

AN ANNOTATED LIST OF THE SCOLYTIDAE OCCURRING IN AUSTRALIA.

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SUMMARY.

A review has been made of the Scolytidae recorded from Australia with extensive additional data from Queensland. This includes 92 species in 35 genera.

Queensland with 72 species has many more than the other States.

Sixty-six species are considered to be endemic to Australia and 52 to Queensland.

Locality and host records show that many of the species are widely distributed and are associated with a variety of plants.

INTRODUCTION.

The post-war demand for timber gave impetus to the importation of logs from the rainforests of the islands to the north of Australia. Many of the shipments included logs showing active borer infestations on arrival at Brisbane and other Australian ports. Because Queensland has extensive rainforests, quarantine authorities were alerted to the risk of introducing undesirable borer species.

Most of the borers associated with the imported logs were Scolytidae and to assist quarantine the species already known to be present in Australia were listed and reviewed. The review was facilitated by extensive collections previously made by the author in Queensland and continued after the war.

The Scolytidae are borers, tunnelling as beetles or larvae, in most instances in the bark or wood of trees. Several of the species in Australia are of economic importance, but except those from Europe and America, rarely has any been responsible for direct attacks on growing trees.

On boring habits the Scolytidae may be divided into four general types—(a) the bark beetles, (b) the engraver bark beetles, (c) the wood-boring bark beetles, and (d) the wood borers. In all types the adults bore into the host tissues, where oviposition occurs. The bark beetles such as *Hylurdrectonus piniarius* Schedl confine their damage to the bark itself (Fig. 5). The engraver beetles like *Hylesinus varians* (Lea) tunnel in the cambial region, leaving an engraved scroll on both the inner bark and the sapwood (Figs. 2 and 3). In each of these two types the larvae make independent tunnels and feed on the host tissue. The wood-boring bark beetles (for example, *Pachycotes australis* Schedl) resemble the previous types in appearance but bore into the wood, where the larvae continue to tunnel and feed (Fig. 7). The wood borers, of which *Xyleborus* species are typical, penetrate directly into the wood and continue the tunnel system, which may extend deeply into the timber (Figs. 15 and 16). The larvae do not tunnel, and their food consists of fungal growths within the parent tunnels.

Generally four subfamilies are recognised in the Scolytidae. Two of these occur in Australia and the numbers of genera and species in each are as follows:—

Subfamily.	No. of Genera.	No. of Species.
Hylesininae	15	28
Ipinae	19	63
Unplaced	1	1
	—	—
	35	92

The present list contains 75 named species and 17 still to be identified specifically or described as new. Sixty-six species are considered to be endemic to Australia, while the remainder, except a few from Europe and America, are common to Queensland, the adjacent islands, New Guinea and the East Indies. Of the Australian States, Queensland with 72 has the largest number of species. New South Wales, from published data, has 24, and only a few have been recorded in each of the other States. Fifty-two of the species occurring in Queensland are regarded as endemic.

In this presentation, genera are arranged alphabetically within subfamilies and species are similarly arranged in each genus. The more important synonyms are given. With each named species is included the reference to the type description, the type locality and, where available, the host of the type. Additional localities and hosts, unless otherwise stated, are from the author's records. Localities are not repeated unless for a different host and vice versa. Where an overseas type locality is given, "other records" relate only to Australia.

Subfamily HYLESININAE.*

This subfamily contains bark beetles, engraver bark beetles and wood-boring bark beetles. The bark beetles and their larvae show no regularity in tunnel pattern, but the engraver bark beetles and larvae make a specifically characteristic pattern. The tunnelling of the wood-boring bark beetles resembles the irregularly branched tunnels of some of the true wood-boring species.

I. Genus **ACACICIS** Lea, 1910: Proc. Roy. Soc. Vict. 22: p. 149.

This is an Australian genus, with two species confined to the southern States.

1. **abundans** Lea, 1910: Proc. Roy. Soc. Vict. 22: p. 149.

Type localities.—Tasmania (Aug. Simon. No. 2074): Hobart, Mt. Wellington, Bruny Is. etc.; Victoria: Emerald (A. M. Lea).

Other records.—Tasmania: Launceston; South Australia: Lucindale, Feuerheerdt (Schedl 1936).

2. **minor** Schedl, 1936: Rec. S. Aust. Mus. 5: p. 525.

Type locality.—“New South Wales: Sydney and Wollongong (A. M. Lea).”

II. Genus **ARICERUS** Blandford, 1894: Ann. Soc. Ent. Belg. 38: p. 133.

Syn.—*Hylesinosoma* Lea, 1910: Proc. Roy. Soc. Vict. 22: p. 143.

Only one of the two species in this Australian genus is common. It occurs along the eastern coast and is confined essentially to figs as host trees.

3. **chapuisi** Blandford, 1894: Ann. Soc. Ent. Belg. 38: p. 134.

Type locality.—Australia.

Other record.—New South Wales: Tweed River (Schedl 1936).

4. **eichhoffi** Blandford, 1894: Ann. Soc. Ent. Belg. 38: p. 135.

Syns.—*Hylesinus fici* Lea, 1904: Proc. Linn. Soc. N.S.W. 29: p. 103.

Hylesinosoma fici Lea, 1910: Proc. Roy. Soc. Vict. 22: p. 143.

Type locality.—Australia: New South Wales.

Other records.—New South Wales: in wild fig (Froggatt 1899), Gosford (Schedl 1936); Queensland: Cairns district (A. M. Lea); Maryborough (E. W. Fischer); Mt. Tambourine (A. M. Lea) (Schedl 1936); *Ficus carica* L., Brisbane, Nov. 1910 (H. Tryon), also Gympie, Oct. 1934, Sunnybank, Nov. 1951; *Ficus macrophylla* Desf., Beenleigh, Nov. 1933; *Ficus rubiginosa* Desf., Brisbane, Nov. 1935; *Ficus* sp. National Park, Dec. 1919 (H. Hacker), also Emu Vale, Mar. 1941, Manumbar, Oct. 1942; a species of rainforest tree, Imbil, July 1937.

* See also Addendum.

This insect is common in rainforest and other places where native figs grow. The adults tunnel into the bark of suppressed or dying branches or of dying or felled trees. The larvae tunnel mainly in the phloem. Pupation occurs away from the parent entrance hole and therefore emerging beetles make new holes (Fig. 1). Froggatt (1899) gave brief notes on this insect



Fig. 1.

Aricerus eichhoffi. Bark of *Ficus* sp., showing emergence holes.
(Slightly enlarged.)

under a mistaken identification of *Hylesinus porcatus* Chap., when it was recorded tunnelling as adults and larvae in the centre of terminal branches of a wild fig. Attacks in commercial fig orchards have been confined to the bark of dying branches.

III. Genus **DIAMERUS** Erichson, 1836: Arch. Naturgesch. 2 (1): p. 57.

Species of this genus occur in several tropical countries.

5. **curvifer** (Walker), 1859: Ann. Mag. Nat. Hist. 3: p. 261.

Syn.—*Hylesinus curvifer* Walker, 1859.

Type locality.—Ceylon.

Other record.—Queensland: Cairns, Apr. 1947 (J. G. Brooks).

6. **interstitialis** (Lea), 1910: Proc. Roy. Soc. Vict. 22: p. 145.

Syn.—*Hylesinus interstitialis* Lea, 1910.

Type locality.—Queensland: Cairns (Macleay Museum, H. Hacker, E. Allen).

This species has been recorded from New Guinea.

IV. Genus **HYLASTES** Erichson, 1836: Arch. Naturgesch. 2 (1): p. 47.

Several species of this genus occurring in Europe and America attack only conifers and generally are considered to be of minor importance. Attacks are normally confined to dying trees or logs.

7. **ater** (Paykull), 1800: Fauna Suec. Ins. 3: p. 153.

Syn.—*Bostrichus ater* Paykull, 1800.

Type locality.—Sweden.

Other records.—South Australia: Mt. Burr, *Pinus radiata* D. Don (Swan 1942); New South Wales: species of *Pinus* (Hadlington 1951).

Swan (1942) recorded this insect as damaging young plantation *Pinus radiata* trees following a population pressure from breeding in nearby recently felled areas.

7A. **Hylastes** sp.

Queensland: *Araucaria cunninghamii* D. Don, Elgin Vale, Feb. 1944.

V. Genus **HYLEOPS** Schedl, 1938: Trans. Roy. Soc. S. Aust. 62: p. 35.

This genus contains one species.

8. **glabratus** Schedl, 1938: Trans. Roy. Soc. S. Aust. 62: p. 36.

Type locality and host.—"Nanango, Queensland, 14 September 1936, bred from hoop pine, A. R. Brimblecombe."

Other records.—Queensland: Nanango, July 1936; Imbil, Aug. 1936; and Emu Vale, Feb. 1939. On all occasions the host was *Araucaria cunninghamii*.

