

HERBIVOROUS INSECTS ASSOCIATED WITH THE PAPERBARK *MELALEUCA QUINQUENERVIA* AND ITS ALLIES: III. GELECHIOIDEA (LEPIDOPTERA)

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Abstract

Although *Melaleuca* spp. are common and diverse in Australia, the herbivorous insects associated with these trees and shrubs are poorly known. Since late 1986, surveys have been conducted in Queensland and northern New South Wales to detect insects with potential for controlling the paperbark tree, *Melaleuca quinquenervia*, in Florida, USA, where it has become a serious pest. This paper, the third in a series, presents new host records for 31 species of Gelechioidea moths collected and reared on *M. quinquenervia* and six closely related tree species. Some of the Xyloryctinae, as well as three other Gelechioidea may warrant further study of their potential as biocontrol agents for *M. quinquenervia*.

Introduction

With around 250 species (Barlow 1988), *Melaleuca* spp. are very diverse. Despite their diversity and distribution throughout Australia, the herbivorous insect faunas of *Melaleuca* spp. are poorly known. *Melaleuca quinquenervia* is one of 10 species included in the *M. leucadendra* (L.) L. complex (Blake 1968). A summary of the problems caused by *M. quinquenervia* in Florida, and of the surveys to detect potential insect biological control agents is described in the first paper in this series (Balciunas *et al.* 1993a). This paper, the third in a series, presents our records and observations of the 31 Gelechioidea species which we reared from larvae or pupae collected on *Melaleuca* species.

Methods

Collecting methods were described in Balciunas *et al.* (1993a). All of our Gelechioidea moths were collected and reared on *M. quinquenervia* or one of six close relatives in the *M. leucadendra* complex; *M. leucadendra*, *M. dealbata* S.T. Blake, *M. viridiflora* Sol. ex Gaertn., *M. "fluviatilis"*, *M. nervosa* (Lindl.) Cheel, and *M. cajuputi* Powell. *M. "fluviatilis"* has not yet been formally described but is already in use in the literature (Barlow 1988). We referred to *M. "fluviatilis"* as *M. n. sp. A* in our earlier papers (Balciunas *et al.* 1993a, 1993b).

Our collecting was concentrated in two coastal areas: from the Daintree River, north of Cairns, to Townsville; and from Coolum in southeastern Queensland to Grafton in northern New South Wales. The locations of most of the sites in this paper have been listed in the previous two publications in this series. Sites listed for the first time are: **Angus Smith Drive** (19°19.4'S 146°45.3'E), Townsville; **Bohle River** (19°17.5'S 146°42.6'E), 12 kms WSW of Townsville; **Crossroads Swamp** (16°16.8'S 145°22.7'E), 7 kms ESE of

Daintree village; **Double Barrel Creek** (18°07.8'S 145°54.9'E), 22 kms S of Tully; **Good Shepherd Hospice*** (19°18.8'S 146°45.9'E), Townsville; **Palmetum Ponds*** (19°18.8'S 146°45.9'E), Townsville; **Ross River*** (19°18.5'S 146°45.6'E), Townsville; **Rowes Bay Lions Park*** (19°14.7'S 146°47.6'E), Townsville; **Sunnybank** (27°34.5'S 153°04.1'E), Brisbane and **Woodburn** (29°13.2'S 153°15.4'E), 62 kms NE of Grafton. Sites marked with an asterisk (*) are either ornamental plantings, or forests remnants in urban areas. Specimens were reared on the tree species from which they were collected. One of the authors (E.D. Edwards) identified the adults. As the taxonomy of the Gelechioidea is currently being revised, identifications presented in this paper may be subject to change. Staff of the USDA Australian Biological Control Laboratory (ABCL) associated larvae with identified adults. Voucher specimens will be deposited at the Australian National Insect Collection in Canberra, while the remainder will be held at the ABCL.

Results

Collection and rearing records for all Gelechioidea species in this paper are presented in Table 1.

