The bark and ambrosia beetles (Coleoptera: Scolytidae and Platypodidae) of Tonga

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Abstract

A key is given to 14 species of Scolytidae and 1 species of Platypodidae known to occur in Tonga. **New synonymy** is proposed as follows: *Hypocryphalus mollis* (Schedl) (= *Hypocryphalus tongaensis* Schedl), *Eccoptopterus spinosus* (Olivier) (= *Xyleborus eccoptopterus* Schedl). *Hypocryphalus mollis* (Schedl) **comb. nov.** is transferred to *Hypocryphalus* from *Cryphalus*; *Liparthrum tongatapui* (Schedl) **comb. nov.** is transferred to *Liparthrum* from *Mimiophthorus*. The distribution, biology, and potential economic importance of the species are discussed.

Keywords: Coleoptera; Scolytidae; Platypodidae; bark beetles; ambrosia beetles; new records; new synonymy; new combinations; Tonga.

INTRODUCTION

The bark and ambrosia beetles (Coleoptera: Scolytidae and Platypodidae) are an economically important group which, in the tropics, are particularly involved in the degrade of recently felled timber. The gallery systems of the ambrosia beetles penetrate the wood and reduce its value particularly for veneer or furniture manufacture. Some species attack unhealthy or stressed trees, and others may attack young transplants and seedlings in forest nurseries. Damage is sometimes caused to crop and shade trees. However, many species may be considered beneficial in natural forests through their role in the initial stages of the breakdown and recycling of dead wood.

The only published records of scolytid and platypodid beetles from the Kingdom of Tonga are given by Schedl (1979). Since there are errors in these records, and further species have been collected from Tonga, it seems useful at this time to provide a key to, and some taxonomic and biological notes on, the 14 species of Scolytidae and 1 species of Platypodidae now known to occur there. More species undoubtedly remain to be discovered. There is also a continual danger of the introduction of further species through commerce. The material on which this paper is based is in the New Zealand Arthropod Collection (NZAC) at Entomology Division, DSIR, Auckland, and was collected largely by staff of the Entomology Division, DSIR. I am grateful to Dr T. Crosby and Dr G. Kuschel for permission to study it. Particular thanks are due to Dr P Maddison for providing detailed collecting data from the specimens and to Dr C. Webb for comments on the paper and for testing the key.

NEW RECORDS

Scolytidae

Coccotrypes striatus (Eggers) 'EUA, nr Vaifefe, 15.vii.1977, litter, W. R. Sykes. NIUATOPUTAPU, Falehau, v.1971, litter under *Hibiscus tiliaceus* and *Rhus taitensis*, W. & G. Rogers. TONGATAPU, Toloa forest remnant, 25.viii.1975, litter J. C. Watt.

Coccotrypes tutuilensis (Beeson). NIUATOPUTAPU, Falehau, v.1971, W. & G. Rogers.

Hylesinus porcatus Chapuis. NIUATOPUTAPU, Falehau, v-vi.1971, ix.1971, W. & G. Rogers; Hahake, v.1971, W. & G. Rogers.

Hypocryphalus mollis (Schedl). TONGATAPU, 12.ix.75, G. Kuschel.

Hypothenemus areccae (Hornung). NIUATOPUTAPU, Falehau to Muifonua Hahake, v.1971, sweeping and beating, W. & G. Rogers.

Hypothenemus birmanus (Eichhoff). NIUATOPUTAPU, Falehau, ii-iii.1971, in tent on sand at seashore, W. & G. Rogers; Falehau, v.1971, beating & sweeping *Triumfetta* & *Lantana camara*, W. & G. Rogers.

Hypothenemus eruditus Westwood. NIUATOPUTAPU, Falehau, x.1971, ex litter & rotten wood, W. & G. Rogers. TONGATAPU, Exp. Farm, 25.viii.1975, in old longhorn tunnels in dead stems *Cajanus cajan*, J. C. Watt.

Hypothenemus seriatus (Eichhoff). NIUATOPUTAPU, Falehau, v.1971, litter of *Hibiscus tiliaceus* & *Rhus taitensis*, W. & G. Rogers; Falehau to Muifonua Hahake, v.1971, sweeping & beating, W. & G. Rogers.

