line. Hindwing basally more greyish-lilac than in the male in which the basal area has a thin red-brown suffusion.

Diagnosis: Size very variable: expanse 36-51mm.. Facies distinctive; closest apparent ally is the small (expanse 36-38mm.) H. discontenta (Walker) Thermesia discontenta Walker, 1864, J.Linn. Soc. Lond. Zool. 7:185.) from south east Asia and the East Indies in which the hindwing is darker and the forewing antemedial fascia is infilled posteriorly with dark red-brown or grey-brown.

World distribution: Ceylon and India through south east Asia and the East Indies, New Hebrides, New Caledonia, Samoa.

Fiji distribution:- VITI LEVU: Savura Creek, Nandarivatu, Koro-O, Nausori Highlands. VANUA LEVU: Lambasa, Savusavu area.

Remarks: A rare species most often encountered in primary forest.

Genus: Hypocala Guenee, 1852, Hist. nat. Insectes Lepid. 7:73.

Hypocala australiae Butler

Hypocala australiae Butler, 1892, Ann. Mag. nat. Hist. (6)10:21. Type examined.

Male: (Plate fig.130) Head, thorax and legs mauve-grey, dull buff beneath. Abdomen yellow patterned with black. Forewing medium brown patterned with deep brown and black, grey and cream. Hindwing brownish black patterned with yellow.

Female: Similarly patterned to the male but the forewing pattern very variable, not as variegated as in the male.

Diagnosis: Expanse 45-55mm.. The hindwing pattern is diagnostic. Closely allied to H. deflorata (F.) (Hyblaea deflorata F., 1794, Ent. Syst. 3(2):127) from India, south east Asia and New Guinea but the yellow hindwing markings less extensive and the medial part of the yellow pattern not extending as far towards the anterior margin of the hindwing as in deflorata.

World distribution: Australia, New Hebrides, New Caledonia, Norfolk I., Samoa, Hawaii, New Zealand (migrant).

Fiji distribution:- VITI LEVU: Suva, Nanggali, Rakiraki, Mba, Nandarivatu, Koro-O, summit of Mt Victoria, Vunindawa, Nausori Highlands, Lautoka, Korolevu, VANUA LEVU: Savusavu area, Ndelaikoro. OVALAU. LELEUVIA, VIWA. NAVUTU-I-RA. ONGEA. FULANGA. ROTUMA.

Biology: Zimmerman (1958) describes the larva of this species which feeds on Diospyros and Planchonella in Fiji.

Remarks: This is a very common species in montane forest, often constituting more than 30% of light trap samples from Nandarivatu. It is widespread though uncommon in other localities. At Ndelaikoro on Vanua Levu it is a rather uncommon species with a frequency of only 2%. Zimmerman (1958) considers australiae a synonym of deflorata (see above) but Tams (1935) considers australiae a good species though he points out the reduction of hindwing yellow patterning in specimens of australiae from Samoa in comparison with specimens from Queensland. Hawaiian, Fijian and New Hebridean specimens closely approach Queensland specimens and Holloway (pers. comm.) considers New Caledonian and Norfolk I. material to be australiae.

Genus: Hyospila Guenee, 1852, Hist. nat. Insectes Lepid. 7:358.

Hyospila similis Tams

Hyospila similis Tams, 1935, Insects Samoa 3:226, pl.6, fig.18.
Type examined.

subsp. fijiensis subsp. n.

Male: (Plate fig.118) Head, thorax, legs and abdomen grey-brown tinged with purplish, forelegs banded with buff and black. Forewing grey-brown patterned with dull buff, black and dark brown, the hindwing similar. There is often a little orange-brown suffusion in the forewing postmedially. Hindwing basally with a hyaline scale-less 'bubble' reminiscent of that in the forewing of Amyna natalis (Walker) (q.v.). Pattern somewhat variable; fore- and hindwings often with dense black medial markings. Valve with a large process arising basicaudally, directed caudally then ventrally (text fig. 86).

Female: Similarly patterned to the male but the forewing with a rather even dull purple-brown pattern, without the irrorations and paler markings of the male. As in the male the postmedial line is distinct in the forewing and hindwing.

Diagnosis: Very similarly patterned to H. similis similis Tams from Samoa but the large basicaudal process on the male valve is wider distally in fijiensis than in similis and the tip of the process is markedly bilobed - there is only a slight terminal concavity in the ventral margin of the process in similis. In Hyospila similis tamsi Viette comb. n. (Hyospila tamsi Viette, 1951, Ann. Soc. ent. Fr. 118:43, figs. 30, 31 and 33) the caudal margin of the basidorsal valve process is deeply concave and the process is thus more slender terminally than in similis or fijiensis. Expanse 35-40mm..

World distribution: New Hebrides (H. s. tamsi), Samoa (H. s. similis).
New Caledonia (unplaced subspecifically).

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nanggali, Mba, Dombuilevu, Vatukoula, Nandarivatu, Koro-O, Rakiraki, Lautoka, Korolevu, Vunindawa. VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro. NANANU-I-RA. OVALAU. LELEUVIA. YASAWA. NAUKATHUVU. VIWA. MOTHE. ROTUMA.

Holotype: ♂, FIJI, (Viti Levu), May 1966, H.S. Robinson, BMNGSN 7175.

Paratypes: ♂, as holotype but July 1966.

♂, FIJI, (Viti Levu), Suva, vi.1968, H.S. & G.S. Robinson.

♀, as holotype.

♀, FIJI, (Viti Levu), 1966/7, H.S. Robinson.

♀, FIJI, (Viti Levu), Suva, 28.xii.1970, H.S. & G.S. Robinson.

♀, FIJI, (Viti Levu), Nanggali, 8.xii.1970, H.S. & G.S. Robinson.

Remarks: This is a common and widely distributed species in Fiji, it is never exceptionally numerous but often comprises up to 3% of light trap catches at Nandarivatu.

Genus: Lacera Guenee, 1852, Hist. nat. Insectes Lepid. 7:336.

Lacera alope (Cramer)

Phalaena alope Cramer, 1780, Uitlandsche Kapellen 3(24):168, pl.286, figs.E, F. Type not examined, identity not in doubt.

Male: (Plate fig. 131) Head, thorax, abdomen and legs dull grey-brown, fore tibiae and palps tinged with red-brown. Fore- and hindwings dark grey-brown and black patterned with dull brown and ochreous cream. The hindwing is sometimes tinged with blue in the terminal fascia.

Female: Similarly patterned to the male but often even more sombrely coloured with no traces of ochreous cream in the fore- and hindwing pattern.

Diagnosis: A large species (expanse 48-54mm.) with a very characteristic cryptic pattern and characteristic wing shape. It is not easily confused with any other species.

World distribution: India and Ceylon through south east Asia and the East Indies to New Guinea, Solomons, New Hebrides, New Caledonia, Micronesia and Guam, Samoa and Tonga.

Fiji distribution:- VITI LEVU: Suva, Rakiraki, Nandarivatu, Nausori Highlands. VANUA LEVU: Savusavu area. NANANU-I-RA. OVALAU. LELEUVIA. NAVUTU-I-RA. VIWA.

Biology: Gardner (1947) describes the larva of this species which feeds on Caesalpinia in India. Caesalpinia sepiaria Roxb., one of the Indian foodplants, also occurs in Fiji.

Remarks: An uncommon species, only encountered in moderate numbers on limestone islands such as Leleuvia and Viwa.

Genus: Leptotroga Hampson, 1926, Descriptions new Genera Species Noctuinae Colln Br. Mus. :596.

Leptotroga armstrongi Tams

Leptotroga armstrongi Tams, 1935, Insects Samoa 3:228. pl.8. figs. 8, 9. Type examined.

Male: Head, thorax, legs and abdomen brownish purple above; abdomen and legs ochreous buff below. Meso- and metathorax cream dorsally if forewing costal fascia cream as in plate fig. 132 else brownish purple. Forewings and hindwings orange-brown patterned with cream and blackish brown; sometimes dull brown with the pattern reduced as in Tams' plate 8, fig. 9.

Female: (Plate fig.132) Similarly patterned to the male.

Diagnosis: Expanse 33-39mm.. A characteristically patterned species; the pale costal fascia, present in five out of eight Fijian specimens examined, is a useful character in recognition as are the narrow pale subterminal line and large, thickly scaled, obtecal palps.

World distribution: Samoa, ?New Caledonia (Holloway - pers. comm.).

Fiji distribution:- VITI LEVU: Nausori Highlands, Koro-O, Vunindawa.
VANUA LEVU: Ndelaikoro. ROTUMA.

Remarks: On Viti and Vanua Levu this species is restricted to primary montane rain forest which also seems to be its habitat in Samoa. The occurrence of this species on the coast of Rotuma at Noatau is thus very surprising. It is a very rare species.

Genus: Mecodina Guenee, 1852, Hist. nat. Insectes Lepid. 7:372.

Mecodina variata Robinson

Mecodina variata Robinson, 1969, Entomologist's Rec. J. Var. 81:194.
Type examined.

Male: (Plate fig. 133) Palps, head and prothorax deep red brown; meso- and metathorax and abdomen dull purple-brown. Legs blackish brown above but fore tibiae and tarsi reddish ochreous above. Fore- and hindwings purple-brown patterned with black and ochreous cream. Colour very variable: antemedial cream fascia of illustrated specimen not always present; wing ground-colour varies from light russet brown to deep brownish black.

Female: Similarly patterned to and as variable as the male in colouring. In one exceptionally dark example the pattern is almost obsolete.

Diagnosis: Expanse 40-46mm.. Antennae elongate, bipectinate in both sexes, extending in the male seven eighths the length of the costa, in the female three quarters. Wing shape, pattern, and elongate antennae differentiate this species from all other Fijian Ophiderinae. The closest apparent ally of this species is Mecodina striata Hampson (Descriptions new Genera Species Noctuinae Colln Br. Mus.:492, 1926) in which the forewing apex is right-angled and the postmedial line is approximately parallel to the termen.

Fiji distribution:- VITI LEVU: Tholoisuva, Nanggali, Nandarivatu.
VANUA LEVU: Savusavu area, Ndelaikoro.

Remarks: A rare species restricted to primary forest.

Genus: Nagia Walker, 1858, List Specimens Lepid. Insects Colln Br. Mus. 15:1739.

Nagia sp. near homotima Tams

Nagia homotima Tams, 1935, Insects Samoa 3:220, pl.8, fig.3. Type examined.

Male: (Plate fig. 150) Head, thorax and legs brownish black flecked with white, the thorax tinged with red-brown above, legs banded with white at the tarsal articulations. Underside of thorax densely irrorated with white. Abdomen jet-black with a bluish sheen. Forewing grey patterned with black, warm brown and white, the pattern almost obliterated with wear. Hindwing jet-black with a slight bluish sheen, patterned with white. Valves much modified, each with a laterocaudal corematal process and caudal digitate processes at the dorsal and ventral apices: arising medially at two thirds a caudally-directed digitate process - on the right valve only this process bears a dorsally-directed basal lobe. Juxta produced caudally, bifurcate (text fig. 92). Aedeagus with a globular vesica bearing two scobinate lobes.

Diagnosis: The hindwing pattern is an instant diagnostic feature separating this from all other Fijian Noctuidae. Expanse 59mm..

World distribution: (homotima) Samoa.

Fiji distribution:- A singleton male only: VANUA LEVU, Ndelaikoro VHF Sta., 940m., 24-25.ii.1971, G.S. Robinson. BMNGSN 7227.

Remarks: This specimen possibly represents a male of homotima; Tams' holotype and paratype are female and the white markings in the hindwing of the Fiji male are more extensive than in these specimens.

Genus: Neogabara Wileman & West, 1929, Novit. zool. 35:25.

Neogabara plagiola Wileman & West

Neogabara plagiola Wileman & West, 1929, Novit. zool. 35:25. Type examined.

Male: (Plate fig. 348) Head, thorax, legs and abdomen dull ochreous buff, paler beneath. Forewings dull buff-brown with a bluish sheen, flecked with grey and suffused with orange-red in the postmedial fascia. Orbicular and two basal dots small and black surrounded by crimson scales. Erratic and indistinct postmedial line composed of black crescentic dots edged distally with white and proximally with a few crimson scales. Hindwing pale dull greyish buff; fringe intermittently white.

Female: (Plate fig. 135) Larger than the male with a distinct reniform - a black point - and smoothly curved ante- and postmedial lines in the forewing which is dull buff-brown flecked with grey. Basal and postmedial fascia often suffused with blue-black (as in the illustrated specimen) in which case the meso- and metathorax are blue-black dorsally: otherwise colouration as in the male. Hindwing ochreous cream anteriorly: fringes white or off-white.

Diagnosis: Male expanse 18-21mm., females 25-32mm.. Females have highly characteristic facies and are not easily confused with any other species. Males lack any striking characteristics but are quite distinct from any other species inhabiting the Pacific region: the palpi are porrected and appear conical when viewed from the side.

World distribution: South east Asia, East Indies, New Guinea, Solomon Is..

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nanggali, Dombuilevu, Vatukoula, Mba, Vunindawa, Lautoka, Nandarivatu, Koro-O, Nausori Highlands, Korolevu. VANUA LEVU: Savusavu area, Governor's Pool, Lambasa, Ndelaikoro. OVALAU. NAVUTU-I-RA. YASAWA.

Remarks: A common species associated with both dry and wet secondary vegetation. Males are rare and do not appear to have been collected from any locality other than Fiji.

Genus: Othreis Hubner, 1823, Verz. bekannter Schmett. (17):264.

Othreis fullonia (Clerck)

Phalaena fullonia Clerck, 1764, Icones Insectorum Rariorum 2:pl.48.
Type not examined, identity not in doubt.

Male: Head and thorax purple-brown above, pale olive-buff below. Legs dull olive-buff above, paler beneath. Abdomen dull orange-yellow dorsally, pale olive-buff ventrally. Forewings olive-brown to dull red-brown often flecked with dull green; straight antemedial line usually conspicuous; oblique line from apex to one half of the posterior margin. Hindwing deep orange-yellow patterned with black; cream marginal marks at the termen.

Female: (Plate fig.136) Similarly patterned to the male but the forewing more variegated, sometimes yellowish; transverse antemedial line concave distally and oblique line from the apex broken up and sinuate.

Diagnosis: A large species, expanse 80-110mm., larger than O. paulii Robinson (q.v.) and the forewings apically more acute. Male paulii do not have an oblique line running from the forewing apex and the antemedial line is sharply curved proximally posteriorly. Female paulii lack the large triangular reniform of female fullonia and have a much more speckled pattern. The medial mark in the hindwing of fullonia is a crescent, not a circle as in O. materna (L.)(q.v.).

World distribution: Africa through India and south east Asia to the East Indies, New Guinea, Australia, Solomon Is., New Hebrides, New Caledonia, Wallis and Futuna Is., Loyalty Is., Micronesia (and Guam), Samoa, Society Is., New Zealand (migrant only).

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Vunindawa, Rakiraki, Nandarivatu, Nausori Highlands. VANUA LEVU: Savusavu area, Governor's Pool. OVALAU. ONO (Kandavu). ONGEA.

Biology: The larva is described by Gardner (1941 and 1947), Comstock (1966) and several other authors (see Gardner, 1947). Comstock is one of the few who describe the 'pale' or green form of the larva as well as the dark form. Unfortunately, neither of his illustrations is particularly accurate: the green form larva is a pale bright bluish green and the 'eye' on the second abdominal segment has a bright blue centre making it far more striking than Comstock's figure suggests: the spiracles are bright crimson. The dark phase larva is much brighter than in Comstock's illustration: the 'eyes' are yellow and red and the body is flecked and streaked with yellow to form a lateral line: the spiracles are surrounded by an orange-red field: the dorsocaudal protuberance is red with yellow streaks directed ventrally and obliquely below it. The larva feeds on Erythrina fusca Lour., E. lithosperma Blume and E. variegata L. in the Pacific area. Erythrina is an introduction in southern Melanesia and Cochereau believes (pers. comm.) Stephania forsteri to be the 'natural' foodplant in New Caledonia. The adult pierces fruit and is recorded as attacking Carica papaya L., Psidium guajava L., Citrus spp., Mangifera indica L., Lycopersicum esculentum Mill., Musa balbisiana Colla and M. nana Lour.. The fruit-piercing moths of the Pacific (E. salaminia (Cramer), O. fullonia (Clerck) and O. materna (L.)) were discussed by Viette (1949f). These should not be confused with fruit-feeding species which may be found on damaged or fallen fruit and

rely on the flesh of the fruit being exposed before they may feed. In the New Hebrides I frequently made collections of fruit-feeders from pawpaws which had been damaged by flying foxes. These fruit-feeders include Anua coronata (F.), A tongaensis Hampson, Anomis nigritarsis (Walker), A. flava (F.), Thyas miniacea (Felder), Parallelia vitiensis (Butler), Ericeia spp. and Serrododes spp.. In the New Hebrides Phyllodes imperialis Druce feeds on damaged pawpaw. See also Swain (1971:56).

Remarks: An uncommon but widespread species, fullonia rarely appears in forest areas. It can be more easily collected at fruit than at light.

Othreis materna (L.)

Noctua materna Linnaeus, 1758, Syst. nat. (edn 12):840. Type not examined, identity not in doubt.

A male of this species was collected by R.H. Phillips at Lautoka (Viti Levu) on 5.ix.1927. The specimen is now in BMNH having been donated from the SPSM collection in 1969.

The facies of this species are similar to those of O. fullonia (Clerck) (q.v.) but the marginal black band in the hindwing is narrower and extends further towards the anal angle. There is a medial black dot in the hindwing instead of a crescentic mark. The forewing has a cream medial fascia speckled with the forewing ground colour which may be green or brown.

Lever (1941) mentions that "...O. materna...attacks mango fruits on the northern side of Viti Levu.". In my opinion, materna is not a resident species in Fiji. The only other known "Fijian" specimen is an unlabelled individual in colln KRS. Lever's record may be perfectly genuine but I cannot help but wonder whether his "materna" are either E. salaminia (Cramer) or O. paulii Robinson. However, both these species are montane in Fiji. Lever's record is repeated by Viette (1949f).

Materna ranges from Africa through India and south east Asia to the East Indies, Solomon Is., New Caledonia and Norfolk I. It is a fruit-piercer and Moore (Trans. zool. Soc. Lond. 11, 1881) illustrates the larva. The larval foodplants in the Pacific region are unknown.

Othreis paulii Robinson

Othreis paulii Robinson, 1968, Entomologist's Rec. J. Var. 80:251, pl.14. Type examined.

Male: Head, thorax and legs purple-brown above, dull yellow-buff below. Abdomen yellow. Forewings rich dark brown with a greenish tinge; faded specimens become greenish brown. Reniform a white dot; ante- and postmedial transverse lines dark purple-brown edged inwardly with a few lilac scales. Hindwing yellow patterned with black.

Female: (Plate fig. 137) Similarly patterned to the male but the forewing with an olive, brown and lilac mottled pattern.

Diagnosis: Expanse 68-80mm.; smaller than O. fullonia (Clerck) (q.v.), the forewings more square and the crescentic black mark in the hindwing wider and less elongate (compare plate fig.137 with 136). The male genitalia of the two species differ in that the juxta of fullonia is elongate, about 4mm. in length, and in paulii it is only 1mm. in length. In fullonia the vesica carries an elongate line of several hundred fine needle-like cornuti: in paulii the vesica is basally sclerotised and scobinate with twelve cornuti of varying sizes.

Fiji distribution:- VITI LEVU: Tholoisuva, Nandarivatu, Koro-O, summit of Mt Victoria, Nausori Highlands. VANUA LEVU: Ndelaikoro.

Remarks: An uncommon species restricted to primary forest on Viti and Vanua Levu and usually only found in montane forest: the Tholoisuva record is based on a singleton male.

Genus: Oxyodes Guenee, 1852, Hist. nat. Insectes Lepid. 7:128.

Oxyodes scrobiculata (F.)

Noctua scrobiculata Fabricius, 1775, Syst. ent. :592, Type not examined, identity not in doubt.

subsp. tanymekes Tams

Oxyodes ochreata tanymekes Tams, 1935, Insects Samoa 3:229, pl.9, fig.8. Type examined.

Male: (Plate fig. 138) Head, thorax, legs and abdomen dull grey-buff, the thorax clothed with elongate greyish white hairs beneath. Forewings dull greyish buff tinged with yellow and patterned with grey-brown. Hindwings yellow marked with black anteriorly and dull brown postmedially.

Female: Similarly patterned to the male.

Diagnosis: Expanse 47-56mm.. Characterised by the female eighth sternite which bears a pair of more elongate caudal processes than the eighth sternite of other races of scrobiculata. The wing pattern of this species is highly distinctive.

World distribution: India (O.s. scrobiculata), New Guinea, (O.s. ochreata Rothschild stat. rev.), New Hebrides (Oxyodes scrobiculata novaehebridensis Viette comb. n. (Oxyodes ochreata novaehebridensis Viette, 1951a:48, figs. 35, 37)), New Caledonia (O.s. novaehebridensis), Samoa (Oxyodes scrobiculata samoana Tams comb. n. (Oxyodes ochreata samoana Tams, 1935, Insects Samoa 3:229, pl.9, figs.4,6)).

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nanggali, Korolevu, Dombuilevu, Mba, Nandarivatu, Koro-O, summit of Mt Victoria, Vunindawa, Rakiraki, Lautoka, Nausori Highlands. VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro. TAVEUNI.

Remarks: After discussion with Mr. W.H.T. Tams I have adopted the name scrobiculata for all Oxyodes taxa represented in the Indo-Australian region: progressive development of the genitalia from India to Samoa suggests no more than a pattern of progressive subspeciation. There seems to be no valid reason for the adoption of ochreata Rothschild as a specific name for the Melanesian races. The name Oxyodes ochreata risbeci Viette (Bull. Soc. ent. Fr. 56:16) is a nomen nudum. This is a moderately common and widely distributed species in Fiji.

subsp. samoana Tams

See above.

Distinguished from tanymekes Tams (q.v.) in that the caudal processes of the female eighth sternite are less elongate and wider basally than in that race.

World distribution: Samoa.

Fiji distribution:- ROTUMA.

Genus: Pantylidia Guenee, 1852, Hist. nat. Insectes Lepid. 6:436.

Pantylidia metaspila (Walker)

Toxocampa metaspila Walker, 1857, List Specimens Lepid. Insects Colln Br. Mus. 13:1032. Type examined.

Hypaetra sordida Butler, 1886, Trans. ent. Soc. Lond.:414. Type examined.

Male: (Plate fig.152) Head, thorax, legs and abdomen light greyish brown; prothorax brownish black dorsally. Forewing pale dull grey-brown, sometimes tinged reddish, flecked with grey-brown; postmedial line cream, edged with reddish brown. Orbicular a white point; conspicuous postero-basal black mark. Hindwing buff-grey, fringes buff; medial fascia grey-buff.

Female: Similarly patterned to the male.

Diagnosis: Expanse 39-43mm.. A distinctively-patterned species. The postero-basal black mark in the forewing is diagnostic.

World distribution: India through south east Asia and the East Indies to New Guinea, Australia, Solomon Is., New Hebrides, New Caledonia.

Fiji distribution:- VANUA LEVU: Savusavu. LELEUVIA. VIWA. ONGEA. ROTUMA.

Biology: A larva, collected from Vigna marina (Burm.) on Rotuma, pupated before it could be photographed. Its facies resembled a Plusia larva, pale russet brown faintly mottled with white laterally.

Remarks: An uncommon, local species which seems to be restricted to limestone and coral sand areas. Butler's type of sordida is from the "Vi'i Islands".

Genus: Parilyrgis Bethune-Baker, 1908, Novit. zool. 15:204.

Parilyrgis concolor Bethune-Baker

Parilyrgis concolor Bethune-Baker, 1908, Novit. zool. 15:205. Type examined.

Male: (Plate fig. 154) Head, thorax and abdomen buff-cream. Palps elongate, obtect, terminal segment tufted with elongate scales. Antennae unipectinate to one quarter then bipectinate. Fore tibia tufted with elongate scales and with a deep grooved hollow inwardly. Forewings buff-cream, transverse lines white. Hindwing white dusted with buff-cream, transverse lines buff-cream. Uncus laterally compressed, elongate, triangular. Sacculus produced with a thorn-like process at one half. Vesica with a large group of minute thorn-like cornuti, scobinate basally.

Female: Similarly patterned to the male, antennae filiform.

Diagnosis: Expanse 21, 23mm.. A small species characterised by its curious palps and antennae. Differs from other Parilyrgis species in that the terminal segment of the palps is elongate and tufted; the genitalia are distinctive.

World distribution: New Guinea (male type only).

Fiji distribution:- VANUA LEVU: Savusavu area.

Remarks: Only known from Fiji from a male and a female taken at Savusavu (Namale Estate) on 24-28.xii.1969 and 7.ii.1971 respectively. The type of concolor is damaged but I am fairly certain as to the correct placement of these two specimens.

Footnote: A further series of ten specimens of this species was collected from Matanikavika Estate, about fifteen kilometres east of Savusavu, in December 1972.

Genus: Plusiodonta Guenee, 1852, Hist. nat. Insectes Lepid. 6:359.

Plusiodonta dimorpha sp. n.

Male: (Plate fig. 139) Head, thorax and legs deep purple-brown, hind-legs cream inwardly. Abdomen pale grey-buff. Forewing deep purple-brown with flecks of copper or gold antero-basally and subterminally; ill-defined striate pattern of blackish purple transverse lines. Hindwing cream basally, suffused with grey distally. Valve expanded caudally; sacculus produced into a stubby dorso-caudally directed clasper at one half and a hooked caudally-directed process at three quarters. The sacculus continues to the tip of the valve where it terminates in a small depression bearing two dorsally directed lobes at the rim (text fig. 87). Aedeagus 3mm. in length; vesica with a small group of minute needle-like cornuti.

Female: (Plate fig. 140) Head and thorax chocolate-brown dusted with orange. Legs purple-brown, hindlegs cream inwardly. Abdomen pale grey-buff. Forewing chocolate brown patterned with gold and coppery brown; medial line purple-brown. Hindwing cream basally, suffused with grey distally.

Diagnosis: A medium-sized species (expanse 36-41mm.) with diagnostic wing pattern and wing shape. The closest apparent ally of this species is Plusiodonta auripicta Moore (Descriptions new Indian Lepid. Insects Colln Atkinson: 150, 1882) from India. The gold patterning of dimorpha females is much reduced in comparison with auripicta and male dimorpha exhibit almost complete loss of the complex gold and copper pattern characteristic of both sexes of other members of the genus.

Fiji distribution:- VITI LEVU: Tholoisuva, Nanggali, Nandarivatu, Koro-O, Nausori Highlands. VANUA LEVU: Savusavu area, Ndelaikoro.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 16-20.xii.1968, H.S. & G.S. Robinson, BMNGSN 7204.

Paratypes: 6♂♂, 5♀♀, data as holotype. BMNGSN 7205 ♀.

Remarks: An uncommon species associated with primary forest: relatively more common in montane forest.

Genus: Polydesma Boisduval, 1833, Nouv. Ann. Mus. Hist. nat. (Paris) 2 (2):256.

Polydesma boarmoides Guenee

Polydesma boarmoides Guenee, 1852, Hist. nat. Insectes Lepid. 6:441. Type examined.

Male: Head, thorax, legs and abdomen buff-cream, heavily flecked with grey dorsally. Legs clothed distally with elongate buff-cream hairs; fore tibia with a distal tuft of elongate black hairs. Fore- and hindwing ground-colour buff-cream almost completely obscured by grey patterning; black patterning at the forewing costa.

Female: (Plate fig.141) Similarly patterned to the male, legs not hirsute.

Diagnosis: Expanse 37-46mm.. A dull, grey insect with an irrorate pattern on fore- and hindwings. It is not easily confused with any other Fijian species.

World distribution: India through south east Asia and the East Indies, Australia, Micronesia (Guam), New Hebrides, New Caledonia, Society Is., Hawaii.

Fiji distribution:- VITI LEVU: Suva, Vunindawa, Dombuilevu, Lautoka, Nausori Highlands, Nandarivatu, Koro-O, VANUA LEVU: Savusavu. TAVEUNI.

Biology: Larva described by Gardner (1948) as P. umbricola Boisduval; recorded Fijian foodplants are Albizzia lebbek (L.) and Pithecellobium saman (Jacq.).

Remarks: A widespread species rarely taken at light, boarmoides may often be found hiding in rock crevices. It is quite common in the raised reef limestone on the south coast of Vanua Levu, east of Savusavu, where the limestone has been undercut by the sea.

Genus: Rhesala Walker, 1858, List Specimens Lepid. Insects Colln Br. Mus. 15:1776.

Rhesala albizziae Prout

Rhesala albizziae Prout, 1929, Ann. Mag. nat. Hist. (10)3:598.
Type examined.

Male: (Plate fig. 142) Head, thorax, legs and abdomen light brownish grey, sometimes with an ochreous tinge. Forewings light brownish grey with a black medial band and ill-defined pale basal and sub-terminal lines. Hindwing a little paler than the forewing with pale cream medial and postmedial lines edged proximally with dark grey. The postmedial line is only apparent at the anal angle. Second morph: rather more dull than the first with the dark medial band absent in the forewing; reniform and orbicular outlined in pale buff; basal and postmedial lines pale buff. Hindwing with not as much dark grey scaling on the proximal edges of the medial and postmedial lines as in the first morph.

Female: Similarly patterned to the male, with two morphs, one with and without the black medial band in the forewing.

Diagnosis: Expanse 18-22mm.. A small dull species which is exceptionally common in talasinga areas. Specimens of the banded form are easily recognised but unbanded specimens are easily confused with Progonia micrastis Meyrick (q.v.). The hindwing of micrastis, however, is pale and without the conspicuous dark shading proximal to the medial and postmedial lines in the anal angle; the reniform is black whereas in albizziae it is a pale buff circle. The palps of micrastis are elongate and curved upwards; in albizziae they are short and do not, as in micrastis, curve upward and over the top of the head.

World distribution: New Hebrides, New Caledonia.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Korolevu, Dombuilevu, Rakiraki, Vatukoula, Mba, Lautoka, Nausori Highlands, Vunindawa, Nandarivatu, Koro-O, summit of Mt Victoria, Nandi. VANUA LEVU: Savusavu area, Governor's Pool, Lambasa. NANANU-I-RA. YASAWA. VIWA.

Biology: The larva feeds on Albizia lebbek (L.) and Albizia procera (Roxb.) in Fiji.

Remarks: This is an exceptionally widely distributed species and an exceptionally common one in areas of dry grassland: it may constitute 30% of a light trap sample at Vatukoula or Mba.

Genus: Rivula Guenee in Duponchel, 1845, Cat. meth. Lepid. Eur. (2):206.

Rivula dipterygosoma Tams

Rivula dipterygosoma Tams, 1935, Insects Samoa 3:223, pl.6, fig.13, p.1.7, fig.7, pl.12, fig.1. Type examined.

Male: (Plate fig. 143) Head, thorax, legs and abdomen light creamy buff; abdomen ventrally with a pair of minute tufts of black hairs at two thirds; mid tibia with elongate buff hairs; hind tibia with a scale-less black patch inwardly. Forewing light buff patterned with dark brown dots. Hindwing silky white flecked with light brown scales; fringe tinged with sepia.

Female: (Plate fig.146) Head and thorax similarly patterned to the male but abdomen without black ventral scale-tufts. Forewing warm sepia patterned with dull brown. Hindwing light grey-brown.

Diagnosis: Expanse 18-21mm.. Males characterised by the two ventral abdominal black hair tufts; female wing pattern diagnostic. Differs from R. maxwelli sp. n. (q.v.) in that the hindwing is lighter coloured than in maxwelli and the reniform is apparent only as a small black dot in the male, occasionally represented by a minute black point in the female: in maxwelli the reniform is a large diffuse black spot about 1mm. in diameter. The uncus of dipterygosoma is slender: in maxwelli it is spatulate.

World distribution: New Hebrides, Samoa.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nanggali, Nausori Highlands, Nandarivatu, Koro-O. VANUA LEVU: Savusavu area.

Remarks: An uncommon species most usually found in wet lowland localities.

Rivula maxwelli sp. n.

Male: (Plate fig. 349) Head, thorax and abdomen rich buff above, paler beneath; thorax dorsocaudally with a patch of purple-brown scales. Abdomen with elongate black hairs and bulbous, digitate, elongate scales in a pair of pouches on the sixth sternite; this feature is seen externally as a pair of protruding black scale-tufts. Abdomen also with a dorsocaudal streak of black scales. Legs light buff; hind tibia with a black scale-less spot inwardly; midlegs much elongated, mid tibia with a tuft of elongate black hairs inwardly. Forewing rich buff patterned with dark brown; reniform black. Hindwing suffused with light grey-brown, paler anteriorly.

Female: Similarly patterned to the male but the hindwing dark grey: abdomen flecked with grey-brown. Legs unmarked and, like the abdomen, without hair tufts.

Diagnosis: Expanse 22-23mm.. Larger than R. dipterygosoma Tams (q.v.), the reniform larger and more distinctive, the hindwing darker, the mid- and hindlegs with darker markings or hair tufts. Uncus spatulate, not slender. Male abdomen with dorsocaudal dark streak.

Fiji distribution:- Type localities.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 12-14.ix.1969, H.S. & G.S. Robinson, BMNGSN 7214.

Paratypes: ♀, data as holotype.

♂, FIJI, (Viti Levu), Nausori Highlands, Site 2 - 2000', 16-20.xii.19669, G.S. Robinson.

Remarks: An extremely rare species apparently restricted to montane rain forest.

Rivula polynesiana Hampson

Rivula polynesiana Hampson, 1926, Descr. new Genera Species Noctuidae Colln Br. Mus.:256. Female type examined: lack of topotypical males makes placement uncertain.

Male: (Plate fig.145) Head, thorax, legs and abdomen pale buff. Palps densely scaled, appearing square-ended. Forewing pale buff with a large conspicuous black reniform. Hindwing deep yellow suffused with grey-brown distally. Genitalia very small; valves ovate, simple, with bulbous expanded scales and elongate hairs forming a corema on the dorsal surface. Aedeagus short; vesica with an extensive scobinate area and a large zone of small thorn-like cornuti.

Female: Similarly patterned to but much darker and more dull than the male; body and forewings dull buff-brown, reniform black, conspicuous. Hindwing uniformly grey-brown.

Diagnosis: A very small species, expanse 13-17mm.. Smaller than other Fijian *Rivula* species and with a characteristic wing pattern. Mid-legs not hirsute. The specialised scales on the male genitalia are diagnostic as is the form of the palps (see Tams, 1935, pl.18, fig.10).

World distribution: Tonga, (?)Samoa (see Tams, 1935:225).

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nanggali. VANUA LEVU: Savusavu area, Governor's Pool. ROTUMA.

Remarks: A moderately common species in lowland rain forest and areas of disturbed forest. Males are much more commonly collected at MV light than are females: of thirty five specimens collected from Fiji, only three are female. Specimens from Rotuma are slightly smaller and rather brighter than Fijian specimens: only males are known from Rotuma.

Genus: Sericia Guenee, 1852, Hist. nat. Insectes Lepid. 7:171.

Sericia mutabilis (F.)

Noctua mutabilis Fabricius, 1794, Syst. ent. 3(2):12. Type not examined, identity not in doubt.

Male: Head, thorax and abdomen deep blue-black. Underside of body and legs brownish black. Fore- and hindwings blue-black marked with deep bluish black with a purplish blue iridescent sheen in fresh specimens.

Female: (Plate fig.147) Similarly patterned to the male.

Diagnosis: A large and conspicuous species, expanse 59-64mm.. Wing pattern and facies are diagnostic and this species differs from S. strigiformis sp. n. (q.v.) and S. obalauae B.-B. (q.v.) in that it lacks a conspicuous blue 'eye' in the forewing.

World distribution: India through south east Asia and the East Indies, Australia, Solomon Is., New Hebrides, New Caledonia, Tonga.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, summit of Mt Victoria, Nausori Highlands. VANUA LEVU: Ndelaikoro.

Remarks: An uncommon species restricted to montane rain forest in Fiji.

Sericia obalauae Bethune-Baker

Sericia obalauae Bethune-Baker, 1915, Ann. Mag. nat. Hist. (8)16:198.
Type examined.

Male: (Plate fig. 149) Head, thorax and abdomen deep purple-brown; body and legs dark brown below. Fore- and hindwings deep grey-brown patterned with blue-black with a bluish purple sheen: conspicuous blue-black, blue and cream 'eye' in the forewing. Sacculus produced into a caudally-directed digitate process at two thirds the length of the valve; ventral margin of sacculus with a swelling at the base of the digitate process. Interior dorsal margin of sacculus with a protuberance at one half the length of the valve. Aedeagus 6mm. long; vesica with four lobes, one with two scobinate protuberances, one with a large sparsely scobinate area, one with a basal scobinate protuberance and a pointed, densely scobinate, cornutus-like tip and the fourth with a spiral sclerotised band.

Female: Similarly patterned to the male.

Diagnosis: Expanse 75mm. (♂). Closely allied to Sericia feducia (Stoll) (Phalaena feducia Stoll, 1790, Aanhangsel Cramer's Uitlandsche Kapellen 5:160) described in detail (New Caledonian specimens) by Viette (1951a) but the uncus with a pronounced medial eminence, slightly hooked, which is absent in feducia. Compared with Viette's fig.22 the sacculus of obalauae bears two much more distinct protuberances and the digitate process at the tip of the sacculus is not curved ventrally.

World distribution: Tonga, (?) New Hebrides - see below.

Fiji distribution:- VITI LEVU: Suva (Lever), Lautoka (Phillips - two specimens in colln SPSM). OVALAU (Baxandale). VIWA.

Remarks: An exceptionally rare species in Fiji, obalauae (or a very close relative) was found in large numbers roosting in a cave in a limestone sea-cliff 2km. north of Tisbel, west coast of Malekula, New Hebrides, in October 1971. The single male I collected from Viwa was taken at night inside a bure (native hut). The name obalauae is from Bethune-Baker's reading of Baxandale's handwritten 'Ovalau' as 'Obalau'.

Sericia strigiformis sp. n.

Male: Head, thorax, abdomen and legs deep brownish black, abdomen dorsally with a bluish sheen. Fore- and hindwings deep blue-black with a blue sheen, marked with very deep blue. Forewing with a conspicuous black and blue 'eye' surrounded with orange-brown scales. Sacculus with a slightly clawed digitate process at three quarters the length of the valve; a protuberance on the interior dorsal margin of the sacculus (text fig. 89). Anellus with two sclerotised processes, the left twice the length of the right. Uncus with a hooked medial protuberance. Aedeagus 6mm. long; vesica with four lobes, one scobinate terminally, one with a terminal and medial scobinate protuberance, one with a spiral sclerotised band, the fourth without ornamentation.

Female: (Plate fig.148) Similarly patterned to the male.

Diagnosis: Expanse 64-74mm.. Wings broader and forewing 'eye' larger and brighter than in other Sericia species. Closest apparent ally is perhaps S. obalauae B.-B. (q.v.) in which the antemedial transverse lines in the fore- and hindwings are more dentate, the 'eyes' smaller, the ornamentation of the vesica different, the anellus without projections and the ventral margin of the sacculus without a protuberance. A bright and conspicuous species.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O. VANUA LEVU: Ndelaikoro.

Holotype: ♂, FIJI, Vanua Levu, Ndelaikoro VHF sta., 940m., 24-25.ii.1971, G.S. Robinson. BMNGSN 7221.

Paratypes: ♀, data as holotype.

♀, FIJI, (Viti Levu), Nandarivatu, 16-20.xii.1968, H.S. & G.S. Robinson.

♀, as above but 27-30.vi.1968.

♀, as above but 27-30.ix.1968.

♀, as above but 12-14.ix.1969.

Remarks: A rare species restricted to montane rain forest on Viti and Vanua Levu.

Genus: Serrodes Guenee, 1852, Hist. nat. Insectes Lepid. 7:251.

Serrodes campana callipepla Prout

Serrodes campana Guenee, 1852, Hist. nat. Insectes Lepid. 7:252, pl.22, fig.6. Type examined.

Serrodes callipepla Prout, 1929, Ann. Mag. nat. Hist. (10)3:598. Type examined.

Male: Head and thorax dull grey-brown; abdomen dull greyish buff. Ventral surface of body and legs pale dull greyish ochre, the tufts of hair on the hind tibia cream inwardly. Forewings brownish black, black marks basally; medial fascia suffused with cream in some specimens; reniform large, black, dissected. Forewing ground colour very variable, light purple brown to black. Postmedial line cream, double, slightly concave proximally. Hindwing distally deep grey, medial line cream, fringe partly white; base of hindwing light grey. Valves with a small triangular process at the ventral margin at two thirds. Left valve with a transverse scobinate band from the dorsal to the ventral margin at three quarters (text fig. 90). Aedeagus with seven lobes, one bearing a large conical cornutus, one with a small patch of minute spines and the most elongate, corrugated, scobinate, with a band of coarse scobination for one third of its length.

Female: (Plate fig. 346) Similarly patterned to the male.

Diagnosis: Expanse 68-75mm.. Wings appearing more elongate than in Serrodes mediopallens Prout (q.v.), the postmedial line not so deeply concave, the reniform larger and more conspicuously dissected. The male genitalia of the two species differ as follows: the dorsal margin of the valve lacks an angulate projection in callipepla; the left valve bears a conspicuous scobinate band; the elongate lobe of the vesica bears a band of coarse scobination for one third of its length, not a band of fine, needle-like cornuti as in mediopallens.

World distribution: (campana subspecies) India through south east Asia to New Guinea and Australia, New Hebrides, New Caledonia, Loyalty Is., Samoa.

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Lautoka, (?Rakiraki, Vatukoula). VANUA LEVU: Ndelaikoro.

Remarks: This genus is much in need of revision with examination of more material than is at present available. The presence of two Serrodes species in Fiji was not realised until recently; callipepla is perhaps commoner than the following species which does not seem to inhabit dry areas. The adult is a fruit-feeder.

Serrodus mediopallens Prout

Serrodus mediopallens Prout, 1924, Bull. Hill Mus. Witley 1:447, fig. Type examined.

Male: (Plate fig. 347) Head, thorax, legs and abdomen dark grey, elongate hairs on legs cream inwardly. Forewing dark purple-brown patterned with black and cream. Medial fascia purple-brown or cream or suffused with the forewing ground-colour. Hindwing grey with a pale greyish ochre medial line; fringe apically and posteriorly white. Valves with a protuberance on the dorsal margin at one half. Tip of sacculus square-ended at two thirds the length of the valve; distally a small hooked process (text fig. 91). Aedeagus 6mm. in length; vesica with seven lobes, one with a large thorn-like cornutus and sclerotised basally, one with a scobinate patch, one with a sclerotised bar and one with a row of about seventy needle-like cornuti.

Female: (Plate fig. 151) Head, thorax and legs deep brown, abdomen dull ochre; body grey-buff beneath. Forewings purple-brown patterned with black; sometimes the medial and basal fascia red-brown: colour pattern rather variable. Hindwing grey with a pale greyish ochre medial line; fringe apically and posteriorly white.

Diagnosis: Smaller (expanse 57-66mm.) and more square-winged than S. campana callipepla Prout (q.v.). The structure of the male genitalia of the two species is different, notably in the form of the left valve (compare text fig. 91 with 90) and in the vesical ornamentation, the row of needle-like cornuti in this species being represented by only a band of minute thorn-like cornuti (coarse scobination) in callipepla.

World distribution: New Guinea, New Hebrides, New Caledonia.

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Nanggali, Tholoisuva, Nandarivatu, Koro-O, summit of Mt Victoria.
VANUA LEVU: Governor's Pool.

Remarks: A widely distributed species which is moderately common in forest areas. Like the preceding species it is a fruit-feeder in the adult stage.

INDETERMINATE SPECIES (Ophiderinae) A

Male: (Plate fig. 350) Head, thorax and abdomen brownish red above, cream below. Terminal segment of palps elongate, porrected. Fore- and hindwings brownish red patterned with white and pale greyish blue. Medial fascia of fore- and hindwings suffused with pale blue-grey in one specimen. Genitalia unremarkable: valves with a caudally-directed process arising from the dorsal margin at three quarters extending a little beyond the tip of the valve. Vesica without ornamentation.

Female: Similarly patterned to the male but the medial fascia of the forewing suffused with orange-yellow; subterminal fascia orange-yellow anteriorly, dusted with blue-grey at the apex. Hindwing with an antemedial orange-yellow spot and a similar but larger spot in the subterminal fascia.

Diagnosis: Expanse 25-27mm.. Overall dirty brick-red colouration distinctive. This species appears to have no close allies.

Fiji distribution:- Three specimens known:

♂, ♀ : FIJI, (Viti Levu), Nandarivatu, 16-20.xii.1968, H.S. & G.S. Robinson.

♂ as above but Tholoisuva, viii.1968.

INDETERMINATE SPECIES (Ophiderinae) B

Male: Head, thorax and abdomen ochre to greyish buff, prothoracic 'collar' often dark brown. Forewings and hindwings ochreous to grey-buff patterned with brown, purple-brown or black. Medial fascia of forewing and medial and basal fasciae of hindwing sometimes completely black. In some specimens the reticulate pattern is lost; in some of these there is an apical brownish black mark in the forewing and similar ante- and postmedial marks at the costa, a medial dark mark at the inner margin of the hindwing. Valves swollen, a corematal process at the base. Uncus much widened at two thirds, this swelling clothed with stiff, short hairs; at the base of the swelling on the uncus, elongate hair-like scales with globular tips. Vesica extensively scobinate.

Female: (Plate fig. 325) Similarly patterned to and as variable as the male.

Diagnosis: Expanse 23-28mm.. The only constant feature of the wing pattern seems to be the small white cross between reniform and orbicular. Size and wing shape are diagnostic.

Fiji distribution:- VITI LEVU: Tholoisuva, Dombuilevu, Vatuvula (Waimanu R.), Nandarivatu, Nausori Highlands. VANUA LEVU: Ndelaikoro.

Remarks: An uncommon species, usually taken at light in primary forest. The position of this species within the Ophiderinae is probably near Throana Walker (List Specimens Lepid. Insects Colln Br. Mus. 16:224, 1858) but so little material is available in this part of the subfamily that it is impossible to place this species. My series contains 5♂♂ and 9♀♀.

Subfamily: Hypeninae

Genus: Bocana Walker, 1858, List Specimens Lepid. Insects Colln Br. Mus. 16:170.

Bocana manifestalis Walker

Bocana manifestalis Walker, 1858, List Specimens Lepid. Insects Colln Br. Mus. 16:171. Type examined.

Male: (Plate fig. 163) Head, thorax, legs and abdomen deep charcoal grey; antennae pectinate. Fore- and hindwings deep charcoal grey, orbicular and reniform white but sometimes jet-black: basal, postmedial and subterminal lines ebony-black, edged distally with a few buff or white scales, subterminal line edged distally with white. Genitalia unspecialised; valves swollen caudally, aedeagus short with two groups of fine thorn-like carinae; vesica lacking ornamentation.

Female: Similarly patterned to the male but antennae filiform.

Diagnosis: Expanse 32-36mm.. An unmistakeable species when fresh but when worn and faded could be mistaken for a Hydrillodes species (q.v.); however, the hindwing is as dark as the forewing in this species and the male antennae are conspicuously pectinate.

World distribution: Africa through tropical Asia and the East Indies to Australia, New Guinea, Solomons, New Hebrides, New Caledonia, Samoa and Hawaii.

Fiji distribution:- VITI LEVU: Suva, Nanggali, Serua, Nandarivatu, Vatuvula (Waimanu R.). VANUA LEVU: Governor's Pool, Matanikavika Est.. OVALAU.

Biology: Zimmerman (1958) quotes Swezey as giving the hostplants of this species as "grasses and weeds" and suggests that manifestalis may have been introduced into Hawaii from Fiji.

Remarks: An uncommon species apparently restricted to well-established secondary vegetation in the wet zones of the largest islands. Zimmerman (1958) places Bocana in the Eustrotiinae: this is an opinion with which I cannot concur.

Genus: Catada Walker, 1858, List Specimens Lepid. Insects Colln Br. Mus. 16:209.

Catada charalis Swinhoe

Catada charalis Swinhoe, 1900, Ann. Mag. nat. Hist. (7)6:311. Type examined.

There is a single specimen of this species in BM(NH) labelled 'Fiji'. I believe this may be an erroneous locality label. This species is known from New Guinea, Solomon Is. and Australia and there is a long series of specimens from Samoa in BM(NH) (see Tams, 1935:229). This species has not been collected from Fiji this century. Charalis is illustrated by Tams (1935, pl.12, fig.9).

Genus: Catadoides Bethune-Baker, 1908, Novit. zool. 15:218.
Mecistognatha Hampson (no published reference found)

Catadoides fijiensis sp. n.

Mecistognatha fijiensis Hampson (no published reference found).

Male: (Plate fig.169) Head, thorax and abdomen yellowish white sparsely flecked with dull purple-brown; prothoracic 'collar' densely flecked with purple-brown. Antennae pectinate to five sixths. Palps illustrated in text fig. 120. Fore- and hindwings yellowish white patterned with dull brown of varying intensity. Genitalia illustrated in text fig. 119; sacculus only extending one third the length of the valve. Aedeagus as long as the genital armature; vesica with several coarsely scobinate lobes.

Female: Similarly patterned to the male but antennae filiform.

Diagnosis: Expanse 23-28mm.. A distinctive medium-sized species recognisable by wing pattern and (in the male) the broadly pectinate antennae. Larger and more densely marked than C. punctata Bethune-Baker (Novit. zool. 15:219, 1908) from New Guinea, the first segment of the palp about four times as long as the second in both sexes and longer than in punctata. The male genitalia differ in that the genitalia of fijiensis are generally a half again larger than those of punctata and in punctata the vesical scobination in two areas is modified such that the fine spines are heavily sclerotised, close-set, and the surrounding vesical membrane sclerotised so as to form two spiny pads.

Fiji distribution:- VITI LEVU: Suva, Vunindawa, Nandarivatu.

Holotype: ♂, FIJI (Viti Levu), Nandarivatu, 15-17.viii.1969, H.S. & G.S. Robinson.

Paratypes: 8♂♂, 2♀♀, data as holotype but 27.xi.1971, BMNGSN 7387♂.

Remarks: A rare species most often encountered on the fringes of primary forest (mahogany plantations south of Nandarivatu, disturbed forest as Savura Creek).

Catadoides vunindawa sp. n.

Male: Head, thorax and abdomen light buff flecked with deep purple-brown. Antennae pectinate to four fifths. Palps illustrated in text fig. 118. Forewings rounded; with the hindwings, light yellowish ochre mottled with purple-brown; ground colour of hindwing paler. Genitalia (text fig. 117) similar to those of C. fijiensis (q.v.) but smaller, the valve shorter and the vesica with only one area of fine scobination.

Female: Similarly patterned to the male. Palps probably resembling those of C. fijiensis but the females I have seen all have the palps absent.

Diagnosis: Expanse 24-26mm.. Smaller, more ochreous and the forewings more rounded than in C. fijiensis sp. n (q.v.) and with less ornamentation on the vesica. The male palp differs from that of fijiensis in that the second and third segments are twice as long (compare text fig. 118 with 120) and the terminal segment of the palp carries a plume of elongate deciduous hairs. Closely allied to Catadoides longipalpis (Swinhoe) comb. n. (Oxaenanus longipalpis Swinhoe, 1903, in Annandale, T.N. & Robinson, H.C. (1903-1907) Fasciculi Malayenses 1(1):83.) cited by Hampson in manuscript as the type species of Mecistognatha (see above)) from Malaya but the forewings more rounded and the palps less elongate.

Fiji distribution:- VITI LEVU: Vunindawa.

Holotype: ♂, FIJI, (Viti Levu), Vunindawa, 7.iii.1933, (R).H. Phillips. Pres. by Imp. Inst. Ent. B.M. 1946-54. BMNGSN 7386.

Paratypes: 299 as holotype, 2.i. and 22.vii.1932.

♀ lacking locality label but with same accession label as holotype.

Remarks: I have never collected this species.

Genus: Dichromia Guenee, 1854, in Boisduval & Guenee, Hist. nat. Insectes Lepid. 8:18.

Dichromia quinqualis Walker

Dichromia quinqualis Walker, 1859, List Specimens Lepid. Insects Colln Br. Mus. 16:15: Type examined.

Male: (Plate fig. 165) Head, thorax and legs purple-brown dorsally; thorax and fore- and midlegs buff ventrally. Hindlegs and abdomen bright yellow. Forewing purple-brown patterned with creamy buff, grey and black. Hindwing bright yellow with a black apical band.

Female: Similarly patterned to the male.

Diagnosis: Expanse 32-40mm.. The wing pattern, particularly the bright yellow hindwing, of this species is completely diagnostic.

World distribution: East Indies through Australia and New Guinea, Solomons, New Hebrides, New Caledonia.

Fiji distribution:- VITI LEVU: Suva, Korolevu, Vatukoula, Nandarivatu, Nausori Highlands, Rakiraki, Lautoka. YASAWA. NAUKATHUVU. VIWA.

Remarks: A common species in the Yasawas but uncommon on Viti Levu and most frequently encountered in dry zone localities.

Genus: Echaneila Bethune-Baker, 1908, Novit. zool. 15:216.

Echaneila hirsutipennis sp. n.

Male: (Plate fig. 168) Palp with third segment almost as long as the second (text fig. 114); antenna filiform but slightly swollen and kinked at one fifth and with a tuft of elongate scales. Foreleg with first tarsal segment elongate, the tibia extended to form a flap over the first tarsal segment for three quarters its length, the second tarsal segment expanded (text fig. 113). Head buff-brown, palps blackish brown laterally; thorax blackish brown; abdomen grey-buff. Forewing brownish black patterned with russet-brown towards the costa, with two patches of raised blackish brown elongate scales, one at the distal edge of the cell, the other from the costa at one half to two thirds; subterminal line indistinct, orange-brown. Hindwing uniform grey-buff. Genitalia illustrated in text fig. 111; uncus broad and thin; tip of sacculus heavily sclerotised and serrate, a serrate bifurcate process from the base of the valve dorsally. Anellus finely scobinate dorsally, with a dorsal catena of fine spines. Aedeagus (text fig. 112) with a discus-like cornutus at the base of the vesica which bears two finely scobinate patches.

Female: Darker than the male, forewings with a smoother appearance, brownish black, a basal band of deep orange-brown, a short buff transverse line from the costa at one half; subterminal line whitish buff, indistinct except for a conspicuous white fleck at the costa. Hindwing as in the male: forelegs normal, forewings without raised scales. Genitalia with walls of ostium bursae infolded, heavily sclerotised and scobinate.

Diagnosis: Expanse 28-33mm.. Differentiated from Hydrillodes spp. (see H. surata Meyrick below) in that the male palps are not hirsute and recurved over the head, the antenna in the male is kinked and slightly swollen basally and the male forewing carries tufts of elongate scales and the male foreleg is modified. Females differ from Hydrillodes surata Meyrick (which is found with this species) in that there is no pale medial fascia in the forewing and there is a distinctive white fleck on the subterminal line at the costa. Allied to Echanella purpurea Bethune-Baker (Novit. zool. 15:216) from New Guinea but smaller, the elongate scaling of the male forewing extending further distally along the costa, the female without a pronounced white basal fascia in the forewing, the forewing apex with a suffusion of russet-brown, not a distinct longitudinal streak as in purpurea. The male genitalia are diagnostic.

Fiji distribution:- VITI LEVU: Tholoisuva, Nandarivatu, Koro-O, Nanggali, Dombuilevu. VANUA LEVU: Governor's Pool, Ndelaikoro, Matanikavika Est..

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 27-30.ix.1968, H.S. & G.S. Robinson. BMNGSN 7370.

Paratypes: ♂, as holotype but 16-20.xii.1968. BMNGSN 7373.

2♀♀ as holotype.

3♂♂, 4♀♀, FIJI, (Viti Levu), Nanggali, 8.xii.1970, H.S. & G.S. Robinson. BMNGSN 7453♂.

2♀♀, FIJI, 1966-67, H.S. Robinson. BMNGSN 7371, 7372.

Remarks: A common species in some forest localities, notably Nanggali and Governor's Pool. The antenna and modified foreleg of the male of this species are reminiscent of Tholocoleus.

Genus: Harita Moore, 1882, in Hewitson & Moore, Descr. new Indian Lepid. Insects colln late Mr. W.S. Atkinson : 187.

Harita nodyna (Bethune-Baker)

Hypena nodyna Bethune-Baker, 1908, Novit. zool. 15:229. Type examined.

Male: Head and thorax russet brown above; abdomen grey-brown: underside of body greyish buff. Terminal segment of palps elongate, laterally compressed, square-ended and densely scaled. Antennae ciliate. Forewing russet brown flecked with black. Medial transverse line narrow, white. Distal half of forewing suffused with dull orange-buff, some flecks of white towards the costa; two white spots in the forewing apex. Hindwing brownish grey. Genitalia slender, elongate; valves broad dorsoventrally, without ornamentation; uncus of sickle-form; aedeagus small, about 0.2mm. long; vesica with a scobinate area.

Female: (Plate fig.166) Similarly patterned to the male; antennae filiform. Forewing with transverse line more marked than in the male and flecked with white distal to the transverse line.

Diagnosis: Expanse 24-28mm.. Easily confused with Hypena iconicalis Walker (q.v. - plate fig. 171) but in this species the male antenna is filiform and the terminal segment of the palp is short. Iconicalis does not have white spots in the forewing apex and there is a marked subterminal line of black dots edged distally with white.

World distribution: New Guinea, New Hebrides, New Caledonia.

Fiji distribution:- VITI LEVU: Tholoisuva, Nandarivatu, Koro-O, Nanggali, Suva, Nausori Highlands. VANUA LEVU: Matanikavika Est., Lambasa.

Remarks: A moderately common species in primary forest. Little material is available in this genus and the placing of Fijian specimens as nodyna is, of necessity, an approximation.

Genus: Hydrillodes Guenee, 1854, in Boisduval & Guenee, Hist. nat. Insectes Lepid. 8:65.

Hydrillodes surata Meyrick

Hydrillodes surata Meyrick, 1910, Trans. N.Z. Inst. 42:68. Type not examined, identity not in doubt.

Male: (Plate fig. 167, also Tams, 1935, pl.10, figs. 1,3) Head, thorax and abdomen grey-brown; ventrally and on the abdomen, paler. Palps (illustrated by Tams, 1935, pl.10, fig.5) with some yellow-buff scales beneath the terminal segment. Fore tibia tufted with greyish brown scales, the distal scales dull yellow. Forewing grey-brown to dull brown patterned with pale buff. Hindwing greyish buff. Valve bifurcate, ventral lobe scobinate. Uncus small, cygnae. Vesica with an extensive scobinate area.

Female: Similarly patterned to the male but the forewing medial fascia contracted and paler, often cream, sparsely flecked with brown. Palp illustrated by Tams (1935, pl.10, fig.7).

Diagnosis: Expanse 28-32mm.. Closely allied to Hydrillodes sigma Tams from Samoa but the terminal segment of the male palp more elongate and straighter, the penultimate segment more densely scaled (see Tams' illustrations). A distinctive, small, dull species.

World distribution: Kermadec Is., New Hebrides, Samoa, Tonga.

Fiji distribution:- VITI LEVU: Suva, Nandarivatu, Koro-O, Nanggali, Korolevu, Dombuilevu, Rakiraki, Vatukoula, Mba, Nausori Highlands. VANUA LEVU: Governor's Pool, Savusavu area, Ndelaikoro, Matanikavika Est., Lambasa. TAVEUNI. LELEUVIA. YASAWA. NANUYA LAILAI. NAUKATHUVU. VIWA. ONGEA. NANANU-I-RA. ROTUMA.

Biology: The larva is recorded as feeding on dead leaves of Cocos nucifera L.. Gardner (1948) describes the larva of H. lentalis Guenee.

Remarks: Tams' fig. 3 is of the underside of the hindwing. This is an exceptionally common species on Viwa where it constituted almost 50% of the light trap samples: in other localities it is a widespread and common species.

Genus: Hypena Schrank, 1802, Fauna Boica 2(2): 163.

Hypena commixtura (Swinhoe)

Bomolocha commixtura Swinhoe, 1918, Ann. Mag. nat. Hist. (9) 2: 93. Type examined.

Two males of this species, larger (expanse 30mm.) and more suffused with dark fuscous than H. laceratalis Walker (q.v.), labelled "FIJI, 87-50. 111." are in BM(NH). This species is known from Lombok (type locality) and material from St Aignan I., Fergusson I., Sudest I. and Samoa (damaged ♀, colln Comstock) is associated with the type.

The two Fijian specimens are from a lot of nearly 2000 Lepidoptera purchased by BM(NH) from Gervase F. Mathew in 1887. I consider that these two specimens may have erroneous data labels. The male genitalia of commixtura are highly distinctive: the sacculus is produced into an elongate diamond-shaped process, one edge of the diamond attached to the ventral margin of the valve basally; the valve carries a lobe-like apical process.

Hypena conscitalis Walker

Hypena conscitalis Walker, 1865, List Specimens Lepid. Insects Colln Br. Mus. 34:1509. Type examined.

Male: Forewing orange-brown traversed by a distinctive silver-grey costal streak: oblique line from the apex to two thirds of the posterior margin white; terminal fascia silver-grey with serrate white transverse lines.

Female: Similarly patterned to the male.

Diagnosis: Expanse 19-23mm.. A small, distinctively patterned Hypena.

Fiji distribution: Fijian record based on a single specimen collected by R.H. Phillips at Lautoka, VITI LEVU, on 1.ii.1929. Possibly non-resident.

World distribution: Africa, Seychelles, India and Ceylon to Formosa, Australia and Tonga (!).

Biology: The larva is recorded as feeding on Desmodium gangeticum (L.) in India and is described by Gardner (1946a:71).

Remarks: The record of a specimen from Tonga is dubious: the specimen in question is in BM(NH) and is from the Mathew collection, the same source as the "Fijian" Hypena commixtura (see above).

Footnote: Two further Fijian specimens of this species are in the SPSM collection at Lautoka: both are from Lautoka, collected on 3.x.1929 (R.H. Phillips) and 10.xii.1929 (W.F.N. Greenwood).

Hypena cryptica sp. n

Male: Palps, head and thorax greyish cream to purple-brown, abdomen pale dull brown. Body slightly paler ventrally. Forewings buff-cream variably suffused with purple-brown, suffusion usually concentrated in proximal two thirds of the wing; antemedial line pale buff, not evident in some specimens. Postmedial transverse line yellow-buff, often edged inwardly with rich buff. Orbicular always present as a black dot. Sometimes reniform present, a black spot, size variable. Basal two thirds of forewing sometimes suffused with black posteriorly, this suffusion continued beyond the postmedial line to the termen; sometimes streaks of black between the veins across the postmedial line. Hindwing brownish grey. Genitalia remarkable only in that the valve has a serrate semi-circular process at one half (text fig.116).

Female: (Plate fig. 187) Similarly patterned to and as variable as the male. The specimen illustrated shows the simplest form of pattern.

Diagnosis: Expanse 30-34mm.. The shape of the postmedial line is the only obvious external diagnostic feature of this species in which the wing pattern is exceptionally variable. The male valve is diagnostic. The postmedial line meets the costa at three quarters rather than at a little beyond one half as in Hypena iconicalis Walker (q.v.). Perhaps related to Hypena columbana Moore (Lepid. Ceylon 3:223, pl.176, fig.8,1885) from Ceylon but the

postmedial straighter, the ground colour of the forewings paler, the two distinct apical dashes of columbana represented in some specimens by diffuse black spots; basal line - where evident - not running from the posterior margin towards the reniform for about 3 to 4 mm. but only with a small distal kink.

Fiji distribution:- Localities of type material, also VANUA LEVU: Savusavu area, Ndelaikoro.

Holotype: ♂, FIJI, (Viti Levu), Tholoisuva, viii.1968, H.S. & G.S. Robinson. BMNGSN 7455.

Paratypes: 2♂♂, ♀, as holotype but 15.xi.1970.

2♂♂, ♀, FIJI, (Viti Levu), Nandarivatu, 27-30.ix.1968, H.S. & G.S. Robinson. BMNGSN 7450♂, 7451♀.

♂, as above but 27-30.xi.1968.

♂, as above but 12-14.ix.1969.

♂, ♀, FIJI, Viti Levu, Koro-O, 23.xi.1971, H.S. & G.S. Robinson.

♂, FIJI, (Viti Levu), Nausori Highlands, 16-20.xii.1969, G.S. Robinson.

♂, FIJI, (Viti Levu), Suva, 1955, H.W. Simmonds. BM 1956-128.

♂, FIJI, (Viti Levu), Vunindawa, 14.xi.1932, (R)H. Phillips, 780. Pres. by Com. Inst. Ent. BM 1950-525.

♂, as above but 26.iii.1933, 825.

Remarks: An uncommon species apparently associated with primary forest.

Hypena fijiensis sp. n.

Male: Palps, head and thorax greyish brown, abdomen light grey-buff.

Body dull ochreous cream ventrally. Forewings warm buff densely flecked with purple-brown scales, the buff colouration evident only in the proximal half of the wing. Orbicular a black dot; reniform faintly indicated by two black dots. Postmedial line dark brown edged distally with sparse lilac scales. Subterminal line of black dots with one or two lilac scales at the outer edge of each; terminal line deep brown with proximal lilac dots on the veins. In some specimens the anterior third of the forewing is suffused postmedially with lilac as in the illustrated female. Male valve with a sclerotised ridge and apical process (text fig.115). Anellus scobinate: vesica with a basal group of about ten cornuti, a medial group of about five cornuti and an apical band of about twenty cornuti.

Female: (Plate fig.182) Similarly patterned to the male.

Diagnosis: Expanse 22-26mm.. The dentate postmedial line and well defined line of black subterminal dots are diagnostic, as is the structure of the male valve. Wing pattern more definite, forewings more square, the postmedial line less straight than in Hypena masuralis ferriscitalis Walker (q.v.). Very closely allied to Hypena caerulealis Walker (List Specimens Lepid. Insects Colln Br. Mus. 34:1142, 1865) from Australia but in this species the apical spine from the tip of the ridge along the valve is replaced by a small square lobe and the apical grey suffusion in the forewing is lighter than in fijiensis.

Fiji distribution: Localities of type material.

Holotype: ♂, FIJI. (Viti Levu), Nandarivatu, 15-17.viii.1969, H.S. & G.S. Robinson. BMNGSN 7383.

Paratypes: 5♂♂, 2♀♀, data as holotype.

♂ as holotype but 27-30.ix.1968.

♀, FIJI, (Viti Levu), Suva, iv.1968, H.S. & G.S. Robinson.

Remarks: A rare and local montane forest species. The specimen from Suva is worn and is probably a vagrant.

Hypena gonospilalis Walker

Hypena gonospilalis Walker, 1865, List Specimens Lepid. Insects Colln Br. Mus. 34:1516. Type examined.

Male: (Plate fig.170) Head and thorax lilac-grey; abdomen cream flecked with medium brown scales; legs and underside of body light greyish buff. Forewings silver-grey patterned with brownish black; hindwings silvery brown with a dark terminal line. Uncus stout, sickle-shaped, valve with the sacculus concave to one half where it is produced into a nodulose ventral projection. Vesica with a basal lobe ornamented with fine cornuti.

Female: Similarly patterned to the male.

Diagnosis: Expanse 22-28mm.. The dark medial fascia in the posterior two thirds of the forewing is a diagnostic feature of this species.

World distribution: South East Asia, New Hebrides, Kermadec Is., Samoa, Cook Is., Marshall Is..

Fiji distribution:- VITI LEVU: Suva, Nandarivatu, Koro-O, Savura Creek, Tholoisuva, Nausori Highlands. VANUA LEVU: Savusavu area, Matanikavika Est.. YASAWA. ONGEA. ROTUMA.

Remarks: A very uncommon species except on Rotuma where it is abundant.

Hypena iconicalis Walker

Hypena iconicalis Walker, 1859, List Specimens Lepid. Insects Colln Br. Mus. 16:61. Type examined.

Male: Head and thorax dull brown tinged with grey; abdomen dull greyish buff; body paler ventrally. Forewings dull brown tinged with grey; postmedial line deep red-brown edged distally with white; subterminal dots black edged with white distally; white flecks on veins at termen. Hindwing uniformly grey, a charcoal grey terminal line. Genitalia simple, valve with a small, thinly sclerotised medial semicircular lobe at one half. Anellus scobinate. Vesica with about twenty elongate cornuti basally.

Female: (Plate fig.171) Rather larger and brighter than the male, forewing broader. Forewing proximally dull red-brown tinged olivaceous, lilac brown flecked with black distal to the postmedial line.

Diagnosis: Expanse 28-34mm. Differentiated from H. robustalis Snellen (q.v.) by the shape of the postmedial line which is almost straight in this species but has two distal concavities in robustalis (compare plate fig.171 with 173). Reniform not apparent in this species. See also diagnostic comments for Harita nodyna (B.-B.) above.

World distribution: India and Ceylon to the Philippines, East Indies, New Guinea.

Fiji distribution:- VITI LEVU: Suva, Nandarivatu, Koro-O.
VANUA LEVU: Savusavu area.

Biology: Larva described and recorded as feeding on Desmodium gangeticum (L.) in India by Gardner (1941:294, 1946a:71).

Remarks: Very uncommon, especially the male of which I have only one Fijian specimen.

Hypena laceratalis Walker

Hypena laceratalis Walker, 1859, List Specimens Lepid. Insects Colln Br. Mus. 16:60. Type examined.

N.B. This species has been referred to as "Hypena strigatus F." and "Hypena strigata F." by many authors.

Male: (Plate fig.174) Head, thorax and legs buff-grey flecked with black; abdomen pale buff-grey, body paler ventrally. Forewings warm brown flecked with lilac and black scales and patterned with white. Hindwings brownish grey, darker on the veins. Valve with a small semicircular thinly sclerotised medial lobe at one half and a sclerotised semicircular process with a serrate ventral edge at the apex of the valve: uncus short with a sharply hooked tip. Vesica with basal and medial groups of minute cornuti.

Female: Similarly patterned to the male.

Diagnosis: Expanse 20-25mm.. A small species with a distinctive mottled wing pattern and distinctively ornamented valve in the male.

World distribution: India through south east Asia to New Guinea, New Caledonia, Norfolk I. and Tonga. Introduced into Hawaii.

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Nandarivatu, Tholoisuva, Rakiraki, Lautoka. VANUA LEVU: Matanikavika Est., Lambasa. VIWA. ROTUMA.

Biology: The larva feeds on Lantana camara L. - see Swain (1971:386).

Remarks: An uncommon although widespread species, laceratalis was introduced into Fiji as a Lantana control in the early 1960's. This was a native species prior to its introduction and its present wide distribution (Viwa to Rotuma and Tonga) covers small isolated islands to which it has not been introduced. Phillips records "Hypena strigatus F." in his MS list (1937) and laceratalis was collected in Suva by Simmonds in 1955.