Discussion

This paper presents our records for the 31 Gelechioidea species reared from larvae or pupae on *M. quinquenervia* or its close allies. The only Gelechioidea listed by McFarland (1979) as feeding on *Melaleuca*, is *Myrascia megalocentra* (Meyrick), which he recorded as feeding upon *M. uncinata* R. Br., *M. radula* Lindl., *M. megacephala* F. Muell. and *M. scabra* R. Br. No additional records for Gelechioidea upon *Melaleuca* are presented by Common (1990), and the host records presented in this paper are apparently all new.

Of 83 Lepidoptera species listed by Julien (1992) as being used for biological control of weeds, eight were Gelechioidea. Five of these biocontrol agents belonged to the family Gelechiidae, while two belonged to the family Coleophoridae. The remaining species was an Oecophoridae. We have not collected any Coleophoridae, but one of the three Gelechiidae species that we have reared, Gelechiidae sp. A, may be further investigated to assess its biocontrol potential. Although no cosmopterigids have been used as biocontrol agents, Cosmopterigidae sp. A and B are both being considered for further research into their biocontrol potential. However, our efforts to study these species are hampered by the taxonomic difficulties associated with this family.

Our Xyloryctinae specimens, like most members of this sub-family, are wood-boring leaf-feeders. The larvae bore short tunnels into the branches and trunks of trees, often at, or near, branch forks. The larvae leave their tunnels, probably at night, to collect leaves which are brought back to the tunnel entrance. The larvae then feed on the leaves from within the retreat. The tunnel entrance is often covered with silk, detritus, and spherical faecal

Table 1. Gelechioidea species reared from *Melaleuca quinquenervia* and six of its close relatives.

Family and Species	Collection Site	Host Plant ¹	Stage and No. Collected	Date Collected	Plant Part Fed Upon	Life-history information pp = pupal period
Cosmopterigidae						
<i>Labdia</i> sp.	Ross River	Mlb	Larva	23.vi.88	Wood	
<i>Leptozestis daserodes</i> (Meyrick)	Sunnybank	Mqn	2 larvae	6.iv.87	Flowers ²	
undet. <i>Cosmopterigidae</i> sp. A	Aspley	Mqn	13 larvae	29.ii.88	Flowers	3 adults emerged 18-22.iii.88
	Cardwell Swamp	Mqn	Pupa	25.vii.88		Adult emerged 31.vii.88
	Chelmer	Mqn	Larva	21.iv.87		Adult emerged
	Coolum	Mqn	Larva	11.ii.91	Flowers	Adult emerged 27.ii.91, pp=8 d
	Edmund Kennedy Nat. Park	Mqn	Larva	22.iii.88	Flowers	Adult emerged
	Edmund Kennedy Nat. Park	Mqn	Larva	30.v.88	Fruit	Adult emerged
	Edmund Kennedy Nat. Park	Mqn	5 adults	25.vii.88		
	Forrest Beach West	Mqn	Larva	20.vii.87	Flowers	Adult emerged 31.vii.87
	Forrest Beach West	Mqn	Adult	8.vi.88		
	Gundale	Mqn	2 larvae	23.x.90	Flowers	Adult emerged 26.xi.90, pp=14 d
	Hyde Park Shopping Centre	Mqn	Adult	25.ii.92		
	Rockingham Road	Mvr	8 larvae	12.iii.91	Flowers	8 adults emerged 1.iv.91
	Sherwood	Mqn	3 larvae	22.ii.88	Flowers	Adult emerged 14.iii.88, pp=13 d
	Sunnybank	Mqn	2 larvae	6.iv.87	Flowers	2 adults emerged
	Taringa	Mqn	Pupa, 4 larvae	24.ii.92	Flowers	Adult emerged 12.iii.92, pp=10 d
	Woodburn	Mqn	3 larvae	20.iii.90	Flowers	Adult emerged 18.iv.90, pp=19 d
	Woodward Park	Mqn	2 adults	7.viii.89		
undet. <i>Cosmopterigidae</i> sp. B	Burpengary	Mqn		26.vii.89	Inside gall ³	Adult emerged 8.ix.89
	Cardwell Swamp	Mqn	Adult	22.iii.88		
	Double Barrel Creek	Mqn	Adult	7.viii.89		
	Edmund Kennedy Nat. Park	Mqn	Adult	22.iii.88		
	Forrest Beach West	Mqn	Larva, 2 adults	30.v.88	Fruit	Adult emerged
	James Cook University	Mqn	2 larvae	18.v.92	Flowers	2 adults emerged
	Woodward Park	Mqn	Adult	29.vii.88		

