

Host Relations and Distribution of New Guinea Hispine Beetles¹

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The hispine beetles constitute an economically important subfamily of the leaf-beetles (Chrysomelidae) which present interesting problems from the standpoint of distribution and host relations. In general the beetles are limited in host range, and feed on particular genera or families of Monocotyledonae. They are tropical, and do not extend high in the mountains. For the most part, their habits are secretive, and in New Guinea they are rarely found by the general collector, or even one who does extensive sweeping of vegetation for leaf-feeding insects.

Maulik (1937) treated the host relationships of the hispine beetles from the world standpoint, but much more is now known on the subject. Kalschoven (1957) brought the subject up to date for the Orient, presenting an interesting discussion on host preference. The South Pacific fauna in the subfamily was reviewed (Gressitt, 1957) with many new host records, and the distribution discussed again (Gressitt, in press). Since then, a number of additional species and host records have been accumulated for New Guinea. It is thus now possible to discuss in a rough way the hosts and distribution on a generic basis for that island. Many gaps still exist, however, so a more conclusive discussion must come later. Since a number of the new species are not yet described, no reference will be made to species names. The discussion will be limited to New Guinea and adjacent islands, including the Bismarck Archipelago, with occasional reference to hosts of Solomon Islands representatives of genera occurring in New Guinea.

HOST RELATIONS

Most of the genera of hispines in New Guinea belong to the more primitive tribes of spineless forms which, at least here, feed entirely on monocotyledons. Half of the non-spiny genera belong to the tribe Cryptonychini, which is fairly primitive, and which seems to be largely limited

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to the Palmae. If Hutchinson (1934) is followed, the more primitive hispines seem to be mainly attached to the more primitive plants and have limited host ranges, and the more specialized hispines seem to have slightly wider host ranges, including higher plants in some cases. Thus there appears to be a correlation between the phylogeny of the beetles and the phylogeny of their hosts, as appeared to be the case in the closely related subfamily Cassidinae (Gressitt, 1952). The spiny hispines are the most specialized. In New Guinea, of the four genera of spiny hispines, two (*Hispellinus* and *Di cladispa*) seem to be limited to the Gramineae and two (*Dactylispa* and *Platypria*) may attack dicotyledons, although the local hosts have not been determined. The hosts of *Dactylispa* and *Platypria* in southeast Asia include some dicotyledons, and careful searching of monocotyledons in New Guinea has failed to produce evidence of these two genera.

Most of the New Guinea forms, and particularly the more primitive ones, live in hidden environments, at least in the immature stages. The larval niches include (1) petiole-bases of palm fronds (between petiole-base and trunk), particularly or rattans; (2) folded leaflets of new palm fronds (including leaflets not properly opened because of entwined vines, rattan, tendrils, etc.); (3) base of crowns of monocots (Araceae, Pandanaceae, Cyperaceae, Gramineae); and (4) mines within leaves (Palmae, Pandanaceae, Cyperaceae, Gramineae, Zingiberaceae, and rarely Dicotyledonae). For the first category, the adults are often found on new fronds, and sometimes in the second larval niche. Adults of the second and third categories are generally found with the larvae, and adults of the fourth category on the under surfaces (*Promecotheca*, some Hispini) or upper surfaces (most of the other miners) of the open leaflets. Thus it is seen that the more primitive eight genera occur in the first three niches and the more advanced eight genera are probably all leaf-miners.

In general, a species of hispine is limited to one genus or family of plants, but a genus of hispines may have more than one family among the hosts of its species.

The known hosts (with some abridgement among the palms) are indicated in Table I. The numbers refer to the larval niches, as indicated in the preceding paragraph.

DISTRIBUTION

As already shown (Gressitt, in press), the faunae of the Old and New Worlds in this group are generically and tribally mutually exclusive. Host limitation in relation to the Bering connection as a filter bridge is assumed to bear on this. Furthermore, the Papuan fauna, though having some endemic genera (asterisked on Table I), is primarily related to the Malayan and Philippine faunae, and is thus Oriental. Only one true Australian genus (*Eurispia*) occurs in New Guinea, and it has been

found only in the Territory of Papua (SE New Guinea).

Within New Guinea, the known distribution of the various genera relates primarily to the extent of special searching, most of which has been along the northern coast, in Papua, and in a few interior highland areas. Searching in other areas will show that many of the genera are widely distributed over the island. The Bismarck Archipelago has some endemic genera and species (Gressitt, 1957). The distribution for the various genera, as far as known, is indicated on the map by abbreviations showing records.

