

AN ANALYSIS OF ETHOLOGICAL, ECOLOGICAL AND TAXONOMIC DATA ON ORIENTAL HISPINAE (COLEOPTERA, CHRYSOMELIDAE)

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Blaricum

SUMMARY

Fairly numerous notes on host plants and larval life of oriental Hispinae can be found scattered in the literature. They point to oligophagous or even monophagous habits and a striking association with Monocotyl plant families in most instances, while three main kinds of larval occurrence can be distinguished: feeding between folded top leaves, boring in stalks, and mining in mature leaves. Moreover, the taxonomy of these Hispinae has been well studied.

Therefore, it was considered useful, to investigate to what extent the "biological" groups" are in correlation with the classification as accepted by the taxonomists at present.

For this purpose the available biological data, completed with own observations, have been brought together in a list of species arranged according to current classification. This survey comprises 133 species. Remarks on the source of the data, some of them critical, and new notes on the habits of the species, are added.

A table is given to show the relative importance of various plant families as sources of foodplants of the oriental Hispinae. The preponderance of Monocotyls, particularly Zingiberaceae, Palmae and Graminaceae, is again well brought to light.

In comparing the grouping according to "biological" and "systematic" points of view a fair agreement is found in many instances, but some discrepancies also occur.

The association of a limited number of Hispinae with Dicotyls may be considered as being of relatively recent origin.

INTRODUCTION

Several Hispinae are pests of palm trees of great importance, such as coconut, sago, nipah, and rattan. Many others are injurious to valuable crops like rice, maize, sugar cane, banana, or to bamboo and orchids. As a rule the beetles are easily recognisable, rather sedentary, clinging to their foodplants for feeding and for shelter. Therefore it is not astonishing that considerable material of Hispinae is brought together by collectors, among them by field entomologists and by workers in applied entomology, who usually attach host labels to the specimens. Moreover, the subfamily has attracted devoted students of taxonomy at different periods. Of those working in recent times the late SPAETH and MAULIK may be mentioned. At present E. UHMANN, who completed the manuscript of a new catalogue of the family, and J. L. GRESSITT, are specialists in this field.

Thus the Hispinae have been studied fairly well in various respects. As regards the species of Indonesia, Java in particular, ZEHNTNER, and especially LEEFMANS published extensive notes and papers on the bionomics of injurious species.

KONINGSBERGER gave an interesting account of the habitat of the beetles in cultivated and wild areas, ROEPKE contributed noteworthy records on host plants, and so did AWIBOWO. A considerable amount of data and material was collected by T. H. C. TAYLOR in Java, during his search for parasites for the control of *Promecotheca* in the New Hebrides. A compilation of the main points of all these studies was given by the present author in his book "De Plagen van de Cultuurgewassen in Indonesië" (Pests of Indonesian Crops) vol. 2, p. 140, 1951.

In 1918 LEEFMANS noted certain differences between larvae of various genera in connection with their ways of living: feeding between the unexpanded top leaves of palms, or mining the leaves. However, this study was not further elaborated.

More recently GRESSITT (1950) gave a summary of biological details of Hispinae from which the following may be quoted: "Apparently all of the spiny forms of hispids in the Orient (tribe Hispini) are leafminers and only certain of the elongate, more generalized, spineless types have larvae which live externally on plants, though more often in protected situations such as calyces, blossoms, petiole bases and leaf-buds of certain types of plants."

In my opinion at least three distinct types or modes of larval habits should be distinguished, viz. (a) larvae feeding between the folded top leaves (particularly the "heart" of grasses and the "spear" of palms), (b) boring the stalks of herbaceous or semi-ligneous plants, and (c) mining in the leaves.

GRESSITT in his above mentioned paper also listed examples of the preference for particular host plants for a dozen hispine genera in the oriental region. ROEPKE mentioned in a popular discussion of the insect fauna of the isle of Batchan, Moluccas, that the oriental hispines appear to be attached mainly to Monocotyls. This fact attracted my attention also when I had the opportunity to make several observations on the foodplants of hispines during field work in the teak forests and other wooded areas in Java. Here Zingiberaceae, Palmae and Graminaceae, all three main host families of Indonesian hispines, are abundant. This obvious association of the beetles with Monocotyls was, therefore, pointed out in the few introductory lines to the Hispid family (more correctly Hispine subfamily) in my handbook. Evidence of this host selection, was also given in the survey of foodplants listed according to HUTCHINSON's system, with their specific enemies, in the appendix to my book (p. 1017—1063).

In 1937 MAULIK published a paper on "Distributional correlation between Hispine beetles and their host plants". Out of some 2570 species known at that time he enumerates 148 species with known food plants, and gives a list of 28 plant families, representatives of which had been recorded as hosts of Hispinae. These families are listed according to the customary botanical system. Monocotyls and Dicotyls were not dealt with separately. The highest records were found to occur in the Graminaceae (57), Palmae (40), Leguminosae (23) and Compositae (20), the other families showing 1—8 records (3 on an average) only.

The present study has a different object from MAULIK's. Its aim is in the first place to stipulate clearly the predominant attachment of numerous hispine genera to monocotyl plants, and to show the distribution of the different modes of larval habits over the various tribes. Furthermore, to investigate whether the ethological and ecological characteristics of the Hispinae, as manifested in their larval habits and their association with certain plant groups, respectively, correspond with the

division into tribes and genera, as these are accepted by taxonomists on the basis of purely morphological characters of the adult beetles. Finally it is hoped that a study of this kind may ultimately contribute towards understanding of the possible evolution of the phytophagous habits in the Hispinae.

With these purposes in view the following tabular survey has been drawn up. The comprehensive list of hispines and their host plants found in MAULIK's paper (1937) provided some valuable additions to the data already incorporated in my card index.

If not otherwise indicated, it is assumed that the recorded hosts serve as food plants during the larval as well as the adult stage, which appears to be the normal state of affairs. A few instances are recorded in which the beetles may feed regularly on plants not serving for the larval development. We shall discuss these instances in the last section.

ACKNOWLEDGMENTS

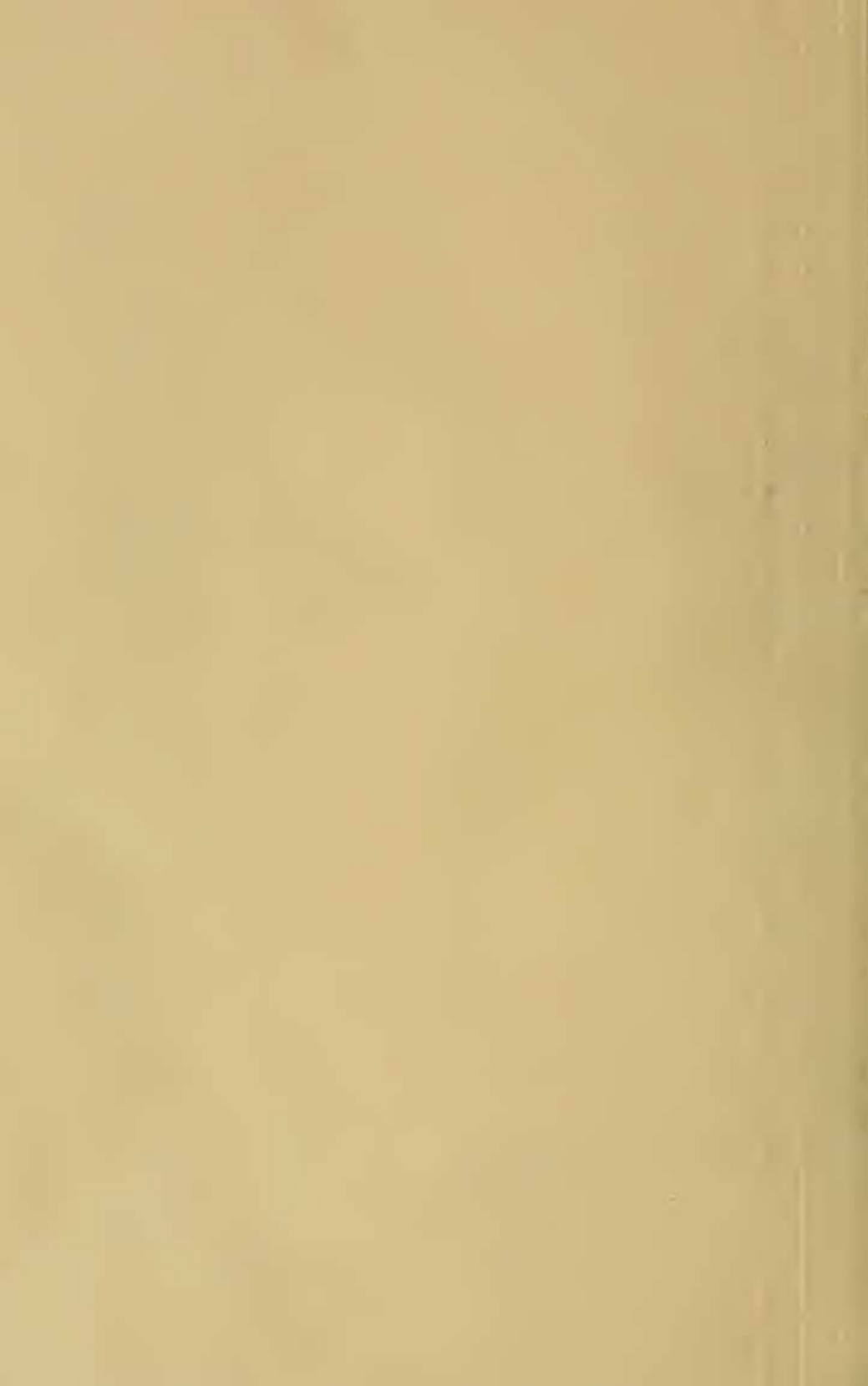
The author is much indebted to Mr. E. UHMANN, Stollberg/Sachsen, Deutsche Demokratische Republik, for the identification of his specimens and for the verifications of the nomenclature of the species mentioned in the following list. My sincere thanks are also due to my friends Dr. A. DIAKONOFF and Dr. J. VAN DER VECHT for their kindness of reading the manuscript and giving valuable hints for the wording of the explanations.

