Review of the biology and host plants of the Australian longicorn beetle *Uracanthus triangularis* (HOPE, 1833) (Coleoptera: Cerambycidae)

● TREVOR J. HAWKESWOOD

Abstract. The host plants and biology of the Australian longicorn beetle, *Uracanthus triangularis* (HOPE, 1833) are reviewed from the literature and the personal observations of the author. The beetle is known to breed in the wood of the following plant species: *Acacia decurrens*, *A. mearnsii* [= *A. mollissima*], *A. penninervis*, *A. pycnantha*, *Acacia sophorae* [= *A. longifolia* var. *sophorae*], *Acacia* spp. (Mimosaceae), *Boronia pinnata*, *Eriostemon australasius* [= *E. lanceolatus*] (Rutaceae), *Banksia ericifolia*, *B. integrifolia*, *Banksia* spp., *Hakea gibbosa*, *H. nodosa*, *H. sericea* (Proteaceae). These host plant relationships appear to be co-evolutionary and probably originated at least in the mid-Tertiary Period, 30–40 million years BP.

Zusammenfassung. Die larvalen Nahrungspflanzen und die Biologie des australischen Bockkäfers *Uracanthus triangularis* (HOPE, 1833) werden anhand von Literaturangaben und nach eigenen Beobachtungen dargestellt. Es ist bekannt, dass der Käfer sich in den folgenden Baumarten entwickelt: *Acacia decurrens*, *A. mearnsii* [= *A. mollissima*], *A. penninervis*, *A. pycnantha*, *Acacia sophorae* [= *A. longifolia* var. *sophorae*], *Acacia* spp. (Mimosaceae), *Boronia pinnata*, *Eriostemon australasius* [= *E. lanceolatus*] (Rutaceae), *Banksia ericifolia*, *B. integrifolia*, *Banksia* spp., *Hakea gibbosa*, *H. nodosa*, *H. sericea* (Proteaceae). Es wird angenommen, dass diese Nahrungspflanzen-Beziehungen co-evolutionärer Natur sind und bereits seit dem mittleren Tertiär, d.h. vor 30–40 Mio Jahren existieren.

Key words. Coleoptera, Cerambycidae, Uracanthus triangularis, biology, larval host-plants.

Introduction

The Triangular-marked Longicorn Beetle, *Uracanthus triangularis* (HOPE, 1833) (Cerambycidae: Cerambycinae, Uracanthini) (fig. 1) is a well known species of longicorn beetle from Australia. It has been recorded from Queensland, New South Wales, Victoria, Tasmania, South Australia and Western Australia (MCKEOWN, 1947). Biological notes and other information have been published and scattered throughout the literature long after its initial description. DUFFY (1963) last reviewed the biology and life stages of this species but missed several references with host records. Since then more information has accrued including observations of the present author. These data are reviewed and discussed below.

This paper is part of a continuing project dealing with the biology and host plants of the Australian Cerambycidae (see HAWKESWOOD 1985, 1992a, b, 1993, 1994, 1997; HAWKESWOOD & TURNER 1996a, b, 1997a, b, 2001; HAWKESWOOD *et al.* 1997).

Review of biology and host plants

Host plants. *Acacia mearnsii* (= *A. mollissima*) (Mimosaceae) (BEST, 1882, 1920; FROGGATT, 1902, 1907, 1923; FRENCH 1908); *Acacia* spp. (Mimosaceae) (FRENCH 1900, GURNEY 1911, MCKEOWN 1942); *Eriostemon australasius* (= *E. lanceolatus*) (Rutaceae) (FROGGATT 1893, 1898, 1902, 1923, DUFFY 1963, WEBB 1987); *Boronia pinnata* (Rutaceae) (FROGGATT 1893, 1898, 1902, 1923); *Acacia sophorae* [= *A. longifolia* var. *sophorae*] (Mimosaceae) (FROGGATT 1893, 1902, 1923); *Banksia integrifolia* (Proteaceae) (FROGGATT 1893, 1902, 1923, FRENCH 1900, DIXON 1908, ILLIDGE 1908); *Hakea nodosa* (Proteaceae) (DIXON 1908); *Acacia decurrens* (Mimosaceae) (FROGGATT 1902, GALLARD 1916, VAN DEN BERG 1982); *Acacia penninervis*, *A. pycnantha* (Mimosaceae) (BEST 1920); *Hakea gibbosa* (Proteaceae) (MOORE 1964, WEBB 1987); *Hakea sericea*, *Banksia* spp. (Proteaceae) (MOORE 1964); *Banksia ericifolia* (Proteaceae) (HAWKESWOOD 2001, this paper).