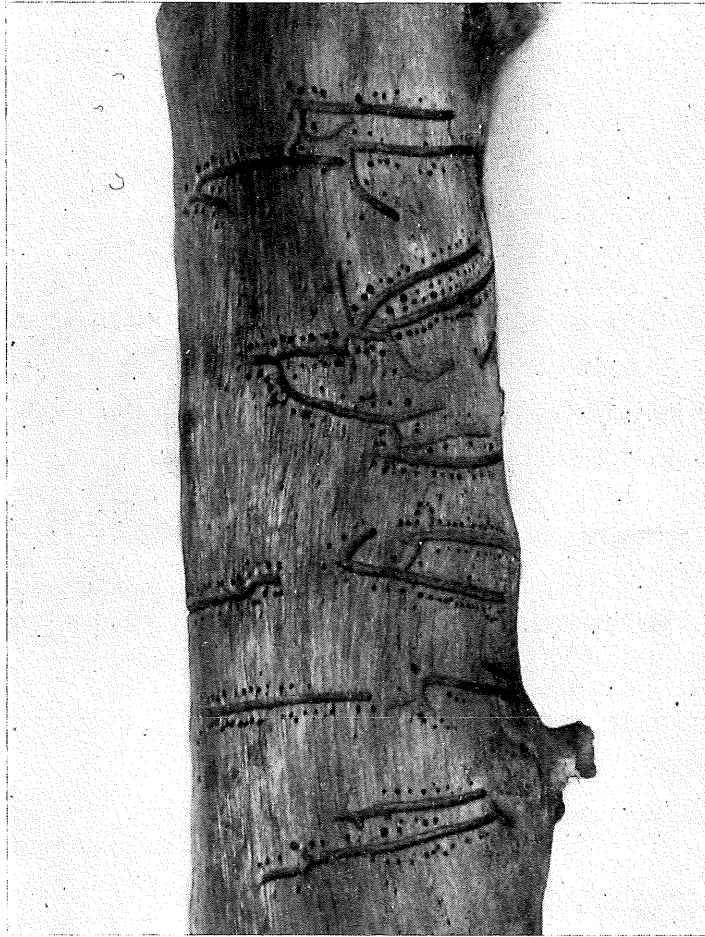


Fig. 2.

Hyleops glabratus. Adult and larval tunnelling on sapwood surface of *Araucaria cunninghamii*. (Half natural size.)

The adult beetle penetrates the bark to the cambial region, where mostly one but sometimes two egg galleries are made across the grain. Eggs are deposited in niches on both sides of the galleries. Larvae tunnel for a short distance at right angles to the parent tunnel and when full-grown again turn at right angles to make pupal chambers in the wood (Fig. 2). As determined by the number of pupal cavities accompanying galleries, up to 50 eggs may be laid by a female.

VI. Genus **HYLESINUS** Fabricius, 1801: Syst. Eleuth 2: p. 390.

Syn.—*Ficicis* Lea, 1910: Proc. Roy. Soc. Vict. 22: p. 147.

This is a well-known genus with species in most countries. Beetles attack freshly felled logs and dying trees or branches. Only one of the three Australian species is well known.

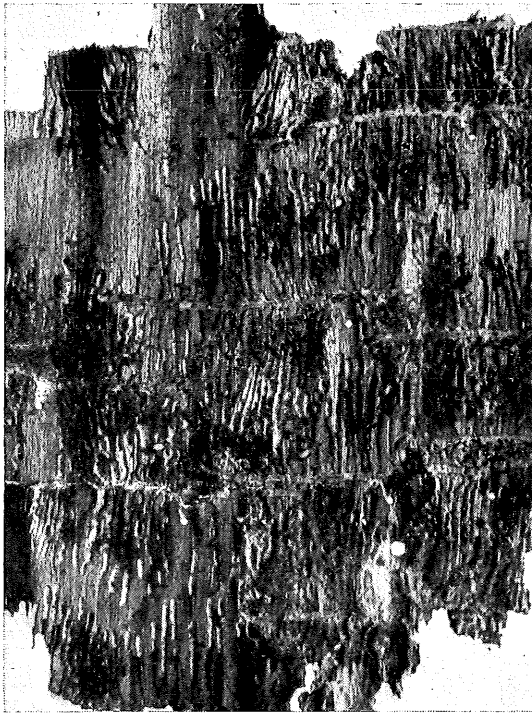


Fig. 3.

Hylesinus varians. Sapwood and inner bark of *Ficus stenocarpa* showing engraving by beetles and larvae. (Natural size.)

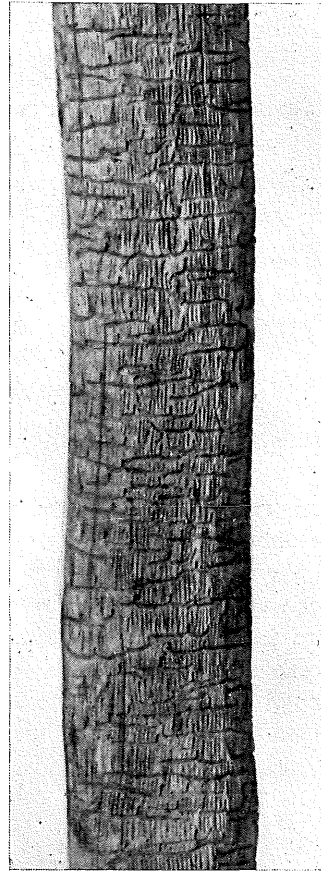


Fig. 4.

Hylesinus varians. Sapwood surface of *Pseudomorus brunoniana*, illustrating intensity of breeding. (Half natural size.)

9. *cordipennis* Lea, 1910: Proc. Roy. Soc. Vict. 22: p. 144.

Type locality.—Queensland: Cairns (J. A. Anderson).

10. *koebelei* (Lea), 1910: Proc. Roy. Soc. Vict. 22: p. 148

Syn.—*Ficicis koebelei* Lea, 1910.

Type locality.—Queensland (H. Hacker), also Barron Falls (A. Koebele).

Schedl (1936) suspected that this species, which is recorded also from New Guinea, might be a synonym of *H. philippinensis* Eggers.

11. *varians* (Lea), 1910: Proc. Roy. Soc. Vict. 22: p. 147.

Syn.—*Ficicis varians* Lea, 1910.

Type localities and host.—New South Wales: Gosford (from dying trunks of cultivated fig, W. B. Gurney), Sydney (A. M. Lea).

Other records.—Queensland: Cairns district (Schedl 1936); *Pseudomorus brunoviana* (Endl.) Bur., Gympie, 1917 (H. Tryon), also Imbil, June 1941, Yarraman, Aug. 1945; *Morus alba* L., Brisbane, 1935; *Ficus stenocarpa* F. Muell. ex Benth., Imbil, June 1936; *Melicope neurococca* (F. Muell.) Benth., Gallangowan, Oct. 1939; *Ficus* sp., Emu Vale, Feb. 1939; a species of liana, Wongabel, Feb. 1935 (J. H. Smith); National Park, Nov. 1920 (H. Hacker).

This is one of the commonest bark beetles in Queensland rainforests. The parent beetles first bore a small mating chamber into the inner phloem, and then in each transverse direction excavate tunnels in which the eggs are placed singly in small side niches. The larvae tunnel parallel to the grain, engraving both the sapwood and inner bark (Figs. 3 and 4). Pupation occurs in cells at the ends of the tunnels and the new beetles eat their way directly through the bark to the exterior. Attacks occur only on dying or felled trees and on occasions may be so intense (Fig. 4) that it is doubtful if many of the progeny survive.

- 11A. *Hylésinus* sp.

Queensland: *Malasia scandens* (Lour.) Planch., Yarraman, June 1948.

- VII. Genus **HYLURDRECTONUS** Schedl, 1938: Trans. Roy. Soc. S. Aust. 62: p. 40.

12. *pinarius* Schedl, 1938: Trans. Roy. Soc. S. Aust. 62: p. 40.

Type locality and host.—Queensland: "A. R. Brimblecombe, Yarraman Feb. 1934, from axes of hoop pine cones."

This is the only species in the genus. Since the first collection in May 1933 from hoop pine (*Araucaria cunninghamii*) at Yarraman, it has been found regularly in all rainforests where hoop pine occurs, and is one of the most abundant insects in hoop pine plantations in the same localities (vide Brimblecombe 1945). Also, it was found breeding in bunya pine (*Araucaria bidwillii* Hook.) at Cinnabar, Oct. 1942.



Fig. 5.

Hyalodreconus piniarius. Bark of *Araucaria cunninghamii*, showing beetle entrance holes (arrow) and irregular larval tunnels. (Slightly less than natural size.)

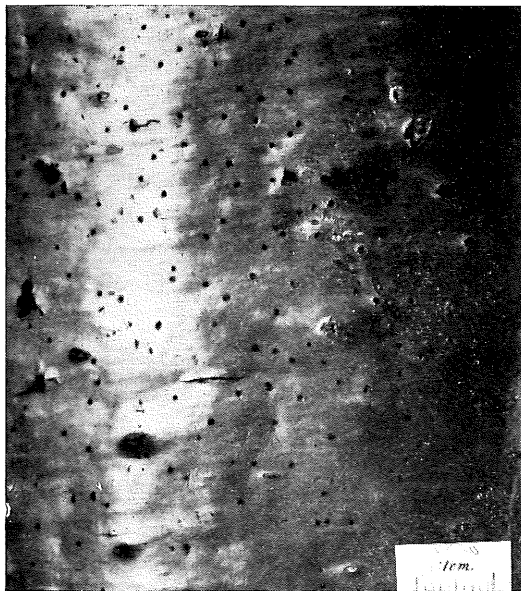


Fig. 6.

Hylurdretonus piniarius. Emergence holes through bark of *Araucaria cunninghamii*. (Natural size.)