TABULAR SURVEY OF REARED HISPINAE

Tribes, genera, species	Locality of host plant	Host plants		References
		plant group or genus	plant family	
Botryonopini <i>Botryonopa grandis</i> Baly <i>sanguinea</i> Guér.	N.E. Sumatra, Java C. & W. Java	<i>Nipa</i> , <i>Metroxylon</i> <i>Metroxylon</i> , rattan palm	} Palmae	see next section
Anisoderini <i>Anisodera elongata</i> Gestr. <i>gracilis</i> Guér. <i>guérinii</i> Baly <i>lucidiventris</i> Guér. <i>sutarella</i> Uhm.	S. Sumatra C. & W. Java, India, Java W. Java	<i>Musa</i> (wild and cultivated) <i>Musa</i> (id.) <i>Costus speciosus</i> { <i>Amonum</i> c.a., sedge grass	} Musac. } Zingib. { Cyper.	leg. Toxopeus 1933 leg. Leefmans/ Awibowo 1932 } see next section
<i>Estigmene chinensis</i> <i>Lasiobila goryi</i> Guér. <i>rufa</i> Guér.	India, China, Java Java Java	} bamboo (various species)	} Gramin.	

larvalhabitus	Tribes, genera, species	Locality of host plant	Host plants		References
			plant group or genus	plant family	
type a: between folded top leaves	Callispini <i>Hispodonta unicolor</i> Hell.	N. Celebes	<i>Musa</i>	Musac.	leg. Awibowo
	<i>Callispa metroxylonidis</i> Uhm.	W. Java, 250 m	<i>Metroxylon</i>	Palmae	leg. Roepke Uhmann 1929, p. 14
	<i>roepkei</i> Uhm.	W. Java, 1500 m	rattan-palm		leg. Kalshoven
	<i>bioculata</i> Uhm.	Malaya	<i>Zalacca</i>		Miller 1932, p. 18
	<i>elegans</i> Baly	W. Java, 1500 m	<i>Pinanga</i>		leg. Kalshoven
	<i>kalshoveni</i> Uhm.	N. Celebes	<i>Metroxylon</i>		leg. Awibowo
	<i>splendidula</i> Gestr.				
	<i>bowringii</i> Baly	China, Hongkong	bamboo (7 species)	Gramin.	Maulik 1937, Gressitt 1950, p. 6
	<i>cumingii</i> Baly	Philipp. Isl.	<i>Bambusa glaucescens</i>		Schultze 1915, p. 18
	<i>faae</i> Baly	Burma	bamboo		Maulik 1937
	<i>flavescens</i> Weise	Philipp. Isl.	<i>Bambusa blumeana</i>		Schultze 1915, p. 18
	<i>12-maculata</i> Chap.	Java, Sumatra, N. Cel.	<i>Spathoglottis</i>	Orchid.	ref. in Kalshoven 1951, vol. 2, p. 74
	<i>Amblyspa laevigata</i> Guér.	N. India	high grass	Gramin.	Maxw., Lefroy 1907, p. 364
	<i>Miltinaspis cassidoides</i> Guér.	W. Java	rattan palm	Palmae	leg. Drescher 1933
	Leptispini <i>Leptispa abdominalis</i> Baly	China	bamboo	Gramin.	Gressitt 1950, p. 7
	<i>arundina</i> Maul.	India	<i>Saccharum arundinaceum</i>		Maulik 1937
	<i>bicornis</i> Spaeth	Java	bamboo		Taylor 1937, p. 14
<i>longipennis</i> Gestr.	China	<i>Sinocalamus</i> (bamboo)	Gressitt 1950, p. 7		
<i>pygmaea</i> Baly	India	<i>Oryza, Saccharum</i>		Fletcher 1914, p. 3	
<i>rufithorax</i> Maul.	India	<i>Saccharum</i>		Id. 1921, p. 17	
Eurispini <i>Eurispa</i> spp.	Australia	sedges	Cyperac.	Froggatt 1907, p. 206	
Cryptonychini <i>Drescheria reinecki</i> Weise	W. Java, 1500 m	bamboo	Gramin.	leg. Drescher 1933	
<i>Octodonta affinis</i> Uhm.	W. Java	<i>Metroxylon</i>	Palmae	Kalshoven II 1951 p. 752	
<i>angulosa</i> Uhm.	Philipp. Isl.	<i>Cocos</i>		Lepesme 1947, p. 540	
<i>banguinensis</i> Uhm.	Philipp. Isl.	<i>Cocos</i>		Maulik 1937	
<i>nipae</i> Maul.	Malaya	<i>Areca, Metroxylon, Nipa, Oncosperma</i>		Corbett 1932, p.	
<i>surigaoana</i> Uhm.	Philipp. Isl.	<i>Cocos</i>		Lepesme 1947, p. 540	
<i>Brontispa chalybeipennis</i> Zach.	Ponape, Palau	<i>Cocos</i>		Zacher 1916, p. 2	

Tribes, genera, species	Locality of host plant	Host plants		References
		plant group or genus	plant family	
<i>depressi</i> Baly	Philipp. Isl.	<i>Normanbya merrillii</i> <i>Arenga</i>	Palmae	Schultze 1915, p. 187 Proc. Ent. Haw. Soc. 14, p. 154 Maulik 1937
<i>mariana</i> Spaeth	Saipan, Mar. Isl., Guam	<i>Cocos</i>		
<i>linearis</i> Spaeth <i>longissima</i> Gestr. (+ var. <i>froggatti</i>)	W. New Guinea Indonesia, New Guinea, Fiji Isl., New Hebr	<i>Areca</i> <i>Cocos</i> , <i>Latania</i> , <i>Areca</i> , <i>Phoenix</i> , <i>Metrox.</i> , <i>Oreodoxa</i> <i>Elaeis</i> , <i>Thrinax</i> <i>Cocos</i>		
<i>paluensis</i> Es. & Ch.	Palau Isl.	<i>Saccharum officinarum</i>	Gramin.	Proc. Haw. Ent. Soc. 14, p. 227 Dumbleton 1954, p. 18
<i>lateralis</i> Uhm.	Austr. New Guinea	<i>Areca</i> <i>Cocos</i> , <i>Nipa</i> , <i>Arenga</i> , <i>Cryptostachys</i> , <i>Oreodoxa</i> <i>Cocos</i>	Palmae	Maulik 1937 ref. in Kalshoven II, 1951, p. 753
<i>Plesispa</i> <i>biroi</i> Gestr. <i>reichei</i> Chap.	N. New Guinea Mal., Indonesia, E. New Guinea			
<i>ruficollis</i> Spaeth	E. New Guinea	<i>Cocos</i>	Palmae	Froggatt 1936, p. 10
<i>Isopedbispa</i> <i>cocotis</i> Maul.	New Caledonia	<i>Cocos</i>		
<i>Aulostyrax</i> <i>nuciferae</i> Maul.	Solomon Isl.	<i>Cocos</i>	Pandanus	Maulik 1929, p. 235
<i>Oxycephala</i> <i>corporeali</i> Uhm. <i>grossa</i> Maul. <i>speciosa</i> Boisd.	Isl. of Buru Isl. of Batchian New Guinea, Aru Isl.	<i>Pandanus</i>		
<i>tripartita</i> Fairm.	E. New Guinea			
Pharangispini <i>Pharangispa</i> <i>purpureiventris</i> Maul.	Solomon Isl.	ginger	Zingib.	Maulik 1937
Coelaenomenoderini <i>Javeta</i> <i>arecae</i> Uhm.	S. Sumatra	<i>Areca</i>	Palmae	Kalshoven II 1951, p. 759 leg. Kalshoven 1933 leg. Awibowo 1940
<i>corporeali</i> Uhm.	W. Java, 800 m	<i>Pinanga kublii</i>		
<i>thoracica</i> Uhm.	W. Java, 250 m	<i>Metroxylon</i>		
Promecothecini <i>Promecotheca</i> <i>alpiniae</i> Maul.	Solomon Isl.	<i>Alpinia</i> <i>Cocos</i>	Zingib.	Maulik 1929, p. 238 Froggatt 1914, p. 151 Id., p. 150
<i>callosa</i> Baly <i>coeruleipennis</i> Blanch.	Queensland Fiji, Sol. Isl., Tonga, Philipp. Isl.	<i>Cocos</i> , <i>Pritchardia</i>	Palmae	
<i>cumingii</i> Baly	Philipp. Isl. Java	<i>Cocos</i> <i>Nipa</i>		
				Schultze 1915, p. 190 leg. Koningsberger



