FOLIAGE INSECT DIVERSITY IN DRY EUCALYPT FORESTS IN EASTERN TASMANIA

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(with four tables, one text-figure and two appendices)

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Species numbers and composition of the insect fauna occurring on trees and shrubs were studied in dry eucalypt forests in eastern Tasmania over nine years. In all, 1164 named and putative species representing 17 orders and 157 families were collected. The bulk of the species belonged to the orders Coleoptera (28%), Hymenoptera (25%), Hemiptera (18%), Lepidoptera (14%) and Diptera (10%). Of the species collected, 388 — about one-third — were identified at least to genus or species level. These included 21 named species not previously listed in the Tasmanian insect fauna and 90 undescribed species.

A list of 22 host plants for 171 insect species was compiled from records of 132 insect species observed feeding during the study and from previous records of insect/host plant associations for 39 insect species found on the study plots. Most insects were feeding on eucalypts (127 insect species) and acacias (38 species). The most widely distributed and commonly collected species were several well-known pests of eucalypts: *Gonipterus scutellatus* (Coleoptera: Curculionidae), *Uraba lugens* (Lepidoptera: Noctuidae), *Amorbus obscuricornis* (Hemiptera: Coreidae), *Chaetophyes compacta* (Hemiptera: Machaerotidae) and *Eriococcus coriaceous* (Hemiptera: Eriococcidae). Host plants supporting the richest insect fauna were *Eucalyptus amygdalina* (74 species), *E. obliqua* (64), *E. viminalis* (46), *Acacia dealbata* (35), *E. dalrympleana* (33), *E. sieberi* (31), *E. delegatensis* (30), *E. pulchella* (24) and *E. globulus* (19).

The broad-striped ghost moth, *Fraus latistria* Walker (Lepidoptera: Hepialidae), was collected during the study. This species is classified as 'rare' on the list of Tasmania's threatened fauna and the collection established a new locality record.

Key Words: Insect diversity, host plants, eucalypt forests, Tasmania.

INTRODUCTION

Prior to the late 1960s, dry eucalypt forests in eastern Tasmania were selectively logged for sawlogs and small volumes of fence posts and firewood. Following the development of an export woodchip industry, large areas of these forests were harvested and regenerated by clearfelling all merchantable timber, burning the logging slash to prepare a seedbed and aerially sowing with eucalypt seed (Felton & Cunningham 1971).

The effects of forest operations associated with the woodchip industry on flora, fauna and other natural values became the subject of considerable public concern in the 1970s (Senate Standing Committee on Science and the Environment 1977) and research projects were initiated by various agencies to provide quantitative data to assist rational debate on the issue.

The invertebrates are an obvious target group for such studies because of their extraordinary species richness across a wide range of habitats and their key role in essential ecological functions including soil conditioning, nutrient cycling, pollination and biological control. There have been many investigations of individual forest insect species, particularly commercially important pests, in dry eucalypt forests, but surprisingly few studies of the species composition of the general insect fauna.

Knowledge of the insect fauna of Tasmanian eucalypt forests has been limited by the paucity of collections in some forest types and taxonomic deficiencies for many insect groups. There is a scarcity of ecological data for most of the insect fauna in these forests apart from commercially important pests (Elliott & de Little 1984, Elliott *et al.* 1998) and some individual species or groups. Long-term studies of the size and composition of the forest insect fauna at specific Tasmanian sites are rare although some intensive short-term studies (1–2 years) in rainforest and wet eucalypt forests have provided valuable data on species composition. Coy *et al.* (1993) collected 618 species of insects from 20 orders in cool temperate rainforest, and Hickman & Hill (1978) collected 105 named insect species and many more unidentified species from 17 orders, mainly from moss and leaf litter, in the Lower Gordon Scientific Study in southwestern Tasmania. Several studies of particular insect groups have been conducted in dry eucalypt forests in Tasmania. For example, in northeastern Tasmania, McQuillan *et al.* (1998) reported on the seasonality of 126 species of geometrid moths in eucalypt forests, including a dry forest site, and Bashford (1993) recorded 81 species of macrolepidoptera from dry eucalypt forests over a five-year period.

In 1978 we established a series of plots in several dry eucalypt forests scheduled for harvesting in eastern Tasmania as part of a study of the effects of clearfelling and burning on vegetation and its associated insect fauna over the long term (i.e., at least 20 years). This paper records the species diversity and host plant records of the insect fauna found on tree and shrub vegetation during the first nine years of the study. Other aspects of the study, including the effects of harvesting and regeneration on the flora and insect fauna, are being documented elsewhere.