Biology. The first published observations on the biology and host plants of *U. triangularis* appear to be those of BEST (1882) who briefly noted that the species bred in the „*common Wattle*" (*Acacia mollissima*, which is now known as *A. mearnsii*) in the Melbourne area, Victoria, and that adults were observed on the foliage from September to December. TEPPER (1887) briefly noted that the adults of *U. triangularis* were found on the leaves and flowers of *Eucalyptus* and *Leptospermum* species (Myrtaceae) during October to December in South Australia. FROGGATT (1893, 1898, 1902, 1923) provided the first descriptions of the larva as well as the first detailed biological observations on the species, which are summarised here as follows: (a) the larva attacks the stems of *Eriostemon australasius* (cited by FROGGATT by the old name of *E. lanceolatus*) and *Boronia pinnata* (both Rutaceae) in the Sydney area, New South Wales, (b) the larvae first feed just above ground level and then chew their way upwards, tunnelling out the centre of the stem and at intervals of about 25 mm chewing small [ventilation] holes in the bark, thereby producing a regular row of holes in the infested portions; as the larva becomes fully fed, it moves downwards, excavating several tunnels in the larger roots, finally pupating in the last of them; (c) the larvae are present in *Eriostemon* branches from May to December but the adults do not emerge until early November, where they feed on the floral nectar of *Leptospermum* (Myrtaceae). FROGGATT (1893) also noted that C.

FRENCH had informed him that in Victoria, the larvae generally feed in the stems of young saplings of *Banksia integrifolia* (Proteaceae) but that he had also bred the beetle from the stems of *Acacia sophorae* (cited as *Acacia longifolia* var. *sophorae*) growing on the coast. (DUFFY (1963) erroneously attributed FROGGATT's (1893) record of *Acacia longifolia* to BEST (1882) (date of that paper also cited erroneously by DUFFY as 1880). BEST (1882) recorded *Acacia mollissima* as host which is a synonym of *Acacia mearnsii* (BEADLE *et al.* 1976, CAROLIN & TINDALE 1994). In addition, it should be noted that FROGGATT (1893, 1898, 1902, 1923) erroneously stated that the host plant which BEST (1882) had found in Victoria was *Acacia decurrens*, but as noted above, it is clear that BEST recorded *A. mollissima*, which, [also mentioned above], is now regarded as a synonym of *A. mearnsii*. It is possible that BEST (1882) actually collected beetles from *A. decurrens*, a closely related species to *A. mearnsii*, which also occurs in Victoria, but since BEST recorded in print *A. mollissima*, there is really no doubt as to his intentions, so the presently accepted name of *A. mearnsii* must be applied for his records. Furthermore, it is interesting to see that FROGGATT (1893) questioned the record of *A. decurrens* as the identity of the plant species listed by BEST (1882) (in litt.) as „common wattle", but that in his subsequent articles, *viz.* FROGGATT (1902, 1923), dealing with *U. triangularis*, the host plant is clearly stated as *Acacia decurrens*!. FROGGATT (1893) also noted that the larvae of *U. triangularis* could be found in the *Eriostemon* bushes from May to December and that the adults do not usually appear until early November, when they occur almost exclusively on *Leptospermum* bushes (Myrtaceae).