larval habits	Tribes, genera, species	Locality of host plant	Host plants		References
			plant group or genus	plant family	
	<i>Callispini</i> <i>Hispidonta</i> <i>unicolor</i> Hell.	N. Celebes	<i>Musa</i>	Musac.	leg. Awibowo
	<i>Callispa</i> <i>metroxyloides</i> Uhm.	W. Java, 250 m	<i>Metroxylon</i>	Palmae	leg. Roepke Uhmann 1929, p. 143
	<i>roepkei</i> Uhm.	W. Java, 1500 m	rattan-palm		leg. Kalshoven
	<i>bioculata</i> Uhm.	Malaya	<i>Zalacca</i>		Miller 1932, p. 18
	<i>elegans</i> Baly	W. Java, 1500 m	<i>Pinanga</i>		leg. Kalshoven
	<i>kalshoveni</i> Uhm.	N. Celebes	<i>Metroxylon</i>		leg. Awibowo
	<i>splendidula</i> Gestr.				
	<i>bowringii</i> Baly	China, Hongkong	bamboo (7 species)		Maulik 1937, Gressitt 1950, p. 69
	<i>cumingii</i> Baly	Philipp. Isl.	<i>Bambusa glaucescens</i>	Gramin.	Schultze 1915, p. 187
	<i>feae</i> Baly	Burma	bamboo		Maulik 1937
	<i>flavescens</i> Weise	Philipp. Isl.	<i>Bambusa blumeana</i>	Orchid.	Schultze 1915, p. 187
	<i>12-maculata</i> Chap.	Java, Sumatra, N. Cel.	<i>Spathoglottis</i>		ref. in Kalshoven 1951, vol. 2, p. 740
	<i>Amblyspa</i> <i>laevigata</i> Guér.	N. India	high grass	Gramin.	Maxw, Lefroy 1909, p. 364
	<i>Milinaspis</i> <i>castidooides</i> Guér.	W. Java	rattan palm	Palmae	leg. Drescher 1933
	<i>Leptispini</i> <i>Leptispa</i> <i>abdominalis</i> Baly	China	bamboo	Gramin.	Gressitt 1950, p. 74
	<i>arundina</i> Maul.	India	<i>Saccharum arundi-</i> <i>naceum</i>		Maulik 1937
	<i>bicornis</i> Spaeth	Java	bamboo		Taylor 1937, p. 144
	<i>longipennis</i> Gestr.	China	<i>Sinocladamus</i> (bamboo)		Gressitt 1950, p. 76
	<i>pygmaea</i> Baly	India	<i>Oryza, Saccharum</i>		Fletcher 1914, p. 313
	<i>rufithorax</i> Maul.	India	<i>Saccharum</i>		Id. 1921, p. 17
	<i>Eurispini</i> <i>Eurispa</i> spp.	Australia	sedges	Cyperac.	Froggatt 1907, p. 206
	<i>Cryptonychini</i> <i>Drescheria</i> <i>reinecki</i> Weise	W. Java, 1500 m	bamboo	Gramin.	leg. Drescher 1936
	<i>Octodonta</i> <i>affinis</i> Uhm.	W. Java	<i>Metroxylon</i>		Kalshoven II 1951, p. 752
	<i>angulosa</i> Uhm.	Philipp. Isl.	<i>Cocos</i>		Lepesme 1947, p. 540
	<i>banguinensis</i> Uhm.	Philipp. Isl.	<i>Cocos</i>	Palmae	Maulik 1937
	<i>nipae</i> Maul.	Malaya	<i>Areca, Metroxylon,</i> <i>Nipa, Oncosperma</i>		Corbett 1932, p. 21
	<i>swirigaana</i> Uhm.	Philipp. Isl.	<i>Cocos</i>		Lepesme 1947, p. 540
	<i>Brontispa</i> <i>chalybeipennis</i>	Zach. Ponape, Palau	<i>Cocos</i>		Zacher 1916, p. 243

type 4: between folded top leaves

larval habits	Tribes, genera, species	Locality of host plant	Host plants		References	
			plant group or genus	plant family		
	<i>depressa</i> Baly	Philipp. Isl.	<i>Normanbya merrillii</i> <i>Arenga</i>		Schultze 1915, p. 187 Proc. Ent. Haw. Soc. 14, p. 151 Maulik 1937	
	<i>mariana</i> Spaeth	Saipan, Mar. Isl., Guam	<i>Cocos</i>	Palmae	leg. Reyne Lepesme 1947, p. 540	
	<i>linearis</i> Spaeth	W. New Guinea	<i>Areca</i>			
	<i>longissima</i> Gestr. (+ var. <i>froggattii</i>)	Indonesia, New Guinea, Fiji Isl., New Hebr.	<i>Cocos, Latania,</i> <i>Areca, Phoenix,</i> <i>Metrox., Oreodoxa</i> <i>Elaeis, Thrinax</i>			
	<i>paluensis</i> Es. & Ch.	Palau Isl.	<i>Cocos</i>		Proc. Haw. Ent. Soc. 14, p. 227	
	<i>laetaris</i> Uhm.	Austr. New Guinea	<i>Saccharum officin-</i> <i>arium</i>	Gramin.	Dumbleton 1954, p. 18	
	<i>Pletispa</i> <i>biroi</i> Gestr.	N. New Guinea	<i>Areca</i>		Maulik 1937	
	<i>reichei</i> Chap.	Mal., Indonesia, E. New Guinea	<i>Cocos, Nipa, Arenga,</i> <i>Cryptostachys,</i> <i>Oreodoxa</i>		ref. in Kalshoven II, 1951, p. 753	
	<i>ruficollis</i> Spaeth	E. New Guinea	<i>Cocos</i>	Palmae	Froggatt 1936, p. 10	
	<i>Ispedbispa</i> <i>cocotis</i> Maul.	New Caledonia	<i>Cocos</i>		Maulik 1933b, p. 280	
	<i>Aulostyax</i> <i>nuciferae</i> Maul.	Solomon Isl.	<i>Cocos</i>		Maulik 1929, p. 235	
	<i>Oxycephala</i> <i>corporea</i> Uhm.	Isl. of Buru	<i>Pandanus</i>	Pandanan.	Uhmann 1932, p. 14	
	<i>grossa</i> Maul.	Isl. of Batchian				see next section
	<i>speciosa</i> Boisid.	New Guinea, Aru Isl.				Maulik 1937
	<i>niparita</i> Fairm.	E. New Guinea			Froggatt 1936, p. 12	
	<i>Pharangispini</i> <i>Pharangispa</i> <i>purpureiventris</i>	Maul. Solomon Isl.	ginger	Zingib.	Maulik 1937	
	<i>Coelaenomenoderini</i> <i>Javeta</i> <i>arecae</i> Uhm.	S. Sumatra	<i>Areca</i>		Kalshoven II 1951, p. 759	
	<i>corporea</i> Uhm.	W. Java, 800 m	<i>Pinanga knbltii</i>	Palmae	leg. Kalshoven 1933	
	<i>iboracica</i> Uhm.	W. Java, 250 m	<i>Metroxylon</i>			leg. Awibowo 1940
	<i>Promecothechini</i> <i>Promecotheba</i> <i>alpiniae</i> Maul.	Solomon Isl.	<i>Alpinia</i>	Zingib.	Maulik 1929, p. 238	
	<i>callosa</i> Baly	Queensland	<i>Cocos</i>		Froggatt 1914, p. 151	
	<i>coeruleipennis</i>	Fiji, Sol. Isl., Tonga,	<i>Cocos, Pritchardia</i>		Id., p. 150	
	<i>cumingii</i> Baly	Philipp. Isl.	<i>Cocos</i>	Palmae	Schultze 1915, p. 190	
		Java	<i>Nipa</i>		leg. Koningsberger	