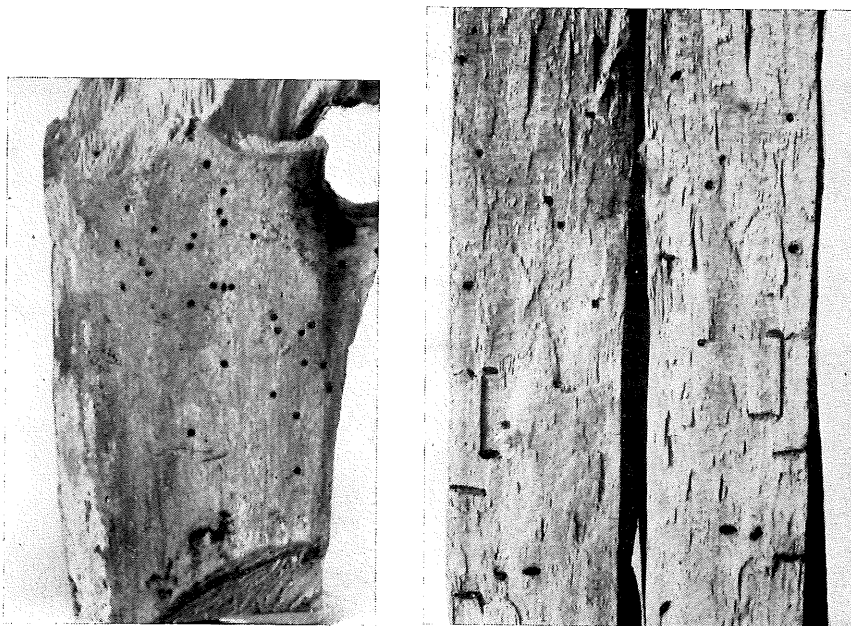


Fig. 7.

Pachycotes australis. A, Sapwood surface of *Araucaria cunninghamii*, showing entrance holes. (Three-quarters natural size.) B, Longitudinal section of *Araucaria cunninghamii*, showing tunnels. (Slightly more than half natural size.)

On fine warm days, adults emerge in large numbers from the parent host and take to the wing. They are strongly attracted to freshly felled or dying trees, pruned branches and pruning cuts on plantation trees. Branches dying from suppression also exert a strong attraction and this source of breeding material maintains a high population in plantations. Mating occurs while the insects are free-living. The beetles then bore into the cortex, without making a definite tunnel pattern, and there deposit eggs indiscriminately amongst the frass. The larvae likewise do not bore according to a definite pattern (Fig. 5). Tunnelling is almost entirely confined to the cortex, and even in young trees or branches rarely penetrates the stone layer. Pupation occurs in small cells at the ends of the larval tunnels and emerging beetles bore directly through the bark (Fig. 6). In summer the life cycle period is approximately five weeks, but during the cold weather this may be extended to six months. Adults are present throughout the year but are more abundant in summer and autumn.

VIII. Genus **HYLURGUS** Latreille, 1807: Gen. Crust. Ins. 2: p. 274.

This genus is predominantly European and the one species present in Australia is an introduction.

13. ***ligniperda*** (Fabricius), 1792: Ent. Syst. 1 (1): p. 367.

Syn.—*Bostrichus ligniperda* Fabricius, 1792.

Type locality.—Germany.

Swan (1942) recorded this bark beetle from South Australian plantations of *Pinus radiata* in association with *Hylastes ater*.

IX. Genus **LEPERISINUS** Reitter, 1913: Wien. Ent. Ztg. 32, Beih.: p. 41.

Species of this genus occur in several countries.

14. ***bimaculatus*** Schedl, 1936: Rec. S. Aust. Mus. 5: p. 520.

Type locality.—Queensland: Blackall Range (A. M. Lea).

15. ***tricolor*** Schedl, 1938: Trans. Roy. Soc. S. Aust. 62: p. 34.

Type locality.—Australia.

Other records.—New South Wales: *Baloghia lucida* Endl. (Hadlington 1951); Queensland: species of rainforest tree, Emu Vale, Feb. 1939.

16. ***Leperisinus*** sp.

Queensland: National Park, Aug. 1932 (H. Hacker).

X. Genus **PACHYCOTES** Sharp, 1877: Ent. Mon.Mag. 13: p. 266.

One species of this genus occurs in New Zealand and two in Australia.

17. **australis** Schedl, 1938: Trans. Roy. Soc. S. Aust. 62: p. 38.

Type locality and host.—“New South Wales: Dorrigo; Queensland: Gallan-gowan, ex hoop pine log, A. R. Brimblecombe, 18th Jan. 1936.”

Other records.—Benarkin, May 1936; Imbil, Jan. 1938; Yarraman, Oct. 1939.

In all instances the host was *Araucaria cunninghamii*.

Froggatt (1927, pp. 92-93) gave a brief account and illustration of an insect from hoop pine, Dorrigo, under the name *Hylastes* sp. which is undoubtedly *Pachycotes australis*. It is probable that the type specimen from Dorrigo was part of Froggatt's material.

Beetles are attracted to felled hoop pine logs, and displaying a habit of the Ipinae penetrate into the wood (Fig. 7), where the larvae can make an extensive tunnel system. Damage may become serious if logs remain in the forest for several months, especially in moist weather during the summer. Entrance into the logs of plantation thinnings is through either the bark or exposed wood. The tunnel extensions made by the larvae penetrate deeply across the grain with little change in direction or plane. Branch tunnels change in both direction and plane and end in pupal cavities from which the new adults bore directly to the surface.

18. **clavatus** Schedl, 1938: Trans. Roy. Soc. S. Aust. 62: p. 39.

Type locality.—New South Wales: Sydney.

- XI. Genus **PHLOEOPHTHORUS** Wollaston, 1854: Ins. Maderensia: p. 209.

Species of this genus occur in North and South America.

19. **acaciae** Lea, 1910: Proc. Roy. Soc. Viet. 22: p. 146.

Type locality.—Tasmania.

- XII. Genus **PHLOEOSINUS** Chapuis, 1873 (preprint 1869): Mem. Soc. Sci. Liege 3: p. 245.

Most species in this genus occur in North America, but a few are known from tropical countries. The beetles penetrate to the cambium, where egg galleries are made parallel to the grain. Larval tunnels are across the grain but those near the extremes of the egg gallery curve to the direction of the grain. Pupation occurs at the extremities of the tunnels and adults emerge directly to the exterior.

20. **australis** Schedl, 1938: Trans. Roy. Soc. S. Aust. 62: p. 36.

Type locality.—Australia.

(*Note.*—The generic spelling used for this species was given as *Phloesinus* in error).

21. **cupressi** Hopkins, 1903: Bull. U.S. Bur. For. No. 38: p. 35.

Type locality.—California.

This species was first collected in Australia by K. L. Taylor in 1947 from *Cupressus torulosa* D. Don in Sydney. Hadlington (1951) recorded it as far as Hornsby and pointed out that in addition to killing *C. torulosa* trees it had attacked seedling *Callitris*. In California it is known to kill ornamental as well as forest cypress pine.

22. **transversarius** Schedl, 1936: Rec. S. Aust. Mus. 5: p. 522.

Type locality.—Queensland: Blackall Range (A. M. Lea).

23. ?**Phloeosinus** sp.

Queensland: Emu Vale, Feb. 1939.

- XIII. Genus **PHLOEOTRIBUS** Latreille, 1796: Prec. Caract. Gen. Ins.: p. 50.

Species of this genus occur in America.

24. **australis** Schedl, 1953; Mem. Qld. Mus. 13: p. 80.

Type locality.—Queensland, Australia.

- XIV. Genus **XYLECHINUS** Chapuis, 1873 (preprint 1869): Mem. Soc. Sci. Liege 3: p. 244.

Species of this genus are known from several east-Asian countries.

25. **leai** Schedl, 1936: Rec. S. Aust. Mus. 5: p. 524.

Type locality.—Queensland: Cairns district (A. M. Lea).

Subfamily IPINAE.*

This subfamily contains bark beetles, engraver bark beetles and wood borers. The species of economic importance belong to the wood borers, which, because of their larval feeding habits, are known in some countries as ambrosia beetles. In Australia they are called pinhole or shothole borers, according to the size of the tunnels. The beetles bore through bark or exposed sapwood, and the extensive tunnel system can cause serious timber degrade in humid weather if logs are not quickly removed from foci of infestation in the forests. In addition to direct damage caused by the beetles, the ambrosial fungus often causes a blue stain extending deeply into the surrounding timber.

* See also Addendum.

XV. Genus **CARPOSINUS** Hopkins, 1915: Rep. Off. Secy. U.S. Dept. Agric. 99: p. 47.

Syn.—*Pelicerus* Eggers, 1923: Zool. Meded. 7: p. 216.

This genus is known from several Pacific countries.

26. **pini** var. **orientalis** Eggers, 1923: Zool. Meded. 7: p. 217.

Syn.—*Pelicerus nitidis* var. *orientalis* Eggers, 1923.

Type locality.—New Guinea (Salvatti).

Other record.—Queensland: Cairns district (Schedl 1936).

XVI. Genus **COCCOTRYPES** Eichhoff, 1878: Mem. Soc. Sci. Liege 8: p. 308.

This genus is known from several tropical countries.

27. **carpophagus** (Hornung), 1842: Ent. Ztg., Stettin 3: p. 116.

Syn.—*Bostrichus carpophagus* Hornung, 1842.

Type locality.—East Indies.

Other records.—Queensland: Seeds of a species of palm, Buderim, May 1911 (H. Tryon); palm seeds, Cairns, May 1930.

In Queensland, beetles have been found boring into palm seeds nearing maturity. The tunnels extend through the pulp into the hard seed, in which the eggs are deposited and where the larvae feed and pupate.

28. **dactyliperda** (Fabricius), 1801: Syst. Eleuth 2: p. 387.