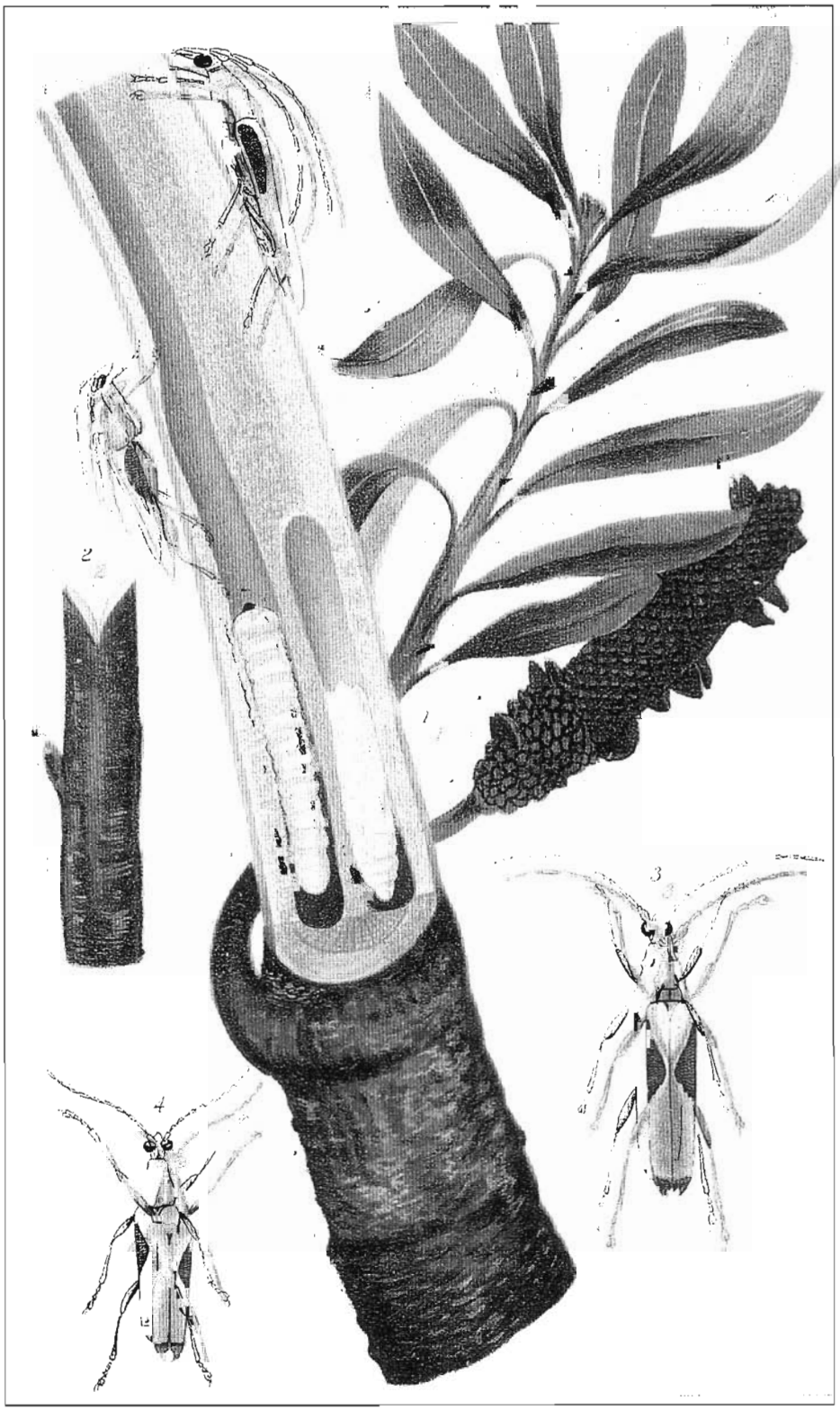

Fig. 1. *Uracanthus triangularis* (HOPE, 1933). Adults with pupa and larva in stem of *Banksia integrifolia* (Proteaceae) (from FRENCH, 1900).

At Cheltenham and Port Phillip Bay, Melbourne, Victoria, FRENCH (1900) noted that the larvae of *U. triangularis* fed in the stems of young saplings of *Banksia integrifolia* (Proteaceae) growing along the Victorian coast; he also noted that the eggs are deposited on the smaller branches of the host tree and that the larvae have the habit of cutting the tops from the smaller branches in a broad V-shape, with a plug of wood fragments protruding from the upper cut portion. FRENCH (1900) further noted that wattles (*Acacia* spp., Mimosaceae) are also attacked by the larvae but did not identify these *Acacia* species. FROGGATT (1907) briefly noted that in Victoria, the beetle was almost exclusively restricted to the „black wattle" (*Acacia mearnsii*), but it is most likely that FROGGATT meant the „green wattle", *Acacia decurrens*, as recorded by him in all of his other works dealing with *U. triangularis* (see discussion above). DIXON (1908) noted that the food plants (presumably larval hosts) from Carrum, Victoria, were *Banksia integrifolia* and *Hakea nodosa* (both Proteaceae) and at Frankston, Victoria, was *Acacia mearnsii* (cited as *Acacia mollissima*). ILLIDGE (1908) noted that *U. triangularis* bred in *Banksia integrifo-*