type 3: between folded top leaves

larval habits	Tribes, genera, species	Locality of host plant	Host plants		References	
			plant group or genus	plant family		
type c: leaf miners	<i>cyaniipes</i> Er. <i>nuciferae</i> Maul. <i>opacicollis</i> Gestr.	Philipp. Isl. N. Celebes New Hebr., Sol. Isl.	<i>Cocos</i> <i>Cocos</i> <i>Cocos, Areca,</i> <i>Phoenix, Phytelephas, Ravenala</i> <i>Cocos, Metroxylon,</i> <i>Nipa, Elaeis</i>	Palmae	Maulik 1929 Lepesme 1947, p. 560	
	<i>papuaana</i> Cs.	E. New Guinea, Solom. Isl.			Froggatt 1914, p. 151 Lepesme 1947, p. 561 Maulik 1937	
	<i>ptychospermae</i> Maul.	Solom. Isl.	<i>Ptychosperma</i>			
	<i>soror</i> Maul.	Moluccas, Sula Isl.	<i>Cocos</i>			leg. Reyne, Maulik 1929
	<i>varipes</i> Baly	Port Darwin	<i>Cocos</i>			Froggatt 1914, p. 151, Lever in Maulik 1932, p. 204
	<i>violacea</i> Spaeth	Solom. Isl.	<i>Ptychosperma</i>			
type a: between folded top leaves	Gonophorini <i>Wallaceana</i> <i>apicalis</i> Gestr.	Sumatra, Malaya, Java	<i>Areca</i> and other palm trees	Palmae	Kalshoven II 1951 p. 755	
	<i>dactyliferae</i> Maul. <i>inornata</i> Gestr. <i>marginata</i> Gestr. <i>pboenicia</i> Maul. sp. pr. <i>pboenicia</i>	India Java W. Java Malaya, Cary Isl. W. Java	<i>Phoenix</i> palms <i>Plectocomia</i> <i>Oncosperma, Zalacca</i> <i>Didymosperma</i>		Maulik 1919, p. see next section id. Corbett 1932, p. leg. Kalshoven	
	<i>Downesia bambusae</i> Maul.	W. Java	bamboo		Gramin.	Taylor 1937, p. 1 (D. excelsa) Maulik 1933a, p. 1
	<i>javana</i> Weise <i>marginicollis</i> Weise	C. & W. Java China	bamboo <i>Sinocalamus</i> (bamboo)			Gressitt 1950, p. leg. Awibowo Taylor 1937, p. 1
<i>perniciosa</i> Spaeth <i>sumatrana</i> Gestr.	W. Java, 1000 m W. Java	bamboo bamboo				
type c: leaf miners	<i>Klitispa opacula</i> Spaeth	C. & W. Java, 250—1000 m	bamboo	Orchid.	see next section	
	<i>Agonita pallipes</i> Spaeth	C. & W. Java, 250—1000 m	bamboo			
	<i>decorata</i> Gestr. <i>spatboglottis</i> Uhm.	Sumatra Java	<i>Coelogyne</i> <i>Spatboglottis,</i> <i>Arundinacea, Pblaenopsis</i>	Orchid.		
	<i>undata</i> Uhm. <i>suturella</i> Baly <i>bicolor</i> Gestr. (<i>Lachnispia</i>)	Borneo Java W. Java	? orchid <i>Pandanus</i> <i>Metroxylon</i>			Pandan.
	<i>Wallacispa javanica</i> Gestr.	N. Celebes	<i>Metroxylon</i>	Palmae	Kalshoven II 1951 p. 759 leg. Awibowo 19	

Tribes, genera, species	Locality of host plant	Host plants		References
		plant group or genus	plant family	
<i>Gonophora bouwingii</i> Baly	Java	<i>Curcuma</i> c.a.	Zingib., Musac.	see next section
<i>haemorrhoidalis</i> Web.	Sumatra	<i>Amomum</i> c.a.		
<i>integra</i> Baly	C. & W., Java	<i>Nicolaia</i> c.a.	Marant.	Maulik 1919, p. 150 leg. Kalshoven
<i>taylori</i> Spaeth	Java	<i>pr. Amomum</i>		
<i>xanthomela</i> Wied.	Java	<i>Elettaria</i> , <i>Musa</i>	Zingib.	Taylor 1937, p. 144
<i>zinzibaris</i> Mots.	Ceylon	ginger		
<i>Micrispa</i> sp.	W. Java	<i>Maranta</i>	Zingib.	Koningsb. '08, p. 70 leg. Dammerman
Chaeridionini				
<i>Chaeridiona metallica</i> Baly	India		Commel.	Miller, 1932, p. 18
<i>Prionispa fulvicollis</i> Guér.	Java	<i>Curcuma</i>		
Oncocephalini			Orchid. Dioscor. Zingib. Solan.	Maulik 1919, p. 100 in collection Bogor Ind. Jrn. Ent. '40 p. 97
<i>Oncocephala angulata</i> Gestr.	Java	<i>Pollicia thyrsoiflora</i>		
	Malaya	orchids ?	Convolv.	Maulik 1919, p. 100 in collection Bogor Ind. Jrn. Ent. '40 p. 97
<i>tuberculata</i> Cl.	India	<i>Dioscorea</i> sp.		
	Java	<i>Curcuma</i> sp.	Convolv.	Maulik 1919, p. 100 in collection Bogor Ind. Jrn. Ent. '40 p. 97
	India	'egg plant'		
	India	<i>Ipomoea batatas</i>	Convolv.	Maulik 1919, p. 100 in collection Bogor Ind. Jrn. Ent. '40 p. 97
	India	Id.		
		<i>Ipomoea sepiaria</i>		
Hispidi				
<i>Hispellinus albertisii</i> Gestr.	Austr. New Guinea	? wild <i>Saccharum</i>	Gramin.	leg. Jeswiet 1928 Uichanco 1929 p. 572
<i>callicanthus</i> Bat.	Philipp. Isl.	<i>Oryza sativa</i>		
	Formosa	Id.	Gramin.	Maulik 1919, p. 11, 17 Woodworth 1921
<i>moestus</i> Baly	Philipp. Isl.	bamboo		
	Malaya	<i>Saccharum officinarum</i>	Gramin.	Corbett 1924, p. 256
<i>Hispella andrewesi</i> Weise	China	narrow leaved grass		
<i>Phidodonta modesta</i> Weise	India		Gramin.	Gressitt 1950, p. 101 (<i>H. donckieri</i>)
		<i>Saccharum officinarum</i> , <i>Andropogon sorghum</i>		
<i>Rhadinosa fleutiauxi</i> Baly	S. China	wild grasses	Gramin.	Lefroy 1909, p. 365 Fletcher 1921, p. 18
<i>nigrocyanea</i> Mots.	Japan	<i>Oryza sativa</i>		
<i>parvula</i> Mots.	E. Java	<i>Saccharum officinarum</i> , <i>Zea mays</i> , <i>Oryza</i> , wild grasses	Gramin.	Gressitt 1950, p. 102 v. Heurn, 1923, p. 119
	C. Java	<i>Imperata</i>		
<i>Asamangulia cuspidata</i> Maul.	India		Gramin.	Zehntner 1894, p. 793
		<i>Saccharum officinarum</i>		
<i>borni</i> Uhm.	Formosa	Id.	Gramin.	leg. Verbeek 1930
<i>wakkeri</i> Zehntn.	Java	Id., + hybr., <i>S. spontaneum</i> , bamboo, <i>Oryza sativa</i>		
		<i>Oryza</i> & other grasses		Fletcher 1921, p. 18 Gressitt 1950, p. 104
				Zehntner 1894, p. 793
				v. Heurn 1923
				Taylor 1937, p. 145



