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 Mimioptithorus. 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


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Xylosandrus morigerus (Blandford). VAVAU 10.i.1974, J. A. Litsinger.

Platypodidae

Crosstarsus 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.) ............................................ Crosstarsus 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. (Niutoputapu) (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. Antennal club strongly flattened, about equally pubescent on both sides, sutures visible on both sides, not strongly displaced apically on posterior face ................................................................. 6

6. Antennal club not as above, not displaced apically on posterior face. (Male dwarfed, flightless, eyes reduced, rare. Key applies to females only) .................................................. 7

7. Antennal club not as above, not displaced apically on posterior face. (Male dwarfed, flightless, eyes reduced, rare. Key applies to females only) .................................................. 8

8. Antennal club not as above, not displaced apically on posterior face. (Male dwarfed, flightless, eyes reduced, rare. Key applies to females only) .................................................. 9

9. Antennal club not as above, not 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) ................................................................. Hemiceraphalus 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 interstitial 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 hairy 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 hairy 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 hairy or absent. Length 1.0-1.5 mm. .................................................................................................................. 9

9. Larger (1.4-1.5 mm). Interstitial ground vestiture absent. Elytral vestiture of uniseriate rows of erect interstitial scales and fine stria1 hairs only. Short median frontal groove often present. (Niuatoputapu) (Wood 1982) ......................................................................................................................................................... Hypothenemus seriatus (Eichhoff)
   - Smaller (1.0-1.3 mm). Interstitial ground vestiture of fine confused hairs, usually well-developed at least on postero-lateral part of elytra, in addition to uniseriate rows of erect interstitial scales and fine stria1 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 conspicuous 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.
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 procurred 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)
The species was recorded from Tonga by Schedl (1979) as Eccoptopterus sexspinosis 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 altiiis (Park.) Fosberg). The part of the host attacked may be restricted, but several of the species, especially of Hypothemenemus, 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 Hypothemenemus 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. *Cossutotarsusexternedentatus* has been found attacking living and apparently healthy *Eucalyptus* in Samoa (Beaver 1976) and mahogany and other trees in Fiji (Roberts 1977b). *Xyleborsusserrugineus* 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. serrugineus* 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.

REFERENCES


