

SOME AUSTRALIAN NATIVE PLANTS AS LARVAL HOSTS OF THE ELEPHANT WEEVIL *ORTHORHINUS CYLINDIROSTRIS* (F.) (COLEOPTERA: CURCULIONIDAE: MOLYTINAE) AND SOME HISTORICAL MUSEUM RECORDS.

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Summary

Orthorhinus cylindrirostris (F.) was recorded from a range of native host plants around Sydney (NSW). All six species have not previously been recorded as larval host plants for *O. cylindrirostris*. Specimen records from several Australian insect collections were also collected. *Orthorhinus cylindrirostris* is now known to breed in the wood of 29 plant species representing 21 plant families. *Orthorhinus cylindrirostris* is polyphagous and so far there appears to be only one direct familial link between native and introduced plant species (Sapindaceae). Most historical records indicate that *O. cylindrirostris* was well known as a pest of agriculture (specifically citrus and grapevines) in the late 1800's but there were no specific records of their native host plants until very recently.

Keywords: *Orthorhinus*, Curculionidae, larval host plants, agricultural pest

INTRODUCTION

Orthorhinus cylindrirostris (F.) is a native species of south-eastern Australia generally believed to breed in timber of eucalypts and wattles and more specifically in brushbox (*Lophostemon confertus* (R.Br.) Peter Wilson & J.T. Waterh.), blackbean (*Castanospermum australe* A.Cunn ex Hook.) and *Angophora floribunda* (Smith) (Bashford 1991; Froggatt 1897, 1990, Gallard 1916; Jones and Elliott 2000; McKeown 1945, Murdoch *et al.* 2014; Tepper 1887). *Orthorhinus cylindrirostris* was first noted as a pest of cultivated citrus in the late 1800's (Olliff 1890; Murdoch *et al.* 2014) and since then from a range of cultivated food and ornamental plants including grapes, blueberry (*Vaccinium* sect. *Cyanococcus* Rydb.), elms (*Ulmus* sp.) and tamarisks (*Tamarix* sp.) (French 1909; Hely *et al.* 1982; Murdoch *et al.* 2014). Murdoch *et al.* (2014) tested the preference of *O. cylindrirostris* for oviposition, larval survival and ultimately adult emergence in blueberry, lemon (*Citrus x limon* L.), *Acacia falcata* Wildenow and *A. floribunda* and found that infestation was more successful in blueberry than the other three species.

During the process of collecting and storing infested timber to rear timber-boring Coleoptera, *O. cylindrirostris* has emerged from several samples. Timber samples were maintained in plastic tubs under semi-controlled conditions. The insect collection of the Department of Primary Industries at Orange Agricultural Institute (NSWDPI), Queensland Department of Primary Industries (QDPI), Brisbane and the Australian Museum (Sydney) were also examined for specimens of *O. cylindrirostris* with specific larval host data.

RESULTS AND DISCUSSION

During this study, *O. cylindrirostris* was bred from branches and stems of six species of native plants collected in southern Sydney (Table 1, specific details are shown in Appendix 1). All appear to be new host plant records for this species and all six are from different plant families. Of the six plant families, only one has been recorded previously in the literature (Fabaceae).

The insect collections of the Department of Primary Industries for both New South Wales and Queensland as well as the Australian Museum were inspected for host plant records for *O. cylindrirostris*. The NSWDPI and QDPI collections contain a number of specimens with label data sufficiently detailed to identify a larval host species (specific details in Appendix 2). These include a wide range of cultivated food and ornamental plants as well as native species in the families Casuarinaceae and Pittosporaceae. Some specimens in the NSWDPI collection, collected from Yanco (NSW) on 16 September 1958 by D.E. Wallin, have a generic label which suggests they have been found in *Eucalyptus botrioides* Sm., *Eucalyptus globulus* (Maiden, Blakely & Simmonds) J.B.Kirkp. (as *bicostata*) and *Casuarina cunninghamiana* Miq., but individual specimens were not assigned to specific host plants. Various authors (McKeown 1945, Hely *et al.* 1982, Tepper 1887) have listed eucalypts as possible hosts of *O. cylindrirostris* but there do not appear to be any specific references in the literature, where the host species is identified. Murdoch *et al.* (2014) found *A. floribunda* to be a relatively poor host for *O. cylindrirostris* compared with cultivated

blueberry and lemon under experimental conditions but nevertheless, females did oviposit on *A. floribunda* and adults did emerge from infested *A. floribunda* plants. Jones and Elliott (2000) list *L. confertus* as a larval host plant for *O. cylindrirostris* but there does not appear to be any earlier reference in the literature.