larval habits	Tribes, genera, species	Locality of host plant	Host plants		References	
			plant group or genus	plant family		
type c: leaf miners	<i>cyanipes</i> Er. <i>nuciferae</i> Maul. <i>opacicolis</i> Gestr.	Philipp. Isl. N. Celebes New Hebr., Sol. Isl.	<i>Cocos</i> <i>Cocos</i> <i>Cocos, Areca,</i> <i>Phoenix, Phytelephas,</i> <i>Ravenala</i> <i>Cocos, Metroxylon,</i> <i>Nipa, Elaeis</i>	Palmae	Maulik 1929 Lepesme 1947, p. 560	
	<i>papuana</i> Cs.	E. New Guinea, Solom. Isl.			Froggatt 1914, p. 151 Lepesme 1947, p. 561 Maulik 1937	
	<i>ptychospermae</i> Maul.	Solom. Isl.	<i>Ptychosperma</i>			
	<i>soror</i> Maul.	Moluccas, Sula Isl.	<i>Cocos</i>			leg. Reyne, Maulik 1929
	<i>varipes</i> Baly	Port Darwin	<i>Cocos</i>			Froggatt 1914, p. 151. Lever in Maulik 1932, p. 204
<i>violacea</i> Spaeth	Solom. Isl.	<i>Ptychosperma</i>				
type d: between folded top leaves	Genophorini <i>Wallaceana</i> <i>apicalis</i> Gestr.	Sumatra, Malaya, Java	<i>Areca</i> and other palm trees	Palmae	Kalshoven II 1951, p. 755	
	<i>dactyliferae</i> Maul. <i>inornata</i> Gestr. <i>marginata</i> Gestr. <i>phoenicia</i> Maul. sp. pr. <i>phoenicia</i>	India Java W. Java Malaya, Cary Isl. W. Java	<i>Phoenix</i> palms <i>Plectocomia</i> <i>Oncosperma, Zalacca</i> <i>Didymosperma</i>		Maulik 1919, p. 11 see next section id. Corbett 1932, p. 21 leg. Kalshoven	
type c: leaf miners	<i>Downesia</i> <i>bambusae</i> Maul.	W. Java	bamboo	Gramin.	Taylor 1937, p. 143 (D. excelsa) Maulik 1933a, p. 90	
	<i>javana</i> Weise <i>marginicollis</i> Weise	C. & W. Java China	bamboo <i>Sinocalamus</i> (bam- boo)		Gressitt 1950, p. 85 leg. Awibowo Taylor 1937, p. 144	
	<i>perniciosa</i> Spaeth <i>sumatrana</i> Gestr.	W. Java, 1000 m W. Java	bamboo bamboo			
	<i>Klitispa</i> <i>opacula</i> Spaeth	C. & W. Java, 250—1000 m	bamboo		see next section	
	<i>Agonita</i> <i>pallipes</i> Spaeth	C. & W. Java, 250—1000 m	bamboo			
	<i>decorata</i> Gestr. <i>spuhloglottis</i> Uhm.	Sumatra Java	<i>Coelogyne</i> <i>Spatoglottis,</i> <i>Arundinacea, Pba-</i> <i>laenopsis</i>	Orchid.		
	<i>undata</i> Uhm. <i>suturrella</i> Baly <i>bicolor</i> Gestr. (<i>Lachnispia</i>)	Borneo Java W. Java	? orchid <i>Pandanus</i> <i>Metroxylon</i>		Pandan.	Kalshoven II 1951, p. 759
	<i>Wallacispa</i> <i>javana</i> Gestr.	N. Celebes	<i>Metroxylon</i>	Palmae	leg. Awibowo 1941	

larval habits	Tribes, genera, species	Locality of host plant	Host plants		References
			plant group or genus	plant family	
type c: leaf miners	<i>Gonophora</i> <i>bowringii</i> Baly <i>haemorrhoidalis</i> Web.	Java Sumatra C. & W., Java Java Java Ceylon W. Java	<i>Curcuma</i> c.a. <i>Amomum</i> c.a. <i>Nicolaia</i> c.a. pr. <i>Amomum</i> <i>Elektaria, Musa</i> ginger <i>Maranta</i>	Zingib. Musac.	see next section Maulik 1919, p. 150 leg. Kalshoven
	<i>integra</i> Baly <i>taylori</i> Spaeth <i>xanthomela</i> Wied. <i>zinzibaris</i> Mots. <i>Mierispa</i> sp. Chaeridionini <i>Chaeridiona</i> <i>metallica</i> Baly <i>Prionispa</i> <i>fulvicollis</i> Guér.	India Java	<i>Curcuma</i>	Zingib.	Taylor 1937, p. 141
	Onccephalini <i>Onccephala</i> <i>angulata</i> Gestr.	Java	<i>Pollicia thyrsoiflora</i>	Commel.	
	<i>tuberculata</i> Cl.	Malaya India Java India	orchids? <i>Dioscorea</i> sp. <i>Curcuma</i> sp. 'egg plant' <i>Ipomoea batatas</i> Id. <i>Ipomoea sepiaria</i>	Orchid. Dioscor. Zingib. Solan. Convolv.	Koningsb. '08, p. 70 leg. Dammerman leg. Kalshoven 1930 Miller, 1932, p. 18 Maulik 1919, p. 100 in collection Bogor Ind. Jrn. Ent. '40 p. 97
	Hispiini <i>Hispiellinus</i> <i>albertisii</i> Gestr. <i>callicanthus</i> Bat.	Austr. New Guinea Philipp. Isl.	? wild <i>Saccharum</i> <i>Oryza sativa</i>		leg. Jeswiet 1928 Uichanco 1929 p. 572 Maulik 1919, p. 11, 17 Woodworth 1921
	<i>moestus</i> Baly	Formosa Philipp. Isl. Malaya	Id. bamboo <i>Saccharum officinarum</i>		Corbett 1924, p. 256
	<i>Hispiella</i> <i>andrewesi</i> Weise	China	narrow leaved grass		Gressitt 1950, p. 101 (II. <i>donckieri</i>)
	<i>Phidodonta</i> <i>modesta</i> Weise	India	<i>Saccharum officinarum, Andropogon sorghum</i>	Gramin.	Leftroy 1909, p. 365 Fletcher 1921, p. 18
	<i>Rhadinosa</i> <i>flexicauci</i> Baly <i>nigrocyanea</i> Mots. <i>parvula</i> Mots.	S. China Japan E. Java	wild grasses <i>Oryza sativa</i> <i>Saccharum officinarum, Zea mays,</i> <i>Oryza, wild grasses</i> <i>Imperata</i>		Gressitt 1950, p. 102 v. Heurn, 1923, p. 119
	<i>Atamangulia</i> <i>cuspidata</i> Maul.	C. Java India			Zehntner 1894, p. 793 leg. Verbeek 1930
	<i>borni</i> Uhm. <i>wakkeri</i> Zehntn.	Formosa Java	<i>Saccharum officinarum</i> Id. Id., + hybr., <i>S. spontaneum, bam-</i> boo, <i>Oryza sativa</i> <i>Oryza</i> & other grasses		Fletcher 1921, p. 18 Gressitt 1950, p. 104 Zehntner 1894, p. 793 v. Heurn 1923 Taylor 1937, p. 145