lia (Proteaceae) at Wellington Point, near Brisbane, Queensland, but did not refer to the previous records of this host by FRENCH (1900) or DIXON (1908), nor any other relevant papers. GURNEY (1911) briefly noted that *U. triangularis* was a wattle tree (*Acacia*) insect but did not provide any other details nor refer to any earlier published biological notes on the beetle. FROGGATT (1914) noted that adults were found during summer (December 1912) on the flowers of *Angophora hispida* (Myrtaceae) (cited by the old name of *Angophora cordifolia*) at Como, in the Sydney district, New South Wales. [This reference was overlooked by both MCKEOWN (1947) and DUFFY (1963)]. GALLARD (1916) noted that *U. triangularis* was a borer in the wood of *Acacia decurrens* (Mimosaceae) but did not provide any other details or refer to any previously published data. BEST (1920) collected larvae (which he supposed belonged to *U. triangularis*) from the roots of *Acacia penninervis* (Mimosaceae) at Mount St. Bernard, Victoria and also noted that in the Melbourne area, the beetle bred in *Acacia pycnantha* and *A. mearnsii* (the latter species cited by the old name of *Acacia mollissima*). [BEST's record of *A. pycnantha* as a larval host was overlooked by DUFFY (1963)]. MCKEOWN (1942) briefly noted that larvae bore into the stems of *Acacia*, sometimes cutting off the top of the branch with a V-shaped notch. DUFFY (1963) provided an account of the biology of *U. triangularis* based on the data provided by TEPPER (1887) and FRENCH (1900) but overlooked a number of references.

MOORE (1964), without any reference to previously published data on the species, noted the following: (a) the species is confined to the smaller stems and branches of *Hakea sericea* and *H. gibbosa* (Proteaceae) where the larvae occur singly; (b) the portion of the plant distal to the area of attack may be killed, so that the effect on the plant is subsequent branching below the attacked area; (c) damage may extend for more than 2 feet (0.6 metres) in a single stem, with an accompanying extrusion of powdery or granular frass and a clear jelly-like gum from the attacked area; (d) there appears to be a single generation each year, with the adults emerging during January to May; (e) *Banksia* species are also attacked by this beetle; (f) damage by *U. triangularis* on the *Hakea* spp. appears to be of little value for purposes of biological control. VAN DEN BERG (1982) found a purported larva of *U. triangularis* boring in a woody branch of *Acacia decurrens* (Mimosaceae) in eastern Australia but provided no other details or referred to any previously published information on the species. WEBB (1987) provided two host records from Museum specimens (see below).

New observations. The following observations on the biology of *U. triangularis* were made by the author on 24 August 1990 near Hastings Point, New South Wales. Two larvae were collected from the dead/dying branches of *Banksia ericifolia* (Proteaceae) growing in heathland on old Holocene sand dungs. From an examination of the infested wood, it was apparent that (a) the larvae develop from eggs laid high in the plant on narrow, minor branches above the major branch nodes which often possess a large inflorescence or a cone of large seed pods; (b) the larvae spend some time feeding in this area before burrowing a tunnel downwards for a distance of 5–50 cm until the larvae reach a node below or at the level of a flowering inflorescence or cone; (c) the minor branches of *B. ericifolia* measured 14–20 mm in diameter while the major branches bored into by the larvae measured 28–35 mm in diameter; (d) the larvae bored further down from the major node for about 15–25 cm before pupating in a chamber at the base of the tunnel; (e) only one larva per branch was found.

Published collection records with biological data. Rose Bay, Sydney, New South Wales, 1892, W. W. FROGGATT, from *Eriostemon australasius* (cited as *Eriostemon lanceolatus*) (DUFFY 1963, WEBB 1987); Somersby, New South Wales, 1963, K. M. MOORE, from *Hakea gibbosa* (Proteaceae) (WEBB 1987).

Discussion

Uracanthus triangularis (HOPE, 1833) is a polyphagous species which feeds as larvae in the wood of small to large shrubs (usually not trees) of three families, Mimosaceae, Rutaceae and Proteaceae. All three are relatively ancient families in an evolutionary sense but they are not closely related botanically. Of these families, the Proteaceae apper to be the most primitive, with fossils dating back to the Cretaceous Period (65–100 million years B.P.) (JOHNSON & BRIGGS 1963, 1975, WHITE 1990). However, it should be noted that *Banksia* is one of the most recently evolved groups of the Protaceae (JOHNSON & BRIGGS 1963, 1975), with the earliest fossils of *Banksia*-like plants having been found in rocks dating back to the early Tertiary (Oligocene), c. 35 million years BP (COOKSON & DUIGAN 1950). Since the Proteaceae are favoured by *U. triangularis* especially within heathland habitats where *Banksia* and *Hakea* species commonly occur sympatrically, the relationship with Proteaceae, in particular, is probably co-evolutionary and the species adapted to *Acacia* (Mimosaceae) and *Eriostemon* and *Boronia* (Rutaceae) at a slightly later or contemporary stage in its evolution. Mimosaceae and Rutaceae speciated from rainforest ancestors during the drying out of the Australian landmass during the Tertiary period (30–60 million years B. P.) (WHITE 1990). However L. PEDLEY (in HAWKESWOOD & PETERSON 1982) believed that *Acacia* had a longer evolutionary history, originating in the late Cretaceous, about 80–90 million years B. P. So if the latter suggestion is correct, *Acacia* would be more ancient than *Banksia* (and the reliated *Hakea*) such that *U. triangularis* may have first co-evolved with *Acacia* and then the Proteaceae. However, is is more likely that co-evolution occurred concurrently between the longicorn beetle and the three plant groups during the mid-Tertiary Period. (30–40 million years BP).