Hypena masurialis Guenee

Hypena masurialis Guenee, 1854, in Boisduval & Guenee, Hist. nat. Insectes Lepid. 8:38.

subsp. ferriscitalis Walker comb. n.

Hypena ferriscitalis Walker, 1865, List Specimens Lepid. Insects Colln Br. Mus. 34:1142. Type examined.

Male: (Plate fig.172) Palps, head and thorax greyish brown faintly tinged with lilac, abdomen dull buff; body paler ventrally. Forewings greyish brown faintly tinged with lilac: orbicular a black point. Transverse medial line narrow, orange-brown; two diffuse subterminal black dots posteriorly. Forewing flecked to a varying extent with greyish brown. Hindwing light brownish grey, a little paler basally and towards the anal angle. Valve with the dorsal margin finely scobinate and a small thinly sclerotised semicircular flap towards the base. Anellus scobinate. Vesica with a group of fine cornuti basally.

Female: Similarly patterned to the male.

Diagnosis: Expanse 22-26mm.. Lacking the mottled pattern of H. laceratalis Walker (q.v.), the transverse medial line straighter than in H. fijiensis sp. n. (q.v.), without the well-defined subterminal line of black dots in the forewing and (in the male) the sclerotised ridge and apical process of the valve of the latter species. Ferriscitalis is larger, darker and more densely freckled with dark brown on the forewings than masurialis masurialis.

World distribution: India and south east Asia through the East Indies (masurialis masurialis), New Guinea, Australia, Norfolk I. and Samoa (masurialis ferriscitalis).

Fiji distribution:- VITI LEVU: Suva.

Biology: Larva recorded as feeding on Commelina pacifica Vahl in Fiji.

Hypena robustalis Snellen

Hypena robustalis Snellen, 1880, Tijd.v. Ent. 23:120, 24: pl.5, figs. 9, 9a, 9b. Type not found - determination tentative.

Male: Head and thorax warm brown, abdomen dull brown, body paler beneath. Forewing warm brown tinged with olivaceous in the basal half. Antemedial line reddish brown; median line dark red-brown edged distally with pale lilac. Distal half of forewing orange-brown, heavily flecked with purple-brown, lilac and black. Orbicular, reniform and a basal dot black; subterminal line of black dots edged outwardly with lilac. Hindwing greyish brown. Valve finely scobinate at the ventral and apical margins, otherwise unornamented. There is a corema of elongate, deciduous scales from the outer surfaces of the valves. Vesica with some fine scobination.

Female: (Plate fig. 173) Similarly patterned to the male.

Diagnosis: Expanse 29-31mm.. The wing pattern of this species is completely diagnostic: Fijian specimens match Snellen's illustration well.

World distribution: South east Asia, Formosa, New Guinea (St Aignan I.).

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Lautoka, Rakiraki, Korolevu, Nandarivatu. VANUA LEVU: Savusavu area, Matanikavika Est., Lambasa. ROTUMA.

Remarks: An uncommon species, the presence of which on Rotuma is somewhat surprising in view of the fact that it is known from no other small islands of the Fiji group. Prout proposed the MS name fuscescens for specimens of this species from Fiji but in view of the paucity of material associated with robustalis this separation does not appear to me to be justified.

Genus: Hypenagonia Hampson, 1893, Illust. typical Specimens Lepid. Heterocera Colln Br. Mus. 9:30, 122.

Very little material of this genus is available and what there is requires extensive revision. From fifty-eight Fijian specimens I have separated five species, all apparently undescribed, of which three (catherina, diana and emma spp. n.) are represented by two sexes. Two "odd" female specimens are provisionally associated with barbara sp. n. although they could equally well belong to anna sp. n. or even represent a sixth species.

Fijian Hypenagonia spp. appear similar to Hypenagonia longipalpis Hampson (J. Bombay nat. Hist. Soc. 21:1239, 1912) from Ceylon but show marked differences in the form of the male genitalia. The apex of the tegumen carries a normal, thin uncus in longipalpis: there are two wing-like flaps from the tegumen laterally one third of the distance from the uncus to the point of fusion with the dorsal margin of the valve: there is no trace of the sclerotised, elongate lateral processes from the base of the tegumen.

Hypenagonia anna sp. n.

Male: Two specimens, expanse of holotype 16mm.: head, thorax, abdomen and wings straw buff flecked and patterned with dull red-brown: reniform two black dots. Paratype larger, expanse 19mm., medial and subterminal fasciae of both wings suffused with purple-brown. Genitalia illustrated in text fig. 121: valves without processes, short and broad. Uncus very small, spatulate. Lateral processes from tegumen short, without projecting modified scales basally.

Female: Unknown.

Diagnosis: Forewing postmedial line not acute-angled near the costa: antemedial line not apparent. Male genitalia with the uncus and tegumen processes smaller than in the other Fijian species (compare text fig. 121 with 122 to 125). Valves without processes.

Fiji distribution: Known only from the type and paratype.

Holotype: ♂, FIJI, Vanua Levu, Governor's Pool, 8.ii.1971, G.S. Robinson. BMNGSN 7391.

Paratype: ♂, FIJI, (Viti Levu), Nandarivatu, 15-17.vii.1969, H.S. & G.S. Robinson. BMNGSN 7389.

Hypenagonia barbara sp. n.

Male: Similarly patterned to the preceding species but the white surround of the reniform bordered distad by a black streak extending distally for 1mm.. Hindwing postmedial markedly concave towards the posterior margin. Genitalia illustrated in text fig. 122: valves each with a rectangular dorsally-directed medial process, uncus with a large hirsute lobe at the apex of the tegumen, caudal portion of uncus thinly sclerotised and fused to the scaphium.

Female: Two faded females are provisionally placed here: probably similarly patterned to the male. Hindwing postmedial not well-defined. Forewing subterminal line with a series of four dark brown streaks running proximally, the one directed at the reniform elongate and conspicuous.

Diagnosis: Expanse 19mm. (holotype), 16 and 17mm. (females). Possibly distinguishable from H. anna sp. n. (q.v.) by the black streak beyond the reniform and the shape of the hindwing postmedial line. Male genitalia diagnostic: sclerotised processes laterally from the tegumen longer than in anna, uncus larger with a well-developed basal lobe, valves with a rectangular process (see text fig. 122 and compare with 121).

Fiji distribution: Type locality and VITI LEVU: Vunindawa.

Holotype: ♂, FIJI, Vanua Levu, Governor's Pool, 8.ii.1971, G.S. Robinson. BMNGSN 7398.

Remarks: The two associated females are from VITI LEVU, Vunindawa, 4.ii.1932 and 11.ii.1933 ((R)H. Phillips).

Hypenagonia catherina sp. n.

Male: Head, thorax and abdomen greenish yellow flecked dorsally with medium brown and purple-brown scales. Forewings greenish yellow patterned with brown, purple-brown and black. Reniform a white crescent edged proximad with black, the black edge widened anteriorly and posteriorly and resembling a bent dumb-bell. Hindwing with ante- and postmedial lines straight, close together,

enclosing a dark brown or purple-brown fascia: distal to this there is a white or cream field the same width as the medial band. Genitalia illustrated in text fig. 123. Uncus well-developed, cygnate, a large hirsute basal lobe, lateral processes at one half. Valves with a small dorsally-directed digitate process at two thirds. Tegumen processes sinuate and elongate.

Female: Similarly patterned to the male.

Diagnosis: Expanse 16-19mm.. Well-defined straight, narrow and dark hindwing medial band diagnostic. In some specimens of H. diana sp. n. the hindwing medial fascia is dark but there is never a pale fascia of the same width as the medial fascia on the distal side of the postmedial. The reniform of diana rarely has the ends of the "dumb-bell" joined by a black line as is usual in this species and the curve of the reniform crescent is shallower in diana than in catherina. Differences in the genitalia between catherina and other Fijian Hypenagonia species are obvious from the illustrations (compare text fig. 123 with 121 to 125).

Fiji distribution:- VITI LEVU: Nandarivatu, Vunindawa.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, vi.1968, H.S. & G.S. Robinson. BMNGSN 7390.

Paratypes: 4♂♂, 10♀♀, FIJI, (Viti Levu), Vunindawa, various dates 1932-1934, (R.)H. Phillips.

Hypenagonia diana sp. n.

Male: Ground colour of head, thorax, abdomen and wings buff; heavily patterned with medium brown. Wing pattern somewhat variable: reniform white, a shallow crescent, the tips of the crescent expanded to enclose a black dot at each end. Forewing postmedial acute-angled just before joining the costa. Hindwing postmedial concave proximad. Genitalia illustrated in text fig. 124: basal lobe of uncus enormously developed, remainder of uncus reduced to a small diamond-shaped flap from the ventral edge of the lobe. Apex of valve narrow, club-shaped. Tegumen processes swollen basally with tufts of modified scales (?) directed towards the uncus.

Female: Similarly patterned to the male.

Diagnosis: Expanse 18-21mm.. Acute-angled forewing postmedial and overall dull brown colouration diagnostic. Male genitalia (text fig. 124) larger than in other Fijian Hypenagonia species with the exception of H. emma sp. n. (q.v.) in which the vinculum is enormously extended anteriorly, and in which the only remaining part of the uncus is a small basal lobe.

Fiji distribution:- VITI LEVU: Suva area, Nandarivatu.
VANUA LEVU: Lambasa.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 27-30.ix.1968, H.S. & G.S. Robinson. BMNGSN 7396.

Paratypes: ♂, as holotype but 16-20.xii.1968. BMNGSN 7399.

♂, FIJI, 1966-67, H.S. Robinson. BMNGSN 7400.

5♂♂, 5♀♀, FIJI, (Viti Levu), Vunindawa, various dates 1931-1934, (R.)H. Phillips.

Remarks: Perhaps a wet-season species; of the twenty-six dated specimens examined, two were collected in October, five in November, three in December, nine in January and two in February.

Hypenagonia emma sp. n.

Male: Head, thorax, abdomen and wings greenish yellow flecked with grey and brown. Wings patterned with medium brown and dark brown, a slight suffusion of red-brown in the postmedial fascia. Reniform two or three black dots. Ante- and postmedial lines of hindwing parallel, concave proximally, obsolete in the anterior half of the wing. Genitalia illustrated in text fig. 125: valves with a club-shaped dorsally-directed process at two thirds, uncus reduced to a small hirsute lobe, vinculum extended anteriorly, tegumen processes elongate.

Female: (Plate fig. 175) Similarly patterned to the male, abdomen with a grey medial band dorsally at one half.

Diagnosis: Expanse 16-19mm.. The largest and palest of the Fijian Hypenagonia species. Superficially similar to H. catherina sp. n. (q.v.) but without the dark straight medial band in the hindwing and crescentic white forewing reniform. The male genitalia are diagnostic, the tip of the valve extending beyond the apex of the tegumen, the valve with a spatulate medial process, the tip of the valve flattened and curved dorsoventrally.

Fiji distribution:- VITI LEVU: Nandarivatu. VANUA LEVU: Governor's Pool.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 15-17.viii.1969, H.S. & G.S. Robinson. BMNGSN 7439.

Paratypes: 3♂♂, ♀, data as holotype. BMNGSN 7440♂.
♂ as holotype but 16-20.xii.1968.
♀ as holotype but 27-30.ix.1968.

Genus: Lophocoleus Butler, 1886, Trans. ent. Soc. Lond.:416.

Type species: Lophocoleus mirabilis Butler, ibidem: 416-7, pl.10, figs. 1, 1a, by monotypy. Type ♂ in BMNH labelled 'Fiji'. BMNGSN 7266.

This genus is of exceptional interest. It is apparently endemic to Fiji and, apart from Hypenagonia, is the only genus dealt with here to show pronounced radiation. It is characterised by the pectinate male antennae, unipectinate from the base to one quarter, and the curiously modified male foreleg (text fig.93).

The tibia is modified and the first tarsal segment enormously elongated so that the tibia extends as a flap or sheath over the first tarsal segment to which it is normally appressed, the opposing surfaces bearing a corema of elongate hairs.

The male genitalia are diagnostic, the valve truncated apically with dorsal and ventral apical processes variously developed (text figs. 95-100). The vesica bears a group of heavily sclerotised minute cornuti on a small, sclerotised area of the vesica (text figs. 101-106). In one species (L. acuta sp. n.) sclerotisation is reduced (text fig. 106) and in L. albipuncta sp. n. the cornuti are fused and enormously elongated (text fig.104). Members of the genus are large blackish insects (plate figs. 177, 183, 184, 186, 188) with the exception of L. rubescens sp. n. which is reddish brown (plate fig. 189). Six species are here included in Lophocoleus of which five are new. Butler's "Lophocoleus? astrifer" (ibidem:417) does not belong here and is dealt with separately.

Key to males of Lophocoleus Butler

- 1a Forewing bright red-brown patterned with white ...rubescens
- b Forewing ground colour black, brownish black or grey.....2
- 2a Forewing termen markedly concave; forewing pattern variegated; vesica appears ornamented with only two spines if examined under low magnification acuta
- b Forewing, if termen concave, marked with a gold spot in the reniform or subterminal line is iridescent blue 3
- 3a Forewing with a diffuse subterminal line sharply dentate between M1 and M2 and a diffuse white spot distal to the reniform. Vesica with three curved, partially fused cornuti.....albipuncta
- b If subterminal line apparent in forewing it is iridescent blue and inwardly concave between M1 and M2. Vesica with a typical spine-pad as in text figs. 101-103.....4
- 4a Reniform with a gold spot, any other forewing markings not immediately apparent; vesica with a spine-pad bearing at least eight sharp spines (text fig.101).....mirabilis
- b Reniform if present represented by a few white or blue scales, spine pad with fewer than five sharp spines.....5
- 5a Forewing markings iridescent blue.....iridescens
- b Forewing deep brown or blackish; markings ill-defined. Vesica with four sharp and two blunt spines on the spine-pad. Valve as in text fig.97.....suffusa

Lophocoleus acuta sp. n.

Male: (Plate fig. 184) Head, thorax and upperside of forelegs violaceous black, underside of body and abdomen buff-grey. Forewing grey tinged with violet and marked with brownish black; ante- and postmedial lines dull orange-brown. Hindwing grey-buff. Valve (text fig. 100) narrow with a knob-like dorso-apical process, a ridge from the dorso-apical process to the tip of the sacculus. The sclerotisation of the 'spine-pad' is much reduced - under low magnification only two spines are visible but detailed examination reveals nine small, almost unsclerotised spines adjacent to these (text fig.106).

Female: Unknown.

Diagnosis: Expanse 32-39mm.. Pattern much more variegated than in other Lophocoleus species, the forewing margin more angulate and concave (it is slightly scalloped in two of the specimens before me). Genitalia distinctive (see figures) and serving to differentiate this from all other Lophocoleus species.

Fiji distribution:- Localities of types and VANUA LEVU:
Savundrondro Dam.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 15-17.viii.1969,
H.S. & G.S. Robinson. BMNGSN 7239.

Paratypes: ♂, FIJI, (Viti Levu), Nausori Highlands - site 2 - 2000',
16-20.xii.1969, G.S. Robinson.

♂, FIJI, 1966-67, H.S. Robinson, (Viti Levu). BMNGSN 7233.

Remarks: An extremely rare primary forest species.

Lophocoleus albipuncta sp. n.

Male: (Plate fig. 186), Head, thorax and upperside of legs brownish black; abdomen and underside of body brownish grey. Palps tipped with white. Forewing brownish black; reniform black, a diffuse white spot distad. Subterminal line white, inwardly dentate on M1 and M2. Hindwing dusted grey; white subterminal line conspicuous but becoming obsolete anteriorly. Valve (text fig. 98) with a well-developed dorso-apical process and a slightly developed ventro-apical process. Vesica ornamented with three elongate fused spines (text fig. 104).

Female: Similarly patterned to the male.

Diagnosis: Expanse 40-45mm.. Reminiscent of L. iridescens sp. n. but with the iridescent blue patterning replaced by white, the subterminal line more markedly dentate and the hindwing subterminal line better developed. The terminal line of lunules in the hindwing of iridescens is represented only by minute white dots. Male genitalia distinctive, the 'spine-pad' of other members of the genus represented by three large fused spines which are almost three times the length of the spines in other Lophocoleus species.

Fiji distribution:- Type localities.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 27-30.vi.1968, H.S. & G.S. Robinson. BMNGSN 7241.

Paratypes: ♂, FIJI, Viti Levu, Suva area, 1967, H.S. Robinson, BMNGSN 7241.

♂, FIJI, (Viti Levu), Vatuva (Waimanu R.), 12.xii.1970, H.S. & G.S. Robinson.

♀, FIJI, (Viti Levu), Tholoisuva, 14.xi.1970, H.S. & G.S. Robinson. BMNGSN 7244.

Lophocoleus iridescens sp. n

Male: (Plate fig. 183) Head, thorax and upperside of legs brownish black; underside of body and abdomen dull grey tinged with buff. Foreleg (text fig. 93) typical of the genus, with pale straw hairs within the tibial 'sheath'. Palp illustrated in text fig. 94. Forewing black, a faint tinge of grey-buff, a line of white dots at the margin. Basal, postmedial and subterminal lines bright iridescent blue, the wing sparsely flecked with scales of this colour. Hindwing buff-grey, darker distally, with a marginal line of bluish white lunules; pale subterminal line evident near the anal angle. Valve (text fig. 96) with a small dorso-apical process with a ventrally-directed triangular flap. Vesica with the 'spine-pad' dominated by a single large spine and with three smaller spines, two of them blunt (text fig. 102).

Female: Similarly patterned to the male; medial signate section of bursa copulatrix more elongate than in L. mirabilis Butler and L. suffusa sp. n. (q.v.).

Diagnosis: Expanse 37-40mm.. Characterised by the iridescent blue patterning of the forewing and the marginal white lunules in the hindwing. Valve of male reminiscent of L. suffusa sp. n. but the caudal margin not deeply excavated.

Fiji distribution:- VITI LEVU: Nanggali.

Holotype: ♂, FIJI (Viti Levu), Nanggali, 8.xii.1970, H.S. & G.S. Robinson. BMNGSN 7235 & 7443.

Paratypes: 2♂♂, data as holotype. ♀, FIJI, 1966-67, H.S. Robinson.

Remarks: A rare species known only from the fringes of lowland forest. The female is probably from Suva.

Lophocoleus mirabilis Butler

Lophocoleus mirabilis Butler, 1886, Trans. ent. Soc. London.: 416-417, pl.10, fig.1, 1a. Type examined.

Male: (Plate fig.177) Head, thorax and upperside of legs brownish black, the hairs within the foreleg 'sheath' pale bright straw. Underside of body and abdomen dull grey tinged with buff. Forewings brownish black, basal and postmedial lines darker; subterminal line of minute bluish white lunules; at the fringe a line of minute pale yellow dots. Reniform large, conspicuous, round, pale gold. Hind-wing smoke-grey, paler proximally. Right valve (text fig.95) with a club-shaped dorso-apical process and a moderately well-developed ventral process. Vesica with the characteristic 'spine-pad' with about about eighteen sharp spines (text fig.101).

Female: Apparently similarly patterned to the male but specimen very worn. Bursa copulatrix thin-walled anteriorly, globose; medially with moderate sclerotisation and fine, conical signa becoming scobination posteriorly.

Diagnosis: Expanse 42-47mm., the forewing margin slightly concave below the apex, unlike L. suffusa sp. n. in which the forewing margin is convex. Large gold reniform exclusively diagnostic.

Fiji distribution:- VITI LEVU: Summit of Mt Victoria.

Remarks: A rare species apparently restricted to moss-forest. It is most curious that this should be the only Lophocoleus species collected in the nineteenth century. Known from 2♂♂, ♀ collected on the summit of Mt Victoria on 24.xi.1970 by the author and the male type (see above). The second Mt Victoria male shows a valve structure slightly different to that illustrated in text fig.95 and very similar to that of the type. The dorso-apical process is extended dorso-ventrally and appears triangular: the ventro-apical process is rather better-developed in the second specimen and there are fewer large sclerotised spines on the 'spine-pad'. Despite these difference, there is no external difference between the two Mt Victoria males and the type and I consider the three to be conspecific.

Lophocoleus rubescens sp. n.

Male: (Plate fig.189) Head and thorax red-brown; upperside of legs and sides of palps brown. Underside of body and legs dull greyish buff, the abdomen tinged with reddish dorsally. Hairs in foreleg 'sheath' white. Forewings red-brown patterned with white. Hindwings grey-buff with a white subterminal line in the anal angle. Valve with a well-developed ventro-apical process (text fig.99). Vesica with a typical 'spine-pad' with some fifteen to eighteen spines (text fig. 105).

Female: Unknown.

Diagnosis: Expanse 31-34mm.. The only Lophocoleus species with this colouration - all other known species are a shade of black or brownish black. The male valve is distinctive, showing the greatest development of the dorso-apical process in the genus.

Fiji distribution:- Type localities.

Holotype: ♂, FIJI, (Viti Levu), Tholoisuva, 14.xi.1970, H.S. & G.S. Robinson. BMNGSN 7248.

Paratype: ♂, FIJI, Vanua Levu, Ndelaikoro VHF Sta., 940m., 24-25.ii. 1971, G.S. Robinson. BMNGSN 7347.

Remarks: Exceptionally rare. The pattern of the paratype is completely obliterated.

Lophocoleus suffusa sp. n.

Male: (Plate fig. 188) Head, thorax and upperside of legs purplish grey (faded specimens dull brown). Underside of body and abdomen dull brownish grey. Forewings purplish grey, basal and postmedial lines darker. Reniform small, diffuse, white, often not apparent. Subterminal line white, ill-defined. Valve with a pronounced dorso-apical process (text fig. 97) with a ventrally-directed triangular flap and deeply excavated caudal margin. Vesica with a sclerotised 'spine-pad' dominated by one large spine, with five smaller spines, two of them blunt (text fig. 103).

Female: Similarly patterned to the male. Bursa copulatrix expanded and signate medially; anteriorly narrow, elongate and thin-walled.

Diagnosis: Expanse 37-48mm.. The male genitalia show close affinities to L. iridescens sp. n. but the spines on the vesical 'spine-pad' are more numerous (compare text fig. 103 with 102). The dorso-apical process of the valve is more elongate and the caudal margin of the valve more deeply concave than in iridescens (compare text fig. 97 with 96). Suffusa lacks iridescent blue markings and does not possess the distinct white postmedial line and reniform of L. albipuncta sp. n. (q.v.).

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Nandarivatu, Nausori Highlands, Serua. VANUA LEVU: Savundrondro Dam, Matanikavika Est..

Holotype: ♂, FIJI, Vanua Levu, Matanikavika Est., 21-28.xii.1972, H.S. Robinson. BMNGSN 7237.

Paratypes: 2♂♂, ♀, data as holotype. BMNGSN 7242♂, 7441(wings). ♂, FIJI, Vanua Levu, Savundrondro Dam, 10.ii.1971, G.S. Robinson.

Remarks: This is the commonest Lophocoleus species. In addition to the type material above, 7♂♂ and one ♀ known from Viti Levu.

Genus: Luceria Walker, 1859, List Specimens Lepid. Insects Colln Br. Mus. 19:853.

Luceria oculalis (Moore)

Chusaris oculalis Moore, 1877, Proc. zool. Soc. Lond.:614.
Type examined.

Male: Palps, head, thorax and legs buff-cream, palps dusted with black outwardly, forelegs dusted with black dorsally. Abdomen pale dull buff, paler beneath. Forewings buff-cream suffused with dull brown at the termen and below the margin, an oblique streak of ground-colour from the apex past the distal side of the reniform to the posterior margin. Reniform brownish black, a smaller black spot posteriorly. Antemedial line indicated by two blackish brown dots. Hindwing silky white with a faint suffusion of greyish cream towards the apex. Valve with a slender, sigmoid, ventrally-directed process arising from a sclerotised median fold at two thirds the length of the ventral margin and a short hook-like process from the dorsal corner of the fold. Vesica with a slender, scobinate ridge one third the length of the aedeagus.

Female: Similarly patterned to the male.

Diagnosis: Expanse 13-15mm.. Smaller and paler than Schrankia vitiensis sp. n. (q.v.) in which the reniform is a streak and the male of which has lateral and caudal hair-tufts on the abdomen and in which the terminal segment of the palp is less than one quarter the length of the penultimate segment: in oculalis the male abdomen lacks tufts, the reniform is round and the terminal segment of the palp is more than one half the length of the penultimate segment.

World distribution: Ceylon, south east Asia, through the East Indies to Australia, New Hebrides, Samoa, Tonga and Rapa I..

Fiji distribution:- VITI LEVU: Suva, Nanggali, Tholoisuva, Lautoka.
VANUA LEVU: Matanikavika Est.. LELEUVIA. NANUYA LAILAI.
NAUKATHUVU.

Remarks: This species has been confused with Schrankia vitiensis sp. n. and overlooked in the field and its distribution is probably wider than that listed. Clarke (1971:34) illustrates the male and female genitalia.

Genus: Mecistoptera Hampson, 1893, Illust. typical Specimens Lepid. Heterocera Colln Br. Mus. 9:32, 134.

Mecistoptera sp. near albisigna Hampson

Mecistoptera albisigna Hampson, 1912, J. Bombay nat. Hist. Soc. 21:1240. Type examined.

Male: (Plate fig.180) Palps, head and thorax purple-brown above: abdomen light greyish brown. Body greyish buff ventrally. Forewings purple-brown marked with brownish black: reniform and orbicular cream. Hindwing light brownish grey.

Female: Very worn singleton - larger than but apparently similarly patterned to the male.

Diagnosis: Expanse 20mm. (♂), 25mm. (♀). A small, distinctively patterned species. The singleton type differs from the Fiji male in that the forewing postmedial is apparent, forming an olive-brown crescent beyond the reniform, the concavity of the crescent proximad. The ground colour of the type forewing is silvery-brown and there is an olive-cream spot at the tornus; the orbicular is a black ring. The palps of the Fijian male appear to be more densely scaled and elongate than those of the type.

World distribution: Male type from south India.

Fiji distribution:- ♂, VITI LEVU, Nausori Highlands, 16-20.xii.1969.
♀, VITI LEVU, Tholoisuva, 14.xi.1970.

Remarks: With only three specimens available I am unable to draw firm conclusions as to the relationship of the Fijian specimens with the Indian type of albisigna. I suspect that the Fijian material is not conspecific with albisigna but further material is required before this can be confirmed.

Genus: Palaeocoleus gen. n.

Type species: Bocana sypnoides Butler, 1886, Trans. ent. Soc. Lond.:416.

Type ♀, 'Fiji', in BMNH.

Closely allied to Lophocoleus Butler (q.v.) but differing in that the included species has, overall, a rougher appearance and more rounded wings (plate fig.164). Male palp with the terminal segment twice the size of that in Lophocoleus but smaller than in Tholocoleus gen. n. (q.v.) (text fig.108). Male antenna with the four proximal segments not pectinate but segments three and four with a spine. Fifth segment with a small pecten; segments six to nine unipectinate, nine to the tip of the antenna pectinate, each pecten carrying a terminal spine, but the terminal ten segments with the pectination progressively reduced in length. Structure of male foreleg similar to that of Lophocoleus and Tholocoleus but the tibial 'sheath' extended beyond the first tarsal segment to one half the second, the tibia and tarsus clothed with elongate hairs. Genitalia reminiscent of Lophocoleus, the valve angulate (text fig 110). Aedeagus plain, vesica only with extensive fine scobination.

Monotypic; the single included species is known only from Fiji.

This genus retains some of the apparently primitive characters of Lophocoleus and Tholocoleus - almost complete antennal pectination, small terminal palp segment and unornamented vesica; however, the male genitalia are modified. The simplest conditions from which this genus and its allies might have been derived are expressed in Bocana Walker (see Bocana manifestalis Walker, above) in which the male antennae are fully pectinate, the male palp similar to that of Palaeocoleus and the genitalia simple, the valves rounded. The aedeagus is carinate terminally and the vesica finely scobinate in part. The male forelegs are not modified.

Palaeocoleus sypnoides (Butler) comb. n.

Bocana sypnoides Butler, 1886, Trans. ent. Soc. Lond.:416.

Type examined.

Male: (Plate fig.164) Head, thorax, legs and abdomen brownish black; abdomen and underside a little paler: corema of elongate pale straw hairs at the base of the foreleg. Forewings and hindwings brownish black flecked and patterned with buff, reniform orange-brown, transverse lines black. Valve illustrated in text fig.110. Aedeagus plain; vesica extensively scobinate.

Female: Similarly patterned to the male but antennae filiform and forelegs not modified.

Diagnosis: Expanse 38-49mm.. Larger, paler and with a rougher appearance than Bocana manifestalis Walker (q.v.), the male foreleg of which is normal. Differentiated from other Hypenine species by the generic characters given above.

Fiji distribution:- VITI LEVU: Nanggali, Nandarivatu, Savura Creek, Nausori Highlands, Suva. VANUA LEVU: Governor's Pool, Ndelaikoro, Matanikavika Est., Savusavu area.

Remarks: Locally, this is a common species. It is abundant at Nanggali and at Matanikavika Estate, both sites in secondary lowland forest. A female labelled "Aroa R., A.S. Meek. Joicey Bequest, Brit. Mus. 1934-120." in BMNH is clearly a close ally of, if not conspecific with, this species. (The Aroa River is 75km. north of Port Moresby, New Guinea.)

Genus: Progonia Hampson, 1896, Fauna Br. India Moths 4:538.

Progonia micrastis (Meyrick)

Simplicia micrastis Meyrick, 1902, Trans. ent. Soc. London.:43.
Type not examined, identity not in doubt.

Male: (Plate fig. 179) Head, thorax, legs and abdomen ochreous buff, abdomen slightly paler. Forewings ochreous buff, reniform dark brown. Ochreous buff colouration formed of brown scales finely freckled among a cream ground-colour. Hindwing cream suffused with ochreous buff towards the termen posteriorly; terminal dark brown line. Valves narrow, elongate, apex with a dorsal curved digitate process; sacculus extends one half the length of the valve. Vesica with about six large cornuti, several small cornuti, extensive scobination and a circular sclerotised patch.

Female: Similarly patterned to the male.

Diagnosis: Expanse 19-22mm.. A small, dull species easily identifiable by facies and separable from other members of the genus by the structure of the male genitalia.

World distribution: India and Ceylon, south east Asia, East Indies, Australia, Solomon Is., New Caledonia, New Hebrides, Samoa, Tonga.

Fiji distribution:- VITI LEVU: All localities examined.

VANUA LEVU: All localities examined. LELEUVIA. NANUYA LAILAI.
NAUKATHUVU. VIWA. ROTUMA. TAVEUNI.

Remarks: Like Lophocoleus and its allies, this genus has a modified male foreleg, the tibia forming a sheath over the first tarsal segment which is enlarged and in cross-section would appear to be deeply u-shaped. Apart from the first tarsal segment there are only two other minute tarsal segments !

Genus: Schrankia Hubner, 1825, Verz. bekannter Schmett.:345.

Schrankia furorora sp. n.

Male: Palps, head and forelegs black; thorax, abdomen and legs brownish grey; abdomen with lateral and terminal tufts of elongate buff-grey hairs. Forewing brownish black; basal line bright yellow edged distally with black, becoming obsolete towards the costa. Reniform black. Postmedial line bright yellow, edged distally with black, obsolete towards the costa, conspicuous; subterminal line pale grey, indistinct, black dots on the veins at the termen. Hindwing smokey grey. Genitalia illustrated in text fig. 126: sacculus produced into a dorsally directed process, a basal process from beneath this to one half the length of the valve. Dorsal margin of valve with a protuberance.

Female: Unknown.

Diagnosis: Expanse 12-13mm.. Externally similar to S. dochmographa Fletcher (Nat. Hist. Rennell I., Brit. Solomon Is. 2: 56, figs. 10, 11, 70, 71) from Rennell I. but the postmedial not running distally from the costa to the reniform and not with a suffusion of yellow-buff distal to it. The abdomen of male dochmographa lacks hair tufts and the valve lacks a caudally-directed basal process, dorsal margin protuberance and hook-like extension of the sacculus. The genitalia of furorora closely resemble those of S. taenialis (Hubner) (Pyralis taenialis Hubner, 1809, Samml. eur. Schmett. 6: pl.23, fig.151) from Europe and

(?)Japan but in taenialis the basal process of the male valve is broader and longer with a distinct caudal margin and extends beyond the dorsal margin protuberance of the valve to two thirds the length of the valve.

Fiji distribution:- ROTUMA only.

Holotype: ♂, FIJI, Rotuma, Fururoa, 22.iv.1971, G.S. Robinson.
BMNGSN 7394.

Paratypes: 5♂♂, data as holotype.

Remarks: A widespread and common species on Rotuma.

Schrankia vitiensis sp. n.

Male: (Plate fig.178) Head, thorax and legs pale straw flecked with grey-brown; abdomen dull buff with lateral and caudal greyish hair-tufts. Forewing pale straw flecked and patterned with dull purple-brown and grey-brown scales: orbicular and reniform black, reniform a streak: postmedial line kinked distally round the reniform and curved distally at the posterior margin and towards the costa, warm yellow-buff with some black scaling at the proximal edge. Hindwing suffused pale brownish grey, dark stigma sometimes apparent. Genitalia illustrated in text fig.127: basal process yoke-shaped, spatulate at the tip; dorsal margin of valve with a protuberance; sacculus terminating in a rounded margin at one half the length of the valve.

Female: Similarly patterned to the male but the forewing suffused with pale dull greyish brown: abdomen without hair-tufts.

Diagnosis: Expanse 15-18mm.. A species with few diagnostic facies: larger and paler than S. fururoa sp. n. (q.v.) and darker and smaller than Schrankia taona (Tams) comb. n. (Hypenodes taona Tams, 1935, Insects Samoa 3:235, pl.12, fig.6, pl.18, fig.11) from Samoa. The male genitalia are diagnostic, separating this species from fururoa (compare text fig. 127 with 126) and from taona in which the uncus is broad and bifurcate with an anterior lobe and the valve has a spine from the caudal margin.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nanggali, Vunindawa, Nandarivatu. VANUA LEVU: Savusavu area, Matanikavika Estate.

Holotype: ♂, FIJI, (Viti Levu), Tholoisuva, 14.xi.1970, H.S. & G.S. Robinson. BMNGSN 7393.

Paratypes: 5♂♂, 2♀♀, data as holotype.

4♂♂, FIJI, (Viti Levu), Nanggali, 8.xii.1970, H.S. & G.S. Robinson. BMNGSN 7457.

3♂♂, FIJI, (Viti Levu), Suva, viii.1968, H.S. & G.S. Robinson.

Remarks: A moderately common species in lowland forest.

Genus: Simplicia Guenee, 1854, in Boisduval & Guenee, Hist. nat. Insectes Lepid. 8:51.

Simplicia caeneusalis (Walker)

Sophronia caeneusalis Walker, 1859, List Specimens Lepid. Insects Colln Br. Mus. 16:94. Type examined.

Simplicia lautokiensis Prout, 1933, Stylops 2:85. Type examined.
syn. n.

Male: (Plate fig.181) Head, thorax, legs and abdomen buff-brown, thorax with a lilac sheen. Antenna swollen and kinked at one third. Forewing buff-brown; transverse lines grey-brown; subterminal line yellow-buff. Hindwing buff-cream suffused with buff towards the margin; subterminal line cream. Genitalia simple; valve with a small dorsoapical spine. Aedeagus large - about 3mm. long - with a short carina. Vesica extensively scobinate.

Female: Similarly patterned to the male; antennae filiform.

Diagnosis: Expanse 25-33mm.. An easily recognised medium-sized species. The male genitalia are diagnostic.

World distribution: South east Asia, East Indies, New Guinea, Australia, Solomon Is., New Hebrides, New Caledonia, Norfolk I., Samoa, Tahiti, Marquesas, Rapa I., Austral Is., Hawaii. Probably also Ceylon and India.

Fiji distribution:- VITI LEVU: All localities examined except Vatukoula. VANUA LEVU: All localities examined. VIWA. ONGEA. ROTUMA.

Biology: The larva feeds on Metroxylon vitiense (H. Wendl.) in Fiji and on dead leaves of chayote vine in Hawaii (see Zimmerman, 1958: 394).

Remarks: A common species, especially in wet secondary vegetation, with a wide distribution.

Genus: Tholocoleus gen. n.

Type species: Lophocoleus? astrifer Butler, 1886, Trans. ent. Soc. Lond.:417. Type ♀, 'Fiji', in BMNH.

Allied to Lophocoleus Butler (q.v.) but differing in that the forewings are narrower, the termen doubly concave (Plate fig. 176), resembling only Lophocoleus acuta sp. n. (q.v.). Male palp with the terminal segment greatly expanded (text fig.107) in comparison with that of Lophocoleus (text fig. 94) and the male antenna filiform though swollen and 'kinked' at one fifth. The structure of the male foreleg is similar to that of Lophocoleus (q.v.) but the hairs between the tibia and elongated first tarsal segment are sparse and the tarsal segments larger. Genitalia of the male with the valve rounded apically, the sacculus forming a spine at one half (text fig.109): uncus slightly swollen, with a tuft of elongate hairs on the caudal surface. Aedeagus with a group of thorn-like carinae terminally; vesica partly scobinate.

Monotypic; the single included species is only known from Fiji.

Tholocoleus astrifer (Butler) comb. n.

Lophocoleus? astrifer Butler, 1886, Trans. ent. Soc. Lond.:417. Type examined.

Male: (Plate fig.176) Head, thorax, palps and legs purple-brown above; beneath and on the abdomen buff flecked with purple-brown. Underside of terminal segment of palp tufted with yellow hairs, the palps normally held back over the head. Forewings purple-brown; medial fascia buff flecked with purplish brown; subterminal line of buff dots, a large posterior buff mark flecked with brown. Hindwings purple-brown, basally and towards the anal margin buff flecked with purple-brown; subterminal line of pale buff dots becoming continuous at the anal angle. Transverse line on fore- and hindwings black. Uncus with a medial tuft of elongate non-deciduous hairs, valve (text fig.109) with the sacculus terminating in a claw-like process at one half. Aedeagus carinate; vesica with a scobinate lobe on the caudal surface.

Female: Similarly patterned to the male but the terminal segment of the palp reduced, one third the length of the male palp, and not tufted. Forelegs not modified.

Diagnosis: Expanse 36-46mm.; a species of distinctive appearance which can be differentiated from other Hyphenine species by the generic characters given above.

Fiji distribution:- VITI LEVU: Nausori Highlands, Nandarivatu, Koro-O. VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro.

Remarks: A rare species apparently restricted to primary forest.

INDETERMINATE SPECIES A (Hypheninae)

Female: Expanse 28mm.. Head, thorax and abdomen blackish brown, greyish buff ventrally. Wings narrow: forewing margin concave with apex acute-angled; tornus truncated such that the most distal point of the wing is an angle of 110 degrees; angle of tornus approximately 160 degrees. Forewing blackish brown; costa buff from the base of the forewing to the postmedial line which is deep brownish black. Hindwing uniform charcoal grey, cream in the anterior third. Genitalia unremarkable: ductus bursae with an s-bend posteriorly, elongate medially; corpus bursae small, thin-walled, droplet-shaped.

Remarks: This taxon is represented by a single very worn female from VITI LEVU, Mt Victoria (summit - 1323m.), 24.xi.1970. BMNGSN 7249. I am unable to place this specimen owing to its state of preservation and sex.

INDETERMINATE SPECIES B (Hypheninae)

Male: (Plate fig.185) Palps, head, thorax and upperside of forelegs dark reddish purple. Abdomen light ochre tinged with purple dorsally. Antennae pectinate. Forewing deep reddish purple with several black spots (including reniform and orbicular) ringed with cream. Subterminal line of white crescents edged distally with red-brown; terminal line of black dots, each surrounded with a few white scales. Hindwing pale straw suffused distally with reddish purple. Genitalia large; margin of sacculus with a digitate process at three quarters: valve with a medial digitate process at two thirds. Vesica corrugated basally, with a coarsely scobinate terminal lobe.

Female: Similarly patterned to the male but the antennae filiform. Head, thorax and forewings olivaceous-ochreous with a tinge of pink. Hindwing with purplish pink suffusion more equitably distributed than in the male.

Diagnosis: Expanse 30-32mm.. Completely unmistakable; the males look like a bright purplish-red Hyphen species, the female rather more cryptic at rest but unmistakable when the hindwings are exposed.

Fiji distribution:- VITI LEVU: Tholoisuva.

Remarks: I have 5♂♂ and 2♀♀ of this species which is most bizarre and resembles no other Hyphenine known to me but I am loth to erect a monotypic genus to accommodate it whilst so many portions of the Hypheninae remain so poorly collected and so little studied.

INDETERMINATE SPECIES C (Hypeninae)

Male: (Plate fig. 190) Head, thorax, abdomen and legs very pale straw; palps one and a half times the dorsal length of the thorax. Antennae with large ciliate pectinations. Forewings pale straw marked with rich brown and black; in well-marked specimens a brown transverse band from the costa just below the apex to the posterior margin at one half, becoming denser posteriorly; ante- and postmedial lines black, becoming obsolete one third the wing width from the costa. Reniform black with a distal cream fleck; terminal line of black dots. Hindwing pale cream with an ill-defined brown medial band; fringes pale buff. Genitalia small, simple; valves narrow, elongate; uncus slender. Aedeagus stout, four times as long as broad; vesica scobinate basally.

Female: Similar to the male but antennae filiform; forewings evenly freckled with rich brown, darker towards the termen. Reniform a black dot; ante- and postmedial lines indicated by black dots. Hindwing suffused with very pale greyish buff.

Diagnosis: A small (expanse 14-17mm.) species with characteristic elongate, straight palps and distinctive male antennae. No close allies are known.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nanggali, Vunindawa, Nandarivatu. VANUA LEVU: Savusavu area.

FAMILY: LYMANTRIIDAE

Genus: Dasychira Hubner, 1809, Samml. exot. Schmett. 1, pl.(178).

Dasychira fidjiensis Mabille & Vuillot

Dasychira fidjiensis Mabille & Vuillot, 1890, Novit.

Lepidopterologicae 1:5, pl.1:2. Type examined.

Dasychira vitensis Bethune-Baker, 1905, Proc. zool. Soc. Lond.:92.
Type examined.

Male: (Plate fig.191) Head, thorax and legs white; face and base of forelegs dark grey; antennae white, sometimes with grey scales, pectinations brown; abdomen grey tufted with white. Forewings white flecked with grey or brownish grey to a varying extent; transverse lines sometimes defined in grey or brownish grey; ante- and postmedial fasciae sometimes suffused with deep brown or dark grey, the postmedial in the posterior half only. Hindwing white to brownish cream, variably suffused with grey postmedially. Genitalia with the valves fused ventrally, uncus absent, two flap-like socii; valves with a medial heavily sclerotised, thick, sickle-shaped process. Aedeagus short, 1.5mm. long; vesica with an encircling basal band of fine cornuti.

Female: Similarly patterned to the male but larger.

Diagnosis: Expanse 34-50mm. (males), 48-70mm. (females). The smaller extremes of both sexes are bred specimens. Lacks the overall brownish grey hindwing of D. flavobrunnea Robinson (q.v.) and the purple-brown appearance of D. nandarivatu Robinson (q.v.). The encircling band of cornuti at the base of the vesica is diagnostic.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Vunindawa, Nandarivatu, Koro-O, summit of Mt Victoria, Nausori Highlands, Lautoka, Nandi, Korolevu. VANUA LEVU: Savusavu area, Matanikavika Est., Ndelaikoro. TAVEUNI.

Biology: The larva has been bred on Rhizophora mangle L. (see Robinson, 1969) and the life history has been described. Psidium littorale Raddi has also been recorded as a larval foodplant. In February 1971, a female collected at Ndelaikoro yielded eggs which gave rise to larvae of rather different appearance from those of typical D. fidjiensis. In colour slides of the only two surviving larvae in their penultimate instar, the elongate white hairs are replaced by black and the terminal black hair tuft is absent. The genitalia of the parent female (mother 'D') and her offspring, one male and one female, do not appear to be significantly different from those of other specimens of fidjiensis from Viti and Vanua Levu.

Remarks: This is an uncommon but widespread species, apparently restricted to the largest islands of the Fiji group. Fidjiensis is an exceptionally variable species as regards forewing pattern: major variation is apparently due to four pairs of alleles (see Robinson, 1969) which permit apostatic polymorphism whilst providing a range of patterns possibly adapting the species to a Batesian mimicry complex involving the two other members of the genus in Fiji (see Robinson 1969c).

Dasychira flavobrunnea Robinson

Dasychira flavobrunnea Robinson, 1969, Entomologist's Rec. J. Var. 81: 195. Type examined.

Male: (Plate fig. 194) Head, thorax and legs cream; face and base of forelegs black; antennae white flecked with brown, pectinations brown; abdomen grey tufted with cream. Forewings white, suffused with yellow-brown and patterned with dark grey-brown. Hindwings uniform brownish grey. Genitalia similar to those of D. fidjiensis M. & V. (q.v.) but process from valves smaller and narrower. Vesica with two large patches of fine cornuti medially.

Female: Similarly patterned to the male but larger, forewing pattern darker, medial fascia suffused with medium brown, basal and postmedial fasciae flecked with black scales.

Diagnosis: Expanse 37-38mm. (males), 50-53mm. (females). The dark hindwing immediately separates this from other Fijian Dasychira species; the vesical ornamentation is diagnostic.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O.

Remarks: A rare species restricted to primary montane rain forest and known only from seven males and two females. In addition, the single male illustrated in plate fig. 193 is provisionally placed here. It was collected at Savundrondro Dam, Vanua Levu, on 10.ii.1971. The hindwing is pale buff-cream basally, the forewings strongly suffused with black, expanse 29mm.. The genitalia are similar to those of typical flavobrunnea.

Dasychira nandarivatu Robinson

Dasychira nandarivatu Robinson, 1968, Entomologist's Rec. J. Var. 80: 253, pl. 14. Type examined.

Male: (Plate fig. 192) Head, thorax and legs white, densely flecked with purple-brown, cream beneath; face and base of forelegs black; antennae white flecked with brown, pectinations brown; abdomen cream. Forewings white, flecked and patterned with brown and purple; terminal line black; basal and postmedial fasciae sometimes suffused with purplish black; basal, antemedial and postmedial lines sometimes purplish black. Hindwing buff-cream with a faint brown subterminal band. Genitalia similar to those of D. flavobrunnea Robinson (q.v.) but socii smaller; vesica without ornamentation.

Female: Similarly patterned to the male but larger, duller and darker.

Diagnosis: Expanse 33-40mm. (males), 47-53mm. (females). Smaller and more brownish than D. fidjiensis M. & V. (q.v.), the forewing pattern better defined, the hindwing ground-colour dull buff-cream, not white: lacking the dark hindwing of D. flavobrunnea Robinson (q.v.).

Fiji distribution:- VITI LEVU: Tholoisuva, Nandarivatu, Koro-O.
VANUA LEVU: Ndeiaikoro.

Remarks: A rare species restricted to primary forest.

Genus: Euproctis Hubner, 1819, Verz. bekannter Schmett.: 159.

Euproctis mimetica Robinson

Euproctis mimetica Robinson, 1969, Entomologist's Rec. J. Var. 81:196. Type examined.

Male: (Plate fig.195) Head, thorax and legs yellowish ochreous, legs flecked with dark brown; underside of head and palps and base of forelegs black. Antennae ochreous, a black dorsal dot on the shaft at three quarters. Abdomen ochreous. Forewings ochreous buff to yellowish ochre flecked with brown, in some cases (as in the illustrated specimen) the medial fascia densely suffused with dark brown. Hindwings ochreous grey.

Female: Similarly patterned to the male but larger, the ground colour of thorax and forewings medium brown, medial fascia darker brown: reniform two black dots. Underside of head and base of forelegs not black.

Diagnosis: Expanse 35-41mm. (males), 54mm. (female). A distinctive species with no close allies.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, Tholoisuva, Nanggali.

Remarks: A rare species restricted to primary forest. Known only from seven males and one female, the latter from Tholoisuva (Simmonds).

FAMILY: SPHINGIDAE

Genus: Agrius Hubner, 1819, Verz. bekannter Schmett.:140.

Agrius convolvuli (L.)

Sphinx convolvuli L., 1758, Syst. Nat. (ed.10):490. Type not examined, identity not in doubt.

Male: (Plate fig. 198) Head, thorax, legs, forewings and hindwings purplish grey, grey or greyish brown patterned with darker grey, white and black. Abdomen brown and black with purplish pink lateral patches.

Female: Similarly patterned to the male.

Diagnosis: Expanse 75-110mm.. Wing pattern and conspicuously pink-banded abdomen diagnostic.

World distribution: Europe, Africa, Asia, East Indies, New Guinea, Australia, Solomons, New Hebrides, New Caledonia, Norfolk I., Kermadec Is., Micronesia, Gilbert & Ellice Is., Samoa, Tonga, Society Is., Marquesas, Pitcairn I.

Fiji distribution:- VITI LEVU: All localities except summit of Mt Victoria. VANUA LEVU: All localities except Governor's Pool. NASAUTAMBU. NAVUTU-I-RA. MOTHE. FULANGA. VIWA. ROTUMA.

Biology: Larva described by many authors but very variable and colour is not a good guide to identity. Caudal horn reddish brown, tipped with black, shiny but very finely rugose. Head yellow, green or pale brown with four distinct vertical black stripes which are not known in any other Fijian Sphingid larva. Life history described by Swezey (1942b): foodplants in Fiji are Ipomoea batatas (L.), I. pes-caprae (L.), I. quamoclit L., Merremia peltata (L.), Alocasia indica (Roxb.), Colocasia esculenta (L.) and (doubtfully !) Vitex trifolia L..

Genus: Cephonodes Hubner, 1819, Verz. bekannter Schmett.:131.

Cephonodes armatus Rothschild & Jordan

Cephonodes armatus R. &J., 1903, Novit. zool. 9, Suppl.: 470. Type examined.

Male: (Plate fig. 199) Head and thorax olive green dorsally and laterally, pale yellow-brown ventrally. Legs pale yellow-brown, mid- and hindlegs greyish white above. Abdomen olive green dorsally with a rich brown caudal tuft; ventrally light yellow brown shading to dull red-brown laterally, a white fleck at the posterior corner of each sternite. Olive-green dorsal scales deciduous: worn specimens exhibit a rufous brown transverse band on the fifth tergite and lateral rufous brown patches on the sixth tergite. Forewings scaled grey when freshly emerged but scales are shed immediately and wings transparent marked with black costally, terminally and on the veins after the first flight. Anal angle, anterior margin of hindwing, posterior and costal margin of forewing basally with olive green scales.

Female: Similarly patterned to the male.

Diagnosis: Expanse 40-60mm.. Facies completely diagnostic.

World distribution: Marianna Is. (subsp. marianna R. & J.), Gilbert & Ellice Is., Samoa and Tonga.

Fiji distribution:- VITI LEVU: Suva, Lautoka, Nausori Highlands.
VANUA LEVU: Lambasa, Savusavu area. LELEUVIA. KANDAVU (3 miles offshore).

Biology: Has been bred from Morinda citrifolia L. in the Ellice Is. and from Guettarda speciosa L. in the Gilberts: frequently taken as a larva on cultivated Gardenia jasminoides Ellis in Fiji. Larva black, double spiracular orange-brown stripe, red dorsolateral stripe edged with white. Caudal horn black, anal claspers yellow-brown, rugose: prothorax with a large rugose yellow-brown sclerotised dorsal plate. Head black. Rarely larva green, legs red, prolegs purple-grey, rugosities of prothorax and anal claspers white, caudal horn black, lateral stripe red edged with white ventrally; spiracles white with a red oblique mark, surrounded with brown.

Remarks: Although apparently common, this species is rarely collected in light traps. Like Macroglossum spp. it can be collected hovering over flowers at dusk.

Genus: Daphnis Hubner, 1819, Verz. bekannter Schmett.:134.

Daphnis placida (Walker)

Darapsa placida Walker, 1856, List Specimens Lepid. Insects Colln Br. Mus. 8:186. Type examined.

subsp. torenia Druce

Daphnis torenia Druce, 1882, Ent. mon. Mag. 19:16. Type examined.

Male: (Plate fig. 201) Head olivaceous brown with an orange tinge; thorax olive, white and greyish ochre; legs grey-buff; abdomen shades of olive and olive brown with a white dorsal bar. Forewings olivaceous grey-brown, antemedially and apically patterned with deep olive and cream; towards the tornus a blue-grey area surrounded by a suffusion of reddish brown. Hindwings purplish black basally, cream medial band, warm brown in the terminal fascia.

Female: Similarly patterned to the male.

Diagnosis: Expanse 80-90mm.. Wing pattern completely diagnostic: differs from other placida subspecies (except steffanyi Clark which I cannot distinguish from torenia) in the abrupt, straight proximal edge to and shape of the deep olive medial fascia.

World distribution: East Indies, Formose, Philippines, Australia, New Hebrides, New Caledonia, New Guinea, Celebes (placida placida); Solomons (placida salomonis R. & J.); Samoa (placida steffanyi Clark).

Fiji distribution:- VITI LEVU: All localities examined. VANUA LEVU: All localities examined. OVALAU. LELEUVIA. FULANGA.

Biology: Bred in New Guinea from Alstonia sp. (placida placida). Three inflated larval skins from Queensland are bright orange-brown (probably faded from green), the caudal horn rugose. In one of the three skins examined there is a purple lateral line above the spiracles and two have a purple dorsal line. The metathorax carries a small lateral white 'eye' with a green centre.

Genus: Gnathothlibus Wallengren, 1859, Ofvers. K. VetenskAkad. Forh. Stockh. 15:137, gen. rev..

Type species: Gnathothlibus erotoides Wallengren, ibidem, p.137, by original designation.

Gnathothlibus erotus (Cramer) comb. n.

Sphinx erotus Cramer, 1777, Uitlandsche Kapellen 2:12, pl.104, fig.B. Type not examined, identity not in doubt.

subsp. eras (Boisduval) comb. n.

Deilephila eras Boisduval in d'Urville, 1832, Voyage de Decouvertes de l'Astrolabe (Ent.)1:185. Type not examined, identity not in doubt.

Note: The genus-group name Chromis Hubner, 1819, Verz. bekannter Schmett.:138 (type species erotus Cramer) is preoccupied by Chromis Lacepede, 1802, Hist. nat. Poiss. 3:546 (Pisces): there is apparently no objective replacement name for Chromis Hubner but erotoides Wallengren is a junior subjective synonym of erotus Cramer and therefore Gnathothlibus Wallengren is available as a subjective replacement name.

Male: (Plate fig. 200) Head, thorax, abdomen and legs red-brown, a white lateral stripe from the base of the hindwing to the top of the eye: base of palps and upperside of legs white. Forewing red-brown or deep olive patterned with dark brown and black. Hindwing bright yellow with a red-brown terminal fascia.

Female: Similarly patterned to the male.

Diagnosis: Expanse 85-110mm.. A large species with very variable forewing and body colouration: the bright yellow hindwing is diagnostic. The division of erotus into subspecies is perhaps unnecessary: the only differentiating characters seem to be the shade of underside colouring (more reddish in eras) and the width of the hindwing terminal fascia in the female (narrower in eras than in typical erotus) (Rothschild & Jordan, 1903, Novit. zool. 9, Suppl.:504).

World distribution: Ceylon, Andaman Is., Nicobar Is., East Indies (erotus erotus); New Guinea and eastern islands, Solomon Is., New Hebrides, New Caledonia, Loyalty Is., Samoa, Tonga, Guam, Gilbert Is., Austral Is., Marquesas, Niue I., Society Is., Tuamotus (erotus eras).

Fiji distribution:- VITI LEVU: All localities examined. VANUA LEVU: All localities examined. NANANU-I-RA. OVALAU. LELEUVIA. LAKEMBA. MOTHE. FULANGA. ONGEA. VIWA. ROTUMA.

Biology: Larva described by Rothschild & Jordan (ibidem: 504): in Fijian larvae the eight eye-spots on the abdominal segments are reduced posteriorly and are only obvious on segments one and two. Head dull buff to cream; caudal horn curved ventrally, almost smooth, with a black tip. Larval foodplants are Morinda citrifolia L., Pentas lanceolata (Forsk.) and Ipomoea alba L..

Genus: Hippotion Hubner, 1819, Verz. bekannter Schmett.:134.

Hippotion celerio (L.)

Sphinx celerio L., 1758, Syst. Nat. (edn 10):491. Type not examined, identity not in doubt.

Male: (Plate fig. 205) Head and thorax olivaceous ochre; palps cream, a cream band from the base of the hindwing, above the eye, to the palp; tegula with a gold stripe; body dull greyish ochreous ventrally; thorax tinged pinkish. Abdomen patterned dorsally with white and brownish black. Forewings olivaceous ochreous patterned with warm brown, cream and black, a conspicuous oblique silver-white stripe across the forewing. Hindwing rose-red basally, distally black and pinkish olive.

Female: Similarly patterned to the male.

Diagnosis: Expanse 60-80mm.. Wing pattern entirely diagnostic.

World distribution: Africa, Europe and the Middle East through northern India and south east Asia, East Indies, New Guinea, Australia, Solomons, New Hebrides, New Caledonia, Loyalty Is., Samoa, Tonga, Society Is., Ellice Is., Rapa I..

Fiji distribution:- VITI LEVU: Suva, Vunindawa, Nandarivatu, Lautoka, Nausori Highlands, Korolevu, Dombuilevu, Vatukoula, Mba.
VANUA LEVU: Savusavu area, Matanikavika Est., Ndelaikoro.
ONO (KANDAVU). YASAWA.

Biology: Larva and pupa described by Rothschild & Jordan (Novit. zool. 9, Suppl.:753, 1903); larva very variable in shade: caudal horn short, straight and black. First abdominal segment with dorsolateral eye-spots, black with blue flecks and with a yellow ring. Second abdominal segment with yellow 'eyes'. In some green larvae the centre of the first segment 'eye' is green. In some very dark larvae the yellow of the eye-spots may shade to light brown. The early stages are described by Comstock (1966). Larval foodplants in Fiji are Caladium bicolor (Ait.), Colocasia esculenta (L.), Zantedeschia aethiopica Spreng., Nicotiana tabacum L., Gossypium spp., Ipomoea aquatica Forsk., I. batatas (L.), Morinda citrifolia L. and Boerhaavia diffusa L..

Hippotion velox (F.)

Sphinx velox F., 1793, Ent. Syst. 3:378. Type not examined, identity not in doubt.

Male: (Plate fig.206) Head, thorax, abdomen and wings patterned in varying shades of cream to brown and black. Legs cream dorsally. Wing pattern very variable: the illustrated specimen shows the typical reduced forewing pattern but specimens with a pattern of oblique stripes much resembling that of H. celerio (L.) (q.v.) may be found. Some specimens are suffused overall with very pale rose-pink.

Female: As variable as the male and the range of variation similar.

Diagnosis: Expanse 70-90mm.. Larger and lacking the dorsal abdominal white stripe of Theretra pinastrina intersecta (Butler)(q.v.): lacks the basal rose-red hindwing fascia of H. celerio (L.)(q.v.).

World distribution: Ceylon and India through south east Asia, East Indies, New Guinea, Australia, Solomon Is., New Hebrides, New Caledonia, Loyalty Is., Norfolk I., Samoa.

Fiji distribution:- VITI LEVU: Suva, Vunindawa, Rakiraki, Tholoisuva, Nandarivatu, Koro-O, Korolevu, Dombuilevu, Vatukoula, Mba.
VANUA LEVU: Savusavu area, Matanikavika Est., Ndelaikoro.
NANANU-I-RA. LAKEMBA. NAVUTU-I-RA. FULANGA. ONGEA. NANUYA
LAILAI. NAUKATHUVU. VIWA. ROTUMA.

Biology: Larva reminiscent of G. erotus eras (Boisduval) (q.v.) but first abdominal segment with dorsolateral 'eyes', black flecked with white, ringed with yellow; no 'eyes' on the second segment as in H. celerio (L.) (q.v.). Caudal horn slightly curved, finely rugose, brown to black, more elongate than in celerio. Larval foodplants are Alocasia indica (Roxb.) and Ipomoea batatas (L.) in Fiji.

Genus: Macroglossum Scopoli, 1777, Intr. Hist. nat.:414.

Macroglossum godeffroyi (Butler)

Rhamphoschisma godeffroyi Butler, 1882, Ann. Mag. nat. Hist.(5)10:157.
Type examined.

Male: (Plate fig. 203) Head, thorax and abdomen olivaceous dark brown; margins of tegula white; abdomen with yellow lateral hair-tufts, segments four and five with lateral yellow bars. Body cream and red-brown ventrally. Forelegs with elongate scales ventrally and inwardly. Hindlegs with conspicuous corema of elongate yellow hairs. Forewings dull olivaceous brown patterned with darker blackish brown; sometimes the pale medial band is complete across the wing. Hindwing blackish brown patterned with yellow.

Female: Similarly patterned to the male but legs normal; forewings rather more reddish brown than in the male.

Diagnosis: Expanse 50-60mm.. Males immediately separable from all other Macroglossum species by the long scaling of the forelegs and remarkable hindleg corema (visible in plate fig. 203). Females can be separated from those of M. hirundo vitiense R. & J. (q.v.) by the more obvious dark forewing patterning and lack of pale narrow medial band.

World distribution: Apart from Fijian material the only specimen known is the male type labelled "Duke of York I." (30km. off the north-east tip of New Britain, 4°12'S., 152°28'E.).

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, summit of Mt Victoria, Nausori Highlands. VANUA LEVU: Ndelaikoro.

Remarks: A rare species restricted to primary montane rain forest. It is possible that the type is from Fiji and has been mis-labelled.

Macroglossum hirundo (Boisduval)

Macroglossa hirundo Boisduval, 1832, Voyage de Decouvertes de l'Astrolabe (Ent.) 1:184. Type not examined, identity not in doubt.

subsp. vitiense Rothschild & Jordan

Macroglossum hirundo vitiense Rothschild & Jordan, 1903, Novit. zool. 9, Suppl.:649. Type examined.

Male: (Plate fig. 204) Head, thorax and abdomen olivaceous brown dorsally, abdomen patterned with black, yellow and white: caudal tuft black. Underside of palps white; thorax and abdomen brown ventrally, thorax densely flecked with white, abdomen sparsely so. Forewing shades of olivaceous brown patterned with black. Medial band cream; in some specimens absent or reduced. Hindwing brownish black, medial fascia bright yellow.

Female: Similarly patterned to the male.

Diagnosis: Expanse 47-60mm.. Male without the hindleg hair fans of M. godeffroyi (Butler) (q.v.) which never has a white medial band in the forewing: dark and distinctive ante- and postmedial band pattern of godeffroyi absent.

World distribution: Pitcairn I. and Society Is. (typical subspecies); Samoa (M. h. samoanum R. & J.); Tonga, Cook Is. (M. h. tonganum Gehlen); New Caledonia, Loyalty Is. (M. h. lifuensis (Rothschild)); New Hebrides (M. h. confluens R. & J.); Caroline Is. (M. h. cinerascens (Butler)); Australia, Bismarck Arch., Tanimbar, Solomon Is. (M. h. errans (Walker));.

Fiji distribution:- VITI LEVU: Suva, Lautoka, Vunindawa, Rakiraki, Nandarivatu, Korolevu, Nausori Highlands, Tholoisuva, summit of Mt. Victoria, Nanggali, Dombuilevu. VANUA LEVU: Savusavu area, Matanikavika Est.. NANANU-I-RA. OVALAU. LELEUVIA. FULANGA. YASAWA. ROTUMA.

Biology: No larvae from Fiji are available although Gardenia and Morinda citrifolia L. are recorded as larval foodplants in Fiji. Larval skins of M. h. errans (Walker) from Australia are yellow-green to dark red-brown. Green specimens have a red dorsal line. All colour forms with yellow subspiracular and latero-dorsal longitudinal lines; below the latero-dorsal line a scattering of four to seven bright white dots in a dark surround on each segment. Body completely covered with minute yellow dots. Caudal horn rugose, curved dorsally. Errans adults do not seem to me to be particularly close to vitiense and the larvae could well differ.

Genus: Psilogramma Rothschild & Jordan, 1903, Novit. zool. 9, Suppl.:42.

Psilogramma jordana Bethune-Baker

Psilogramma jordana Bethune-Baker, 1905, Proc. zool. Soc. Lond.:88, pl.8, fig.1. Type examined.

Male: (Plate fig.207) Head and thorax creamy white flecked with deep chocolate brown. Legs, underside of thorax and abdomen creamy white flecked with red-brown. Forewings creamy white patterned with deep chocolate brown. Hindwings light brownish red suffused with black terminally and streaked with white towards the posterior margin.

Female: Similarly patterned to the male but larger and more densely patterned with deep chocolate brown.

Diagnosis: Expanse 88-105mm. (males), 110-130mm.(females); extreme minima (bred specimens) 66mm. male, 78mm. female. Wing pattern completely diagnostic.

Fiji distribution:- VITI LEVU: Savura Creek, Nausori, Tholoisuva, Nandarivatu, Koro-O, Nausori Highlands, Vunindawa, summit of Mt Victoria, Nanggali. VANUA LEVU: Savusavu area, Ndelaikoro.

Biology: Larva and life history were described by the author (1969b); the stridulatory mechanism and characteristics of the sound output were described by the author and H.S. Robinson (1972). The larva differs from other Fijian Sphingid larvae in that the head, anal claspers and caudal horn are rugose; the thoracic segments each carry a dorsal group of large wart-like tubercles. I can detect no apparent differences between larvae of jordana and of

P.menephron (Cramer), the widespread Indo-Australian representative of the genus. Recorded foodplants of jordana are Casuarina nodiflora Forst. f., Citharexylum spinosum L., Premna sp. and Vitex trifolia L..

Remarks: An uncommon species mainly restricted to forest areas.

Genus: Theretra Hubner, 1819, Verz. bekannter Schmett.:135.

Theretra pinastrina (Martyn)

Sphinx pinastrina Martyn, 1797, Psyche pl. 29, fig.81, pl.30, fig.85.

subsp. intersecta (Butler)

Chaerocampa intersecta Butler, 1875, Proc. zool. Soc. Lond.:623.

Male: (Plate fig.202) Head, thorax and abdomen ochreous olive dorsally, a cream line from the base of the hindwing to the tip of the palps. Tegula with a yellow-gold longitudinal line. Abdomen striped with reddish ochreous laterally; a white dorsal line. Body cream tinted with reddish ochre ventrally. Forewings olive-ochre streaked with shades of ochreous cream. Hindwing dull brown, postmedial fascia light pinkish brown.

Female: Similarly patterned to the male.

Diagnosis: Expanse 53-61mm.. The white dorsal stripe on the abdomen distinguishes this small species from other Fijian Sphingidae.

World distribution: Ceylon and India through south east Asia to the East Indies (typical subspecies); Celebes, Philippines, Australia, New Guinea, Solomon Is., New Hebrides, New Caledonia, Guam (T. p. intersecta (Butler)).

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nandarivatu, Lautoka. VANUA LEVU: Savusavu area, Matanikavika Est.. OVALAU. TAVEUNI. LAKEMBA.

Biology: Larvae from Australia have a short (3mm.) pinkish brown caudal horn, are reddish brown freckled all over with paler minute macula in longitudinal lines; fine, darker longitudinal lines separate the lines of paler dots. Lateral streak pale pinkish brown shading to yellow subspiracularly. Each abdominal segment with a small black-ringed, black-centred yellow or yellow-brown dorsolateral 'eye'. Green phase larvae with 'eyes' but without longitudinal patterning. Rothschild & Jordan (Novit. zool. 9, Suppl.:784, 1903) record Balbas and Boerhaavia as foodplants: recorded from Colocasia esculenta (L.) in Fiji.

FAMILY : GEOMETRIDAE

Subfamily: Geometrinae

Genus: Agathia Guenee, 1858, Hist. nat. Insectes Lepid. 9:388.

Agathia asterias dimota Prout

Agathia asterias Meyrick, 1888, Proc. Linn. Soc. N.S.W. (2)2:899. Paratypes examined.

Agathia dimota Prout, 1911, Entomologist 44:26. Type examined.

Agathia asterias dimota Prout, 1920, in Seitz, Macrolepid. World 12:68.

Male: (Plate fig. 211) Head and thorax charcoal grey faintly tinged with purple, patterned with bright green. Abdomen grey dorsally; laterally buff-cream. Body cream ventrally, legs cream. Fore- and hindwings bright green patterned with charcoal grey, tinges of purple and red; white spot in hindwing tornus. Deep grey patterning is usually separated from the green by a thin yellow line.

Female: Similarly patterned to the male but the charcoal grey replaced by warm brown, the dark markings more bold.

Diagnosis: Expanse 37-42mm.. A large green species with characteristic wing pattern. Resembles A. a. pisina Butler from the Solomon Is. and Espiritu Santa, New Hebrides (2♂♂ collected by the author) but lacking the two distinct green patches on the dorsal surface of the abdomen - the abdomen of dimota has a grey or brown longitudinal dorsal stripe without green maculation: the dark wing markings are heavier in pisina than in dimota.

World distribution: Solomon Is., New Hebrides (A. a. pisina Butler); New Guinea and adjacent islands (A. a. diversilinea Warren); mountains of New Guinea (A. a. ampla Prout); Kei Is. (A. a. irregularis Prout). Closely allied species (possibly subspecies - revision required) occur in the Bismarck Archipelago, Admiralty Is., Ceram, Celebes and New Caledonia.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nandarivatu, Vunindawa, Koro-O, Nanggali, Nausori Highlands, Korolevu. VANUA LEVU: Savusavu area, Ndelaikoro.

Remarks: A moderately common species usually encountered in primary forest localities.

Genus: Anisozyga Prout, 1911, Entomologist 44:26.

Anisozyga pieroides (Walker)

Comibaena pieroides Walker, 1861, List Specimens Lepid. Insects Colln Br. Mus. 22:580. Type examined.

Comibaena pacifica Felder, 1875, Reise Ost. Fregatte 'Novara', Zool., 2(Lepid.)(2), pl.127:124. Type examined. Syn. nov.

The type of pacifica Felder is, in my opinion, a female of A. pieroides (Walker) from Australia. The type has the abdomen missing: a replacement of wrong shape and size has been glued on. Felder's label says 'Viti Inf.' quite clearly but I am convinced this is an erroneous locality.

Genus: Comibaena Hubner, 1823, Verz. bekannter Schmett.:284.

Comibaena cheramota (Meyrick)

Iodis cheramota Meyrick, 1886, Trans. ent. Soc. Lond.:203. Type examined.