larval habits	Tribes, genera, species	Locality of host plant	Host plants		References	
			plant group or genus	plant family		
type c: leaf miners	<i>Dactylispa bakeri</i> Gestr.	E. Java	<i>Saccharum spontaneum</i>	} Gramin.	Kobus in Uhmann 1935, p. 149 Schultze 1915, p. 188 leg. Kalshoven, Uhmann 1956, p. 68 Gressitt 1950, p. 1 Gressitt 1950, p. 1 Schultze 1915, p. 188 Zehntner 1894, p. 793 (<i>Hispa</i> sp. leg. Kalshoven (Uhm. 1956, p. Kalshoven II 1951 p. 761 leg. Kalshoven Gressitt 1950, p. 1 leg. Awibowo 19 leg. Verbeek 192 Schultze 1915, p. 188 Roepke (Uhm. '29 p. 149); Kalshoven (Uhm. ' p. 64 v. d. Meer Mohr 1926, p. 500 leg. Leefmans, Franssen leg. Kalshoven leg. Kalshoven 19 leg. Kalshoven Bernard/Menzel 1924 leg. Kalshoven (Uhm. 1956, p. 62) Bernard/Menzel 1924 leg. Kalshoven Kalshoven (Uhm. 1956, p. 6	
	<i>cladophora</i> Guér.	Philipp. Isl.	<i>Bambusa blumeana</i> , <i>Hymenachne</i> sp.			
	<i>kaulina</i> Gress.	China	bamboo			
	<i>lubi</i> Uhm.	China	<i>Anthraxox hispidus</i>			
	<i>infusata</i> Chap.	Philipp. Isl.	<i>Bambusa blumeana</i>			
	<i>spinosa</i> Web.	Java	<i>Saccharum officinarum</i>			
		W. Java, 800 m	<i>Panicum palmifolium</i> , <i>Rottboellia exaltata</i>			
		E. Java	<i>Zea mais</i>			
		C. Java	* <i>Imperata cylindrica</i> * <i>Saccharum spontaneum</i>			
	<i>sjöstedti</i> Uhm.	China	ssp. of <i>Bambusa busa</i> , <i>Lingnania</i> , <i>Sinobambusa</i>			
	<i>sumatrana</i> Weise	C. Java	<i>Saccharum officinarum</i>			
	<i>bipartita</i> Weise	Philipp. Isl.	* <i>S. spontaneum</i> <i>Bambusa blumeana</i>			
		W. Java	* <i>Sterculia</i>			Stercul.
	<i>leonardi</i> Rits.	Sumatra	* <i>Ceiba pentandra</i>			Bombac.
		W. & C. Java	*id.			
	<i>aspera</i> Gestr.	C. Java	<i>Helicteres</i>			Stercul.
<i>debilis</i> Gestr.	W. Java, 250 m	* <i>Gardenia augusta</i>	} Rubiac.			
	W. Java, 800 m	<i>Nertera depressa</i>				
<i>jawaensis</i> Maul.	W. Java, —800 m	<i>Plectronia horrida</i> <i>Gardenia</i>				
		salam utan, kerema	?Myrtac. ?			
<i>manterii</i> Gestr.	N. Sumatra	<i>Cinchona ledgeriana</i>	Rubiac.			
	Java	* <i>Curcuma</i> * <i>Lagerstroemia</i>	Zingib. Lythrac.			
<i>vetbi</i> Gestr.	W. Java, 800 m	<i>Plectronia horrida</i> , tauluan	Rubiac.?			

Tribes, genera, species	Locality of host plant	Host plants		References
		plant group or genus	plant family	
<i>angulosa</i> Solsky	E. Asia	?* <i>Filipendula palmata</i>	Rosac.	Gressitt 1950, p. 111
<i>nemorialis</i> Gestr.	W. Java, 800 m	<i>Rubus moluccana</i>		
<i>Dicladispa armigera</i> Oliv.	India Java	<i>Oryza sativa</i> id. and wild grasses	Gramin.	Maulik 1919, p. 15 v. Heurn 1923; Taylor 1937 Zehntner 1894, p. 793
<i>alternata</i> Chap.	W. Java, 1500 m	<i>Saccharum officinarum</i> * <i>Saccharum spontaneum</i>		
<i>Platypria andrewesi</i> Weise	India Ceylon	<i>Zizyphus jujuba</i> <i>Erythrina</i>	Legum.	Lefroy 1909, p. 364 Maulik 1919, p. 11, 17 Fletcher 1919, p. 237 leg. Leefmans 1929 leg. Leefmans 1924
<i>echidna</i> Guér.	India	<i>Erythrina lithosperma</i>		
<i>echinogale</i> Gestr.	Java	<i>Erythrina</i> <i>Tephrosia candida</i> <i>Cajanus indicus</i> 'katjangen'		
	Sumatra	<i>Cajanus indicus</i>		
		<i>Uncaria gambir</i>	Rubiac.	Schneider 1940, p. 58
<i>hystrix</i> Fabr.	India	<i>Erythrina</i> spp. <i>Dolichos lablab</i> <i>Sesbania grandiflora</i> <i>Rubus ellypticus</i>	Legum. Rosac.	Beeson 1919, Maulik 1919, p. 11 Ind. For. Rec. 1936, p. 303
		<i>Myrica</i>	Myric.	

* adults only

ANNOTATIONS TO THE FOREGOING TABLE, AND REFERENCES

Botryonopini

Botryonopa grandis Baly. A strikingly coloured beetle with metallic blue or green elytra, 24 mm in length, inhabiting the coastal regions of Sumatra and Java. The species once caused serious injury to a plantation of nipah palms (*Nipa fruticans*), as was reported from Northeast Sumatra in 1935. The species was identified at the time as *B. marginata* Uhm., but specimens sent to the Institute for Plant Diseases and Pests, Bogor (Buitenzorg), Java, were found to belong to *B. grandis*.

B. sanguinea Guér. is a common species on the rumbia or kirai palm, *Metroxylon* sp., in the valleys of West Java up to 600 m. KONINGSBERGER (1915) mentioned it as belonging to the fauna of the jungle borders and stated that it occasionally moved from wild palms to the coconut, but this has not been confirmed, as was pointed out by ROEPKE (in UHMANN, 1929, p. 44). Its occurrence in the tops of rattan palms was noticed by DRESCHER in Banyumas, and by myself near Bandjar in West Java.



larval habits	Tribes, genera, species	Locality of host plant	Host plants		References	Tribes, genera, species	Locality of host plant	Host plants		References
			plant group or genus	plant family				plant group or genus	plant family	
type c: leaf miners	<i>Dactylipa bakeri</i> Gestr.	E. Java	<i>Saccharum spontaneum</i>		Kobus in Uhmann 1935, p. 149	<i>angulosa</i> Soisky	E. Asia	<i>?Filipendula palmata</i>		Gressitt 1950, p. 111
	<i>cladophora</i> Guér.	Philipp. Isl.	<i>Bambusa blumeana</i> , <i>Hymenobne</i> sp.		Schultze 1915, p. 188 leg. Kalshoven, Uhmann 1956, p. 68	<i>nemoralis</i> Gestr.	W. Java, 800 m	<i>Rubus moluccana</i>	Rosac.	leg. Kalshoven (Uhm., '56, p. 69)
	<i>kaulina</i> Gress. <i>lubi</i> Uhm. <i>infucata</i> Chap.	China China Philipp. Isl.	bamboo <i>Anthraxen hispidus</i> <i>Bambusa blumeana</i>		Gressitt 1950, p. 118 Gressitt 1950, p. 121 Schultze 1915, p. 188 Zehntner 1894, p. 793 (<i>Hispa</i> sp.)	<i>Dicladyspa armigera</i> Oliv.	India Java	<i>Oryza sativa</i> id. and wild grasses		Maulik 1919, p. 15 v. Heurn 1923; Taylor 1937 Zehntner 1894, p. 793 leg. Kalshoven 1923
	<i>spinosa</i> Web.	Java	<i>Saccharum officinarum</i>			<i>alternata</i> Chap.	W. Java, 1500 m	<i>Saccharum officinarum</i>	Gramin.	
		W. Java, 800 m	<i>Panicum palmifolium</i> , <i>Rottboellia exaltata</i> <i>Zea mays</i>	Gramin.	leg. Kalshoven (Uhm. 1956, p. 71)	<i>Platypria andrewesi</i> Weise	India Ceylon	<i>Zizyphus jujuba</i> <i>Erythrina</i>		Lefroy 1909, p. 364 Maulik 1919, p. 11, 17 Fletcher 1919, p. 237
		E. Java	<i>Imperata cylindrica</i> <i>Saccharum spontaneum</i>		Kalshoven II 1951, p. 761	<i>echidna</i> Guér.	India	<i>Erythrina lithosperma</i> <i>Erythrina</i>	Legum.	leg. Leeftmans 1929 leg. Leeftmans 1924
		C. Java	<i>Imperata cylindrica</i> <i>Saccharum spontaneum</i>		leg. Kalshoven	<i>echinogale</i> Gestr.	Java	<i>Tephrosia candida</i> <i>Cajanus indicus</i> 'katjangan'		leg. Kalshoven 1931 v. d. Meer Mohr 1926, p. 500
	<i>spottedi</i> Uhm.	China	ssp. of <i>Bambusa busa</i> , <i>Lingnania</i> , <i>Sinobambusa</i>		Gressitt 1950, p. 127		Sumatra	<i>Cajanus indicus</i>		leg. Kalshoven 1931 v. d. Meer Mohr 1926, p. 500
	<i>sumatrina</i> Weise	C. Java	<i>Saccharum officinarum</i>		leg. Awibowo 1925	<i>hystrix</i> Fabr.	India	<i>Uncaria gambir</i>	Rubiac.	Schneider 1940, p. 58
	<i>bipartita</i> Weise	Philipp. Isl.	<i>S. spontaneum</i> <i>Bambusa blumeana</i>		leg. Verbeek 1926 Schultze 1915, p. 188			<i>Erythrina</i> spp. <i>Dolichos lablab</i> <i>Sesbania grandiflora</i> <i>Rubus ellipticus</i>	Legum.	Beeson 1919, Maulik 1919, p. 11
		W. Java	<i>Sterculia</i>	Stercul.	Roepke (Uhm. '29 p. 149); Kalshoven (Uhm. '56 p. 64 v. d. Meer Mohr 1926, p. 500			<i>Myrica</i>	Rosac.	Ind. For. Rec. 1936, p. 303
	<i>leonardi</i> Rits.	Sumatra	<i>Ceiba pentandra</i>	Bombac.	leg. Leeftmans, Franssen					
	W. & C. Java	*id.		leg. Kalshoven 1941						
<i>aspera</i> Gestr. <i>debilis</i> Gestr.	C. Java W. Java, 250 m W. Java, 800 m	<i>Helicteres</i> <i>Gardenia augusta</i> <i>Neiteria depressa</i> <i>Plectyonia horrida</i> <i>Gardenia</i>	Stercul. Rubiac.	leg. Kalshoven 1941						
<i>javensis</i> Maul.	W. Java, — 800 m	salam utan, kerema	?Myrtac.	leg. Kalshoven (Uhm. 1956, p. 62)						
<i>muntenii</i> Gestr.	N. Sumatra	<i>Cinchona ledgeriana</i>	Rubiac.	Bernard/Menzel 1924						
	Java	<i>Cucumis</i> <i>Lagerstroemia</i>	Zingib. Lythrac.	leg. Kalshoven						
<i>veiki</i> Gestr.	W. Java, 800 m	<i>Plectyonia horrida</i> , tauluan	Rubiac.?	Kalshoven (Uhm. 1956, p. 62)						