METHODS

Plot Establishment

Three plots were established in each of five proposed logging coupes containing mature, unlogged, dry eucalypt forest in eastern Tasmania. The location and basic descriptors of these forests are summarised in table 1 and figure 1. Plot size was 75 m x 50 m (0.375 ha), with the corners marked by wooden pegs and wire stakes. Within each coupe, the three plots were located to sample a range of dominant eucalypt associations usually strongly related to aspect.

Following harvesting and regeneration treatments, plots were re-established in the same locations by replacing the wooden stakes and wire pegs with permanent steel star pickets as corner markers. Due to rescheduling of harvesting operations, all plots in SW 51 and one plot in TO 54 were not harvested.

Vegetation

Mature, unlogged, dry forests in the study areas had an overstorey of eucalypt associations comprising two or more of the following species: *Eucalyptus amygdalina* Labill., *E. obliqua* L' Hèrit., *E. delegatensis* R. Baker, *E. pulchella* Desf., *E. globulus* Labill., *E. ovata* Labill., *E. sieberi* L. Johnson, *E. tenuiramis* Miq. and *E. viminalis* Labill. (table 1). These were relatively open forests with the stocking of mature eucalypt stems ranging from 109 to 339 stems per hectare (Elliott *et al.* 1991).

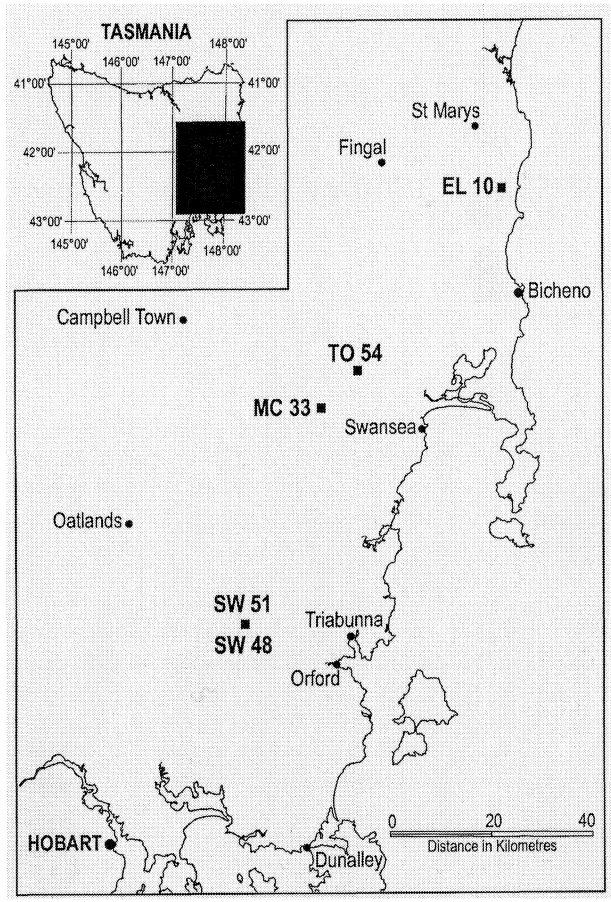

FIG. 1 — Coupe locations.

TABLE 1
Site descriptors for harvesting units (coupes) sampled for insect fauna

Coupe	Location (1:100 000) Tasmap ref.)	Altitude a.s.l. (m)	Mean annual rainfall (mm)	Parent material	Dominant eucalypt species
SW 48	Nugent EN 543 940	320	585	Triassic sandstone	*E.obliqua* *E.amygdalina* *E.viminalis*
SW 51	Nugent EN 510 965	380	585	Triassic sandstone	*E.obliqua* *E.amygdalina* *E.viminalis*
MC 33	LittleSwanport EP 668 392	580	900	Jurassic dolerite	*E.delegatensis* *E.amygdalina*
TO 54	LittleSwanport EP 762 473	460	849	Jurassic dolerite	*E.obliqua* *E.tenuiramis*
EL 10	Break O'Day FP 030 837	300	686	Jurassic dolerite	*E.sieberi* *E.obliqua*