Syn.—*Bostrichus dactyliperda* Fabricius, 1801.

Type locality and host.—Germany “in Dactylorum nucleis” (? *Phoenix dactylifera* L.).

Other records.—Queensland: date seeds, Nambour, 1921 (H. Tryon), also Gatton, Oct. 1937; *Phoenix canariensis* Chabaud, Sandgate, Dec. 1943; New South Wales: Sydney, Apr. 1921 (W. W. Froggatt) (Schedl 1936).

This is a cosmopolitan species and like *carpophagus* attacks the seeds of palm trees. Overseas it is known to attack the ivory nut (*Phytolophas macrocarpa* Ruiz & Pavon) and on a number of occasions it has been found damaging imported buttons made from this nut, sometimes after they had been used on manufactured goods (Fig. 8). Apparently small larvae were present when the buttons were made and in many instances subsequent tunnelling has resulted in almost complete destruction.

29. *Coccotrypes* sp.

Queensland: *Macadamia whelani* (F. M. Bail.) F. M. Bail., Babinda, Jan. 1939.

XVII. Genus **CRYPHALUS** Erichson, 1836: Arch. Naturgesch 2 (1): p. 61.

This genus is represented in many countries. The egg galleries made by the beetles are irregular tunnels in the bark. Larvae tunnel in the bark, barely touching on the sapwood.



Fig. 8.

Coccotrypes dactyliperda. Damaged ivory nut buttons. (One and a-half times natural size.)



Fig. 9.

Cryphalus subcompactus. Emergence holes on the bark of *Grevillea robusta*. (Natural size.)



Fig. 10.

Cryphalus wapleri. Emergence holes in the bark of *Ficus* sp.
(Slightly enlarged.)

30. *asperulus* Schedl, 1950 (preprint 1949): Proc. Roy. Soc. Qld. 1948 60:
p. 26.

Type locality and host.—"Queensland: Imbil, 12.xii.1938, ex *Grevillea*
robusta, A. R. Brimblecombe."

The habits of this species are similar to those described for *C.*
subcompactus Lea, with which it was confused when the material was collected.

31. **brimblecombei** Schedl, 1950 (preprint 1949): Proc. Roy. Soc. Qld. 1948
60: p. 26.

Type locality and host.—"Queensland: Emu Vale, 8.iii.1941, *Cryptocarya erythroxylon*, A. R. Brimblecombe."

Adults bore into the bark and penetrate to the phloem or cambium, where eggs are laid amongst loose frass in short, irregular egg galleries. Because of the comparatively thick phloem, larval tunnels do not extend far from the egg galleries and may not follow the grain.

32. **compactus** Lea, 1910: Proc. Roy. Soc. Vict. 22: p. 139.

Type locality.—Queensland: Port Denison.

33. **pilosellus** Erichson, 1842: Arch. Naturgesch 8 (1): p. 212.

Type locality.—Van Diemen's Land.

Other records.—Tasmania: from *Bursaria spinosa* (Lea 1910), Hobart, Launceston (Schedl 1936); South Australia: Mt. Lofty Range, Lucindale, Feuerheerdt (Schedl 1936).

34. **sidneyanus** (Nordlinger), 1856: Nachtrage, Ratzlerlroerg's Forstinsekten:
p. 75.

Syn.—*Bostrichus sidneyanus* Nordlinger, 1856.

Type locality.—Australia.

35. **subcompactus** Lea, 1910: Proc. Roy. Soc. Vict. 22: p. 140.

Type localities.—New South Wales: Galston (D. Dumbrell), Sydney (A. M. Lea).

Other records.—Queensland: Imbil, Aug. 1936; Atherton, May 1941; Nanango, Nov. 1944. In all instances the host was *Grevillea robusta* A. Cunn. ex R. Br.

The beetles penetrate the bark of suppressed branches or freshly felled trees (Fig. 9). The eggs are laid amongst frass in a short irregular tunnel. Larval tunnels are mostly parallel to the grain and unless the bark is thin no engraving occurs on the sapwood.

36. **wapleri** Eichhoff, 1871: Berl. Ent. Z. 15: p. 131.

Type locality.—Australia.

Other records.—Queensland: National Park, Jan. 1929 (H. Hacker): *Ficus* sp., Emu Vale, Feb. 1941; *Malasia scandens*, Yarraman, June 1948.

Adults were attracted to recently felled trees of *Ficus* and brushed vines of *Malasia*. In the former, tunnelling was irregular in the bark with individual emergence holes (Fig. 10). In woody stems of *Malasia*, tunnelling was confined to the bark but extended into the xylem of young stems.

37. *Cryphalus* sp.

Queensland: *Grevillea robusta*, Imbil, Dec. 1939.

38. *Cryphalus* sp.

Queensland: *Malasia scandens*, Yarraman, June 1948.

XVIII. Genus **DRYOCOETES** Eichhoff, 1864: Berl. Ent. Z. 8: p. 38.

This genus is known from several countries. The beetles bore into the phloem, first making an irregular cavity then several tunnels across the grain with lateral egg niches. Larvae tunnel parallel with the grain. Pupation occurs at the ends of the tunnels and the new beetles emerge directly to the exterior.

39. *dimorphus* Schedl, 1936: Rec. S. Aust. Mus. 5: p. 527.

Type locality and host.—"New South Wales: Burwood, on *Pittosporum* sp., July 12, 1929."

XIX. Genus **ECCOPTOPTERUS** Motschoulsky, 1863: Bull. Soc. Imp. Nat. Moscou. 36: p. 515.

Species occur in tropical countries, mainly in the western Pacific.

40. *sexspinosus* (Motschoulsky), 1863: Bull. Soc. Imp. Nat. Moscou. 36: p. 515.

Syn.—*Xyleborus sexspinosus* Motschoulsky, 1863.

Type localities.—Mts. Nura-Ellia, Ceylon and Burma.

Other record.—Queensland: Coen R. (Schedl 1936).

This species occurs on various hosts in most tropical countries.

41. *Eccoptopterus* sp.

Queensland: Cairns, Nov. 1944.

XX. Genus **ERIOSCHIDIAS** Schedl, 1938: Trans. Roy. Soc. S. Aust. 62: p. 42.

This genus was named to accommodate Lea's species *Cryphalus setistriatus*, and one other species has been added.

42. *queenslandi* Schedl, 1938: Trans. Roy. Soc. S. Aust. 62: p. 43.

Type locality.—Queensland: Cairns district (A. M. Lea).

43. *setistriatus* (Lea), 1910: Proc. Roy. Soc. Viet. 22: p. 141.

Syn.—*Cryphalus setistriatus* Lea, 1910.

Type locality.—Western Australia: Rottnest Island (A. M. Lea).

XXI. Genus **HYPOCRYPHALUS** Hopkins, 1915: Rep. Off. Secy. U.S. Dept. Agric. 99: p. 41.

Species occur in America and on several Pacific islands.

44. **nigrosetosus** Schedl, 1950: (preprint 1949): Trans. Roy. Soc. Qld. 1948 60: p. 27.

Type locality and host.—"Queensland: Kalpowar, ? *Capparis nobilis*, 1.39, A. R. Brimblecombe."



Fig. 11.

Hypocryphalus nigrosetosus. Tunnelling showing on sapwood surface of
(?) *Capparis nobilis*. (Half natural size.)

Adults penetrate to the cambial layer and appear to lay eggs in a "keyhole" cavity from which the larvae radiate in an irregular manner to pupate at tunnel extremities (Fig. 11).

45. **spathulatus** Schedl, 1938: Trans. Roy. Soc. S. Aust. 62: p. 49.

Type locality.—Queensland: Cairns district (A. M. Lea).

XXII. Genus **HYPOTHENEMUS** Westwood, 1834: Trans. Ent. Soc. Lond. 1: p. 34.

Species of this genus occur in most tropical countries. They are rather small and make indefinite galleries in the phloem, often engraving the sapwood.

46. **erythrinae** (Eggers), 1936: Ann. Mag. Nat. Hist. 17: p. 628.

Syn.—*Stephanoderes erythrinae* Eggers, 1936.

Type locality and host.—Sakalaspur, India, 19.7.30 on *Erythrina*.

Other records.—Queensland: *Passiflora edulis* Sims, Redland Bay, Sept. 1939; *Delonix regia* (Boj.) Raf., Brisbane, Mar. 1946.

Beetles penetrated the woody tissue in *Passiflora* but in Poinciana they occurred in the thin bark of branches. In both instances the plants were dying from other causes.

47. **striatopunctatus** (Lea), 1910: Proc. Roy. Soc. Vict. 22: p. 142.

Syn.—*Cryphalus striatopunctatus* Lea, 1910.

Type locality.—New South Wales: National Park, Sydney (A. M. Lea).

This species is also known from New Guinea.

48. **tantillus** (Lea), 1910: Proc. Roy. Soc. Vict. 22: p. 142.

Syn.—*Cryphalus tantillus* Lea, 1910.

Type locality.—New South Wales: Richmond River (A. Coates).

Other records.—Queensland: *Antirrhinum* sp., Sandgate, Sept. 1932; *Carica papaya* L., Brisbane, Jan. 1934; *Cydonia oblonga* Mill., Brisbane, Aug. 1936; *Ficus hillii* F. M. Bail., Brisbane, June 1937; *Wistaria floribunda* (Willd.) DC., Brisbane, Feb. 1938; *Eucalyptus tereticornis* Sm., Brisbane, Feb. 1938; *Pinus* sp., Beerwah, May 1944; *Grevillea robusta*, Imbil, Apr. 1938.