Table 1 (Cont.). Gelechioidea species reared from *Melaleuca quinquenervia* and six of its close relatives.

undet. Cosmopterigidae sp. C	Cardwell Swamp	Mqn	Larva	22.iii.88	Fruit	Adult emerged
undet. Cosmopterigidae sp. D	Keelbottom Creek	Mfl	Adult	28.iii.88		
	Lennox Head	Mqn	Larva	8.i.91	Tips	Adult emerged 18.ii.91
	Stapylton	Mqn	Larva	1.viii.89	Tips	Adult emerged 6.ix.89, pp=19 d
undet. Cosmopterigidae sp. E	Sherwood	Mqn	Larva	29.i.92	Tips	Adult emerged 14.ii.92
Gelechioidea						
<i>Hypatima</i> sp.	Gailes	Mqn	Larva	16.ii.88	Flower buds	Adult emerged 1.iii.88, pp=11 d
<i>Prototechia</i> sp.	Forrest Beach West	Mqn	Larva	14.viii.90	Tips	Adult emerged
undet. Gelechioidea sp. A	Fitzgibbon	Mqn	Larva	26.vii.89	Tips	Adult emerged 28.viii.89, pp=22 d
	Forrest Beach West	Mqn	Larva	21.ix.92	Tips	3 adults emer. 4-11.x.92, pp=10-13 d
	Lennox Head	Mqn	Larva	11.ix.90	Tips	Adult emerged 5.x.90, pp=11 d
	Woodward Park	Mqn	7 pupae	3.ix.92		7 adults emerged 15-20.ix.92
	Woodward Park	Mqn	5 larvae	3.ix.92	Tips	2 adults emer. 22-25.ix.92, pp=10-11 d
Oecophoridae						
Oecophorinae						
<i>Chrysonoma consularis</i> (Meyrick)	Angus Smith Drive	Mnv	3 larvae	14.v.87	Leaves	Adult emerged 18.vi.87, pp=28 d
	Forrest Beach West	Mqn	Larva	20.x.92	Leaves	Adult emerged 29.x.92
	Alice River	Mfl	Larva	18.vii.88	Leaves	Adult emerged 18.viii.88
<i>Comptosia</i> sp.	Murrigal	Mqn	Pupa, 2 larvae	29.ix.92		Adult emerged 5.xi.92, pp=9 d
<i>Eochrois leiochroa</i> Lower	James Cook University	Mqn	Larva	20.xii.91	Leaf-binder	Adult emerged 10.i.92
<i>Eochrois</i> sp. B	Woodward Park	Mqn	Pupa	9.ix.92		Adult emerged 10-12.ix.92
	Five Mile Creek	Mlb	Larva	21.vi.87	Leaves	Adult emerged 12.viii.87
	Crossroads Swamp	Mcj	2 larvae	21.vi.91	Leaves	Adult emerged 28.viii.91
	Eubenangee Swamp	Mqn	Larva	25.v.87	Leaves	Adult emerged
	Forrest Beach West	Mqn	2 larvae	3.xi.91	Leaves	Adult emerged
	Palmetum Ponds	Mdl	Larva	14.iii.88	Leaves	Adult emerged 15.iv.88, pp=10 d
	Woodward Park	Mqn	3 larvae	17.iii.87	Leaves	2 adults emerged 31.iii.-13.iv.87, pp=8-14 d
	Woodward Park	Mqn	Larva	4.v.87	Leaves	Adult emerged 24.v.87, pp=13 d
	Woodward Park	Mqn	Adult	9.vii.90		

Table 1 (Cont.). Gelechioidea species reared from *Melaleuca quinquenervia* and six of its close relatives.