Xyleborus ferrugineus (Fabricius). TONGATAPU, 7.i.1974, at light, J. A. Litsinger; Bush area near Tupou College, 14-15.v.1975, at light, P. A. Maddison.

Xyleborus perforans (Wollaston). 'EUA, 14.iv.1974, J. A. Litsinger; 19.viii.1975, on *Hibiscus syriacus* & *Psidium guajava*, J. C. Watt. NIUAFO'OU, Futu, 28-31.i.1977, at light, J. C. Watt. NIUATOPUTAPU, Falehau, ii-iii, v-vi, viii-ix, 1971, in tent, beating & sweeping *Triumfetta* & *Lantana camara*, litter under *Hibiscus tiliaceus* & *Rhus taitensis*, W. & G. Rogers; Falehau to Muifonua Hahake, 22.v.1971, sweeping & beating, W. & G. Rogers. TONGATAPU, 7.xi.1973, old poultry manure put through Berlese funnel, J. A. Litsinger; 7.i.1974, at light, J. A. Litsinger; Government Experimental Farm, 11.iv.1975, malaise trap, W. H. Pierce; Bush area near Tupou College, 14-15.v.1975, at light, P. A. Maddison; Sopu, 6.viii.1975, m.v. light, P. A. Maddison; Nuku'alofa, 8.viii.1975, on banana (*Musa* sp.), J. C. Watt; Nuku'alofa, Residency, 14.viii.1975, m.v. light, P. A. Maddison.

Xylosandrus morigerus (Blandford). VAVA'U 10.ii.1974, J. A. Litsinger.

Platypodidae

Crossotarsus externedentatus (Fairmaire). TONGATAPU, 7.i.1974, J. A. Litsinger.

KEY TO TONGAN SPECIES OF SCOLYTIDAE AND PLATYPODIDAE

In the key to species which follows, the island(s) of the Tongan archipelago in which each species has been found is listed. This should not be taken to imply that the species do not occur on other islands. References to accounts of the biology of the species are also given where possible. Care should be taken when using the key because of the likelihood that species not included in it will be found.

1. 1st tarsal segment at least as long as the other segments together. Head as wide as thorax, visible from above. Eyes rounded, clearly raised above general surface of head. (Platypodidae). Male elytra appearing apically truncate from above with lateral angles produced, striae impressed on declivity and interstriae with small tubercles; female elytra similarly truncate but with lateral angles not produced apically, striae not impressed on declivity, interstriae without tubercles. (Tongatapu) (Beeson 1941; Browne 1961; Kalshoven 1960; Schedl 1965; Roberts 1977b.) ..... **Crossotarsus externedentatus** (Fairmaire)
   — 1st tarsal segment shorter than the other segments together. Head narrower than thorax, often invisible from above. Eyes elongate, usually emarginate, not noticeably raised above general surface of head. Elytra not as above (Scolytidae) **2**

2. Basal margin of elytra elevated and with a row of crenulations **3**
   — Basal margin of elytra not elevated or crenulate, usually smooth and rounded **4**

3. Elytral bases arcuate, with crenulations extending to about striae 8. Scutellum visible. Antennal funicle 7-segmented. Length 2.0-2.3 mm. (Niuatoputapu) (Beaver 1976; Roberts 1976) ..... **Hylesinus porcatus** Chapuis
   — Elytral bases with crenulations forming a continuous straight line across suture and extending to striae 4. Scutellum not visible. Antennal funicle 4-segmented. Length 1.0 mm. (Tongatapu) ..... **Liparthrum tongatapui** (Schedl)

4. Antennal club strongly flattened, about equally pubescent on both sides, sutures visible on both sides, not strongly displaced apically on posterior face **5**
   — Antennal club obliquely truncate, densely pubescent on anterior face only, sutures strongly displaced apically on posterior face. (Male dwarfed, flightless, eyes reduced, rare. Key applies to females only) **10**

5. Body subglabrous, except on elytral declivity. Pronotum declivous on anterior quarter only. 1st segment of antennal club with 2 partial septa not joining in middle. (Tongatapu) ..... **Hemicryphalus** sp.
—Body pubescent. Pronotum declivous on more than anterior quarter. 1st segment of antennal club aseptate or with a single partial septum **6**