Beetles of this insect have penetrated a wide variety of plant tissues—for example, *Antirrhinum* seed capsule, dried fruit of papaw and persimmon, the bark of woody trees and the woody tissue of *Wistaria*.

49. **Hypothenemus** sp.

Queensland: Brisbane, 1932.

50. **Hypothenemus** sp.

Queensland: Rainforest tree, Emu Vale, Mar. 1939

XXIII. Genus **IPS** De Geer, 1775: Mem. Hist. Ins. 5: pp. 190, 193.

Many species of this genus are present in America; a few occur in Europe and Malaya. The beetle normally makes two egg galleries, one in each direction along the grain from the point of entrance. The eggs are laid in niches along the galleries and the larvae on hatching tunnel at right angles to the parent tunnels, making a characteristic herringbone pattern. Breeding in thin bark is preferred and therefore young trees or branches are attacked. Normally only trees in reduced vigour or felled trees are chosen, but due to the pressure of populations following intensive breeding living trees may be attacked.

51. **grandicollis** (Eichhoff), 1867: Berl. Ent. Z. 11: p. 402.

Syn.—*Tomicus grandicollis* Eichhoff, 1867.

Type locality.—America borealis.

Other records.—South Australia: *Pinus nigra* Arnold, Mt. Burr; *P. halepensis* Miller; *P. radiata* (Swan 1950).

The insect is at present of limited distribution in South Australia, and although first found in that State in 1943, it was not until 1950 that serious damage was recorded (Swan 1950). According to that author it prefers to breed in freshly felled timber, particularly logging residues, and if other conditions also favour breeding, attacks can then be transferred to nearby living trees, more especially young trees. Extensive breeding in logging residues of *Pinus halepensis* in South Australia was responsible for attacks on adjacent plantations of young *Pinus radiata*. The importance of the insect is increased by the fact that it transmits a blue-staining fungus which can cause rapid deterioration of attacked timber.

XXIV. Genus **LETZNERELLA** Reitter, 1913: Wien. Ent. Ztg. 32 Beih.: p. 68.

Species occur in several tropical countries.

52. **tricolor** (Lea), 1910: Proc. Roy. Soc. Vict. 22: p. 141.

Syn.—*Cryphalus tricolor* Lea, 1910.

Type locality.—Queensland: Cairns (E. Allen).

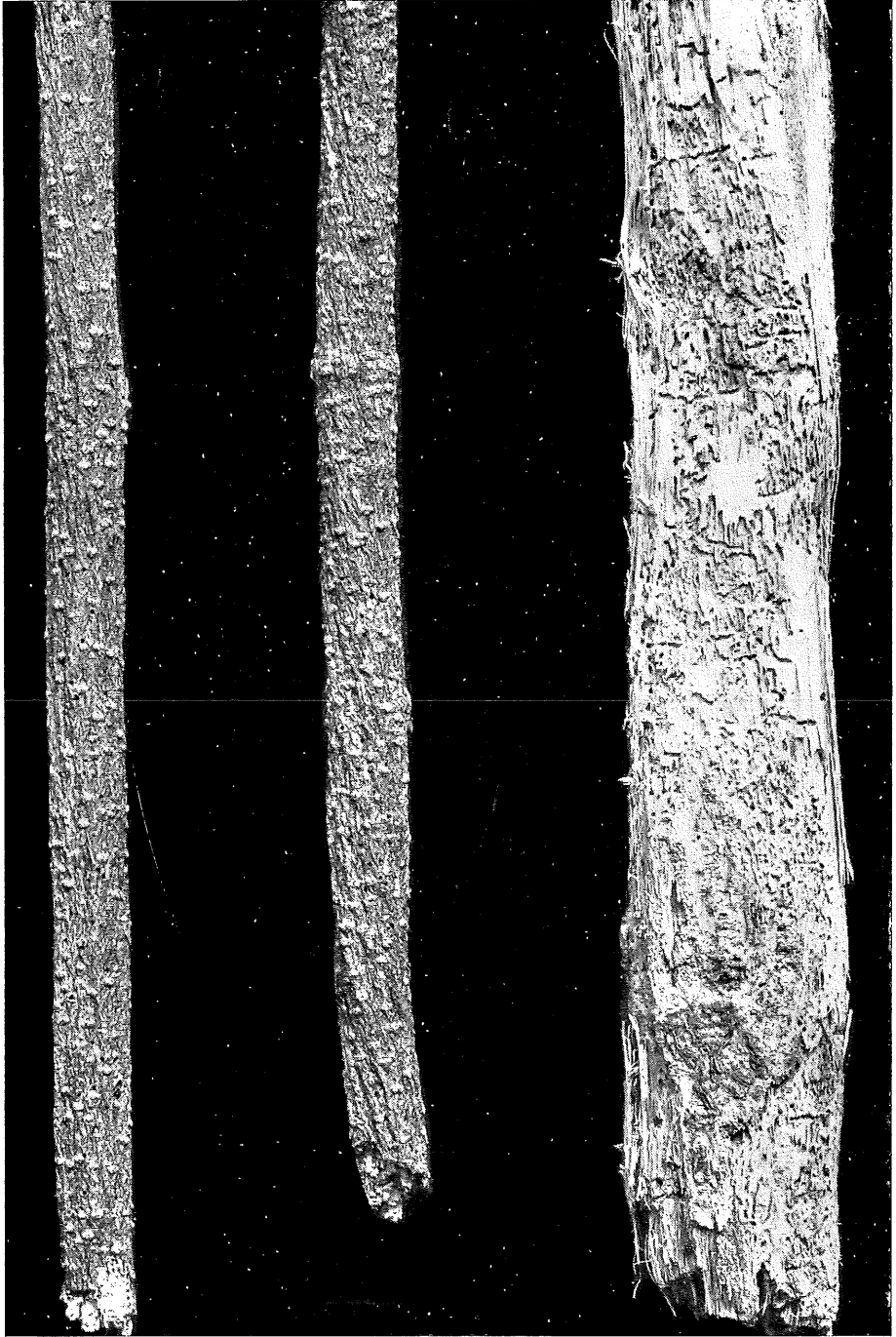


Fig. 12.

Letznerella tricolor. Pieces of *Millettia megasperma*, showing emergence holes and tunnelling. (Natural size.)

Other record.—Queensland: *Millettia megasperma*. (F. Muell.) Benth., Imbil, Nov. 1936.

Beetles penetrate the bark of dying vines, and larvae tunnel in the cambial region, engraving the woody tissue (Fig. 12).

XXV. Genus **POECILIPS** Schaufuss, 1897: Berl. Ent. Z. 42: p. 110.
Species occur in several tropical countries.

53. **cyperi** (Beeson), 1929: Insects of Samoa: Part 4; Fasc. 4: p. 230.

Syn.—*Thamnurgides cyperi* Beeson, 1929.

Type locality and host.—Upolu, Apia, on sedge.

Other records.—Queensland: *Macadamia whelani*, Babinda, 1939; Eubenangee, 1949 (J. G. Brooks).

This insect is recorded also from Java, Assam, Burma and Bengal. Since *Macadamia whelani* can grow to a large tree, it would seem that the record "on sedge" for the Samoan material may represent a chance collection rather than a host record.

XXVI. Genus **PROGENIUS** Blandford, 1896; Ann. Soc. Ent. France 65: p. 20.

Species are known in tropical countries extending from Indo-China to Australia.

54. **Progenius** sp.

Queensland: Brisbane, Jan. 1937.

XXVII. Genus **PTILOPODIUS** Hopkins, 1915: Rep. Off. Secy. U.S. Dep. Agric. 99: pp. 7, 11.

Species occur in America and some of the Pacific islands.

55. **Ptilopodius** sp.

Queensland: *Excoecaria dallachyana* (Bail.) Benth., Yarraman, May 1947.

Beetles penetrate the bark of felled trees and larvae tunnel in an irregular manner in the phloem (Fig. 13).

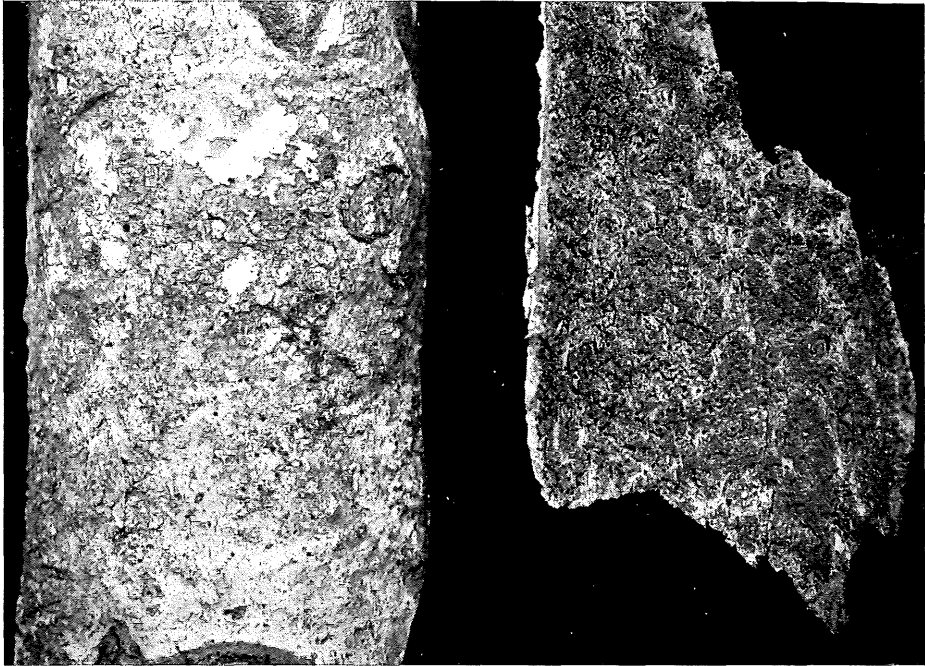


Fig. 13.