Male: (Plate fig.212) Head and thorax bright green dorsally; palps and base of antenna pinkish purple. Antenna and legs white but fore tibia tufted with brown scales dorsally and fore tarsus orange-brown above. Dorsal surface of abdomen green anteriorly, white and orange-brown posteriorly, white ventrally. Fore- and hindwings bright green maculated with white: stigmata brown. Termen with minute white spots surrounded by a narrow brown field forming a terminal line; fringes and costa yellow. Often the white spot in the forewing tornus and hindwing apex are enlarged.

Female: Similarly patterned to the male but larger: forewing tornus and hindwing apex with white spots always enlarged and sometimes infilled with brown. Two spectacular specimens collected by Phillips at Vunindawa have the tornal and apical spots so enlarged that they form a postmedial fascia in the fore- and hindwings, the hindwing fascia only extending halfway towards the posterior margin. In one specimen this fasciation is dark brown, in the other, red.

Diagnosis: Expanse 17-25mm.. A species with conspicuous facies; marginal line of white dots is diagnostic. Closely allied to Comibaena viridifimbria (Warren) (Comostolodes viridifimbria Warren, 1906, Novit. zool. 13:87) from New Guinea in which the wing fringes are green and there is no terminal brown line.

Fiji distribution:- VITI LEVU: Vunindawa, Lautoka, Serua, Suva, Nandarivatu, Koro-O, Nausori Highlands. VANUALEVU: Savusavu area, Governor's Pool, Matanikavika Estate. NANUYA LAILAI. OVALAU.

Biology: Larval foodplants recorded as Tagetes spp. and Myrtus vitiensis (A. Gray) in Fiji.

Remarks: An uncommon but widespread species.

Genus: Eucrostes Hubner, 1823, Verz. Bekannter Schmett.:283.

Eucrostes disparata Walker

Eucrostis disparata Walker, 1861, List Specimens Lepid. Insects Colln Br. Mus. 22:567. Type examined.

N.B. "Eucrostis" was an unjustified emendation by Hubner (1826), Verz. bekannter Schmett. Anzeiger :49, for Eucrostes Hubner, 1823.

Male: Head, thorax and abdomen light apple-green, body cream ventrally. Fore- and hindwings light apple-green; reniform and hindwing stigmata red-brown. Costa red-brown; terminal line of red-brown lunules; fringes pale pink.

Female: Similarly patterned to the male.

Diagnosis: A small species, expanse 15mm.. Smaller, greener and with narrower and less obvious termen pattern than Pyrhorrhachis pyrrhogona (Walker) (q.v.).

World distribution: Madagascar, Ceylon and India through south east Asia and the East Indies, Australia, New Hebrides.

Fiji distribution:- Known only from a female from VANUA LEVU, Matanikavika Est., 21-28.xii.1972 (H.S. Robinson) and a male from VIWA, 30.iii.1971 (G.S. Robinson).

Remarks: A rare coastal species: I have collected day-flying specimens of disparata on the southern coast of Efate, New Hebrides.

Genus: Gelasma Warren, 1893, Proc. zool. Soc. Lond.: 353.

Gelasma albifulgens Prout

Gelasma (?) albifulgens Prout, 1934, Stylops 3:251. Type examined.

Male: (Plate fig.213) Head white above, white scaling extended onto antenna for one third: face brown. Antenna pectinate to two thirds. Thorax and abdomen light silver-grey dorsally: underside of body white, some orange-brown on the legs. Fore- and hindwings silver-grey, darker at the forewing costa, extreme edge of costa orange-brown: pattern of white flecks which coalesce to form a basal line and a conspicuous white postmedial line: cell-spot white in fore- and hindwing.

Female: Similarly patterned to the male but antennae filiform.

Diagnosis: A large (expanse 28-32mm.) distinctive species. Reminiscent of Jodis subtractata (Walker) (?Thalera subtractata Walker, 1863, List Specimens Lepid. Insects Colln Br. Mus. 26:1753) which ranges from India through south east Asia to the Celebes, Philippines and Bali but which is smaller and in which the postmedial and antemedial lines are solid, silver-grey, with a distinct olivaceous tinge.

Fiji distribution:- VITI LEVU: Nandarivatu, summit of Mt Victoria, Vunindawa (q type).

Remarks: A very rare montane forest species. The only known female is the type: I have collected four males.

Gelasma quadrizona Prout

Gelasma quadrizona Prout, 1934, Stylops 3:251. Type examined.

Male: Face brownish black, top of head white; palps tipped with black, white beneath, flecked with brown laterally. Antennae white for one fifth, pectinate to two thirds, medium brown. Thorax and abdomen olivaceous silver-grey banded with dull oliv-green.

Female: (Plate fig. 214) Similarly patterned to the male; antenna pectinate to two thirds but pectinations only one third the length of those in the male.

Diagnosis: Expanse 26-30mm.. Pattern distinctive and diagnostic: this species is apparently without close allies.

Fiji distribution:- VITI LEVU: Tholoisuva, Nandarivatu, Serua, Vunindawa, Korolevu, Nausori Highlands. VANUA LEVU: Savusavu area, Governor's Pool.

Remarks: An uncommon species most often collected in primary montane forest.

Genus: Hemithea Duponchel, 1829, Hist. nat. Lepid. Fr. 7(2):106, 233.

Hemithea stuhlmanni (Prout) comb. n.

Gelasma stuhlmanni Prout, 1933, in Seitz, Macrolepid. World 12:96.
Type in ZM, Hamburg - not examined, identity not in doubt.

Male: (Plate fig. 215) Head white above, face brownish black. Antennae white for one fifth, pectinate to two thirds, brown. Posterior of head, thorax and abdomen greyish olive. Fore- and hindwings greyish olive; forewing costa yellow densely flecked with black; terminal line black, interrupted by yellow-ochre dots; ante- and postmedial lines of white dots.

Female: Similarly patterned to the male: antennae filiform.

Diagnosis: Expanse 20-24mm.. A small, dull species: there is no species of similar appearance in Fiji. Perhaps allied to Gelasma melancholica Prout (Genera Insectorum 129:149, 1912) from Sumatra, Singapore and Borneo but this species lacks the black terminal line of stuhlmanni and the yellow and black costal line is narrower (almost obsolete) in melancholica than in stuhlmanni. Apparently closely allied to Hemithea wuka Pagenstecher (Jb. nassau. Ver. Naturk. 39:153, 1886) from the Celebes, Kei Is., New Guinea and adjacent islands, Australia and Solomons, but darker and more olivaceous, the male antenna pectinate (finely ciliate in wuka).

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, Vunindawa.
VANUA LEVU: Governor's Pool, Ndelaikoro.

Remarks: A rare species restricted to primary forest. Gelasma requires extensive revision: Prout's placing of the above three species in Gelasma reflects the chaotic state of the genus which contains, for the most part, a very mixed bag of taxa with little relationship to the type species. Only the placing of this species in Hemithea is possible at this stage.

Genus: Mesurodes Warren, 1895, Novit. zool. 2:89. See also Prout, 1912, Genera Insectorum 129:149.

Mesurodes erichlora (Meyrick)

Eucrostis erichlora Meyrick, 1886, Trans. ent. Soc. Lond. 19:203.
Type examined.

Male: (Plate fig. 216) Head green but between antennae and on dorsal surface of antennae white. Palps very much reduced (only just visible with a hand lens). Antennae bipectinate to the tip, the longest pectinations approximately the diameter of the eye. Thorax and abdomen apple-green dorsally, caudally the abdominal green broken up with white: body cream ventrally. Frenulum absent. Fore- and hindwings apple-green; costa and termen red-brown to dull brown, fringes white; cell spots dull red-brown; traces of white ante- and postmedial lines.

Female: Similarly patterned to the male but antennae lamellate, minutely ciliated.

Diagnosis: A large green species, expanse 28-38mm.. Genus monotypic. The angulate hindwing and conspicuous cell-spots differentiate this species from other Fijian Geometrinae. Superficially similar to Chrysochloroma Warren (Novit. zool. 3:288, 1896) but male without frenulum, palps much smaller, bipectination of male antenna extending beyond three quarters.

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Nandarivatu, Nanggali, Lautoka. VANUA LEVU: Savusavu area, Matanikavika Est., Ndelaikoro. OVALAU.

Remarks: A very uncommon species which was only taken in any quantity at light at Mata_nikavika Estate.

Genus: Pyrrhorachis Warren, 1896, Novit. zool. 3:292.

Pyrrhorachis pyrrhogona augustata Prout

Eucrostis pyrrhogona Walker, 1866, List Specimens Lepid. Insects Colln Br. Mus. 35:1610. Type examined.

Pyrrhorachis pyrrhogona augustata Prout, 1917, Novit. zool. 24:305. Type examined.

Male: (Plate fig.222) Face and upperside of forelegs bright reddish purple; base of antennae and top of head yellow. Thorax pale turquoise above; abdomen black-spotted dorsally with a red dorsal stripe; body white ventrally. Fore- and hindwings pale turquoise; costal and terminal fasciae yellow marked with black and dull red.

Female: Similarly patterned to the male.

Diagnosis: Expanse 18-22mm.. A small, attractive species: facies are characteristic.

World distribution: South east Asia (P. p. turgescens Prout); New Guines, Solomon Is. (typical subspecies); New Hebrides, New Caledonia, Norfolk I. (P. p. augustata Prout); Australia (P. p. marginata Lucas).

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Tholoisuva, Nandarivatu, Vatuvula (Waimanu R.), summit of Mt Victoria, Koro-O, Korolevu, Dombuilevu, Vunindawa, Nausori Highlands. VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro.

Remarks: A moderately common species of primary and secondary forest areas.

Genus: Thalassodes Guenee, 1858, Hist. nat. Insectes Lepid. 9:359.

Thalassodes chloropis Meyrick

Thalassodes chloropis Meyrick, 1886, Trans. ent. Soc. Lond.:204. Type apparently lost but identity not in doubt.

Thalassodes timoclea Druce, 1888, Proc. zool. Soc.* Lond.:227, pl.13, figs. 6,7. Type examined. Syn. n.

Male: (Plate fig.217) Head, thorax and abdomen light bluish green. Antennae, top of head and underside of body white. Antennae bipectinate, pectinations light orange-brown: palps and legs tinged with light orange-brown. Abdomen and thorax posteriorly with a white dorsal line. Wings light bluish green patterned with white.

Female: Similarly patterned to the male.

Diagnosis: Expanse 23-34mm.. Differs from T. pilaria Guenee (q.v.) in that the face is green, not deep reddish brown (in faded or yellowed specimens the face may be white or yellowish), the medial white line in the forewing reaches the costa and the hindwing is evenly rounded without minute black or brown dots at the margin.

World distribution: New Caledonia, New Hebrides, Samoa, Tonga.

N.B. Specimens from these localities, although with the facies of chloropis, exhibit appreciable differences in the male genitalia from typical (Fijian) specimens of this species and appear to represent well-defined subspecies of chloropis.

Fiji distribution:- VITI LEVU: Suva, Nandarivatu, Tholoisuva, Savura Creek, Koro-O, Nanggali, Korolevu, Dombuilevu, Rakiraki, Vatukoula, Mba, Lautoka, Nausori Highlands, Vunindawa.
VANUA LEVU: Savusavu area, Governor's Pool, Ndelaikoro, Matanikavika Estate. OVALAU.

Biology: Recorded foodplant is Rhus simarubaefolia A. Gray in Fiji but see also T. pilaria Guenee (below).

Remarks: A common species in almost all localities on the largest islands of the Fiji group. The type of chloropis was in the Lucas collection and is perhaps in Australia if it still exists. Attempts by Mr. D.S. Fletcher (BMNH) to locate the type have been unsuccessful.

Thalassodes figurata Robinson

Thalassodes figurata Robinson, 1968, Entomologist's Rec. J. Var. 80:254, pl.14, text fig.5. Type examined.

Male: (Plate fig.219) Head, thorax and abdomen bright green above, white ventrally; forelegs light brown above, mid- and hindlegs buff-cream above, legs white beneath. Antenna white, tinged with green distally; pectinations light brown. Forewings and hindwings bright green, marked with white.

Female: Similarly patterned to the male.

Diagnosis: Expanse 35-49mm.. Wing pattern completely diagnostic: postmedial white area in the forewing is characteristic only of this species.

Fiji distribution:- VITI LEVU: Tholoisuva, Nandarivatu, Koro-O, Nausori Highlands, Vunindawa, summit of Mt Victoria.
VANUA LEVU: Ndelaikoro.

Remarks: An uncommon species restricted to primary forest.

Thalassodes fiona sp. n.

Male: Head, thorax and abdomen bright green with a bluish tinge above, abdomen with a white dorsal line; antennae pale brown tinged with green distally, shaft white to one half. Legs and underside of body white, legs tinged with pale brown on the upper surface. Fore- and hindwings bright green with a faint bluish tinge; postmedial line sinuate, white; wings marked with fine white maculations, more densely spaced postmedially in the forewing; dark-edged basal line apparent in the hindwing. Genitalia with flap-like process at base of valve smooth, thinly sclerotised, closely appressed to the sacculus but with a dorsal flap-like projection directed towards the uncus.

Female: (Plate fig.221) Similarly patterned to the male.

Diagnosis: Expanse 27-34mm.. A small species, the fore- and hindwing postmedial more sinuate than in other Fijian Thalassodes species, the wings more heavily maculated with white. Not as bluish as T. chloropis Meyrick (q.v.), the white postmedial not as straight nor as wide. Facies reminiscent of Thalassodes umbrimedia Warren (Novit. zool. 10:365, 1903) from New Guinea but the male genitalia of that species are very different from those of fiona, the valve with angulate dorsal and medial ventral processes and a triangular basal process, the juxta sclerotised, v-shaped and coarsely scobinate.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nandarivatu.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 12-14.ix.1969, H.S. & G.S. Robinson. BMGGSN 8233.

Paratypes: 3♂♂, ♀, data as holotype. BMGGSN 8240♂, 8239♀.
2♂♂, ♀, FIJI, (Viti Levu), Tholoisuva, vii.1968, H.S. & G.S. Robinson. BMGGSN 8237♂.
2♀♀, FIJI, (Viti Levu), Suva, 16.xi. & 28.xi.1970, H.S. & G.S. Robinson.

Thalassodes liquescens Prout

Thalassodes liquescens Prout, 1934, Stylops 3:252. Type examined.

Male: (Plate fig. 220) Head, thorax and abdomen bluish green dorsally, white ventrally. Forelegs dull green above, midlegs pale green above, hindlegs with a tinge of green above, legs white beneath. Antennae white basally, light brown tinged with green. Fore- and hindwings bluish green finely maculated with white. The green a little darker ante- and postmedially in the forewing and medially in the hindwing to form ill-defined transverse bands. Fringes dark brown.

Female: Similarly patterned to the male.

Diagnosis: Expanse 35-40mm.. The brown wing-fringes distinguish this from all other Fijian Thalassodes species.

Fiji distribution:- VITI LEVU: Savura Creek, Tholoisuva, Nandarivatu, Vunindawa, Nanggali, Nausori Highlands. VANUA LEVU: Matanikavika Estate, Ndelaikoro.

Remarks: An uncommon species associated with primary forest.

Thalassodes pilaria Guenee

Thalassodes pilaria Guenee, 1858, Hist. nat. Insectes Lepid. 9:361, pl.15, fig.2. Type not examined, identity not in doubt.

Male: (Plate fig. 218) Face brown; top of head green; antennae light brown, white basally. Thorax and abdomen bluish green, white ventrally and on the legs, the upperside of the legs tinted with light brown. Fore- and hindwings bluish green marked with white; hindwing margin angulate with a minute brown or black dot in the angle.

Female: Similarly patterned to the male.

Diagnosis: Expanse 31-34mm.. The only Fijian Thalassodes with a brown face and angled hindwing termen containing a minute black dot.

World distribution: New Caledonia, Guam (Micronesia), Samoa, Society Is., Pitcairn I..

Fiji distribution:- VITI LEVU: Suva, Lami. ROTUMA.

Biology: Larva recorded as feeding on the following plants in Fiji:

Rosa damascena Mill, Inocarpus fagiferus (Parkinson), Ricinus communis L., Syzygium jambos (L.), S. seemannianum Merrill & Perry, Barringtonia racemosa (L.), Anacardium occidentale L., Mangifera indica L.. Some of these records may well refer to misidentified specimens of T. chloropis Meyrick (q.v.) which is a much more common species in Fiji.

Remarks: A very uncommon and local species. A number of MS records of pilaria may refer to chloropis (q.v.).

Thalassodes species

Male: Head, thorax and abdomen apple-green; antennae light brown, white basally. Body white beneath; legs white, tinged with light brown above. Fore- and hindwings apple-green thickly freckled with fine, white macula; postmedial line thin, white, ill-defined.

Female: Similarly patterned to the male.

Diagnosis: Expanse 24-27mm.. A small species, rather more yellowish green than other Fijian Thalassodes. No known specimens of this species are in good condition. Smaller, more yellowish and with rounder forewings than T. chloropis Meyrick (q.v.), the postmedial line more distally placed. In the male genitalia, the flap-like process at the base of ~~the base of~~ the valves is conical, coarsely scobinate and directed towards the tip of the valve and as such is diagnostic.

Fiji distribution:- VITI LEVU: Vatuva (Waimanu R.).

Remarks: Extremely rare. In addition to two females from Vatuva, I have one male labelled "Fiji, 1966-67" (H.S. Robinson).

INDETERMINATE SPECIES (Geometrinae)

Male: Face brown, top of head green, antennae dull buff tinged with green on the shaft; thorax green dorsally; legs and ventral surface of thorax white. Fore- and hindwings bright green, brown at the forewing costa; stigmata dark brown. Genitalia unremarkable; valves extending beyond the short, stout uncus, lacking processes. Aedeagus narrow, vesica with a group of small cornuti basally.

Female: (Plate fig. 257) Similarly patterned to the male.

Diagnosis: Expanse 22mm.(male), 27mm.(female). Smaller than Mesurodes erichlora (Meyrick)(q.v.), the termen of fore- and hindwings not brown, the hindwing without an angled 'tail'.

Fiji distribution:- Known only from two specimens from VITI LEVU, a male from Koro-O, 23.xi.1971 (BMGGSN 8231) and a female from Nandarivatu, 7.11.1970 (abdomen missing).

Subfamily: Sterrhinae

Genus: Anisodes Guenee, 1858, Hist. nat. Insectes Lepid. 9:415.

Anisodes compacta lautokensis Prout

Pisoraca compacta Warren, 1898, Novit. zool. 5:426. Type examined.

Anisodes (Pisoraca) compacta lautokensis Prout, 1929, Ann. Mag. nat. Hist. (10)3:595. Type examined.

Male: (Plate fig. 225) Vertex of head and base of antennae white; remainder of head, thorax and abdomen orange-brown; abdomen buff-cream caudally. Forelegs orange-brown above; legs and underside of body buff-cream. Fore- and hindwings orange-brown suffused with purple-brown and freckled with black. Stigmata white. Genitalia asymmetric: left valve with three large digitate club-shaped processes, two heavily sclerotised, one coarsely spined, one scobinate and one thinly sclerotised and bearing fine hairs. Right valve with three rather similar but shorter processes. Aedeagus with a cornutus curved almost into a circle: vesica with a small, coarsely scobinate patch basally.

Female: Similarly patterned to the male.

Diagnosis: Expanse 25-30mm.. Shade of wing colouring variable, pinkish brown to orange-brown: pattern distinctive. This species differs from Anisodes monetaria Guenee (q.v.) in that the latter species is a dull purple-brown and lacks the well-defined subterminal line of black dots on the underside of the male forewing. In monetaria the vesica has a large, coarsely scobinate terminal patch and a small group of minute cornuti basally.

World distribution: New Guinea and adjacent islands (A. c. compacta (Warren)); Australia (A. c. niveostilla Prout).

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nandarivatu, Dombuilevu, Vunindawa, Lautoka. VANUA LEVU: Savusavu area, Matanikavika Est., Lambasa.

Biology: Larva recorded from Myrtus vitiensis (A. Gray) in Fiji.

Remarks: A moderately common and widespread species.

Anisodes decolorata (Warren)

Brachycola decolorata Warren, 1897, Novit. zool. 4:215. Type examined.

Male: (Plate fig.223) Head, thorax, abdomen and legs light buff-brown flecked with medium brown. Forelegs tinged with purple on inner surfaces, abdomen with two tufts of raised purple scales laterally at one third. Hind tibia extremely short with three elongate spurs and a purple hair-tuft. Fore- and hindwings light buff, patterned and flecked with medium brown. Genitalia rather similar to those of Anisodes gloria sp. n. (valve illustrated in text fig. 128) but the valve with a ventrally-directed spur from the caudal angle: aedeagus with a large, elongate cornutus as in gloria (text fig.129) but three quarters the size.

Female: Similarly patterned to the male.

Diagnosis: Expanse 22-26mm. Smaller than A. gloria sp. n. (q.v.); the structure of the male hindleg separates this from other Fijian Anisodes species. Gloria is a larger, more pinkish species and lacks the ventrally-directed spur from the male valve: the spur is

represented only by a small ridge-like protuberance. Decolorata is a species of coastal secondary vegetation whereas gloria is restricted to montane forest.

World distribution: Loyalty Is., Tahiti, Tuamotus, Gilbert & Ellice Is., New Caledonia.

Fiji distribution:- VITI LEVU: Suva, Lautoka. NANUYA LAILAI. NAUKATHUVU. VIWA. LELEUVIA.

Anisodes gloria sp. n.

Male: (Plate fig. 226) Lower half of face white, upper half purple-brown: inner surface of forelegs purple-brown: remainder of head, thorax, abdomen and legs light ochreous buff flecked with dark purple, abdomen with two lateral tufts of purple hairs anteriorly. Hind tibia extremely short. with three spurs and a reddish purple hair-tuft. Fore- and hindwings light ochreous buff flecked with dark purple: basal, medial and postmedial lines pale buff-grey, basal and postmedial with black dots on the venis. Terminal line of minute black dots. Hindwing cell-spot white surrounded with dark brown. Right valve illustrated in text fig.128, aedeagus in fig.129.

Female: Similarly patterned to the male.

Diagnosis: Expanse 29-32mm.. Closely allied to Anisodes niveopuncta Warren (Novit. zool. 4: 48, 1897) from Australia and New Guinea, but without the tooth-like spur from the caudal angle of the male valve, the single vesical cornutus larger: larger than and the postmedial line not as well-defined nor as serrate as in A. decolorata (Warren) (q.v.), the male genitalia appreciably different.

Fiji distribution:- VITI LEVU: Nandarivatu.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 16-20.xii.1968, H.S. & G.S. Robinson. BMGGSN 8245.

Paratypes: 2♂♂, ♀, data as holotype.
♀, as holotype but 27-30.vi.1968.

Remarks: A rare species of montane forest.

Anisodes harrietae sp. n.

Male: (Plate fig.227) Face dark brown; remainder of head, thorax and abdomen dull ochre flecked with brownish black. Inner surface of forelegs tinged with grey. Hind tibia with three spurs but without hair-tufts. Fore- and hindwings dull ochre, heavily flecked with blackish brown: ill-defined postmedial and subterminal lines of brownish black dots: reniform of two small black dots placed diagonally. Radial vein displaced anteriorly, the cell thus enlarged. Genitalia diagnostic: right valve illustrated in text fig.130. Aedeagus with a blunt hook-like carina: vesica with a finely scobinate basal lobe and a thinly sclerotised triangular area at the tip.

Female: Similarly patterned to the male but ground-colour more yellowish, venation normal.

Diagnosis: Expanse 36-44mm.. Superficially similar to A. prionodes Meyrick (q.v.) but the male venation contorted, the female more yellowish and the reniform consisting of two diagonally placed dots.

Closely allied to Anisodes intortaria Guenee (Hist. nat. Insectes Lepid. 9:419, 1858) from Ceylon, India, south east Asia, Sumatra and Borneo, but larger, the males more brownish, antennal pectinations more elongate: intortaria often exhibits dark suffusion in the forewing tornus and hindwing angle. Intortaria is represented in New Guinea, Australia and the Solomons by Anisodes nephelospila (Meyrick) (Perixera nephelospila Meyrick, 1889, Trans. ent. Soc. Lond.:487), a long-winged species with a more rounded tornus than in harrietae or intortaria, the tornus and hindwing angle again often suffused with brown.

Fiji distribution:- Localities of type material.

Holotype: ♂, FIJI, (Viti Levu), Nausori Highlands - site 3, 1950', 16-20.xii.1969, G.S. Robinson. BMGGSN 8257.

Paratypes: ♂, ♀, FIJI, (Viti Levu), Nandarivatu, 16-20.xii.1968, H.S. & G.S. Robinson. BMGGSN 8259♂.

♀, data as holotype.

Remarks: A rare species apparently restricted to montane forest.

Anisodes monetaria Guenee

Anisodes monetaria Guenee, 1858, Hist. nat. Insectes Lepid. 9:458. Type examined.

Male: Upperside of palps, forelegs and face red-brown. Vertex of head and base of antennae white. Body purple-brown above, buff-cream ventrally and towards the tip of the abdomen. Hind tibia with two spurs; hind femur with a tuft of cream hairs. Fore- and hindwing brick-red suffused with dull grey to give an overall dull purple-brown colour. Hindwing stigma white, surrounded with black. Genitalia with enormous dorsal processes from the base of each valve carrying two lobe-like projections and terminating in a semicircular flap. Sacculus produced into a semicircular thinly sclerotised lobe which carries a corema of deciduous hairs. Vesica with a coarsely scobinate terminal lobe and a basal group of fine cornuti.

Female: Similarly patterned to the male.

Diagnosis: Expanse 26-31mm.. Superficially similar to A. compacta lautokensis Prout (q.v.) but the male hind tibia with two spurs, not three. The genitalia of the males are very different. Lautokensis is the brighter of the two species and always seems to have a decidedly orange tint.

World distribution: Ceylon and India through south east Asia and the East Indies to New Guinea, Australia, Solomon Is., Gilbert & Ellice Is.(?).

Fiji distribution:- Known only from two males - VITI LEVU, Suva, 23.vi.1928 and VANUA LEVU, 5km. N of Savusavu, 9.ii.1971.

Remarks: In addition to the two males from the above localities I provisionally place here a female collected at the same locality and at the same time as the second male. This species is probably much commoner than these records suggest: it has been mistaken for A. c. lautokensis Prout in the past.

Footnote: Five further specimens of this species have now come to light; they were collected in Suva, Tholoisuva and Savusavu. Both sexes are represented.

Anisodes obliivaria Walker

Anisodes obliivaria Walker, 1861, List Specimens Lepid. Insects Colln Br. Mus. 22:643. Type examined.

Male: (Plate fig. 224) Head, thorax and abdomen light ochreous buff flecked with purple: top of face with a line of purple scales. Body cream ventrally. Legs light ochreous buff, forelegs tinged with purple. Hind tibia with two terminal spurs; hind femur with a tuft of purple and ochre hairs. Fore- and hindwings ochreous buff flecked with purple; medial band light grey; postmedial and terminal lines of black dots. Stigmata black: hindwing stigma usually infilled with white but sometimes black. Aedeagus unremarkable; vesica with a triangular sclerotised patch at one third.

Female: Similarly patterned to the male.

Diagnosis: Expanse 26-31mm.. Facies very similar to those of A. decolorata (Warren) (q.v.) but larger, the structure of the male hindleg differentiating the two species: in decolorata the hind tibia is extremely short and carries three elongate spurs.

World distribution: Ceylon and India through south east Asia, East Indies, New Guines, Australia, Solomons, New Hebrides, Samoa.

Fiji distribution:- VITI LEVU: Suva, Namanggumangua (Serua).
VANUA LEVU: Savusavu area. ROTUMA.

Remarks: A rare coastal species.

Anisodes prionodes Meyrick

Anisodes prionodes Meyrick, 1886, Trans. ent. Soc. Lond.:209. Type examined.

Male: Head, thorax and abdomen light ochreous buff flecked with dark brown. Face and inner surface of forelegs tinted with dull red-brown. Pectinations of antennae exceptionally long. Hind tibia with two terminal spurs; hind femur with a purplish hair-tuft. Fore- and hindwings light ochreous buff flecked with dark brown and a few black dots: subterminal and terminal lines of black dots: wing margins deeply scalloped. In some specimens the hindwing cell-spot is grossly enlarged (ab. discifera Prout, 1938, in Seitz, Macrolepid. World 12:178). Genitalia with two distinctive sclerotised flaps at either side of the anal tube. Aedeagus short: vesica with about fifteen thorn-like cornuti.

Female: Similarly patterned to the male.

Diagnosis: Expanse 35-42mm.. A large, narrow-winged species with markedly scalloped wings. Male with venation normal, radial not displaced as in A. harrietae sp. n. (q.v.). Females not as yellowish as those of harrietae: reniform a single black dot, not a pair of diagonally spaced dots as in harrietae.

Fiji distribution:- VITI LEVU: Nandarivatu, Nanggali, Serua, Vunindawa, Nausori Highlands. VANUA LEVU: Savusavu area. OVALAU.

Remarks: A moderately common forest species.

Anisodes samoana (Warren)

Brachycola samoana Warren, 1897, Novit. zool. 4:216. Type examined.

Male: (Plate fig. 228) Face purple-brown above, white below: palps short, thick, upcurved, rough-scaled above. Remainder of head, thorax, legs and abdomen buffy cream flecked with brownish black and black. Hind tibia with two terminal spurs. Fore- and hindwing buffy cream with a fleshy tinge, flecked with brown and with pale grey transverse bands: basal, postmedial and terminal lines of black dots. Aedeagus twisted helically through one and a half turns at the tip: vesica apparently without ornamentation.

Female: Similarly patterned to the male.

Diagnosis: Expanse 24-28mm.. A small, narrow-winged species, the only Fijian Anisodes without a purplish hair-tuft on the male hindleg with the exception of the distinctive A. harrietae sp. n. (q.v.).

World distribution: Loyalty Is., New Caledonia, New Hebrides (Erromanga, Aneityum), Samoa, Society Is..

Fiji distribution:- VITI LEVU: Suva, Nanggali, Nandarivatu, Koro-O, Nausori Highlands, Lautoka. VANUA LEVU: Savusavu area, Matanikavika Est., Ndelaikoro. OVALAU.

Biology: Larva recorded from Syzygium cumini (L.) and Cosmos sulphureus Cav. in Fiji. Pupa described by Comstock (1965).

Remarks: A moderately common and widespread species, samoana is replaced in the northern New Hebrides by the very similar but long-palped (in the male) A. praetermissa Bastelberger.

Anisodes species

A single very worn male from VANUA LEVU, Ndelaikoro VHF Sta., 940m., 24-25.ii.1971, G.S. Robinson. Expanse 35 mm.. Upperside of body and wings bright yellow, thickly freckled with dark purple. Hindwing stigma a large purplish black dot. Hind femur with a reddish-purple hair tuft; hind tibia with two terminal spurs. Genitalia differing from A. prionodes Meyrick (q.v.) in that there are no large sclerotised flaps either side of the anal tube: the aedeagus is narrower and the vesica bears about ten small thorn-like cornuti.

Genus: Idaea Treitschke, 1825, Die Schmett. Europa 5(2):446.

Idaea bathromyses (Prout)

Sterrrha bathromyses Prout, 1934, Stylops 3:252. Type examined.

Male: Face brownish black, white below: remainder of head, thorax, legs and abdomen ochreous buff. Hind tibia with a well-developed greyish ochre hair tuft with a slight pink tinge. Fore- and hindwings yellow-ochre freckled and patterned with dull purple-brown. Forewing postmedial equidistant between cell-spot and termen.

Female: (Plate fig.233) Similarly patterned to the male.

Diagnosis: Expanse 19-21mm.. A distinctive species but closely allied to I. dicenea (Prout) (q.v.): I cannot distinguish between the male genitalia of the two species. In dicenea the postmedial

is placed closer to the termen than the cell-spot, the medial line is pronouncedly bowed round the cell-spot, the ground-colour of the forewings is off-white to light buffy cream and the overall appearance is purplish. The hair tuft of the male hind tibia is much brighter in dicenea, a dull purplish red.

Fiji distribution:- VITI LEVU: Nandarivatu, Vunindawa.
VANUA LEVU: Ndelaikoro.

Remarks: The three specimens I place here (♂, ♀ Ndelaikoro; ♂, Nandarivatu) appear to be quite distinct from eleven specimens of dicenea and match Prout's original description of bathromyses very well: Prout's type of bathromyses and the associated material (some of which I believe is doubtfully placed) is badly faded.

Idaea dicenea (Prout)

Sterrrha dicenea Prout, 1934, Stylops 3:253. Type examined.

Male: Face blackish; head, thorax, abdomen and legs ochreous cream densely flecked with dull purple dorsally. Hind tibia with a dull reddish purple hair tuft. Fore- and hindwings off-white to buffy cream densely flecked with dull purple. Medial line curved round cell-spot in forewing: postmedial closer to termen than to cell-spot. Subterminal proximally dentate between radials, expanded into conspicuous white spots, often touching the postmedial.

Female: Similarly patterned to the male.

Diagnosis: Expanse 18-21mm.. More purple or mauve in appearance than I. bathromyses (Prout) (q.v.), the wing ground-colour never of so deep a yellowish ochre tint: male tibial hair tuft brighter, postmedial more distally placed than in bathromyses.

Fiji distribution:- VITI LEVU: Nandarivatu, summit of Mt Victoria, Nausori Highlands, Vunindawa, Rewa River. VANUA LEVU: Matanikavika Estate.

Remarks: An uncommon species of primary forest.

Idaea rhipistis (Meyrick)

Pythodora rhipistis Meyrick, 1886, Trans ent. Soc. Lond.:205.
Type examined.

Male: (Plate fig.232) Face and inner surface of forelegs brownish purple: remainder of head, thorax, legs and abdomen light ochre. Hind femur with an enormous brownish purple hair tuft. Fore- and hindwings light ochre densely flecked with light purple to purple-brown scales: transverse lines very light grey: stigmata deep brown.

Female: Similarly patterned to the male.

Diagnosis: Expanse 17-19mm.. More lightly marked than I. bathromyses (Prout) (q.v.), the male with a larger hindleg hair tuft. Larger, more ochreous and with more rounded wings than Scopula homodoxa (Meyrick) (q.v.), the male of which lacks a hair tuft: hindwing veins M1 and R5 stalked, not arising from the corner of the discal cell as in Scopula spp..

World distribution: ?Tonga (MS record only - specimens not seen).

Fiji distribution:- VITI LEVU: Suva, Nandarivatu. VANUA LEVU: Ndelaikoro, Matanikavika Estate. VIWA. NANANU-I-RA. TAVEUNI.

Remarks: A single female from Ndelaikoro is decidedly brownish in comparison with other specimens of rhipistis: it is provisionally placed here. This is an uncommon but apparently widespread species.

Genus: Pseuderythrolophus Prout, 1932, Novit. zool. 37:229

Pseuderythrolophus bipunctatus idmon (Prout)

Erythrolophus bipunctatus Warren, 1899, Novit. zool. 6:334.

Type examined.

Erythrolophus bipunctatus idmon Prout, 1930, Ann. Mag. nat. Hist. (10)6:690. Type examined.

Male: (Plate fig. 229) Face brown, remainder of head, thorax and abdomen buffy cream flecked with purple-brown. Inner surface of forelegs brownish; legs buffy cream: hind tibia very short, as long as first tarsal segment, with two tufts of elongate hair, lacking spurs. Fore- and hindwings buffy cream flecked with purple-brown, patterned with light grey: terminal and subterminal lines of black dots: overall, a rosy tinge.

Female: Similarly patterned to the male: hindleg normal, tibia with three spurs.

Diagnosis: Expanse 26-29mm.. Facies reminiscent of Anisodes spp. but palps very small in both sexes: male hindleg exceptionally short: wing pattern diagnostic.

World distribution: New Guinea, Australia, Ceram, Dampier I. (typical subspecies).

Fiji distribution:- VITI LEVU: Vunindawa, Nandarivatu, Tholoisuva, Nanggali, Lautoka. OVALAU.

Remarks: A rare species of primary forest. The Lautoka specimen was collected by Phillips (21.v.1930) and is in the SPSM collection.

Genus: Scopula Schrank, 1802, Fauna Boica 2(2):162.

Scopula epigypsa (Meyrick)

Trichoclada epigypsa Meyrick, 1886, Trans. ent. Soc. Lond.:208.

Type not found - identity not in doubt.

Idaea nivipennis Butler, 1886, Trans. ent. Soc. Lond.:436.

Type examined.

Acidalia cernea Druce, 1888, Proc. zool. Soc. Lond.:227, pl.13, fig.8. Type examined.

Male: (Plate fig. 230) Face and inner surface of forelegs black: vertex of head, base of antennae, thorax and abdomen glossy white. Legs tinted with orange-brown. Prothoracic 'collar' and forewing costa orange-brown. Wings glossy white, stigmata black; medial and postmedial lines grey; subterminal fasciae flecked with black scales in two rows parallel to the termen.

Female: Similarly patterned to the male.

Diagnosis: Expanse 20-23mm.. A readily distinguishable glossy-white species with no particularly close allies.

Fiji distribution:- VITI LEVU: Mba River, Suva, Savura Creek, Tholoisuva, Nandarivatu, Koro-O, Nanggali, Korolevu, Dombuilevu, Lami. VANUA LEVU: Governor's Pool, Savusavu area, Ndelaikoro. TAVEUNI. YASAWA. NANUYA LAILAI. NAUKATHUVU. VIWA. NANANU-I-RA.

Biology: Larva recorded from Ficus obliqua Forst. f. in Fiji.

Remarks: A widespread and common species. The type of this species was in the Lucas collection and, like the types of Thalassodes chloropis and Scopula homodoxa, has not been traced.

Scopula homodoxa (Meyrick)

Acidalia homodoxa Meyrick, 1886, Trans. ent. Soc. Lond.:208.

Type not found - Lucas collection - identity not in doubt.

Male: (Plate fig.231) Face black; vertex of head and base of antennae white; thorax, abdomen and legs buff-cream with a few black scales; prothoracic 'collar' light orange-brown. Fore- and hindwings buff-cream flecked with a few black scales: stigmata and terminal line of dots black: transverse lines pale buff, serrate, becoming broader towards the termen.

Female: Similarly patterned to the male.

Diagnosis: Expanse 15-17.. A small, sharp-winged species. Glossier, smaller, more sharp-winged and with a better-developed pattern of transverse lines than Idaea rhipistis (Meyrick) (q.v.), the males without the well-developed tuft on the hind tibia: in male homodoxa the hind leg is short, the tibia swollen.

World distribution: New Guinea, Australia, New Caledonia, Loyalty Is., Samoa, Tonga.

Fiji distribution:- VITI LEVU: Suva, Rakiraki, Lautoka, Dombuilevu, Vatukoula. VANUA LEVU: Savusavu area, Matanikavika Estate. NANANU-I-RA. ONO(KANDAVU). LELEUVIA. YASAWA. NANUYA LAILAI. NAUKATHUVU. VIWA. ROTUMA.

Remarks: A common and widespread species in areas of low rainfall and secondary vegetation. The type of this species has not been located (see remarks on Scopula epigypsa above).

Scopula julietae sp. n.

Male: Face and inner side of forelegs black; head, thorax and abdomen otherwise white. Fore- and hindwings white, stigmata black. Forewing costa suffused with slate-grey; medial, postmedial and subterminal lines light brownish grey, serrate. Medial and postmedial lines widely separate; postmedial fascia not lightly dusted with brownish grey as in the remainder of the wing and thus forming a white diagonal band across fore- and hindwings. Subterminal expanded caudally in the forewing to form a conspicuous brownish grey dot; terminal line of black dots. Genitalia minute; valve with a short ventral lobe, an elongate, slightly curved, heavily sclerotised process extending beyond the apex of the tegumen and an elongate, thinly sclerotised blunt-tipped basidorsal process extending to one half of the length of the uncus. Aedeagus minute, narrow; vesica with a group of fine thorn-like cornuti basally (text fig. 134). Seventh segment illustrated in text fig. 132.

Female: Similarly patterned to the male.

Diagnosis: Expanse 16-22mm.. A distinctively patterned species, the only Fijian Sterrhine with a pure white ground-colour to the wings with the exception of the larger S. epigypsa Meyrick (q.v.) in which the forewing costa is orange-brown. This species has no close allies: the male genitalia and wing pattern are diagnostic.

Fiji distribution:- VITI LEVU: Nandarivatu, Tholoisuva.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 15-17.viii.1969, H.S. & G.S. Robinson. BMGGSN 8268.

Paratypes: ♂, data as holotype. BMGGSN 8269.

♂, as holotype but vi.1968.

2♂♂, ♀, as holotype but 12-14.ix.1969.

♀, as holotype but 16-20.xii.1968.

4♂♂, FIJI, (Viti Levu), Tholoisuva, 15.xi.1970 (2), 9/10.i.1971(2),
H.S. & G.S. Robinson.

Remarks: An uncommon species of primary forest.

Scopula sublinearia ida subsp. n.

Acidalia sublinearia Walker, 1866, List Specimens Lepid. Insects
Colln Br. Mus. 35:1632. Type examined.

Male: Head, thorax, legs and abdomen silver grey tinged with buff and flecked with black. Face and inner side of forelegs brownish black. Fore- and hindwings silver-grey with a buff tinge, lightly flecked with brownish black; stigmata black; postmedial line light grey, serrate; subterminal line light grey with black dots on the veins; subterminal fascia suffused with light grey, veins cream, a fine cream transverse line almost at the termen; terminal line of black dots. Seventh segment illustrated in text fig. 131, aedeagus in text fig. 133.

Female: Unknown.

Diagnosis: Expanse 18-21mm.. A distinctive silvery-grey species. Differs from nominotypical sublinearia from Queensland in being larger and brighter, the socii in the male broader terminally and the aedeagus much larger, the sinuate cornutus more heavily sclerotised and elongate.

World distribution: Australia, Kei Is., Formosa (?) (sublinearia);
Sudest I. (s. massimensis Prout).

Fiji distribution:- VITI LEVU: Nandarivatu.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 15-17.viii.1969,
H.S. & G.S. Robinson. BMGGSN 8267.

Paratypes: 2♂♂, data as holotype.

4♂♂, as holotype but 12-14.ix.1969. BMGGSN 8270.

Remarks: A rare species of montane forest.

Genus: Symmacra Warren, 1896, Novit. zool. 3:116.

Symmacra solidaria baptata (Warren)

Nemoria solidaria Guenee, 1858, Hist. nat. Insectes Lepid. 9:348.
Type examined.

Sterrha baptata Warren, 1897, Novit. zool. 4:224. Type examined.

Male: (Plate fig.234) Face and inside surface of forelegs red-brown; remainder of head and legs, thorax and abdomen silvery white dorsally, white ventrally. Fore- and hindwings pale silver, patterned with white, a transverse line of raised white scales at the end of the cell in the hindwing.

Female: Similarly patterned to the male.

Diagnosis: Expanse 18-23mm.. Facies completely characteristic: baptata is markedly different from the other subspecies of solidaria which are silvery olive-green.

World distribution: Tibet, west China (s. sinensis Prout); Ceylon and India to the East Indies (s. solidaria Guenee); Celebes (s. validaria Walker); New Guinea and adjacent islands (s. ochrea Warren); Samoa (s. baptata Warren).

Fiji distribution:- VITI LEVU: Nandarivatu, Lautoka, Rakiraki, Nausori Highlands. VANUA LEVU: Savusavu area, Ndelaikoro. OVALAU. NANUYA LAILAI. NAUKATHUVU.

Remarks: An uncommon species on the larger islands of the Fiji group but apparently common in the southern Yasawas.

Subfamily: Larentiinae

Genus: Brabira Moore, 1888, Descr. new Indian Lepid. Colln
Atkinson: 271.

Brabira apatopleura Prout

Brabira apatopleura Prout, 1934, Stylops 3:256. Type examined.

Male: (Plate fig.235) Head, thorax and abdomen olivaceous brown, the postero-lateral scales of each abdominal segment with a metallic appearance. Forelegs black and cream: mid- and hindlegs buff-brown. First and second abdominal segments elongate: tympanum exposed and obvious. Antennal pectinations curled. Fore- and hindwings olivaceous brown marked with buff-cream and black, a purplish tinge in fresh specimens. Base of hindwing scale-less.

Female: Similarly patterned to the male but paler, antennae filiform. Hindwing scaled basally: tympanum hidden.

Diagnosis: Expanse 27-31mm.. A distinctive species allied to Brabira emerita Prout (Sarawak Mus. J. 3:189, pl.16, fig.1, 1926) from Borneo but darker, the palps longer, the male forewing apex more rounded.

Fiji distribution:- VITI LEVU: Tholoisuva, Nandarivatu, Vunindawa.

Remarks: A rare species of primary forest: 9♂♂, 2♀♀ known.

Genus: Chloroclystis Hubner, 1825, Verz. bekannter Schmett.:323.

Chloroclystis bosora (Druce)

Larentia bosora Druce, 1888, Proc. zool. Soc. Lond.:228, pl.13, fig.10. Type examined.

Male: Head, thorax and abdomen light olive-green above, pinkish cream ventrally: first three and terminal abdominal segments dusted with purple-brown dorsally. Abdomen exceptionally elongate. Fore- and hindwings white to pinkish cream patterned with light olive green, light purple-brown and black, the pattern rather variable. Genitalia unremarkable: aedeagus 2mm. long; vesica with a sinuate sclerotised band: a corema of two tufts of elongate light-coloured hairs from membrane at base of vinculum.

Female: (Plate fig. 245) Wings more rounded, abdomen shorter than in the male but similarly patterned: there is a tendency towards reduction of the general olive-green suffusion of fore- and hindwings and concentration of colour into finely serrate transverse bands. Bursa copulatrix with anterior surface densely signate three lines of signa running caudally, one line ridged, the signa compacted. Longitudinal lines of signa separated by fields of lightly sclerotised, spicular signa.

Diagnosis: Expanse 19-23mm.. Paler and never as rosy-tinted as Chloroclystis rubicunda Prout (q.v.) (male - plate fig. 250).

I cannot distinguish between the female genitalia of the two species but male rubicunda differ from bosora in that the coremata hairs are dark and 5.5mm. long, the aedeagus is a little more elongate but the vesical ornamentation similar, the valves and vinculum are more elongate and the caudally-directed processes from the base of the transtilla are twice as long in rubicunda as in bosora.

World distribution: New Hebrides (Tanna, Aneityum), Samoa.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Vunindawa, Lautoka, Nandarivatu, summit of Mt Victoria. VANUA LEVU: Savundrondro Dam, Ndelaikoro.

Remarks: An uncommon species of primary forest.

Chloroclystis encteta Prout

Chloroclystis encteta Prout, 1934, Stylops 3:254. Type examined.

Male: (Plate fig. 291) Head, thorax and abdomen cream, dusted with light grey-brown: forelegs brownish black banded with white at articulations: mid- and hindlegs buff-cream. Forewing with costal fold at one half containing conspicuous tuft of black and cream hairs; from costal fold to subterminal line, a narrow depression containing minute yellow appressed scales, bowed posteriorly. Fore- and hindwings patterned with grey-brown. Terminal segment of abdomen with complex corema dominated by a pair of tufts of elongate dark brown scales. Genitalia box-like with two elongate spines from base of vinculum. Aedeagus with at least six tooth-like cornuti on the vesica basally, adjacent to a large number of much smaller cornuti; terminally a group of fine, spicular cornuti.

Female: (Plate fig. 246) Lacking secondary sexual characters of male forewing: body and wings white patterned with brownish red and black.

Diagnosis: Expanse 14-17mm.. Allied to Chloroclystis insigillata (Walker) (Bupithecia insigillata Walker, 1862, List Specimens Lepid. Insects Colln Br. Mus. 24:1245) but much smaller and brighter (insigillata is predominantly grey); the bowed, sunken line of yellow scales in the male forewing of insigillata is not well-developed. The basal vesical cornuti of encteta appear to be absent in insigillata.

World distribution: New Hebrides (Aneityum, Santo).

Fiji distribution:- VITI LEVU: Tholoisuva, Nandarivatu, Koro-O summit of Mt Victoria. VANUA LEVU: Governor's Pool, Ndelaikoro. YASAWA (! - single specimen).

Remarks: A moderately common species restricted to primary forest. I am certain that the specimen from Yasawa is a vagrant.

Chloroclystis hypotmeta Prout

Chloroclystis hypotmeta Prout, 1934, Stylops 3:255. Type examined.

Male: (Plate fig. 248) Body mixed cream and light olive-green when fresh, ochreous when faded. Abdomen banded with dull brown medially and with a ventral black tuft. Fore- and hindwings mixed cream and light olive-green, tinted pinkish in fresh specimens, patterned with brown and black, the anterior third of the hindwing suffused with reddish orange. Hindwing with a strong fold from cell to termen into which is inserted an elongate (3mm. long) tuft of hairs arising from the underside of the posterior margin of the forewing. Underside of fore- and hindwings suffused with rosy orange: base of forewing with specialised scaling. Genitalia with tufts of elongate dark-tipped hairs from the membrane at the base of the vinculum: aedeagus with a sclerotised band at the tip of the vesica.

Female: Similarly patterned to the male but the forewings more rounded, the rosy suffusion reduced and absent from the anterior third of the hindwing. Underside of wings reddish orange. Specialised scaling, hindwing fold and elongate hair tuft from forewing absent. Bursa copulatrix with an anterior triangular zone of dense, thorn-like signa.

Diagnosis: Expanse 14-17mm.. Males easily recognisable: females with their light olive-green markings and pronounced ante- and postmedial dark bands in the forewing rather different from other Pacific Chloroclystis. Pinkish orange underside of wings is diagnostic.

World distribution: New Hebrides (Anatopyum, Santo).

Fiji distribution:- VITI LEVU: Vunindawa, Tholoisuva, Nandarivatu, Koro-O. VANUA LEVU: Matanikavika Estate.

Remarks: A rare species apparently restricted to primary forest.

Chloroclystis katherina sp. n.

Male: (Plate fig. 292) Head, thorax and abdomen buff tinged with dull green: legs and underside of body pale dull buff, legs flecked with brown above. Abdomen marked dorsally with dull purplish brown anteriorly and medially. Fore- and hindwings buff-cream marked with reddish brown and very deep purplish brown. In forewing, antemedial line runs straight from Sc to one half then is reflexed, a marked posterior kink from which a dark streak to termen: postmedial bowed sharply outward. Genitalia with rhomboidal valves, sacculus produced into slight point at one third of ventral margin: corema of elongate pale hairs from membranous lobe at edge of vinculum below base of valve. Aedeagus with three or four large and three small cornuti and sclerotised terminal band on vesica (text fig. 137).

Female: Similarly patterned to the male. Colliculum elongate, slightly corrugated: ductus bursae short, kinked: bursa filled with fine, elongate signa which extend in a line a short way up the ductus bursae.

Diagnosis: Expanse 15.5-18mm.. Wing pattern (notably the angulate antemedial and posterior streak in the forewing) and male genitalia diagnostic. Closely allied to Chloroclystis invisibilis Warren (Novit. zool. 14:104, 1907) from New Guinea but the spike-like elongation of the antemedial line from the subcosta is not nearly so pronounced in invisibilis and the postmedial line is more rounded and slightly serrate.

Fiji distribution:- Localities of type material.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 16-20.xii.1968, H.S. & G.S. Robinson. BMGGSN 8287.

Paratypes: ♀, data as holotype. BMGGSN 8293.

♀, as holotype but 27-30.ix.1968. BMGGSN 8294

3♀♀, as holotype but 21.xi.1971.

♂, ♀, as holotype but Koro-O, 22.xi.1971.

♂, as above but 24.xi.1971.

2♂♂, FIJI, (Viti Levu), Nausori Highlands, 16-20.xii.1969, G.S. Robinson. Site 1 - 2200'; Site 2 - 2000'.

Remarks: A rare species apparently restricted to montane forest.

Chloroclystis lepta Meyrick

Chloroclystis lepta Meyrick, 1886, Trans. ent. Soc. Lond.:191.
Type examined.

subsp. fluctuosa Prout stat. n.

Chloroclystis fluctuosa Prout, 1934, Stylops 3:254. Type examined.

Male: Head, thorax and abdomen warm buff ventrally; dorsally flecked with brownish black, tinged olivaceous. Forelegs brownish black above, warm buff at articulations: remainder of legs warm buff. Fore- and hindwings warm buff patterned with brown and black; tinged olivaceous when fresh. Genitalia with the valves ovate, processes from the base of the vinculum carrying a corema of thin, elongate scales. Aedeagus short, stout; vesica with many fine cornuti, about twelve coarse thorn-like cornuti and a scobinate, ridged patch. Eighth segment illustrated in text fig. 135, showing the spines from the sternite.

Female: (Plate fig. 247) Similarly patterned to the male. Colliculum short and broad; bursa globular with numerous elongate (ca. 0.15mm.) signa in two oval rosette patterns.

Diagnosis: A small (12-14mm.) species of somewhat khaki appearance and a dense pattern of transverse lines. The pale zone in the subterminal fascia of the forewings is an obvious and useful character.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nandarivatu, Koro-O, Vatuvula (Waimanu R.), Vunindawa.

Remarks: A moderately common species but one which is easily overlooked: probably widespread.

subsp. rotumensis subsp. n.

Differs from the typical subspecies in that the overall appearance is more brownish, the medial fascia with the dark transverse lines ill-defined but not obsolete as in lepta lepta and the vesica of the male with only five or six coarse thorn-like cornuti, shorter than in lepta lepta, and no fine cornuti as in lepta fluctuosa. Eighth segment illustrated in text fig. 136 - sternal spines of l. fluctuosa absent but a narrow sclerotised raised ridge. Female genitalia similar to those of l. fluctuosa.

Fiji distribution:- ROTUMA.

Holotype: ♂, FIJI, Rotuma I., E. of Solmafua, 23.iv.1971, G.S. Robinson. BMGGSN 8313.

Paratypes: 2♂♂, data as holotype.

♂, 3♀♀, as holotype but Noatau, 26.iv.1971. BMGGSN 8314♀.

♀, as holotype but Oinafa fdr. rd., 24.iv.1971.

♀, as holotype but Furoroa, 22.iv.1971.

Remarks: A moderately common species on Rotuma.

subsp. lepta Meyrick

Markings pale. medial fascia with no more than traces of transverse lines. Vesica with about twelve elongate cornuti. Structure of eighth segment unknown. The male holotype is from the Marshall Is.. A specimen from Moorea, Society Is. has similar male genitalia to the holotype of lepta and is of similar appearance and is placed here, likewise a female from Woodlark I.. A female from Tahiti placed here by Prout has the forewing to two thirds and the hindwing tinged with yellow: I believe its placing is dubious.

subsp. aeneta Prout

Chloroclystis lepta aeneta Prout, 1958, Bull. Br. Mus. (Nat. Hist.), Ent. 6:409. Type examined.

Ground colour almost chalky: transverse lines narrow, few, pale orange-brown: forewing basal, antemedial and postmedial lines dark brown at the costa. The holotype female (with badly damaged glued abdomen) is from Tonga and is the only known specimen of this subspecies.

subsp. mempta Prout stat. n.

Chloroclystis mempta Prout, 1928, Insects Samoa 3:136. Type examined.

Wings somewhat pinkish, pattern diffuse, transverse lines not clear but medial fascia well-patterned and thus darker than in lepta rotumensis. Differs from all other lepta subspecies in the ornamentation of the vesica which bears at least fifteen elongate, robust cornuti. The type is from Samoa.

Chloroclystis linda sp. n.

Male: Body olivaceous buff dorsally, the abdomen marked anteriorly with black and dull reddish brown. Legs and underside of body light ochre with a faint pinkish tinge. Forewings light olive green: medial fascia of serrate, dull red-brown transverse lines which become denser anteriorly. Costa marked along its length with dull red-brown. Terminal fascia dull brown, expanded to the subterminal at the costa and at one third. Fringes ochreous tinged with purple-brown. Costa of forewing markedly bowed anteriorly and with elongate hairs to one half. Hindwing similarly patterned to the forewing but the terminal fascia only infilled with dull brown at the apex. Pattern somewhat variable: subterminal line sometimes evident - diffuse dull brown: sometimes a pale line between the postmedial and subterminal. Genitalia with valves narrow, sacculus produced into a short, blunt process. Vesica with a sclerotised terminal band but no conspicuous ornamentation. Eighth sternite illustrated in text fig. 138, triangular, with a bifid caudal process.

Female: Similarly patterned to the male but costa not bowed. Bursa copulatrix spheroidal, walls with small, short signa becoming more densely packed anteriorly. Anterior portion of ductus bursae heavily sclerotised, conical, joining the bursa at one half, narrowing before joining the colliculum.

Diagnosis: Expanse 11.5-14mm.. A very small green and brown species which is very susceptible to fading. The markedly bowed male costa is diagnostic within Fijian Chloroclystis. Closely allied to Chloroclystis atypha Prout (Bull. Br. Mus. (Nat. Hist.), Ent. 6:418, 1958) from the Celebes but the male forewing of this species is conspicuously angled at one quarter of the costa with a tuft of large hair-scales. The type of atypha is in poor condition but appears to be more suffused and patterned with dull brown than is linda. In the male genitalia the process formed from the distal portion of the sacculus of atypha is narrower, smoother and more heavily sclerotised than in linda and is bowed slightly anteriorly. In atypha the eighth sternite is triangular with an asymmetric tip, the left side with a finger-like caudal projection, the right side with the projection truncated.

Fiji distribution:- VITI LEVU: Tholoisuva, Nandarivatu. VANUA LEVU: 5km. N of Savusavu.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 12-14.ix.1969, H.S. & G.S. Robinson. BMGGSN 8289.

Paratypes: ♂, ♀, data as holotype.

♀, data as holotype but 15-17.viii.1969.

4♂♂, 10♀♀, data as holotype but vi.1968. BMGGSN's 8295♂, 8299♂, 8296♀, 8297♀, 8290♀.

♀, as holotype but vii.1968. BMGGSN 8298.

Remarks: An uncommon species restricted to primary forest.

Chloroclystis mariae sp. n.

Male: Head and thorax grey-brown: palps green flecked with black, mesothorax with a patch of green above bases of wings. Underside of body and legs grey-buff, legs suffused with grey above. Forewings grey-brown with a faint purplish tinge: basal and post-medial bands olive-green. Antemedial line white, doubly convex distally: medial fascia thinly suffused with light buff: postmedial line white, bowed distally, serrate. Terminal fascia with a square of olive-green and white scales at one half. Hindwing grey-brown: antemedial, medial, postmedial lines light buff: postmedial fascia olive-green: white subterminal line, patch of olive-green scales in the terminal fascia. Fringes pinkish buff and black. Genitalia asymmetric: left valve illustrated in text fig.139. Right valve narrower, simple. Aedeagus 2mm. long: vesica plain except for a thinly sclerotised terminal bar.

Female: Similarly patterned to the male but the medial fascia of the forewing suffused with white leaving only some black and brown scaling towards the costa and the posterior margin and traces of a darker medial band. Bursa copulatrix spherical, walls covered with minute, thorn-like signa which become larger and more densely packed anteriorly. Posteriorly, a heavily sclerotised area produced into a sharp ridge running anteriorly for one half the length of the bursa.

Diagnosis: Expanse 20mm.. A large species with characteristic facies, diagnostic male genitalia and apparently no close allies. The olive-green patch in the terminal band of the forewing and the narrow olive-green postmedial band are diagnostic. The male genitalia are confirmatory, unlike those of any other Chloroclystis species I have seen.

Fiji distribution:- Known only from the types.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 27-30.ix.1968, H.S. & G.S. Robinson. BMGGSN 8300.

Paratype: ♀, data as holotype but vi.1968. BMGGSN 8301.

Remarks: A very rare montane forest species. The affinities of mariae are uncertain - it resembles no other Chloroclystis known to me.

Chloroclystis nina sp. n.

Male: (Plate fig. 258) Head and thorax dark green above, abdomen dull dark green with purple-brown markings anteriorly. Underside of body and legs pale dull buff, legs marked above with grey-brown. Forewings pinkish cream densely marked with dark green, black and reddish brown: hindwing pinkish cream, marked as the forewing but less densely. Pattern variable: faded specimens common.

Genitalia with the valve as illustrated in text fig. 140: vinculum with fan-like corema attached just below the base of the valves, composing elongate hairs and elongate, expanded scales as long as the valve. Centre of valve with a tuft of non-deciduous hairs arising from a small protuberance. Aedeagus small, narrow, vesica without ornamentation but anellus scobinate and with a number of fine, curved spines.

Female: Similarly patterned to the male. Bursa copulatrix (text fig. 141) with a fine, nodulose sclerotised ridge from just below the aperture of the ductus bursae.

Diagnosis: Expanse 15-20mm.. A large, green, round-winged species which bears some resemblance to some of the New Zealand forms of Chloroclystis testulata (Guenee) (Eupithecia testulata Guenee, 1858, Hist. nat. Insectes Lepid. 10:352) from Australia and New Zealand. The male genitalia are strikingly similar but in nina the valve is wider terminally and there are no slender processes from the base of the valve dorsally: the sacculus is narrower and the anellus lacks two elongate spines, each one fifth the length of the aedeagus, present in testulata.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, summit of Mt Victoria.

Holotype: ♂, FIJI, Viti Levu, Mt Victoria (summit - 1323m.), 24.xi.1970, G.S. Robinson. BMGGSN 8333.

Paratypes: 2♂♂, ♀, data as holotype. BMGGSN 8334♀.

♂, as holotype but 25.xi.1970.

♂, ♀, FIJI, (Viti Levu), Nandarivatu, 15-17.viii.1969, H.S. & G.S. Robinson. BMGGSN 8335♂.

♂, as above but 12-14.ix.1969.

3♀♀, as above but 16-20.xii.1968. BMGGSN 8336.

Remarks: This species was abundant in moss forest on the summit of Mt Victoria, comprising 49% of the light trap sample. It has been collected rarely at Nandarivatu and Koro-O. It is the dominant species of the moss forest element and is the only species in Fiji to show a south temperate link, perhaps via an undescribed species from New Caledonia.

Chloroclystis pyrsodonta Turner

Chloroclystis pyrsodonta Turner, 1922, Proc. R. Soc. S. Aust. 46:238. Type not examined - determination tentative.

Male: (Plate fig. 249) Head, thorax and abdomen pinkish cream flecked with purple-brown dorsally; ventrally pale buff-cream. Legs pale buff-cream with darker markings above. Fore- and hindwings buff-cream traversed by numerous pinkish buff transverse bands. Postmedial and subterminal lines white: forewing costa suffused with black, broken by white at antemedial and medial; conspicuous black suffusion in postmedial fascia at costa and at one third the width of the wing. Genitalia with sacculus extended into a spoon-shaped lobe: aedeagus with a finely scobinate vesica.

Female: Similarly patterned to the male.

Diagnosis: Expanse 11-13mm.. A small, pinkish species marked on the forewing with black along the costa and in the postmedial fascia. Facies are unmistakeable.

Fiji distribution:- VITI LEVU: Suva, Nandarivatu, Vunindawa.

Remarks: Only four specimens of this species are known from Fiji.
It may be very rare or it may be easily overlooked and not easily collected at light.

Chloroclystis rubicunda Prout

Chloroclystis rubicunda Prout, 1934, Stylops 3:255. Type examined.

Male: (Plate fig. 250) Upperside of body and legs purple-brown flecked with black, white and olivaceous: buff-cream ventrally, the abdomen suffused with charcoal grey and purple-brown. Fore- and hindwings white patterned with red-brown and purple-brown, black and dull olive-green. Genitalia with valves elongate, angulate: corema of two tufts of elongate, dark hairs from membranes attached to vinculum. Aedeagus narrow: vesica with a sinuate sclerotised bar basally. fa

Female: Similarly patterned to the male but the body and wings more lightly patterned, with more green colouration: postmedial line very dark anteriorly. Bursa copulatrix spheroidal, walls with short signa, a densely packed longitudinal band of blade-shaped signa: bursa with a posterior evagination, containing elongate spine-like signa, running into the ductus bursae.

Diagnosis: Expanse 21-25mm.. A large dark species, the males much more reddish and darker than in C. bosora (Druce) (q.v.), the females more like those of bosora but with a much darker postmedial line and more heavily marked with red-brown. Corema of male with hairs more elongate and darker than in bosora: valves and aedeagus shorter: process from base of transtilla twice the length of the process in bosora.

Fiji distribution:- VITI LEVU: Vunindawa, Nandarivatu, summit of Mt Victoria.

Remarks: A moderately common species in moss forest on the summit of Mt Victoria, rubicunda becomes very rare at lower altitudes.
This species and bosora lack any close allies among the Chloroclystis species known to me (as does C. hypotmeta Prout (q.v.)) and appear to be sympatric derivatives of a single early immigrant species.

Chloroclystis scintillata Prout

Chloroclystis scintillata Prout, 1932, Novit. zool. 38:107. Type examined.

Male: Body purple-brown above with a coppery-metallic sheen on the abdomen: body and legs dull buff-cream ventrally, upper surface of legs dusted with dark brown. Fore- and hindwings greyish cream densely patterned with red-brown, purple-brown and charcoal grey and with some metallic scaling: pattern and density variable, in some specimens the medial fascia infilled with deep red-brown as in the illustrated female. Genitalia with sacculus produced into a spine-like process, curved ventrally, from nearly one half of the ventral margin of the valve. Vesica scobinate, with a thinly sclerotised but elongate cornutus more than one half the length of the aedeagus. Eighth sternite with two lobes, each with at least six elongate spines.

Female: (Plate fig. 251) Similarly patterned to and as variable as the male. Bursa copulatrix small, densely signate anteriorly: posteriorly with two enormous, elongate curved spines.

Diagnosis: Expanse 10.5-13mm.. A small, dark species with pronounced metallic markings on wings and abdomen. The characteristic spined lobes of the male eighth sternite can be exposed by gently brushing the tip of the abdomen. Allied to Chloroclystis metallospora Turner (Proc. R. Soc. Victoria 16:231, 1904) from Australia but the postmedial line not angled sharply at one half: in metallospora the eighth sternite lobes are heavily sclerotised and without spines (descaled abdomen examined).

World distribution: New Hebrides (Santo, Aneityum).

Fiji distribution:- VITI LEVU: Suva, Lautoka, Nandarivatu. YASAWA. NANUYA LAILAI. NAUKATHUVU. ROTUMA.

Remarks: An uncommon but widespread species, scintillata is the only Chloroclystis species known to me from the Pacific which inhabits dry secondary vegetation. Specimens from the New Hebrides were collected in forest,

Genus: Collix Guenee, 1858, Hist. nat. Insectes Lepid. 10:357.

Collix lasiospila (Meyrick)

Cidaria lasiospila Meyrick, 1886, Trans. ent. Soc. Lond.:194. Type not found - Lucas collection - determination tentative.

Male: Body ochreous, densely flecked with dark brown above; ventrally and on the legs light ochreous buff. Abdomen suffused with purple-brown dorsally: upper surface of forelegs black, ochreous at articulations. Fore- and hindwings ochreous buff patterned with grey-brown with a violet sheen: subterminal line of white dots: pattern of fine, serrate greyish-ochreous transverse lines, wings suffused to a varying degree with grey-brown. Stigmata comma-shaped. Underside of fore- and hindwings silver-grey: stigmata and subterminal band dull grey: veins outlined with bright orange-brown. Genitalia with valves oval, ends rounded. Transtilla with a caudal process bearing elongate, coarse hairs extending beyond the uncus. Aedeagus with a small, medial, finely scobinate area and an elongate, sclerotised, strip-like terminal area.

Female: Similarly patterned to the male. Ductus bursae elongate, tapering posteriorly: bursa copulatrix with group of tooth-like signa on anterior wall. Appendix bursae well-developed.

Diagnosis: Expanse 31-33mm.. Underside wing pattern separates this from all other Collix species.

World distribution: New Hebrides (Tanna, Erromango, Santo), Samoa.

Fiji distribution:- VITI LEVU: Tholoisuva, Vunindawa, Nandarivatu, Nausori Highlands. VANUA LEVU: 5km N of Savusavu.

Remarks: As with other species described in Trans. ent. Soc. Lond., 1886 by Meyrick, the type of lasiospila has not been traced. The location of the Lucas collection is uncertain. In the case of lasiospila, the original description is insufficient to determine which of the three Fijian Collix species Meyrick refers to with absolute certainty, but I am inclined to the opinion that it is the species described above.

Collix olivia sp. n

Male: Body light ochreous brown flecked with medium brown above; dark brown scaling at base of palps. Forelegs brownish black banded with ochreous at articulations. Underside of body and legs ochreous cream. Fore- and hindwings light ochre-brown banded

and irrorated with blackish-brown. Reniform circular, black, with raised scales. Hindwing stigma 8-shaped, ringed with white scales. Underside of wings with broad grey interrupted postmedial and subterminal bands; stigmata large, grey. Genitalia with valves elongate, ovate, sacculus expanded, tip of valve projecting, angulate; tegumen elongate, pointed; transtilla with two apical processes bearing elongate hairs which reach to the base of the uncus. Vesica with a small, medial, scobinate patch.

Female: Similarly patterned to the male but ground colour of wings cream, markings light. Ductus bursae short, bursa copulatrix globular with a group of tooth-like, close-packed signa at one side.

Diagnosis: Expanse 32-33mm.. Paler and more distinctly marked than other Collix species, the underside pattern very similar to that of Collix dichobathra Prout (Novit. zool. 37:24, 1931) from New Guinea and Australia but olivia is larger, reniform larger and rounder, postmedial and subterminal bands in forewing darker, better-defined. In male genitalia, valves of dichobathra short, rounded; tegumen not elongate; transtilla with an apical lobe set with fine, short hairs. In female genitalia, bursa copulatrix of dichobathra is elongate, signa similar in number, size and location to those of olivia but posteriorly, a large, sclerotised, concave oval area in the bursa wall.

Fiji distribution:- Known only from the types.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 15-17.viii.1969, H.S. & G.S. Robinson. BMGGSN 8337.

Paratype: ♀, as holotype but 27-30.vi.1968. BMGGSN 8338.

Remarks: Apparently a rare species of montane forest but perhaps overlooked. Olivia is certainly much rarer than lasiospila.

Collix patricia sp. n.

Male: Body purplish brown dorsally, flecked with ochreous: palps tipped black: underside of body and legs ochreous buff: forelegs dark above. ochreous at articulations. Fore- and hindwings ochreous buff densely marked with dark brown with a slight violet tinge: numerous light ochreous transverse lines: subterminal fascia with a conspicuous light ochreous triangle at one half. Stigmata large, round, black. Underside of wings greyish ochreous with slightly darker medial and postmedial lines: subterminal line pale, postmedial fascia suffused distally with light grey. Stigmata light grey. Genitalia with valves club-like, hirsute. Uncus enormously elongate: transtilla developed into a large beak-like process. Aedeagus with vesica very finely scobinate basally, spermatheca sclerotised, corrugated and conspicuous.

Female: (Plate fig. 236) Similarly patterned to the male. Ductus bursae elongate (5mm.), bursa copulatrix globular with a group of close-set tooth-like signa anteriorly.