Together these data indicate that *O. cylindrirostris* is polyphagous across a wide range of plant families (Table 1) with almost no direct linkage between native and introduced species within the same plant family, except for Sapindaceae. *O. cylindrirostris* has adapted well to cultivated plants and therefore is also likely to occur in a wider range of native hosts.

Table 1: Host plants of *Orthorhinus cylindrirostris* (Summary of Appendices 1 and 2). New native species from Appendix 1 are shown in bold.

Plant Family	Species	Location	Status
Anacardiaceae	Wax tree (<i>Toxicodendron succedaneum</i>)	NSW	I, O
Caprifoliaceae	Honeysuckle (<i>Lonicera</i> sp.)	NSW	I, O
Casuarinaceae	Scrub she-oak (<i>Allocasuarina distyla</i>)	NSW	N
	<i>Casuarina/Allocasuarina</i> sp.	NSW	N
Epacridaceae	Coast beard-heath (<i>Leucopogon parviflorus</i>)	NSW	N
Elaeocarpaceae	Blueberry Ash (<i>Elaeocarpus reticulatus</i>)	NSW	N
Ericaceae	Blueberry (<i>Vaccinium</i> sect. <i>Cyanococcus</i> Rydb.) ¹	NSW	I, F
Escaloniaceae	<i>Escallonia</i> sp.	NSW	I, O
Fabaceae	Blackbean (<i>Castanospermum australe</i>) ²	NSW	N, O
	Large-leafed bush-pea (<i>Pultanaea daphnoides</i>)	NSW	N
	Sickle Wattle (<i>Acacia falcata</i>) ³	NSW	N
Juglandaceae	Pecan (<i>Carya illinoensis</i>)	NSW	I, F
Lythraceae	Pomegranate (<i>Punica granatum</i> L.)	NSW, Qld	I, F
Malvaceae	Rose of Sharon (<i>Hibiscus syriacus</i> var. <i>coelestis</i>)	NSW	I, O
Myrtaceae	Brushbox (<i>Lophostemon confertus</i>) ⁴	Unknown	N, O
	Rough-barked Apple (<i>Angophora floribunda</i>) ⁵	NSW	N, O
Phyllanthaceae	Native Coffee Bush (<i>Breynia oblongifolia</i>)	NSW	N
Pittosporaceae	Native Frangipani (<i>Hymenosporum flavum</i>)	NSW	N, O
Proteaceae	Macadamia (<i>Macadamia integrifolia</i>)	Qld	N, F
Roseaceae	Prune (<i>Prunus domestica</i>)	NSW	I, F
	Peach (<i>Prunus persica</i>)	NSW	I, F
	Apple (<i>Malus domestica</i>)	NSW	I, F
Rutaceae	Lemon (<i>Citrus x limon</i> L.) (Rutaceae)	NSW	I, F
Sapindaceae	Tuckeroo (<i>Cupaniopsis anacardioides</i>)	NSW	N, O
	Lychee (<i>Litchi chinensis</i>)	Qld	I, F
Tamaricaceae	Tamarisk (<i>Tamarix</i> sp.)	NSW	I, O
Ulmaceae	Elm (<i>Ulmus</i> sp.) ⁶	Vic	I, O
Vitaceae	Grape (<i>Vitis vinifera</i> L.)	NSW	I, F
Status: N = Native, I = Introduced, F = Cultivated food crop, O = Cultivated ornamental plant ^{1,3,5} Murdoch <i>et al.</i> (2014) ² Froggatt (1897) ⁴ Jones and Elliott (2000) ⁶ French (1909)			

The larval habits of and typical damage caused by *O. cylindrirostris* are well known and well illustrated (Brimblecombe 1956, French 1909, Froggatt 1897, 1990, Hely *et al.* 1982, Olliff 1890) largely as a result of their agricultural significance. The larval habits and damage observed in this study are largely consistent with the published literature and no detailed comments will be made.