6. Summit of pronotum in basal third. Elytral ground vestiture of abundant short interstrial scales extending to elytral bases. Antennal club with 1st segment aseptate. (Male and female approximately equal in size and appearance). (Tongatapu) ..... **Hypocryphalus mollis** (Schedl)
—Summit of pronotum at or anterior to middle. Elytral ground vestiture either absent or hairlike or, if including scales (*Hypothenemus birmanus*) these confined to declivity. Antennal club with 1st segment partly septate. (Male dwarfed, flightless, eyes reduced, rare. Key applies to females only) ..... **(Hypothenemus) 7**

7. Frons with lower half broadly concavely impressed, a weakly developed transverse carina at middle of frons. Elytral ground vestiture hairlike on declivity (see also *H. eruditus*). Length 1.2-1.4 mm. (Niuatoputapu) (Wood 1974) ..... **Hypothenemus areccae** (Hornung)
—Frons convex, without a transverse carina **8**

8. Anterior margin of pronotum armed with 4 teeth, median pair larger. Frons without median groove. Elytral ground vestiture sometimes becoming scalelike on declivity. Length 1.5-2.2 mm. (Niuatoputapu) (Beaver 1976; Browne 1961; Kalshoven 1958) ..... **Hypothenemus birmanus** (Eichhoff)
—Anterior margin armed with 6 teeth of about equal size. Frons with or without a median groove extending up from epistoma. Elytral ground vestiture hairlike or absent. Length 1.0-1.5 mm. **9**

9. Larger (1.4-1.5 mm). Interstrial ground vestiture absent. Elytral vestiture of uniseriate rows of erect interstrial scales and fine strial hairs only. Short median frontal groove often present. (Niuatoputapu) (Wood 1982) ..... **Hypothenemus seriatus** (Eichhoff)
—Smaller (1.0-1.3 mm). Interstrial ground vestiture of fine confused hairs, usually well-developed at least on postero-lateral part of elytra, in addition to uniseriate rows of erect interstrial scales and fine strial hairs. No median groove on frons. (Niuatoputapu, Tongatapu) (Beaver 1976; Browne 1961; Schedl 1963b). ..... **Hypothenemus eruditus** Westwood

10. Pronotum weakly declivous anteriorly, without granules or asperities in Tongan species. Pregular area not depressed below general ventral surface of head ..... **(Coccotrypes) 11**
—Pronotum strongly declivous anteriorly, with short transverse asperities arranged in roughly concentric rows on anterior half. Pregular area depressed **12**

11. Declivity broadly convex, lateral margin rounded. (Niuatoputapu) ..... **Coccotrypes tutuilensis** (Beeson)
—Declivity flattened apically, lateral margin elevated from interstriae 7 to apex. ('Eua, Niuatoputapu, Tongatapu) ..... **Coccotrypes striatus** (Eggers)

12. Anterior coxae widely separated. Body stout, about 2.0 times as long as wide. Elytral declivity strongly convex without spines or tubercles. (Vava'u). (Browne 1961; Kalshoven 1961; Roberts 1977a; Schedl 1963b) ..... **Xylosandrus morigerus** (Blandford)
—Anterior coxae contiguous. Body more elongate. Elytral declivity with spines or tubercles **13**

13. Elytral declivity extending nearly to base of elytra, concave with strong spines on lateral margins. Metatibiae unusually large and broad. (Tongatapu) (Browne 1961; Kalshoven 1959; Schedl 1963b) ..... **Eccoptopterus spinosus** (Olivier)
—Elytral declivity shorter, at least slightly convex, with small tubercles. Metatibiae not very large and broad **14**

14. Declivity flatter, interstriae 3 with a large conspicous tubercle near middle. Colour reddish brown. (Tongatapu) (Browne 1962; Schedl 1963b; Wood 1982) ..... **Xyleborus ferrugineus** (Fabricius)
—Declivity more convex, without a tubercle on interstriae 3 conspicuously larger than those of the other interstriae. Colour paler, yellowish to light reddish brown. ('Eua, Niuafo'ou, Niuatoputapu, Tongatapu) (Beaver 1976; Browne 1961; Kalshoven 1964; Schedl 1963b) ..... **Xyleborus perforans** (Wollaston)

TAXONOMIC NOTES

Hypocryphalus mollis (Schedl) comb. nov.