Diagnosis: Expanse 36-38mm.. A very large, dark, broad-winged species reminiscent of Collix examplata Warren (Novit. zool. 13:98, 1906) from New Guinea but examplata lacks the light triangle in the subterminal fascia, is narrower-winged and has a broader medial fascia. The underside of both wings has a dark, interrupted subterminal band in examplata: in patricia the postmedial fascia is suffused with light grey, becoming denser towards the pale subterminal line.

Fiji distribution:- VITI LEVU: Nandarivatu.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 16-20.xii.1968, H.S. & G.S. Robinson. BMGGSN 8341.

Paratypes: ♂, data as holotype but 27-30.vi.1968 (abdomen missing).
♀, data as holotype.

Remarks: A rare species: like the other Collix species seen by the author, patricia males have a spectacular corema. The membranes between the genitalia and the eighth segment are enormously elongated (about two thirds the length of the abdomen) and carry three pairs of eversible sacs lined with fine hairs.

Genus: Boasthena Prout, 1934, Stylops 3:258.

This genus has its centre of radiation in Fiji where it is represented by six species. Four of these were described fully by Prout (Stylops 3:258-260, 1934) when he erected Boasthena to accommodate them. The genus is characterised by the male antenna which bears elongate pectinations and is only ciliated at the apex: the female antenna is filiform. There is a strongly developed costal fold in the male forewing. Males are divergent and exhibit various stages of elongation and contortion of the wings: females, on the other hand, are not easy to separate and females of at least one species are unknown. The male genitalia possess useful diagnostic features, notably the form of the uncus and ornamentation of spines on the anellus which is well-developed and sclerotised: there are obvious similarities between the genitalia of all the species placed here.

Boasthena catharia Prout

Boasthena catharia Prout, 1934, Stylops 3:260. Type examined.

Male: Head and thorax brown above, prothoracic 'collar' pale greenish yellow. Abdomen pale greenish yellow marked with brown dorsally. Underside of body and legs white. Fore- and hindwings pale greenish yellow, the forewing costa medium brown, the wings with large brown spots distally. Forewing with costal fold containing tufts of hairs. Genitalia with uncus short, bifurcate (text fig. 142): anellus scobinate and spined.

Female: (Plate fig. 237) Similarly patterned to the male but dark brown spots of fore- and hindwing larger, more numerous: costa not brown, ground colour more yellowish than in the male.

Diagnosis: Expanse 19-24mm.. A species with characteristic facies and no close allies of similar appearance: male markings much lighter than in any other Boasthena species. The shape of the uncus is diagnostic.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, Vunindawa.

Remarks: A rare species, apparently restricted to montane rain forest.

Boasthena extranea Prout

Boasthena extranea Prout, 1934, Stylops 3:259. Type examined.

Male: (Plate fig. 238) Body dull brown marked with yellow above, cream ventrally and on the legs. Fore- and hindwings dull yellow with a slight greenish tint and marked with dull brown. Three of fourteen males examined show pronounced dull brown postmedial suffusion in fore- and hindwings extending almost to the termen. Genitalia with uncus almost square-ended (text fig. 143): anellus densely scobinate with four elongate, conspicuous spines caudally.

Female: Characterised by the dense brown postmedial and subterminal marks at one half the width of the wing, sometimes forming a streak. Ground colour more orange than in the male, wing markings less dense than in the male except near the forewing costa.

Diagnosis: Expanse 19-24mm.. A small, narrow-winged species with a pronounced streak-like dark mark in the subterminal fascia at one half.

Fiji distribution:- VITI LEVU: Vunindawa, Nandarivatu, Koro-O, Nausori Highlands. VANUA LEVU: Ndelaikoro.

Remarks: A moderately common species in montane rain forest.

Roasthena gnophobathra Prout

Roasthena gnophobathra Prout, 1934, Stylops 3:258. Type examined.

Male: (Plate fig. 239) Ground colour of body and wings bright orange-brown: thorax and dorsal surface of abdomen dusted with grey-brown. Underside of body and legs dull yellowish cream: upperside of forelegs pinkish buff. Darker markings of fore- and hindwings dull grey-brown. Costal fold of forewing reaching the termen. Genitalia with uncus similar to that of extranea - square ended with a slight medial emargination (text fig. 144): anellus scobinate with two elongate caudal spines and three large tooth-like blunt spines below each elongate spine (text fig. 148).

Female: Ground colour orange: wings traversed by many fine greyish lines: medial and subterminal line dense. In one specimen the forewing tornus and hindwing anal angle are densely suffused with dull grey.

Diagnosis: Expanse 20-24mm.. Ground colour much more orange than in other Roasthena species: male costal fold reaches termen. Male rather wider-winged than in the other species with the exception of the dull-coloured E. rowena sp. n. (q.v.). The male genitalia are diagnostic.

Fiji distribution:- VITI LEVU: Savura Creek, Nandarivatu, Nausori Highlands, Lautoka, Vunindawa. VANUA LEVU: Savusavu area, Savundrondro Dam.

Remarks: A widespread but rare species.

Roasthena quilla sp. n.

Male: (Plate fig. 242) Body light yellow-ochre marked with brown, slightly paler ventrally. Forewing light yellowish ochre marked with light brown: costal fold containing elongate creamy hairs, running to a little beyond one half the length of the costa. Hindwing with venation contorted around the cell: specialised scales above and below the cell. Submedian fold with a line of close-packed, smooth, raised scales. Hindwing, apart from the cell region, only scaled from one half to the posterior margin: ground colour light yellow ochre marked with dark brown. Uncus bifurcate (text fig. 147): anellus densely scobinate, with about six caudal spines of moderate size.

Female: Unknown, but see below.

Diagnosis: Expanse 25-28mm.. The half-patterned hindwing, distorted cell region, specialised scaling and bifurcate uncus distinguish this from all other known Eoasthena species.

Fiji distribution:- VITI LEVU: Nandarivatu, summit of Mt Victoria.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 15-17.viii.1969,
H.S. & G. S. Robinson. BMGGSN 8352.

Paratypes: ♂, as holotype but 27-30.ix.1968.

5♂♂, FIJI, Viti Levu, Mt Victoria (summit - 1323m.), 24.xi.1960,
G.S. Robinson.

Remarks: Moderately common in moss forest at the summit of Mt Victoria, otherwise very rare. It is possible that six females belong here. They resemble females of E. gnophobathra Prout (q.v.) but larger, expanse 24-26mm., the ground colour of the wings very bright orange, the wings somewhat elongate.

Eoasthena rowena sp. n.

Male: (Plate fig. 241) Body very light ochre dusted with light greyish brown. Fore- and hindwings light yellowish ochre patterned with light greyish brown: stigmata brownish black, minute black dots on the veins at the termen. Costal fold of forewing extending to seven eighths: anal margin of hindwing with elongate light ochreous hairs. Uncus with shallow medial emargination at tip (text fig.145); juxta produced into two coarsely spined lobes. Anellus scobinate, two ventral rows of coarse spines basally, caudally with four elongate spines, two of these thick, also a dorsal, blunt spine.

Female: Three specimens tentatively placed here are reminiscent of female E. stygna Prout (q.v.) but light ochreous yellow patterned with light grey-brown. The transverse lines are fewer and less diffuse: postmedial fascia about 1.5mm. wide with no transverse lines.

Diagnosis: Expanse 19-23mm.. Hindwing completely patterned and smaller than E. quilla sp. n. (q.v.). Fore- and hindwing stigmata dark, conspicuous: overall appearance dull. Shape of uncus and ornamentation of anellus diagnostic.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 16-20.xii.1968,
H.S. & G.S. Robinson. BMGGSN 8353.

Paratypes: 3♂♂, as holotype but 15-17.viii.1969.

♂, as holotype but 12-14.ix.1969.

2♂♂, as holotype but 7.ii.1970.

♂, as holotype but Koro-O, 21.ix.1971.

Remarks: A rare species restricted to montane forest: if present in moss forest it is much rarer than E. quilla.

Eoasthena stygna Prout

Eoasthena stygna Prout, 1934, Stylops 3:259. Type examined.

Male: (Plate fig. 240) Body and legs light grey-brown above, a little paler beneath. Fore- and hindwings dull ochreous patterned with darker grey-brown. Costal fold only to seven eighths of the costa; costa sharply angled, wings somewhat contorted. Upperside of hindwing with a conspicuous tuft of hair from the submedian

fold (between 2A and Culb). Genitalia with the uncus double-tipped (text fig. 146); anellus scobinate, two ventro-basal groups of elongate spines, two elongate (0.5mm.) thin caudal spines and three large, medial, heavily sclerotised hook-like spines (text fig. 149).

Female: Ground colour of wings dull yellow; maculated with light brown to form transverse lines. In many specimens the medial line is suffused with grey; fore- and hindwings with a grey streak through the subterminal fascia at one half.

Diagnosis: Expanse 25-30mm. (males), 20-25mm. (females). Male facies and hindwing hair tuft diagnostic. Female paler than and without the conspicuous orange colouration of E. gnophobathra Prout (q.v.).

Fiji distribution:- VITI LEVU: Savura Creek, Tholoisuva, Nandarivatu, Koro-O, Nanggali, Lautoka. VANUA LEVU: Savundrondro Dam, Matanikavika Estate.

Biology: The larva has been reared from Glochidion seemanni Muell. Arg. (Euphorbiaceae) in Fiji.

Remarks: Prout (ibidem:259) described a darkly banded female of this species as form mesosterea. Female stygna appear similar to the three known (female) specimens of Boasthena eurychora (Prout) comb. n. (Asthena eurychora Prout, 1928, Insects Samoa 3:151, pl.6, fig.8.) from Samoa: without a male of the latter species I am reluctant to suggest conspecificity. A female of similar pattern from the New Hebrides can be paired with a male of similar appearance but with a costal fold: this is apparently an undescribed Boasthena species lacking the marked sexual dimorphism of the six Fijian species. Stygna is a moderately common forest species but females predominate in collections made at light

Genus: Eois Hubner, 1818, Zutrage z. Samml. exot. Schmett. 1:27.

Eois species near pyrauges Prout

Eois pyrauges Prout, 1927, Trans. ent. Soc. Lond.:190, pl.20, fig.4. Type examined.

Male: (Plate figs. 243 and 244) Body bright orange above, cream ventrally: antennal shafts white. Fore- and hindwings bright orange patterned with reddish purple. The markings in the second illustrated specimen are much heavier than in the first. Genitalia with large lobate valves: sacculus produced into a fine process closely appressed to the valve margin. Dorsal surface of anellus scobinate with four parallel lines of fine spines. Vesica with three sclerotised, spined pads.

Female: Unknown: females of pyrauges are similarly patterned to the male.

Diagnosis: Expanse 23-24mm.. A bright and attractive species, not easily confused with any other.

Fiji distribution:- VITI LEVU: Nandarivatu.

Remarks: A somewhat enigmatic species.

Two males are known, the abdomen of one is missing. The genitalia are similar to those of pyrauges, a species from West Africa, but the process from the sacculus is much shorter in pyrauges than in the Fijian male. There are also differences in the ornamentation of the vesica.

Genus: Eupithecia Curtis, 1825, Br. Ent. 2:64.

Eupithecia eupitheciata (Walker)

Philabapteryx eupitheciata Walker, 1863, List Specimens Lepid. Insects Colln Br. Mus. 26:1720. Type examined.

Cephalissa delogramma Meyrick, 1886, Trans. ent. Soc. Lond.:195. Lectotype examined.

Male: Body brownish cream above marked with black and medium brown: ventrally and on legs white, a few brown flecks. Upperside of forelegs black; mid- and hindlegs flecked with purple-brown above. Forewings pinkish ochreous marked with red-brown, purple-brown and black, density of colouration variable; sometimes the medial fascia infilled with grey. Hindwing white flecked with black and dull purple towards the anal angle.

Female: (Plate fig. 252) Similarly patterned to the male.

Diagnosis: Expanse 15-20mm.. Forewings very broad apically: sharply defined postmedial with characteristic shape, reniform usually conspicuous. Not easily confused with any other species. Closely allied to E. partitecta Prout (Novit. zool. 37:25, 1931) from the East Indies and New Guinea in which the male hindwing is reduced, suffused with grey-brown postmedially, and has a tufted lobe at the anal angle. Also allied to E. cauditorinata Prout (Novit. zool. 37:25, 1931) from New Guinea in which the male hindwing is as that of eupitheciata but with a tufted lobe from the anal angle.

World distribution: Ceylon and India through south east Asia and the East Indies, New Guinea, Australia, New Caledonia, New Hebrides, Tonga, Samoa.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, summit of Mt Victoria, Vatuvula (Waimanu R.), Tholoisuva, Nanggali, Nausori Highlands. VANUA LEVU: Ndelaikoro, Matanikavika Estate.

Biology: The larva has been recorded in Fiji from flowers of Ischaemum indicum (Houtt.), a wet-zone pasture and lawn grass.

Remarks: A moderately common species in primary and secondary forest.

Genus: Gymnoscelis Mabilie, 1867, Ann. Soc. ent. Fr. 7:656.

Gymnoscelis concinna Swinhoe

Gymnoscelis concinna Swinhoe, 1902, Trans. ent. Soc. Lond.:651. Type examined.

subsp. nephelota Prout comb. n.

Gymnoscelis erymna nephelota Prout, 1958, Bull. Br. Mus. (Nat. Hist.), Ent. 6:443, fig.17. Type examined.

Male: Body ochreous marked with purple-brown and black dorsally: ventrally and on legs light ochreous buff, upperside of forelegs marked with black. Forewings and hindwings ochreous, often with a green tinge, marked with dark lilac, white, red-brown, shades of purple-brown and black. Pattern very variable. Hindwing postmedial line usually black, distinct; v-shaped indentation on M2. Genitalia with simple valves; a pair of processes, turned inward caudally, from the transtilla; corema from membranes at base of vinculum. Aedeagus with right-angled cornutus at base of vesica and a small thorn-like cornutus at one quarter. When vesica not everted, large cornutus protrudes from aperture of aedeagus, tip perpendicular to axis of aedeagus (text fig. 150).

Female: (Plate fig. 253) Similarly patterned to the male. Ostium bursae scobinate, colliculum expanded into two lateral 'nodules' just anterior to the ostium: ductus bursae elongate (2mm.); bursa copulatrix globular, walls with small spicular signa, a circular anterior area with closely packed, large, sharp signa.

Diagnosis: Expanse 14-17mm.. Smaller and not as reddish as Gymnoscelis sara sp. n. (q.v.), the forewing postmedial meeting the costa at about seventy degrees, running straight from M3 to the costa: in sara the postmedial is turned proximally 1mm. from the costa and meets the costa at about fifty degrees. The indented hindwing postmedial and broad wings differentiate this species from G. imparatalis (Walker) (q.v.). The male genitalia are diagnostic.

World distribution: New Hebrides (c. nephelota); Tonga, Samoa, Pitcairn I., Rapa, Austral Is., Society Is. (c. concinna).

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, Dombuilevu, Nanggali, Suva, Korolevu, Vunindawa, Lautoka, Nausori Highlands. VANUA LEVU: Ndelaikoro, Governor's Pool, Savusavu area.

Remarks: Gymnoscelis erymna (Meyrick) (Eupithecia erymna Meyrick, 1886, Trans. ent. Soc. Lond.:192) is only known from the male type from Tonga, the aedeagus of which contains two elongate, stout, heavily sclerotised cornuti on the vesica: the eighth sternite is robust and H-shaped. Erymna and concinna have been much confused in the past. The type of concinna is from Tonga: it appears rounder-winged and paler than nephelota but a good series of Tongan concinna is required before the differentiation of the two subspecies can be firmly established. In Fiji, concinna nephelota is a common species in montane forest and although not common elsewhere, is widespread in areas of high rainfall. Meyrick's "♀ type" (allotype) of erymna appears to be a specimen of G. sara sp. n. (q.v.) as does one of Prout's paratypes of nephelota.

subsp. solmafua subsp. n.

Both sexes slightly darker and duller than c. nephelota and c. concinna, with little or no white marking; not nearly as variable in pattern as c. nephelota. Male genitalia of solmafua differ in that the lobe-like processes from the apex of the transtilla are about one and a half times as long as in c. concinna or c. nephelota and the smaller vesical cornutus is broader and more elongate. Expanse 15-17mm..

Fiji distribution:- ROTUMA only.

Holotype: ♂, FIJI, Rotuma I., Noatau, 26.iv.1971, G.S. Robinson. BMGGSN 8354.

Paratypes: 7♀♀, data as holotype.

2♂♂, 2♀♀, as holotype but E. of Solmafua, 23.iv.1971.

Remarks: Apparently common on Rotuma but restricted to areas where the vegetation is least disturbed.

Gymnoscelis imparatalis (Walker)

Botys imparatalis Walker, 1865, List Specimens Lepid. Insects Colln Br. Mus. 34:1416. Type examined (in UM, Oxford).

Male: Body ochreous buff flecked with blackish brown dorsally, a narrow black dorsal transverse band at the anterior end of the abdomen: ventrally and on the legs, light ochreous buff, upperside of forelegs dusted with blackish brown. Fore- and hindwings

ochreous buff patterned with blackish brown, a conspicuous streak in the forewing, the shape of the postmedial in fore- and hindwings diagnostic. Forewings very narrow. Genital armature elongate, vinculum long with a corema of elongate hairs from the base; valves narrow, extending one fifth beyond the uncus: tip of aedeagus sclerotised and pointed, vesica with a single large cornutus one quarter the length of the aedeagus and a small, conical basal cornutus.

Female: (Plate fig. 255) Similarly patterned to the male but wings broader. Two examples from Suva are small and somewhat heavily suffused with brown, the postmedial not well defined, and resemble G. minutissima acidna Turner (q.v.). Genitalia minute: ductus bursae short, broad, and flattened. Bursa copulatrix with three longitudinal, sclerotised, ribbed ridges bearing signa. The left ridge is more heavily sclerotised, slightly shorter than the other two, the signa longer, some signa on the adjacent bursa wall posteriorly.

Diagnosis: Expanse 13-18mm.. Size and pattern variable. Hindwing postmedial without a v-shaped indentation as in G. concinna Swinhoe (q.v.). Shape of postmedial and genitalia of both sexes diagnostic.

World distribution: Malaya, Singapore, East Indies, Celebes, New Guinea, Australia, Samoa, Tonga, Society Is., Marquesas.

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Rakiraki, Korolevu. VANUA LEVU: Matanikavika Estate. ROTUMA.

Biology: Larva recorded as feeding on flowers of Cassia fistula L. and Mangifera indica L. in Fiji.

Remarks: This species is exceptionally variable and bears numerous synonyms: it is not easy to detect in the field among G. minutissima and G. concinna (q.v.) and may, therefore, be more widespread than suggested here. It is, however, certainly rare in Suva. With adequate revision of Gymnoscelis, more species may well turn out to be imparatalis. The type (and only known specimen) of Gymnoscelis tristrigosa tongaica Prout (Bull. Br. Mus. (Nat. Hist.), Ent. 6:441, 1958) from Tonga appears to be a male of imparatalis.

Gymnoscelis minutissima acidna Turner stat. n.

Gymnoscelis minutissima Swinhoe, 1902, Trans. ent. Soc. Lond.:651. Type examined.

Gymnoscelis acidna Turner, 1904, Proc. R. Soc. Victoria 16:227. Type not examined - in Turner collection; identity not in doubt. Gymnoscelis fasciata Hampson (misidentification) Phillips MS.

Male: (Plate fig. 254) Body greyish fuscous flecked with dark greyish brown, paler beneath and on the legs but forelegs flecked with grey-brown above. Fore- and hindwings fuscous, patterned with dark brownish grey: basal and medial lines ill-defined, antemedial a narrow zigzag; postmedial well-defined in forewing, angled sharply at one third, straight above and below the angle. Valves rhomboidal, slightly pointed at the apex: corema of elongate pale hairs from membranes at base of vinculum. Aedeagus with a line of scobination and a line of fifteen elongate, stout cornuti down the length of the vesica, a group of eight smaller cornuti at the base of the vesica.

Female: Similarly patterned to the male: bursa copulatrix heavily sclerotised posteriorly and with about ten blunt spines, the sclerotised zone contorted and with a protruding lobe: at the junction with the ductus bursae about fifty elongate signa.

Diagnosis: Expanse 10-13mm.. Small, dull-coloured: shape of postmedial disgnostic. Acidna differs from minutissima in that the nominotypical female has the bursa copulatrix elongate, one side sclerotised and spined: the bursa is curled round itself anteriorly and looped at one half. The male genitalia of the two subspecies are similar. This species has been confused with Gymnoscelis fasciata (Hampson) (Eupithecia fasciata Hampson, 1891, Illust. typical Specimens Lepid. Heterocera Colln Br. Mus. 8:118, pl.152, fig.22) from India, south east Asia, Borneo, Celebes, New Guinea and the Solomons, which is larger, more variegated (ground-colour off-white), the male valve narrow but sacculus expanded to one half, the vesica apparently helical or corrugated with a single large cornutus and a line of about twenty small cornuti. In the female the bursa copulatrix is sclerotised posteriorly in two areas but without spines or signa: there is a comb-like row of spines from the posterior edge of the lamella antevaginalis.

World distribution: Bali, Sumbawa (m. minutissima); Queensland, New Caledonia, Loyalty Is., Norfolk I., New Hebrides (m. acidna).

Fiji distribution:- VITI LEVU: Lautoka, Vunindawa, Rakiraki, Suva, VANUA LEVU: Matanikavika Estate. OVALAU.

Biology: Has been bred from larvae in flowers of Acacia farnesiana (L.) and Myrtus vitiensis (A. Gray) in Fiji.

Remarks: A rare species, apparently commoner in dry zone vegetation than in areas of high rainfall.

Gymnoscelis sara sp. n.

Male: Body olivaceous ochreous dorsally, densely patterned with dark purple-brown and black: ventrally and on legs light yellow-ochre, upperside of forelegs marked with purple-brown and black. Fore- and hindwings olivaceous ochreous (pale ochreous cream when faded), patterned with purple-brown, red-brown, black and white: sometimes suffused with pink. Forewing postmedial angled inward 1mm. from costa, meeting costa at about fifty degrees (markings of illustrated female exceptional in this respect); angulate antemedial and medial lines usually well-defined. Hindwing postmedial with a v-shaped indentation, often continued proximally as a streak, at one half. Pattern and density of colouration very variable. Eighth sternite with an asymmetric pair of sclerotised bars carrying curled, flattened transverse processes. Genitalia large: aedeagus with vesica scobinate basally, part of scobination fused and rasp-like: one enormous cornutus with lateral barbs, one smaller, blunt, barbed cornutus, an extensive contorted sclerotised area surrounding the aperture of the spermatic tube (text fig. 151).

Female: (Plate fig. 259) Similarly patterned to and as variable as the male. Course of postmedial in forewing of illustrated specimen exceptional. Ductus bursae short, heavily sclerotised, indented longitudinally in the ventral mid-line. Bursa copulatrix with elongate, close-set signa anteriorly. Posteriorly, two opposed groups of exceptionally elongate signa adjacent to aperture of short, curved appendix bursae: close to aperture of ductus bursae a further group of elongate signa (text fig. 152).

Diagnosis: Expanse 18-22mm.. A large, reddish species with very variable patterning, larger than any other Fijian Gymnoscelis. In lightly-marked specimens the shallow angle of intersection of the postmedial with the forewing costa separates this species from G. concinna nephelota Prout (q.v.). The male genitalia of the two species differ markedly, notably in the aedeagus which distinguishes sara from all other Gymnoscelis species known to me - compare text fig. 151 (sara) with 150 (concinna).

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, summit of Mt Victoria, Namanggumangua (Serua).

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, vi.1968, H.S. & G.S. Robinson. BMGGSN 8332.

Paratypes: 4♂♂, 3♀♀, data as holotype. BMGGSN's 8327♀, 8329♀.
 3♂♂, ♀, as holotype but 27-30.ix.1968. BMGGSN 8328♂.
 2♂♂, ♀, as holotype but 16-20.xii.1968. BMGGSN 8326♂.
 ♂, ♀, as holotype but 15-17.viii.1969.
 ♀, as holotype but 12-14.ix.1969. BMGGSN 8330.

Remarks: A moderately common species in montane rain forest. Meyrick's "♀ type" (allotype) of G. erymna appears to be a specimen of sara as does one of Prout's paratypes of G. concinna nephelota.

Gymnoscelis tylocera Prout

Gymnoscelis tylocera Prout, 1930, Ann. Mag. nat. Hist. (10)6:691.
 Type examined.

Male: Body and legs light greyish buff, dark scaling on underside of head, antennae slightly contorted basally. Upperside of forelegs dusted grey-brown. Abdomen with lateral patches of rust-brown at one half. Fore- and hindwings light buff, sometimes slightly silver-grey, patterned with drab brown: forewing postmedial with conspicuous indentation at one half. Genitalia with vinculum very short, valves tapering from one half. Vesica lacking ornamentation.

Female: (Plate fig. 256) Similarly patterned to the male but rust-brown scaling extending in a narrow transverse band across dorsum at one half. Ductus bursae narrow, as long as bursa copulatrix is wide: bursa spherical with small, thorn-like signa sparsely distributed over two thirds of the bursa wall.

Diagnosis: Expanse 10-13mm.. Allied to Gymnoscelis refusaria (Walker) (Acidalia refusaris Walker, 1861, List Specimens Lepid. Insects Colln Br. Mus. 23:767) from the East Indies but the latter species has the postmedial suffused proximally with grey-brown, lacks rust-brown lateral scaling on the abdomen and the postmedial lacks the marked indentation of tylocera.

Fiji distribution:- VITI LEVU: Lautoka, Vunindawa, Nandarivatu.

Biology: Has been bred from Glochidion seemanni Muell. Arg. in Fiji.

Remarks: All my specimens of this species have been collected at Nandarivatu where tylocera is very uncommon.

Gymnoscelis species

♂, FIJI, Vanua Levu, Lambasa, 23.ii.1971, G.S. Robinson. BMGGSN 8315.
 Expanse 13mm.: worn. Body, legs and wings light ochreous buff. Head scaled with blackish brown beneath. Ante- and postmedial lines blackish brown; blackish brown subterminal spot on costa; wings narrow. Valves with a corema of elongate hairs from dorsal surface. Aedeagus with a single, stout, curved cornutus one quarter the length of the aedeagus. At the present time I am unable to identify this species.

Genus: Horisme Hubner, 1825, Verz. bekannter Schmett.:331.

Horisme chlorodesma (Meyrick)

Cidaria chlorodesma Meyrick, 1886, Trans. ent. Soc. Lond.:194.

Type not found - Lucas collection - identity not in doubt.

Coremia picta Butler, 1886, Trans. ent. Soc. Lond.:439. Type examined.

Larentia rewaensis Bethune-Baker, 1905, Proc. zool. Soc. Lond.:94, pl.8, fig.7. Type examined.

Male: Head yellowish cream marked with black: thorax dorsally brownish black and white: ventrally and on abdomen and legs fuscous, forelegs dark above. Forewing patterned with red-brown, grey-brown, white and black; ante- and postmedial lines narrower than in female, only slightly yellowish. Hindwing light ochreous grey.

Female: (Plate fig.260) Larger and more brightly coloured than the male, ante- and postmedial bands in forewing wide, more yellowish, hindwing paler.

Diagnosis: Expanse 15-19mm. (male), 18-22mm. (female). A medium-sized, attractive species, broad yellow or ochreous ante- and postmedial bands of female diagnostic. Males rather variable: a specimen from Vatuva is suffused with grey-brown and the yellowish-white ante- and postmedial bands are not apparent. This species has no known close allies.

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Nanggali, Vatuva (Waimanu R.), Nandarivatu, Tholoisuva, summit of Mt Victoria, Korolevu, Vunindawa. VANUA LEVU: Governor's Pool, Savusavu area. TAVEUNI. YASAWA.

Remarks: A common species in primary and secondary wet zone vegetation, especially common on the fringes of disturbed forest.

Horisme teresa sp. n.

Male: (Plate fig. 262) Body and legs chocolate brown marked with white; fore- and hindwings chocolate brown, dark brown and black, marked with white. Extent of white markings very variable: the illustrated specimen is exceptionally dark; the other extreme is expressed by a specimen with wings white, blocks of brown along forewing costa, brown markings subterminally at one half and in tornus of fore- and hindwing. Genitalia with valves specialised; dorsal margin sclerotised, with a short, blunt process; sacculus sclerotised, a small flap-like process at one third, a small triangular process at one half. Aedeagus expanded caudally, vesica with two scobinate areas (test fig. 153).

Female: (Plate fig.261) Larger and with less white marking than the male, patterned with light brown, chocolate brown and black. Underside pattern well-developed, as in the male, grey postmedial and stigmata, some grey or grey-brown suffusion, traces of transverse medial lines on light grey ground-colour (white or near-white in male). Ostium and ductus bursae broad, heavily sclerotised. Bursa copulatrix with close-set large signa, sclerotised and asperate posteriorly.

Diagnosis: Expanse 32-35mm. (male), 39-42mm. (female). Closely allied to Horisme xylinata (Warren) (Coenocalpe xylinata Warren, 1906, Novit. zool. 13:98) from New Guinea but larger (xylinata specimens examined all less than 30mm. in expanse) and white

markings heavier in both sexes, not bluish. In xylinata the aedeagus is cylindrical, vesica with a small, coarsely sclerotised, medial patch. In teresa the aedeagus is twice as broad caudally as anteriorly, flattened and heavily sclerotised at the tip, vesica with two scobinate areas, one with the scobination so coarse that the central 'teeth' resemble small cornuti. Genitalia of teresa larger than in xylinata, juxta more heavily sclerotised, its caudal margin more deeply concave. Flap-like process from sacculus of xylinata represented only by small triangular process in teresa. Female genitalia of xylinata with ductus bursae more elongate and narrower than in teresa, lamella antevaginalis not as broad as in teresa, caudal margin convex, not straight.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, summit of Mt Victoria.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 27-30.ix.1968, H.S. & G.S. Robinson. BMGGSN 8360.

Paratypes: 2♂♂, data as holotype.

3♂♂, ♀, as holotype but 27-30.vi.1968. BMGGSN 8361q.

3♂♂, as holotype but 16-20.xii.1968.

♂, ♀, as holotype but 15-17.viii.1969.

♂, ♀, as holotype but 12-14.ix.1969.

♂, ♀, as holotype but 7.ii.1970.

Remarks: Teresa is not common but is fairly frequently collected at light in montane rain forest.

Genus: Micrulia Warren, 1896, Novit. zool. 3:396.

Micrulia tenuilinea Warren

Micrulia tenuilinea Warren, 1896, Novit. zool. 3:391. Type examined.

Male: Body ochreous, paler ventrally and on legs, face grey. Wings yellowish ochreous, basal fasciae suffused with medium brown; antemedial band ochreous; medial fasciae suffused with medium brown, suffusion denser distally; stigmata large, black, conspicuous; broad postmedial band ochreous, with some brown scaling; subterminal fasciae medium brown, broken with ochreous from postmedial to termen at one half; thin, inconspicuous, ochreous subterminal line. Genitalia minute: valves elongate, very narrow, ribbon-like apically; processes from base of vinculum with coremata. Gnathos scobinate, elongate; anellus scobinate. Aedeagus stout, slightly widened apically: vesica with a small, coarsely scobinate terminal area adjacent to several minute thorn-like cornuti.

Female: Similarly patterned to the male. Bursa copulatrix with two longitudinal sclerotised ridges bearing lines of signa, reminiscent of Gymnoscelis imparatalis (Walker) (q.v.); posteriorly the bursa wall sclerotised with two groups of stiletto-like signa at the opening of the ductus bursae. Wall of bursa finely corrugated but a broad, smooth band runs spirally to one half from the junction with the ductus bursae, the smooth zone bounded by a finely ribbed line on the bursa wall reminiscent of a line of tight stitches.

Diagnosis: Expanse 14-16mm.. A small species with triangular, broad wings and conspicuous yellow-ochre postmedial band and dark stigmata. Resembles Chloroclystis species but the hind tibia in both sexes has only three spurs, the proximal one very long (see Prout, 1928, Insects Samoa 3:138).

World distribution: Assam (India), Ceylon, Singapore, Samoa.

Fiji distribution:- ROTUMA only.

Remarks: Only nine specimens of this species are known, apart from a male and three females from Rotuma. The abdomen of the type is missing: Rotuman specimens seem brighter than other specimens of tenuilinea but other specimens are old. I am slightly doubtful as to the correctness of the association of the twelve specimens from widely different localities with the type of tenuilinea: the resultant series maybe a mixed one.

Genus: Poecilasthena Warren, 1894, Novit. zool. 1:394.

Poecilasthena inhaesa Prout

Poecilasthena inhaesa Prout, 1934, Stylops 3:257. Type examined.

Male Unknown.

Female: Body white, flecked with grey-green dorsally. Fore- and hindwings white, forewings with some grey-green basally, costa dusted with brown; white basal line, broad antemedial grey band almost reaching the end of the cell; a broad white postmedial band tapering posteriorly; three lunulate - dentate grey-green subterminal lines, the proximal two thick and diffuse. Termen marked with alternating dark green and white: dark green on the veins. Hindwing with all markings, except basal, of forewing, subterminal markings broader, more diffuse.

Diagnosis: Expanse 23mm. Much more heavily marked than P. leucydra Prout (q.v.) which does not have a broad, slightly oblique, white postmedial band. A very distinctive species.

Fiji distribution:- VITI LEVU: Vunindawa.

Remarks: Known only from the female type taken on 8.ii.1932 (Phillips). It is possible that inhaesa is an aberrant specimen of leucydra but I think this unlikely.

Poecilasthena leucydra Prout

Poecilasthena leucydra Prout, 1934, Stylops 3:257. Type examined.

Male: Body silvery white flecked with pale grey-green dorsally. Fore- and hindwings thinly scaled, translucent, silvery white, patterned with pale grey-green. Forewing costa dusted with grey-brown, some silvering. Fore- and hindwing termen with alternating dark, dull green and white lines.

Female: (Plate fig. 263) Similarly patterned to the male.

Diagnosis: Expanse 21-25mm.. Pattern distinctive. Closely allied to P. paucilinea Warren (Novit. zool. 13:108, 1906) from New Guinea but markings not so brownish, hindwing without an obtuse-angled 'tail'.

World distribution: Comstock (1966) took a long series of leucydra on Tutuila, American Samoa. I have not examined this material.

Fiji distribution:- VITI LEVU: Vunindawa, Tholoisuva, Nandarivatu, Koro-O, Vatuvula (Waimanu R.), summit of Mt Victoria, Nanggali, Nausori Highlands. VANUA LEVU: Ndelaikoro.

Remarks: A common species in primary forest.

Genus: Polyclysta Guenee, 1858, Hist. nat. Insectes Lepid. 10:375.

Polyclysta gonycrota Prout

Polyclysta gonycrota Prout, 1932, Novit. zool. 38:104. Type (in ZM, Hamburg) not examined - identity not in doubt.

Male: (Plate fig. 264) Body and legs ochreous yellow marked with brownish black: abdomen ventrally with some rough, rust-brown scaling. Forewing deep chocolate-brown, reddish on the veins, marked with yellow-cream. Hindwing grey-brown, some cream flecks in the terminal fascia.

Female: Similarly patterned to the male but ground-colour lighter, hindwing light greyish ochreous with a deep greyish cell-spot.

Diagnosis: Expanse 25-29mm.. Wing pattern completely diagnostic. Allied, albeit distantly, to P. hypogrammata Guenee (Hist. nat. Insectes Lepid. 10:376, pl.22, fig.4, 1858) from Australia, a larger (expanse 27-33mm.) and much more variegated species, the ground colour lighter, the male hindwing narrow and slightly contorted.

Fiji distribution:- VITI LEVU: Suva, Vunindawa, Tholoisuva, Nandarivatu, Koro-O, summit of Mt Victoria, Korolevu. VANUA LEVU: Ndelaikoro, Savusavu area.

Remarks: A common species in primary forest.

Genus: Sauris Guenee, 1858, Hist. nat. Insectes Lepid. 10:361.

Sauris acanthina Prout

Sauris acanthina Prout, 1930, Ann. Mag. nat. Hist. (10)6:692. Type examined.

Male: (Plate fig. 265) Body greenish ochreous marked with brown and black. Forewings greenish-ochreous patterned with grey-black. Hindwing contorted, a large compound vesicle at the anal margin. Underside of fore- and hindwing with elongate scaling and small, dark spicules - see Prout's comprehensive original description. In one male specimen the body and forewings are suffused with blue-grey.

Female: Similarly patterned to the male but hindwing normal, cream, tinted with light brown distally, some elongate scaling on underside of wings.

Diagnosis: Expanse 26-29mm.. Wing pattern, male specialised scaling and dark-edged male hindwing diagnostic.

Fiji distribution:- VITI LEVU: Vunindawa, Nandarivatu, Koro-O.

Remarks: A very rare species apparently restricted to montane forest. Three males and three females are known.

Sauris dentatilinea (Warren)

Holorista dentatilinea Warren, 1905, Novit. zool. 12:428. Type examined.

Male: (Description based on a specimen from Bougainville, Solomons) Body olive-green dorsally, ventrally and on the abdomen ochreous. Forewings olive-green, patterned with purplish black; basal line broad, black, conspicuous; medial band interrupted, joining broad postmedial at five sixths. Three dark olive transverse lines in postmedial fascia, five/dark longitudinal dashes from one third

in distal half of postmedial fascia; two lunulate transverse lines, part dark olive, part purplish black, at the termen. Hindwing greyish cream suffused with grey posteriorly, a fold in the posterior margin. Forewing termen with a nick between Cula and Culb, a small tuft of curled, pale hairs at the tornus, some pale, raised scales basally.

Female: Similarly patterned to the male: hindwing normal, light brownish grey (specimen from Bougainville).

Diagnosis: Expanse 25mm. (Fijian male). Nicked male forewing termen with dark postmedial dashes and dark basal line diagnostic.

World distribution: Solomon Is. (Bougainville, Guizo, Vella Lavella, Guadalcanal).

Fiji distribution:- VITI LEVU: a single, very worn, male, Nausori Highlands: site 2 - 2200', 16-20.xii.1969. BMGGSN 8364 (damaged preparation).

Remarks: This specimen is in very poor condition and its determination as dentatilinea is thus tentative: the postmedial dashes and strong basal line are visible as is the specialised scaling and terminal nick in the forewing.

Sauris elaica (Meyrick)

Remodes elaica Meyrick, 1886, Trans. ent. Soc. Lond.:193. Type examined.

Male: (Plate fig.266) Head and thorax olive-green above, 'collar' brown. Abdomen ochreous with an olive tint. Legs reddish ochreous, forelegs dark above, mid- and hindlegs with tufts of reddish ochreous and black hairs. Forewings olive-green marked with purplish black. Hindwing cream proximally, a minute basal vesicle, apically a large vesicle with smooth, black scales. Underside of forewing with three tornal hair-tufts, two tufts with the hairs folding over a split in the termen: hindwing with elongate black scales over the terminal vesicle, surrounded with ochreous scales; a line of elongate pinkish hairs parallel to the posterior margin, short, dark spicular scales at the base of these.

Female: Similarly patterned to the male but forewing more rounded, dark markings lighter, no split in termen. Hindwing normal, uniformly cream, no specialised scaling.

Diagnosis: Expanse 28-35mm.. Male easily recognisable, forewing pattern lighter than S. acanthina Prout (q.v.); black distal hindwing vesicle diagnostic. Female more lightly patterned and with rounder wings than the unidentified species of which the female is illustrated in plate fig. 268.

World distribution: New Hebrides (Malekula).

Fiji distribution:- VITI LEVU: Vunindawa, Nandarivatu, Koro-O, Tholoisuva, Nausori Highlands. VANUA LEVU: Ndelaikoro, Governor's Pool, Savusavu area. OVALAU.

Remarks: A moderately common species in primary montane rain forest, scarce elsewhere.

Sauris nigrilinearia enochra Prout stat. n.

Sauris nigrilinearia Leech, 1897, Ann. Mag. nat. Hist. (6)20:76.

Sauris enochra Prout, 1934, Stylops 3:257. Type examined.

Male: (Plate fig. 267) Body cream, face brown beneath, dorsal surface of thorax flecked with black. Forewings off-white striated with very pale olive-brown, darker at the termen, streaks of black on Sc. Subterminal line brown to black; terminal line brown to black, diffuse, lunulate; intervening fascia suffused with brown to black at one half and at tornus. Hindwing pinkish cream, large vesicle on posterior margin basally. No specialised scaling on underside of wings.

Female: Similarly patterned to the male but hindwing not contorted.

Diagnosis: Expanse 24-29mm.. Distinctive pattern of forewings of both sexes and lack of special scaling on underside of male diagnostic.

World distribution: China, Japan (n. nigrilinearia); Celebes (n. euneta Prout).

Fiji distribution:- VITI LEVU: Savura Creek, Korolevu, Tholoisuva, Vunindawa, Nandarivatu, Nausori Highlands. VANUA LEVU: Governor's Pool.

Remarks: An attractive species, uncommon but widespread in forested areas.

Sauris priva Prout

Sauris priva Prout, 1930, Ann. Mag. nat. Hist. (10)6:693. Type examined.

Male: Body whitish tinged with drab, marked with olive-brown on thorax: black dorsal tuft at tip of abdomen. Wings white patterned with olivaceous brown and black transverse lines. Underside of forewing tornus with a tuft of elongate, curved hairs. Hindwing contorted, with a compound proximal vesicle at the anal margin. See Prout's comprehensive original description.

Female: Similarly patterned to the male; hindwing normal.

Diagnosis: Expanse 27mm.. The only whitish Fijian Sauris - simple tornal hair tuft on underside of male forewing and normal termen to forewing diagnostic. Affinities uncertain: Prout allied priva with S. ignobilis Butler (Ann. Mag. nat. Hist. (5)6:227, 1880) from India and south east Asia but in the latter species the male hindwing is orange-brown, the forewing basal line well-defined and convex distally: in priva the basal line is dentate anteriorly. In ignobilis the forewing apex is cut off by the postmedial and a medial streak to leave a conspicuous pale triangle at the apex.

Fiji distribution:- VITI LEVU: Vunindawa.

Remarks: Known only from two specimens from Vunindawa - a male, 1.iii.1930, C. Phillips (type) and a female, 2.ix.1932, (R.)H. Phillips: exceptionally rare.

Sauris ursula sp. n.

Male: (Plate fig. 290) Head and thorax olive-green dorsally, ventrally pinkish ochreous. Abdomen ochreous, tinted green dorsally: second, fourth, sixth and seventh sternites with lateral tufts of elongate coremata hair, fourth sternite with short, stiff bristles adjacent to the hair tufts. Forelegs green and grey: midlegs short, tufted with elongate pinkish ochreous hairs. Hind femur with a proximal tuft of dark purple hairs. Forewings bright olive-green with disrupted basal, ante- and postmedial and subterminal bands of brownish black: terminal line of large black dots on veins, a lunulate light green subterminal line, lunules flecked outwardly with black: some silver scaling in lunulate transverse lines. Hindwing contorted, cream, posterior margin tufted with light pinkish ochre hairs: proximal compound vesicle on posterior margin: at hind tip of wing a black vesicular fold. Underside of forewing with elongate hair over the tornus which projects 3mm. beyond line of termen; at junction of tornal 'flap' and termen a split running proximally for 3mm., covered beneath with tufts of hair. Posterior margin with a short slit at two thirds, covered in elongate hair. Genitalia with valves elongate, rectangular, tipped with fine hairs as long as the valve: process from dorsal margin of valve at three quarters bearing densely packed, apparently sticky hairs: socii extend beyond tip of uncus (text fig.154 - aedeagus 155).

Female: Unknown.

Diagnosis: Expanse 36mm.. Forewings broader than in the following three species, no hair tuft on underside of forewing at two thirds between R5 and M1 (S. victoria sp. n.), second sternite with hair tufts, not spicular scales (S. xissa sp. n.), forewings not purple-brown and tips of socii not level with tip of uncus (S. wanda sp. n.).

Perhaps allied to S. elaica (Meyrick) (q.v.) but much larger, tornus protruding; elaica does not have a short slit in the posterior margin of the forewing.

Holotype: ♂, FIJI, Vanua Levu, Ndelaikoro VHF Sta., 940m., 24-25.ii.1971, G.S. Robinson. BMGGSN 8363.

Remarks: Only the holotype known. This and the following three species form a closely related complex restricted to high-altitude forest on Viti and Vanua Levu.

Sauris victoria sp. n.

Male: Patterning of body as in S. ursula sp. n. (above). Fore legs reddish brown becoming blackish distally, some cream scales at articulations: midlegs short, tufted with pinkish ochreous hairs. Hind femur with a proximal tuft of dull ochreous hairs. Forewings olive-green with purple-brown mottling concentrated so as to leave a conspicuous green medial band. No dots on termen. Hindwing contorted, white, elongate pale ochreous scales tipped with grey at posterior margin. Proximal compound vesicle on anal margin: large black vesicular fold at apex of wing. Underside of forewing with tuft of elongate hairs between R5 and M1 at two thirds: tornus not projecting but apex expanded to M1. Split above tornus only 1.5mm. long, covered on underside by tufts of elongate hairs: a slit in the posterior margin just above the tip of A2, covered on underside by dark, elongate hairs. Genitalia similar to those of S. ursula but uncus extends beyond tips of socii, valve shorter, dorsal process from margin at two thirds.

Female: A single very worn, faded specimen is tentatively placed here. Resembles female S. elaica (Meyrick)(q.v.) but larger - expanse 38mm..

Diagnosis: Expanse 40-45mm.(males). Males differ from S. ursula sp.n. and the two species below in possessing a hair tuft on the underside of the forewing between R5 and M1, the tornus not projecting, the uncus shorter than the socii.

Holotype: ♂, FIJI, Viti Levu, Mt Victoria (summit-1323m.), 25.xi.1970, G.S. Robinson.

Paratypes: 3♂♂, data as holotype.

7♂♂, as holotype but 24.xi.1970. BMGGSN 8362.

Sauris wanda sp. n.

Male: Head and thorax purple-brown tinged olivaceous dorsally; ventrally dull ochreous. Tufts of abdomen similar to those of S. ursula sp. n.. Forelegs purple-brown basally, black distally, banded with cream at articulations: midlegs short, tufted with purple-brown. Hind femur with conspicuous proximal tuft of dark purple hairs. Forewings with termen evenly rounded, tornus protruding 2.5mm., purplish grey with dark brown transverse lines: basal and postmedial olivaceous transverse lines, a patch of red-brown below the costa subterminally, terminal line of black dots on veins, flecked with sparse silvery scales. Hindwing similar to that of S. victoria sp. n. (above) but smaller, more twisted posteriorly, vesicular fold at apex black, smaller than in victoria, some ochreous hairs from the proximal corner. Underside of forewing with elongate hairs over tornus and over u-shaped slit in margin, 3mm. long, between tornus and termen: small slit in posterior margin with a few elongate hairs. Genitalia similar to those of other species in this complex but socii extend to tip of uncus. Process from dorsal margin of valve at three quarters.

Female: Unknown.

Diagnosis: Expanse 40mm.. Wing pattern very different from that of the other three species of this complex, predominantly purplish brown. Structurally very similar to S. ursula sp. n. (q.v.) but in ursula the socii extend beyond the uncus and the hind femur is tufted with dark buff-brown, not purple hairs.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 27-30.ix.1968, H.S. & G.S. Robinson. BMGGSN 8367.

Sauris xissa sp. n.

Male: (Specimen worn and faded) Very similar in appearance to S. victoria sp. n. (q.v.): structure and shape of tornal area of forewing like that of S. ursula sp. n. (q.v.). Hindwing similar to that of victoria but vesicular fold at posterior margin smaller, hairs on anal margin pinkish ochreous, not tipped with grey. Genitalia similar to S. victoria. No tuft of hair on underside of forewing at two thirds between R5 and M1. Second sternite with lateral tufts of short, broad, dark, spicular scales instead of the hair tufts present in the preceding three species.

Female: Unknown.

Diagnosis: Expanse 45mm.. Differentiated from victoria by the characteristics above.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 27-30.vi.1968, H.S. & G.S. Robinson. BMGGSN 8366.

Sauris species

Male: Unknown

Female: (Plate fig. 268) Body green above: ventrally and on abdomen ochreous: abdomen dorsally tinted olivaceous. Forewings olive-green patterned with charcoal grey: medial mark towards posterior margin rust-brown. Hindwing light grey-buff.

Diagnosis: Expanse 34mm.. Wing pattern diagnostic. Possibly allied to two undescribed males from Java in turn allied with S. nigrifusalis (Warren) (Pseudoschista nigrifusalia Warren, 1896, Novit. zool. 3:120) but this association is based on superficial similarities in facies and is tenuous, to say the least.

Fiji distribution:- VITI LEVU: Nandarivatu (two females only - 16-20.xii.1968).

Genus: Scotocyma Turner, 1904, Proc. R. Soc. Victoria 16:245.

Scotocyma miscix Prout

Scotocyma miscix Prout, 1934, Stylops 3:254. Type examined.

Male: Body purple-brown or brown above, flecked with black, ochreous ventrally. Fore- and hindwings purple-brown or brown with transverse lines of black, medium brown and ochreous: thin postmedial line of white scales: forewing medial band suffused with black proximally - conspicuous, medial fascia rather darker than remainder of wing. Underside of wings light pinkish purple with well-developed pattern of transverse grey lines and distal grey suffusion.

Female: (Plate fig. 269) Similarly patterned to the male but medial fascia not as dark, often suffused with blue, pinkish cream or white, extent of suffusion variable. Subterminal white 'tooth' in fore- and hindwing at one half in some specimens - known also in one male.

Diagnosis: Expanse 34-42mm.. Wings not as elongate as in Collix species (q.v.), more reddish or purplish brown in appearance, underside not light grey or silver-grey. Some female forms have extensive areas of white in the forewing: this variation does not seem to occur in other Scotocyma species although specimens exhibiting slight suffusion of pale blue in the forewing medial fascia are known in species other than miscix.

Fiji distribution:- VITI LEVU: Vunindawa, Nandarivatu, Koro-O, summit of Mt Victoria, Nausori Highlands, Tholoisuva.

Remarks: An uncommon species restricted to primary forest. Scotocyma appears to be limited to Australia and Melanesia, reaching its eastern limit in Fiji.

Genus: Symmimetis Turner, 1907, Proc. Linn. Soc. N.S.W. 31:683.

Symmimetis merceri sp. n.

Male: (Plate fig. 270) Body brown flecked with black, some white scaling laterally on mesothorax: underside of thorax with large, whitish, plate-like scales. Fore- and hindwings light purplish brown patterned with lunulate and serrate black transverse lines. In forewing, from medial line to termen, a streak of bright olive-green: forewing tornus and anal angle of hindwing with some thin olive-green scaling. Postmedial line bowed outward parallel to termen from posterior margin: sharply turned proximally on green streak and meeting forewing costa at about seventy five degrees. No abdominal corematal tufts; vinculum elongate, as long as valves, with two tufts of dark hair from membranes at base. Membrane joining genitalia to eighth segment with a pair of corematal tufts anteriorly. Vesica scobinate basally, a single large cornutus at one half: at three quarters a very large, stout cornutus: terminally a sclerotised zone bearing about thirty coarse, thorn-like cornuti (text fig. 157).

Female: Similarly patterned to the male but some suffusion of white beyond the postmedial line in fore- and hindwing.

Diagnosis: Expanse 19-23mm.. Pattern much better defined than in S. thorectes Prout (q.v.), male without corematal tufts on abdomen. In male genitalia, vinculum and vesica much more elongate, the latter bearing two separate cornuti, one relatively enormous, and a pad of terminal cornuti; in thorectes the cornuti are of approximately the same size and spread evenly over the distal half of the vesica. Superficially similar to Symmimetis cristata (Warren) (Gymnoscelis cristata Warren, 1897, Novit. zool. 4:229) from Ceylon, but in cristata the postmedial is not so angulate - it turns through sixty degrees and meets the forewing costa at right angles: in merceri it turns through ninety degrees and meets the costa at seventy degrees: vesica of cristata coarsely scobinate, with three short, stout cornuti.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O. VANUA LEVU: Governor's Pool, Matanikavika Estate.

Holotype: ♂, FIJI, Vanua Levu, Matanikavika Estate, 21-28.xii.1972, H.S. Robinson. BMGGSN 8371.

Paratypes: 2♂♂, 2♀♀, data as holotype.

♂, FIJI, Vanua Levu, Governor's Pool, 8.ii.1971, G.S. Robinson.

Remarks: This species was not uncommon at Matanikavika Estate where it was collected at light with S. thorectes. It is named after Mr. R. Mercer in recognition of his hospitality and his help at Matanikavika.

Symmimetis thorectes Prout

Symmimetis thorectes Prout, 1934, Stylops 3:255. Type examined.

Male: Body grey-brown tinged with olive-green dorsally. Underside of thorax plated with large, glossy whitish scales. Forewings greyish brown with paler ill-defined ante- and postmedial bands, anterior and posterior ill-defined olivaceous longitudinal streaks, some red-brown scaling posteriorly. Hindwing similarly patterned to forewing - rather greyish anteriorly posteriorly the pale postmedial band well-defined. Wing shape similar to that of S. merceri sp. n. (plate fig.270). Corematal tufts between second and third and fifth and sixth abdominal sternites. Genitalia with vinculum short, corematal tufts from membranes at base. Vesica scobinate basally; distally with about thirty large cornuti (text fig. 156).

Female: Similarly patterned to the male but thorax without plate-like scales ventrally.

Diagnosis: Expanse 18-21mm.. Smaller than S. merceri sp. n. (q.v.), the postmedial not well defined in the forewing, not sharply bowed in from one half to meet the costa. Female without white scaling in fore- and hindwings.

Fiji distribution:- VITI LEVU: Nandarivatu, Vunindawa, Suva (Woodford).
VANUA LEVU: Matanikavika Estate.

Remarks: A rare species in all localities where it has been collected, except at Matanikavika Estate where it was collected at light in some number with S. merceri.

Subfamily: Ennominae

Genus: Aplochlora Warren, 1893, Proc. zool. Soc. Lond.:386.

Aplochlora vivilaca (Walker)

Iodis vivilaca Walker, 1861, List Specimens Lepid. Insects Colln Br. Mus. 22:545. Type examined.

Male: Face and antennae dull orange-brown: thorax and abdomen light yellow-green dorsally, ochreous ventrally. Fore- and hindwings uniform light yellowish green, very much like those of the indeterminate Geometrine species illustrated in plate fig. 257. Forewing costa dull orange-brown, stigmata dull blackish brown. Genitalia with valves elongate, leaf-like; uncus short, stout, curved, heavily sclerotised: aedeagus 2.5mm. long, vesica with eleven elongate cornuti.

Female: (Not known from Fiji) Similarly patterned to the male.

Diagnosis: Expanse 27mm.. The only green Fijian Geometrid in which the male has dentate, finely ciliate antennae and vein M2 of the hindwing absent in both sexes. The indeterminate Geometrine species (above) has the male antennae with well-developed pectinations.

World distribution: Ceylon, India, south east Asia, Celebes, Australia, New Caledonia.

Fiji distribution:- VIWA (one male only - 30.iii.1971, G.S. Robinson. BMGGSN 8232).

Remarks: This specimen differs slightly from a specimen from New Caledonia (J.D. Holloway - BMGGSN 8205) in which the valves are proportionately rather smaller, vesica with only six elongate cornuti.

Genus: Bulonga Walker, 1859, J. Linn. Soc. Lond. 3:193.

Bulonga phillipsi Prout

Bulonga phillipsi Prout, 1930, Ann. Mag. nat. Hist. (10)6:695. Type examined.

Male: (Plate fig. 271) Head olivaceous ochreous, body silvery grey-brown, silver-grey ventrally. Fore- and hindwings silvery grey-brown patterned with grey, forewing costa tending to cream with transverse grey striae: fringes white. Underside silky white: apex of forewing charcoal grey, subterminal band of charcoal grey spots in hindwing; large, wide spot at costa.

Female: Similarly patterned to the male.

Diagnosis: Expanse 35-43mm.. Wing pattern completely diagnostic: unlike any other Fijian species. Closely allied to Bulonga griseosericea (Pagenstecher) (Numeria? griseosericea Pagenstecher, 1886, Jb nassau. Ver. Naturk. 39:159) from New Guinea and adjacent islands and the Celebes but in griseosericea the hindwing postmedial is straight, not bowed and wavy.

Fiji distribution:- VITI LEVU: Nandarivatu, Tholoisuva, Lautoka (Phillips), Vunindawa, Koro-O, summit of Mt Victoria. VANUA LEVU: Governor's Pool, Ndelaikoro.

Remarks: A moderately common species in primary, especially primary montane forest.

Genus: Casbia Walker, 1866, List Specimens Lepid. Insects Colln Br. Mus. 35:1667.

Casbia aedoea (Prout MS) sp. n.

Male: (Plate fig. 272) Body dull purple above, ochreous ventrally, antennae grey. Fore- and hindwings dull purple flecked with charcoal grey, grey colouration dense on forewing costa. Light markings cream to bright orange: forewing stigma black, hindwing stigma white. At base of forewing a narrow rectangular fovea with a line of minute dark scales with the appearance of a cheese-grater. Genitalia with sacculus extending to one third length of valve, caudally-directed process from tip extending beyond one half: flap-like, membranous corema from base of valve. Aedeagus with vesica finely scobinate.

Female: More dull than the male, ground colour dull dark mauve heavily dusted with grey: subterminal line of charcoal grey spots in fore- and hindwing: light markings not apparent, represented only by a faint postmedial orange suffusion in one specimen: ante- and postmedial purplish transverse lines in fore- and hindwing ill-defined.

Diagnosis: Expanse 25-28mm.. Larger than C. alphitoniae Prout (q.v.), brighter and the fovea of the male narrower and with minute dark scales. Alphitoniae males lack the well-developed patches of light colour of aedoea and have an overall lunulate pattern of fine grey markings in both sexes, absent in aedoea. Male genitalia with valve more elongate, process from tip of sacculus extending beyond one half the length of the valve, only to one third in alphitoniae.

Fiji distribution:- VITI LEVU: Nandarivatu, Tholoisuva, Vunindawa.

Holotype: ♂, FIJI, (Viti Levu), Vunindawa, 7.xi.1934, (R.)H. Phillips, 914. / 'Casbia aedoea Prout, ♂ type' (in Prout's handwriting). / Pres. by Imp. Inst. Ent. B.M. 1937-294. BMGGSN 8583.

Paratypes: 4♂♂, FIJI, (Viti Levu), Nandarivatu, 16-20.xii.1968. H.S. & G.S. Robinson.

3♂♂, ♀, as above but 27-30.ix.1968

♂, ♀, as above but 15-17.viii.1969.

♂, as above but 7.ii.1970.

♂, FIJI, (Viti Levu), Tholoisuva, vi.1968, H.S. & G.S. Robinson.

Remarks: In addition to the localities cited for aedoea and alphitoniae for which 'voucher specimens' are available, I have the following MS records of "alphitoniae" (presumably both species): VITI LEVU: Nausori Highlands, summit of Mt Victoria, Koro-O, Vatukoula. VANUA LEVU: Governor's Pool, Ndelaikoro, Savusavu area, Lambasa. NAUKATHUVU. From the short series of both species, it would seem that aedoea is a forest species whereas the preferred habitat of alphitoniae is dry-zone secondary vegetation.

Casbia alphitoniae Prout

Casbia alphitoniae Prout, 1929, Ann. Mag. nat. Hist. (10)3:595. Type examined.

Male: Body pale dull orange-brown above, ochreous ventrally, antennae grey. Fore- and hindwings pale orange-brown flecked with charcoal grey lunules. Traces of two reddish transverse bands across fore- and hindwings. At base of forewing an oval, scale-less fovea with what appears to be a ladder-like strigil running longitudinally and medially. Genitalia simple but an elongate, caudally-directed

process from tip of sacculus which is short: membranous coremata with hairs as long as valves at base of valve ventrally. Aedeagus with vesica coarsely scobinate.

Female: Lighter and duller than the male: orange-brown ground colour replaced by dull pinkish mauve densely flecked with grey: traces of two reddish transverse bands across fore- and hindwings.

Diagnosis: Expanse 23-24mm.. Both sexes marked with lunulate, grey dots, unlike C. aedoea sp. n. (q.v.); postmedial orange colour in males not concentrated into pronounced bands or dots, merely suffused.

World distribution: New Caledonia, New Hebrides (?subspecies).

Fiji distribution: VITI LEVU: Lautoka, Suva. Nandarivatu.

Biology: Larva feeds on Alphitonia zizyphoides (Spreng.) in Fiji.

Remarks: Distribution probably wider than indicated above - see remarks on C. aedoea sp. n.

Genus: Catoria Moore, 1887, Lepid. Ceylon 3:414.

Catoria hemiprosopa Turner

Catoria hemiprosopa Turner, 1904, Trans. R. Soc. S. Aust. 28:230.
Type not examined, identity not in doubt.

Male: (Plate fig. 289) Upper half of face black; lower half and remainder of body and legs light brownish grey: forelegs dark above. Antennae pectinate to three quarters. Fore- and hindwings light brownish grey patterned with dark grey. Third sternite with a medial group of caudally-directed spines. Sacculus enlarged, terminating in a sclerotised ridge and a hook-like process at one half the length of the valve, a ventrally directed spine from the middle of the valve: vesica with a longitudinal row of fine, thorn-like cornuti.

Female: Similarly patterned to the male but antennae filiform, forewings rather more rounded and more densely marked with grey-brown.

Diagnosis: Expanse 33-37mm.. The half-black face distinguishes this from all other Catoria species - see Prout's revision of Catoria in Novit. zool. 35:132-141 (1929).

World distribution: South east Asia (C. h. affinis Prout); East Indies, New Guinea, Australia, Solomons (typical subspecies).

Fiji distribution:- VITI LEVU: Suva. VANUA LEVU: Savusavu area.

Remarks: A rare species, possibly restricted to coastal localities.

Genus: Cleora Curtis, 1825, Brit. Ent. 2: pl.88.

The Fijian representatives of Cleora were revised and two new species described by the author in 1971 (J. Ent. B 40:71-82). This paper contains genitalia illustrations, illustrations of adults and a key to males. Further locality data for many of the species and further diagnostic characters are given below and three new subspecies are recognised. All relevant types have been examined.

Cleora diversa Robinson

Cleora diversa Robinson, 1971, J. Ent. B 40:73, pl.I, fig.1, text figs. 1, 11.

Male: (Plate fig.282)

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, summit of Mt Victoria. VANUA LEVU: Ndelaikoro.

Remarks: Restricted to high-altitude primary forest: much commoner at Koro-O than at Nandarivatu.

Cleora fowlesi Robinson

Cleora fowlesi Robinson, 1971, J. Ent. B 40:74, pl.I, fig.4, text figs 4, 12.

Male: (Plate fig.281)

Fiji distribution:- VITI LEVU: Savura Creek, Vatuvula (Waimanu R.), Namanggumangua (Serua), Tholoisuva.

Remarks: Rare, apparently restricted to lowland forest.

Cleora injectaria anidryta Prout

Boarmia injectaria Walker, 1860, List Specimens Lepid. Insects Colln Br. Mus. 21:376.

Cleora injectaria anidryta Prout, 1929, Ann. Mag. nat. Hist. (10)3: 596.

Robinson, 1971:74, pl.I, fig.11, text figs. 10,13.

Male: (Plate fig.273)

Fiji distribution:- VITI LEVU: Suva, Rakiraki, Lautoka, Korolevu, Nandarivatu. VANUA LEVU: Savusavu area, Lambasa. YASAWA. NANANU-I-RA.

Remarks: Decidedly rarer than suggested in 1971: only four specimens of anidryta were collected during the 1970-71 trapping period. This species seems to prefer dry secondary vegetation although H.S. Robinson collected a good series at Tamavua (wet grassland, NW of Suva) in April, 1968. Most specimens have been collected in the dry season.

Cleora lanaris (Butler)

Aegitrichus lanaris Butler, 1886, Trans. ent. Soc. Lond.:434. Robinson, 1971:76, pl.I, fig.2, text figs. 2,24.

Male: (Plate fig.274)

Fiji distribution:- VITI LEVU: Nandarivatu, Nausori Highlands, Koro-O. VANUA LEVU: Ndelaikoro, Matanikavika Estate (!).

Remarks: Uncommon, a species of primary montane forest.

Cleora munditibia Prout

Cleora munditibia Prout, 1927, Novit. zool. 35:71.

Robinson, 1971:78, pl.I, fig.7, text figs.7, 15.

subsp. munditibia Prout

Male: (Plate fig.275)

Female: Similarly patterned to the male - hind tibia uniformly ochreous.

Fiji distribution:- VITI LEVU: Suva, Savura Creek, Nandarivatu, Mba River, Vunindawa, Tholoisuva, summit of Mt Victoria, Koro-O, Nanggali, Korolevu, Dombuilevu, Lautoka, Nausori Highlands. VANUA LEVU: Governor's Pool, Savusavu area, Ndelaikoro, Lambasa. OVALAU.

Biology: Larva recorded as feeding on Mucuna aterrima (Piper & Tracy) in Fiji.

Remarks: Common and widespread in areas of high rainfall: very common in forest. Can be differentiated from C. nausori (Bethune-Baker) (q.v.) by the underside of the hind tibia being uniformly ochreous: in nausori it is flecked with black.

subsp. lauensis subsp. n.

Male: Differs from munditibia munditibia in the form of ornamentation of the valve: the medial process is elongate, the adjacent nodular digitate process reduced in comparison with m. munditibia. Sacculus bearing a small, caudally-directed process at two thirds, dorsally directed and not as long as in m. munditibia (text fig. 158); terminal cornuti of vesica not as elongate.

Female: Unknown.

Diagnosis: Expanse 38mm.. Differentiated from m. munditibia as above.

Holotype: ♂, FIJI, Lau Group, On_gesa I., 9.vi.1971, G.S. Robinson. BMGGSN 8374.

Cleora nausori (Bethune-Baker)

Alcis nausori Bethune-Baker, 1905, Proc. zool. Soc. Lond.:94, pl.8, fig.6.

Robinson, 1971:78, pl.1, figs.3,12, text figs.3,16.

Male: (Plate fig.276)

Female: Larger than the male, with a dark reniform: hind tibia flecked with black: banded form as in male.

Fiji distribution:- VITI LEVU: Suva, Nausori, Nandarivatu, Koro-O, Nausori Highlands, Tholoisuva, summit of Mt Victoria, Nanggali, Korolevu. VANUA LEVU: Savusavu area, Ndelaikoro.

Remarks: A widespread species, especially common in forest areas. Underside of male hind tibia speckled with black, not uniformly ochreous as in C. munditibia Prout (q.v.).

Cleora ochricollis (Prout)

Tolmera ochricollis Prout, 1934, Stylops 3:261.

Robinson, 1971:78, pl.1, figs.6,10, text fig.6.

Male: (Plate fig.277)

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, summit of Mt Victoria. VANUA LEVU: Ndelaikoro. TAVEUNI (2300').

Remarks: A moderately common species of primary montane forest and moss forest.

Cleora perstricta Prout

Cleora perstricta Prout, 1934, Stylops 3:260.

Robinson, 1971:79, pl.1, fig.8, text fig.8.

Male: (Plate fig.278) (An aberrant specimen with a yellow subterminal line.)

Fiji distribution:- VITI LEVU: Vunindawa, Tholoisuva, Nandarivatu, Nausori Highlands.

Remarks: A rare species restricted to primary forest: not known from Vanua Levu.

Cleora samoana (Butler)

Boarmia samoana Butler, 1886, Trans. ent. Soc. Lond.:433.

Robinson, 1971:80, pl.I, fig.5, text figs.5,17.

subsp. fijiensis subsp. n.

Male: (Plate fig.279) Differs from nominotypical samoana in being less variable in wing pattern and, in the genitalia, the small rectangular process from the tip of the sacculus being square-ended. In samoana samoana the process at the tip of the sacculus is elongate, rhomboidal and dentate (illustrated by Prout, 1928, Insects Samoa 3:160, fig.D), ~~the process~~ pointed at the tip; the terminal cornutus on the vesica is one half again as long as in samoana fijiensis.

Female: Similarly patterned to the male.

Diagnosis: Expanse 31-33mm.. Differentiated from the nominotypical subspecies above.

World distribution: Samoa and Tonga (samoana samoana).

Fiji distribution:- VITI LEVU: Suva, Lautoka, Nandarivatu, Rakiraki, Tholoisuva, Korolevu. VANUA LEVU: Savusavu area, Lambasa. YASAWA.

Biology: Comstock (1966) quotes Swezey as having found a larva of samoana feeding on Eugenia on Upolu, Samoa.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 27-30.vi.1968, H.S.&G.S. Robinson. BMGGSN 8392.

Paratypes: 2♂♂, ♀, data as holotype.

Remarks: A moderately common species in areas of secondary vegetation. subsp. noatau subsp. n.

Male: Slightly darker than C. samoana fijiensis, ground colour tending towards dull grey-brown. Valve slightly narrower than in C. samoana samoana. the process at the tip of the sacculus almost semicircular, rough-edged (text fig. 159).

Female: Similarly patterned to the male.

Diagnosis: Expanse 31-34mm.. Differentiated from C.s. samoana and C. s. fijiensis above.

Fiji distribution:- ROTUMA only.

Holotype: ♂, FIJI, Rotuma I., 26.iv.1971, G.S. Robinson. BMGGSN 8373.

Paratypes: 5♂♂, data as holotype.

4♂♂, as holotype but Fururoa, 22.iv.1971.

♂, ♀, as holotype but Oinafa, 20.iv. and 18.iv.1971.

Remarks: Moderately common on Rotuma.

Cleora vitensis (Bethune-Baker)

Alcis vitensis Bethune-Baker, 1905, Proc. zool. Soc. Lond.:93, pl.8, fig.5.

Robinson, 1971:80, pl.I, fig.9, text figs.9,18.

Male: (Plate fig.280)

Female: Similarly patterned to the male. ('Unknown' in 1971 paper)

Fiji distribution:- VITI LEVU: Nausori Highlands, Nandarivatu, Korolevu, Rakiraki, Nausori, Vunindawa. VANUA LEVU: Ndelaikoro. OVALAU.

Remarks: An uncommon but widespread species.

Genus: Clepsimelia Warren, 1897, Novit. zool. 4:261.

Clepsimelia phryganeoides Warren

Clepsimelia phryganeoides Warren, 1897, Novit. zool. 4:262.
Type examined.

Male: Body and legs charcoal grey, light grey ventrally. Forelegs silvery basally, fore- and midlegs banded with white at articulations. Forewings smoky grey, irrorated with darker brownish grey. Hindwings uniform steel-grey.

Female: (Plate fig.284) Similarly patterned to the male but some suffusion of white in the medial fascia anteriorly.