TABLE 1. Hosts of New Guinea Hispinae

	MUSCAGAE	ARACEAE	ZINGIBERACEAE	PALMAE					PANDAN- ACEAE	CYPERACEAE	GRAM- INAE	DICOTYLEDONS			
				Nyssa	Metroxylon	rattans	Cocos	Rhopaloblaste	Areca	other palms	Pandanus	Freyinetia	canes	grasses	
CALLISPINI															
<i>Hispodonta</i>				1											
EURISPINI															
<i>Eurispa</i>												3?		?	
CRYPTONYCHINI															
<i>Octodonta</i>					2				2						
<i>Brontispa</i>							2	2	2						
<i>Plesispa</i>							2	2	2				3	3	3
* <i>Ceratispa</i>				1	1			1							
* <i>Oxycephala</i>					1	1									
<i>Callistola</i>		(3)									3	3			
COELAENOMENODERINI															
* <i>Enischnispa</i>					4?										
PROMECOTHECINI															
<i>Promecothea</i>			(4)	4	4		4	4	4	4	4	4	(4)	(4)	
GONOPHORINI															
* <i>Aspidispa</i>					4					4					
<i>Gonophora</i>	4		4												
HISPINI															
<i>Hispellinus</i>														4	
<i>Dactylispa</i>															?
<i>Dicladispa</i>															4
<i>Platypria</i>															?

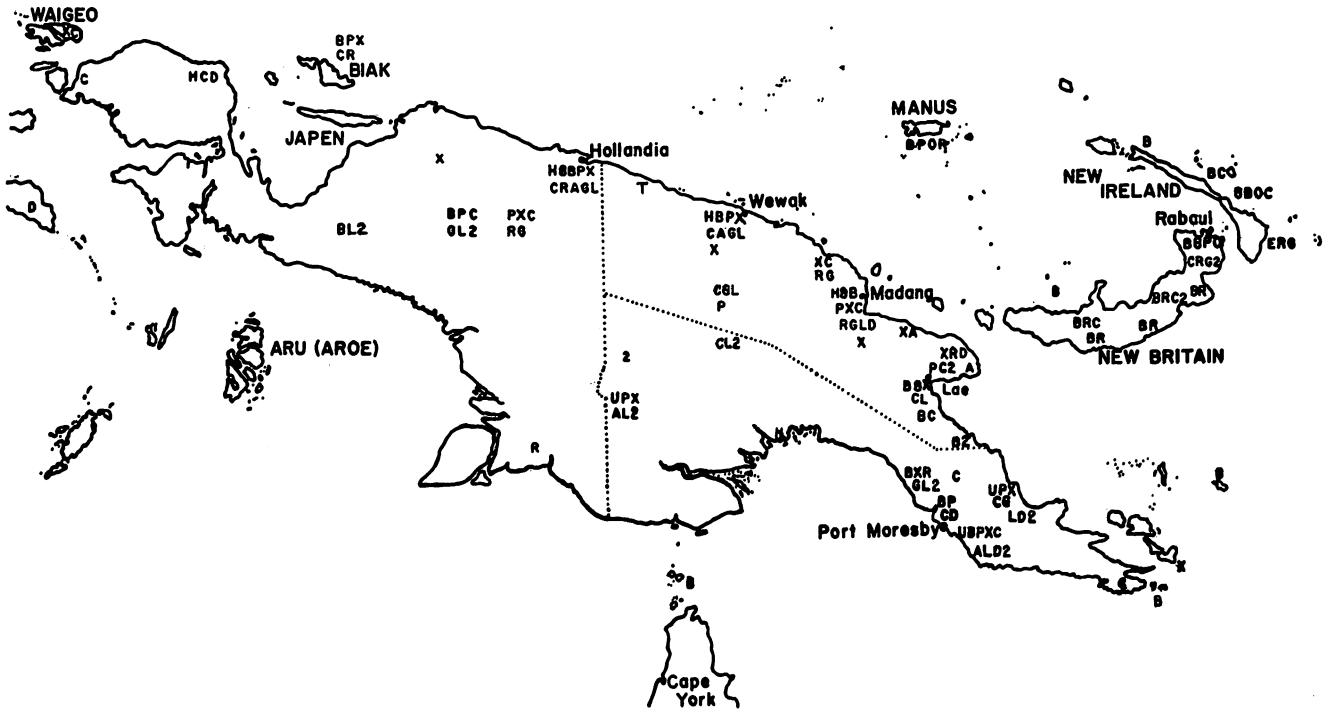
Note: Numbers refer to larval niche. Asterisk indicates genus is endemic to the Papuan Subregion. Parentheses indicate hosts of Solomon Island species. Question mark after number indicates uncertainty as to niche and question mark before number indicates questioned host.

