Further Records of Insect Pests of Theobroma cacao *in the Territory of Papua and New Guinea*

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This is a supplement to the author's paper entitled : "Insect Pests of Theobroma cacao *in the Territory of Papua and New Guinea" (Szent-Ivany, 1961). Seventy-six new cacao insects are listed, most of them representing new economic records. Besides this some corrections are made (including species omitted from the first paper because of the unavailability of relevant literature), and new distribution data of previously recorded cacao insects are given, together with some remarks on ecology and ethology. Two moths, previously mentioned as minor pests (Szent-Ivany, 1961) are now considered major pests of* Theobroma cacao. *These are the noctuids* Tiracola plagiata (*Walk.*) *and* Achaea janata *L.*

ONE hundred and forty-two insect species were recorded in the author's first comprehensive paper on the cacao pests of the Territory of Papua and New Guinea (Szent-Ivany, 1961). Since the publication of this paper another 76 insects were found associated with *Theobroma cacao* in Papua and New Guinea. Most of these represent new economic records. In the present paper all newly found cacao pests are listed, together with some new distribution records of previously recorded cacao pests, and some corrections are made partly based on literature references which were previously unknown or unavailable to the author (Aulmann, 1912, La Baume 1912.)

The insect orders follow the phylogenetic sequence of the ninth edition of Imms : "General Textbook of Entomology" (Imms, 1957, p. 252). The families within the orders, the genera within the families and the species within the genera are listed in alphabetical order. Much of the material has been collected by Mr. G. S. Dun, Principal Entomologist with the Department of Agriculture, Stock and Fisheries, by Mr. A. Catley, Entomologist with the Department, and by the author. The names of these three collectors are abbreviated as follows : D = G. S. Dun, Sz = J. J. H. Szent-Ivany, C = A. Catley.

PHASMIDA.

Phasmidae.

Anchiale maculata (Oliv.). Previously known as a widespread minor pest of cacao in New Britain (Szent-Ivany 1958, 1961). Recently it appeared in plague proportions in some plantations in the Madang District.

ISOPTERA.

Termitidae.

Nasutitermes princeps (Desneux). Matupi Plantation, Madang District, 6.9.62. Nests on healthy cacao trees. (Primary attack.) (Coll. Sz.).

HEMIPTERA.

Aphididae.

Aphis gossypii Glover. Lowlands Agricultural Experiment Station, Keravat, New Britain District, February, 1960. In flowers. (Coll. L. Smee and Sz.).

Cercopidae.

Cloviana sp. Jimboro Plantation, Northern District, 1.12.1961. (Coll. R. J. Cheetham and Sz.).

Cloviana sp. Girua Plantation, Northern District, 21.11.1961. (Coll. R. J. Cheetham and Sz.).

Coccidae.

Asterolecanium sp. near *javae* Russell. Narakapor Plantation, Morobe District, 31.1.1962. Heavy infestation on branches ; suspected to be associated with die-back. (Coll. J. H. Ardley).

Criniticoccus theobromae Williams. Numa Numa Plantation, Bougainville District, 1.8.1961. Pods ; tended by *Technomyrmex detorquens* Walk. (Coll. C.).

Crisicoccus sp. Wanigela Plantation, Northern District, 22.9.1960. Branches and pods covered with scales. (Coll. Dr. D. E. Shaw).

Eucalymnatus tesselatus (Sign.) Plant Industry Centre, Bubia, Morobe District, 21.10.1959. Foliage. (Coll. J. H. Ardley).

Hemiberlesia palmae (Ckll.) Lowlands Agricultural Experiment Station, Keravat, New Britain District, 16.8.1962. Twigs. (Coll. D.).

Planococcus sp. near *citri* (Risso), Lowlands Agricultural Experiment Station, Keravat, New Britain District, January, 1960. (Coll. D.).

Pseudococcus sp. Dylup Plantation, Madang District, 8.3.1960. Pods. (Coll. Sz.).

Coreidae.

