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A note on the biology and host plants of the Australian longicorn beetle *Notoceresium elongatum* Mc Keown (Coleoptera: Cerambycidae)

With 1 Table

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Abstract: The biology and host plants of the Australian longicorn beetle *Notoceresium elongatum* Mc Keown (Coleoptera: Cerambycidae) are reviewed from the literature and previously unpublished data. The larvae of this species are presently known to breed in the dead wood of *Acacia dealbata* Link, *Acacia mucronata* Willd. ex Wendl. (Mimosaceae) and *Cinnamomum camphora* (L.) Nees (Lauraceae) in New South Wales. The species also occurs in Queensland but no biological details are known from there. A possible co-evolutionary insect/plant relationship is suggested and discussed.

Zusammenfassung: Beobachtungen über die Biologie und die Wirtspflanzen des australischen Bockkäfers *Notoceresium elongatum* Mc Keown (Col.: Cerambycidae) werden anhand der Literatur und aufgrund bisher unveröffentlichter Daten vorgestellt. Von den Larven dieser Art ist bekannt, daß sie in Neusüdwales im Totholz von *Acacia dealbata* Link, *Acacia mucronata* Willd. ex Wendl. (Mimosaceae) und vom Kampferbaum *Cinnamomum camphora* (L.) Nees (Lauraceae) leben. Von den Vorkommen der Art in Queensland sind bislang keinerlei biologische Details bekannt. Eine mögliche koevolutionäre Insekten-Pflanzen-Beziehung wird diskutiert.

Introduction

Notoceresium elongatum Mc Keown (Coleoptera: Cerambycidae) is a small, orange-brown, somewhat flattish longicorn beetle from eastern Australia (MC KEOWN 1942, 1947). There is also a closely related sympatric species, *N. setistriatum* Mc Keown (MC KEOWN 1942). For *N. elongatum*, the type series of 28 specimens were collected between January 1928 and February 1940 from the Bunya Mountains, south-eastern Queensland (c. 26°52′ S, 151°50′ E) at 3,000 feet (c. 1,000 m) elevation (MC KEOWN 1942); we suspect that these specimens were collected at night in or adjacent to rainforest. Adults of *N. elongatum* measure as follows: males – c. 10 mm long, 2 mm wide; females – c. 12 mm long, 3 mm wide (MC KEOWN 1942).

The first published biological note on *N. elongatum* is the listing of the species as a borer in the dead wood of *Acacia dealbata* Link (Mimosaceae) by WEBB (1990) (see also listing by HAWKESWOOD 1993). This record was based on (then) unpublished data which was later released and elaborated upon by WEBB (1994). WEBB (1994) noted that *N. elongatum* was one of the most common species of Cerambycidae bred from the dead wood of *Acacia dealbata* Link and *A. mucronata* Willd. ex Wendl. (Mimosaceae) from the Coolangubra State Forest near Bombala, New South Wales (c. 36° 50′ S, 149° 20′ E). The vegetation of this area from where the adults of *N. elongatum* were obtained, consists of tall open forests of *Eucalyptus fastigata* Deane et Maiden, *E. obliqua* L'Herit. and *E. viminalis* Labill. (Myrtaceae) or open forests of *E. sieberi* L. A. S. Johnson and *E. viminalis* (WEBB 1994). WEBB (1994) also noted that the emergence of *N. elongatum* was dissimilar to all of the other wood-boring beetles he obtained from the dead *Acacia* timber, in that emergences only occurred during late summer (February – March); the species is apparently capable of surviving in timber for more than one year.

Further collections and observations of this species have been made during 1990 by the senior author and these are reported here for the first time.

Observations

On 5 October 1990, the senior author collected dead wood from a fallen main trunk of camphor laurel, *Cinnamomum camphorae* (L.) Nees (Lauraceae), situated about 0.5 km NW of Hastings Point, New South Wales (c. 28° 20′ S, 153° 35′ E). The tree had been growing on the side of a steep slope amongst houses in a degraded *Tristania* vine forest. The diameter of the dead, dry timber that was collected measured 80 – 90 cm in diameter. A large number of narrowly-oval to oval-shaped exit (bore) holes were observed on the thin (1.0 – 1.5 mm thick) bark covering the wood. Twenty of these bore holes were measured and the results recorded as follows: Length of the exit holes (long axis) (mm): Range = 2.2 – 3.5, Mean ± SD = 2.96 ± 0.42; width of the exit holes (short axis): Range = 1.3 – 2.2, Mean ± SD = 1.69 ± 0.24. Dissection of the sampled wood of *C. camphorae* revealed many empty pupal chambers as well as two teneral adults which were later identified as *Notoceresium elongatum* from named specimens in the collection of the Entomology Department, Queensland Department of Primary Industries, Indooroopilly, Brisbane, Queensland. Several of the pupal chambers were measured as follows: Length (mm): Range = 21.0 – 25.5; Mean ± SD = 23.8 ± 2.2; Width (mm): Range 2.0 – 3.0, Mean ± SD = 2.6 ± 0.5; Height (mm): Range = 2.1 – 4.5; Mean ± SD = 3.0 ± 0.9). From a closer examination of the infested wood, it was evident that (a) upon hatching from the eggs (presumably laid by the female in the thin bark), the larvae feed upon the vascular cambium layer, chewing into the underlying sapwood of the timber to form irregular galleries measuring 0.5 – 1.5 mm in diameter initially, becoming 3.5 – 4.0 mm in diameter as the larva matures; the galleries are usually tightly and completely filled with dry, fine, powdery frass or larger wood fragments behind the larvae; (b) upon completion of feeding, the larvae bore down into the sapwood to within approximately 20 mm below the bark layer (no deeper) and burrow more or less straight channels parallel to the grain of the wood for distances up to about 5.0 cm, before producing a pupal chamber at one end; the pupal cells are packed tightly with wood dust for a distance of 5 – 7 cm; (c) the emergence of the adults is accomplished by gnawing an exit hole from the unplugged end of the pupal cell upwards through the sapwood (usually a total distance of less than 1 cm) and thence through the bark. No other cerambycid species or other wood-boring beetles were obtained from the *C. camphorae* timber.