Ptilopodius sp. Emergence holes and tunnelling in the bark of
Excoecaria dallachyana. (Natural size.)

XXVIII. Genus **SCOLYTOGENES** Eichhoff, 1878: Mem. Soc. Sci. Liege 8:
p. 475: 1878, Ent. Ztg. Stettin 39: p. 387.

Species are known from several Pacific islands.

56. **major** (Eggers), 1927: Philipp. J. Sci. 33: p. 69.

Syn.—*Negritus major* Eggers, 1927.

Type locality.—Philippines: Mindanao, Basilan.

Other record.—Queensland: Cairns, Jan. 1949 (J. G. Brooks).

XXIX. Genus **SCOLYTOTARSUS** Schedl, 1937: Riv. Zool. Bot. Afr. 29:
p. 404.

A species is known from tropical West Africa.

57. **maculatus** Schedl, 1936: Rec. S. Aust. Mus. 5: p. 534.

Type locality.—Queensland: Coen district, Cape York (H. Hacker).

XXX. Genus **STEPHANODERES** Eichhoff, 1871: Berl. Ent. Z. 15: p. 132.

This genus is cosmopolitan and the beetles bore into dying or dead twigs. Tunnels are more often in the bark but they may penetrate the wood if it is soft. The larvae occur in the tunnels with the adults, but move to the extremities of the tunnels, which are sealed off for pupation.

58. *darwiniensis* Schedl, 1942: Mitt. Munch. Ent. Ges. 32: p. 178.

Type localities and host.—Australia: Darwin; N. Queensland: Cairns, Leichhardt tree, 17.3.34 (J. H. Smith).

Other records.—Queensland: *Ficus carica*, Brisbane, May 1949; *Saccharum officinarum* L., Brisbane, June 1949; *Citrus* sp., Brisbane, 1949.



Fig. 14.

Stephanoderes darwiniensis. Surface of wood of *Ficus carica*, showing tunnelling. (Natural size.)

Tunnelling in figs occurs only in dying or recently dead branches and is common on the dying ends of pruned twigs (Fig. 14). At first it is confined to the cambial region but later extends into the wood. The attack on sugar cane occurred in overmature sticks and penetrated in various directions in the internal tissue.

59. **maculicollis** (Sharp), 1879: Trans. Ent. Soc. London 1879: p. 101.

Syn.—*Hypothenemus maculicollis* Sharp, 1879.

Type locality.—Hawaii.

Other records.—Queensland: *Prunus domestica* L., Maryborough, Feb. 1932; *Eucalyptus trachyphloia* F. Muell., Redland Bay, Sept. 1937; *Litchi chinensis* Sonn., Bowen, Oct. 1946.

The beetles were found tunnelling in the inner layers of the bark.

60. **melasomus** (Lea), 1910: Proc. Roy. Soc. Vict. 22: p. 140.

Syn.—*Cryphalus melasomus* Lea, 1910.

Type localities.—New South Wales: Clarence River (G. Compere), Wollongong (A. M. Lea).

Other records.—New South Wales: *Casuarina* sp., Sydney (Schedl 1936); Queensland: Brisbane (Schedl 1936); *Alphitonia excelsa* (Fenzl.) Benth., Mt. Coot-tha, Aug. 1937; *Delonix regia*, Brisbane, Aug. 1945; *Eucalyptus acmenioides* Schau., Brisbane, May 1947.

In all instances the attacks were in small dying twigs and adults had penetrated beyond the bark into the wood.

61. **Stephanoderes** sp.

Queensland: *Alphitonia excelsa*, Blair Athol, Oct. 1938.

62. **Stephanoderes** sp.

Queensland: *Litchi chinensis*, Bowen, Oct. 1946.

- XXXI. Genus **THAMNURGIDES** Hopkins, 1915: Rep. Off. Secy. U.S. Dept. Agric. 99: p. 45.

Syn.—*Dendrugus* Eggers, 1923: Zool. Meded. 7: p. 144.

Species of this genus are known from India and several Pacific countries.

63. **philippinensis** Eggers, 1923: Zool. Meded. 7: p. 145.

Syn.—*Dendrugus philippinensis* Eggers, 1923.

Type localities.—Mt. Mikiling, Luzon Is., Philippines, and from New Guinea.

Other record.—Queensland: Cairns district (A. M. Lea) (Schedl 1936).

Eggers (1927) placed *Dendrugus* Eggers as a synonym of *Thamnurgides* Hopkins, but Schedl (1938) considered it to be a synonym of *Poecilips* Schaufuss, in which he placed some species of *Thamnurgides*, including *philippinensis*.

XXXII. Genus **XYLEBORUS** Eichhoff, 1864: Berl. Ent. Z. 8: p. 37.

Many species of this genus are known from practically every country and some of them, such as *X. perforans* (Wollaston), have a wide natural distribution while others have been spread by human agencies. The genus is by far the largest in the family, and it contains more than a quarter of the Australian Scolytids. The habitat of most species is the humid tropical rainforest, where climatic conditions maintain a high moisture content in the host tissues and favour the growth of the ambrosial fungi on which the *Xyleborus* species subsist.

During humid weather, beetles are stimulated to leave old host tissue and are strongly attracted in most instances to felled, suppressed or dying trees, into which they bore either through the bark or directly into exposed wood. Some species make an extensive branched tunnel system penetrating deeply into the host tissue. Eggs are laid in the tunnels and larvae may move throughout the system. Other species make "keyhole" cavities a short distance from the surface, and eggs, larvae, pupae and beetles may be found congregated together.

Many of the economic species become of importance only after some other agency has made the host tissue attractive, such as with freshly felled logs, and in these the extent of the infestation and damage depends on the time intervals between felling, removal from the forest and conversion. Some species directly attack living plants or trees, but this habit is not dominant in endemic Australian species.

64. **abruptulus** Schedl, 1953: Mem. Qld. Mus. 13: p. 81.

Type locality and host.—"Queensland: Wongabel, ex *Loranthus* sp., 2.5.41, A. R. Brimblecombe."

Adults were found tunnelling into the woody stems of a dying mistletoe plant which had previously been dislodged from its host tree.

65. **acanthurus** (Lea), 1910: Proc. Roy. Soc. Viet. 22: p. 137.

Syn.—*Tomicus acanthurus* Lea, 1910.

Type locality.—Queensland: Cairns.

66. **affinis** Eichhoff, 1867: Berl. Ent. Z. 11: p. 401.

Type locality.—America borealis, Cuba.

This species is recorded from most tropical countries. The beetles make a complicated tunnel system consisting of short entrance holes and extended longitudinal tunnels with many transverse branches. Blue-staining fungi are transmitted by the beetles from infected old hosts to new hosts. Beeson (1929) recorded it from Australian regions.

67. **artestriatus** Eichhoff, 1878: Mem. Soc. Sci. Liege 8: p. 507.

Type locality.—East Indies.

Other record.—Northern Territory: Darwin (F. G. Hill) (Schedl 1936).

68. **compressus** (Lea), 1894: Proc. Linn. Soc. N.S.W. 8: p. 321.

Syn.—*Xylopertha compressa* Lea, 1894.

Type localities.—Tamworth and Sydney.

Other records.—New South Wales: Tamworth, Galston (Dumbrell), Dorrigo (W. Heron), St. Marys, Upper William R. (Lea and Wilson, October 1926, ex *Pittosporum*) and Burwood 19.7.29 (Schedl 1936); Sth. Australia: Mt. Lofty Ra. (S. H. Curnow), Lucindale, Feuerheerdt and Adelaide (A. M. Lea) (Schedl 1936); Tasmania: Hobart (A. M. Lea) and Kelso (A. Simson) (Schedl 1936); Queensland: Blackall Ra. (A. M. Lea), Mount Tambourine, Brisbane, Bowen (Schedl 1936); Bunya Mts., Dec. 1925, (H. Hacker); *Araucaria bidwillii*, Yarraman, Apr. 1933; *Araucaria cunninghamii*, Brisbane, Feb. 1935, also Imbil, Mar. 1935, Emu Vale, Feb. 1941, Tambourine Mt., Mar. 1945; *Endiandra palmerstonii* (F. M. Bail) Wh. & Fr., also *Flindersia brayleyana* F. Muell., *Flindersia bourjotiana* F. Muell., *Argyrodendron trifoliatum* F. Muell. var. *peralatum* (F. M. Bail.) Burt-Davy, Gadgarra, Apr. 1934 (J. H. Smith); *Eucalyptus tereticornis*, Goodna, July 1936; *Castanospermum australe* A. Cunn. & Fraser ex Hook., Wongabel, July 1937; *Eucalyptus maculata* Hook., also *Eucalyptus seeana* Maiden, Goodna, Mar. 1938.

This insect is not normally common in Queensland although its distribution extends from the Atherton Tableland in the north to the border in the south. On two occasions beetles were found in numbers on the wing just before dusk, but in most instances they were taken only as individuals from freshly felled logs, where entrance occurred on exposed wood. Beetles may also be attracted to and tunnel into freshly sawn or rain-drenched timber in mill yards.

69. **confusus** Eichhoff, 1867: Berl. Ent. Z. 11: p. 401.