"Garrha" sp. C4	Feluga Site #1 Woodward Park	Mqn Larva Mqn Larva	20.x.92 3.ix.92	Leaf-binder Tips	Adult emerged 17.xi.92, pp=18 d Adult emerged 22.ix.92
<i>Lophopepla igniferella</i> (Walker)	Crossroads Swamp	Mcj 2 larvae	6.v.91	Leaves	Adult emerged 25.v.91, pp=11 d
<i>Lophopepla</i> sp. B	Crossroads Swamp	Mcj Larva	6.v.91	Leaves	Braconidae parasite emerged 22.v.91
<i>Oenochroa</i> sp.	Five Mile Creek	Mvr Pupa			Adult emerged 11-17.vii.87
<i>Pyroptila matutinelia</i> (Walker)	Murrigal	Mqn Larva	9.ix.92		Adult emerged 9.ix.92
<i>Pycnozania epiprepes</i> (Turner)	Taringa	Mqn Larva	29.v.90	Leaves	Adult emerged 17.x.90, pp=7 d
undet. <i>Oecophorinae</i> sp. C	Cardwell Swamp	Mqn Pupa	22.iii.88		Adult emerged 28.iii.88
Stenommatinae	Caloundra	Mqn Larva	17.vii.90	Tips	Adult emerged 5.x.90, pp=11 d
<i>Agriophara</i> sp.	Bohle River	Mlb 3 larvae	1.iv.87	Leaves	Adult emerged 20.iv.87, pp=10 d
	Keelbottom Creek	Mlb 2 larvae	28.iii.88	Leaves	2 adults emerged 28-29.iv.88, pp=10-11d
Xyloryctinae					
<i>Clerarcha poliochyta</i> Turner	James Cook University	Mvr Larva	22.ii.88	Leaves	Adult emerged 5.iv.88, pp=8 d
	James Cook University	Mvr 2 larvae	14.iii.88	Leaves	Adult emerged 11.iv.88
<i>Cryptophasa nephrosema</i> Turner	Forrest Beach West	Mqn Larva	25.vii.88	Leaves	Adult emerged
	Woodward Park	Mqn Larva	16.vi.91	Leaves	Adult emerged 23.vii.91
<i>Cryptophasa</i> sp. C	Burpengary	Mqn Larva	12.vii.88	Leaves	Adult female emerged
<i>Cryptophasa</i> sp. D	Indooroopilly	Mqn Pupa	27.xi.89		Adult male emerged 8.xii.89
<i>Xylorycta</i> sp.	James Cook University	Mvr Larva	20.iv.88	Leaves	Adult emerged
undet. <i>Xyloryctinae</i> sp. A	James Cook University	Mvr Larva	28.iii.88	Leaves	Adult emerged 18.iv.88
undet. <i>Oecophoridae</i> sp. B	Rowes Bay Lions Park	Mlb Larva	6.vi.88	Leaves	Adult emerged 17.vii.88

1 Mqn = *M. quinquenervia*, Mcj = *M. cajuputi*, Mdl = *M. dealbata*, Mfl = *M. "fluvialis"*, Mlb = *M. leucadendra*, Mnv = *M. nervosa*, Mvr = *M. viridiflora*

2 Larvae fed within the stem of a flower bud or inflorescence, as well as within individual flowers

3 Adult emerged from a green, fleshy, tip-gall

4 Most members of this genus feed on dead eucalypt leaves (Common 1990)

pellets. Pupation may occur within the retreat or the larvae may leave the retreat to pupate in the soil. Although not voracious leaf-feeders, the wood-boring activities of these larvae may cause significant damage to *M. quinquenervia*. Xyloryctinae larvae are common on the *Melaleuca* trees outside of our shadehouse, but those that we have collected appear to have long life-cycles and have proved very difficult to rear. We plan to opportunistically study some of these Xyloryctinae in the future.

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