Acknowledgements. Thanks are expressed to Mr LAN FAITHFULL (Victoria, Australia) for acquisition of important overlooked references and for encouragement to publish my ideas and observations.

References

BEADLE, N. C. W., CAROLIN, R. C., EVANS, O. D. & TINDALE, M. D. 1981. *Flora of the Sydney Region*. Sydney (A. H.& A. W. Reed).

BEST, D. 1882. Longicorn beeties of Victoria. Part V. *Southern Science Record* **2**: 35–38.

BEST, D. 1920. To the Alps for Coleoptera. *Vict. Naturalist* **37**: 85–90.

CAROLIN, R. C.& TINDALE, M. D. 1994. *Flora of the Sydney Region*. Sydney (Reed Books).

COOKSON, I. C. & DUIGAN, S. L. 1950. Fossil Banksiae from Yallourn, Victoria, with notes on the morphology and anatomy of living species. *Aust. J. Scient. Res.* **3**: 133–165.

DIXON, J. E. 1908. Food plants of Victorian longicorn beetles. *Vict. Naturalist* **24**: 155, **25**: 72, 77.

DUFFY, E. A. J. 1963. *A monograph of the immature stages of the Australasian timber beetles (Cerambycidae)*. London (British Museum of Natural History).

FRENCH, C. 1900. *A Handbook of the Destructive Insects of Victoria*. Part 111. Melbourne (Government Printer).

FROGGATT, W. W. 1893. On the life-histories of Australian Coleoptera. Part 1. *Proc. Linn. Soc. N. S. W.* **8**: 27–42.

FROGGATT, W. W. 1898. Fruit tree and vine pests. *Agric. Gaz. N. S. W.* **9**: 41–47 + plate.

FROGGATT, W. W. 1902. Insects of wattle trees. *Agric. Gaz. N. S. W.* **13**: 701–720.

FROGGATT, W. W. 1907. *Australian Insects*. Sydney (William Brooks & Co.).

FROGGATT, W. W. 1914. Insects associated with *Angophora cordifolia*. *Aust. Naturalist* **3**: 18–20.

FROGGATT, W. W. 1923. *Forest Insects of Australia*. Sydney (Government Printer).

GALLARD, L. 1916. List of insects associated with *Acacia decurrens*. *Aust. Naturalist* **3**: 112–114.

GURNEY, W. B. 1911. A study of wattle trees (*Acacia*) and a list of insects of wattle trees. *Aust. Naturalist* **2**: 56–59.

HAWKESWOOD, T. J. & PETERSON, M. 1982. A review of the larval host records for Australian jewel beetles. (Coleoptera: Buprestidae). *Vict. Naturalist* **99**: 240–251.

HAWKESWOOD, T. J. 1985. New larval host plants for ten Australian longicorns (Coleoptera, Cerambycidae). *G. ital Ent.* **2**: 393–397.

HAWKESWOOD, T. J. 1992a. Review of the biology, host plants and immature stages of the Australian Cerambycidae (Coleoptera) Part 1. Parandrinae and Prioninae. *G. ital Ent.* **6**: 207–224.

HAWKESWOOD, T. J. 1992b. Review of the biology and host plants of the Australian longicorn beetle *Scolecobrotus westwoodi* HOPE (Coleoptera: Cerambycidae). *G. ital. Ent.* **6**: 53–58.

HAWKESWOOD, T. J. 1993. Review of the biology, host plants and immature stages of the Australian Cerambycidae. Part 2. Cerambycinae (Tribes Oemini, Cerambycini, Hesperophanini, Callidiopini, Neostenini, Aphanasiini, Phlyctaenodini, Tessarommatini and Piesarthrini). *G. ital. Ent.* **6**: 313–355.