Amblypelta madangana Brown & Ghauri. This species was found by the author on *Theobroma cacao* at Amele village plantation in the Madang District in June, 1959, and it was described as a new species two years later (Brown & Ghauri 1961). Specimens were seen feeding on cacao pods and causing scars very similar to those caused by *Amblypelta theobromae* Brown. An unknown species of the asilid genus *Heligmoneura* Bigot (= *cinadus* van der Wulp) was observed preying upon last instar neanides (nymphs). The plantation was at the same time severely infested with the cacao mirid *Pseudodoniella laensis* Mill. (known also from the Markham Valley and from the Northern District). *Amblypelta* and *Amblypelta* damage was found only on cacao trees along the south-east boundary of the plantation near the adjoining swampy rainforest. In this area some pods were covered with both the small regular scars caused by the mirid (capsid) and the larger irregular scars caused by *Amblypelta madangana*. The author revisited Amele Plantation in March, 1960. No specimens of *Amblypelta madangana* could be found on this occasion and there was no sign of *Amblypelta* damage on cacao pods. During a third visit in September, 1962 some cacao pods were seen with many typical *Amblypelta* scars, however no specimens of *Amblypelta madangana* were sighted. There was very little evidence of mirid damage. In March, 1963 a few cacao pods which showed the typical injury of both the mirid and the coreid were submitted to the author. Thus, it is believed that this species is still present in the plantation area. However, it cannot be considered a major pest. *Pseudodoniella laensis* became thoroughly adapted to cacao as a new host plant, and in 1959 it was found in almost every part of the plantation causing severe reduction of yield. *Amblypelta madangana* and its typical damage was found only on the edge of the plantation and despite many visits to Amele by various officers of the Department of Agriculture, Stock and Fisheries, no live specimens of this species could be collected apart from those which were taken by the writer in June, 1959. It most likely has more favoured indigenous host plants in the surrounding rainforest than *Theobroma cacao*.

Amblypelta theobromae Brown. This species, previously known as a major pest of *Theobroma cacao* in the Morobe and Northern Districts (Szent-Ivany 1961) was found in 1962 also in the Milne Bay District of Papua. Specimens were collected by Mr. E. Mobbs of the Department of Agriculture at Naura village (10 miles inland of the Western end of the District) on the 1st November, 1962. Mr. Mobbs observed extensive damage to cacao pods and some damage to tips of branches was also noticed. Damage to growing points by *Amblypelta theobromae* Brown has not been observed in the past. However, it is quite possible that this species also feeds on and around the growing points of the branches, as another species of the genus (*Amblypelta lutescens papuensis* Brown) is known to cause extensive tipwilt to various cultivated plants (Szent-Ivany and Catley 1960).

Brachylybas inflexus Blote. This species was observed feeding on cacao pods by Mr. L. A. Bridgland at Popondetta in the Northern District (30.9.1959), by Mr. A. Catley at

Gabensis Plantation, in the Morobe District (6.6.1960) and by Mr. K. G. Newton at Finschhafen (December, 1960).

Derbidae.

Diostrombus sp. Carberry Plantation, Northern District, 23.11.1962. Foliage. (Coll. C.).

Proutista sp. Javuni Plantation, Northern District, 22.11.1961. Foliage. (Coll. R. J. Cheetham).

Zoraida fuscipennis Walk. Epa Plantation, Northern District, 24.11.1961. Foliage. (Coll. Sz. and E. Kanjiri).

Zoraida punctipennis Walk. Suambu Plantation, Morobe District, 26.4.1960. Foliage. (Coll. C.).

Zoraida sp. near *punctipennis* Walk. Kapurahambo village, Northern District, 14.11.1962. Foliage. (Coll. C.).

Zoraida sp. Suambu Plantation, Morobe District, 26.4.1960. Foliage. (Coll. C.).

Zoraida sp. Sangara Estate, Northern District, 16.11.1962. (Coll. C.). Bakahari Plantation, Northern District, 13.11.1962. Foliage. (Coll. C.).

Zoraida sp. Sumbaripa Plantation, Northern District, 13.11.1962. Foliage. (Coll.C.).

Zoraida sp. Popondetta, Northern District, 7.5.1962. Foliage. (Coll. C.).

Flatidae.

Euphanta sp. Jimboro Plantation, Northern District, 1.12.1961. (Coll. R. J. Cheetham and Sz.).

Euphanta sp. Kagona Estate, Northern District, 22.11.1961. (Coll. Sz.).

Papuanella sp. Jimboro Plantation, Northern District, 1.12.1961. (Coll. R. J. Cheetham and Sz.).

Paradaksha sp. Javunie Plantation, Northern District, 25.11.1961. (Coll. Sz.).

Paradaksha sp. Sumbaripa Plantation, Northern District, 22.11.1961. (Coll. Sz.).