Cryphalus mollis Schedl, 1955, Ent. Arb. Mus. G. Frey 6: 288.
Hypocryphalus tongaensis Schedl, 1979, N.Z. entomologist 7: 104 **syn. nov.**

Several characters have been used to separate the genera *Cryphalus* Erichson and *Hypocryphalus* Hopkins (= *Dacryphalus* Hopkins) (Hopkins 1915; Wood 1954, 1960, 1982; Nobuchi 1983). One character frequently used is the number of segments in the antennal funicle (4 in *Cryphalus*, 5 in *Hypocryphalus*). Other characters which are correlated with this, at least in species from North and Central America, are: **1** the presence of 3 recurved sutures on the anterior face of the antennal club in *Cryphalus*, these sutures being straight or procurved in *Hypocryphalus*; **2** the 3rd tarsal segment which is broad and emarginate in *Cryphalus*, cylindrical in *Hypocryphalus* (Wood 1982). In the South Pacific species of the 2 genera, these correlations break down. The species described as *Cryphalus mollis* Schedl has a 5-segmented antennal funicle, but a broad, emarginate 3rd tarsal segment, and the sutures on the anterior face of the antennal club are slightly sinuate. It is clear that both genera need further study preferably on a world-wide basis. Provisionally, I am considering those species with a 5-segmented antennal funicle to belong in the genus *Hypocryphalus*. However, it may well prove that a separation based on other characters, such as the form of the tarsal segment, is more useful for classificatory purposes.

The holotype of *Hypocryphalus tongaensis* in NZAC has been compared to other specimens from the same series, and to specimens of *H. mollis* in my collection. The latter had earlier been compared to the holotype of *H. mollis* in the British Museum (Natural History). All clearly represent the same species, which was described from Western Samoa, and also occurs in Fiji. It has only been recorded as its synonym from Tonga.

Eccoptopterus spinosus (Olivier)

Scolytus spinosus Olivier, 1795, Entomologie, ou Histoire Naturelle des Insectes 3: 9.
Eccoptopterus spinosus: Schedl, 1962, Ent. Blätt. Biol. Syst. Käfer 58: 201.
Eccoptopterus sexspinosus Motschulsky, 1863, Bull. Soc. Imp. Nat. Moscou 36: 515; Schedl, 1962, Ent. Blätt. Biol. Syst. Käfer, 58: 201. Synonymy.
Xyleborus eccoptopterus Schedl, 1951, Occ. Pap. B. P. Bishop Mus. 20: 154. **Syn. nov.**
Eccoptopterus eccoptopterus: Beaver, 1976, Bull. ent. Res. 65: 544.

The species was recorded from Tonga by Schedl (1979) as *Eccoptopterus sexspinosus* Oliv. (sic). A series in NZAC taken from a dead branch of *Mangifera indica* L. on Tongatapu I. contains specimens determined as *E. spinosus* by Schedl, and as *E. eccoptopterus* by F. G. Browne. *E. spinosus* is a variable species with a wide geographical range from Africa through the Oriental region. Examination of specimens from both Africa and the Orient shows that *E. eccoptopterus* falls into the range of variation of *E. spinosus*.

Hemicryphalus sp.

This species was listed by Schedl (1979) as *Eidophelus samoanus* Schedl. However, the male genitalia clearly differ from those of specimens from Fiji which were determined by Schedl as *E. samoanus* (G. Kuschel, pers. comm.). On antennal characters (Schedl 1963a), the species should be placed in *Hemicryphalus* Schedl rather than *Eidophelus* Eichhoff.

Liparthrum tongatapui (Schedl) **comb. nov.**

Schedl (1979) noted that he was uncertain of the generic placement of his new species *Mimiophthorus tongatapui*. Examination of the holotype in NZAC indicates that the species should be transferred from the tribe Cryphalini to *Liparthrum* Wollaston in the tribe Hypoborini. *L. tongatapui* appears to be related to *L. palauensis* (Wood 1960) but is less elongate, the lateral areas of the pronotum are reticulate and not smooth and shining, and the interstrial setae on the elytral declivity are scalelike. *Mimiophthorus* Schedl seems to be a wholly African genus. The other species described from the Pacific region (*M. orientalis* Schedl, 1972) is probably also misplaced.