World distribution: Celebes, New Guinea, New Hebrides, New Caledonia.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O, summit of Mt Victoria. VANUA LEVU: Ndelaikoro.

Remarks: A rare species restricted to primary montane rain forest.

Clepsimelia is a monotypic genus: it appears to have no allies whatsoever within the Ennominae and occupies an anomalous position.

Genus: Gonodontis Hubner, 1823, Verz. bekannter Schmett.:287.

Gonodontis clelia (Cramer)

Phalaena clelia Cramer, 1780, Uitlandsche Kapellen 3:172, pl.288, figs. B,C. Type not examined, identity not in doubt.

Male: (Not known from Fiji) Smaller and more ochreous than the female; ante- and postmedial lines often well-defined, sharply angled just below costa of forewing.

Female: (Plate fig.341) Body and legs pinkish lilac, forelegs flecked with black. Fore- and hindwings lilac-grey, partly suffused with warm brown in the medial fascia: scale-less, transparent areas in medial fascia of fore- and hindwings.

Diagnosis: Expanse 49mm.. Wing pattern diagnostic.

World distribution: India, Ceylon, south east Asia, East Indies, New Guinea, Australia, Solomon Is., New Caledonia (?subspecies), Samoa.

Fiji distribution:- Known from a single female from VITI LEVU, Suva, 8.x.1972, H. S. & G.S. Robinson.

Remarks: This specimen is in very good condition: its provenance is reminiscent of that of Pataeta carbo (Guenee) (q.v.) and I suspect it may have been introduced.

Genus: Luxiaria Walker, 1860, List Specimens Lepid. Insects Colln Br. Mus. 20:231.

Luxiaria sesquilinea Prout

Luxiaria sesquilinea Prout, 1930, Ann. Mag. nat. Hist. (10)6:695.
Type not examined - in ZM, Hamburg - identity not in doubt.

Male: (Plate fig.285) Body and wings pale buff finely freckled with dark brown: medial line of dark brown dots, some brown suffusion postmedially. The illustrated specimen and one other, rather densely freckled with brown, differ from the typical form in which the medial line is solid, brown, and continues to the forewing apex (see Prout's comprehensive original description).

Female: Similarly patterned to the typical male, slightly larger, medial line in fore- and hindwing paler but broader and more diffused at the edges.

Diagnosis: Expanse 29-38mm.. Wing pattern entirely diagnostic.

Fiji distribution:- VITI LEVU: Nanggali, Nausori Highlands, Nandarivatu, Vunindawa. OVALAU.

Remarks: Rare and restricted to primary forest.

Genus: Nadagara Walker, 1862, List Specimens Lepid. Insects Colln Br. Mus. 24:1093.

Nadagara irretracta levuensis subsp. n.

Nadagara irretracta Warren, 1899, Novit. zool. 6:356. Type examined.

Male: (Plate fig.286) Body and wings silver-grey; face, palps and tegula brown, forelegs flecked with blackish brown above. Wings flecked with dark brown, patterned with warm red-brown; stigmata brownish black. Postmedial line in fore- and hindwing edged distally with cream.

Female: Similarly patterned to the male.

Diagnosis: Expanse 35-38mm.. Wing pattern completely diagnostic.

Levuensis differs from nominotypical irretracta (type from Tulagi I., Solomon Is.) in that the postmedial line meets the forewing posterior margin at less than one half its length (beyond one half in irretracta), the hindwing postmedial is convex and lunulate (straight or very slightly concave to within 1mm. of the costa in irretracta) and there is a faint, dark subterminal line in both wings (not apparent in irretracta) beyond the light creamy grey subterminal line.

World distribution: (N. i. irretracta) New Britain, New Ireland, Admiralty and Louisiade Is., Solomon Is., Australia, New Hebrides.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O. VANUA LEVU: Ndelaikoro, Matanikavika Estate (!).

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 16-20.xii.1968, H.S. & G.S. Robinson.

Paratypes: 3♂♂, data as holotype.

♀, FIJI, ix.1966, H.S. Robinson.

♀, FIJI, i.1967, H.S. Robinson.

♀, as holotype but 27-30.ix.1968.

♂, as holotype but Koro-O, 24.xi.1971.

Remarks: An uncommon species restricted to primary montane forest with the exception of the single specimen from Matanikavika Estate, probably a vagrant.

Genus: Petelia Herrich-Schaffer, 1856, Samml. ausser, Schmett.:29, (pl. 56) fig.534.

Petelia aesyla Prout

Petelia aesyla Prout, 1930, Ann. Mag. nat. Hist. (10)6:696. Type examined.

Male: (Plate fig. 287) Body and wings light brownish drab suffused with cinnamon, flecked with grey. Dark markings charcoal-grey, hindwing cell-spot when enlarged infilled with yellow. The illustration is of an exceptionally heavily marked individual: most specimens are almost unmarked with grey.

Female: Similarly patterned to the male.

Diagnosis: Expanse 37-42mm.. Closely allied to Petelia medardaria Herrich-Schaffer (Samml. ausser. Schmett.:54, (pl.56) fig.534, 1856) from India (type) to the New Hebrides but in medardaria the hindwing termen is not concave between R5 and M3.

Fiji distribution:- VITI LEVU: Nandarivatu, Vunindawa, Tholoisuva, Nausori Highlands, Korolevu, Koro-O, Nanggali, Dombuilevu. VANUA LEVU: Ndelaikoro, Savusavu area, Matanikavika Estate.

Remarks: A very common species in forest areas. Wing pattern and density of colouration very variable.

Genus: Ruttelerona Swinhoe, 1894, Trans. ent. Soc. Lond.:220.

Ruttelerona presbytica (Prout MS) sp. n.

Male: (Plate fig. 283) Body olive-grey patterned with blackish brown on prothoracic 'collar' and second and third abdominal terga. Lateral tufts of pinkish ochre hair and some brown suffusion on fourth to seventh abdominal terga. Body ochreous cream ventrally, legs (especially forelegs) flecked with black. Hind tibia swollen, pocketed, with a dense tuft of blackish hairs three quarters the length of the tibia. Antennae ciliate, cilia twice as long as width of antennal shaft. Wings olivaceous grey patterned with orange-brown, black and light grey-blue, flecked with black.

Female: Pattern similar to that of male but much duller: ground colour of body and wings brownish olive flecked with black, transverse lines brownish black, some suffusion of dull brown and grey: flecks of white on subterminal line.

Diagnosis: Expanse 39-43mm.. Facies characteristic. Allied to Ruttelerona lithina (Warren) (Paralcis lithina Warren, 1903, Novit. zool. 10:398) from New Guinea but wings not as elongate, pale subterminal not apparent, not as variegated. In male lithina the hind tibia has a shallow pocket with a few pale hairs.

Fiji distribution:- VITI LEVU: Suva, Nandarivatu, Savura Creek, Nausori Highlands, Tholoisuva, summit of Mt Victoria, Koro-O, Nanggali, Korolevu. VANUA LEVU: Governor's Pool, Ndelaikoro, Savusavu area. NANANU-I-RA. YASAWA. ONGEA.

Holotype: ♂, FIJI, (Viti Levu), Vunindawa, 7.i.1935, (R.)H. Phillips, 985. / 'Ruttelerona presbytica Prout, ♂ type' (in Prout's handwriting). / Pres. by Imp. Inst. Ent. B.M. 1937-294.

Paratype: ♀, as holotype but 2.i.1932, 460. / 'Ruttelerona presbytica Prout, ♀ allotype' (in Prout's handwriting). / Pres. by Imp. Inst. Ent. B.M. 1934-101.

Remarks: A widespread species with a catholic choice in habitats but commonest in forested areas.

Genus: Scardamia Guenee, 1857, Hist. nat. Insectes Lepid. 9:89.

Scardamia eucampta Prout

Scardamia eucampta Prout, 1930, Ann. Mag. nat. Hist. (10)6:594.
Type examined.

Male: (Plate fig. 288) Body and wings bright orange above, yellowish ventrally. Abdomen tinged with purple dorsally with tufts of large purple scales on second and third terga. Wings patterned with purple and black, metallic scaling in ante-, postmedial and terminal lines. In two examples, extensive purple suffusion in basal and terminal fasciae.

Female: Similarly patterned to the male.

Diagnosis: Expanse 25-31mm.. A gaudy, unmistakable species. Closely allied to Scardamia chrysolina Meyrick (Proc. Linn. Soc. N.S.W. 6:640, 1892) from Australia but wings more rounded, deeper orange, hindwing with antemedial line straighter, postmedial much more curved.

World distribution: Loyalty Is., New Hebrides, New Caledonia.

Fiji distribution:- VITI LEVU: Tholoisuva, Nandarivatu, Koro-O, Lautoka, Nausori Highlands. VANUA LEVU: Savusavu area.

Remarks: Uncommon but widespread in areas of primary and secondary forest.

FAMILY : SATURNIIDAE

Subfamily: Saturniinae

Genus: Opodiphthera Wallengren, 1859, Ofvers. K. VetenskAkad. Forh. Stockh. 15:209.

Opodiphthera eucalypti (Scott)

Antheraea eucalypti Scott, 1864, Austral. Lepid. 1:1, pl.1.

Male: Body and wings pinkish buff; fore- and hindwings with large orange 'eyes', hindwing eye ringed with black.

Female: (Not known from Fiji) Similarly patterned to the male.

Diagnosis: Expanse 120mm.. Facies unmistakeable.

World distribution: Australia.

Fiji distribution: Known only from one male from VANUA LEVU: Wainikoro (H. Nicholls, 1924) ex CSR/SPSM collection.

Biology: See Campbell, 1926, Aust. Mus. Mag. 2:315.

Remarks: This specimen is almost certainly an introduction. It was determined by G.E. Bryant as Austrocaligula eucalypti (Scott).

FAMILY : EPIPLEMIDAE

Genus: Epiplema Herrich-Schaffer, 1855, Samml. ausser. Schmett.
1:26, 38, 62, fig.324 (text 1856).

Epiplema cretosa Swinhoe

Epiplema cretosa Swinhoe, 1902, Trans. ent. Soc. Lond.:595. Type
examined.

Male: (Plate fig.156) Body and wings white, legs and palps flecked with black. Fore- and hindwings with broken light yellow transverse bands darker and denser at the forewing costa which is flecked with brown: minute hindwing tail at R5 with a black dot at the tip.

Female: Similarly patterned to the male.

Diagnosis: Expanse 14-17mm.. A small, whitish species: worn specimens lose much of their yellow speckling. Facies diagnostic.

Fiji distribution:- VITI LEVU: Savura Creek, Tholoisuva, Nandarivatu, Koro-O, Nanggali. VANUA LEVU: Savusavu area, Governor's Pool.

Remarks: Uncommon but widespread in forested areas.

Epiplema instabilata (Walker)

Erosia instabilata Walker, 1866, List Specimens Lepid. Insects Colln Br. Mus. 35:1646. Type examined.

Male: (Plate fig.157) Body white flecked with dark brown on head and abdomen dorsally. Wings white patterned with dark brown, brownish black, steel grey and dull orange.

Female: Similarly patterned to the male.

Diagnosis: Expanse 17-20mm.. Facies completely diagnostic.

World distribution: Ceylon and India through south east Asia and the East Indies. New Guinea, Australia, Solomons, New Hebrides, New Caledonia.

Fiji distribution:- VITI LEVU: Suva, Nandarivatu. VANUA LEVU: Savusavu area. LELEUVIA. VIWA. ROTUMA.

Remarks: Apparently a rare species on the larger islands of the group: instabilata could be a coastal species as the Nandarivatu record refers to a singleton. Of the three specimens collected from Rotuma, two are very lightly marked; one of these is almost albino with faint traces of the hindwing medial line, posterior spot and dark flecks on the forewing costa only. All three are somewhat smaller than specimens from the Fiji group.

Epiplema lomalangi sp. n.

Male: Similarly patterned to the female but antennae unipectinate to five sixths, pectinations less than one fifth the length of the antenna: anal angle of hindwing completely white. (One worn and somewhat faded specimen).

Female: (Plate fig.293) Top of head and antennal shaft white, body silver-grey dorsally, ventrally and on the legs light ochreous: upperside of fore- and midlegs silver-grey. Antennae filiform. Fore- and hindwings silver-grey flecked with black: forewing medial fascia suffused with grey medially, warm brown posteriorly, obsolete anteriorly. Antemedial fascia of hindwing enclosed by white medial line: medium grey anteriorly, warm brown posteriorly suffused with white at anal margin, white patterning extending to termen.

Diagnosis: Expanse 26-29mm.. A large species with distinctive wing pattern. Possibly allied to Epiplema lypera Tams (Insects Samoa 3:240, pl.11, figs.1,2, 1935) from Samoa but the colouring of lypera more brownish, male antennae not pectinate, posterior hindwing 'tail' not well-developed, colouring rather uniform: forewing postmedial of lypera slightly convex, extending to costa, in lomalangi bulged medially and obsolete in the anterior third.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O.

Holotype: ♀, FIJI, Viti Levu, Koro-O, 23.xi.1971, H.S. & G.S. Robinson.

Paratypes: ♂, ♀, FIJI, (Viti Levu), Nandarivatu, 2700', 14-16.ix.1955, B.M. 1955-817, H.W. Simmonds.

♀, FIJI, (Viti Levu), Nandarivatu, 27-30.vi.1968, H.S. & G.S. Robinson. BM Uraniid GSN 64.

♀, as above but 27-30.ix.1968.

♀, as above but 7.ii.1970.

♀, FIJI, (Viti Levu), Nandarivatu, 17-24.x.1954. H.W. Simmonds. / Brit. Mus. 1955-6.

Epiplema simmondsi sp. n.

Male: (Plate fig. 294) Face and upperside of legs dull brown; body light grey-brown above, buffy cream ventrally. Antenna unipectinate, longest pectinations at one half, one third length of antenna. Fore- and hindwings light grey-brown with a lilac tint, patterned with light pinkish buff, dark purple-brown and black, some steel-grey suffusion postmedially in the forewing. Forewing tornal margin and hindwing costa proximally and distally with deciduous anteriorly-directed tufts of dark hair. Ground colour varies to dark blue-grey in one specimen: paratype series exhibits a variety of shades of brown.

Female: Similarly patterned to the male: antenna unipectinate but pectinations only twice width of antennal shaft. Shade of wing colouration variable.

Diagnosis: Expanse 20-22mm.. Facies diagnostic: male antennal pectination much longer than in any other Fijian Epiplemid. Allied to Epiplema concinnula Warren (Novit. zool. 5:321, 1891) from Woodlark I. (type), Sudest I. and New Guinea. In concinnula the forewing termen is convex, the hindwing postmedial line evenly bowed, forewing without a dark terminal line. Although swollen, the antenna of female concinnula is without pectinations: the male is unknown.

Fiji distribution:- VITI LEVU: Nandarivatu, Koro-O.

Holotype: ♂, FIJI, (Viti Levu), Nandarivatu, 15-17.viii.1969, H.S. & G.S. Robinson.

Paratypes: ♂, data as holotype.

♂, as holotype but 27-30.vi.1968.

3♂♂, 3♀♀, as holotype but 16-20.xii.1968. BM Uraniid GSN 620, 63♀.

♀, as holotype but 7.ii.1970.

♂, as holotype but Koro-O, 23.xi.1971.

Epiplema species

♂, FIJI, (Viti Levu), Suva, i.1954, H.W. Simmonds. BM 1954-266. Expanse 16mm.. Body and wings buffy cream with a slight fleshy tint. Forewing with a pronounced dark stigma and traces of a dark medial fascia at the posterior margin. Hindwing with short, conical tails on R5 and M3, a small dark 'eye' just below the posterior tail, the 'eye' repeated on the underside. I am unable to identify this specimen.

Genus: Gathynia Walker, 1862, List Specimens Lepid. Insects Colln Br. Mus. 26:1639.

Gathynia cythera Swinhoe

Gathynia cythera Swinhoe, 1902, Trans. ent. Soc. Lond.:598. Type examined.

Male: (Plate fig.159) Top of head and base of antennae white: head and prothoracic 'collar' greyish purple: remainder of thorax and abdomen purplish ochreous. Legs and underside of body ochreous but upperside of legs dull grey: hind tibia with a tuft of elongate hairs. Forewings purplish grey streaked medially and just below costa with red-brown. Hindwing dark brown marked with purplish black towards termen, a white section anteriorly: anal margin pinkish cream, submedian fold containing a hair tuft posteriorly

and a flat, round pad of white scales; over the scale-pad (when hindwing folded) a pad of ridged, compressed hair, possibly a strigil: subterminal fold and posterior of hindwing slightly contorted.

Female: Similarly patterned to the male but hindwing not modified, forewings rather more elongate, more greyish.

Diagnosis: Expanse 17-24mm.. Facies and extensive secondary sexual modifications of male diagnostic.

Fiji distribution:- VITI LEVU: Nandarivatu, Tholoisuva, Nanggali, Korolevu, Vatukoula, Rakiraki, Nausori Highlands. VANUA LEVU: Savusavu area, Ndelaikoro, Matanikavika Estate.

Remarks: An uncommon but widespread species: collected at light in some numbers at Matanikavika.

Gathynia yasawa sp. n.

Male: Body and legs pale greyish ochreous, upperside of forelegs dark brown. Antennae dentate, finely ciliate. Forewings greyish ochreous irrorated with grey-brown: traces of ante- and postmedial lines dark grey at costa; apex suffused with dull grey. Hindwing greyish ochreous irrorated with grey-brown: medial line white, distally suffused with dark brown, lighter at apex: medial line and irrorate pattern obsolete from two thirds. Submedian fold with a large, oval patch of pale yellow, elongate, fine hairs, dark brown scaling between tuft and posterior margin; fine, elongate white hairs from posterior margin.

Female: Duller than the male, wings elongate, greyish ochreous, freckled with dull brown. Hindwing normal. Antennae filiform, finely ciliate.

Diagnosis: Expanse 14-15mm. (males), 16-18mm. (females). A small, dull-coloured species, lacking the white bar in the anterior third of the hindwing of Gathynia cythera Swinhoe (q.v.). The oval hair-tuft in the male hindwing is completely diagnostic. Females resemble those of Lobogethes interrupta Warren (Novit. zool. 3:351, 1896) from Australia, but female interrupta have the hindwing streaked with cream in the anal angle: the male of interrupta has the anal angle lobed, the lobe carrying fine hairs of moderate length; the submedian fold does not have an oval tuft of hair as in yasawa.

Fiji distribution:- VITI LEVU: Nandarivatu (Simmonds - 2♀♀), Lautoka (Phillips - 2♀♀), Nausori Highlands (author - ♂). NANUYA LAILAI. NAUKATHUVU.

Holotype: ♂, FIJI, Yasawa Group, Naukathuvu I., 17.ii.1971, G.S. Robinson.

Paratypes: ♀, data as holotype.

♂, 5♀♀, as holotype but Nanuya Lailai I., 16.ii.1971.

Remarks: Very rare on Viti Levu but apparently common on the wetter islands of the Yasawa Group.

Gathynia species

♀, FIJI, Yasawa Group, Nanuya Lailai I., 16.ii.1971, G.S. Robinson.
The specimen is in poor condition. Expanse 15mm.. Wings narrower but similarly patterned to Gathynia cythera Swinhoe (q.v.), the anterior white area in the hindwing narrower, its distal margin running anteriorly and distally to join the costa at an acute angle: in cythera the margin intersects the costa almost at right angles. The identity of this specimen is uncertain.

FAMILY : URANIIDAE

Genus: Urapteroides Moore, 1888, Descr. new Indian Lepid. Colln
Atkinson: 258.

Urapteroides anerces (Meyrick) comb. n.

Strophidia anerces Meyrick, 1886, Trans. ent. Soc. Lond.:201.
 Type not examined - Lucas collection - identity not in doubt.
Micronia hermaea Druce, 1888, Proc. zool. Soc. Lond.:227, pl.13,
 fig.9. Type examined. Syn. n.

Male: (Plate fig. 158) Body and wings white, flecks of brownish
 black on forewing costa and forming three dark marks on the
 hindwing tail. Lighter markings fawn.

Female: Similarly patterned to the male.

Diagnosis: Expanse 44-52mm.. Pattern very distinctive: unlike any
 other Fijian species. Larger than Urapteroides hyemalis (Butler)
 (Strophidia hyemalis Butler, 1887, Ann. Mag. nat. Hist. (5)20:247) from
 the Solomon Is. and New Hebrides, and without the distinctive black
 terminal line in the hindwing.

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, Nandarivatu,
 Nausori Highlands, Koro-O, Nanggali. VANUA LEVU: Ndelaikoro.

Biology: Larva recorded from Endospermum macrophyllum (Muell. Arg.)
 in Fiji.

Remarks: A moderately common species in primary and secondary forest.

FAMILY : COSSIDAE

Genus: Acritocera Butler, 1886, Trans. ent. Soc. Lond.:389.

Acritocera negligens Butler

Acritocera negligens Butler, 1886, Trans. ent. Soc. Lond.:390, pl.2, fig.4. Type examined.

Male: (Plate fig.162) Head, thorax, forewings and legs dark brown and deep grey patterned with cream. Antenna unipectinate to seven eighths, pectinations folded and doubled over at one half. Hind femur-tibia articulation with a conspicuous white spot. Abdomen dull ochreous. Hindwing white suffused distally with dull brown.

Female: Similarly patterned to the male: antennal pectinations shorter, tufted at the tip.

Diagnosis: Expanse 38-48mm. (male) 45-54mm. (female). Facies completely diagnostic: no close allies.

Fiji distribution:- VITI LEVU: Suva, Korolevu, Namanggumangua (Serua). VANUA LEVU: Savusavu area, Matanikavika Estate. LELEUVIA. OVALAU. MOTURIKI. TAVEUNI. YASAWA. NANUYA LAILAI. NAUKATHUVU. VIWA.

Biology: The larva bores into coconut (Cocos nucifera L.) spathes and destroys flower spikes: it is known in Fiji as the "coconut spathe-borer" and is a major pest. The larva pupates in soil at the base of the palm: the cocoon is solid but thin-walled, spheroidal, with attached sand grains.

Remarks: Acritocera is a monotypic genus endemic to Fiji: it has no close allies. Female adults do not seem to be readily collected at light: all my light-trapped specimens are male and the two females in BM(NH) are bred specimens (Simmonds). This species is apparently absent from the Lau group but elsewhere seems to be found where coconuts are grown in any number.

H.S. Robinson (in litt.) reports taking in a light trap on three nights in November 1973, 16♂ and 4♀♀ of this species. The trap was situated in the centre of a dense and heavily infested stand of coconut. On the three following nights the trap was stationed a hundred yards outside this stand and a further 16 ♂ (but no females) were taken.

The indications seem to be that, while the males of the species range fairly widely, the flight-range of females is limited to a few yards from the foodplant (c.f. p.18, Robinson H.S. 1952 re Trichiura crataegi (L)).

FAMILY : LIMACODIDAE

Genus: Beggina Hering in Seitz, 1931, Macrolepid. World 10:702.

This genus contains seven species: the type species, Beggina lymantrina Hering (ibidem:702) is known only from the male type from New Georgia, Solomon Islands. Of the remaining six species, one is transferred from another genus and five are described below as new: all are endemic to Fiji. Hering's classification of the Limacodidae (in Seitz) is based almost exclusively on venational characters and many of the generic assemblages are doubtful. The species here included in Beggina are clearly very divergent but their external structure is very similar although patterns and size vary widely. Similar modification of the juxta of the male occurs in three externally dissimilar species (albifascia, dentilinea, minima): the external appearance of dentilinea and mediopunctata is similar: the remaining three species (lymantrina, unicornis, zena) exhibit genitalic similarities, notably in the possession of apical processes on the aedeagus: this feature is also present in albifascia. Unfortunately the genitalia of the type of lymantrina were made into a dry preparation: the aedeagus is damaged and does not show this apical process with reassuring clarity. Beggina appears to represent remnants of an ancient and divergent Melanesian group of species with doubtful affinities. Fijian species of Beggina are all very rare with the exception of mediopunctata which is locally frequent. All appear to be species of lowland forest and most were collected at Tholoisuva.

Beggina albifascia sp. n.

Male: (Plate fig.197) Head and thorax warm brown with a slight purplish tint: scales on face erect: abdomen ochreous. Legs ochreous, hirsute, flecked with medium brown to dark brown. Antennae bipectinate to four fifths, longest pectinations one quarter length of antenna. Forewings warm brown, some dark brown suffusion at end of cell and at medial and postmedial lines. Posterior fifth suffused yellowish: conspicuous postmedial yellow fascia with a few flecks of light brown: medial and postmedial lines almost straight. Hindwing light reddish ochreous, fringes yellow at base and on veins. Genitalia (text fig. 160) with gnathos sclerotised, almost reaching tip of uncus: juxta forming an elongate digitate process to one half of the valve, directed to the left. Aedeagus (text fig.161) with an apical process and an elongate medial cornutus on the vesica.

Female: Unknown.

Diagnosis: Expanse 16-18mm.. Differs from Beggina lymantrina Hering (above) in being more darkly marked, wings narrower:~in lymantrina the yellow postmedial fascia extends to the termen whereas in albifascia the subterminal fascia is warm brown. In lymantrina the juxta does not form a process.

Fiji distribution:- VITI LEVU: Tholoisuva.

Holotype: ♂, FIJ1, (Viti Levu), Tholoisuva, 14.xi.1970, H.S. & G.S. Robinson. BM Limacodid GSN 129.

Paratypes: 2♂♂, data as holotype but 15.xi.1970 and 9-10.i.1971.

Remarks: The two paratypes are worn and faded: the forewing postmedial fascia appears white or cream.

Beggina dentilinea sp. n.

Male: Head, thorax and legs dark brown: scales on face elongate, erect: antennae bipectinate to four fifths, longest pectinations one fifth length of antenna. Abdomen brownish ochreous; legs hirsute, flecked with light reddish brown. Forewings dark brown and black mixed with a few pale scales, thinly suffused with yellow-brown towards posterior margin: faint dark antemedial line: postmedial line dentate, black, flecked distally with a few white scales: subterminal line black, serrate. Hindwing light grey-brown with a reddish tinge: fringe yellow basally and at tips of veins. Genitalia (text fig.162) with valves broad basally, juxta forming a digitate process on the left. Aedeagus (text fig. 163) with a ridge-like carina: vesica with a small lobe-like basal cornutus.

Female: Unknown.

Diagnosis: Expanse 24-28mm.. Easily confused with Beggina mediopunctata (Hering) (q.v.) but mediopunctata has no white scaling beside the postmedial line nor any yellow suffusion near the posterior margin of the forewing. In mediopunctata the juxta does not form a process and the aedeagus has the vesica scobinate medially.

Fiji distribution:- VITI LEVU: Tholoisuva.

Holotype: ♂, FIJI, (Viti Levu), Tholoisuva, 14.xi.1970, H.S. & G.S. Robinson. BM Limacodid GSN 131.

Paratypes: ♂, data as holotype.
♂, as holotype but 9-10.i.1971.

Beggina mediopunctata (Hering) comb. n.

Limacarina mediopunctata Hering in Seitz, 1931, Macrolepid. World 10:686. Type not examined - in NM, Vienna - identity not in doubt.

Male: (Plate fig.196) Body purplish brown, thorax pinkish ochre ventrally. Face with elongate, erect scales. Antennae bipectinate to four fifths, longest pectinations one quarter length of antenna. Forewings warm brown flecked with grey-brown, a yellowish tinge to the paler scales. Medial line of four black lunules, anterior lunule with a few white scales distally. Postmedial line black, narrow, dentate. Hindwing light pinkish brown, darker distally, fringes grey-brown basally. Genitalia with base of valves broad (text fig.164); aedeagus with coarsely scobinate area terminally (text fig.165); juxta sclerotised, enveloping anellus.

Female: Similarly patterned to the male but larger, antennae with short pectinations.

Diagnosis: Expanse 20-26mm. (male), 24-33mm. (female). Medial line placed more proximally, not as dentate as in B. dentilinea sp. n. (q.v.), posterior of forewing not suffused with yellow.

Fiji distribution:- VITI LEVU: Savura Creek, Nausori Highlands, Vunindawa. VANUA LEVU: Savundrondro Dam, Matañikavika Estate, Ndelaikoro.

Remarks: An uncommon and local forest species. The Vunindawa record refers to two males collected by Phillips and determined as Limacarina mediopunctata by Hering.

Beggina minima sp. n.

Male: Head and thorax warm brown with a purplish tinge, face and prothoracic collar with some admixture of buff: ventrally and on the abdomen ochreous buff with some warm brown. Antennae bipectinate to four fifths, longest pectinations one quarter length of antenna. Forewings uniform chocolate brown with a slight purplish tint. Hindwings dull pinkish ochreous. Genitalia (text fig. 166) with juxta produced into an elongate, digitate basal process and extending round the anellus to form a second dorsal process. Vesica with a small, blunt, basal cornutus and a sclerotised, scobinate band terminating in a ledge-like carina at the tip of the aedeagus (text fig. 167).

Female: Unknown.

Diagnosis: Expanse 13mm.. The smallest Beggina species and the only one with an apparently uniformly-coloured forewing. Differs from all other known Beggina species in possessing a digitate process from the right hand side of the juxta, dorsal to the anellus.

Fiji distribution:- Only the holotype known.

Holotype: ♂, FIJI, Vanua Levu, Matanikavika Estate, 21-28.xii.1972, H.S. Robinson. BM Limacodid GSN 130.

Beggina unicornis sp. n.

Male: Body cream, some flecks of dark brown on palps and legs. Antennae bipectinate, longest pectinations one fifth length of antenna. Forewings ochreous cream, traces of brown medial and postmedial bands at termen. Fringe flecked with brown posteriorly. Hindwing cream suffused with light brown terminally and on the fringe. Genitalia (text fig. 168) with juxta extended round anellus, sclerotised but without processes. Aedeagus large (text fig. 169), apex produced into a stout process.

Female: Unknown.

Diagnosis: Expanse 19mm.. Both known specimens of this species are in poor condition but are apparently much paler-coloured than any other known Beggina species. The male genitalia with broad-based valves and aedeagus with large apical process are diagnostic. The aedeagus can be exposed by de-scaling the abdomen.

Fiji distribution:- VITI LEVU: Tholoisuva.

Holotype: ♂, FIJI, (Viti Levu), Tholoisuva, 9-10.i.1971, H.S. & G.S. Robinson. BM Limacodid GSN 133.

Paratype: ♂, data as holotype but 15.xi.1970.

Beggina zena sp. n.

Male: Body and legs cream flecked with brown: midlegs quite heavily dusted with dark purplish brown. Antennae bipectinate to four fifths, longest pectinations one quarter length of antennal shaft. Forewings cream flecked broadly with brown along the costa to two thirds: distal brown-flecked fascia extending from apex to posterior margin at one third, a faint antemedial line of brown scales from the costa at one fifth to the distal fascia at one half the width of the wing. Hindwing uniform pinkish ochre. Genitalia (text fig. 170) with narrow valves; juxta enlarged, sclerotised and freely projecting almost to base of gnathos, asymmetric. Aedeagus (text fig. 171) with apex bifurcate.

Female: Similarly patterned to the male but a pronounced dark brown basal fascia: postmedial line concave, enclosing brown terminal fascia. Posterior portion of medial fascia not as heavily infilled with brown as in the male.

Diagnosis: Expanse 16-17mm. (male), 23mm. (female). Patterned very differently from other Beggina species, pattern diffuse, pale band not sharply delimited as in B. albifascia sp. n. (q.v.). Darker markings more extensive than in B. unicornis sp. n. (q.v.), the aedeagus and apical processes much smaller, valves narrower basally (compare illustrations).

Fiji distribution:- VITI LEVU: Tholoisuva. VANUA LEVU: Savusavu area.

Holotype: ♂, FIJI, Vanua Levu, Savusavu (Namale Est.), 24-28.xii.1969, H.S. & G.S. Robinson. BM Limacodid GSN 132.

Paratypes: ♂, FIJI, (Viti Levu), Tholoisuva, 15.xi.1970, H.S. & G.S. Robinson. BM Limacodid GSN 135.

♀, as above but 9-10.i.1971.

♀, as above but 24.ix.1957, H.W. Simmonds.

FAMILY : ZYGAENIDAE

Subfamily: Chalcosiinae

Genus: Heteropan Walker, 1854, List Specimens Lepid. Insects Colln Br. Mus. 2:440.

Heteropan dolens Druce

Heteropan dolens Druce, 1888, Proc. zool. Soc. Lond.:220, pl.13, fig.1. Type examined.

Male: Head, thorax and forewings blackish brown, abdomen black with a bluish tint. Antennae with short pectinations. Hindwing vivid dark iridescent blue. This species is illustrated by Tothill, Taylor & Paine (1930: pl.31. fig.5) but the forewing is much too broad, the head, thorax and forewing too bluish.

Female: Similarly patterned to the male.

Diagnosis: Expanse 17-19mm.. Larger, wings broader than in Levuana iridescens B.-B. (q.v.).

World distribution: New Hebrides (2♂, Aneityum I., Agathis Camp - 1150', 19-21.vii.1971, G.S. Robinson, Roy. Soc. Expedition).

Fiji distribution:- VITI LEVU: Suva.

Remarks: This species was not collected by either R.H. Phillips or the author: I consider it to be extinct in Fiji and extinction to have been caused by predation by Ptychomyia remota Aldr., the Tachinid introduced into Fiji in 1925 to control Levuana (see Tothill, Taylor & Paine, 1930). Luckily, dolens still survives on Aneityum.

Subfamily: Procridinae

Genus: Levuana Bethune-Baker, 1906, Ann. Mag. nat. Hist. (7)18:343.

Levuana iridescens Bethune-Baker

Levuana iridescens Bethune-Baker, 1906, Ann. Mag. nat. Hist. (7) 18:343. Type examined.

Male: Head and prothorax dark greenish blue with a metallic sheen; meso- and metathorax similar but with a purplish tinge; head and thorax ventrally similar to head and prothorax: antennae bipectinate. Legs bluish ochreous to greenish blue. First and last abdominal segments same colour as metathorax: remaining segments ochreous with blue tinge on mid-line ventrally. Forewings uniformly dark metallic purple: hindwings thinly scaled, semi-transparent; scales dark, concentrated near margins where wing is purple; fringes purple. For more detailed description and illustration see Tothill, Taylor & Paine (1930: 110-134, pls.29,30).

Female: Similarly patterned to the male but slightly larger, antennae bipectinate from one third.

Diagnosis: Expanse 13-15mm. (males), 15-17.5mm.(females). Facies completely diagnostic: close allies discussed by Tothill, Taylor & Paine (1930).

Fiji distribution:- (Pre- 1925) VITI LEVU: Widespread. OVALAU. LELEUVIA. THANGALAI. NAINGANI. MOTURIKI.

Biology: Larva recorded from Cocos nucifera L., Areca catechu L., Metroxylon vitiense (H. Wendl.), Oreodoxa regia H.B. & K. and (where grown in close proximity to infested coconuts) Musa balbisiana Colla and M. nana Lour.. See below.

Remarks: Tothill, Taylor & Paine (1930) described this insect, its life history, habits and eventual control in great detail. It is apparently extinct: the last record of collection is in 1929 and it has now been completely exterminated by Ptychomyia remota Aldr., the Tachinid introduced for its control, along with Heteropan dolens Druce (q.v.). I am under the impression that there is a specimen of iridescens in the KRS collection dated 1942 but I am unable to confirm this.

ADDENDA

Diastema tigris Guenee (Noctuidae, Eustrotiinae)

Unsuccessfully introduced into Fiji in 1954 as a Lantana control: a South American and West Indian species. It has never been recovered.

Parallelia propyrrha (Walker) (Noctuidae, Catocalinae)

A single male in colln BM(NH) labelled "Fiji Is. 89-114". This is an Australian species. Accession 89-114 is of 150 Lepidoptera from Australia and 200 from North America presented by H. Edwards. I believe the locality label of this specimen is erroneous.

Dappula tertia (Templeton) (Psychidae) (Plate fig.160)Fumea samoana Tams (Psychidae) (Plate fig.161)

The Psychidae are now placed in the Microlepidoptera and these two species therefore come outside the scope of this work.

INDETERMINATE SPECIES (Noctuidae, Hypeninae) D

♂, FIJI, Viti Levu, summit of Mt Victoria - 1323m., 24.xi.1970, G.S. Robinson. BMNGSN 7468. Expanse 31mm.. Forewings brownish black with ill-defined blackish transverse lines. Hindwings similar but some suffusion of white in anal angle. First segment of palp about 6mm. long, second segment reflexed on the first, about 4mm. long: third segment directed upwards, as long as the second. Palps rough-scaled, terminal segment with elongate hairs. Antennae slender, bipectinate, pectinations ciliate. I am unable to identify this specimen: it is possibly allied to Catadoides spp. (q.v.). Genitalia illustrated in text fig. 172.

Part 2:

RHOPALOCERA
(Butterflies)

In the following account the treatment of species is much curtailed in comparison with that of Heterocera species. Many groups of Fijian butterflies have been well-studied, notably Euploea spp. (Carpenter, 1942, 1953; Poulton, 1923c). The butterflies of the Australasian Region (including most Fijian species) have been catalogued and most species illustrated in colour by D'Abrera (1971). The latter work does not include the HesperIIDae which are catalogued by Evans (1949). My thanks are due to Dr. P.H. Arnaud and Mr. T.W. Davies for the loan of an excellent collection of specimens made by Mr Davies at Korolevu (S coast of Viti Levu) in 1963 and 1970. Most of this material is in the California Academy of Sciences collection (CAS) and some specimens are in Mr Davies' collection (TWD). Records of this material are included below. Records of specimens collected by Mr H.W. Simmonds at present in the collection of the Fiji Dept of Agriculture, Koronivia Research Station, are also included and indicated (KRS). This latter collection is not well curated and the specimens are unlikely to survive.

FAMILY: SATYRIDAE

Melanitis leda solandra F. (Plate fig. 295; D'Abrera 1971:263)

World distribution: South east Asia, East Indies, New Guinea, Australia, New Hebrides, New Caledonia, Loyalty Is., Kermadec Is., Micronesia, Samoa, Tonga, Society Is..

Fiji distribution:- VITI LEVU: Widespread, Korolevu (CAS).
VANUA LEVU: Widespread. NANANU-I-RA. VIWA. ONO (Kandavu).

Biology: Larva described by D'Abrera (1971:263) - recorded from the following species of Gramineae in Fiji: Brachiaria mutica Forsk. , Panicum maximum Jacq., Saccharum edule L. and S. officinarum L..

Remarks: Flies at dusk and is common in most areas of secondary vegetation.

Xois fulvida Butler (D'Abrera 1971:265)

Remarks: This appears to be no more than a form of X. sesara Hewitson (below) but D'abrera recognises it as a separate species. I cannot establish synonymy without a genitalia comparison of the types which Butler (1883) lists as from Kandavu and "banks of the Wai Levu, Viti Levu". The Wailevu River is on Vanua Levu, near Lambasa.

Xois sesara Hewitson (Plate fig.296; D'Abrera 1971:265)

Fiji distribution:- VITI LEVU: Lautoka, Nausori Highlands, Suva, Tholoisuva, Korolevu (CAS), Nandarivatu. VANUA LEVU: Savusavu area, Lambasa, Mbua Bay. NANANU-I-RA. OVALAU. VIWA. KANDAVU.

Biology: The larvae were found in grass roots by Mathew (1885) who successfully reared them: his description is excellent.

Remarks: Xois is an endemic (and, in my opinion, monotypic) genus allied to Yphthima Hubner (from the East Indies, New Guinea and Australia) and Austroyphthima Holloway (in press) from New Caledonia. Sesara is a widespread and abundant species.

FAMILY: DANAIDAE

Danaus chrysippus petilia Stoll (D'Abrera 1971:171)

World distribution: Throughout the Old World tropics to Australia and New Guinea, migrant to New Zealand, New Caledonia, Loyalty Is., New Hebrides, (not known from the Solomons), South America.

Fiji distribution:- Known from a single female collected on NAITA(U)MBA I., (N Lau Group) in July 1927 by R.W. Paine (KRS). ?Migrant.

Biology: Larva described by D'Abrera (1971:170) - feeds on Asclepias curassavica L.

Danaus hamata neptunica Felder (Plate fig.297; Poulton, 1923c - many figs.)

World distribution: East Indies, New Guinea, Australia, Solomons, New Hebrides, New Caledonia, Samoa, Tonga (many subspecies).

Fiji distribution:- VITI LEVU: Suva area, Navua River, Korolevu (CAS). VANUA LEVU: Savusavu area. TAVEUNI. OVALAU. MANGO. NAVITI.

Biology: Larva described by D'Abrera (1971:172) - feeds on Tylophora and Parsonsia spp. Early stages described and illustrated by Hopkins (1927).

Remarks: Two recognised forms of this species are found in Fiji (see Poulton, 1923c): f. neptunica Felder (plate fig. 297) and f. protoneptunia Poulton. In the latter the bluish-white markings are larger and occur to the base of the fore- and hindwings. Form neptunica appears to be restricted to Viti Levu and Ovalau where it occurs with protoneptunia. Specimens from Mango and Naviti are transitional between the two forms. D'Abrera (1971:172) also lists female form claribella Butler in which the base of the forewing is suffused with bluish white. I believe this is an aberration.

Danaus plexippus L. (Plate fig. 298; D'Abrera 1971:171)

World distribution: North America, Europe, south east Asia (?migrant), East Indies, New Guinea, Australia, Solomons, New Hebrides, New Caledonia, Loyalty Is., Norfolk I., Samoa, Tonga, Micronesia, Gilbert & Ellice Is., Marquesas, Society Is., Hawaii, New Zealand (migrant).

Fiji distribution:- VITI LEVU: Lautoka, Nausori Highlands, Singatoka valley, Suva, Korolevu (CAS). VANUA LEVU: Savusavu area. YASAWA. ROTUMA.

Biology: Larva described by D'Abrera (1971:170) and Smithers (1970) - feeds on Asclepias curassavica L. and Calotropis gigantea Willd..

Euploea boisduvali boisduvali Lucas (Plate fig. 299; Poulton 1923c - mang figs.)

World distribution: Solomon Is., New Hebrides, New Caledonia (several subspecies).

Fiji distribution:- VITI LEVU: Suva, Korolevu (CAS). VANUA LEVU: Savusavu area, Mbua Bay. TAVEUNI. OVALAU. MOTURIKI. KORO. MAKINGAI. NGAU. MOALA. LAKEMBA. THITHIA. MANGO. MUNIA. VANUA MBALAVU. FULANGA. MBULIA. WAYA LAILAI. NAVITI. YASAWA.

Biology: Larva recorded as feeding on Hoya australis R. Br. in Fiji

Remarks: This species is represented by two forms in Fiji, f. herrichi Felder which is widespread and f. mangoensis Butler which is found as the only form on Moala, Mango, Munia and Vanua Mbalavu. On Thithia and Koro it is found with herrichi and on the latter island f. boisduvali Lucas, an intermediate, is found (see Poulton 1923c). Mangoensis has the white spotting reduced and the conspicuous white "clothes-peg" mark in the forewing is absent.

Euploea lewinii eschscholtzi Felder (Plate fig. 300; Poulton 1923c - many figs.)

World distribution: New Hebrides, New Caledonia, Loyalty Is., Gilbert & Ellice Is., Tokelau Is., Samoa, Tonga, Niue Is., Society Is. (many subspecies and forms).

Fiji distribution: VITI LEVU: Suva, Nausori Highlands, Lautoka, Korolevu (CAS). VANUA LEVU: Savusavu area, NE coast, Mbua Bay. OVALAU. KORO. TAVEUNI. NGAU. NANDAVU. MBULIA. YASAWA. NAVITI. WAYA LAILAI. KOWATA.

Biology: Larva recorded from Ficus barclayana (Miq.) and F. tinctoria Forst. in Fiji.

subsp. walkeri Druce (Poulton 1923c - many figs.)

Fiji distribution: ONO (Kandavu). NAIRAI. MATUKU. NAITAU(U)MBA. KANATHEA. VANUA MBALAVU. MANGO. MUNIA. THITHIA. LAKEMBA. VANUA VATU. KAMBARA. FULANGA. ONGEA.

Remarks: Differs from eschscholtzi in that the marginal spots of the hindwing are more elongate. This subspecies (with various minor variations) extends from Eastern Fiji to the Society Is. In northern Lau some specimens are referable to form lauensis Talbot in which the white markings are suffused and dusted with black to a varying degree.

Euploea nemertes macleayi Felder (Plate fig. 301.(♂); Poulton 1923c - many figs.)

World distribution: East Indies, New Guinea, New Hebrides, New Caledonia, Solomons (various subspecies).

Fiji distribution: VITI LEVU: Suva, Korolevu (CAS). VANUA LEVU: Savusavu area. OVALAU. KORO. TAVEUNI. KANDAVU. ONO. MBULIA. MOALA. TOTOYA. NAITA(U)MBA. VANUA MBALAVU. MANGO. THITHIA. LAKEMBA.

Biology: Larva described by D'Abrera (1971:194) - feeds on Ficus spp. in Fiji.

Remarks: A few specimens are known of this species in which the terminal fascia of fore- and hindwings is suffused with white. A male of this aberration is illustrated by Poulton (1923c), plate 37, fig. 13 and an intermediate specimen on plate 30, fig. 8.

Euploea tulliolus forsteri Felder (Plate fig. 302(♂); Poulton 1923c - many figs.)

World distribution: South east Asia, East Indies, New Guinea, Australia, New Hebrides, New Caledonia, Loyalty Is., (absent from Solomons).

Fiji distribution:- VITI LEVU: Suva, Korolevu (CAS). VANUA LEVU: Savusavu area, NE coast. OVALAU. MOTURIKI. TAVEUNI. KANDAVU. KORO. NAIRAI. MOALA. MATUKU. TOTOYA. NAITA(U)MBA. VANUA MBALAVU. MUNIA. MANGO. THITHIA. LAKEMBA. YASAWA. NAVITI. WAYA LAILAI.

Biology: Larva not known but recorded as feeding on Malaisia scandens Lour. in Fiji.

Remarks: In the eastern islands of the archipelago the forewing marginal spots of this species are often reduced and sometimes absent. This form is sometimes known as incompta H.-S. (=protoforsteri Poulton) and often flies with forsteri.

FAMILY: NYMPHALIDAE

Acraea andromacha F. (D'Abrera 1971:199)

World distribution: East Indies, New Guinea, Australia, New Hebrides, New Caledonia, Loyalty Is., Samoa, Tonga (several subspecies).

Fiji distribution:- VITI LEVU: Lautoka, Nausori Highlands (USP colln), Korolevu (CAS). VANUA LEVU: Savusavu area.

Biology: Larva described by D'Abrera (1971:198) and Hopkins (1927) described the early stages. The larva feeds on Passiflora spp. in Australia and Samoa.

Doleschallia bisaltide vomana Fruhstorfer (Plate fig.303; D'Abrera 1971:277)

World distribution: East Indies, Australia, Solomons, New Hebrides, New Caledonia, Loyalty Is., Tonga, (many subspecies, see below).

Fiji distribution:- VITI LEVU: Suva, Tholoisuva, VANUA LEVU: Savusavu area. ONO (Kandavu).

Biology: Larva described and illustrated by D'Abrera (1971:227, 229). Fijian foodplants are Graptophyllum insularum A. Gray, G. pictum L., Pseuderanthemum laxifolium A. Gray, Artocarpus altilis Parkinson, A. integra Thunb. and Erythrina spp.

Remarks: The exceptional variability of the underside pattern of this species renders many of the presently recognised subspecies doubtful.

Hypolimnias antilope lutescens Butler (Plate fig.304)

World distribution: East Indies, New Guinea, Australia, Solomons, New Hebrides, New Caledonia, Samoa, Tonga, Cook Is. (several subspecies).

Fiji distribution:- VANUA LEVU: Savusavu area, NE coast. OVALAU. VANUA MBALAVU. MANGO. THITHIA. TOTOYA (KRS). MOALA.

Biology: Early stages described by Hopkins (1927): foodplant is Pipturus spp.

Remarks: A rare species in Fiji, not known from Viti Levu.

Hypolimnias bolina L. (Plate fig. 305(♂); Poulton 1923c - many figs.; D'Abrera 1971:221, 222; Comstock 1966:6)

World distribution: India to south east Asia, East Indies, New Guinea, Australia, Solomons, New Hebrides, New Caledonia, Loyalty Is., Norfolk I., Micronesia, Gilbert & Ellice Is., Samoa, Tonga, Niue I., Cook Is., Gambier Is., Kermadec Is., Marquesas, Rapa I., Society Is., New Zealand (migrant).

Fiji distribution:- VITI LEVU: Widespread, Korolevu (CAS). VANUA LEVU: Widespread. NANANU-I-RA. LELEUVIA. KANDAVU. ONO (Kandavu). MBULIA. LAKEMBA. KOMO. YASAWA. NAVITI. TAVEUNI. NAUKATHUVU. VIWA. ROTUMA.

Biology: Larva described by Hopkins (1927), Poulton (1923c), Comstock (1966), Smithers (1970) and D'Abrera (1971). Recorded larval foodplants are Ipomoea batatas (L.), Pipturus spp., Sida rhombifolia L., Synedrella nodiflora (L.) and Phaseolus calcaratus Roxb.

Remarks: Females of this species exhibit a variety of forms and these are discussed and illustrated by Poulton (1923c). Bolina has two well-developed subspecies, one of which inhabits India to south east Asia (excluding the Malay Peninsula) and the other which inhabits the remainder of its range. The applicable name for the Pacific subspecies is given by D'Abrera as nerina Butler but this is by no means the oldest available name. Many of the female forms possess names and in some areas one female form may be dominant: this is discussed by Poulton (1923c) and Hopkins (1927). On Rotuma bolina is very small (plate fig. 305) and the females are dark, resembling that shown in Poulton's (1923c) plate 49, fig.6.

Hypolimnas inopinata Waterhouse (never illustrated)

Male: Dark blue-black with a narrow, white oblique bar across the forewing; four white subterminal spots in forewing apex; hindwing with a large, round, dark purplish-blue medial spot.

Female: Similarly patterned to the male, but additionally two small subterminal white spots below the distal end of the white bar in the forewing.

Fiji distribution:- VITI LEVU: Waidoi, Nasongoto (Navai).

Remarks: Very rare and known only from the type material in the Australian Museum, Sydney (Peters, 1971). The original description by G.A. Waterhouse is in Proc. Linn. Soc. N.S.W. 45:468-469 (1920). I am indebted to the Australian Museum for colour transparencies of the holotype and allotype of this species. The type localities given above are in SE Viti Levu but I am unable to find them, even on the 1:50,000 map.

Hypolimnas octocula Butler (D'Abrera 1971:224)

World distribution: New Hebrides, New Caledonia, Loyalty Is., Micronesia (several subspecies).

Fiji distribution:- OVALAU. MANGO. THITHIA (KRS). KANDAVU.

Remarks: Very rare in Fiji; could be confused with H. antilope (above) but hindwing with seven or eight distinct subterminal spots; oblique orange bar in forewing extends to termen.

Polyura caphontis (Hewitson) (D'Abrera 1971:246)

Fiji distribution:- VITI LEVU: Lami (4km E of Suva), Tholoisuva, Korolevu (TWD).

Remarks: I thought this was an extremely rare species: in six years H.S. Robinson and I have seen one specimen (at Tholoisuva) flying rapidly up and down a forest path. T.W. Davies caught 4♂♂ and 2♀♀ in five days at Korolevu.

Precis villida (F.) (Plate fig.306; D'Abrera 1971:211)

World distribution: East Indies, New Guinea, Australia, Solomons, New Hebrides, New Caledonia, Loyalty Is., Norfolk I., Gilbert & Ellice Is., Samoa, Tonga, Tokelau Is., Tuamotus, Society Is..

Fiji distribution:- VITI LEVU: Suva, Lautoka, Korolevu (CAS).
VANUA LEVU: Mbua Bay, Savusavu area. ONO (Kandavu). LAKEMBA.
YASAWA. NAVITI. ROTUMA.

Biology: Early stages described by D'Abrera (1971) and Smithers (1970): foodplants in Fiji and the Pacific islands are Scaevola sericea Vahl, S. frutescens (Krauss), Plantago major L., Antirrhinum majus L. and Ipomoea sp..

Remarks: Specimens from Rotuma are more round-winged, the upperside less heavily freckled with black and the orange areas much more extensive than in specimens from Viti Levu: the underside of Rotuman specimens is much paler and brighter.

Vagrans egista vitiensis (Waterhouse) (D'Abrera 1971:203; Comstock 1966:6)

World distribution: East Indies, New Guinea, Australia, Solomons, New Hebrides, New Caledonia, Loyalty Is., Samoa, Tonga, Cook Is., Society Is. (several subspecies).

Fiji distribution:- VANUA LEVU: Lambasa.

Biology: Early stages described by Hopkins (1927), Comstock (1966) and D'Abrera (1971). Recorded foodplants are Homalium and Xylosma spp.

Remarks: Extremely rare in Fiji and known only from Waterhouse's type in the Australian Museum, Sydney (Peters, 1970): colour transparencies of the type have been examined.

Vanessa cardui kershawi McCoy (D'Abrera 1971:212)

MIGRANT. A very worn specimen was captured in Suva by a schoolboy on 22.iv.1921. This is a cosmopolitan species resident in Australia but not in the Pacific islands. A migrant specimen is known from the Loyalty Is. (Holloway - pers. comm.). Perhaps resident on Norfolk I. (see Smithers, 1970).

FAMILY: PAPILIONIDAE

Papilio schmeltzi H.-S. (Plate fig. 307; D'Abrera 1971:100)

Fiji distribution:- VITI LEVU: Suva, Korolevu (CAS,TWD). VANUA LEVU: Savusavu area, Lambasa (SPSM colln). NANANU-I-RA. OVALAU. ONO (Kandavu). MANGO. VANUA MBALAVU. YASAWA. NAVITI. NATHULA.

Biology: Larva described by D'Abrera (1971) and Mathew (1883). Recorded foodplants are Citrus spp., Micromelum minutum (Forst. f.) and Schefflera vitiensis (A. Gray).

Remarks: This is by no means a universally common species as several authors have suggested. Although its distribution within the Fiji group is wide it is only locally frequent: Davies took ten specimens at Korolevu in 1970 and I took three on Nananu-I-Ra in 1969. Schmeltzi was not uncommon on the larger islands of the northern Yasawa group in February 1971. Attempts to induce a female to lay on sleeved Citrus have been unsuccessful and I am not certain that this is by any means a preferred foodplant.

FAMILY: PIERIDAE

Anaphaeis java micronesia (Fruhstorfer) (Plate fig.308; D'Abrera 1971:153)

World distribution: East Indies, Australia, New Hebrides, New Caledonia, Loyalty Is., Tonga, Samoa, Niue I., Norfolk I. (several subspecies).

Fiji distribution:- VITI LEVU: Suva, Rakiraki, summit of Mt Victoria (vagrant), Lautoka, Nandi, Nausori Highlands, Korolevu (CAS), Navua River. VANUA LEVU: Savusavu area. LELEUVIA. FULANGA. SAWA-I-LAU. NAVITI. VIWA. ROTUMA.

Biology: Early stages described by D'Abrera (1971): Pacific foodplants are Capparis richii A. Gray and Crateva religiosa Forst.

Remarks: A moderately common species.

Appias albina Boisduval (D'Abrera 1971:156; Hopkins 1927:pl.2)

World distribution: East Indies, Australia, New Hebrides, New Caledonia, Samoa, Tonga (several subspecies).

Fiji distribution:- ONGEA (KRS). VITI LEVU: Singatoka valley (Dixey, 1923).

Remarks: Known only to the author from 2♂♂, ♀ collected on Ongea by Simmonds on 29.iv.1933. The specimens are very close indeed to "Catophaga jacquinotii manaia Hopkins" (1927:44, pl.2, figs.9-12) which is a race of albina. Specimens of albina from the New Hebrides and New Caledonia (subspecies wallacei Butler and psyche Felder respectively) have a yellowish ground colour and may not be referable to albina (D'Abrera, 1971).

Catopsilia pomona (F.) (Plate fig.309(♀), 310(♂); D'Abrera 1971:161 with errata)

World distribution: East Indies, New Guinea, Australia, Solomons, New Hebrides, New Caledonia, Micronesia.

Fiji distribution:- VITI LEVU: Suva, Korolevu (CAS), Lautoka, Nausori Highlands. VANUA LEVU: Savusavu area.

Biology: Larva described by D'Abrera (1971): Fijian foodplants are Cassia fistula L. and C. grandis L.

Remarks: Moderately common; both sexes dimorphic (see D'Abrera, 1971, with errata).

Catopsilia scylla gorgophone Boisduval (D'Abrera 1971:161)

World distribution: Australia, New Caledonia.

Fiji distribution:- VITI LEVU: Suva (KRS).

Biology: Early stages described by D'Abrera (1971): foodplant is Cassia glauca Lam. in Australia.

Remarks: All known Fijian material is in the KRS collection and was collected by Simmonds in Suva. I have never seen or collected this species.

Cepora perimale inopinata Waterhouse (Plate fig.313 (o))

World distribution: East Indies, New Guinea, Australia, Solomons, New Hebrides, New Caledonia, Loyalty Is., Norfolk I. (several subspecies).

Fiji distribution:- VIWA.

Biology: Larva described by D'Abrera (1971) and Smithers (1970): foodplant is Capparis spp.

Remarks: Material in BMNH is labelled only 'Fiji'. A single male from Viwa is the only precise locality record; probably very rare although at least two others seen on Viwa. The male of this species very much resembles that of Appias paulina ega Boisduval (D'Abrera 1971:156) which does not occur in Fiji.

Eurema hecabe sulphurata (Butler) (Plate fig.311; D'Abrera 1971:162)

World distribution: South east Asia, East Indies, New Guinea, Australia, Solomons, New Hebrides, New Caledonia, Loyalty Is., Micronesia, Tonga (several subspecies).

Fiji distribution:- VITI LEVU: Suva, Lautoka, Nausori Highlands, Singatoka valley, Korolevu (CAS). VANUA LEVU: Savusavu area. NANANU-I-RA. MBULIA. FULANGA. YASAWA. NATHULA. NAVITI. NAUKATHUVU. VIWA. ROTUMA.

Biology: Larva described by D'Abrera (1971): Fijian foodplants are Albizia lebbek (L.), Breynia disticha Forst., Cassia tora L. and Sesbania grandiflora (L.).

FAMILY: LYCAENIDAE

Catochrysops taitensis (Boisduval) (Plate fig.320)

World distribution: New Hebrides, Samoa, Tonga, Society Is.

Fiji distribution:- YASAWA. OVALAU (Specimens not seen). MAKONGAI. ROTUMA.

Remarks: Very common on Rotuma.

Deudorix epijarbas diovella Waterhouse (Plate fig. 314; D'Abrera 1971:302)

World distribution: South east Asia, East Indies, New Guinea, Australia, Solomons, New Hebrides, New Caledonia, Samoa, Tonga (several subspecies).

Fiji distribution: VITI LEVU: Suva. VANUA LEVU: Matanikavika Estate. VIWA.

Biology: Larva described by D'Abrera (1971): foodplant is Harpullia sp. in Australia. Harpullia is only known from Kambara and Fulanga in Fiji.

Remarks: A very uncommon species. The type of diovella is in the Australian Museum, Sydney (Peters, 1970) - colour transparency examined.

Euchrysops cnejus (F.) (Plate fig.315; D'Abrera 1971:360)

World distribution: India to south east Asia, East Indies, New Guinea, Australia, Solomons, New Hebrides, New Caledonia, Samoa, Tonga.

Fiji distribution:- VITI LEVU: Suva, Tavua, Lautoka. VANUA LEVU: Mbua Bay. OVALAU. VANUA MBALAVU. MANGO. YASAWA. NATHULA. NAVITI. VIWA.

Biology: Larva pale green with dark dorsal and paradorsal lines forming a broad band on the anal segment; spiracles black, larva covered with minute white tubercles. Fijian foodplants are Crotalaria mucronata Desv., Phaseolus spp., Vigna marina (Burm.) and V. sinensis (L.).

Jamides bochus (Stoll) (Plate fig.316; D'Abrera 1971:351)

World distribution: Ceylon, south east Asia, East Indies, New Guinea, Solomons, New Hebrides, New Caledonia, Loyalty Is., Samoa, Tonga, Niue I., Cook Is., Austral Is. (see below).

Fiji distribution:- VITI LEVU: Suva, Korolevu (CAS). VANUA LEVU: Mbua Bay. OVALAU. LELEUVIA. VANUA MBALAVU. MANGO. THITHIA. KOMO. NAVUTU-I-RA. FULANGA. YASAWA. NAVITI. NANUYA LAILAI. VOMO. VIWA. ROTUMA.

Biology: The early stages of J. phaseli Mathew are described by D'Abrera (1971) - this species is close to bochus. Fijian foodplants are Crotalaria mucronata Desv., Derris trifoliata Lour., Phaseolus mungo L. and Vigna marina (Burm.).

Remarks: The subspecific name candrena H.-S. has been applied to specimens from Fiji. The "bochus group" (including J. cephion Druce, J. kava Druce, J. morphoides Butler, J. carissima Butler etcetera) requires thorough revision: I have given an extensive "world distribution" for bochus based on the assumption that it is a superspecies.

Lampides boeticus (L.) (Plate fig.317; D'Abrera 1971:358)

World distribution: Europe, Africa, Asia to the East Indies, Australia, New Hebrides, New Caledonia, Norfolk I., Micronesia, Niue I., Hawaii.

Fiji distribution:- VITI LEVU: Suva. FULANGA. YASAWA. NANUYA LAILAI. VOMO. ROTUMA.

Biology: Larva described by D'Abrera (1971) and Smithers (1970). Fijian foodplants are Crotalaria mucronata Desv. and Vigna marina (Burm.).

Nacaduba biocellata armillata (Butler) (D'Abrera 1971:348)

World distribution: East Indies, Australia, New Hebrides, New Caledonia, Loyalty Is. (three subspecies).

Fiji distribution:- VITI LEVU: Lautoka.

Biology: Early stages described by D'Abrera (1971): feeds on buds of Acacia sp. in Australia (see below) and recorded by Greenwood (1940) as feeding on flowers of Acacia farnesiana(L.) in Fiji.

Remarks: Two specimens of this species in BM(NH) (Lautoka, 17.viii. and 7.ix.1931, Phillips) are labelled "feeds under bark of Alphitonia zizyphoides". This labelling is reconcilable with the habits of the larva which hides by day under leaves and stones (D'Abrera, 1971). These two specimens, the only ones known from Fiji, are not mentioned by Tite (1963).

Nacaduba dyopa (Herrich-Schaffer) (Plate fig.319; D'Abrera 1971:348)

World distribution: New Hebrides, Samoa, Tonga.

Fiji distribution:- VITI LEVU: Suva, Lautoka. OVALAU. VIWA. ROTUMA.

Remarks: Although Tite (1963) records 31 specimens in BM(NH) from Fiji this species seems to be extremely scarce and I have collected only single specimens on Viwa and Rotuma.

Nacaduba samoensis Druce (Druce 1892:pl.27)

World distribution: Samoa.

Fiji distribution:- VITI LEVU: Suva. OVALAU. ROTUMA.

Biology: The larva and pupa of this species are described and illustrated by Comstock (1966) who beat the illustrated larva and others from Terminalia catappa L.. The imago illustrated by Comstock in his pl.1, fig.3 appears to be a specimen of Jamides bochus (Stoll) (q.v.)

Strymon bazochii gundlachianus (Bates) (Plate fig.312)

World distribution: Central and South America, Hawaii (introduced).

Fiji distribution:- (INTRODUCED) VITI LEVU: Suva area, Korolevu.
VANUA LEVU: Savusavu area. OVALAU. LELEUVIA.

Biology: Introduced as a Lantana control: larval foodplants are Lantana camara L. and Hyptis pectinata (L.): early stages are described by Zimmerman (1958).

Remarks: Since its introduction in 1922-23 this butterfly has become well-established and widespread on Viti and Vanua Levu. It appears to have moderate powers of dispersal as it must have reached Leleuvia under its own steam. Thecla echion (L.) was released on Taveuni with bazochii but failed to establish itself (Simmonds, 1934; Rao, 1971).

Zizeeria alsulus (Herrich-Schaffer) (D'Abrera 1971:360)

World distribution: Australia, Tonga, Samoa.

Remarks: According to D'Abrera (1971) a race of this species (lulu(Mathew)) is known from Fiji. The types of lulu were from Tonga (Hopkins, 1927) and this species is not known to occur in Fiji.

Zizina otis mangoensis (Butler) (Plate fig.318; D'Abrera 1971:362; Smithers 1970)

World distribution: East Indies, New Guinea, Australia, Solomons, New Hebrides, New Caledonia, Loyalty Is., Norfolk I., Lord Howe I., Kermadec Is., Samoa, Tonga, Society Is. (several subspecies).

Fiji distribution:- VITI LEVU: Widespread. Korolevu (CAS).
VANUA LEVU: Widespread. NANANU-I-RA. OVALAU. LELEUVIA.
NASAUTAMBU. MANGO. FULANGA. YASAWA. NATHULA. NAVITI. NANUYA
LAILAI. VIWA. ROTUMA.

Biology: Early stages described by Smithers (1970) and Hopkins (1927 - as 'Zizera labradus (Godart)'). Fijian foodplants are Desmodium umbellatum DC, Indigofera tinctoria L., Phaseolus adenanthus G.W.F. Mey, P. vulgaris L. and Vigna sinensis (L.).

Remarks: This is the common "Grass Blue" encountered almost everywhere within the Fiji group. The taxonomic history of this species is chequered: it has been placed in Zizera, Zizula, and Zizeeria by various authors and has been confused with Z. alsulus (H.-S.) (above): subspecific names used as specific names have included labradus Godart and cheesmanae Poulton & Riley.

Zizula hylax (F.)

(D'Abrera 1971:362)

World distribution: South east Asia, East Indies, New Guinea, Australia, Solomons, New Caledonia, Loyalty Is., Micronesia (several subspecies).

Fiji distribution:- VANUA LEVU: Matanikavika Estate.

Remarks: This is the first record of this species from Fiji: two specimens were collected flying in a clearing at the edge of secondary forest.

FAMILY: HESPERIIDAE

Badamia atrox subflava Waterhouse (Plate fig. 322)

World distribution: Australia, New Guinea, New Hebrides, New Caledonia, Loyalty Is. (several subspecies).

Fiji distribution:- VITI LEVU: Waidoi (SE Viti Levu - precise locality not located), Suva. VANUA LEVU: Savusavu area. OVALAU.

Remarks: The type is in the Australian Museum (Sydney) - colour transparencies examined. This is apparently a rare species in Fiji although the paucity of material may only reflect difficulty in capturing this strong-flighted species.

Badamia exclamatonis (F.) (Plate fig.321; Comstock 1966:11)

World distribution: India through south east Asia and the East Indies to New Guinea, Australia, Solomons, New Hebrides, New Caledonia, Samoa, Gilbert & Ellice Is., Marquesas.

Fiji distribution:- VITI LEVU: Suva. VANUA LEVU: Savusavu area.

Biology: Early stages described by Hopkins (1927) and Comstock (1966). Fijian foodplant is Terminalia catappa L.

Remarks: Like atrox this is a difficult species to catch and it is probably widespread in coastal areas.

Hasora chromus bilunata Butler (Plate fig.323)

World distribution: New Hebrides.

Fiji distribution:- VITI LEVU: Suva, Mbilo Battery (8km W of Suva), Waidoi, Lautoka. VANUA LEVU: Savusavu area.

Remarks: Rare and, as with the other big Fijian Hesperids, not well-collected.

Hasora khoda Mabille

World distribution:- New Hebrides, New Caledonia, Loyalty Is.

Fiji distribution:- VITI LEVU: Korolevu (CAS).

Remarks: Only a single specimen known from Fiji, collected by T.W. Davies at Korolevu, 10-15.vii.1970. Resembles H. chromus (above) but lacks the white lunules in the forewing; underside of hindwing with a broad white stripe.

Oriens augustula (Herrich-Schaffer) (Plate fig.324)

Fiji distribution:- VITI LEVU: Suva, Nausori Highlands, Korolevu (CAS). VANUA LEVU: Savusavu area, Mbua Bay. LELEUVIA (Sight record only). ONO (Kandavu). MBULIA. VIWA.

Biology: Foodplant recorded as Brachiaria mutica (Forsk.).

Remarks: A widespread and moderately common species.

The fauna and flora of Fiji have sometimes been described as continental and sometimes as insular (Raven & Axelrod, 1972). A "continental" biota, the origin of which is explained by a large land-mass encompassing most of Melanesia is suggested, for example, by Gorham (1965). Raven and Axelrod (1972) suggest an austral origin for the biota of Fiji ("we ... consider that Fiji arose from the sea close to the main Australian land-mass and possibly connected with it at this time (Eocene)."). On balance, however, few biologists and no recent geologists postulate a "continental origin" for Fiji or its biota. Gressitt (1956, 1960, 1963) recognises the insect fauna of Fiji as insular and more than fifty years ago Poulton (1923c), referring to butterflies, wrote -

" The Old World affinity of the indigenous species (of Polynesia) is easily accounted for when we look, first at the wide expanse of ocean separating Eastern Polynesia from the American coast, and then at the Western Pacific and the distribution of its island groups. Innumerable stepping-stones are scattered over the track by which an entrance was effected from the nearest islands, and by which these became populated . From the east end of New Guinea the track runs north and then eastward, through New Britain and New Ireland to the Solomons, and through these south-east ... to the New Hebrides - a huge mass of scattered islands lying due west of Fiji and stretching far to the north and south of it. Its (i.e. the track - G.S.R.) importance is much increased by the Loyalties and New Caledonia There can be no doubt that it was from this great multitude of islands, mostly small but rich in Austro-Malayan species, that Fiji received its butterfly fauna, and became the gateway through which Polynesia was invaded. Fiji itself cannot be regarded as oceanic but rather as an outlying part of the Island Screen."

The affinities demonstrated (in chapter 4) for the Macrolepidoptera of Fiji with the New Hebrides, Solomons and Papuan region amply support Poulton's views as to the origin of the fauna. The geological evidence presented in chapter 2 offers no "continental" solution for the origin of the biota and, indeed, none is necessary for the Lepidoptera. Records of migrant Lepidoptera in the Pacific are not common but several recent works (Asahina and Turuoka, 1968, 1969, 1970; Fox, 1969, 1970, 1973) serve to illustrate the frequency of long-distance dispersal in this area, not only from Australia or New Zealand to the Pacific islands (Robinson & Robinson, in press; see also Vanessa cardui in chapter 5) but also from the Pacific islands to (at least) New Zealand (Fox, 1973). Flights of 1500 km or more are commonplace, one recorder alone noting nine species of Macrolepidoptera (represented by over 50 specimens) migrant to New Zealand in one year (Fox, 1973). At this stage of our knowledge of the Lepidoptera of Fiji, the New Hebrides and the Solomons it is, unfortunately, impossible to gauge (except in a very few cases) which recorded species are immigrants which fail to breed. The disharmonic nature of the Macrolepidoptera fauna of Fiji (butterflies somewhat impoverished, absence of Libytheidae; absence of Coccytiidae, Notodontidae and Saturniidae) and the low number of species per genus and the degree of development of endemic species all suggest an origin based on transoceanic island-hopping. The marked paucity of

species of "southern" origin (which parallels that found by Smith, 1955, for flowering plants - see chapter 2) offers, I believe, strong argument against any theory involving the proximity of Fiji to an Austral land-mass in the past.