Orthorhinus klugii Bohem. has been recorded breeding in a more limited range of plants, specifically several species of *Acacia* and cultivated grapevines (Allen *et al.* 1898c, French 1900, Froggatt 1894, 1898, 1900, 1902, 1907, 1923; Gallard 1916; Gurney 1910, Hely *et al.* 1982, McKeown 1945, Olliff 1890). *Orthorhinus klugii* is smaller than *O. cylindrirostris* and has in past been referred to as the “small elephant beetle” (Gurney 1910) or the “vine-cane weevil” (Froggatt 1902). Body length of *O. cylindrirostris* ranges from 8-20mm while *O. klugii* is smaller (ca. 7mm) (Dunn and Zerbo 2014) but this is the only distinction they make between the two with the remaining discussion on biology relevant to both. The museum collections examined hold a large number of *Orthorhinus* specimens which range in size but they are not always clearly separated into the various species (mostly unsorted accession material). Smaller specimens often have a distinctive lighter patch on the pronotum,

typical of *O. klugii*, while most of the larger specimens are more uniform in colour. These were deemed to be *O. cylindrirostris* for the purposes of this study. Many are older specimens that have darkened in colour with age. Interestingly, only one specimen of *O. cylindrirostris* was clearly reared from a grapevine (Appendix 2). No specimens of *O. klugii* had associated host data except one in the QDPI collection which indicated it had been reared from Lychee at Amamoor (Qld). Olliff (1890) alluded to there being several similar species of *Orthorhinus* which may be pests of agricultural crops and recently Pullen *et al.* (2014) indicated that *O. cylindrirostris* may be a complex of closely related species. Therefore, some caution is required in definitively categorising the host plant range of *O. cylindrirostris* (and *O. klugii*) at this time. Nevertheless, these species appear to be polyphagous and easily adaptable to cultivated plants.

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Appendix 1: New *Orthorhinus cylindrirostris* records*Cupaniopsis anarcardioides* (A.Rich.) Radlk. (Sapindaceae)

1. NSW, Sydney, Carss Park. Collected 6 March 2019, 4 specimens emerged between 4 April and 10 Sep 2019.
2. NSW, Sydney, Carss Park. Collected 12 February 2020, 3 specimens emerged on 1 March 2020.
3. NSW, Sydney, Wanda. Collected 10 October 2019, 2 specimens emerged between 11 January and 13 March 2020.
4. NSW, Sydney, Wanda. Collected 20 October 2019, 5 specimens were cut from infested branches on 20 October 2019.

Eleaeocarpus reticulatus Sm. (Elaeocarpaceae)

1. NSW, Sydney, Gynea. Collected 26 September 2019, 1 specimen emerged on 1 October 2019.
2. NSW, Sydney, Kurnell. Collected 10 December 2019, 1 specimen emerged on 20 March 2020.
3. NSW, Sydney, Kurnell. Collected 18 December 2019, 8 specimens emerged between 25 February and 20 March 2020.

Pultanaea daphnoides J.C.Wendl. (Fabaceae)

1. NSW, Sydney, Gynea. Collected 26 September 2019, 1 specimen emerged on 10 December 2019.

Allocasuarina distyla (Vent.) L.A.S.Johnson (Casuarinaceae)

1. NSW, Sydney, Loftus. Collected 21 April 2019, 1 specimen emerged on 29 December 2019.

Leucopogon parviflorus (Andrews) Lindl. (Epacridaceae)

1. NSW, Sydney, Kurnell. Collected 5 March 2020, 2 specimens emerged on 7 March 2020.

Breynia oblongifolia (Mull.Arg.) Mull.Arg. (Phyllanthaceae)

1. NSW, Sydney, Miranda. Collected 1 September 2022, 3 specimens emerged on 12 November, 8 and 20 December 2022.

Appendix 2: Larval host records from *Orthorhinus cylindrirostris* specimens in the Department of Primary Industries NSW and Queensland Department of Primary Industries insect collections (All specimens were adults).