ANNOTATIONS TO THE FOREGOING TABLE, AND REFERENCES

Botryonopini

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B. sanguinea Guér. is a common species on the rumbia or kirai palm, *Metroxylon* sp., in the valleys of West Java up to 600 m. KONINGSBERGER (1915) mentioned it as belonging to the fauna of the jungle borders and stated that it occasionally moved from wild palms to the coconut, but this has not been confirmed, as was pointed out by ROEPKE (in UHMANN, 1929, p. 44). Its occurrence in the tops of rattan palms was noticed by DRESCHER in Banyumas, and by myself near Bandjar in West Java.

Anisoderini

Anisodera beetles are very common in western Indonesia and Malaya. From observations made in Java they appear to be mainly associated with large-stalked Zingiberaceae, which are a regular feature in ravines and along the borders of the jungle forests, reaching a height of a few meters. On my host labels these plants are mostly indicated by their vernacular names (hondje and bolang in West Java, tepus in Central Java, etc.), which names are in use for species of the genera *Anomum*, *Achasma* and *Nicolaia*. The beetles can easily be found by unrolling the youngest still sprouting leaves, where they hide, often in couples. They feed there on the succulent inner parts, and when attacked leaves afterwards unfold, they show cross rows of holes; these details were already mentioned by KONINGSBERGER in 1915. Some species also inhabit wild banana (*Musa*) and move occasionally to cultivated banana plants growing close to the forest or to ravines with wild vegetation. Once I found some *Anisodera* beetles in high sedge-grass on the slopes of Mount Gedé (ca 1200 m, West Java); out of three specimens captured two were identified by UHMANN as *A. lucidiventris* and one as *A. suturella* (two species considered to be closely allied). All other specimens in the author's collection, identified as belonging to one of the two species, were collected on large Zingiberaceae.

It may be remarked here that *Anisodera* beetles have so far defied all attempts of taxonomists to divide this genus into readily distinguishable species. This is especially true of the material collected in Sumatra, which has been assigned to 8 species. Yet UHMANN wrote (1943, p. 169) "Die *Anisodera*-Arten sind einander oft sehr ähnlich und scheinen recht zahlreich zu sein, denn ich habe viele Einzelstücke gesehen, die sich bei keiner der bisher beschriebenen Arten unterbringen liessen. Auch viele kritische Stücke habe ich gefunden".

It is regrettable that no notes are available on the hostplants of the Sumatran species, except in one case (*A. elongata*).

Concerning the larval habits of the *Anisodera* species nothing appears to have been published so far, which is a curious fact for so common insects. Fortunately I made an observation on one species, *A. guérini*. This is a regular feeder on *Costus speciosus*, a characteristic large herb with leaves placed spirally (screw-wise) and with a terminal inflorescence, growing abundantly in teak forests and other wooded areas in Java; BEESON mentions the same host for *guérini* in India. I found larvae, pupae and immature beetles in tunnels of 8—10 cm length in the stalks of the host plant at some distance from the top. The presence of these tunnels was indicated by a small oval hole. The unfolded leaves of *Costus* may show cross rows of oval perforations, which are probably the results of the feeding activities of the borers in the core (heart) of the still folded leaves at the top. The beetles have been caught in light traps but they have also been seen on the wing during day-time.

Thus the larvae of *A. guérini* appear to live in galleries in the heart of the host plant and can be classified in the ethological group of stalk borers. They appear to have somewhat similar habits as the larvae of the related genera *Lasiochila* and *Estigmene*, which are shoot borers in bamboo (see below). It may be assumed that larvae of other *Anisodera* species are also stalk borers in Zingibera-

ceae during their larval stages. A corroboration of this assumption was found in a note by LEEFMANS, who once observed an *Anisodera* species boring in leaf stalks of a banana tree (*Musa*) in Bogor (1932).

Estigmena chinensis Hope, *Lasiochila goryi* Guér. and *L. rufa* Guér. Beetles bred from larvae boring in tops of bamboo shoots in different parts of Java have been assigned by the specialists to these three apparently closely allied species; the latter two were originally described from Java. The damage done by the borers (identified on that occasion as "*Anisodera goryi*"*) was described by ROEPKE (1918) as follows (translated from the Dutch): "The larva tunnels in the wall of green bamboo internodes and pupates in it. The beetles bore exit holes. As a result of the activities of the insect narrow slits are formed which are not rarely seen on ripe, hardened bamboo stalks. The openings allow the entrance of rain water, dirt and secondary insect intruders, which prevent a normal development of the internode". This damage is well known to the Indonesians, who in West Java call the borer tjangkilung; however, this name is also used for a Pyralid borer causing similar deformation of the bamboo internodes (KONINGSBERGER, 1915, p. 207). The habits of *Estigmena chinensis* as a very injurious shoot borer of various bamboo species have long been known from observations in India and Burma (STEBBING 1914, p. 254, BEESON 1941, p. 225, MATHUR 1943, p. 117). Beetles, identified by UHMANN as belonging to this species were bred by my assistants from bambu krisik (*Bambusa multiplex*) in Bandjar, West Java, and from pring legi (*Bambusa vulgaris*) and pring wuluh (*Schizostachyum blumei*) in the teak area of Central Java; they were also collected from unidentified bamboo in Bogor, West Java.

However, a specimen bred from a shoot boring larva in bambu tali (*Gigantochloa apus*) at Bandjar was identified by UHMANN as *Lasiochila rufa*, and a specimen labelled tjangkilung at Bogor, as *L. goryi*. No differences between these three species as to their habits or habitats have been discovered in Java so far.

Cryptonychini

Several species of this tribe were studied to some extent in connection with the damage done by them, both as larvae and adults, to coconut and other palms of economic importance. They can be collected, as far as known, by opening the still folded top leaves, the spear, of their host trees. *Plesispa reichei*, well known through the investigations by LEEFMANS, attacks young coconut trees. The *Bron-tispa* species, including some of the worst pests of *Cocos*, live in the crowns of mature trees.

ROEPKE (1935) recorded how he detected a conspicuous 16—18 mm large hispid, predominantly steel-blue, with the base of the elytra straw yellow, on a very spiny *Pandanus* sp. near Labuan on the isle of Batchian, North Moluccas, in August 1929. The beetle was found between the unexpanded top leaves, where larvae and pupae were also present. The species was described by MAULIK as *Oxy-*

*) In the collection of the Entomological Laboratory, Agricultural University, Wageningen: there is a specimen of *Anisodera goryi* Guér. (det. UHMANN) which bears the label "dari daun bamboe" (= from bamboo leaf) "leg. ZEHNTNER" (Salatiga, ± 1900).

cephala grossa. From our survey it now appears that three more *Oxycephala* species are living on *Pandanus* in different regions.

Gonophorini

The *Wallaceana* species, small brown beetles, live in the spear of palms in about the same manner as the *Callispa* species. Though rather common they have not been well investigated because their host palms are of less importance than the coconut.

W. marginata Gestr. was found in the bracteolate inflorescence of a rattan palm (*Plectocomia* sp.) (leg. PAINE, Mount Salak, West Java, XII.1930).