The Macrolepidoptera fauna of Fiji is, however, very different from that of the islands of Polynesia and the reasons for this have, I believe, been shown in chapter 4. The size of the two major islands of the group and their vegetational diversity has permitted the establishment of an enormous number of species, many of which inhabit forest. Rain forest does not occur on the small islands of Polynesia; they are too dry, too small and too isolated for the seeds of many forest plants to reach. Some of Fiji's forest Lepidoptera reach Samoa where there are small areas of rain forest but they range no further eastward. The almost complete loss of rain forest biota has been demonstrated in many groups if their distribution be considered progressively eastward across the Pacific: the floristic change has been demonstrated to some extent by Van Balgooy (1960, 1969), changes in the avifauna by Mayr (1945).

The "continental" biota of Smith (1955) and other botanical authors is that which is closely allied to the biota of Australia or south east Asia and the East Indies and which has a very limited eastward distribution. In the "continental" category, then, we must place the Macrolepidoptera of the Fijian rain forest. The term "continental", it seems, means "of rain forest": rain forest, by dint of its strict requirements is characteristic of continents and large islands near continents. The argument becomes circular:

"Most of the (plant) genera terminating in Fiji are groups of forest plants, often with heavy seeds, and it may be suspected that land connections were needed to permit their forbears to reach this region."
(Smith, 1955)

It is the Macrolepidoptera defined by cluster analysis as characteristic of secondary vegetation which form the "insular" portion of the fauna. The term "insular" here has nothing whatsoever to do with the term "insularity": any apparent paradox can be resolved by definition of "insular" as "common to, pertaining to islands" and "insularity" as "possession of evidence for isolation". The rain forest Lepidoptera of Fiji are continental but exhibit insularity in their degree of endemic speciation. On the other hand, the secondary vegetation species are insular, being common to many islands. It is the insular species which often possess marked dispersive ability and are capable of colonising ephemeral habitats after fire, hurricane, catastrophic geological events or, more recently, the destructive efforts of man. These species include those whose larvae are weed-feeders, utilisers of strand plants, defoliators and agricultural pests: their fecundity may be high (Carlquist, 1966). These are the species which have dispersed across and colonised Polynesia and form the greatest proportion of the Polynesian fauna. In the "insular" category of the biota we may also place many of the weeds and strand plants, the Polynesian rat, the flying fox Pteropus, several species of gecko, the Pacific Pigeon, several genera of wood-boring beetles, almost all the termites and several species of dragonfly. All these range deep into Polynesia.

Fiji, in Poulton's words, is the gateway to Polynesia but it is not, in my view, the only gateway. The genera Nagia (see chapter 4) and Utetheisa (Robinson, 1971b) have distributions that range from the Papuasian region through Micronesia and the Gilbert and Ellice Is., Samoa and Polynesia: they are entirely absent from southern Melanesia (except for three Utetheisa species which are of different stock to the section of the genus discussed in the 1971 paper). These genera apparently offer evidence that dispersal to Samoa and Polynesia may have been via Micronesia and the Gilbert & Ellice Is. in at least two instances.

The faunal affinities of Rotuma (chapter 4) do not seem to be wholly compatible with its geographic position: it appears to "bridge the gap" between northern Melanesia and Samoa. The fauna of the latter is by no means a continuation of that of Fiji and 4% of Samoa's species are "bypass species", found in northern Melanesia and not in Fiji. Map 15 shows that during the lowered sea levels of the last glaciation Rotuma lay among a long string of islands running from west to east and forming a bridging archipelago between the Santa Cruz Is. and Samoa. Only five of these islands now remain, Cherry I., Mitre I., Tikopia, Rotuma and Wallis I. but 20,000 years ago (Quinn, 1971) there would have been more than fifty, the maximum distance between two neighbouring islands being no more than 300 km. These islands would have offered a stepping-stone dispersal track from the southern tip of the Solomon Is. direct to Samoa via Rotuma, a third gateway to Polynesia. The latter track has not, to my knowledge, been postulated by any other author yet seems to offer a perfectly feasible explanation for "bypass species" and also offers a track of dispersal from which Fiji could receive north Melanesian species by immigration from the north. The extension of the Australian coastline and emergence of dry land around the present Chesterfield Is. also offers a track from Queensland to New Caledonia by which New Caledonia's "southern element" of Lepidoptera could have reached New Caledonia with the sea barrier much reduced. Depression of sea level also very much narrowed water-barriers within the Fiji group, possibly accounting for the marked lack of geographic speciation among the Fijian Lepidoptera. Indeed, geographic speciation is hardly found in any plant or animal groups in Fiji with the exception of the birds which seem to subspeciate far more readily than any other animal group throughout most of the Pacific (see Mayr, 1945). On the Galapagos Is. there is, in marked contrast to the birds, no endemic radiation in the Lepidoptera (A.H. Hayes - pers. comm.).

The question of faunal impoverishment has been discussed in chapter 4 and it has been shown that there is marked impoverishment of the Macrolepidoptera to the east of Samoa and of the butterflies east of the New Hebrides. The relationship between plant genera, island area and the question of impoverishment in the Pacific has been discussed by Van Balgooy (1969) but he omitted to calculate z values and used a linear y axis in his graphs. He found that temperate regions were poorer in genera than areas of tropical rain forest on islands in close proximity to continents (e.g. Java). Fiji and New Caledonia are distinctly impoverished in comparison with continental islands (such as Penang, Formosa, Java and New Guinea) but islands further east into the Pacific are even more impoverished. MacArthur and Wilson (1967) demonstrate the

ponerine ant fauna of Fiji to be on a par (allowing for island area) with the New Hebrides, Solomons, New Britain and New Ireland but impoverished in comparison with New Guinea which is on a par with central tropical Asia. The avifauna of Fiji is impoverished in comparison with New Guinea and islands adjacent to New Guinea but on a par with the remainder of Melanesia: the outlying islands of Polynesia (such as the Tuamotu Archipelago) are markedly impoverished. The "impoverishment line" for the birds seems to follow that for the Macrolepidoptera. The Macrolepidoptera of the Solomons, New Guinea or one of the islands close to south east Asia have not been catalogued and it is impossible to judge whether there is a second "impoverishment line" running east and south of New Guinea as there evidently is for plant genera, ponerine ants and birds.

Considering the different moth faunal elements of Fiji (see chapter 4 and summary in section iii(g)) it is apparent that the forest species (and more so the moss forest species) are even more isolated both geographically and taxonomically than their compatriots associated with secondary vegetation. The same is true for the plant species involved in the vegetational associations (see Parham, 1964, 1972; Smith 1951, 1955). Small, unforested islands can be ignored as stepping-stones for those species which would require a thickly forested (and well-watered) stepping-stone. Large, well-watered islands are few and far between. Forest species especially moss-forest species, do show extreme insularity, characterised by a high degree of endemism (100% in the moss forest element, 49% in montane forest). Secondary vegetation species, which are dispersive, are unlikely to exhibit endemic race development and rarely do so in Fiji (35% endemism in the secondary bush and forest element, 0% endemism in the talasinga element) and elsewhere. I suggest that the vegetation and the Macrolepidoptera of Fiji have, in the case of forest and forest moth species, developed together, in isolation, for some considerable period of time. Further, the same seems to have occurred in secondary bush and forest which has been maintained by natural catastrophe (predominantly hurricanes) and is now maintained by man. I consider the dry grasslands (talasinga) of north and west Viti and Vanua Levu to be comparatively modern and entirely due to the impact of man. Neither the flora nor the Macrolepidoptera nor the avifauna of talasinga appear at all mature: there is no evidence of endemic speciation in either its fauna or flora.

The question arises now of how long the development of native vegetation types and the associated element of Macrolepidoptera species has been continuing. I know too little of tropical botany to even hazard guesses in this direction but the development of endemic phanerogam genera (see chapter 2) appears to have progressed no further than that of Macrolepidoptera genera. The considerable volcanic activity in Fiji during the Mio-Pliocene boundary period has already been discussed (chapter 2). I believe we may take 4 m.y. B.P. as the starting point for undisturbed development of flora and fauna, this point coinciding with the cessation of widespread volcanic eruption. It is, of course, conceivable that a forest habitat could have persisted on Fiji through the events of the Mio-Pliocene, much as forest approaches the slopes of Yasur, the active volcano on Tanna, New Hebrides, today. I am not convinced

that this was so : if it was, then the available land area would have been small. Taking the starting-point above, this would require the development of the largest present-day endemic genera or species complexes in four million years.

The largest endemic species-groups of Macrolepidoptera contain six species. Assuming dichotomous divergence the development of six species requires three sets of "splits" of a phyletic line and four "interval periods". This gives a rough evolutionary rate of one species per million years. The evolutionary rates postulated by Zimmerman (1948) are in the order of tens of thousands of years for insects on Hawaii. Assuming seven sets of "splits" necessary to yield an endemic genus of over 100 species and a Pliocene age for the more recent Hawaiian islands the rate is about one species per 30,000 years. For Macrolepidoptera on Hawaii the rate is of this order of magnitude. The rapidity of evolution on Hawaii is atypical and the reasons for it have been discussed by Zimmerman (1948): evolutionary rates are apparently greater the more isolated, topographically diverse and well-vegetated the island. Fiji fulfils the latter two conditions but is not particularly isolated in comparison with Hawaii: any "explosive radiation" in a group might be suppressed by competition from a continual rain of immigrant species from (ultimately) northern Melanesia. I have not, by measurement of equitability, been able to demonstrate competition (or lack of it) satisfactorily but the low equitability value for Fijian montane forest is perhaps suggestive of a situation in which competition occurs.

Rotuma is a little more than 4 million years old. It exhibits no endemic radiation but it is small, badly damaged by man, and 20,000 years ago was very far from being isolated. Its one endemic moth species is perhaps no more than a guarantee of age. The endemic subspecies of Rotuma (e.g. Giaura tetragramma simeoni, Callopietria meridionalis rotumensis) are interesting, however. As mentioned previously several are smaller and darker than their nominotypes. Small races of butterflies are found on many small, bleak islands and melanic reptiles are often found on isolated islands (Carlquist, 1966): on the largest islands of the Fiji group small moths are often a result of extreme drought conditions. At least two dark races of Lepidoptera occur on Tanna I. in the New Hebrides where the active volcano periodically produces falls of dark ash and I am inclined to the view that this phenomenon might be described as "volcanic melanism." Whether or not the dark subspecies of Rotuma are a legacy of the ash-falls which now lie bedded with scoria in the cliffs of Hauatuu is a matter for speculation.

The impact of man upon the vegetation of Fiji (and, ultimately, upon the Macrolepidoptera) has been considerable. The results of burning, logging and shifting cultivation have been discussed in chapter 2 and it is now possible to gauge the impact of these activities upon the Lepidoptera. Conversion of primary rain forest into wet secondary vegetation results in the Lepidoptera associated with the primary vegetation either disappearing or remaining at much lower population levels. The distinct separation of primary and secondary vegetation elements is clearly very important. Reduction of primary vegetation to grassland results, apparently, in loss of all endemic species and creation of a very poor environment with low diversity.

Even low-density selective logging operations open up the forest canopy and promote growth of choking vegetation in the herb layer: the complement of secondary vegetation Lepidoptera and probably their associated parasites will increase. A large-scale logging operation (such as that at the Nouankao River on Erromango I., New Hebrides) has an enormous and deleterious effect on the Lepidoptera population, so much so that a faunal element of low diversity and equitability appears which is quite distinct from any other element (see chapter 4). It contains predominantly "waif" species of secondary vegetation in large numbers with very marked dominance and is, I suspect, an unstable element representing an ephemeral population. Comparison of the elements for logged and shattered Kauri forest on Erromango and primary and almost untouched forest with kauri on Aneityum (New Hebrides, 150km from Erromango) is illuminating: four of the six species of the Aneityum element are undescribed and three of these are endemic to the southern islands of the New Hebrides. Clearly the preservation of intact kauri forest (with, in the New Hebrides, an element of mostly endemic Macrolepidoptera) is worthwhile.

It would seem that the size of a faunal element is to some extent a function of the area of the vegetation with which it is associated (see chapter 4, section iii(g)). Thus any reduction of forest must, eventually bring about a reduction in the number of species inhabiting that forest. In several instances the problem of preserving a distinct primary vegetation type is critical, notably the kauri forest of Erromango and the moss forest of Fiji. The primary rain forest of Fiji is still, apparently, surviving but the pressures on this vegetation type in a country which relies very much upon its timber industry are considerable.

Conservation, except where clearly of tourist-industry value, is generally ignored in the Pacific region. Fiji does have nature reserves but these are pitifully small, the largest on Viti and Vanua Levu is Mt Victoria and covers 5 square miles.

Extinction of species in areas where the only records are recent is impossible to ascertain but two species, Heteropan dolens and Levuana iridescens are definitely extinct (see chapter 5) although the former survives on Aneityum. Species now possibly extinct in Fiji are Xanthodes congenita and Hypena commixtura (see chapter 5). Only one "threatened species" springs to mind, Utetheisa clareae (Robinson, 1971b) but the arguments above suggest, I hope, that any species confined to primary forest is a threatened species.

The fate of Levuana, probably a feeder upon native palms until it encountered monocultured coconuts, was unfortunate, (see Tothill et al., 1930). Yet another monotypic genus, Acritocera, causes extensive damage to coconuts but does not respond to control measures and its damage is eclipsed by that of rhinoceros beetle. The remainder of Fiji's Lepidoptera pests are waif species: direct control measures do not affect the endemic species but the wholesale introduction of broad-spectrum parasites and predators may obviously be detrimental to forest moth species.

Nearly half Fiji's species of Macrolepidoptera are found only in Fiji. Almost all of them are forest species and for many of them I believe the future is bleak. Their habitats are threatened by a booming population's requirements for timber and agricultural land and with them are threatened the endemic forest plants, birds and other insect groups which together make up the endemic ecosystem which is peculiar to the largest, forested islands of the Fiji group.

Our basic knowledge of the endemic forest ecosystem is very poor. This work has attempted to catalogue the Macrolepidoptera and define the primary contributors to the populations associated with the different vegetation types. The shortcomings of this exercise are considerable; several species no doubt still await discovery; faunal element analysis is based on a very small number of samples, very few of them from the deep interior of the forests. We know very little indeed about the foodplants or larval habits of many of the species, nothing at all of the majority. It would, I think, be a valuable exercise to investigate the life histories of many of the endemic Fijian lepidoptera, especially those species which are members of groups which have radiated. The predominance of radiation and endemic speciation is especially noticeable in the Hypeninae (see chapter 4, section iv(d)), not only in Fiji but also in Samoa (Mormecia and Lachnogyia endemic) and the Society Is. (Fautaua endemic)(see chapter 4, section iv). The reason for this concentration of endemic radiation in one subfamily is obscure and might be resolved by life-history studies.

Our state of knowledge of most invertebrate groups in Fiji is far poorer than our knowledge of the Lepidoptera: knowledge of plant and animal community ecology in terrestrial Fijian ecosystems is non-existent. Thus the interrelationships of the Lepidoptera are impossible to assess.

Very little is known of changes in the Lepidoptera populations with time; although most species are apparently aseasonal some occur sporadically (Parallelia hicanora - chapter 5) or at fixed times of the year (the Hepialid Phassodes vitiensis Roths. is a dry-season species). Knowledge of transoceanic dispersal and colonisation potentials, rates of immigration and extinction, the basic parameters for modelling island colonisation patterns, is scant (MacArthur and Wilson, 1967). The gulf between the theory of island biogeography and the facts is still enormous. But the facts of biogeography need to be recorded: this is a descriptive work and I do not apologise for that.

Here is my quiet, pacific harbour,
 My writing table's sheltering shore
 the seconds' flight
 Is marked by the slow minute hand
 The quarto sheets are virgin white
 The pens
 are dozing
 in their stand.
 How peacefully the seconds run.
 Pacifically, I take my pen
 It is as though
 I'd raised
 a gun:
 Beyond my writing table's shore
 The Ocean lies - Pacific. Vast.

(from "Prelude" by Ilya Selvinsky,
 1899 - 1968, Crimea. Translated by
 Avril Pyman.)

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MAPS 1 - 12

- 1: New Hebrides, Fiji and Rotuma - the study area.
- 2: Fiji, Viti Levu.
- 3: Fiji, Yasawa Group.
- 4: Fiji, Vanua Levu.
- 5: Fiji, Thikombia and Kandavu.
- 6: Fiji, northern Lau Group.
- 7: Fiji, southern Lau Group.
- 8: New Hebrides, Espiritu Santo.
- 9: New Hebrides, Malekula and Efate.
- 10: New Hebrides, Erromanga, Tanna and Aneityum.
- 11: Rotuma.
- 12: Fiji, Lomaiviti Group.

KEY



Locality in which a light trap was operated in 1970/1.



Locality visited only by day and collections made 1970/1.



Locality worked prior to 1970 by the author but not during 1970/1.



Centre of population - town or city.

ABBREVIATIONS IN SITE DESCRIPTIONS

RF: Rainfall

SDS: Strong dry season : June - October with less than 10cm. RF per month.

MDS: Moderate dry season: June - Aug./Sept. with less than 10cm. RF per month.

USP: University of the South Pacific.

- Rotuma

N

New Hebrides

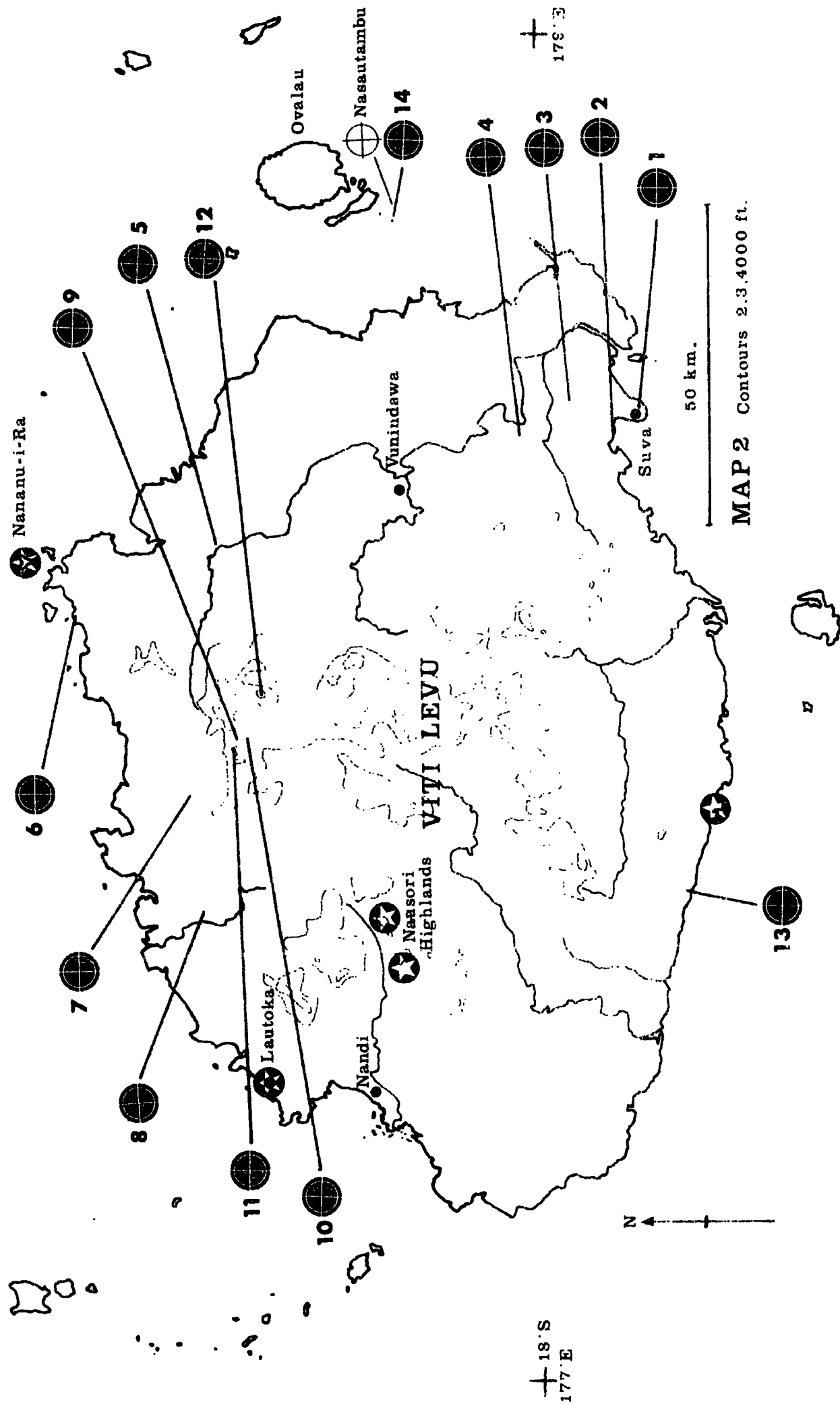
500 km.

MAP 1

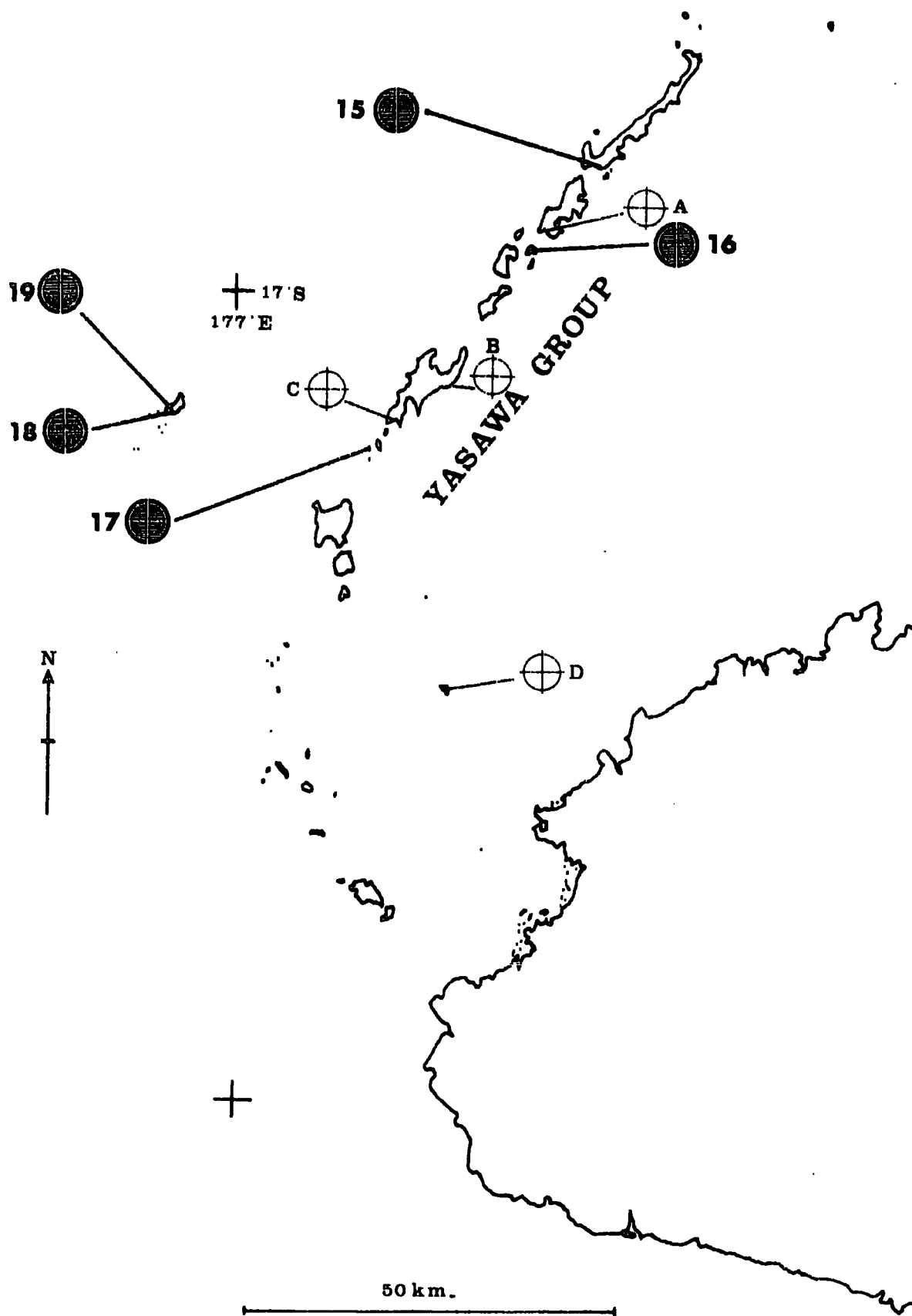
170°E

+20°S
180°

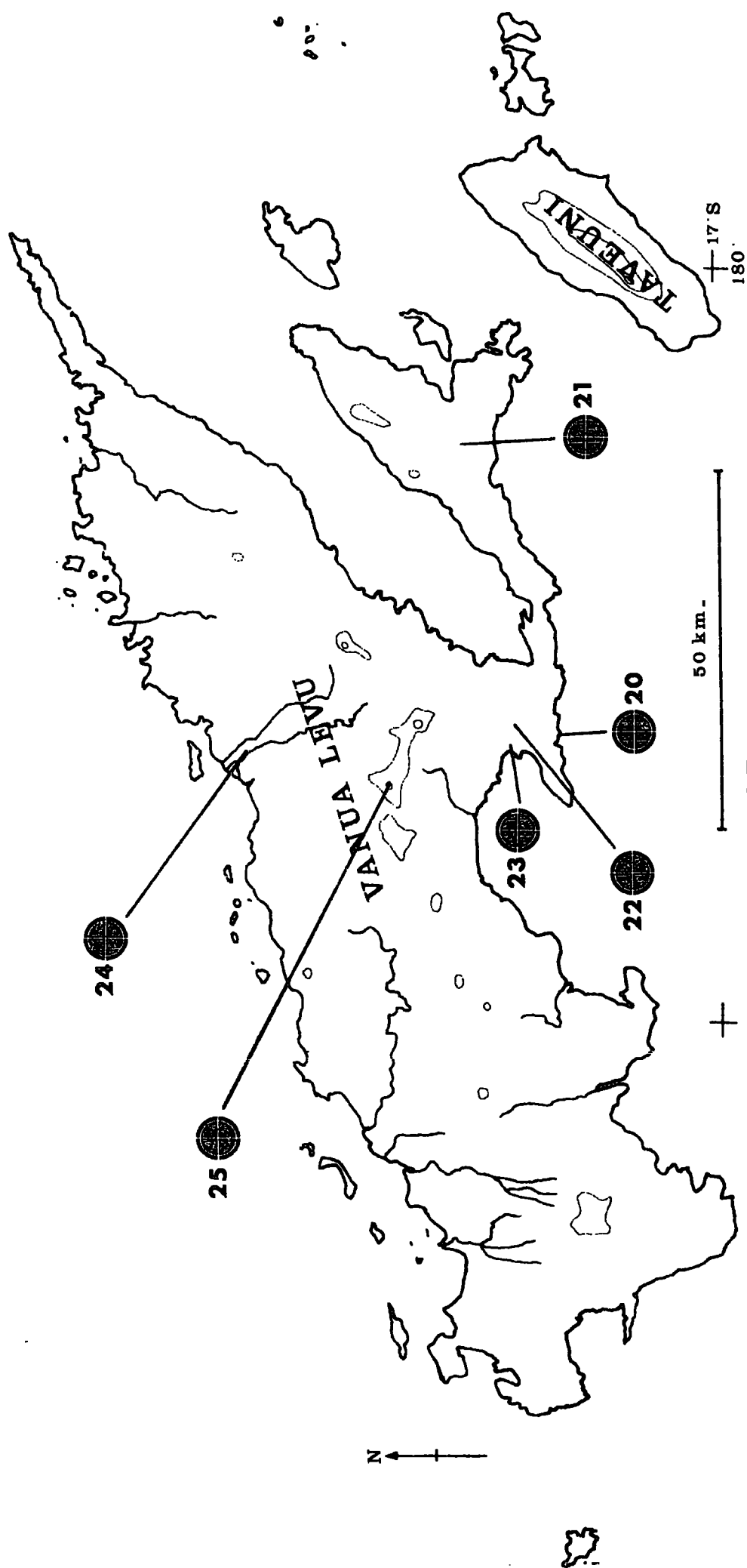
Fiji



MAP 2 Contours 2,34000 ft.



MAP 3



MAP 4 Contours 2,3000 ft.

Thikombia



16°S
180°

VANUA LEVU

50 km.

VITI LEVU

D



Mbulia



(McLean, 1970)

Ono



178°E
19°S

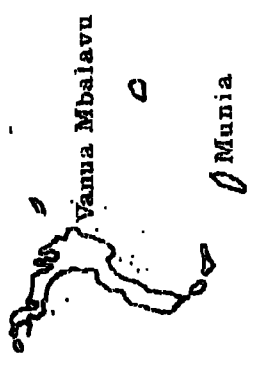
KANDAVU

50 km.

MAP 5



Naita(u)mba
+17°S
179°W



Vanua Mbalavu

Kanaithea

Munia

Mango

LAU GROUP (N.)

50 km.

MAP 6

Tuvutha

Thithia



Nayau
+



Lakemba

A (USP)

Vanua Vatu

B (USP)

Mothe

Koino

(USP) C

Kambara

+ 19° S
179° W

26

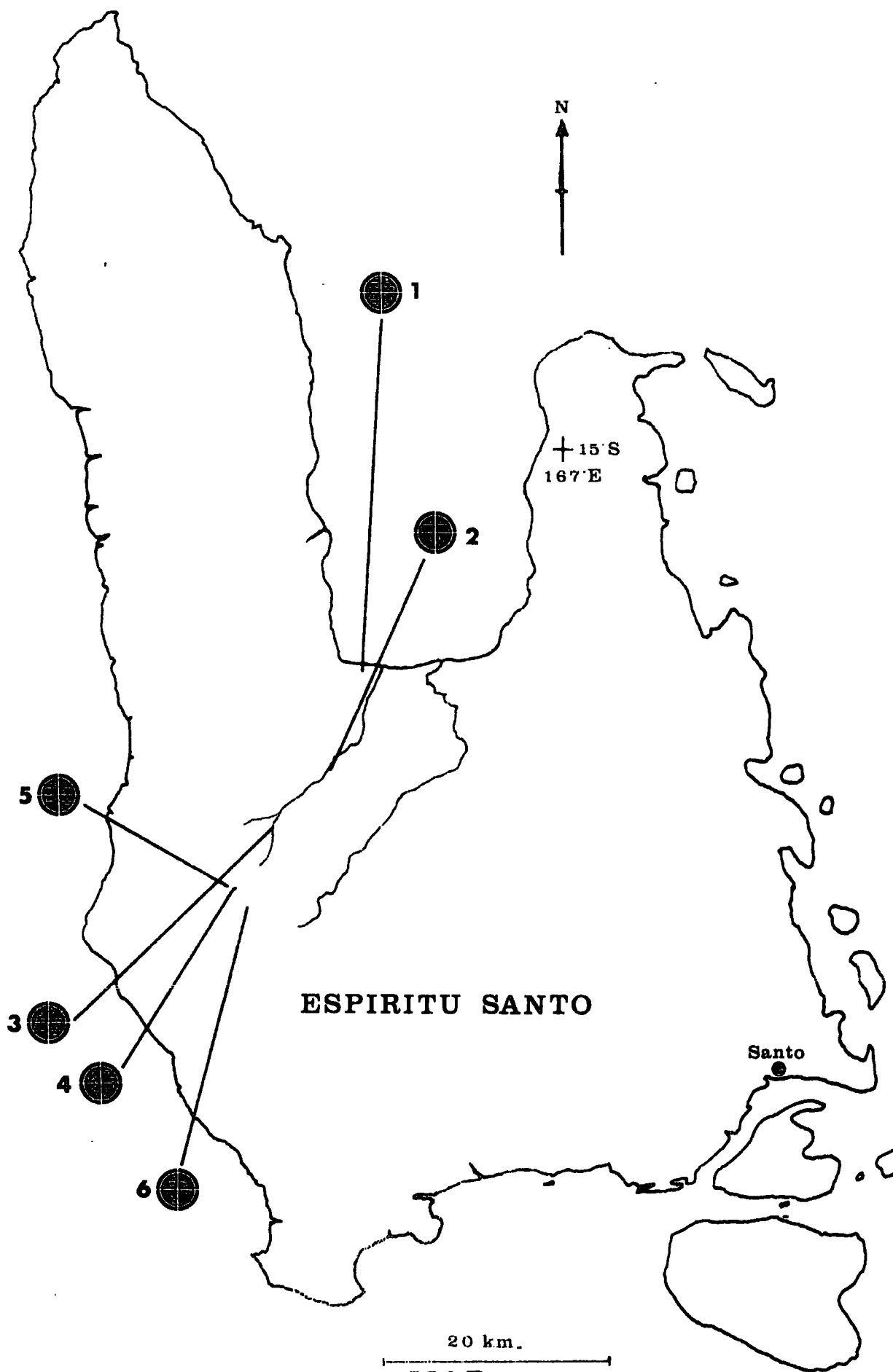
(USP) D

LAU GROUP (S.)

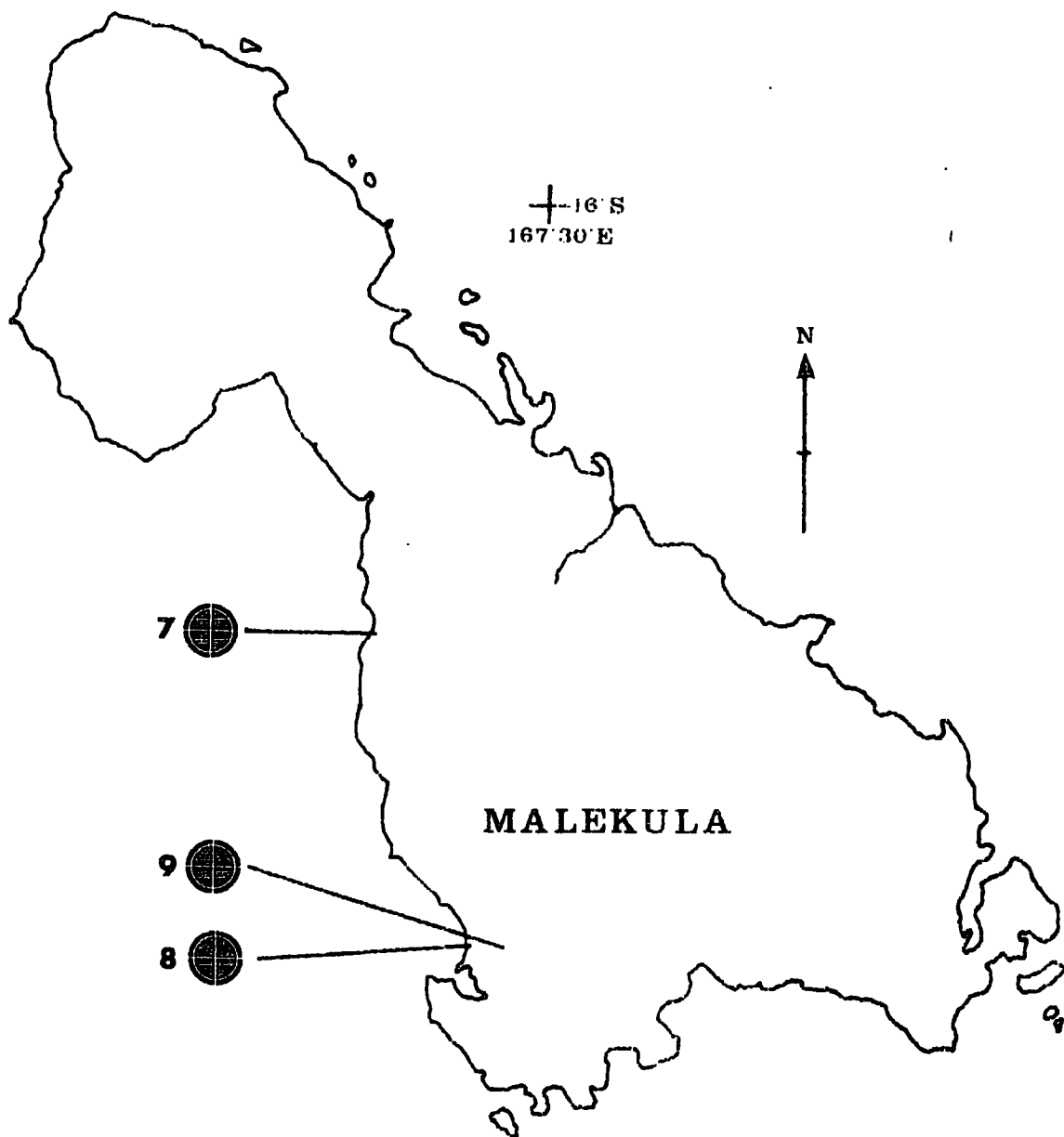
50 km.

MAP 7





MAP 8



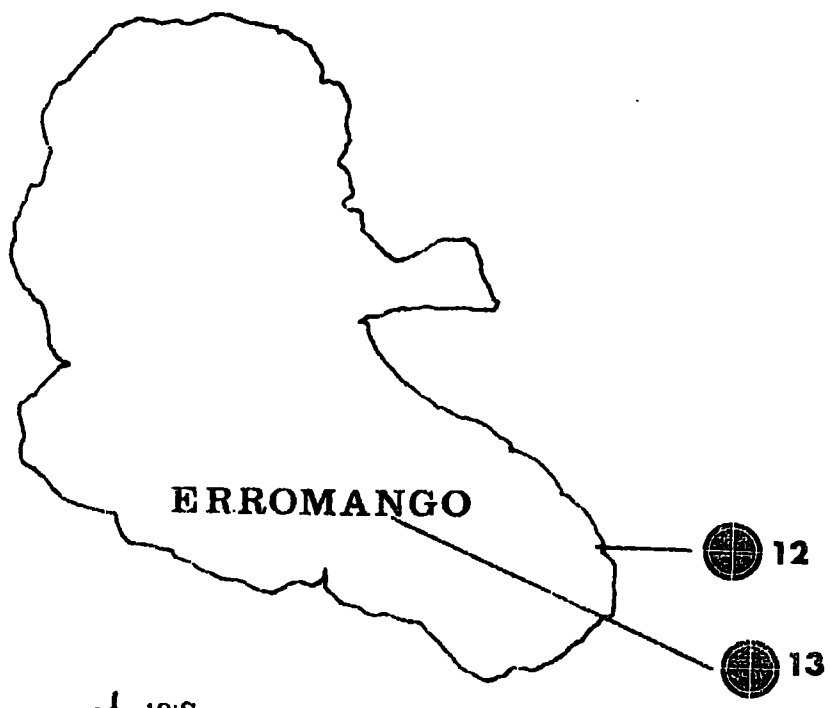
$+17^{\circ}30'S$
 $168^{\circ}E$



20 km.



MAP 9

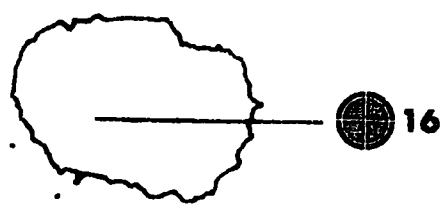


19° S
169° E

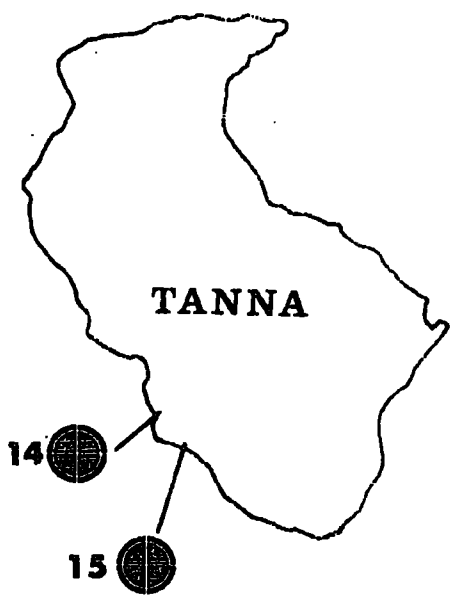


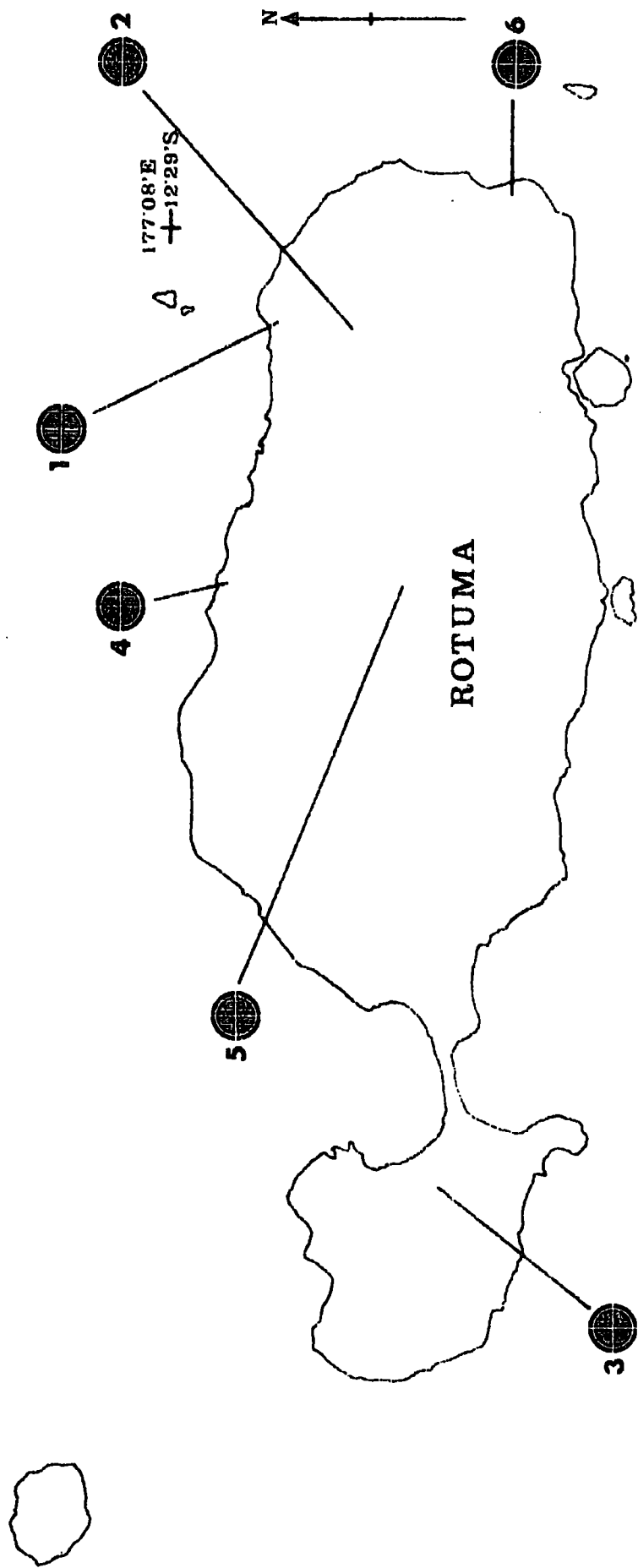
20 km.
MAP 10

ANEITYUM



20° S +
170° E





5 km.

MAP 11

Koro

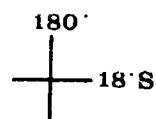
Makongai

Wakaya

Mbatiki

Nairai

Ngau

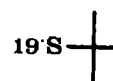


50 km.

MAP 12

Moala

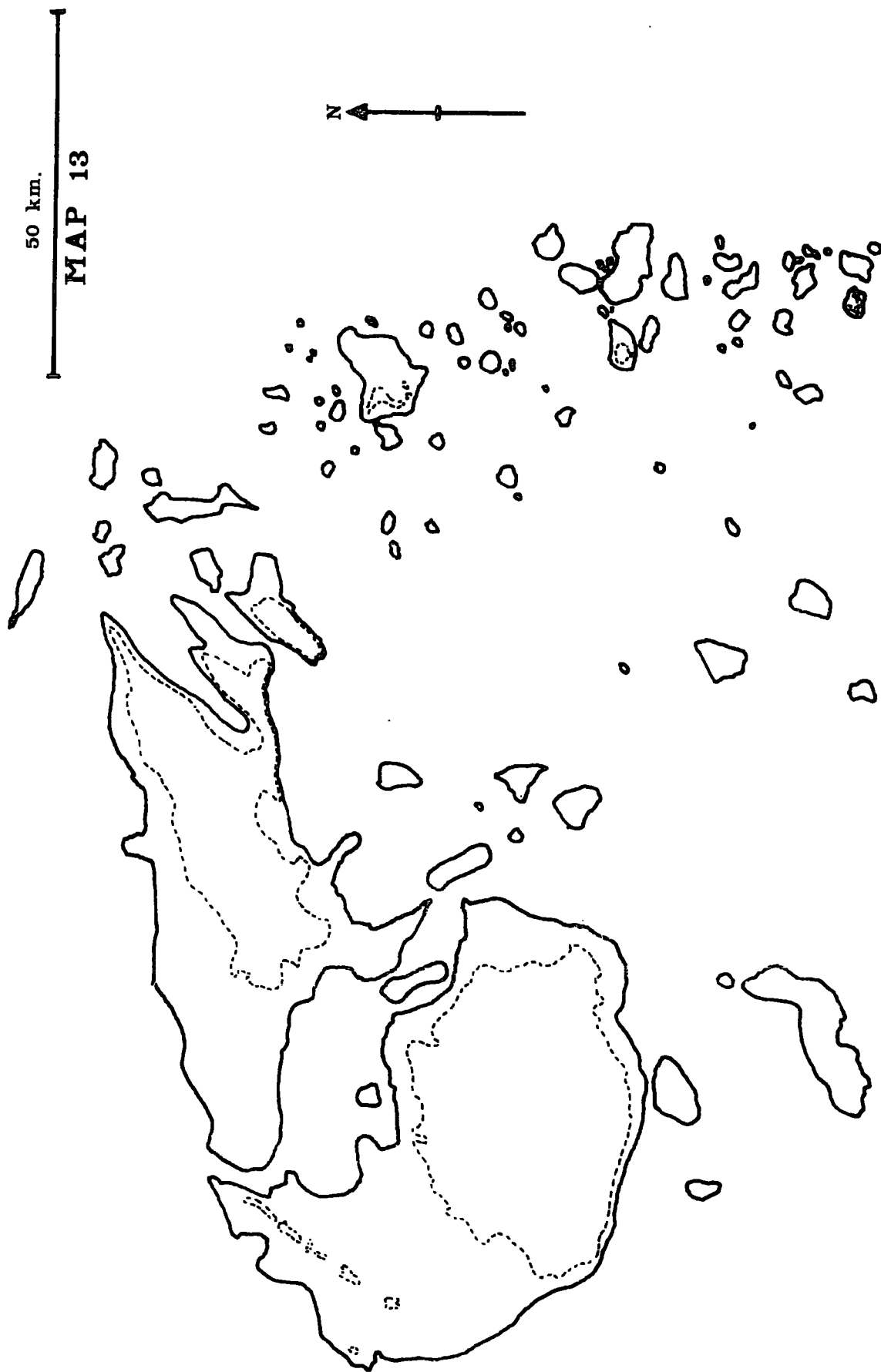
Totoya



Matuku

MAPS 13 - 15

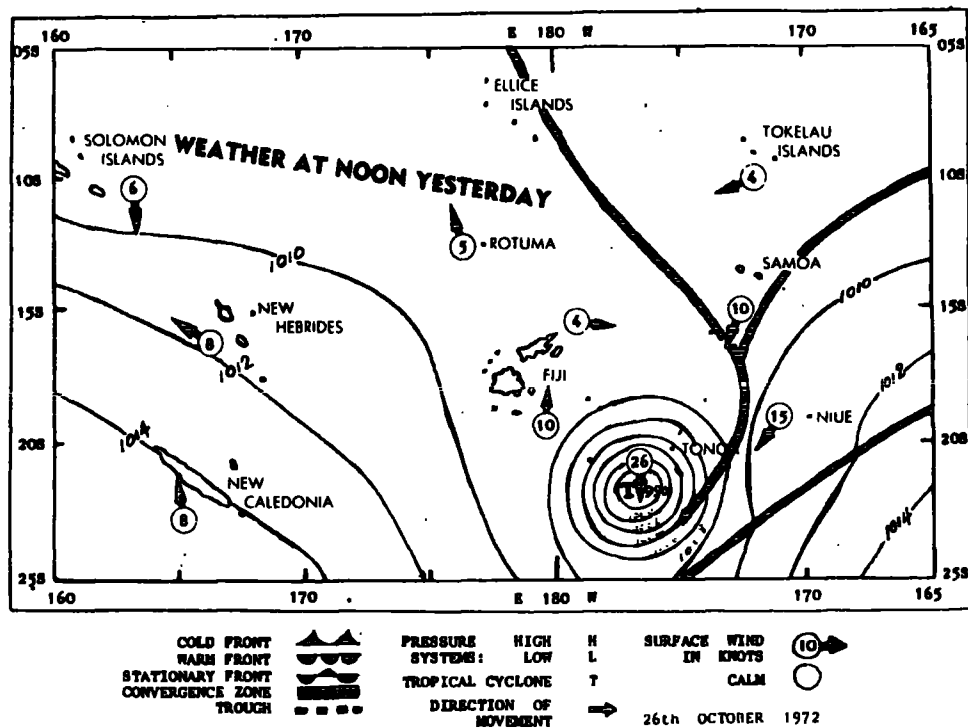
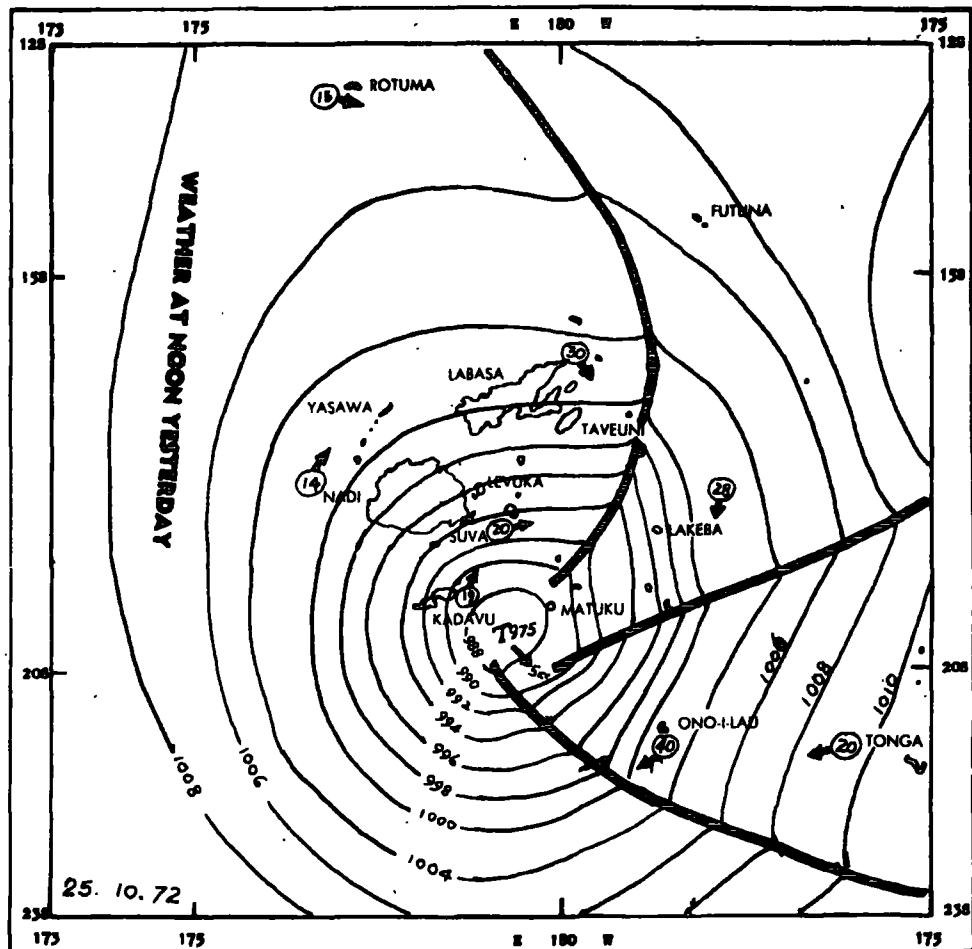
- 13: Configuration of Fiji archipelago
with sea level at -120m.
(see p.14)
- 14: Hurricane 'Bebe' weather maps (see p.15)
- 15: Configuration of western Pacific with
sea level at -120m., trenches, plates
(see pp. 11, 13, 14).



50 km.

MAP 13

N



Map 14

Hurricane "Bebe" on 25th and 26th October 1972
 (maps from 'Fiji Times')

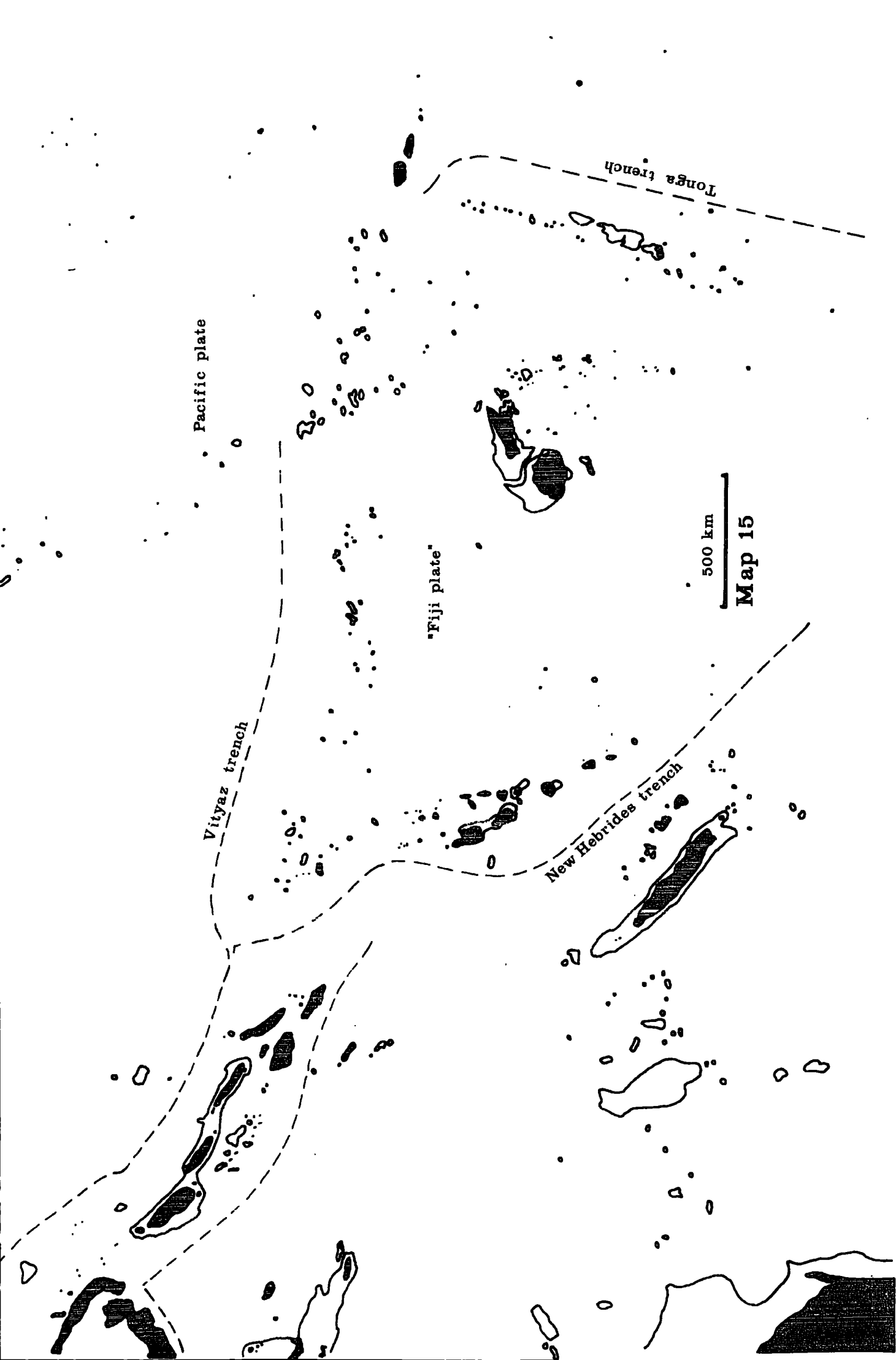


PLATE FIGURES 1-350

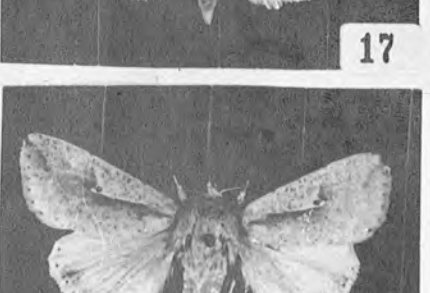
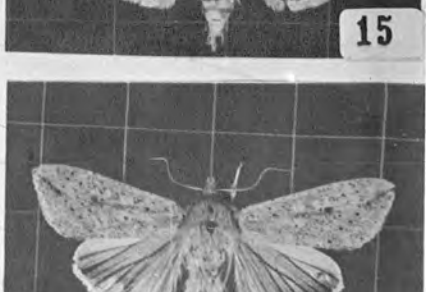
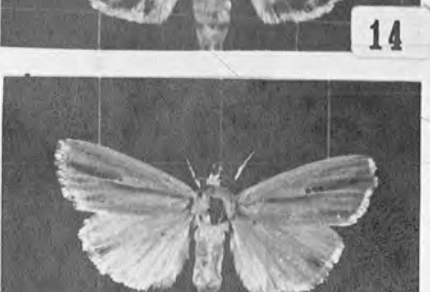
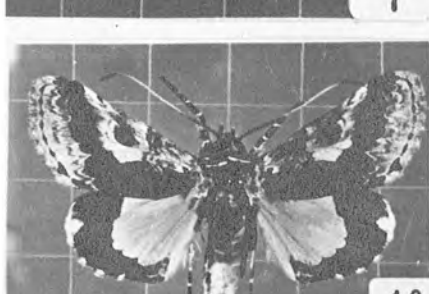
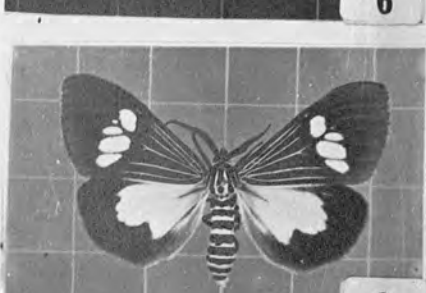
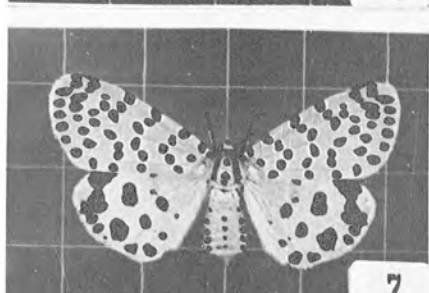
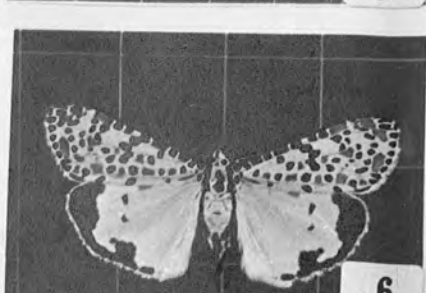
Specimens were pinned in a small disc of cork set in a sheet of Perspex engraved with intersecting lines at intervals of 1cm.. Smaller insects (e.g. in plate fig. 39) were pinned over a Perspex sheet with vertical lines engraved at 1mm. intervals and horizontal lines engraved at 1cm. intervals. Specimens were illuminated using a pair of spotlamps placed at left and right of the specimen and directed towards it at an angle of about thirty five degrees to the horizontal. Photographs of individual specimens were collaged on a frame set in a case attached to a vacuum cleaner, the photographs thus held down flat by suction. The collage was re-photographed and A4-sized plates, each of 21 specimens, were prepared. Where the background is too pale to show the Perspex grid clearly, a 1cm. scale-line has been added using Indian ink. All photographs were taken by H.S. Robinson using a Nikon camera fitted with a 55 mm. Micro-Nikkor lens.