Location	Collection	Date	Collector	Larval host	Label notes
Anacardiaceae					
Roseville (NSW) (2 specimens)	NSWDPI	14 November 1966	C.E. Chadwick	Wax tree (<i>Toxicodendron succedaneum</i> (L.) Kuntze) <u>Anacardiaceae</u>	Ex. limb of <i>Toxicodendron succedaneum</i>
Caprifoliaceae					
Lower Lewis Ponds (nr. Orange) (NSW)	NSWDPI	6 May 1970	Mangerson	Honeysuckle (<i>Lonicera</i> sp.) <u>(Caprifoliaceae)</u>	Bred ex. Honeysuckle (climbing type)
Casuarinaceae					
Orange (NSW) (3 specimens)	NSWDPI	5 July 1985	W.G. Thwaite	<i>Casuarina/Allocasuarina</i> sp. (Casuarinaceae)	Reared from sheoak from Raylan Apr. 1985
Escaloniaceae					
Wollongong (NSW)	NSWDPI	9 December 1966	C.E. Chadwick	<i>Escalonia</i> sp. (Escaloniaceae)	Bred ex. limb Escalonia coll. 15/10/66 at N. Robinsons
Juglandaceae					
Richmond Hill (nr. Lismore) (NSW)	NSWDPI	15 October 2010	G. Bugden	Pecan (<i>Carya illinoensis</i>) <u>(Juglandaceae)</u>	Ex. Stem and roots of pecan
Lythraceae					
Newcastle (NSW)	NSWDPI	31 October 1960	Not specified	Pomegranate (<i>Punica granatum</i> L.) (Lythraceae)	Emerged in laboratory larvae coll. in pomegranate 17/8/60
Brisbane (Qld)	QDPI	27 Nov. 1976	L. Rogers	Pomegranate (<i>Punica granatum</i> L.) (Lythraceae)	Ex. Stem <i>Punica granatum</i> (x2).
Malvaceae					
Leichardt (NSW) (2 specimens)	NSWDPI	12 November 1959	F. Hasemer	Hibiscus (<i>Hibiscus syriacus</i> var. <i>coelestis</i>) (Malvaceae)	Bred from Hibiscus stem, <i>H. syriacus</i> var. <i>coelestis</i>
Pittosporaceae					
Newport (NSW)	NSWDPI	1 December 1958	Not specified	Native Frangipani (<i>Hymenosporum flavum</i>) (Hook.) F. Muell. (Pittosporaceae)	20-30 holes in trunk of Hymenosporum
Proteaceae					
Montville (Qld) (5 specimens)	QDPI	4 Nov. 1974	D.A.I (?)	Macadamia <i>Macadamia integrifolia</i> Maiden & Betche (Proteaceae)	"reared boring in lower trunk of <i>M. integrifolia</i> var. 246".
Roseaceae					
Griffith (NSW)	NSWDPI	15 August 1957	P.C. Hely	Prune (<i>Prunus domestica</i>) (Roseaceae)	Larvae boring vertical tunnels of prune tree coll. 15/8/57, emerged 28/10/57
Orchard Hills (NSW)	NSWDPI	18 December 1970	Not specified	Peach (<i>Prunus persica</i>) (L.) Batsch (Roseaceae)	Bred in lab. from larvae in peach wood coll. 11/9/70
Sydney (NSW)	NSWDPI	12 February 1968	Not specified	Apple (<i>Malus domestica</i>) (Borkh.) (Roseaceae)	In apple trunk, found dead
Rutaceae					
Grose Vale (NSW)	NSWDPI	5 December 1966	P.C. Hely	Lemon (<i>Citrus limon</i> L.) (Rutaceae)	Bred from lemon root stock.
South Strathfield (NSW) (4 specimens)	NSWDPI	20 January 1958	Not specified	Lemon (<i>Citrus limon</i> L.) (Rutaceae)	Pupae and adults in borings in seedling lemon
Sapindaceae					
Tully (Qld)	QDPI	19 Oct. 1973	B. Franzmann	<i>Lychee chinensis</i> (<i>Litchi chinensis</i>) (Sapindaceae)	Ex. ringbarked <i>Litchi chinensis</i>
Nambour (Qld)	QDPI	3 May 1985	G.K. Waite	<i>Lychee chinensis</i> (<i>Litchi chinensis</i>) (Sapindaceae)	Ex. Lychee stem
Woombye (Qld)	QDPI	18 Nov. 1986	G.K. Waite	<i>Lychee chinensis</i> (<i>Litchi chinensis</i>) (Sapindaceae)	Ex. Lychee
Tamaricaceae					
Avalon (NSW)	NSWDPI	19 November 1956	Not specified	Tamarisk (<i>Tamarix</i> sp.) (Tamaricaceae)	Ex. Tamarisk boring in stem em. Dec. 56
Vitaceae					
Denman (NSW)	NSWDPI	9 July 1996	G. Keeping	Grape (<i>Vitis vinifera</i> L.) (Vitaceae)	In grapevine, Inglewood Vineyard via Denman