Sephena sp. Magafin Village Plantation, near Dagua, Sepik District, 7.3.1960. (Coll. Sz.).

Sephena sp. Carberry Plantation, Northern District, 23.11.1961. (Coll. Sz.).

Sephena sp. Jimboro Plantation. Northern District, 1.12.1962. (Coll. R. J. Cheetham and Sz.).

Lophopidae.

Kasserota sp. Finschhafen, Morobe District, 10.1.1956. (J. H. Ardley).

Lophops sp. Jimboro Plantation, Northern District, 1.12.1961. (Coll. R. J. Cheetham and Sz.).

Membracidae.

Terentius sp. Carberry Plantation, Northern District, 17.11.1961. (Coll. Sz.).

Terentius sp. Banap Plantation, Madang District, September, 1962. (Coll. Sz.). This species was breeding in vast numbers on pods, branches and on the bark of the main stems of cacao trees at Banap Plantation. On the pods it was tended by the ant *Anoplolepis longipes* Jerd. and it caused very similar scars to those inflicted by cacao mirids.

Pentatomidae.

Annandazia franzeni Kim. Plant Industry Centre, Bubia, Morobe District. (Coll. J. H. Ardley.).

Coctoteris viridescens Walk. Plant Industry Centre, Bubia Morobe District. (Coll. J. H. Ardley.).

Ricaniidae.

Euricania villica Stal. Hohota Plantation, Northern District, 14.4.1958. Foliage. (Coll. Sz.) Bakahari, Mamoo and Tentri Plantations, Northern District, 25.9.1961. Foliage. (Coll. Sz.).

Ricania sp. Dylup Plantation, Madang District, 8.3.1960. (Coll. Sz.).

Ricania sp. Magafin Village Plantation, near Dagua, Sepik District, 7.3.1960. (Coll. Sz).

Ricania sp. Magafin Village Plantation, near Dagua, Sepik District, 7.3.1960. (Coll. Sz).

THYSANOPTERA.

Thripidae.

Heliothrips aulmanni Karny. New Guinea (La Baume, 1912).

Heliothrips haemorrhoidalis (Bouche) New Guinea (Frogatt, 1940; Dumbleton, 1954; Dun, 1951, 1954). This almost cosmopolitan species is probably widely distributed in the Territory of Papua and New Guinea representing a minor pest of cacao foliage.

Selenothrips decolor Karny. New Guinea (La Baume, 1912).

Selenothrips rubrocinctus Giard. (New Britain) (Frogatt, 1940 ; Dun, 1951, 1954, Dumbleton, 1954). This species was found also by the author in a plantation in the Northern District in November, 1961. Leaves were severely attacked but only a few trees were infested. *Selenothrips rubrocinctus* is a circum-tropical species and it is a serious pest of cacao in the West Indies (Kalshoven, 1947.). It is only a minor pest of *Theobroma cacao* in the Territory of Papua and New Guinea.

LEPIDOPTERA.

Danaidae.

Euploea nemertes subsp.? near *ulagona* Ribbe. Lowlands Agricultural Experiment Station, Keravat, New Britain District, 1.9.1962. Foliage. (Coll. D.).

Geometridae.

Hyposydra talaca Wlk. Lowlands Agricultural Experiment Station, Keravat, New Britain District, 13.8.1961. Foliage. (Coll. D.).

Ectropis sabulosa Warr. Lowlands Agricultural Experiment Station, Keravat, New Britain District, 11.9.1959. Foliage. (Coll. D.). This and a near related species have caused severe damage to cacao foliage in various parts of the Gazelle Peninsula of New Britain in 1959-63.

Gracilariidae.

Acrocercops sp.? near *brochogramma* Meyr. Lowlands Agricultural Experiment Station, Keravat, New Britain District, October, 1961. (Coll. D.).

Limacodidae.

Scopelodes venosus Walk. Aropa Plantation, Bougainville District, June, 1956. Foliage (Coll. W. Smith).

Pinzulenza kukisch Hering. This species, previously recorded as a cacao pest from Kar Kar Island (Madang District) and from the Gulf District (Szent-Ivany 1959, 1961) appeared in 1960 in plague proportions at Dylup Plantation in the Madang District. (Coll. Sz.).

Lycaenidae.

Lampides celeno Cram. Markham Valley, Morobe District, December, 1961. Foliage. (Coll. J. H. Ardley).