Type localities.—Chile, Venezuela.

Beeson (1929) recorded this insect from Queensland. It is known from rainforests of most tropical islands.

70. **eucalypticus** Schedl, 1938: Trans. Roy. Soc. S. Aust. 62: p. 51.

Type locality and host.—"North Queensland: Geagana, June 15, 1934, ex *E. palmerstoni* T. H. Smith."

(Note: The locality is Gadgarra, the host *Endiandra palmerstonii* and the collector J. H. Smith.)

The spelling of the name given as the species heading (*eucalypticus*) by Schedl does not agree with that used in the legend of the illustration (*eucalypticus*). It would appear that Schedl thought the host *E. palmerstonii* was a eucalypt in naming the species *eucalypticus*.

Other records.—Queensland: *Nauclea orientalis* L., Wongabel, Mar. 1934 (J. H. Smith); *Endiandra palmerstonii*, Gadgarra, May 1934, also Wongabel, Dec. 1934 (J. H. Smith); *Flindersia brayleyana*, Gadgarra, June 1934 (J. H. Smith); *Cardwellia sublimis* F. Muell., Gadgarra, June 1934 (J. H. Smith); *Araucaria cunninghamii*, Emu Vale, June 1937; *Euroschinus falcatus* Hook. f., Imbil, July 1938.

The beetles penetrate the bark of some hosts, or enter the wood directly and tunnel in various directions, sometimes extending well into the logs (Brimblecombe 1951).

71. **funereus** Lea, 1910: Proc. Roy. Soc. Viet. 22: p. 139.

Type locality.—Queensland: Cairns (E. Allen).

72. **indicus** Eichehoff, 1878: Mem. Soc. Sci. Liege 8: p. 354.

Type locality.—Java.

Other record.—Queensland: Mulgrave River (H. Hacker) (Schedl 1936).

This species has a distribution through the East Indies, Malaya and Ceylon to East Africa.

73. **insulindicus** Eggers, 1923: Zool. Meded. 7: p. 177.

Type localities.—S.E. New Guinea, Paumotu River, Kuranda (Australia).

Other records.—Queensland: *Flindersia acuminata* C. T. White, Gadgarra, Apr. 1932 (J. H. Smith); *Endiandra palmerstonii*, Gadgarra, Feb. 1933 (J. H. Smith); *Cardwellia sublimis*, Clump Pt., Aug. 1934.

74. **latecompressus** Schedl, 1936: Rec. S. Aust. Mus. 5: p. 532.

Type localities.—New South Wales: Upper Williams R. (Lea and Wilson, October, 1926), Galston (Dumbrel); Victoria: Kewell (Hill 1877).

75. **morigerus** Blandford, 1894: Insect Life 6: p. 264.

Syn.—*X. coffeae* Wurth, 1908: Meded v. h. Allgem. Proefst. of Java 2: pp. 63-8.

Type locality.—New Guinea.

Other records.—Queensland: *Dendrobium phalaenopsis* Fitzg., Cleveland, Nov. 1937, and Brisbane, Oct. 1948.

Attacks on orchids also occur in North Queensland, but particular records are not available. The insect is known from most tropical countries.

The beetle bores into the orchid stems, penetrating to the soft internal tissue, where it makes a "keyhole" cavity, sometimes to three-quarters of an inch in length. Eggs are deposited in this cavity and later adults, eggs, larvae and pupae may be present concurrently. Attacks are made on living plants, and on old stems as many as 12-15 entrance holes may occur in a stem length of 10 inches. The associated fungus causes a blue-staining and appears to assist in the death of attacked stems. The insect is troublesome to commercial orchid growers.

76. **parvus** (Lea), 1894: Proc. Linn. Soc. N.S.W. 8: p. 321.

Syn.—*Xylopertha parva* Lea, 1894.

Type locality.—Richmond River.

77. **perforans** (Wollaston), 1857: Catal. Col. Ins. Madeira: p. 96.

Syns.—*Tomicus perforans* Wollaston, 1857.

Bostrichus testaceus Walker, 1859: Ann. Mag. Nat. Hist. 3: p. 260.

Xyleborus testaceus (Walker), 1859.

Xyleborus kraatzi Eichhoff, 1868: Berl. Ent. Z. 12: p. 152.

Xyleborus immaturus Blackburn, 1885: Trans. Roy. Soc. Dublin 3: p. 193.

Xylopertha hirsuta Lea, 1894: Proc. Linn. Soc. N.S.W. 8: p. 317.

Xyleborus hirsutus (Lea), 1894.

Type locality.—Madeira, attacking bungs of wine casks. The type localities of *Xylopertha hirsuta* were Tamworth, Cootamundra, Tweed and Richmond River, N.S.W.

Other records.—Queensland: Cairns, Jan. 1891; *Litsea* sp., Gadgarra, Oct. 1930 (J. H. Smith); *Endiandra palmerstonii*, Gadgarra, Mar. 1931 (J. H. Smith); *Cedrela toona* Roxb. var. *australis* (F. Muell.) C. D.C., also *Elaeocarpus grandis* F. Muell., *Xanthostemon pubescens* C. T. White, *Flindersia bourjotiana*, Gadgarra, Feb. 1932 (J. H. Smith); *Araucaria cunninghamii*, Nambour, Aug. 1932, also Gympie, July 1933, Imbil, Mar. 1935, Emu Vale, Feb. 1939, Yarraman, Mar. 1948; *Annona squamosa* L., Koumala, Sept. 1933 (J. H. Smith), also Redland Bay, Feb. 1938; *Argyrodendron trifoliatum*, Yarraman, Feb. 1934; *Flindersia laevicarpa* Wh. & Fr., also *Flindersia bourjotiana* Danbulla, Mar. 1934 (J. H. Smith); *Flindersia brayleyana* also *Dysoxylum pettigrewianum* F. Muell., Gadgarra, Mar. 1934 (J. H. Smith); *Eucalyptus intermedia* R. T. Baker, El Arish, May 1934 (J. H. Smith); *Citrus sinensis* Osbeck, Cardwell, May 1934, also Gayndah, 1950 (A. A. Ross); *Melaleuca leucadendron* (L.) L., Cardwell, May 1935; *Argyrodendron trifoliatum* var. *peralatum*, Gadgarra, Aug. 1934 (J. H. Smith); *Castanospermum australe*, Wongabel, Dec. 1934 (J. H. Smith); *Mangifera indica* L., Dayboro, Mar. 1935; *Casuarina cunninghamiana* Miq., Canungra,

Mar. 1937; *Cinnamomum camphora* (L.) Neds & Eberm., Brisbane, Feb. 1938; *Eucalyptus intermedia*, also *E. maculata*, *E. drepanophylla* F. Muell. ex Benth., *E. seeana*, *E. tereticornis*, *Angophora costata* (Gaertn.) Domin, R. 446 Staphylton, Mar. 1938; *Cinnamomum baileyianum* (F. Muell. ex F. M. Bail.) W. D. Francis, Fraser Is., Mar. 1938; *Carica papaya*, Goomboorian, Apr. 1938; *Baloghia lucida*, Imbil, June 1938; *Eucalyptus maculata*, Barakula, July 1938; *Eucalyptus citriodora* Hook., R. 8 Doongul, Sept. 1938; *Cardwellia sublimis*, Gadgarra, Oct. 1938; *Eucalyptus drepanophylla*, Blair Athol, Oct. 1938; *Dysoxylum muellerii* Benth., Emu Vale, Feb. 1941; *Agathis palmerstonii* F. Muell., Cairns, Apr. 1941; *Argyrodendron*



Fig. 15.

Xyleborus perforans. Longitudinal section of *Euroschinus falcatus*, showing tunnels. (Four-fifths natural size.)

trifoliatum var. *peralatum*, also *Cedrela toona* var. *australis*, *Aleurites moluccana* (L.) Willd., Wongabel, Apr. 1941; *Planchonella pohlmaniana* (F. Muell.) Pierre ex Dubard., Yarraman, May 1942; *Ficus stenocarpa*, Gallangowan, Oct. 1942; *Euroschinus falcatus*, Yarraman, Aug. 1947, also Imbil, May 1950; *Delonix regia*, Cleveland, Mar. 1948; timber of alcohol vat, Sarina, 1944; beer casks, Brisbane, 1937; *Eucalyptus grandis* W. Hill ex Maiden, Gallangowan, Feb. 1944; *Jacksonia* sp., Fletcher, Feb. 1948.



Fig. 16.

Xyleborus perforans. Transverse section of *Araucaria cunninghamii* thinning, showing tunnel system. (Natural size.)

Accounts of this insect occur in many publications and Froggatt (1925, 1926) discussed it under both the names *X. perforans* and *X. hirsutus*. The insect is particularly widespread in Australia, occurring in a wide variety of hosts in both open forest and rainforest (Brimblecombe 1951). Tunnels are made only by females. They are simple or branched, extending



Fig. 17.

Xyleborus perforans. A board from a wet stack attacked by beetles.
(Half natural size.)

deeply into the wood of the host tree or log (Figs. 15-17). Eggs are laid in the tunnels, and the larvae may move throughout the system. The males are flightless, mating occurring in the parent host tissue before the females are stimulated to leave in search of new host tissue. Attacks may also occur on freshly sown or rain-wet timber (Fig. 17) stacked in the millyard. The life cycle may be completed in three months during the summer.

78. *pityogenes* Schedl, 1936: Rec. S. Aust. Mus. 5: p. 534.

Type locality.—Australia.