HAWKESWOOD, T. J. 1994. Observations on the biology and host plants of the Australian longicorn beetle, *Ceresium seminigrum* AURIVILLIUS (Coleoptera: Cerambycidae). *G. ital. Ent.* **7**: 5–10.

HAWKESWOOD, T. J. 1997. A biological note on the rare Australian longicorn beetle, *Paressius viridipennis* AURIVILLIUS (Coleoptera: Cerambycidae: Lamiinae). *G. ital. Ent.* **8**: 341–342.

HAWKESWOOD, T. J. & TURNER, J. R. 1996a. Review of the biology and host plants of the Australian longicorn beetle *Amphirhoe decora* NEWMAN (Coleoptera, Cerambycidae). *Mauritiana* **16**: 87–90.

HAWKESWOOD, T. J. & TURNER, J. R. 1996b. A note on the biology and host plants of the Australian longicorn beetle *Notoceresium elongatum* MCKEOWN (Coleoptera: Cerambycidae). *Mauritiana* **16**: 91–94.

HAWKESWOOD, T. J. & TURNER, J. R. 1997a. Review of the biology and larval host plants of the Australian longicorn beetie, *Tessaromma undatum* NEWMAN (Coleoptera: Cerambycidae). *G. ital. Ent.* **8**: 335–339.

HAWKESWOOD, T. J. & TURNER, J. R. 1997b. Review of the taxonomy, biology and host plants of the Australian longicorn beetie, *Aridaeus thoracicus* (DONOVAN) (Coleoptera: Cerambycidae). *G. ital. Ent.* **8**: 327–334.

HAWKESWOOD, T. J. & TURNER, J. R. 2001. A note on the larval host plant of a *Cnemoplites* species (Coleoptera: Cerambycidae: Prioninae) from Australia. *Mauritiana* **18**: 109–112.

HAWKESWOOD, T. J., TURNER, J. R. & WELLS, R. W. 1997. Further observations on the biology and host plants of the Australian longicorn beetle *Agrianome spinicollis* (MACLEAY) (Coleoptera: Cerambycidae). *Mauritiana* **16**: 327–332.

HOPE, F. W. 1833. On the characters of several new genera and species of Coleopterous insects. *Proc. Zool. Soc. Lond.* **1833**: 61–64.

ILLIDGE, R. 1908. Excursion to Wellington Point; 4th May 1908. *Queensland Naturalist* **1**: 42–43.

JOHNSON, L. A. S. & BRIGGS, B. G. 1963. Evolution in the Proteaceae. *Aust. J. Bot.* **11**: 21–61.

JOHNSON, L. A. S. & BRIGGS, B. G. 1975. On the Proteaceae- the evolution and classification of a southern family. *J. Linn. Soc. Bot. (Lond.)* **70**: 83–182.

MCKEOWN, K. C. 1942. Australian Insects. An Introductory Handbook. Royal Zoologieal Society of New South Wales, Sydney.

MCKEOWN, K. C. 1947. Catalogue of the Gerambycidae (Coleoptera) of Australia. *Mem. Austr. Mus.* **10**: 1–190.

MOORE, K. M. 1964. Observations on some Australian forest insects. 20. Insects attacking *Hakea* spp. in New South Wales. *Proc. Linn. Soc. N.S. W.* **34**: 295–306.

TEPPER, J. G. 0. 1887. *Common native insects of South Austratia. A popular guide to South Australian Entomology*. Part 1. *Coleoptera or beetles*. Adelaide (E. Wigg & Sons).

VAN DEN BERG, G. A.1982. Coleoptera attacking *Acacia dealbata* LINK., *Acacia decurrens* WILLD., *Acacia longifolia* (ANDR.) WILLD, *Acacia mearnsii* DE WILD. and *Acacia melanoxylon* R.BR. in Australia. *Phytophylactica* **14**: 51–55.

WEBB, G. A. 1987. Larval host plants of Cerambycidae (Coleoptera) held in some Australian insect collections. *Forestry Commission of New South Wales, Technical Paper* no. 36:1–19.

WHITE, M. F. 1990. *The Nature of Hidden Worids (Animals and Plants in Prehistoric Australia and New Zealand)*. Sydney (A. H. & A. W. Reed).

● TREVOR J. HAWKESWOOD,
21270 Terrace Road, North Richmond,
New South Wales, 2754, Australia.