Lymantriidae.

Dasychira mendosa Hbn. Popondetta, Northern District, 16.11.1961. Foliage. (Coll. R. J. Cheetham). Azerita Plantation, Northern District, 16.11.1961. Foliage. (Coll. Sz.). Haugata Plantation, Northern District, 4.5.1962. Foliage. (Coll. C.). Jimboro Plantation, Northern District, 10.5.1962. Foliage. (Coll. C.).

Noctuidae.

Achaea janata L. This polyphagous noctuid mentioned earlier as a minor pest of cacao by the author (Szent-Ivany 1960) appeared to be more troublesome as a cacao defoliator during the last three years in New Britain (Smee, 1962*a*) and in the Northern District.

Elydna sp. is suspected of feeding on cacao foliage. The species has been reared from pupae found in Bakahari Plantation, 7.11.1962 and Carberry Plantation, 8.1.1962 (both Northern District) in the ground under cacao trees. (Coll. C.).

Tiracola plagiata (Wlk.) Previously considered a minor pest (Szent-Ivany, 1960) since 1960 this species has become a very severe pest of *Theobroma cacao* in a new cacao growing area in the Northern District of Papua, causing complete defoliation of flush growth. (Catley, 1962*a*, 1962*b*). In May, 1962, it also appeared in plague proportions in a plantation in the Morobe District. In September, 1962, the author found a small population of *Tiracola plagiata* in a cacao plantation near Madang.

Nymphalidae.

Hypolymnas alimena L. Lowlands Agricultural Experiment Station, Keravat, New Britain District, 7.11.1961. (Coll. D.).

Pyralidae.

Terastia meticulosalis Guen. Lowlands Agricultural Experiment Station, Keravat, New Britain District. (Coll. J. H. Ardley).

Thyrididae.

Striglina asinina Warr. Popondetta, Northern District, June, 1962. Foliage. (Coll. C.).

Tineidae.

Endothetis anomogramma Meyr. Lowlands Agricultural Experiment Station, Keravat, New Britain District, January, 1959. (Coll. D.). Breeds in nests of *Neotermes* sp. (Smee, 1962*b*) damaging *Theobroma cacao*.

Genus and species indet. Lowlands Agricultural Experiment Station, Keravat, New Britain District, March-April, 1959. Breeds in nests of *Neotermes* sp. damaging cacao trees. (Coll. D.).

Tortricidae.

Cryptophlebia sp.? *encarpa* Meyr. Lowlands Agricultural Experiment Station, Keravat, New Britain District, April, 1959. Larvae feed on the skin of ripe pods. (Coll. D.).

COLEOPTERA.

Anthribidae.

Phleops platypennis Montr. Kerema, Gulf District, 21.3.1959. (Coll. J. Cox).

Bostrychidae.

Allorthrum kolbei Haged. Aulmann (1912, p. 37) reported this bark beetle as a pest of cacao in Peterhafen (New Guinea) in 1910.

Brenthidae.

Ectocemus decemmaculatus Montr. Mamoo Plantation, Northern District, February, 1956. On the branches of young cacao tree (Coll. G. Pritchard). It is not known whether this species is able to cause primary damage to healthy cacao seedlings. However, it is not impossible because other brenthids (*Miolispa papuanus* Kleine, *Miolispa* sp. nr. *papuanus* Kleine and *Miolispa* sp. nr. *aruensis* Kleine and *Miolispa novae-guineensis* Guer.) were observed causing primary injury to the growing points of rubber seedlings in Papua (Szent-Ivany, 1956).

Cetoniidae.

Glycyphana rufopicta Kr. Lowlands Agricultural Experiment Station, Keravat, New Britain District, February, 1960. Flowers. (Coll. L. Smee and Sz.).

Macronota regia (Fr.) Mamoo Plantation, Northern District, 3.11.1961. Foliage (Coll. R. J. Cheetham.).

Poecilopharus bimaculata Schurhoff. Lowlands Agricultural Experiment Station, Keravat, New Britain District, February, 1960. (Coll. L. Smee and Sz.).

Crioceridae.

Lema staudingeri Jac. Cassell Estate, Northern District, November, 1961. Foliage. (Coll. R. J. Cheetham and Sz.).

Cerambycidae.

Megaceresium horni Heller. Arawa Plantation, Bougainville, September, 1956. (Coll. F. R. McKillop.).