Discussion

The genus *Notoceresium* as a whole appears to be polyphagous in the larval stages but some species may be monophagous (HAWKESWOOD 1993). Larval host plants are known for all three described species in the genus (see Table 1, adapted from HAWKESWOOD 1993). *Notoceresium elongatum* appears to prefer *Acacia* (Mimosaceae) (WEBB 1994) but our new record from *Cinnamomum camphorae* indicates that this cerambycid is capable of switching and adapting to foreign (introduced) plant species (under certain circumstances) which are not related botanically and possess a different chemistry and morphology to that of its usual and apparently preferred (primary) hosts. (See later discussion for alternative scenario).

All published larval host records for *N. elongatum* have been made in New South Wales. The species is poorly represented in museum collections, especially in Queensland. The senior author has examined two major collections in Brisbane, Queensland (viz. Queensland Forestry Service, Indooroopilly and Queensland Department of Primary Industries, Indooroopilly) and they either had no material of *N. elongatum* or had only a few specimens from Queensland without any biological label data. Thus it would be interesting to determine its larval hosts in Queensland, especially those in the Bunya Mountains (the type locality) which is an interesting entomological area which has been poorly studied in terms of its beetle fauna.

The large number of exit holes present in the bark and sapwood of the *C. camphorae* timber indicates that, as also found by WEBB (1994), the species may be locally common with many

Table 1. Summary of the published larval host plants for the three species of *Notoceresium* presently recognized from Australia (* = introduced plant species).

Species	Larval host plant	Family	Reference
N. elongatum Mc Keown	*Acacia dealbata* Link	Mimosaceae	WEBB (1990, 1994)
	Aacia mucronata Willd. ex Wendl.	Mimosaceae	WEBB (1994)
	**Cinnamomum camphorae* (L.) Nees	Lauraceae	HAWKESWOOD & TURNER (this paper)
N. impressiceps Blackburn	*Hakea sericea* Schrad.	Proteaceae	WEBB (1987)
N. setistriatum Mc Keown	*Cissus antarctica* Vent.	Vitaceae	WILLIAMS (1985)

larvae reaching adulthood and successfully emerging from the dead wood. *Notoceresium* is not a deep-boring cerambycid like many of the Prioninae, Lamiinae and larger Cerambycinae, with pupal chambers rarely situated more than 15 mm below the bark surface (i.e. vascular cambium/bark interface).

Cinnamomum camphorae (L.) Nees is an introduced tree from China and Japan, with high levels of camphor oils in its wood, leaves and other parts. The wood itself is extremely hard and densely fibrous. These attributes suggest that only specialized wood-boring insects would be able to digest wood with such high oil content and fibrosity (although in dead, rotting wood these features would not be so marked due to chemical and physical breakdown). As far as we are aware, this is the first record of an Australian cerambycid breeding in the dead wood of *C. camphorae*. The general distribution and morphology of *N. elongatum* suggests that it is rather primitive cerambycid with an association with rainforests, wet sclerophyll forests or other eucalypt forest associations in wet coastal or semi-coastal areas. There are other *Cinnamomum* species known from the rainforests of eastern Australia as well as many other Lauraceae, a family which is usually regarded by botanists as one of the most ancient and primitive of the Angiospermae, with a long fossil record (RAVEN & AXELROD 1974; WHITE 1990). It is possible that *Notoceresium* has originated in the rainforests of eastern Australia, breeding in *Cinnamomum* and/or other related Lauraceae and has adapted to alternate (secondary) hosts such as *Acacia* in more mesic habitats during or after the drying out of the continent in the Tertiary Period (c. 65 million years BP). The Tertiary is usually regarded as a most significant period, when aridity became the main factor affecting the Australian environment, and which resulted in the establishment of an arid interior to the continent, the spread of scrub- and grasslands, the contraction of rainforests and the evolution of sclerophyllous vegetation (WHITE 1990). Thus it will be interesting to determine further larval hosts of *N. elongatum* and of its sibling species from the forests of eastern Australia.

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