One species often attacks ornamental palms (like veerpalm, waaierpalm, bintang mas) grown in tubs in the varandahs of houses in Java. This was already known to ZEHNTNER (specimen labelled Salatiga, 1903) and to JACOBSON (Semarang, 1902). The beetles have been variedly identified by several coleopterists as *W. palmarum* Gestr., *W. apicalis* Gestr., and *W. inornata* Gestr. Probably there is only one species involved which shows some variation with regard to the more or less marked presence or total absence of a black patch at the end of the elytra.

W. palmarum has been found to be a serious pest of the *Areca catechu* palm (betel nut) in North Sumatra. It was further collected from coconut near Medan by CORPORAAL (21.IV.1921) and from kirai (*Metroxylon*) in Bogor. In Malaya it has been reported to be an important enemy of *Nipa* and *Areca* palms, the larvae feeding at the bases of leaf petioles (CORBETT, 1932, p. 21). There is also a record about its attacking *Eugeissona triste* and *Metroxylon sagus* in the same region (*Proc. Haw. Ent. Soc.*, vol. 14, 1950, p. 155).

Downesia species are indigenous in Java, where they appear to be regular inhabitants of bamboos as was observed on several occasions by DRESCHER (i.l.) and his native collectors, and by TAYLOR (1937). In 1931 I noted that the larvae of one species, afterwards described as *D. bambusae*, mine in the leaves (KALSHOVEN, 1931, p. 30; MAULIK, 1933, p. 60). The beetles are very slender.

Klitispa opacula Spaeth, formerly referred to the genus *Agonita*, and *Agonita pallipes* Spaeth have also repeatedly been collected from bamboo in the mountain districts by DRESCHER. TAYLOR stated that the larvae were leaf miners (1937, p. 144); I found the same.

The record of the *Coelogyne* orchid as the host plant of *Agonita decorata* Gestr. (KALSHOVEN, vol. 2, 1951) is based on a communication from the orchid grower, Mr. LATIF, in Kayu Taman, Sumatra, May, 1936. Only one specimen of the beetle appears to have been submitted.

The habits of the Spathoglottis beetle, *Agonita spathoglottis* Uhm., with its leaf mining larva have been studied mainly by VAN DER VECHT (1930). In FRANSSSEN & TIGGELOVEND's review of the orchid pests (1935) two more orchids are added to the list of food plants, but the species of the beetle is wrongly identified as *Gonophora xanthomelaena* Wied., the name *Agonita spathoglottis* Uhm. being mentioned as a synonym. The same was done in my handbook and was a result of the two species having got mixed up in the collections of Bogor and London. The mistake was corrected by UHMANN (1953).

A. undata, formerly considered as a var. of *A. spathoglottis*, was collected from the foliage of a *Lagerstroemia* tree used as a support of epiphytic orchids in Pontianak, West Borneo (leg. SCHUITEMAKER). Most probably the species bred on the orchids.

Agonita suturella Baly, a rather conspicuous red beetle, has been taken from the leaves of *Pandanus* plants (corkscrew palms) in widely separated localities in Java by F. C. DRESCHER and myself. No larvae have been observed so far.

Gonophora bowringi Baly is very common in the teak woods of Java, living on temu (*Curcuma* spp.) and lireh (*Zingiber cassumunar*). The former herb grows abundantly in these forests, actually covering the ground over large stretches.

G. xanthomela Wied. (formerly *xanthomelaena*) is a regular inhabitant of the gigantic Zingiberaceous herbs called hondje in West Java (largely *Nicolaia* species), tepus (*Amomum coccineum* et al.) and bangle (*Zingiber* sp.) in Central Java, bolang near Subah (= *Alpinia malaccensis* ?), and sentet (*Amomum* sp. ?) near Paree, Kediri, Central Java. In West Java it has been found breeding on wild *Musa* by TAYLOR (1937, p. 144) and AWIBOWO (i.l.). The larvae mine in the leaves, the feeding beetles cut very characteristic narrow streaks in the leaf epidermis.

TAYLOR (l.c.) also mentions orchids as host plants of *xanthomela* but this must be another result of the confusion between this species and *Agonita spathoglottis* explained on the foregoing page. KONINGSBERGER recorded *Gonophora orientalis* Guér. as a pest of fleshy-leaved orchids in his second survey of injurious and beneficial insects of Java (1908, p. 70) and the same author wrote in 1915 (p. 127) that the beetle could be found commonly on home-grown orchids in the towns, the larvae mining in the leaves. According to information received from UHMANN *G. orientalis* Guér. is a synonym of *G. xanthomela* Wied. It therefore appears that in KONINGSBERGER's time the same misidentification of the species was made as in recent years.

G. integra Baly has approximately the same foodplants as the former species, but it is more common in West Java and Sumatra, and has not been found farther east than Mount Slamet. So far it has been listed from hondje, tepus and tongtak in W. Java (*Nicolaia* and *Zingiber* species).

A small number of mining larvae were found working in a parallel row in the leaf of a tepus plant on the East slope of Mount Salak, in a locality where several single specimens and couples of *G. integra* were collected from the same plants. Very probably these were the larvae of this species.

G. taylori Spaeth has been described from beetles collected by F. C. DRESCHER on tepus plants, probably an *Amomum* sp., on Mount Slamet, Central Java.

Specimens of *G. (Lachnispia) bicolor* Gestr., taken from kirai (*Metroxylon* palm) near Bogor, West Java (leg. FRANSSSEN V.1937) are present in the collection of the Institute for Plant Diseases and Pests in that town.

Oncocephalini

The record of *Oncocephala angulata* as a leaf miner of cultivated orchids appears to go back to KONINGSBERGER, who mentioned the species very briefly in his second list of injurious and beneficial insects of Java (1908, p. 70). This

statement he repeated, again without mentioning the species of orchids affected, in his comprehensive work "Java Zoologisch en Biologisch" (1915, p. 127). LEEFMANS included the species in his treatise on diseases and pests of orchids (1931, p. 8). Although LEEFMANS did not cite KONINGSBERGER, he may have drawn upon this early information as he added no own observations whatsoever on the habits of the insect. Again, FRANSSEN & TIGGELOVEND mention *O. angulata* in their more detailed booklet on the pests and blights of orchids in Java (1935), citing LEEFMANS. They plainly state that they themselves did not meet the species on the plants in Java, where they carried out their studies for several years. Their record of the insect's occurrence on *Coelogyne* orchids in Sumatra is incorrect and should refer to *Agonita decorata* (KALSHOVEN, 1951, vol. 2, p. 760). As a matter of fact, the Bogor collection did not contain any specimens bred from or taken on orchids at the time, I searched for authentic material in 1951. On the other hand this collection included a few specimens, labelled *O. bicristata* Chap., a synonym for *angulata* according to UHMANN, which had been collected from two other Monocotyl families, while there is a record of the species having occurred on a solanaceous plant in Malaya (see table). In all these instances only the beetles appear to have been observed. Therefore sufficient evidence is still lacking about the regular or true host plants of the mining larvae.

Specimens of *O. tuberculata* taken from sweet potato plants (undated) were represented in the Bogor collection before 1924, when they were identified by BRYANT of the British Museum, London. The occurrence of the species on this host plant was recently confirmed by TJOA TJIEN MO, who also collected the mining larvae (personal communication by E. UHMANN to the writer). The occurrence appears to be rare, as the insect is not mentioned in FRANSSEN's treatise on the injurious insects of sweet potato in Java (1934, p. 205).

Hispini

Many host plant records in this readily recognisable group of mostly black, spiny beetles, refer to the widely cultivated Graminaceae, sugar cane and rice. However, the same Hispini appear to frequent a large variety of wild grasses, including the wild relative of sugar cane, the tall, wide-spread glagah or kaso grass, *Saccharum spontaneum*, for large series of the beetles have been captured outside cultivated areas by KNAPPERT, PASTEUR, JACOBSON and DRESCHER. This is particularly the case with *Hispellinus moestus*, *Rhadinosa parvula*, *Dactylispa spinosa*, and *Di cladispa armigera*.

The ecology of *Asamangulia wakkeri* is perhaps the best known among the species of the grass inhabiting group, thanks to the early studies of ZEHNTNER, who was the first sugar cane entomologist in Java.

The occurrence of *Hispellinus albertisii* on *Saccharum spontaneum* in New Guinea (Fly River) seems to be probable through the fact that a series of the beetle was collected by the botanist and selectionist JESWIET, who visited the country to study the wild relatives of sugar cane.

TENTATIVE CONCLUSIONS

In presenting this study on the association between tribes and genera of oriental Hispinae and certain plant groups, the author is fully aware that most observations