Lieftinck (1949, fig. 288) has indicated five zoogeographical provinces for New Guinea as a result of studying the Odonata of the island: (1) The Vogelkop and "neck" at the west end, (2) the northern part of the main portion, north of the high ranges, extending east to the Adelbert Mountains and upper Ramu Valley, (3) the central high mountain areas for the same west-east extension, (4) the eastern end of the island, including the Huon Peninsula, and (5) the southern part of the main portion of the island. Hispines have not been sufficiently collected in some parts of New Guinea to compare their distribution closely with that of the Odonata. However, the division between Lieftinck's provinces 2 and 4 may break down for this group, and province 3 should perhaps be extended farther eastward and then be tapered to a line extending eastward along the main divide (Owen Stanley Mts., etc.) to divide province 4 into northern and southern portions.

The altitudinal distribution is a conspicuous aspect of the problem, for several genera have been found only rather near sea level, and there are no records for above 2,100 meters. Intensive searching has been done between altitudes of 1,500 and 2,000 meters and higher, so in some areas the highest limits may have been established. Insufficient searching, however, has been done between altitudes of 500 and 1,500 meters, so it should be expected that the altitudinal ranges of some of the other genera will be extended. Eight genera (*Hispondonta*, *Eurispa*, *Octodonta*, *Ceratispa*, *Oxycephala*, *Enischnispa*, *Aspidispa*, and *Platypria*) have not been found above an altitude of 400 meters, and some of these have been found very little above sea level. *Dactylispa* has been found up to about 700 meters, *Promecothea* to just over 1,000 meters, *Micrispa* to 1,360 meters, *Plesispa* to 1,480 meters, *Brontispa* and *Diclidispa* to 1,700 meters, *Hispellinus* to just over 2,000 meters, and *Callistola* to 2,100 meters.

The relative abundance of species at low and medium-high altitudes may be suggested by recording that in one lowland locality (Maprik) thirteen species were found in just over a day's searching, whereas in one highland area (Swart Valley environments) between 1,200 and 2,000 meters, only eight species were found in two and one-half weeks of searching.

Whereas some genera of Cerambycidae and Chrysomelidae with wide host ranges have been found in New Guinea from sea level to 3,600 meters in altitude, the Hispinae, being largely confined to tropical hosts, are limited to the ranges of these hosts. In several cases, however, searching of appropriate hosts has failed to produce hispines towards the upper altitudinal ranges of the hosts. In many areas *Pandanus* occurs up to nearly 1,000 meters higher than *Callistola* has been found, and up to nearly 2,000 meters higher than *Promecothea* has been found. In one area a *Brontispa* appeared to extend 400 meters short of the altitudinal range of its palm host in the same valley. The upper limit of *Ceratispa* appears to be far short of that of its rattan hosts. Some of the other



genera do not have enough collection records to justify generalizations, but seem to be in the same category as *Ceratispa*. These facts seem to suggest that the hispine beetles are less tolerant of cold than their hosts. It is interesting that in several cases (*Brontispa* of two species in different hosts, *Callistola* of several species, a *Plesispa*, a *Promecotheca*, an *Hispellinus*, and a *Dicladispa*) hispines have been found most abundant in individuals of a species at or near their upper altitudinal limits. Competition or enemies may be factors in such cases.

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FIG. 1. Map of New Guinea and the Bismarck Archipelago, showing collection areas of the various hispine genera, as indicated by the following abbreviations:

Hispodonta	- H	Callistola	- C	Dicladispa	- 2
Eurispia	- U	Enischnispa	- E	Platypria	- T
Octodontia	- 8	Promecotheca	- R		
Brontispa	- B	Aspidispa	- A		
Plesispa	- P	Gonophora	- G		
Ceratispa	- X	Hispellinus	- L		
Oxycephala	- O	Dactylispa	- D		