DISCUSSION

The fauna is clearly impoverished compared with the neighbouring island groups of Fiji (ca 85 species of Scolytidae and Platypodidae) and Samoa (ca 60 species). The impoverishment is probably related primarily to the smaller size of the islands of the Tongan archipelago, the low elevation of most islands, and the small areas of forest that remain. The majority of species found in Tonga have a wide distribution in the tropics, and occur not only on many islands in the South Pacific, but elsewhere in tropical and subtropical Africa, America, and Asia (Beaver 1976; Browne 1974; Schedl 1963b, 1965; Wood 1960, 1977, 1982). Most have probably been introduced accidentally to Tonga by man through commerce (Marchant & Borden 1976; Wood 1977). Exceptions are the endemic species *Liparthrum tongatapui* and *Hemicryphalus* sp. *Hypocryphalus mollis* is restricted to the Fiji/Tonga/Samoa area.

Most species are polyphagous and attack a taxonomically wide range of hosts. The only known exceptions among Tongan species are the bark beetles *Hypocryphalus mollis* and *Hylesinus porcatus* which are only known to breed in trees of the family Moraceae. They are often found in dying or dead branches of breadfruit (*Artocarpus altilis* (Park.) Fosberg). The part of the host attacked may be restricted, but several of the species, especially of *Hypothenemus*, will breed not only in the pith of twigs, but in the phloem of larger branches, in fruits and seeds, and even in the stalks of fallen leaves (Beaver 1979; Wood 1982). Usually the host tissue is used directly as a source of food, but the species of *Eccoptopterus, Xyleborus,* and *Xylosandrus* (Scolytidae), and *Crossotarsus* (Platypodidae) are xylomycetophagous and feed on ambrosia fungi which are introduced into the gallery system by the adult.

Certain species are of potential economic importance. Potential pests of seedlings and transplants are *Hypothenemus areccae, H. birmanus, H. eruditus*, and *Xylosandrus morigerus. H. areccae* has been recorded killing mango seedlings in Malaya (Browne 1961 as *H. hispidus* Eggers). *H. birmanus* contributed to the death of mango transplants in Western Samoa (Beaver 1976), and both it and *H. eruditus*

are reported to have killed seedlings and transplants in various tropical countries (Browne 1961, 1968; Kalshoven 1958). *X. morigerus* attacked tree seedlings, including tea and mahogany in Java (Kalshoven 1961). It is also a potential pest of established living trees as a twig borer. It is an important pest of coffee in several countries and often attacks shade and ornamental trees (Browne 1968; Kalshoven 1961; Schedl 1963b). Some of the ambrosia beetles are potential pests of living trees as timber borers. *Crossotarsus externedentatus* has been found attacking living and apparently healthy *Eucalyptus* in Samoa (Beaver 1976) and mahogany and other trees in Fiji (Roberts 1977b). *Xyleborus ferrugineus* and *X. perforans* will attack temporarily unhealthy and injured trees and may hasten or cause their death (Beaver 1976; Browne 1961, 1968; Entwhistle 1972; Schedl 1963b; Wood 1982). *X. ferrugineus* is a primary vector of the cocoa wilt fungus, *Ceratocystis fimbriata* (Ellis & Halsted) (Saunders 1965), and is considered by Wood (1982) to be probably the most destructive species of Scolytidae in the tropics, primarily through its attacks on recently felled timber. *X. perforans* and *C. externedentatus* can also be important in the degrade of timber. The only other ambrosia beetle found in Tonga, *Eccoptopterus spinosus*, usually only attacks small branches and stems, and is of no great importance.

The danger from most of these species is probably not great within Tonga. The most important crop tree, the coconut, is not attacked by scolytids or platypodids while alive, and there is no major timber industry on any of the islands. There remains some danger from species which attack healthy twigs, transplants, and seedlings. They could damage ornamental trees and domestic crop trees such as mango.

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