Curculionidae.

Balaninus sp.? *missionis* Heller. Amele Village Plantation, Madang District, 7.12.1959. (Coll. J. H. Ardley).

Eupholus sp. Arehe Plantation, Northern District, 30.11.1961. Foliage. (Coll. R. J. Cheetham, E. Kanjiri and Sz.).

Isoleptus variegatus (author ?) This species has been mentioned by Aulmann (1912) as having caused damage to Criollo cacao at Peterhafen (New Guinea) in 1910. It is a small weevil, (5.5 mm. long, 3 mm. wide) which was found in large numbers under the bark of the cacao tree. It tunnelled in the bark but it did not damage the wood (Aulmann, op. cit. pp. 40-41, Fig. 27).

Mecopus doryphorus Quoy & Gaim. Lowlands Agricultural Experiment Station, Keravat, New Britain District, October, 1959, Pods. (Coll. D.).

Orthorrhinus sp. near *patruelis* Pasc. Warou-Gamenoku Village area, Talasea, New Britain District, 29.3.1962. (Coll. E. Tokebene).

Pantorhytes sp. nov.?) Inauwauni Village, Mekeo, Central District, September, 1962. Larvae borer in stem and branches, causing severe damage. (Coll. B. P. Arney).

Rhinoscapha sp. Arehe Plantation, Northern District, 30.11.1961. Foliage. (Coll. R. J. Cheetham, E. Kanjiri and Sz.).

Dermestidae.

Dermestes cadaverinus F. is reported to have been damaging the growing points of young cacao trees in Peterhafen (New Guinea). (Aulmann 1912, pp. 50, 51, Fig. 31.).

Eumolpidae.

Deretrichia sp. Anir Island, New Ireland District, July, 1962 and Lowlands Agricultural Experiment Station, Keravat, New Britain District, 22.8.1962. On young cacao flush. (Coll. D.).

Rhyparida basalis Baly. Lowlands Agricultural Experiment Station, Keravat, New Britain District, 22.8.1962. On flush growth. (Coll. D.).

Rhyparida impressipennis Bry. This species was previously recorded from New Britain. Recently it has been found as a common pest of cacao flush in the Northern District. (Coll. Sz. and C.).

Rhyparida sp. Cassell Plantation, Northern District, 21.11.1961, on flush growth. (Coll. R. J. Cheetham and Sz.).

Lamiidae.

Monohammus rusticator F. Mentioned as a pest of cacao in New Guinea by G. Aulmann (1912, pp. 19-20, Fig. 14.).

Ropica sp. near *varipennis* Pasc. Kabeira Plantation, New Britain District, November, 1959. Larvae found with those of the xyloryctid borer *Pansepta teleturga* in cacao branches. (Coll. D.).

Nitidulidae.

Carpophilus pallescens Murray. Mentioned to have been found on cacao in Peterhafen (New Guinea) where it probably fed on ripe pods. (Aulmann, 1912, pp. 52-53, Fig 33.).

Rutelidae.

Parastasia guttulata Fairm. "C.B." Plantation, near Kokopo, New Britain District, 3.4.1962. Boring into cacao pod. (Coll. C.).

Parastasia montrouzieri Fairm. Eba Plantation, Northern District, 17.11.1961. Foliage. (Coll. Sz.).

Parastasia simplicipes Ohs. "C.B." Plantation, near Kokopo, New Britain District, 3.4.1962, Boring into cacao pod. (Coll. C.).

Scolytidae.

Xyleborus confusus Eichhoff. This species is reported by Aulmann (1912, p. 34) to have caused very serious damage to cacao trees in 1910 in Peterhafen (New Guinea). It appeared as primary pests and killed 50 strong and healthy Criollo trees within four weeks.

Xyleborus morigerus Blandf. Panapau Plantation, Djaul Island, New Ireland, March, 1963. (Coll. R. E. McDonald.). Borer in taproot of dead cacao seedlings.

Xyleborus morstatti Haged.* Walindi Plantation, Talasea Subdistrict, New Britain District, October, 1961. Borer in branches. (Coll. L. Searle.).

* Since the completion of the manuscript it was found that *Xyleborus morstatti* Haged. is a synonym of *X. compactus* Eichh. (Murayama, J. J. and L. G. E. Kalshoven (1962) Ent. Berichten, 22 : 247-250.)

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