79. *pseudoangustatus* Schedl, 1950 (preprint 1949): Proc. Roy. Soc. Qld. 1948 60: p. 28.

Type localities and hosts.—"Queensland: Stapleton, 8.1936, ex *Eucalyptus maculata*, A. R. Brimblecombe; Stapleton 14.9.1936, ex *Eucalyptus maculata*, J. W. Gottstein; Brookfield, 3.1.1938, ex Loquat, A. R. Brimblecombe; Stanthorpe, 14.3.1946, ex Apple, J. H. Smith; Stanthorpe, 8.2.1946, ex Plum, J. H. Smith; New South Wales: West Pennant Hills, 2.10.1945, ex Apple, A. H. Friend."

Other records.—Queensland: *Prunus persica* (L.) Batsch., 1946, also *Prunus armeniaca* L., *Prunus avium* L., *Prunus persica* var. *nectarina* Maxim *Pyrus communis* L., Stanthorpe, 1946 (N. E. H. Caldwell).



Fig. 18.

Xyleborus pseudoangustatus. Longitudinal section of loquat, showing "keyhole" cavities. (Natural size.)

Caldwell (1946) studied the attacks of this insect on deciduous fruit trees in the Stanthorpe district. According to that author, adults bore into living trees which though not robust are amongst the best in the orchards concerned and average for the district. The points of entry are sometimes evident by a slight gum exudate. A small straight tunnel leads into a "keyhole" shaped brood chamber mostly parallel with the grain (Fig. 18). Eggs are deposited in the chamber and a fungus growing on the walls provides food for the larvae. Later all stages of the insect occur in the chamber at the one time. Foliage may wilt and branches or the whole tree may die. Pathogenic organisms found in association with these insects are suspected as the cause of the comparatively rapid collapse of some trees and the insect is considered to be the vector.

The attacks by this borer were serious in 1946, slight in 1947 and have since been negligible.

80. *pseudosolidus* Schedl, 1936: Rec. S. Aust. Mus. 5: p. 530.

Type localities.—Tasmania; New South Wales: Dorrigo and Narara (Hudson, October 16, 1896).

Other records.—Queensland: *Prunus domestica*, also *Malus sylvestris* Mill., Stanthorpe, Oct. 1929; *Prunus armeniaca*, Applethorpe, Nov. 1935, (H. Jarvis); *Mangifera indica*, Dayboro, Dec. 1935.

Most of the records of this insect in Queensland are from the deciduous orchards of the Stanthorpe district, where it attacks the branches of unhealthy trees and frequently bores into pruned branches or excavated trees. Within the wood the beetles make horseshoe-shaped tunnels which may be simple or branched, and in these the eggs are placed and the larvae develop. The life cycle may be completed in less than two months.

81. *similis* Ferrari, 1867: Borkenk.: p. 24.

Syns.—*Bostrychus ferrugineus* Boh.

Xyleborus submarginatus Blandford, 1896: Trans. Ent. Soc. Lond. 1896: p. 223.

Type localities.—Keeling Islands, also Tahiti.

Other records.—New South Wales: Wearne, Sydney (W. W. Froggatt), 16.12.23 ex white ash (Schedl 1936); Queensland: *Excoecaria dallachyana*, Imbil, July 1938; *Castanospermum australe*, also *Euroschinus falcatus*, Yarraman, Sept. 1948; *Erythrina vespertilio* Benth., East Haldon, Mar. 1950.

This insect occurs in New Guinea, Philippines and through Malaya to India. Adults bore into the wood of dying trees or felled logs and can penetrate well into the timber.

82. *solidus* Eichhoff, 1868: Berl. Ent. Z. 12: p. 151.

Type locality.—New Holland.

Other records.—New South Wales: southern forests, *Eucalyptus maculata*; northern forests, *Eucalyptus saligna*; Batlow district, *Eucalyptus dalrympleana* and *E. gigantea* (Froggatt 1927); Tamworth (A. M. Lea), Tenterfield (J. Miller), in cherry, Feb. 1892, Queanbeyan (A. M. Lea), Dorrigo (W. Herron), Brooklana, ex blue gum, Feb. 1924 (W. W. Froggatt), Bangabla, ex red gum, Mar. 1924 (W. W. Froggatt), Canterbury Vale (Cliff); Victoria (French) (Schedl 1936); Queensland: *Eucalyptus tereticornis*, Redland Bay, Aug. 1937; *Eucalyptus acmenioides*, Byfield, Oct. 1938, also Emu Vale, Feb. 1939, R. 8 Doongul, Oct. 1939; *Eucalyptus citriodora*, R. 8

Doongul, Jan. 1939; *Eucalyptus maculata*, Barakula, Oct. 1939; *Diploglottis australis* (G. Don) Radlk., Yarraman, May 1947; *Eucalyptus pilularis* Sm., Kabunga, Oct. 1942; Gayndah, Mar. 1941; St. Lawrence, 1949.

The beetles may penetrate through bark or directly into exposed wood of dying trees or felled logs. The entrance tunnel normally continues for several inches but may spread as two or three branches. In these as many as 20 full-grown larvae and pupae have been found. An unusual record of damage was a heavy attack on a rubber garden hose.

Schedl (1939) records this insect from Brazil.

83. **torquatus** Eichhoff, 1868: Berl. Ent. Z. 12: p. 146.

Type localities.—Cuba, Brazil, Porto Rico.

Other record.—Queensland: *Planchonella pohlmaniana*, Yarraman, May 1936.

Adults penetrate the bark and extend the tunnels into the wood. At the time of collection the beetles had tunnelled only a short distance and the full tunnel system was not investigated.

The insect is also recorded from many tropical countries.

84. **truncatus** (Erichson), 1842: Arch. Naturgesch. 8 (1); p. 212.

Syns.—*Tomicus truncatus* Erichson, 1842.

Amasa thoracica Lea, 1894: Proc. Linn. Soc. N.S.W. 8: p. 323.

Amasa truncata (Erichson): Froggatt 1925: Aust. For. J. 9: pp. 144-6.

Other records.—New South Wales: *Eucalyptus rostrata*, Forbes, May 1925; *E. saligna*, Ourimbah, Nov. 1925 (Froggatt 1927); South Australia: Kangaroo Is. and Lucindale (A. M. Lea); Tasmania: Huon River (Lea); Davenport (A. Simson); Queensland: Dalby (Mrs. F. H. Hobler) (Schedl 1936); *Eucalyptus maculata*, R. 446 Stapylton, July 1936, also Barakula, July 1938; *E. citriodora*, R. 8 Doongul, Aug. 1938; *E. acmenioides*, Emu Vale, Mar. 1939.

(Note: Listing of Dalby in New South Wales by Schedl (1936) is incorrect.)

This borer attacks exposed sapwood of living or felled trees. The beetle bores a short distance into the wood and excavates a "keyhole" cavity in which the eggs are laid and the larvae develop. The life cycle is completed in about three months.

85. **Xyleborus** sp. near **artegraphus** Schedl.

Queensland: A rainforest tree, Emu Vale, Mar. 1944.

86. **Xyleborus** sp.

Queensland: *Flindersia brayleyana*, Gadgarra, Apr. 1934 (J. H. Smith); *Castanospermum australe*, Wongabel, Mar. 1937.

Subfamily Unplaced.

XXXIII. Genus **DACTYLIPALPUS** Chapuis, 1873 (preprint 1869): Mem. Soc. Sci. Liege 3: p. 220.

Species occur in tropical countries.

87. **transversus** Chapuis, 1873 (preprint 1869): Mem. Soc. Sci. Liege 3: p. 220.

Type localities.—Malacca, Celebes.

Other records.—New South Wales: Batlow, Sydney, Feb. 1915 (W. W. Froggatt) (Schedl 1936); Queensland: Cape York (H. Hacker) (Schedl 1936).

This species occurs also in New Guinea and through to Indo-China.

OTHER SPECIES.

Xyleborus apertus Schedl, 1939: J. Fed. Malay States Mus. 18: p. 355.

Type localities and host.—"North Borneo: Koung, near Mt. Kinabalu, 1,300 feet, 15.III.1929, (H. M. Pendlebury); Malaya, Perak: Trolak For. Res., 6.II.1937, at light; Selangor: Sungei Buloh For. Res., 1.XII.1936, on log of *Shorea leprosula*, (F. G. Browne)."

This species is recorded as attacking brushwood in northern New South Wales by Richards (1953) from a single specimen identified by the Commonwealth Institute of Entomology, London. The differences between this species and *X. perforans* are slight and confirmation of the occurrence of this species in Australia is desirable before the record is definitely accepted.

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ADDENDUM.

Since the above list was compiled the following additional records have been noted.

Subfamily HYLESININAE.

XXXIV. Genus **CRYPTURGUS** Erichson, 1836: Arch. Naturgesch. 2: p. 60.

Species occur in Europe, North Africa and North America.

Crypturgus sp.

Queensland: *Araucaria cunninghamii*, Elgin Vale, Feb. 1944.

Subfamily IPINAE.

Genus **COCCOTYPES**. (See p. 40.)

Coccotypes pilosulus Schedl, 1949: Tijdschr. Ent. 91: p. 118.

Type locality.—Queensland: Kuranda.

XXXV. Genus **CRYPHALOMORPHUS** Schaufuss, 1891: Tijdschr. Ent. 34: p. 12.

Species occur in several tropical countries.

Cryphalomorphus australis (Schedl), 1942: Mitt. Munch. Ent. Ges. 32: p. 175.

Syn.—*Lepicerinus australis* Schedl, 1942.

Type locality.—Australia.