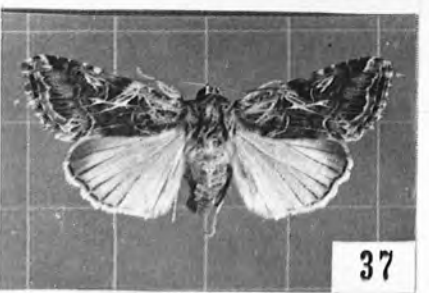
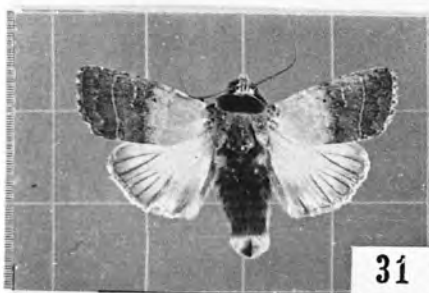
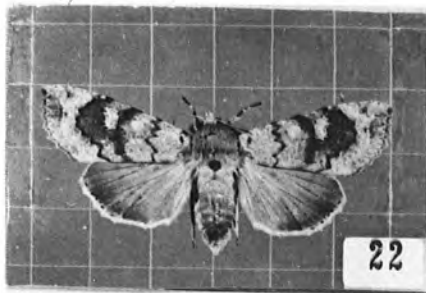
1	<i>Euchromia creusa</i> L.	89	<i>Anua coronata</i> F.
2	<i>Euchromia vitiensis</i> Hampson	90	<i>Anua fijiensis</i> Robinson
3	<i>Philagria entella</i> delia F.	91	<i>Anua tongaensis</i> Hampson
4	<i>Utetheisa clareae</i> Robinson	92	<i>Chalciope alcyona</i> Druce
5	<i>Utetheisa lotrix stigmata</i> Roths.	93	<i>Arcte coerula</i> Guenee
6	<i>Utetheisa pulchellodes marshallorum</i> Roths.	94	<i>Ercheia kebeae</i> Bethune-Baker
7	<i>Argina cribraria</i> Clerck	95	<i>Grammodes oculicola</i> Walker
8	<i>Asota woodfordi</i> Druce	96	<i>Avatha discolor</i> F.
9	<i>Nyctemera baulus</i> Boisduval	97	<i>Thyas miniacea</i> Felder
10	<i>Sarbanissa bostrychonota</i> Tams ♂	98	<i>Mocis frugalis</i> F.
11	<i>Sarbanissa bostrychonota</i> Tams ♀	99	<i>Mocis trifasciata</i> Stephens
12	<i>Agrotis ipsilon aneituma</i> Walker	100	<i>Parallelia arctotaenia</i> Guenee
13	<i>Agrotis munda</i> Walker	101	<i>Parallelia duplicata</i> sp. n.
14	<i>Helicoverpa armigera conferta</i> Walker	102	<i>Parallelia koroensis</i> Robinson
15	<i>Helicoverpa assulta</i> Guenee	103	<i>Parallelia vitiensis</i> Butler
16	<i>Leucania loreyi</i> Duponchel	104	<i>Parallelia hicanora</i> Turner
17	<i>Leucania scottii</i> Butler	105	<i>Parallelia prisca</i> Walker
18	<i>Leucania separata</i> Walker	106	<i>Trigonodes cepheis</i> Cramer
19	<i>Leucania venalba</i> Moore	107	<i>Plusia acuta</i> Walker
20	<i>Leucania yu</i> Guenee	108	<i>Plusia albostrata</i> Bremer & Grey
21	<i>Leucania pseudoformosana</i> sp. n.	109	<i>Plusia chalcites</i> Esper
22	<i>Tiracola plagiata</i> Walker	110	<i>Plusia illuminata</i> Robinson
23	<i>Tiracola plagiata</i> Walker	111	<i>Anomis figlina</i> Butler
24	<i>Callopietria argyrosemastis</i> Hampson	112	<i>Anomis flava</i> F.
25	<i>Callopietria meridionalis nauticorum</i> Tams	113	<i>Anomis nigritarsis xanthochroa</i> Butler
26	<i>Callopietria reticulata</i> Pagenstecher	114	<i>Anomis samoana</i> Butler
27	<i>Calogramma festiva</i> Donovan	115	<i>Anomis revocans</i> Walker
28	<i>Chasmina candida</i> Walker	116	<i>Anomis vitiensis</i> Butler
29	<i>Chasmina tibialis</i> F.	117	<i>Anomis vulpina</i> Butler
30	<i>Chasmina viridis</i> sp. n.	118	<i>Hypospilia similis fijiensis</i> subsp. n.
31	<i>Leucocosmia nonagrica</i> Walker	119	<i>Anticarsia irrorata</i> F.
32	<i>Sasunaga tomaniivensis</i> sp. n. ♀	120	<i>Aedia leucomelas</i> L.
33	<i>Sasunaga tenebrosa</i> Moore	121	<i>Avitta lunifera</i> Druce
34	<i>Athetis striolata</i> Butler	122	<i>Aedia sericea</i> Butler
35	<i>Prospalta caerulea</i> Robinson	123	<i>Chrysopera combinans</i> Walker
36	<i>Platysenta illecta</i> Walker	124	<i>Diomea fenella</i> Robinson
37	<i>Spodoptera litura</i> F.	125	<i>Briceia leichardtii</i> Koch
38	<i>Spodoptera mauritia acronyctoides</i> Guenee	126	<i>Briceia levuensis</i> Prout
39	<i>Amyna natalis</i> Walker	127	<i>Eudocima salamina</i> Cramer
40	<i>Amyna octo</i> Guenee	128	<i>Felinia precedens</i> Walker
41	<i>Amyna punctum</i> F.	129	<i>Hyperlopha cristifera</i> Walker
42	<i>Eublemma anachoresis</i> Wallengren	130	<i>Hypocala australiae</i> Butler
43	<i>Eublemma baccalix</i> Swinhoe	131	<i>Lacera alope</i> Cramer
44	<i>Eublemma cochylioides</i> Guenee	132	<i>Leptotroga armstrongi</i> Tams
45	<i>Eublemma crassiuscula</i> Walker	133	<i>Mecodina variata</i> Robinson
46	<i>Eublemma pudica</i> Snellen	134	<i>Arsacia rectalis</i> Walker
47	<i>Eublemma ragusana</i> Freyer	135	<i>Neogabara plagiola</i> Wileman & West ♀
48	<i>Eublemma rivula</i> Moore	136	<i>Othreis fullonia</i> Clerck
49	<i>Maliattha ritsemae</i> Snellen	137	<i>Othreis paulii</i> Robinson
50	<i>Oruza cariosa</i> Lucas	138	<i>Oxyodes scrobiculata tanymekes</i> Tams
51	<i>Anigraea pectinata</i> sp. n.	139	<i>Plusiodonta dimorpha</i> sp. n. ♂
52	<i>Anigraea ochrobasis</i> Hampson	140	<i>Plusiodonta dimorpha</i> sp. n. ♀
53	<i>Bombotelia dinawa</i> Bethune-Baker	141	<i>Polydesma boarmoides</i> Guenee
54	<i>Bombotelia jocosatrix</i> Guenee	142	<i>Rhesala albizziae</i> Prout
55	<i>Paectes cristatrix fijiensis</i> subsp. n.	143	<i>Rivula dipterygosoma</i> Tams ♂
56	<i>Pataeta carbo</i> Guenee	144	<i>Maliattha melanesiensis</i> sp. n.
57	<i>Phlegetonia barbara</i> sp. n.	145	<i>Rivula polynesiana</i> Hampson
58	<i>Phlegetonia delatrix</i> Guenee	146	<i>Rivula dipterygosoma</i> Tams ♀
59	<i>Tibiocillaria magnifica</i> sp. n.	147	<i>Sericia mutabilis</i> F.
60	<i>Gyrtona hopkinsi</i> Tams ♂	148	<i>Sericia strigiformis</i> sp. n.
61	<i>Gyrtona hopkinsi</i> Tams ♀	149	<i>Sericia obalsuae</i> Bethune-Baker
62	<i>Gyrtona divitalis</i> Walker	150	<i>Nagia</i> sp.
63	<i>Nigramma perstialis</i> Hampson	151	<i>Serrodus mediopallens</i> Prout ♀
64	<i>Nigramma acutipennis</i> sp. n.	152	<i>Pantylidia metaspila</i> Walker
65	<i>Stictoptera describens</i> Walker	153	<i>Attonda adspersa</i> Felder
66	<i>Stictoptera stygia</i> Hampson	154	<i>Parilyrgis concolor</i> Bethune-Baker
67	<i>Stictoptera vitiensis</i> Hampson	155	<i>Lasioceros aroa vitiensis</i> subsp. n.
68	<i>Blenina vatu</i> sp. n.	156	<i>Epiplema cretosa</i> Swinhoe
69	<i>Etanna mackwoodi</i> Hampson	157	<i>Epiplema instabilata</i> Walker
70	<i>Characoma nilotica</i> Rogenhofer	158	<i>Urapteroides anerces</i> Meyrick
71	<i>Giaura sokotokai</i> Robinson	159	<i>Gathynia cythera</i> Swinhoe
72	<i>Giaura tetragramma tetragramma</i> Hampson	160	<i>Dappula tertia</i> Templeton
73	<i>Mniothripa bradleyi</i> Fletcher	161	<i>Pumea samoana</i> Tams
74	<i>Nanaguna albisepta</i> Hampson	162	<i>Acritocera negligens</i> Butler
75	<i>Nanaguna breviscula</i> Walker	163	<i>Bocana manifestalis</i> Walker
76	<i>Nanaguna vittalis</i> Walker	164	<i>Palaeocoleus sypnoides</i> Butler
77	<i>Symitha indicatana</i> Walker	165	<i>Dichromia quinquialis</i> Walker
78	<i>Microthripa buxtoni</i> Tams	166	<i>Harita nodyna</i> Bethune-Baker
79	<i>Carea albipicta</i> Hampson	167	<i>Hydrillodes surata</i> Meyrick
80	<i>Earias luteolaria</i> Hampson	168	<i>Echanella hirsutipennis</i> sp. n. ♂
81	<i>Earias huegeli</i> Rogenhofer	169	<i>Catadoides fijiensis</i> sp. n.
82	<i>Earias flavida</i> Felder	170	<i>Hypena gonospilalis</i> Walker
83	<i>Earias vitella</i> F.	171	<i>Hypena iconicalis</i> Walker
84	<i>Maceda mansueta</i> Walker	172	<i>Hypena masuralis ferriscitalis</i> Walker
85	<i>Maceda savura</i> Robinson	173	<i>Hypena robustalis</i> Snellen
86	<i>Maurilia iconica</i> Walker	174	<i>Hypena laceratalis</i> Walker
87	<i>Gabala australiata</i> Warren	175	<i>Hypenagonia emma</i> sp. n.
88	<i>Achaea serva</i> F.	176	<i>Tholocoleus astrifer</i> Butler

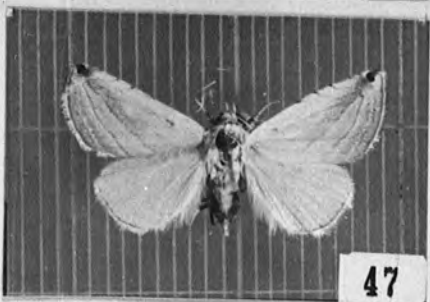
- 177 *Lophocoleus mirabilis* Butler
- 178 *Schranksia vitiensis* sp. n.
- 179 *Progonia micrastis* Meyrick
- 180 *Mecistoptera* sp.
- 181 *Simplicia caeneusalis* Walker
- 182 *Hypena fijiensis* sp. n.
- 183 *Lophocoleus iridescens* sp. n.
- 184 *Lophocoleus acuta* sp. n.
- 185 Indeterminate species B (Hypeninae)
- 186 *Lophocoleus albipuncta* sp. n.
- 187 *Hypena cryptica* sp. n.
- 188 *Lophocoleus suffusa* sp. n.
- 189 *Lophocoleus rubescens* sp. n.
- 190 Indeterminate species C (Hypeninae)
- 191 *Dasychira fidjiensis* M. & V.
- 192 *Dasychira nandariatu* Robinson
- 193 *Dasychira* ? *flavobrunnea* Robinson
- 194 *Dasychira flavobrunnea* Robinson
- 195 *Euproctis mimetica* Robinson
- 196 *Begonia mediopunctata* Hering
- 197 *Begonia albifascia* sp. n.
- 198 *Agrius convolvuli* L.
- 199 *Cephonodes armatus* Roths. & Jordan
- 200 *Gnathothlibus erotus* eras Boisduval
- 201 *Daphnis placida* torenia Druce
- 202 *Theretra pinastrina* intersecta Butler
- 203 *Macroglossum godeffroyi* Butler
- 204 *Macroglossum hirundo vitiense* Roths. & Jordan
- 205 *Hippotion celerio* L.
- 206 *Hippotion velox* F.
- 207 *Psilogramma jordana* Bethune-Baker
- 208 *Stenopterygia nausoriensis* sp. n.
- 209 *Dyrzela trichoptera* sp. n.
- 210 *Trigonodes hyppasia* Cramer
- 211 *Agathia asterias* dimota Prout
- 212 *Comibaena cheramota* Meyrick
- 213 *Gelasma albifulgens* Prout
- 214 *Gelasma quadrizonia* Prout
- 215 *Hemithea stuhlmanni* Prout
- 216 *Mesurodes erichlora* Meyrick
- 217 *Thalassodes chloropis* Meyrick
- 218 *Thalassodes pilaria* Guenee
- 219 *Thalassodes figurata* Robinson
- 220 *Thalassodes liquescens* Prout
- 221 *Thalassodes fiona* sp. n.
- 222 *Pyrrhorachis pyrrhogona* augustata Prout
- 223 *Anisodes decolorata* Warren
- 224 *Anisodes obliivaria* Walker
- 225 *Anisodes compacta* lautokensis Prout
- 226 *Anisodes gloria* sp. n.
- 227 *Anisodes harrietae* sp. n.
- 228 *Anisodes samoana* Warren
- 229 *Pseuderythrolophus bipunctatus* idomon Prout
- 230 *Scopula epigypsa* Meyrick
- 231 *Scopula homodoxa* Meyrick
- 232 *Idaea rhipistis* Meyrick
- 233 *Idaea bathromyses* Prout
- 234 *Symmacra solidaria* baptata Warren
- 235 *Brabira apatopleura* Prout
- 236 *Collix patricia* sp. n.
- 237 *Eoasthena catharia* Prout
- 238 *Eoasthena extranea* Prout
- 239 *Eoasthena gnophobathra* Prout
- 240 *Eoasthena stygna* Prout
- 241 *Eoasthena rowena* sp. n.
- 242 *Eoasthena quilla* sp. n.
- 243 *Eois* sp.
- 244 *Eois* sp.
- 245 *Chloroclystis bosora* Druce
- 246 *Chloroclystis enceteta* Prout ♀
- 247 *Chloroclystis lepta fluctuosa* Prout
- 248 *Chloroclystis hypometra* Prout
- 249 *Chloroclystis pyrsodonta* Turner
- 250 *Chloroclystis rubicunda* Prout
- 251 *Chloroclystis scintillata* Prout
- 252 *Eupithecia eupithecia* Walker
- 253 *Gymnoscelis concinna* nephelota Prout
- 254 *Gymnoscelis minutissima* acidna Turner
- 255 *Gymnoscelis imparatalis* Walker
- 256 *Gymnoscelis tylocera* Prout
- 257 Indeterminate species (Geometrinae)
- 258 *Chloroclystis nina* sp. n.
- 259 *Gymnoscelis sara* sp. n.
- 260 *Horisme chlorodesma* Meyrick
- 261 *Horisme teresa* sp. n. ♀
- 262 *Horisme teresa* sp. n. ♂
- 263 *Poecilasthena leucydra* Prout
- 264 *Polyclysta gonycrota* Prout
- 265 *Sauris acanthina* Prout
- 266 *Sauris elais* Meyrick
- 267 *Sauris nigrilinearia enochra* Prout
- 268 *Sauris* sp.
- 269 *Scotocyma miscix* Prout
- 270 *Symmimetis merceri* sp. n.
- 271 *Bulonga phillipsi* Prout
- 272 *Casbia aedoea* sp. n.
- 273 *Cleora injectaria anidryta* Prout
- 274 *Cleora lanaris* Butler
- 275 *Cleora munditibia munditibia* Prout
- 276 *Cleora nausori* Bethune-Baker
- 277 *Cleora ochricollis* Prout
- 278 *Cleora perstricta* Prout
- 279 *Cleora samoana fijiensis* subsp. n.
- 280 *Cleora vitensis* Bethune-Baker
- 281 *Cleora fowlesi* Robinson
- 282 *Cleora diversa* Robinson
- 283 *Ruttelerona presbytica* sp. n.
- 284 *Clepsimelia phryganeoides* Warren
- 285 *Luxiaria sesquilinea* Prout
- 286 *Nadagara irretracta* levuensis subsp. n.
- 287 *Petelia aesyia* Prout
- 288 *Scardamia eucampa* Prout
- 289 *Catoria hemiprosopa* Turner
- 290 *Sauris ursula* sp. n.
- 291 *Chloroclystis enceteta* Prout ♂
- 292 *Chloroclystis katherina* sp. n.
- 293 *Epiplema lomangi* sp. n.
- 294 *Epiplema simmondsi* sp. n.
- 295 *Melanitis leda solandra* F.
- 296 *Xois sesara* Hewitson
- 297 *Danaus hamata neptunica* Felder
- 298 *Danaus plexippus* L.
- 299 *Euploea boisduvalii herrichi* Felder
- 300 *Euploea lewinii eschscholtzi* Felder
- 301 *Euploea nemertes macleayi* Felder
- 302 *Euploea tulliolus forsteri* Felder
- 303 *Doleschallia bisaltide vomana* Fruhstorfer
- 304 *Hypolimnas antilope lutescens* Butler
- 305 *Hypolimnas bolina* L. (♂, Rotuma)
- 306 *Precis villida* F.
- 307 *Papilio schmeltzi* Herrich-Schaffer
- 308 *Anaphaeis java micronesia* Fruhstorfer
- 309 *Catopsilia pomona* F. ♀
- 310 *Catopsilia pomona* F. ♂
- 311 *Eurema hecabe sulphurata* Butler
- 312 *Strymon bazochii gundlachianus* Bates
- 313 *Cepora perimale inopinata* Butler
- 314 *Deudorix epijarbas diovella* Waterhouse
- 315 *Euchrysops cnejus* F.
- 316 *Jamides bochus candrena* Herrich-Schaffer
- 317 *Lampides boeticus* L.
- 318 *Zizina otis mangoensis* Butler
- 319 *Nacaduba dyopa* Herrich-Schaffer
- 320 *Catochrysops taitensis* Boisduval
- 321 *Badamia exclamatoris* F.
- 322 *Badamia atrox subflava* Waterhouse
- 323 *Hasora chromus bilunata* Butler
- 324 *Oriens augustula* Herrich-Schaffer
- 325 Indeterminate species B (Ophiderinae)
- 326 *Callopteria meridionalis rotumensis* subsp. n.
- 327 *Platysenta conducta* Walker
- 328 *Platysenta dolorosa* Walker
- 329 ?*Platysenta* sp.
- 330 *Sasunaga tomaniiviensis* sp. n. ♂
- 331 *Sasunaga oenistis* Hampson ♀
- 332 *Sasunaga oenistis* Hampson ♂
- 333 *Gyrtona purpurea* sp. n.
- 334 *Nigramma rotundipennis* sp. n.
- 335 *Apothripa vailima* Tams
- 336 *Barasa triangularis* sp. n.
- 337 *Giaura tetragramma simeoni* subsp. n.
- 338 *Calathusa* sp. near *basicunea* Walker
- 339 *Giaura spinosa* sp. n.
- 340 Indeterminate species (Acronictinae)
- 341 *Gonodontis clelia* Cramer
- 342 *Earias flavida* Felder LECTOTYPE
- 343 *Xanthodes congenita* Hampson
- 344 *Achaea janata* L.
- 345 *Mocis vitiensis* Hampson
- 346 *Serrodia campana callipepla* Prout
- 347 *Serrodia mediopallens* Prout ♂
- 348 *Neogabara plagiola* Wileman & West ♂
- 349 *Rivula maxwelli* sp. n.
- 350 Indeterminate species A (Ophiderinae)

- Sauris, 291
 savura Robinson, 168, 169
 Scardamia, 308
 schmeltzi Herrich-Schaffer, 331
 Schrankia, 234, 236
 scintillata Prout, 276
 Scopula, 264, 265
 Scotocyma, 197, 296
 scottii Butler, 117
 scrobiculata F., 207
 scylla gorgophone Boisduval, 332
 semicana Pagenstecher, 117
 separata Walker, 118
 sericea Butler, 187
 sericea Hampson, 125
 Sericia, 212
 serratilinea Bethune-Baker, 180
 Serrodes, 214, 206
 serva F., 171
 sesara Hewitson, 325
 sesquilinea Prout, 305
 Seudyra, 111
 shortlandica Swinhoe, 99
 sigma Tams, 221
 simeoni subsp. n., 159, 161
 similis Tams, 201
 simondsi sp. n., 312
 Simplicia, 236, 237
 sinensis Prout, 268
 sokotokai Robinson, 159, 160
 solidaria Guenee, 267
 solmafua sp. n., 284
 solomonis Swinhoe, 157
 Sophronia, 237
 sordida Butler, 208
 SPHINGIDAE, 244
 Sphinx, 99, 244, 246, 247, 249
 spinosa sp. n., 159, 160
 Spodoptera, 134
 steffany Clark, 245
 Stenopterygia, 135
 Sterrha, 263, 264, 267
 STERRHINAE, 259
 Stictoptera, 151, 153
 STICTOPTERINAE, 150
 stigmata Rothschild, 104
 striata Hampson, 203
 striata sp. n., 101, 102
 strigata F., 225
 strigatus F., 225
 strigiformis sp. n., 212, 213
 striolata Butler, 121, 128
 Strophidia, 315
 Strymon, 336
 stuhlmanni Prout, 254
 stygia Hampson, 154, 155
 stygna Prout, 281
 sublinearia Walker, 267
 subtractata Walker, 253
 suffusa sp. n., 230-233
 surata Meyrick, 220, 221
 Symitha, 164
 Symmacra, 267
 Symmimetis, 297
 sypnoides Butler, 235
 taenialis Hubner, 236
 taitensis Boisduval, 334
 tamsi Viette, 201
 tanymekes Tams, 207
 Tamusida, 163
 taona Tams, 237
 tenebrosa Moore, 132, 133
 tenuilinea Warren, 289
 teresa sp. n., 288
 tertia Templeton, 323
 testulata Guenee, 275
 tetragramma Hampson, 159, 160
 Thalassodes, 255
 Thaleria, 253
 Thalpochara, 141
 Thecla, 336
 Theretra, 250
 Thermesia, 140, 142, 200
 Tholocoleus, 220, 235, 238
 thorectes Prout, 297, 298
 Throana, 216
 Thyas, 179, 181, 206
 tibialis F., 125, 126
 Tibiocillaria, 148
 tigris Guenee, 323
 timoclea Druce, 255
 Tinea, 167
 Tiracola, 119
 Tiridata, 188
 Tolmera, 303
 tomaniiviensis sp. n., 132
 tongaensis Hampson, 173, 206
 tongaica Prout, 285
 tonganum Gehlen, 249
 tornotis Meyrick, 108
 Tortrix, 164
 Toxocampa, 195, 208
 transversata sp. n., 110
 triangularis sp. n., 156
 Trichoclada, 265
 trichoptera sp. n., 127
 trifasciata Stephens, 176
 Trigonodes, 181
 tulliolus forsteri Felder, 327
 turgescens Prout, 255
 tylocera Prout, 287
 umbricola Boisduval, 210
 umbrimedia Warren, 257
 undata F., 177
 unicornis sp. n., 319
 unipuncta Haworth, 118
 URANIIDAE, 315
 Urapteroides, 315
 ursula sp. n., 294-296
 Utetheisa, 104
 Vagrans, 330
 vailima Tams, 156
 validaria Walker, 268
 Vanessa, 330
 variata Robinson, 203
 vatu sp. n., 157
 velox F., 247
 venalba Moore, 118
 victoria sp. n., 294-296
 villida F., 330
 Villosa, 197
 viridifimbria Warren, 252
 viridis sp. n., 125, 126
 vitelia F., 166, 167
 vitensis Bethune-Baker, 241, 304
 vitiense Rothschild & Jordan, 248
 vitiensis Butler, 178, 180, 188, 192, 206
 vitiensis Hampson, 99, 153-155, 176, 177
 vitiensis sp. n., 234, 237
 vitiensis subsp. n., 106
 vittalis Walker, 156, 163
 vivila Walker, 299
 vulpina Butler, 188, 193
 vunindawa sp. n., 218
 walkeri Druce, 326A
 wallacei Butler, 332
 wanda sp. n., 294, 295
 woodfordi Druce, 105
 wuka Pagenstecher, 254
 xanthochroa Butler, 188, 190, 191
 Xanthodes, 170
 Xanthoptera, 138
 xissa sp. n., 294, 296
 Xoia, 325
 xylinata Warren, 288
 yasawa sp. n., 313
 Yphthima, 325
 yu Guenee, 119
 zena sp. n., 319
 Zizeeria, 336
 Zizera, 336
 Zizina, 336
 Zizula, 336
 ZYGAEINIDAE, 321



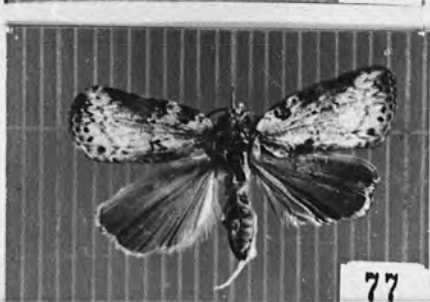
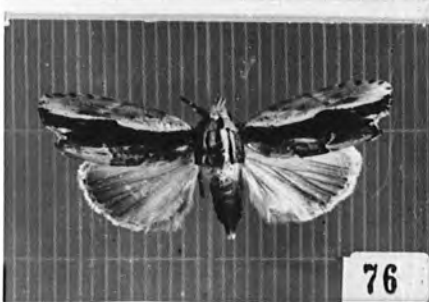


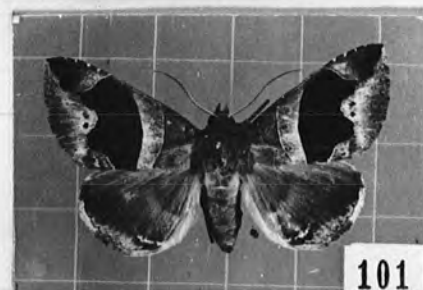
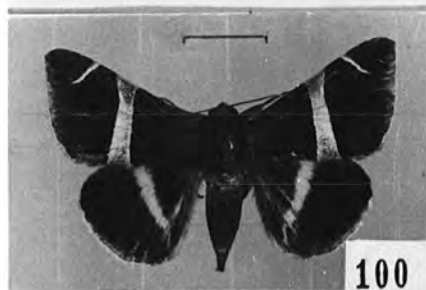
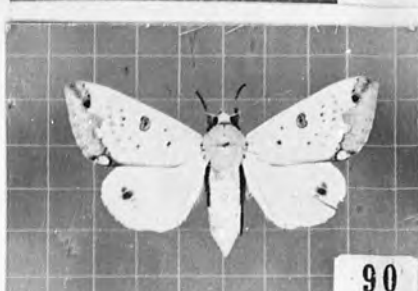
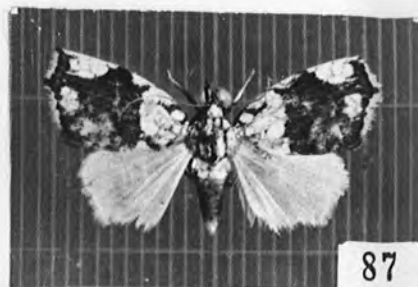




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106



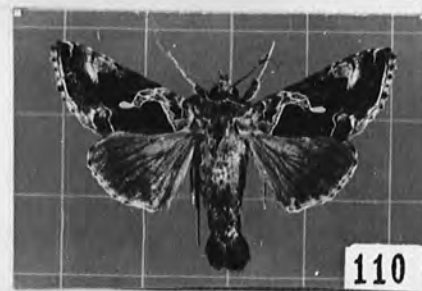
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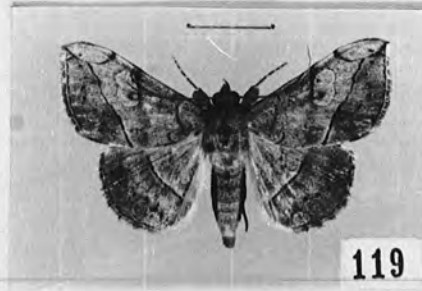
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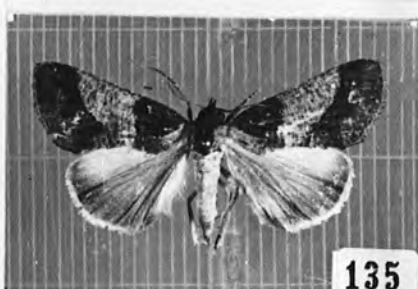
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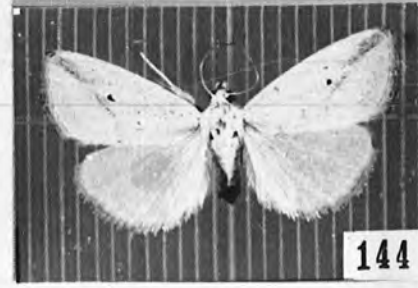
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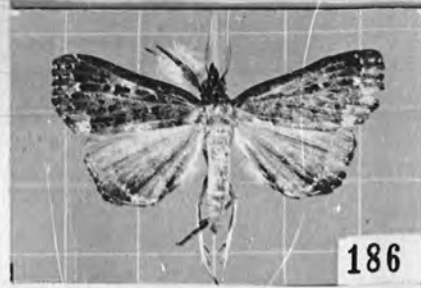
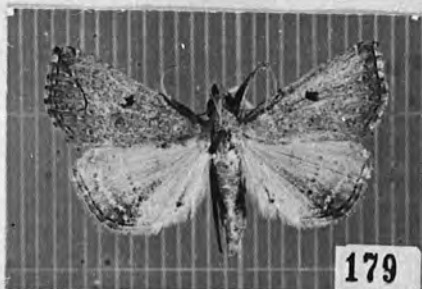
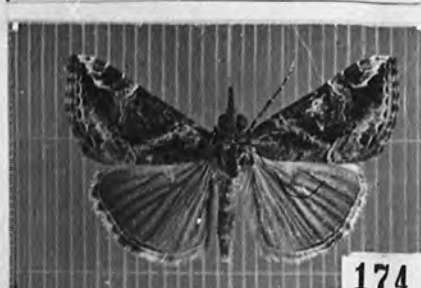
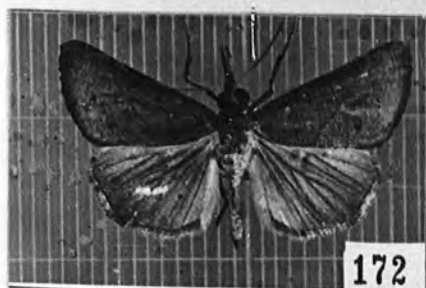
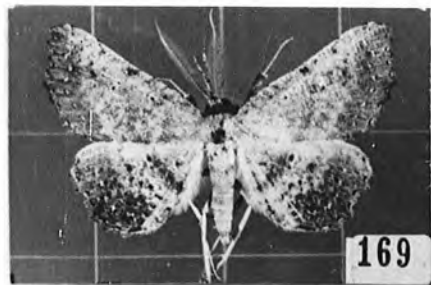
166

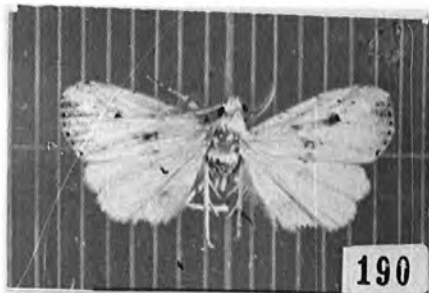


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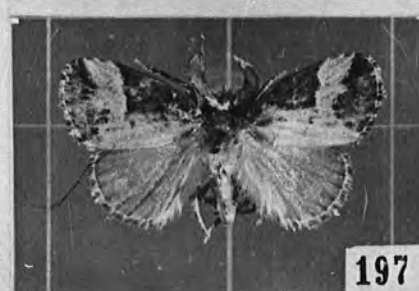
194



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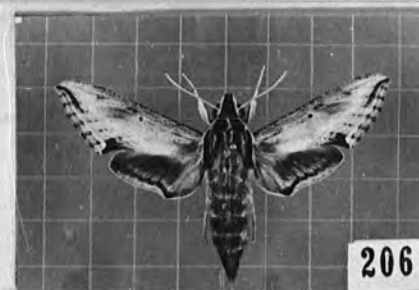
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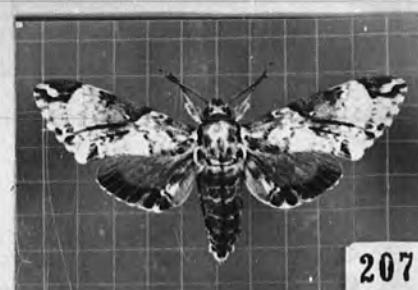
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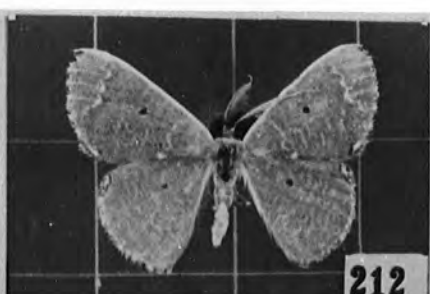
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217



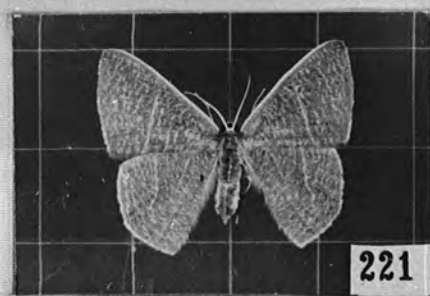
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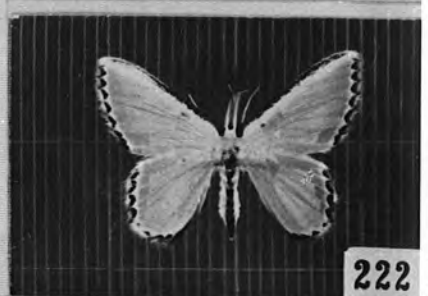
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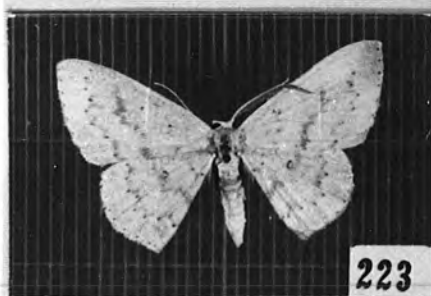
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222



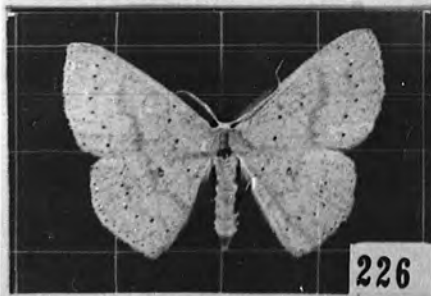
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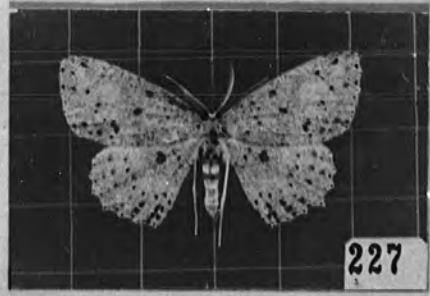
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225



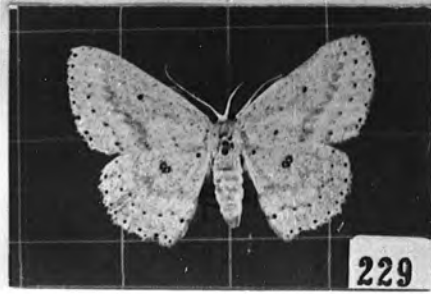
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227



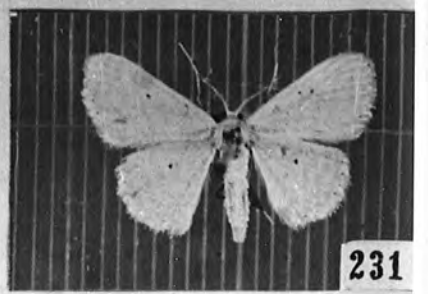
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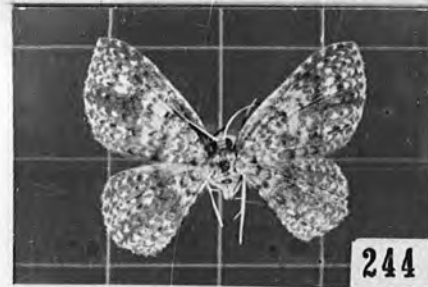
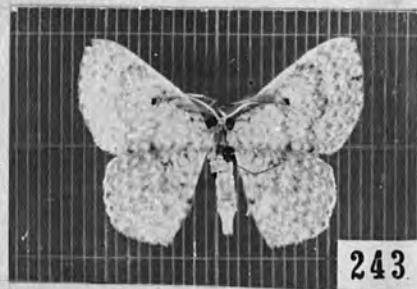
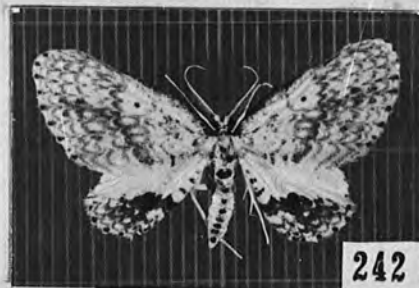
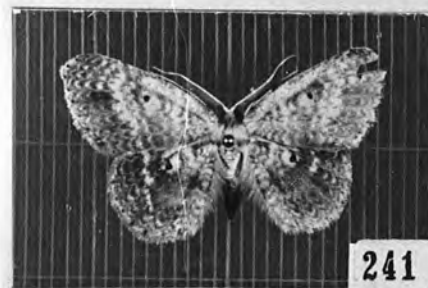
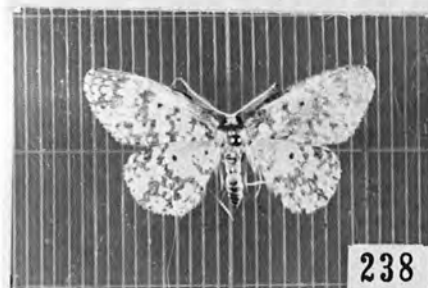
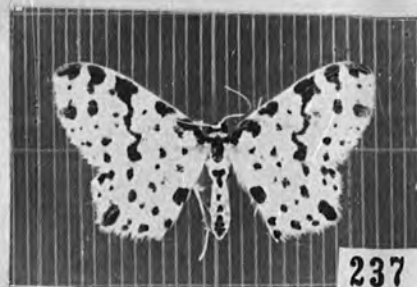
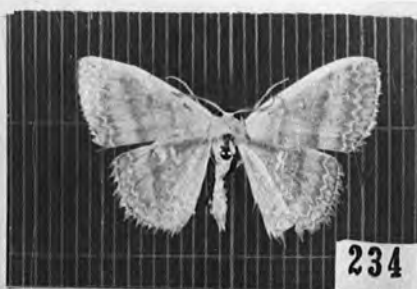
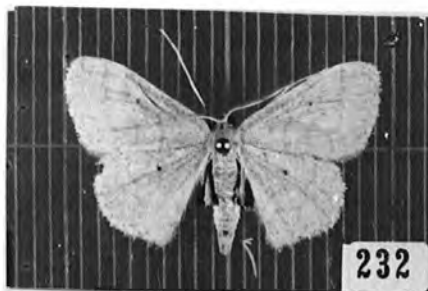
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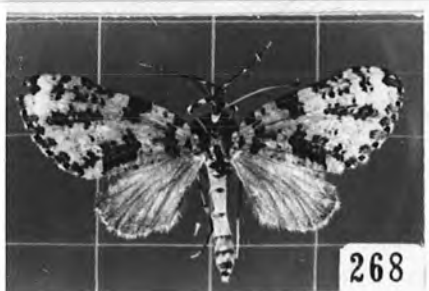
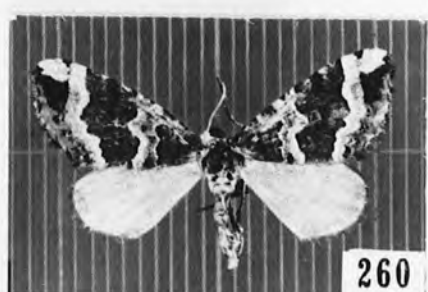
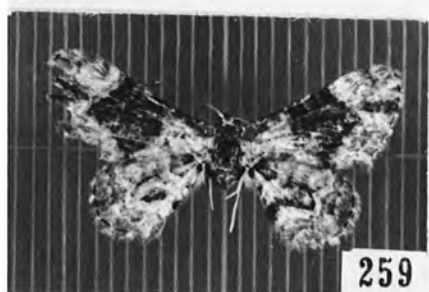
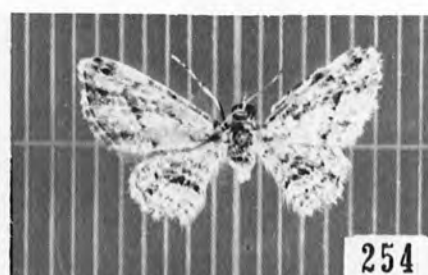
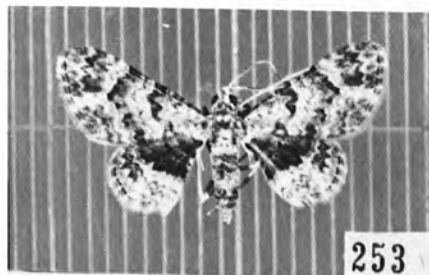


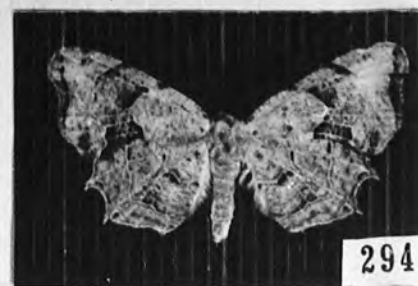
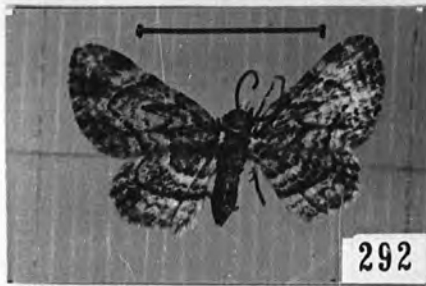
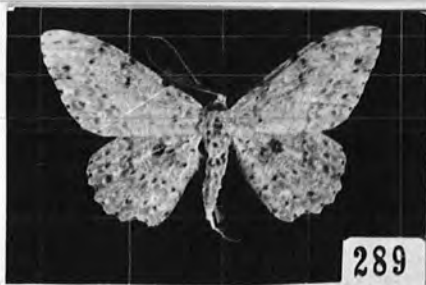
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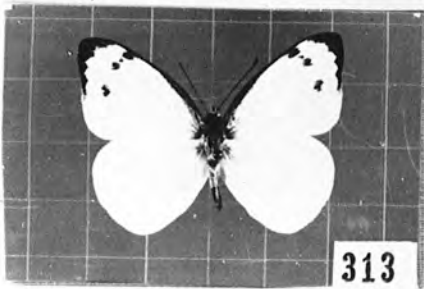
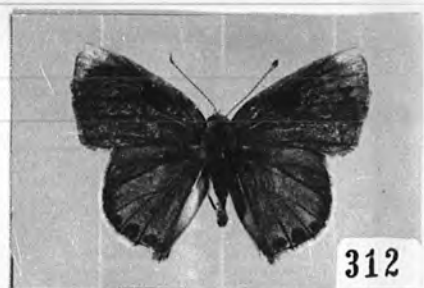
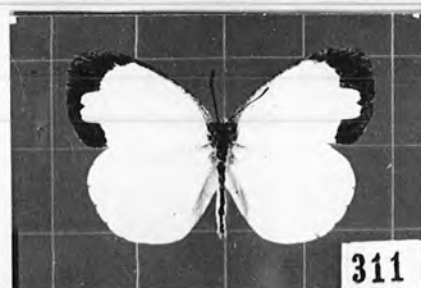
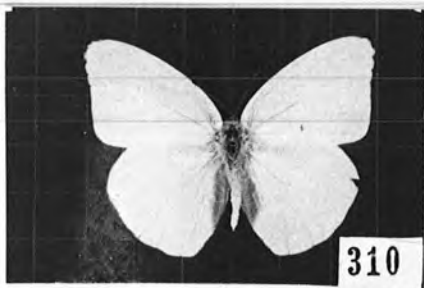
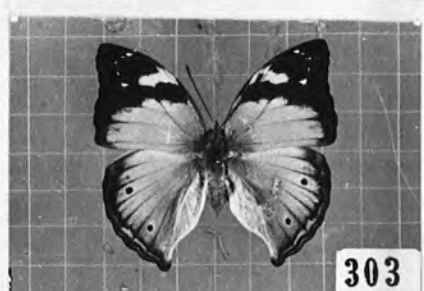
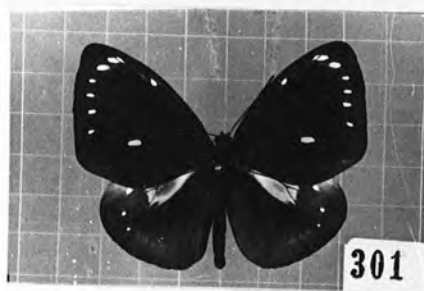
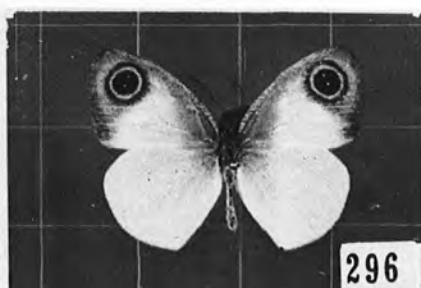


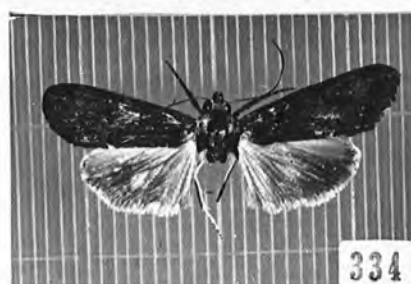
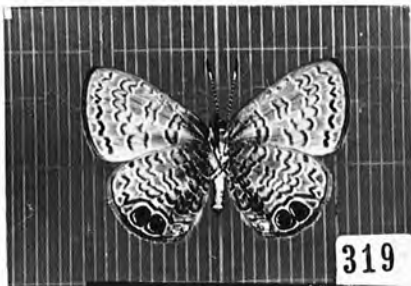
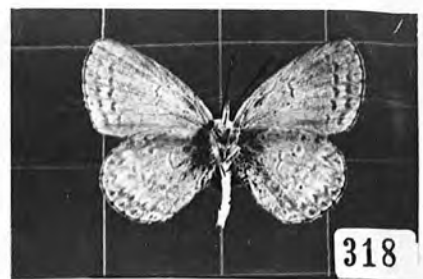
231









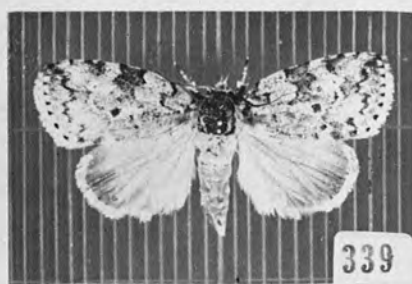




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*Earias
flavola*

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TEXT FIGURES 1 - 173

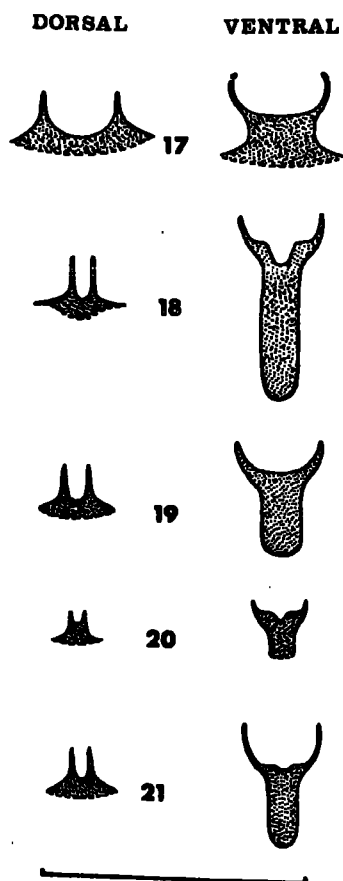
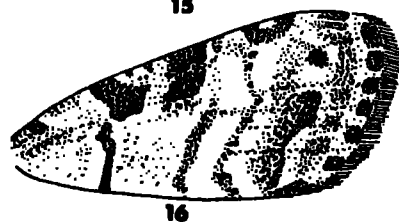
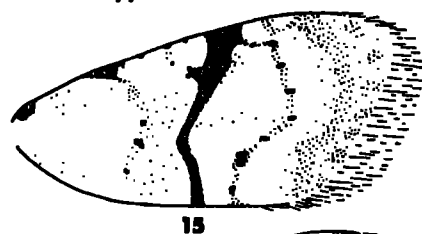
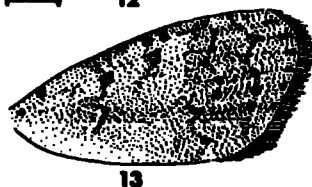
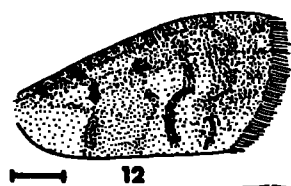
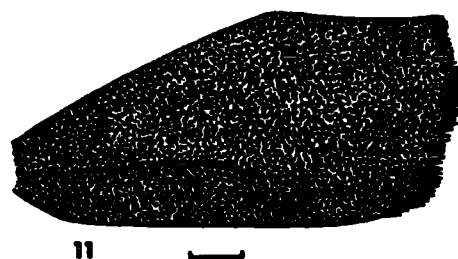
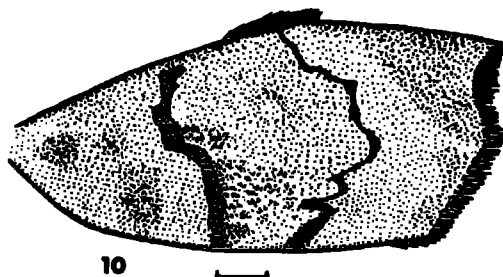
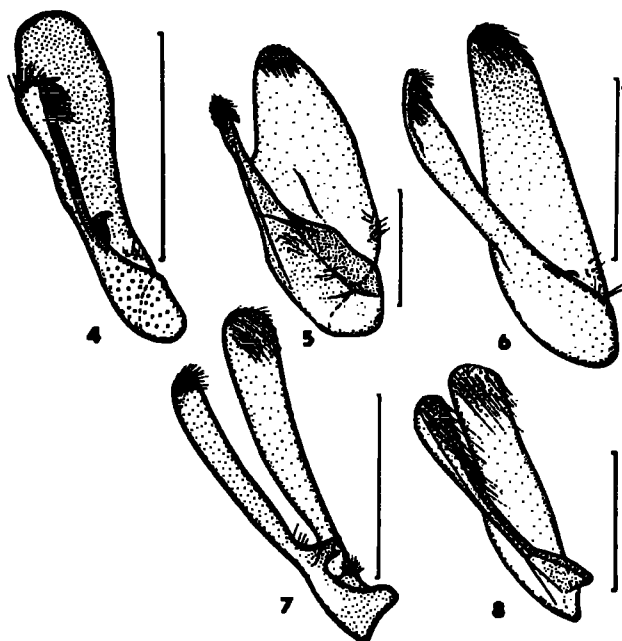
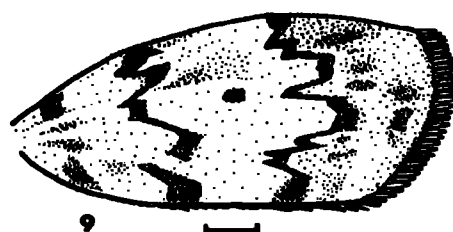
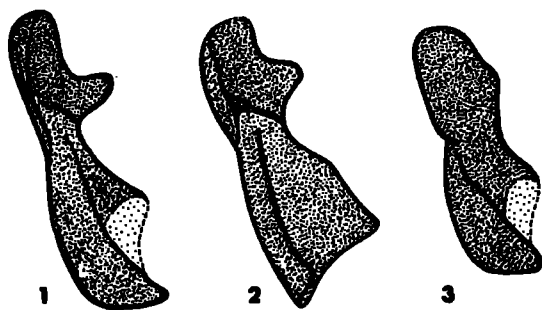
With the exception of figs 9 - 16 all drawings were made using a camera lucida attached to a Zeiss zoom stereoscopic microscope. Scale lines on all drawings are 1mm.. Two drawings were made at x100 magnification using a monocular microscope: these are indicated. In the following list, numbers refer to the British Museum Genitalia Slide number of the preparation from which the drawing was made: figures 1-8 and 17-24 are from the Arctiidae Genitalia Slide series, figures 25-127, 172 and 173 from the Noctuidae series, figures 128-159 from the Geometridae series and figures 160-171 from the Limacodidae series. Drawings are from Fijian specimens except where otherwise stated.

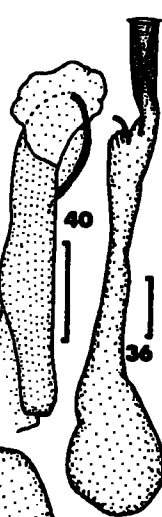
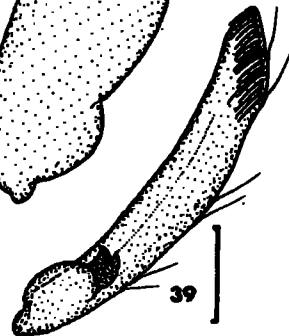
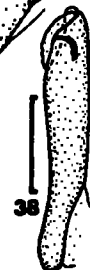
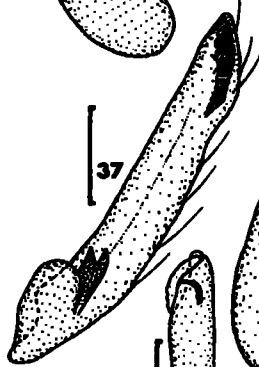
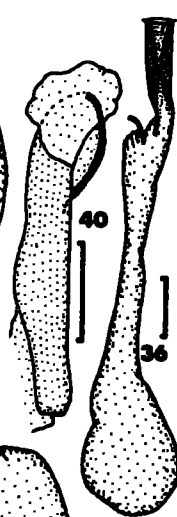
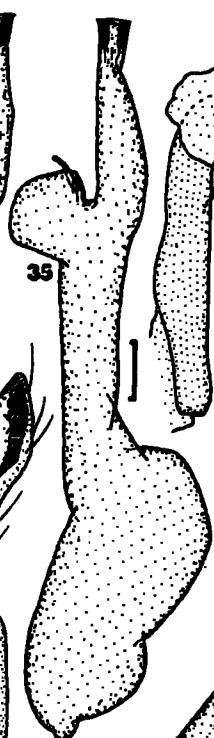
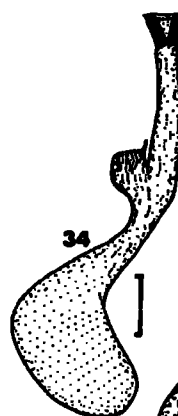
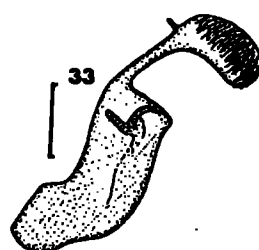
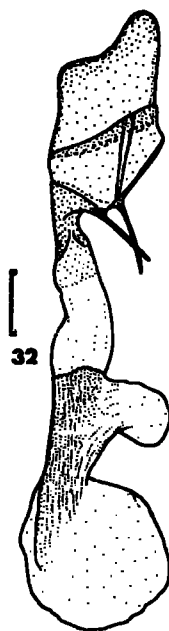
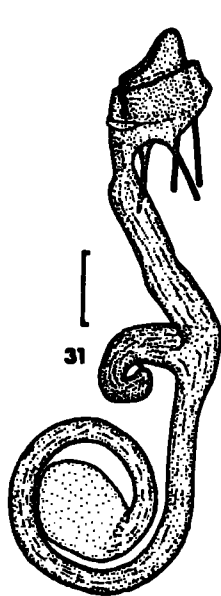
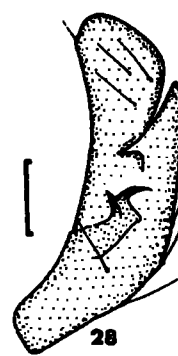
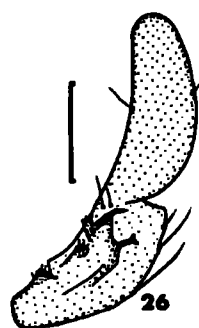
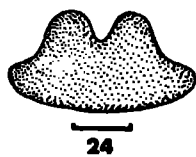
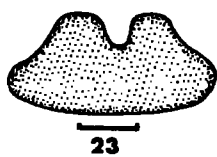
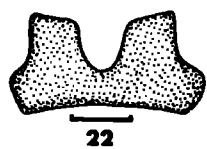
The drawings were photographically reduced to one-half the original linear dimensions for offset reproduction.

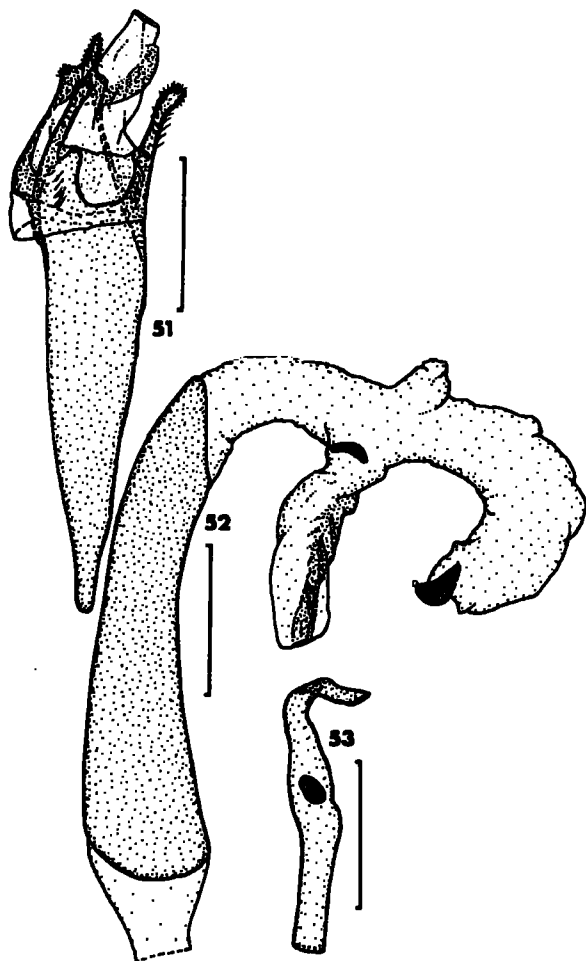
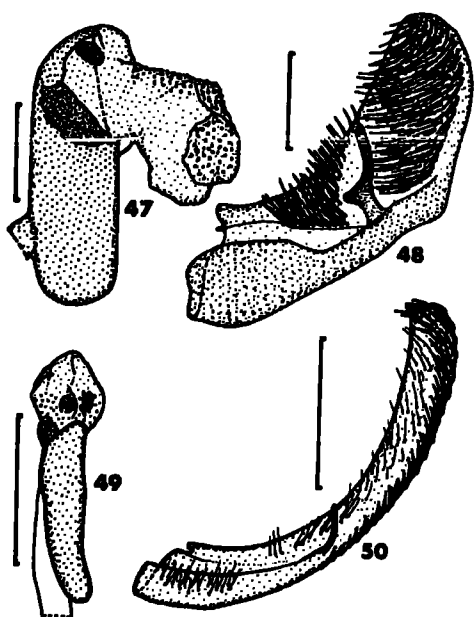
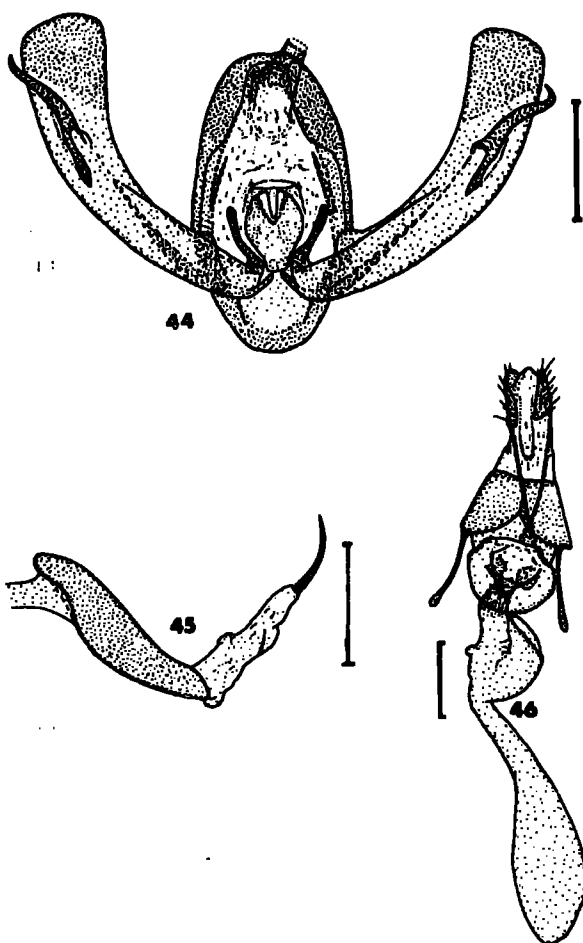
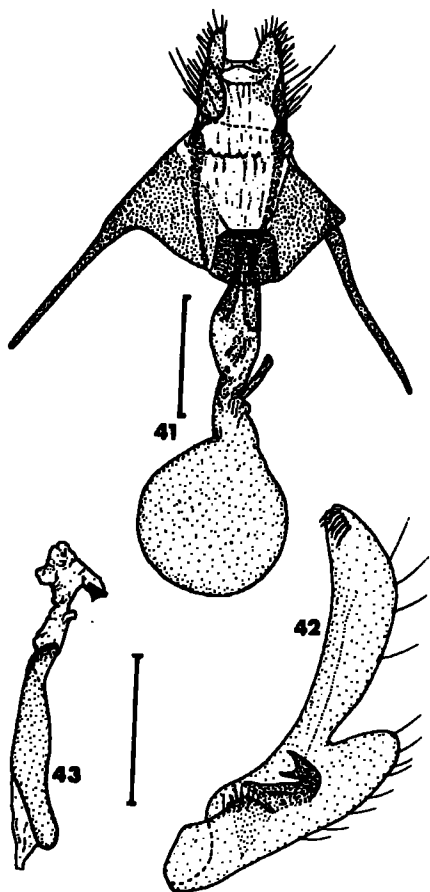
1	<i>Macaduma montana</i> sp. n.	1. valve	1608
2	" <i>corvina</i> Felder	1. valve	1607
3	" <i>striata</i> sp. n.	1. valve	1613
4	<i>Nola transversata</i> sp. n.	1. valve	1600
5	" <i>fijiensis</i> sp. n.	1. valve	1601
6	" <i>insularum</i> Collenette	1. valve	1603
7	" <i>lichenosa</i> sp. n.	1. valve	1605
8	" <i>samoana</i> Hampson	1. valve	1593
9	<i>Macaduma striata</i> sp. n.	forewing	
10	" <i>montana</i> sp. n.	forewing	
11	" <i>corvina</i> Felder	forewing	
12	<i>Nola samoana</i> Hampson	forewing (♂)	
13	" <i>insularum</i> Collenette	forewing (♂)	
14	" <i>lichenosa</i> sp. n.	forewing (♀)	
15	" <i>transversata</i> sp. n.	forewing (♀)	
16	" <i>fijiensis</i> sp. n.	forewing (♂)	
17	" <i>transversata</i> sp. n.	♂ abdominal spines	1600
18	" <i>fijiensis</i> sp. n.	♂ abdominal spines	1601
19	" <i>insularum</i> Collenette	♂ abdominal spines	1603
20	" <i>lichenosa</i> sp. n.	♂ abdominal spines	1604
21	" <i>samoana</i> Hampson	♂ abdominal spines	1593
22	<i>Utetheisa lotrix stigmata</i> Roths.	♀ sternite VII	1594
23	" <i>pulchelloides marshallorum</i> Roths.	♀ sternite VII	1595
24	" <i>clareae</i> Robinson	♀ sternite VII	1597
25	<i>Leucania scottii</i> Butler	r. valve	6834
26	" <i>venalba</i> Moore	r. valve	6836
27	" <i>loreyi</i> Duponchel	r. valve	6837
28	" <i>yu</i> Guenee	r. valve	6840
29	" <i>pseudoformosana</i> sp. n.	r. valve	6839
30	" <i>separata</i> Walker	r. valve	6833
31	" <i>semicana</i> Pagenstecher (Sudest I.)	♀ genitalia	6892
32	" <i>pseudoformosana</i> sp. n.	♀ genitalia	6861
33	" <i>formosana</i> Butler (Philippines)	r. valve	6894
34	<i>Sasunaga tomaniiviensis</i> sp. n.	♀ bursa	6859
35	" "	♀ bursa	6858
36	" <i>oenistis</i> Hampson	♀ bursa	6857
37	" "	r. valve	6855
38	" "	aedeagus	6855
39	" <i>tomaniiviensis</i> sp. n.	r. valve	6854
40	" <i>tomaniiviensis</i> sp. n.	aedeagus	6854
41	<i>Stenopterygia nausoriensis</i> sp. n.	♀ genitalia	6862
42	" "	r. valve	6863
43	" "	aedeagus	6863
44	<i>Athetis striolata</i> Butler	♂ genitalia	6853
45	" "	aedeagus	6853
46	" "	♀ genitalia	6883
47	<i>Platysenta illecta</i> Walker	aedeagus	6898
48	" "	r. valve	6898
49	" <i>conducta</i> Walker	aedeagus	6897
50	" "	r. valve	6897
51	<i>Anigraea pectinata</i> sp. n.	♂ genitalia	6904
52	" "	aedeagus	6904
53	" "	sperm tube	6904
54	<i>Bombotelia dinawa</i> B. - B.	♂ genitalia	6907
55	" "	aedeagus	6907
56	" <i>jocosatrix</i> Guenee	♂ genitalia	6908
57	" "	aedeagus	6909

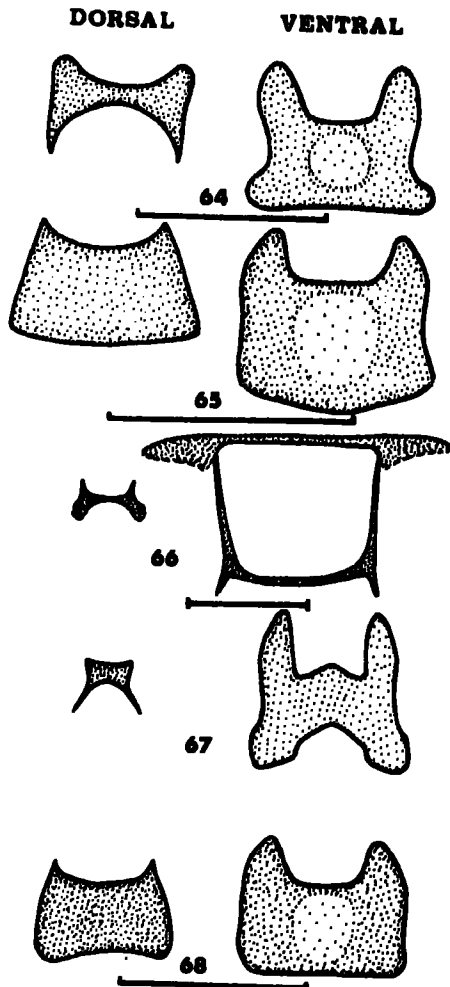
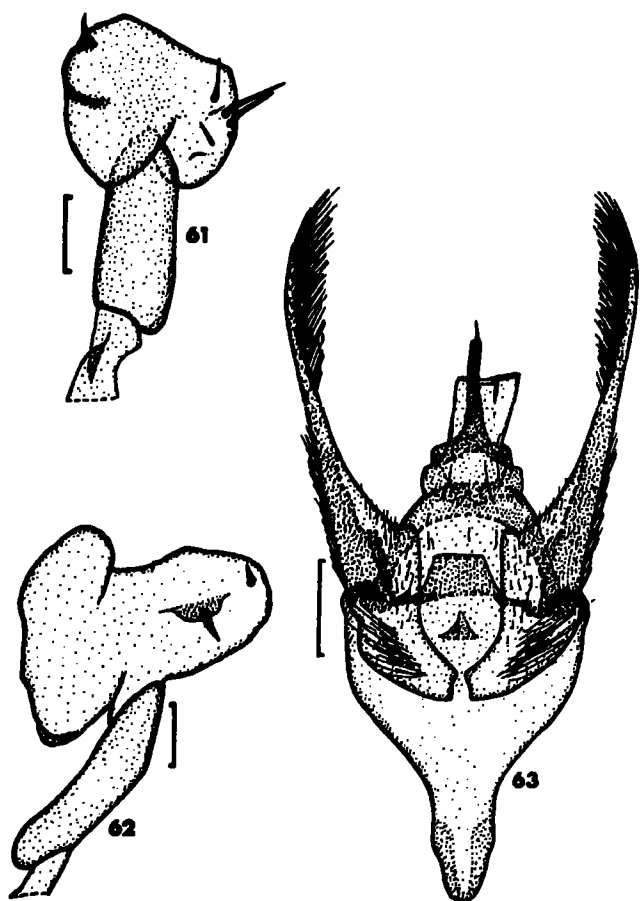
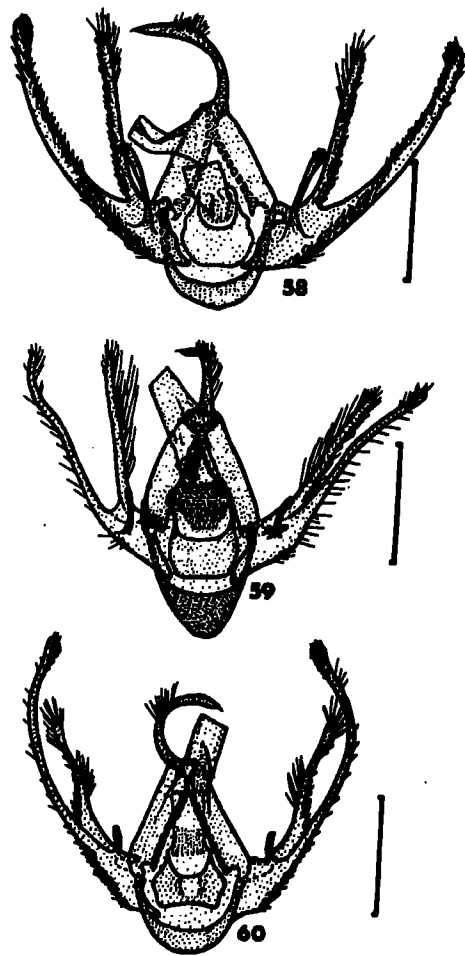
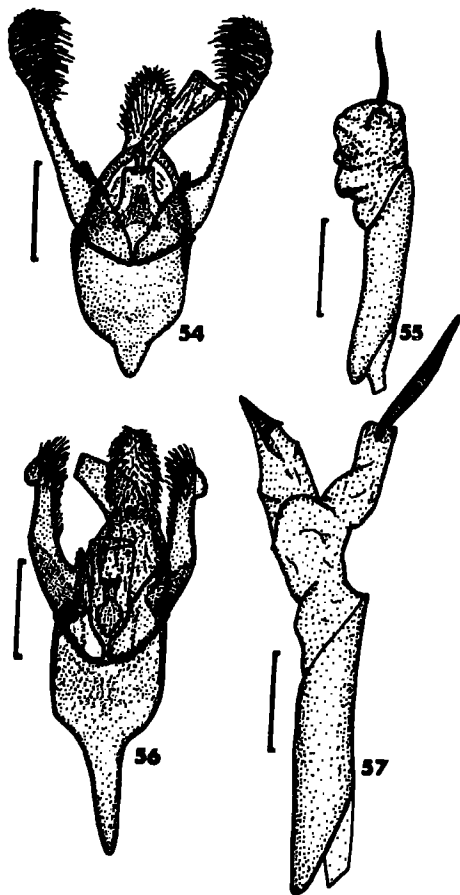
58	<i>Nigramma acutipennis</i> sp. n.	♂ genitalia	6921
59	" <i>rotundipennis</i> sp. n.	♂ genitalia	6922
60	" <i>perstrialis</i> Hampson	♂ genitalia	6919
61	<i>Paectes cristatrix fijiensis</i> subsp. n.	aedeagus	6910
62	<i>Tibiocillaria magnifica</i> sp. n.	aedeagus	6911
63	" "	♂ genitalia	6911
64	<i>Giaura rebeli</i> Tams	♂ 8th tergite & sternite	6930
65	" <i>tetragramma simeoni</i> subsp. n.	"	6934
66	" <i>sokotokai</i> Robinson	"	6932
67	" <i>spinosa</i> sp. n.	"	6933
68	" <i>tetragramma tetragramma</i> Hampson	"	6931
69	<i>Dyrzela trichoptera</i> sp. n.	♂ genitalia	6955
70	" "	aedeagus	6955
71	" "	♀ genitalia	6959
72	<i>Phlegetonia apicifascia</i> Hampson (Khasia Hills)	aedeagus	7154
73	<i>Phlegetonia barbara</i> sp. n. (Samoa)	aedeagus	7153
74	<i>Indeterminate</i> sp. (Acronictinae)	aedeagus	6954
75	"	1. venation	6957
76	"	antenna basal region (v)	6958
77	"	♂ genitalia	6954
78	<i>Phlegetonia barbara</i> sp. n.	aedeagus	6983
79	<i>Parallelia duplicata</i> sp. n.	r. valve process	6972
80	<i>Parallelia vitiensis</i> Butler (Viti Levu)	r. valve process	6979
81	" " (Vanua Mbalavu)	r. valve process	6289
82	<i>Plusia albostriata</i> B. & G.	aedeagus	6985
83	" <i>acuta</i> Walker	aedeagus	6984
84	" <i>chalcites</i> Esper	aedeagus	6986
85	" <i>illuminata</i> Robinson	aedeagus	6987
86	<i>Hypospila similis fijiensis</i> subsp. n.	r. valve	7175
87	<i>Plusiodonta dimorpha</i> sp. n.	r. valve	7204
88	<i>Maliattha melanesiensis</i> sp. n.	♂ genitalia	7219
89	<i>Sericia strigiformis</i> sp. n.	1. valve	7221
90	<i>Serrodes campana callipepla</i> Prout	1. valve	7223
91	" <i>mediopallens</i> Prout	1. valve	7226
92	<i>Nagia</i> sp. nr. <i>homotima</i> Tams	♂ genitalia	7227
93	<i>Lophocoleus iridescens</i> sp. n.	1. leg (♂)	7443
94	" "	1. palp (♂)	7443
95	" <i>mirabilis</i> Butler	r. valve	7240
96	" <i>iridescens</i> sp. n.	r. valve	7235
97	" <i>suffusa</i> sp. n.	r. valve	7237
98	" <i>albipuncta</i> sp. n.	r. valve	7238
99	" <i>rubrescens</i> sp. n.	r. valve	7248
100	" <i>acuta</i> sp. n.	r. valve	7239
101	" <i>mirabilis</i> Butler	cornuti	7234
102	" <i>iridescens</i> sp. n.	cornuti	7235
103	" <i>suffusa</i> sp. n.	cornuti	7237
104	" <i>albipuncta</i> sp. n.	cornuti	7238
105	" <i>rubrescens</i> sp. n.	cornuti	7248
106	" <i>acuta</i> sp. n.	cornuti	7239
107	<i>Tholocoleus astrifer</i> Butler	1. palp (♂)	7444
108	<i>Palaeocoleus sypnoides</i> Butler	1. palp (♂)	7446
109	<i>Tholocoleus astrifer</i> Butler	r. valve	7447
110	<i>Palaeocoleus sypnoides</i> Butler	r. valve	7250
111	<i>Echanella hirsutipennis</i> sp. n.	♂ genitalia	7370
112	" "	aedeagus	7373
113	" "	r. leg (♂)	7453
114	" "	1. palp	7453

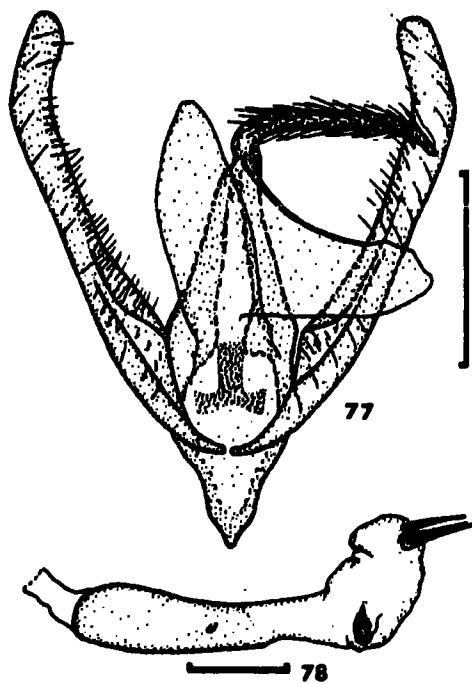
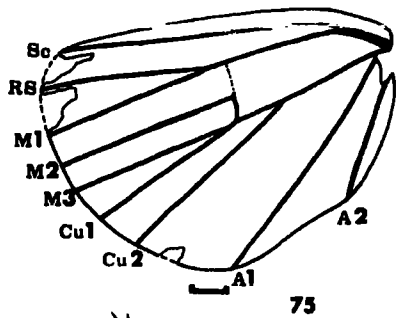
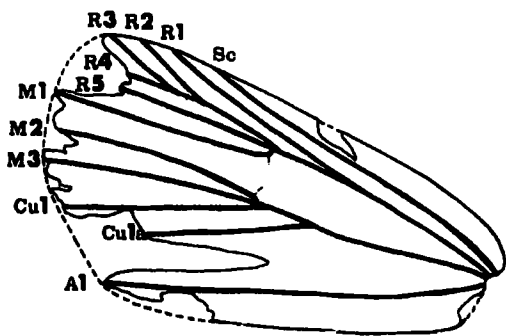
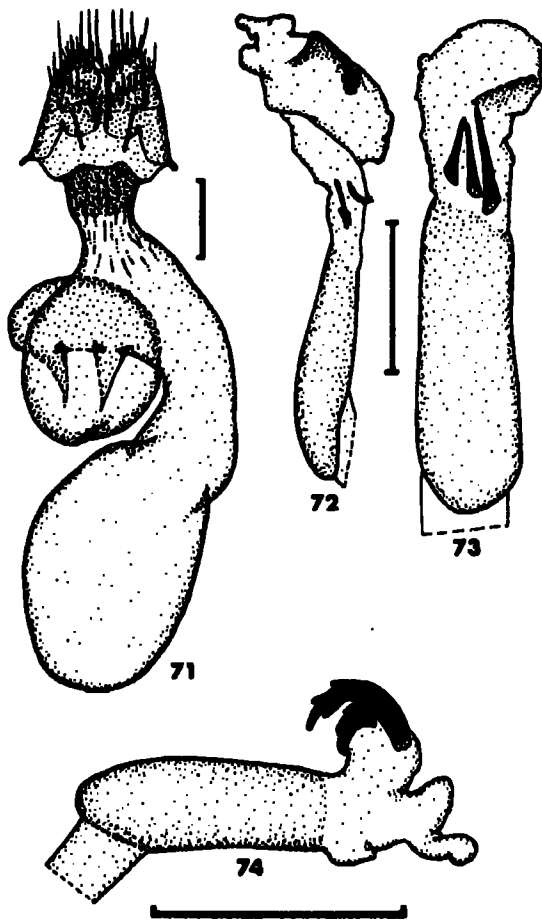
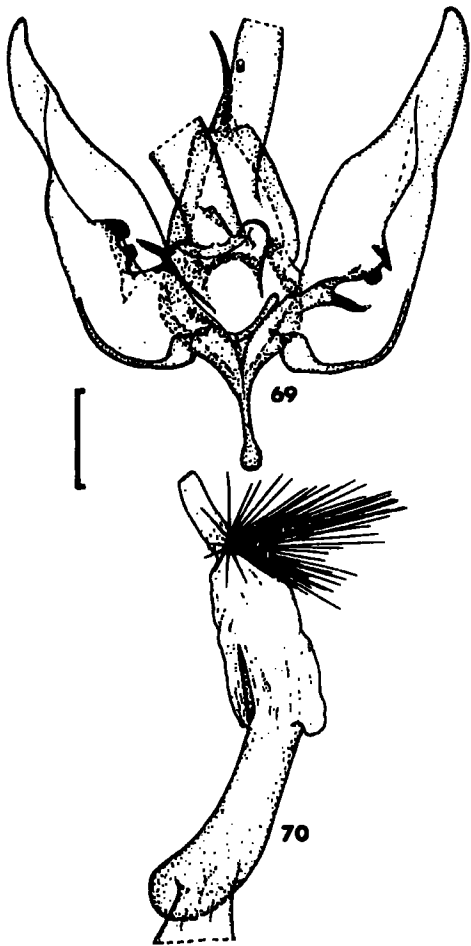
115	<i>Hypena fijiensis</i> sp. n.	r. valve	7383
116	" <i>cryptica</i> sp. n.	r. valve	7455
117	<i>Catadoides vunindawa</i> sp. n.	♂ genitalia	7386
118	" "	palp	7386
119	" <i>fijiensis</i> sp. n.	♂ genitalia	7387
120	" <i>fijiensis</i> sp. n.	♂ palp	7387
121	<i>Hypenagonia anna</i> sp. n.	♂ genitalia	7391
122	" <i>barbara</i> sp. n.	♂ genitalia	7398
123	" <i>catherina</i> sp. n.	♂ genitalia	7390
124	" <i>diana</i> sp. n.	♂ genitalia	7396
125	" <i>emma</i> sp. n.	♂ genitalia	7439
126	<i>Schrankia fururoa</i> sp. n.	♂ genitalia	7394
127	" <i>vitensis</i> sp. n.	♂ genitalia	7393
128	<i>Anisodes gloria</i> sp. n.	r. valve	8245
129	" "	aedeagus	8245
130	" <i>harrietae</i> sp. n.	r. valve	8257
131	<i>Scopula sublinearia ida</i> subsp. n.	♂ 8th segment	8267
132	" <i>julietae</i> sp. n.	♂ 8th segment	8268
133	" <i>sublinearia ida</i> subsp. n.	aedeagus	8267
134	" <i>julietae</i> sp. n.	aedeagus	8268
135	<i>Chloroclystis lepta fluctuosa</i> Prout	♂ 8th segment	8281
136	" " <i>rotumensis</i> subsp. n.	♂ 8th segment	8313
137	" <i>katherina</i> sp. n.	aedeagus	8287
138	" <i>linda</i> sp. n.	♂ 8th sternite	8289
139	" <i>mariae</i> sp. n.	l. valve	8300
140	" <i>nina</i> sp. n.	r. valve	8333
141	" "	♀ bursa	8334
142	<i>Eoasthena catharia</i> Prout	uncus	8348
143	" <i>extranea</i> Prout	uncus	8346
144	" <i>gnophobathra</i> Prout	uncus	8349
145	" <i>rowena</i> sp. n.	uncus	8353
146	" <i>stygnia</i> Prout	uncus	8355
147	" <i>quilla</i> sp. n.	uncus	8352
148	" <i>gnophobathra</i> Prout	anellus	8349
149	" <i>stygnia</i> Prout	anellus	8355
150	<i>Gymnoscelis concinna nephelota</i> Prout	aedeagus	8307
151	" <i>sara</i> sp. n.	aedeagus	8328
152	" "	♀ genitalia	8327
153	<i>Horisma teresa</i> sp. n.	aedeagus	8360
154	<i>Sauris ursula</i> sp. n.	♂ genitalia	8363
155	" "	aedeagus	8363
156	<i>Symmimetis thorectes</i> Prout	aedeagus	8370
157	" <i>merceri</i> sp. n.	aedeagus	8371
158	<i>Cleora munditibia lauensis</i> subsp. n.	r. valve	8374
159	" <i>samoana noatau</i> subsp. n.	r. valve	8373
160	<i>Beggina albifascia</i> sp. n.	♂ genitalia	129
161	" "	aedeagus	129
162	" <i>dentilinea</i> sp. n.	♂ genitalia	131
163	" "	aedeagus	131
164	" <i>mediopunctata</i> Hering	♂ genitalia	136
165	" "	aedeagus	136
166	" <i>minima</i> sp. n.	♂ genitalia	130
167	" "	aedeagus	130
168	" <i>unicornis</i> sp. n.	♂ genitalia	133
169	" "	aedeagus	133
170	" <i>zena</i> sp. n.	♂ genitalia	135
171	" "	aedeagus	135
172	Indeterminate sp. (<i>Hypeninae</i>) D	♂ genitalia	7468
173	"	aedeagus	7468

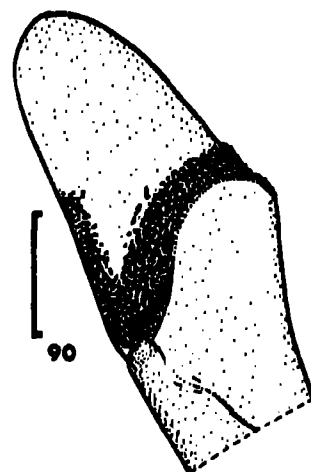
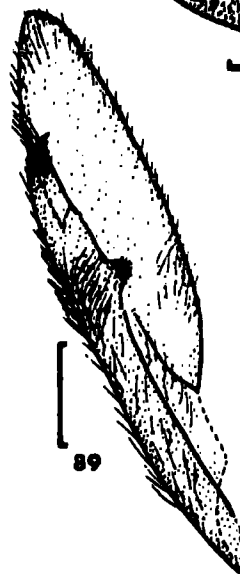
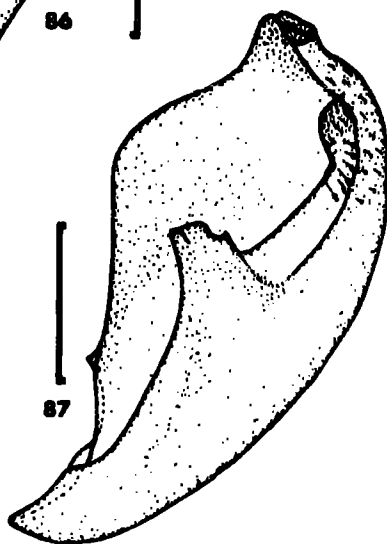
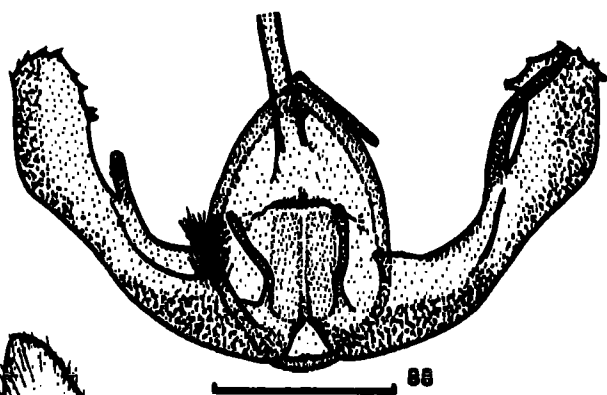
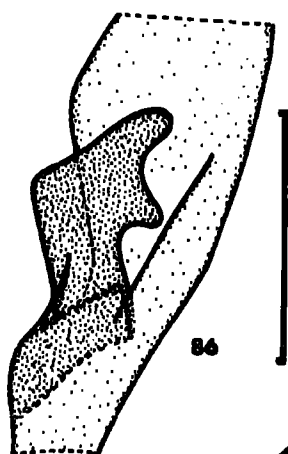
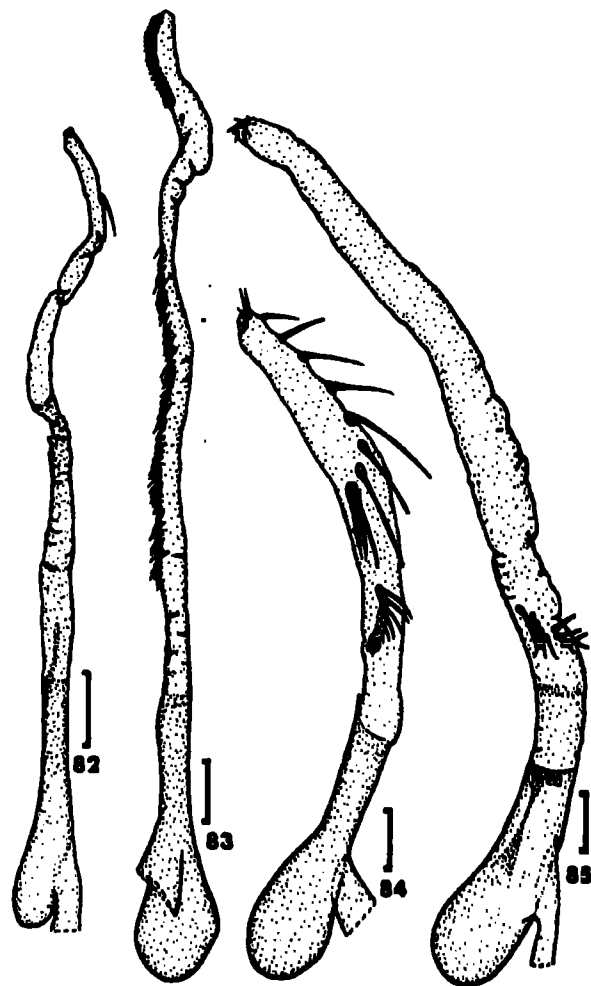
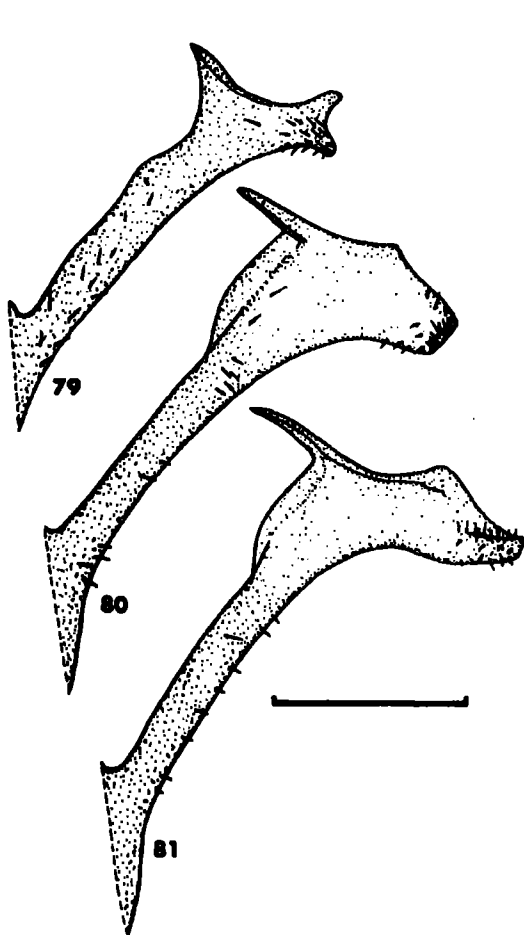


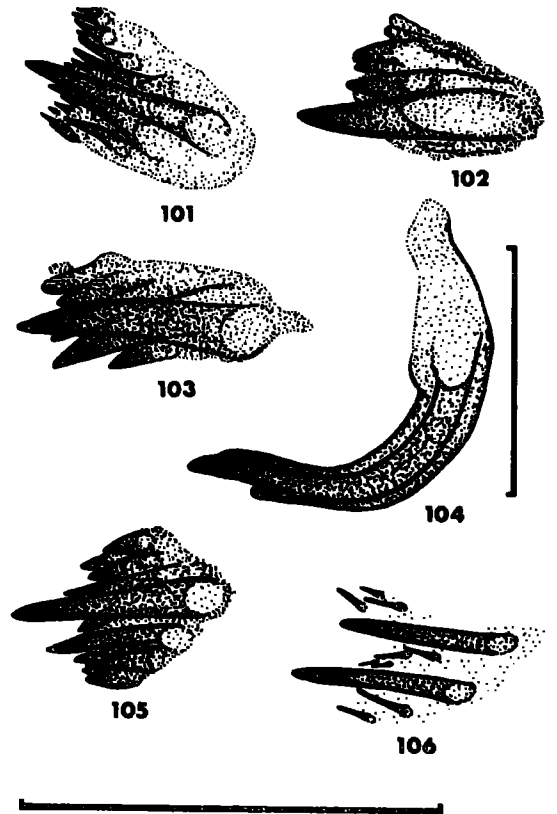
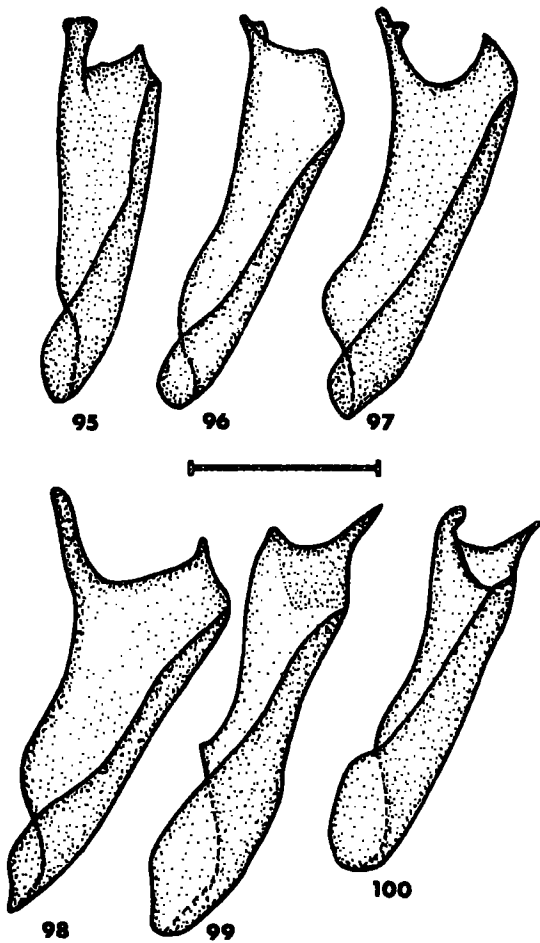
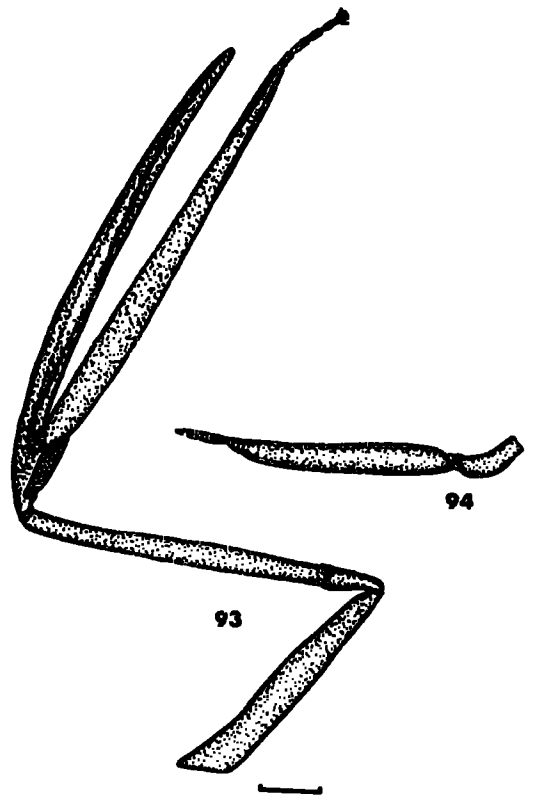
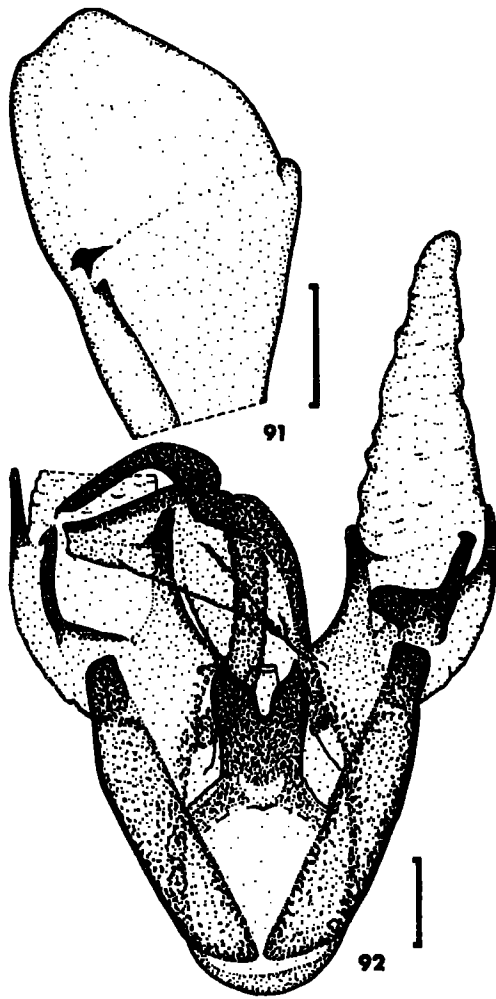


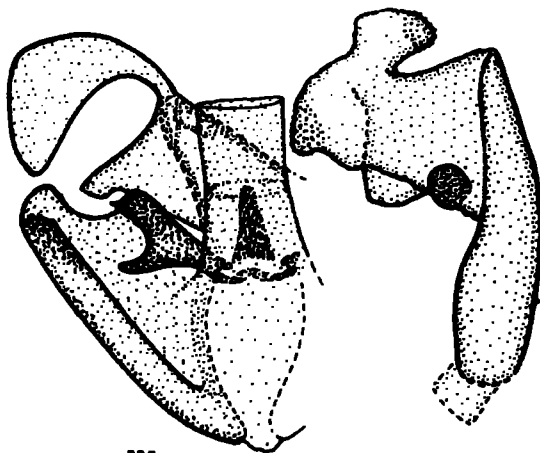
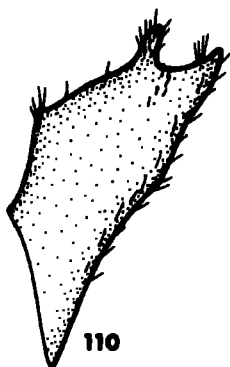
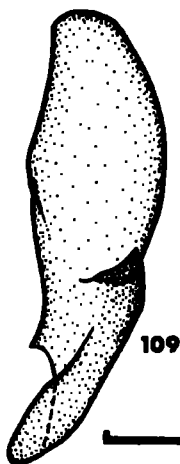
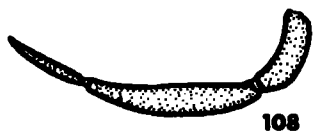
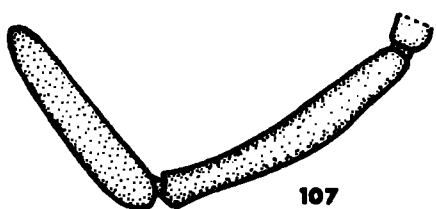




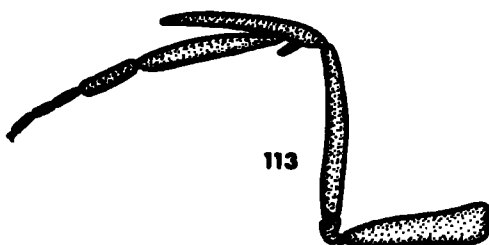




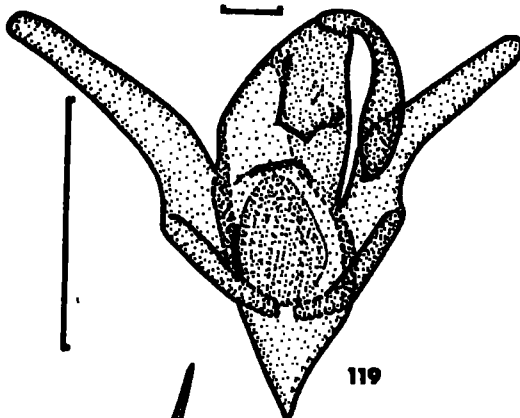
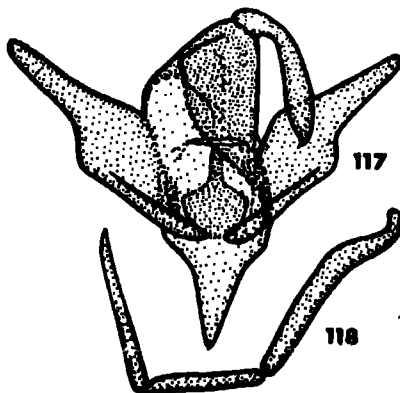
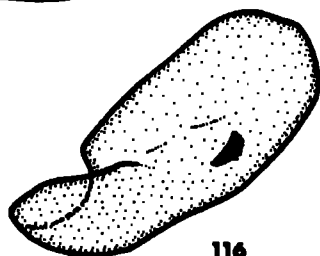
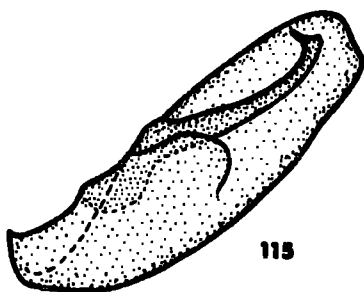


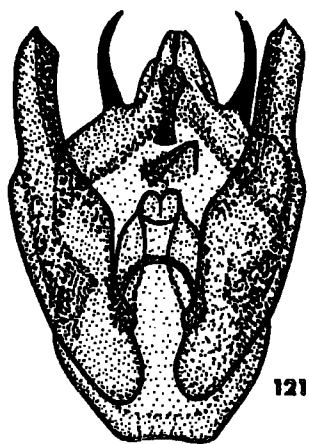


112

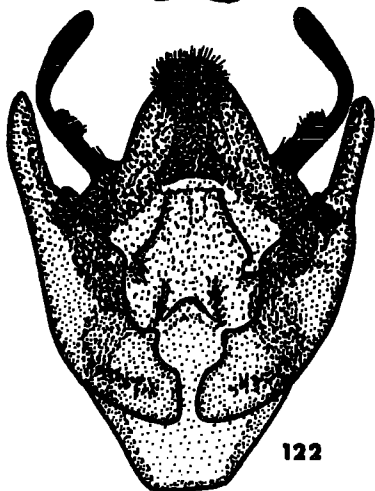


114





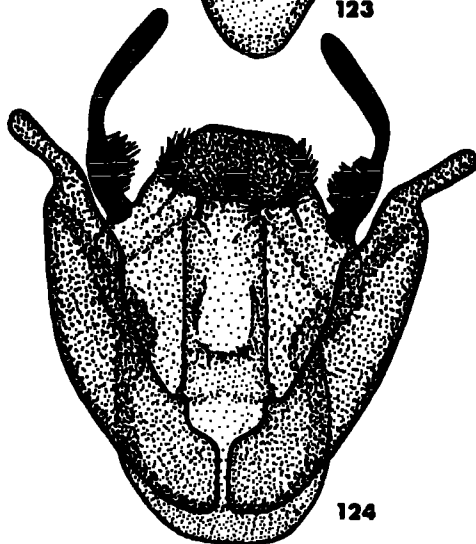
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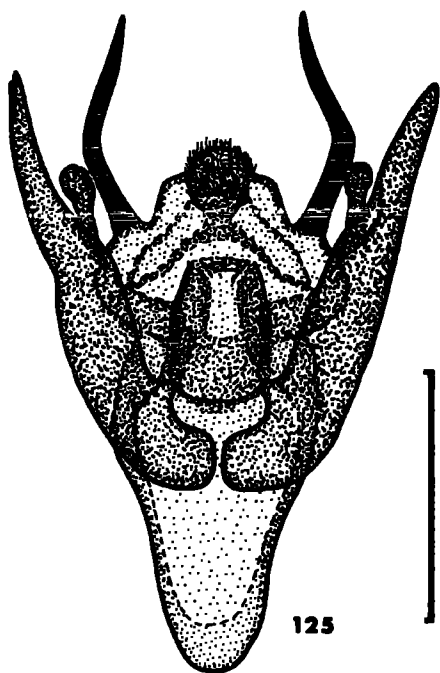
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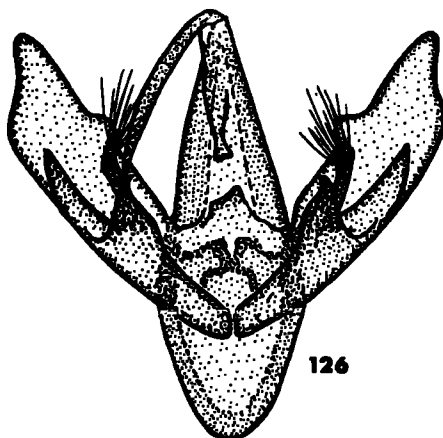
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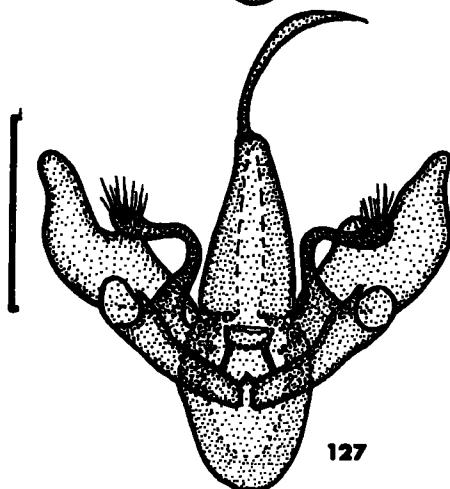
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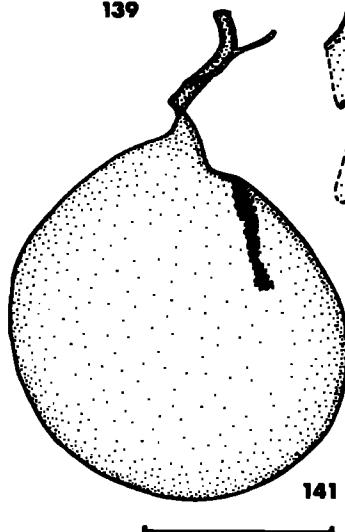
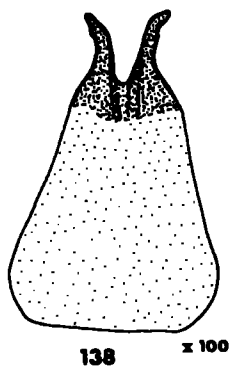
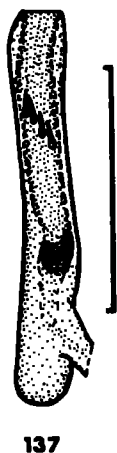
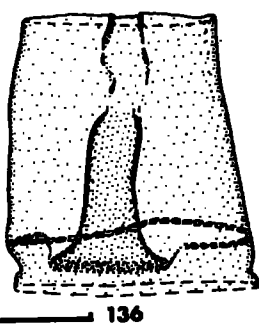
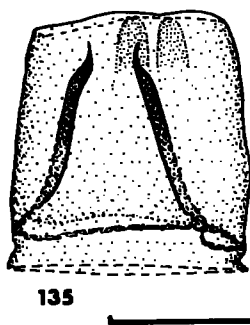
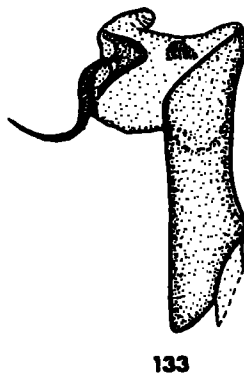
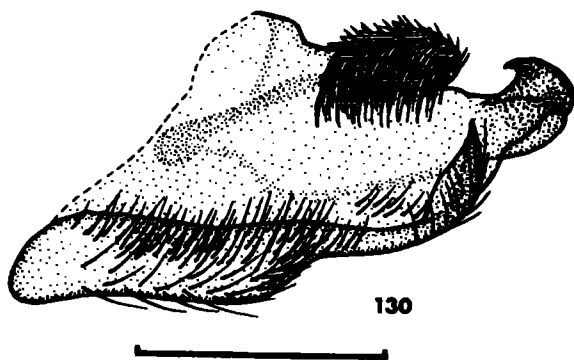
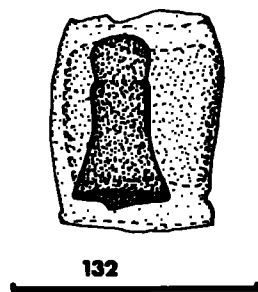
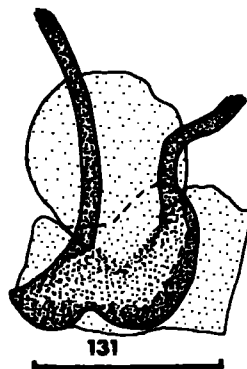
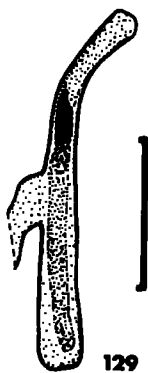
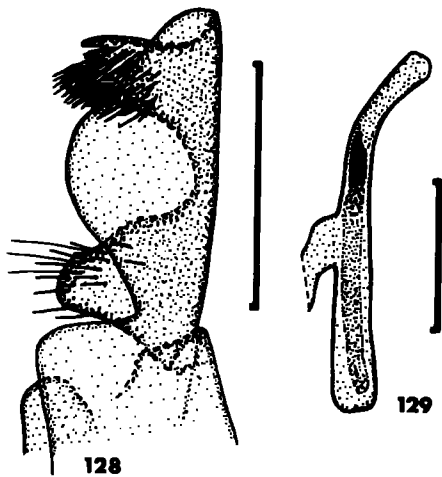
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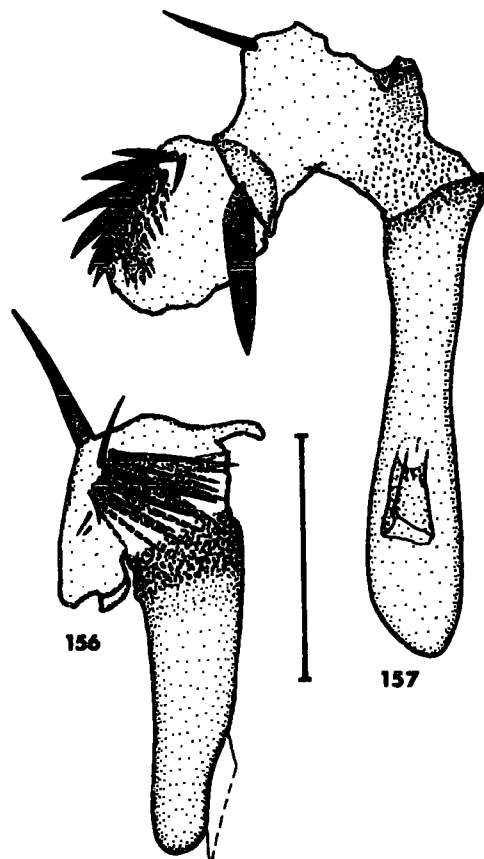
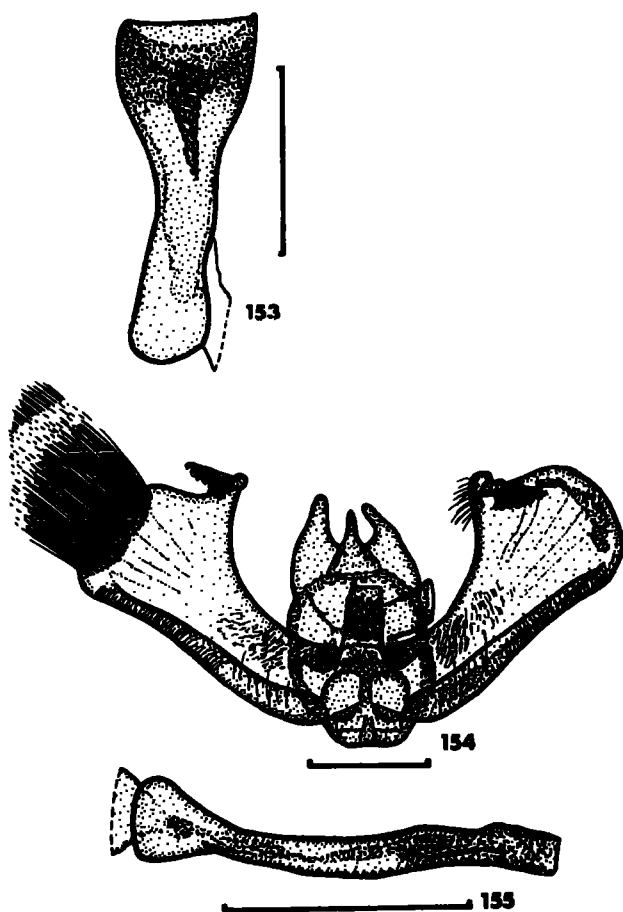
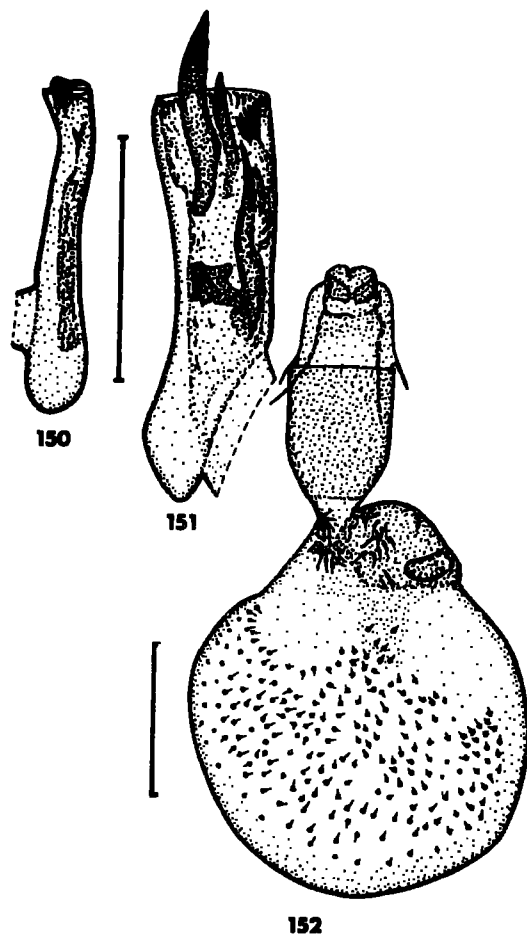
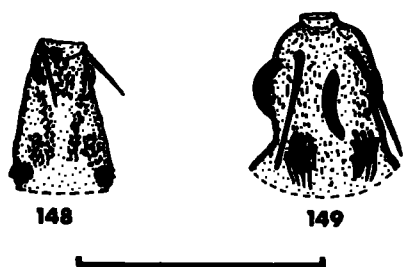
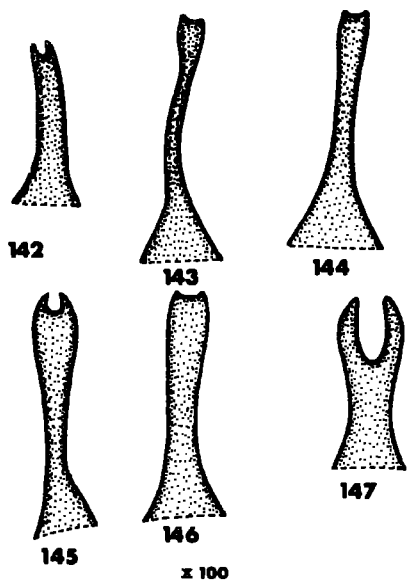


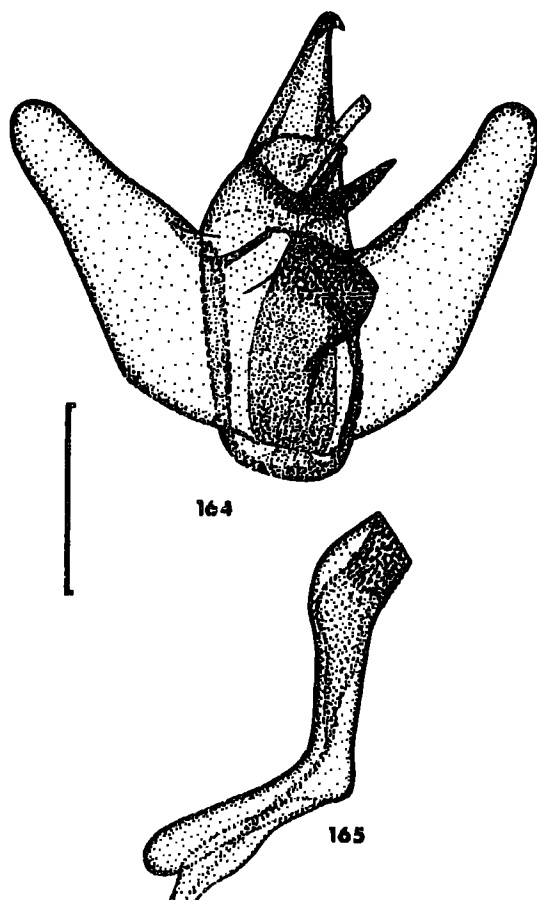
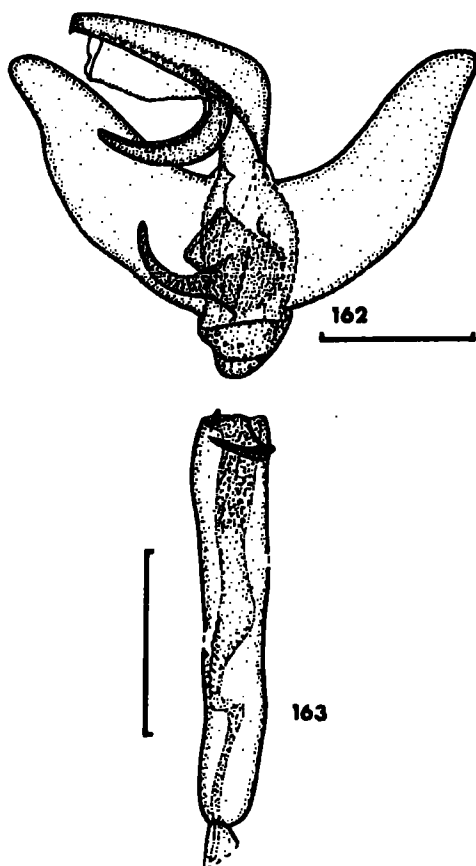
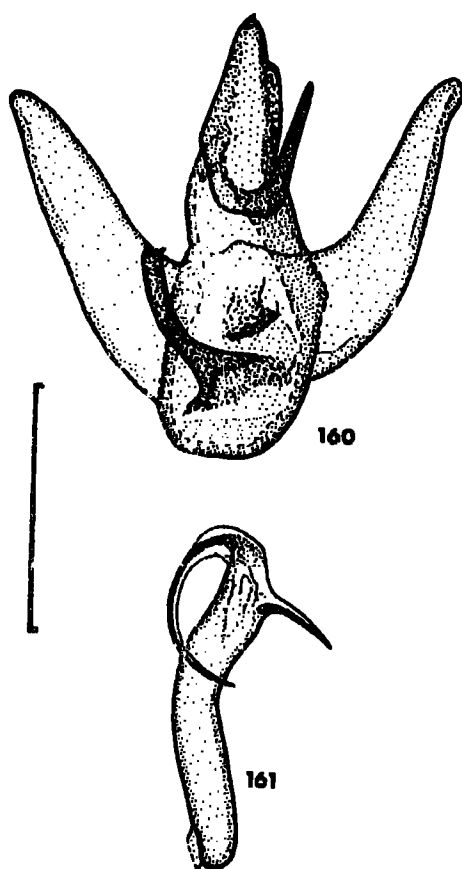
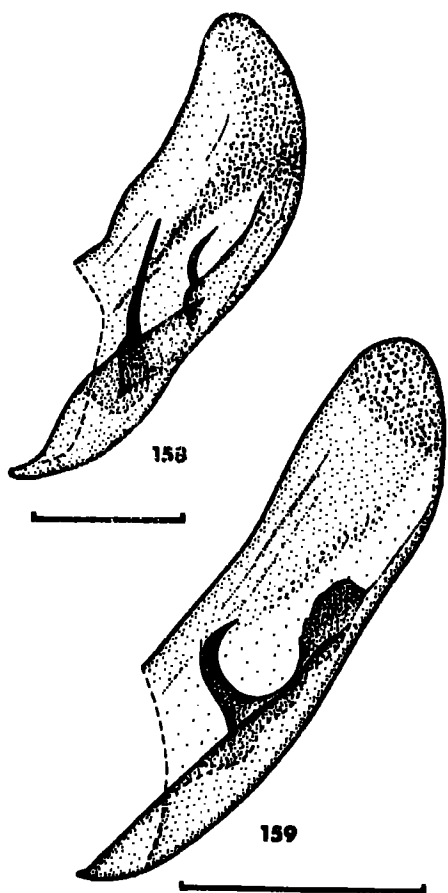
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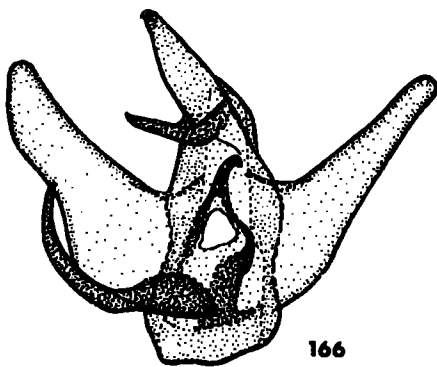


127





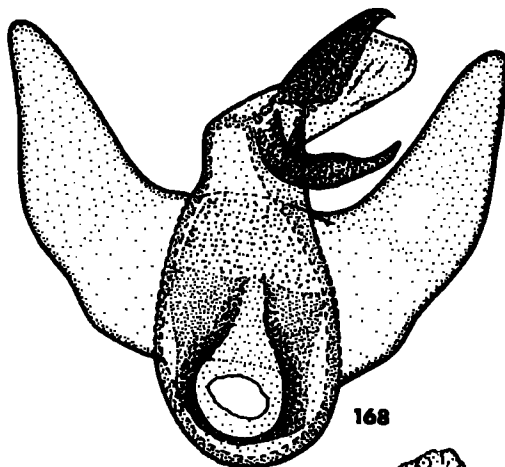




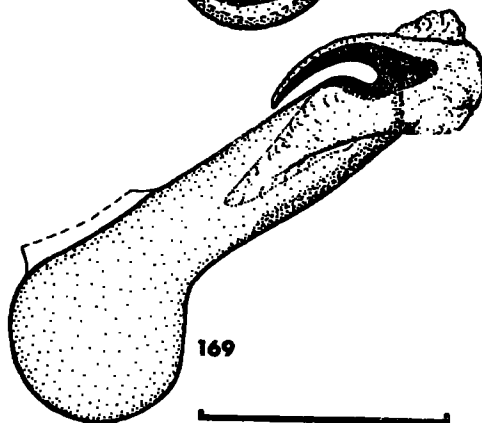
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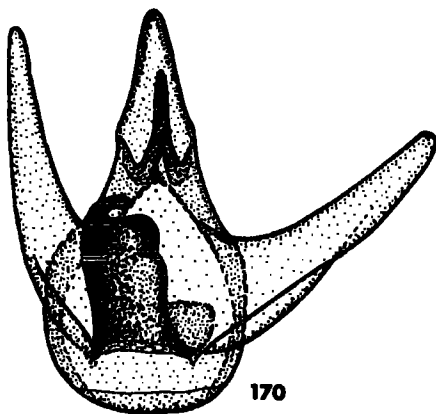
167



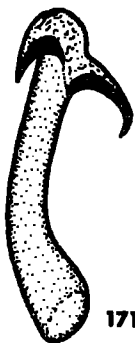
168



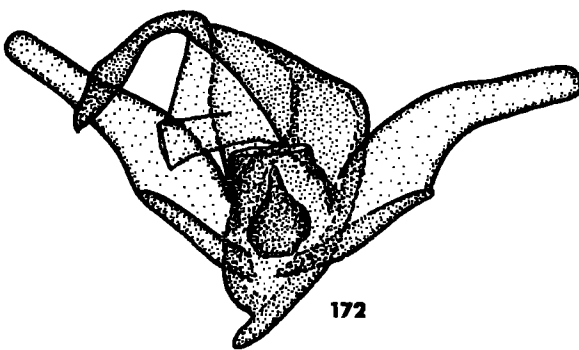
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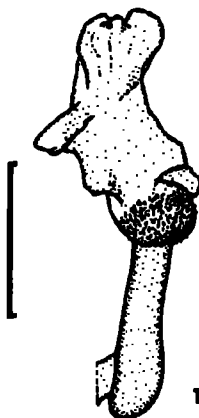
170



171



172



173

INDEX OF SCIENTIFIC NAMES OF LEPIDOPTERA IN CHAPTER 5

- acallis Turner, 121
 acanthina Prout, 291, 292
 Achaea, 171, 196
 Acidalia, 265, 266, 267, 287
 acidna Turner, 285
 Acontia, 170
 ACONTIINAE, 137
 Acraea, 328
 Acritocera, 316
 ACRONICTINAE, 121
 acronyctoides Guenee, 134, 187
 acronyctoides Walker, 156
 acuta sp. n., 229, 230
 acuta Walker, 183, 184, 185, 186
 acutipennis sp. n., 151, 152
 adspersa Felder, 195
 adusta Moore, 117
 Aedia, 187
 aedoea (Prout MS) sp. n., 300
 Aegilia, 154
 Aegitrichus, 302
 aeneta Prout, 273
 aesyia Prout, 306
 affinis Prout, 301
 AGARISTIDAE, 111
 Agathia, 251
 Agrius, 244
 Agrotis, 112, 119
 albifascia sp. n., 317, 320
 albifulgens Prout, 253
 albina Boisduval, 332
 albipicta Hampson, 165
 albipuncta sp. n., 229-233
 albisecta Hampson, 159, 162
 albisigna Hampson, 234
 albizziae Prout, 210
 albobstriata Bremer & Grey, 183, 184
 Alcis, 303, 304
 alcyona Druce, 174
 Aletia, 116
 Alibama, 135
 alope Cramer, 202
 alphonitoniae Prout, 300
 alsulus Herrich-Schaffer, 336
 ampla Prout, 251
 Amyna, 129, 130, 137, 150
 anachoresis Wallengren, 138
 analis Guenee, 178
 Anaphaeis, 332
 andromacha F., 328
 aneituma Walker, 112
 anercus Meyrick, 315
 anetica Felder, 179
 anidryta Prout, 302
 Anigraea, 144
 Anisodes, 259
 Anisozya, 251
 anna sp. n., 227
 Anomis, 169, 188, 206
 Anophia, 187
 Ansa, 199
 antecedens Walker, 199
 Antheraea, 309
 Anthophila, 140
 Anticarsia, 193
 antilope lutescens Butler, 328
 Anua, 172, 206
 apatopleura Prout, 269
 apicifascia Hampson, 147, 148
 Aplochlora, 299
 Apothripa, 156
 Appias, 332, 333
 Araeopteron, 138
 Arbasera, 125
 Arcte, 194
 ARCTIIDAE, 101
 ARCTIINAE, 104
 arctotaenia Guenee, 177
 Argina, 105
 argyrosemastis Hampson, 121, 122
 armatus Rothschild & Jordan, 244
 armigera Hubner, 114, 115
 armstrongi Tams, 202
 aroa Bethune-Baker, 106
 Arsacia, 194
 Asota, 105
 assulta Guenee, 114
 asterias Meyrick, 251
 Asthena, 282
 astrifer Butler, 238
 Athetis, 121, 128
 atrox subflava Waterhouse, 337
 Attonda, 195
 atypha Prout, 273
 augustata Prout, 255
 augustula Herrich-Schaffer, 337
 auripicta Moore, 209
 australiae Butler, 200
 australiata Warren, 168
 Austrocaligula, 309
 Austrotyphthima, 325
 Avatha, 173
 Avitta, 195
 baccalix Swinhoe, 139
 Badamia, 337
 baeota Turner, 162
 baptata Warren, 267
 Barasa, 156, 160
 barbara sp. n., 147, 227
 basicunea Walker, 158
 bathromyses Prout, 263, 264
 baulus Boisduval, 107
 bazochii gundlachianus Bates, 336
 Beggina, 317
 Berresa, 137
 biocellata armillata Butler, 335
 bipunctatus Warren, 265
 bisaltide vomana Fruhstorfer, 328
 Blenina, 157
 Boarmia, 302, 304
 boarmoides Guenee, 209
 Bocana, 196, 217, 235
 bochus Stoll, 334
 boeticus L., 335
 boisduvali boisduvali Lucas, 326A
 bolina L., 328
 Bombotelia, 145
 Bomolocha, 221
 bosora Druce, 269, 276
 bostrychonota Tams, 111
 Botys, 284
 Brabira, 269
 Brachycola, 259, 263
 bradleyi Fletcher, 162
 breviscula Walker, 163
 Briarda, 199
 Bulonga, 299
 buxtoni Tams, 161, 164
 caeneusalis Walker, 237
 caerulea Robinson, 131
 caerulealis Walker, 223
 Calathusa, 158
 callipepla Prout, 214
 Callopietria, 121
 Calogramma, 124
 campana Guenee, 214
 candida Walker, 125, 126
 candrena Herrich-Schaffer, 335
 canescens Tams, 146
 caphontis Hewitson, 329
 Caradrina, 121, 129
 carbo Guenee, 146
 cardui kershawii McCoy, 330
 Carea, 165
 cariosa Lucas, 142
 carissima Butler, 335
 Casbia, 300
 Catada, 217
 Catadoides, 217
 Cataphia, 176, 187
 catharia Prout, 279

- catherina sp. n., 227, 229
 CATOCALINAE, 171
 Catochrysops, 334
 Catophaga, 332
 Catopsilia, 332
 Catoria, 301
 cauditorata Prout, 283
 Celama, 108, 109
 celerio L., 246, 248
 Ceparcha, 157
 Cephalissa, 283
 cephion Druce, 335
 cephise Cramer, 181
 Cephonodes, 244
 Cepora, 333
 ceres Butler, 128
 cernea Druce, 265
 Chaerocampa, 250
 Chalciope, 174
 chalcites Esper, 183, 185, 186
 CHAICOSIINAE, 321
 Characoma, 158
 charalis Swinhoe, 217
 Chasmina, 125
 cheesmanae Poulton & Riley, 336
 cheramota Meyrick, 252
 CHLOEPHORINAE, 165
 Chloroclystis, 269
 chlorodesma Meyrick, 288
 chloropis Meyrick, 255, 257, 258, 265
 Chromis, 246
 chromus bilunata Butler, 337
 chrysippus petilia Stoll, 326
 Chrysochloroma, 254
 chrysolina Meyrick, 308
 Chrysopera, 196
 Chusaris, 233
 Cidaria, 277, 288
 cinerascens Butler, 249
 Cisthene, 101
 clareae Robinson, 104
 claribella Butler, 326
 clelia Cramer, 305
 Cleora, 301
 Clepsimelia, 305
 Clinophlebia, 125
 cnejus F., 334
 cochylioides Guenee, 139
 Cocytodes, 194
 Coenocalpe, 288
 coerulea Guenee, 194
 Collix, 277, 297
 columbana Moore, 222
 combinans Walker, 196
 Comibaena, 251, 252
 commixtura Swinhoe, 221
 Comostolodes, 252
 compacta Warren, 259, 261
 concinna Swinhoe, 283, 287
 concinnula Warren, 312
 concolor Bethune-Baker, 208
 conducta Walker, 129, 130
 conferta Walker, 114, 115
 confluens Rothschild & Jordan, 249
 congenita Hampson, 170
 conscitalis Walker, 222
 convolvuli L., 244
 Coremia, 288
 coronata F., 172, 206
 corvina Felder, 101
 Cosmophila, 188, 189
 COSSIDAE, 316
 crassiuscula Walker, 139, 140
 cretosa Swinhoe, 310
 creusa L., 99
 cribraria Clerck, 105
 cristata Warren, 297
 cristatrix Guenee, 146
 cristifera Walker, 200
 cryptica sp. n., 222
 CTENUCHIDAE, 99
 Curgia, 128
 cythera Swinhoe, 312
 DANAIDAE, 326
 Danaus, 326
 Daphnis, 245
 Dappula, 323
 Darapsa, 245
 Dasychira, 241
 decolorata Warren, 259, 260, 262
 deflorata F., 200
 Deilephila, 246
 delatrix Guenee, 147, 148
 deletoides Bethune-Baker, 144
 delia F., 102
 delogramma Meyrick, 283
 Dendrothripa, 158, 162
 dentatilinea Warren, 291
 dentilinea Bethune-Baker, 178
 dentilinea sp. n., 318
 describens Walker, 154
 Deudorix, 334
 diana sp. n., 228
 Diastema, 323
 dicenea Prout, 263, 264
 dichobathra Prout, 278
 Dichromia, 219
 dimorpha sp. n., 209
 dimota Prout, 251
 dinawa Bethune-Baker, 145
 Diomea, 196
 dipterygosoma Tams, 211
 discifera Prout, 262
 discolor F., 173
 discontenta Walker, 200
 disparata Walker, 252
 diversa Robinson, 301
 diversilinea Warren, 251
 divitalis Walker, 150
 dochmographa Fletcher, 236
 dolens Druce, 321
 Doleschallia, 328
 dolorosa Walker, 129
 duplicata sp. n., 178
 dyopa Herrich-Schaffer, 335
 Dyrzela, 127
 Earias, 165
 Echanella, 219
 echion L., 336
 egista vitiensis Waterhouse, 330
 elaica Meyrick, 292, 295
 emerita Prout, 269
 emma sp. n., 228, 229
 encteta Prout, 270
 ENNOMINAE, 299
 enochra Prout, 293
 entella Cramer, 102
 Eoasthena, 279
 Eois, 282
 Ephyrodes, 200
 epigypsa Meyrick, 265, 266
 epijarbas diovelia Waterhouse, 334
 Epiplema, 310
 EPIPLEMIDAE, 310
 eras Boisduval, 246, 248
 Erastria, 142
 Ercheia, 175
 Ericeia, 197, 206
 erichlora Meyrick, 254
 Eriopus, 122, 123
 Erosia, 311
 erotoides Wallengren, 246
 erotus Cramer, 246
 errans Walker, 249
 erymna Meyrick, 284, 287
 Etanna, 158, 163
 Eublemma, 138
 eucalypti Scott, 309
 eucampta Prout, 308
 Euchromia, 99
 Euchrysops, 334
 Eucrostes, 252
 Eucrostis, 252, 254, 255
 Eudocima, 198, 205, 206

- euneta* Prout, 293
Eupithecia, 270, 275, 283, 284, 286
eupitheciata Walker, 283
Euplexia, 129
Euploea, 326A
Euproctis, 242
Eurema, 333
eurychora Prout, 282
Eutelia, 144, 147
 EUTELIINAE, 144
Euxoa, 113
exemplata Warren, 278
exclamationis F., 337
extranea Prout, 279
fabia Stoll, 167
fasciata Hampson, 285
feducia Stoll, 213
Felinia, 195, 199
fenella Robinson, 196
ferriscitalis Walker, 223, 225
ferrugana Fletcher, 164
festiva Donovan, 124
fidjiensis Mabilie & Vuillot, 241
figlina Butler, 188, 189
figurata Robinson, 256
fijiensis Hampson, 217
fijiensis Robinson, 172
fijiensis sp. n., 108, 110, 223, 225
fijiensis subsp. n., 146, 201, 304
fijiensis (Hampson MS) sp.n., 217, 218
filipalpis Walker, 199
fiona sp. n., 256, 257
flava F., 188, 189, 206
flavida Felder, 165, 166, 167
flavimargo Warren, 168
flavobrunnea Robinson, 241, 242
fluctuosa Prout, 272
formosana Butler, 116, 117
fowlesi Robinson, 302
frugalis F., 176, 177
fullonia Clerck, 199, 205, 206
fulvida Butler, 325
Fumea, 323
funesta Esper, 187
furor sp. n., 236, 237
furvula Hubner, 128
fuscescens Prout MS, 226
Gabala, 168
Gathynia, 312
Gelasma, 253, 254
Geometra, 171
 GEOMETRIDAE, 251
 GEOMETRINAE, 251
Giaura, 159, 162
gloria sp. n., 259, 260
Gnathothlibus, 246
gnophobathra Prout, 280-282
godeffroyi Butler, 248
Gonitis, 188, 190-193
Gonodontis, 305
gonospilalis Walker, 224
gonycrota Prout, 291
Grammodes, 174, 175
griseata Hampson, 138
griseosericea Pagenstecher, 299
Gyrtona, 150
Gymnoscelis, 283, 297
Hadena, 133, 134
 HADENIINAE, 116
hamata neptunica Felder, 326
Harita, 220
harrietae sp. n., 260, 262, 263
Hasora, 337
hecabe sulphurata Butler, 333
Helicoverpa, 114, 115
 HELIOTHIDINAE, 114
Heliothis, 114, 115
hemiprosopa Turner, 301
Hemitheia, 254
hemithyris Hampson, 151
hermaea Druce, 315
herrichi Felder, 326A
 HESPERIIDAE, 337
Heteropan, 321
hicanora Turner, 179
hilaris Warren, 168
Hippotion, 246
hirsutipennis sp. n., 219
hirundo Boisduval, 248
Holorista, 291
homodoxa Meyrick, 264-266
homotima Tams, 203
hopkinsi Tams, 150, 151
Horisme, 288
huegeli Rogenhofer, 166, 167
Hyblaea, 201
Hydrillodes, 217, 220, 221
hyemalis Butler, 315
hylax F., 336
Hypaetra, 174, 208
Hypena, 220, 221
Hypenagonia, 226
 HYPENINAE, 217
Hypenodes, 237
Hyperlopha, 200
Hypocala, 200
hypogrammata Guenee, 291
Hypolimnas, 328
hypometra Prout, 270
Hypospila, 201
hyppasia Cramer, 182
Hypsa, 105
 HYPSIDAE, 105
iconica Walker, 169
iconicalis Walker, 220, 222, 224
ida subsp. n., 267
Idaea, 263, 265
idmon Prout, 265
ignobilis Butler, 294
illecta Walker, 129-131
illuminata Robinson, 183-186
imparatalis Walker, 284
imperialis Druce, 206
inangulata Guenee, 198
incompta Herrich-Schaffer, 327
indicatana Walker, 164
indiscriminata Hampson, 173
Ingura, 146
inhaesa Prout, 290
injectaria Walker, 302
inopinata Waterhouse, 329
insigillata Walker, 270
instabilata Walker, 311
insularis Butler, 124
insularum Collenette, 108, 110
interrupta Warren, 313
intersecta Butler, 247, 250
intercepta Guenee, 170
intortaria Guenee, 261
invisibilis Warren, 271
Iodis, 252, 299
iopolia Fletcher, 198
ipsilon Hufnagel, 112
iridescens Bethune-Baker, 321
iridescens sp. n., 230, 231, 233
irregularis Prout, 251
irretracta Warren, 306
irrorata F., 193
jacquini manaia Hopkins, 332
Jamides, 334
janata L., 171
java micronesia Fruhstorfer, 332
jocosatrix Guenee, 145
Jodis, 253
jordana Bethune-Baker, 249
joviana Stoll, 180
julietae sp. n., 266
katherina sp. n., 271
kava Druce, 335
kebeae Bethune-Baker, 135, 175
kenricki Bethune-Baker, 173
khoda Mabilie, 337
koroensis Robinson, 179
labradus Godart, 336

- Lacera, 202
 laceratalis Walker, 221, 224, 225
 Lagoptera, 181
 Lampides, 335
 lanaris Butler, 302
 Larentia, 269, 288
 LARENTIINAE, 269
 Lasioceros, 106
 lasiospila Meyrick, 277
 lauensis subsp. n., 303
 lauensis Talbot, 326A
 lautokensis Prout, 259, 261
 lautokiensis Prout, 237
 leda solandra F., 325
 leichardtii Koch, 197, 198
 lentalis Guenee, 221
 leprosticta Hampson, 129
 lepta Meyrick, 272
 Leptosema, 107
 Leptotroga, 202
 Leucania, 116
 Leucocoscma, 128
 leucomelas L., 187
 leucydra Prout, 290
 Levuana, 321
 levuensis Prout, 197, 198
 levuensis subsp. n., 306
 lewinii eschscholtzi Felder, 326A
 lichenigera Hampson, 162
 lichenopa Meyrick, 157
 lichenosa sp. n., 109
 lifuensis Rothschild, 249
 LIMACODIDAE, 317
 Limacorina, 318
 linda sp. n., 273
 liquescens Prout, 257
 lithina Warren, 307
 LITHOSIINAE, 101
 litura F., 134, 135
 Lobogethes, 313
 lomalangi sp. n., 311
 longipalpis Swinhoe, 218
 Lophocoleus, 229, 235, 238
 Lophoptera, 151
 loreyi Duponchel, 116
 lotrix Cramer, 104
 Luceria, 233
 lunifera Druce, 195
 luteolaria Hampson, 165-167
 Luxiaria, 305
 LYCAENIDAE, 334
 LYMANTRIIDAE, 241
 lymantrina Hering, 317
 lypera Tams, 311
 Macaduma, 101
 Maceda, 168
 mackwoodi Hampson, 158, 163
 Macroglossa, 248
 Macroglossum, 248
 magnifica sp. n., 148
 Maliaattha, 141
 Mamestra, 129
 mangoensis Butler, 326A
 manifestalis Walker, 217, 235
 mansueta Walker, 168, 169
 marginata Lucas, 255
 mariae sp. n., 274
 marianna Rothschild & Jordan, 244
 marshallorum Rothschild, 104
 massimensis Prout, 267
 masuralis Guenee, 223, 225
 materna L., 205, 206
 Maurilia, 169
 mauritia Boisduval, 134
 maxwelli sp. n., 211
 Mecistognatha, 217, 218
 Mecistoptera, 234
 Mecodina, 203
 medardaria Herrich-Schaffer, 307
 mediifascia Wileman & South, 179
 mediopallens Prout, 214, 215
 mediopunctata Hering, 318
 melancholica Prout, 254
 melanesiensis sp. n., 141
 Melanitis, 325
 mempta Prout, 273
 menephron Cramer, 250
 merceri sp. n., 297, 298
 meridionalis Collenette, 121, 122, 123
 mesosterea Prout, 282
 Mestleta, 139
 Mesurodes, 254
 metallospora Turner, 277
 metaspila Walker, 174, 208
 Micra, 139
 micrastis Meyrick, 210, 236
 microdonta Hampson, 164
 Micronia, 315
 Microthripa, 158, 161, 164
 Micrulia, 289
 Midea, 194
 mimetica Robinson, 242
 miniacea Felder, 181, 206
 minima sp. n., 319
 Minucia, 173
 minutissima Swinhoe, 285
 mirabilis Butler, 229-232
 miscix Prout, 197, 296
 Mniothripa, 162
 Mocis, 176
 monetaria Guenee, 259, 261
 montana sp. n., 101, 102
 morphoides Butler, 335
 multilinea Swinhoe, 175
 munda Walker, 112
 munditibia Prout, 302
 mutabilis F., 212
 mygdon Cramer, 174
 Nacaduba, 335
 Nadagara, 306
 Nagia, 203
 nandarivatu Robinson, 241, 242
 Nanaguna, 156, 159, 162
 natalis Walker, 137, 138, 150
 nausori Bethune-Baker, 303
 nausoriensis sp. n., 135
 nauticorum Tams, 122, 123
 negligens Butler, 316
 nemertes macleayi Felder, 327
 Nemoria, 267
 Neogabara, 204
 nephelospila Meyrick, 261
 nephelota Prout, 283, 287
 nerina Butler, 329
 Nigramma, 150-152
 nigrifusalis Warren, 296
 nigrilinearia Leech, 293
 nigritarsis Walker, 188-191, 206
 nilotica Rogenhofer, 158
 nina sp. n., 274
 Nitocris, 121
 niveopuncta Warren, 260
 niveostilla Prout, 259
 nivipennis Butler, 265
 noatau subsp. n., 304
 Noctua, 102, 112, 114, 116, 134,
 138, 171-174, 176, 177, 181,
 185, 187, 189, 193, 198, 206, 207, 212
 NOCTUIDAE, 112
 NOCTUINAE, 112
 noctuoides Guenee, 174
 nodyna Bethune-Baker, 220
 Nola, 108
 NOLIDAE, 108
 nonagricola Walker, 128
 novaehebridensis Viette, 207
 Numeria, 299
 Nyctemera, 107
 NYMPHALIDAE, 328
 obalauae Bethune-Baker, 212, 213
 obliquifascia Prout, 165
 obliuaria Walker, 262
 ochrea Warren, 268
 ochreata Rothschild, 207

- ochricollis Prout, 303
 ochrobasis Hampson, 144
 octo Guenee, 129, 130, 137, 138
 octocula Butler, 329
 oculalis Moore, 233
 oculicola Walker, 175
 oenistis Hampson, 131
 oenone Butler, 99
 olivia sp. n., 277
 OPHIDERINAE, 187
 Ophisma, 179, 180
 Ophiusa, 173, 178, 180
 ophiusalis Walker, 196
 Opodiphthera, 309
 Oriens, 337
 Oruza, 142
 Othreis, 199, 205
 otis mangoensis Butler, 336
 Oxaenanus, 218
 Oxyodes, 207
 pacifica Felder, 251
 Paectes, 146
 Palaeocoleus, 235
 Pantydia, 174, 208
 Papilio, 331
 PAPILIONIDAE, 331
 papuensis Warren, 194
 Paralcis, 307
 Parallelia, 177, 206, 323
 Parilyrgis, 208
 partitecta Prout, 283
 parvella Walker, 164
 Pataeta, 146
 patricia sp. n., 278
 paucilinea Warren, 290
 paulii Robinson, 205, 206
 paulina ega Boisduval, 333
 pectinata sp. n., 144
 Penicillaria, 145, 148
 pentasema Prout, 171
 Perigea, 130, 137
 perimale inopinata Waterhouse, 333
 Perixera, 261
 perstrialis Hampson, 152, 153
 perstricta Prout, 303
 Petelia, 306
 Phalaena, 104, 105, 112, 124, 171, 174, 182, 185, 187, 202, 205, 213, 305
 phaseli Mathew, 334
 Philabapteryx, 283
 Philagria, 102
 philipsi Prout, 299
 Phlegetonia, 146, 147
 phryganeoides Warren, 305
 Phyllodes, 206
 picta Butler, 288
 PIERIDAE, 332
 pieroides Walker, 251
 pilaria Guenee, 255, 256, 257, 258
 pinastrina Martyn, 250
 Pisoraca, 259
 pisina Butler, 251
 placida Walker, 245
 plagiata Walker, 119, 127
 Plagideicta, 129
 plagiola Wileman & West, 204
 Platysenta, 129
 plexippus L., 326
 Plusia, 183
 PLUSIINAE, 183
 Plusiodonta, 209
 Poecilasthena, 290
 Polyclysta, 291
 Polydesma, 209
 polynesianna Hampson, 212
 Polyura, 329
 pomona F., 332
 praesepta Walker, 130
 praetermissa Bastelberger, 263
 pratti Bethune-Baker, 148
 precedens Walker, 199
 Precis, 330
 presbytica (Prout MS) sp. n., 307
 prionodes Meyrick, 260, 262
 prisca Walker, 179
 priva Prout, 294
 PROCRIDINAE, 321
 Prodenia, 121
 Progonia, 210, 236
 propyrrha Walker, 323
 Prospalta, 131
 protoforsteri Poulton, 327
 protoneptunia Poulton, 326
 Pseudaetia, 118
 Pseuderythrolophus, 265
 pseudoformosana sp. n., 116, 117, 119
 Pseudoschista, 296
 Psilogramma, 249
 psyche Felder, 332
 pudica Snellen, 140
 pulchelloides Hampson, 104
 pulcherrima Lucas, 175
 pumila Snellen, 108
 punctata Bethune-Baker, 218
 punctum F., 137, 138
 pura Fletcher, 109
 purpurea Bethune-Baker, 220
 purpurea sp. n., 150, 151
 Pyralis, 236
 pyrauges Prout, 282
 pyrrhogona Walker, 255
 Pyrrhorachis, 255
 pyrsodonta Turner, 275
 Pythodora, 264
 quadrinigrata Warren, 168
 quadrizona Prout, 253
 quilla sp. n., 280, 281
 quinquialis Walker, 219
 radians Guenee, 113
 ragusana Freyer, 139, 140
 reclusa Walker, 121
 rectalis Walker, 194
 refusaria Walker, 287
 regia Lucas, 181
 Remodes, 292
 reticulata Pagenstecher, 121, 123
 revocans Walker, 188, 190, 191, 193
 rewaensis Bethune-Baker, 288
 Rhamphoschisma, 248
 Rhesala, 210
 rhipistis Meyrick, 264, 266
 risbeci Viette, 207
 ritsemae Snellen, 141, 142
 Rivula, 211
 rivula Moore, 139, 141
 robustalis Snellen, 224, 226
 rotumensis subsp. n., 122-124, 272
 rotundata Walker, 197
 rotundipennis sp. n., 153
 rowena sp. n., 280, 281
 rubicunda Prout, 269, 276
 rubescens sp. n., 229, 230, 232
 rufibasis Warren, 144
 rufimargo samoensis Tams, 120
 Rusicada, 188, 190
 Ruttelerona, 307
 sabulifera Guenee, 192
 salaminia Cramer, 198, 205, 206
 salomonis Rothschild & Jordan, 245
 samoana Butler, 188, 191, 304
 samoana Hampson, 108, 109
 samoana Tams, 207, 323
 samoana Warren, 263
 samoanum Rothschild & Jordan, 249
 samoensis Druce, 335
 samoensis Tams, 102, 120, 173
 sara sp. n., 284, 286
 Sarbanissa, 111
 Sarrothripa, 158
 SARROTHRIPINAE, 156
 Sasunaga, 131
 SATURNIIDAE, 309
 SATYRIDAE, 325