* Nearest meteorological station to coupe

TABLE 2
Plant species sampled for insects on each harvesting unit

Plant species	Coupe				
	SW 48	SW 51	TO 54	MC 33	EL 10
Acacia dealbata* Link	*	*	*	*	*
Acacia genistifolia Link			*		
Acacia mearnsii De Wild.			*		
Acacia melanoxylon R.Br.			*	*	
Acacia myrtifolia (Smith)Willd.					*
Acacia terminalisn(Salisb.)Macbr.			*		*
Acacia verniciflua A.Cunn.					*
Acacia verticillata (L'HÈrit.)Willd.			*	*	*
Allocasuarina littoralis (Salisb.)L.Johnson			*		
Amperea xiphoclada (Sieb. ex Sprengel) Druce			*		
Aotus ericoides (Vent.) G.Don	*	*	*		*
Banksia marginata Cav.	*	*	*	*	
Bossiaea cinerea R.Br.		*			
Bursaria spinosa Cav.		*	*	*	*
Cassinia aculeata (Labill.)R.Br.	*	*		*	
Comesperma volubile Labill.			*		
Cyathodes glauca Labill.	*	*		*	*
Daviesia ulicifolia Andrews			*	*	*
Dianella tasmanica Hook.f.			*	*	
Epacris impressa Labill.		*	*	*	
Eucalyptus amygdalina Labill.	*	*	*	*	*
Eucalyptus dalrympleana Maiden		*	*		
Eucalyptus delegatensis R.Baker	*		*	*	*
Eucalyptus globulus Labill.	*		*		*
Eucalyptus obliqua L'HÈrit.	*	*	*	*	*
Eucalyptus ovata Labill.					*
Eucalyptus pulchella Desf.			*		
Eucalyptus sieberi L.Johnson					*
Eucalyptus tenuiramis Miq.	*	*	*		
Eucalyptus viminalis Labill.	*	*	*	*	*
Exocarpos cupressiformis Labill.	*	*	*	*	*
Gahnia grandis (Labill.)S.T.Blake		*	*	*	
Goodenia ovata Smith				*	*
Lepidosperma elatius Labill.			*	*	*
Leptospermum scoparium Forst. & Forst.f.	*	*	*	*	*
Leucopogon ericoides (Smith) R.Br.		*			
Lomandra longifolia Labill.		*	*		
Lomatia tinctoria (Labill.) R.Br.	*	*	*	*	*
Monotoca glauca (Labill.) Druce					*
Olearia lirata (Sims.) Hutch.		*		*	*
Olearia viscosa (Labill.) Benth.				*	*
Oxylobium ellipticum (Labill.) R.Br.	*				
Polystichum proliferum (R.Br.) C.Presl				*	
Pomaderris apetala Labill.				*	*
Pteridium esculentum (Forst.f.) Cockayne	*	*	*	*	*
Pultenaea daphnoides J.Wendl.	*				*
Pultenaea gunnii Benth.	*		*	*	*
Pultenaea juniperina Labill.	*	*	*	*	*
Senecio minimus Poiret	*	*	*	*	*
Tetratheca labillardierei J.Thompson		*			

* Bold type indicates plant species which were confirmed hosts for insects collected in the study.

The understorey was characterised by short (up to 4 m), often prickly shrubs with a significant grassy/sedgy component in some areas. Seventy-two species of dicotyledons, 24 monocotyledons and five fern species were recorded across all the study areas before logging commenced. The most common plant families and genera present were Fabaceae (*Pultenaea*), Mimosaceae (*Acacia*), Proteaceae (*Banksia, Lomatia*), Asteraceae (*Olearia, Senecio*), Epacridaceae (*Epacris*), Xanthorrhoeaceae (*Lomandra*) and Poaceae (*Poa, Danthonia*). A detailed analysis of the botany from the study areas is in preparation.

Logging and regeneration burning removed most of the overstorey and severely damaged many of the understorey plants. The young forests established following logging have very high stockings of eucalypts (1000–5000 stems ha^{-1}) compared with the forests present before logging (Elliott *et al.* 1991). The species composition of the post-logging vegetation at all the study sites is similar to that which existed prior to logging although there has been an overall increase in species richness, and the structure and relative dominance of the various species has changed (M. Neyland, unpublished data).

Insect Sampling

Insect sampling was conducted on all plots at one-month intervals prior to the logging and regeneration treatment and at approximately three-month intervals (mid-spring, summer, autumn and winter) following treatment. The number of sampling occasions over the nine years ranged from 41–45 for plots within the coupes EL 10, MC 33 and TO 54. However, because of coupe rescheduling and other operational reasons, plots within coupes SW 48 and SW 51 were sampled only 16 and 26 times respectively. Insects occurring on vegetation greater than 30 cm in height were sampled using sweeping, beating and hand-collecting techniques. On each sampling occasion, three to five individuals of each plant species on each plot were swept with a standard 30 cm-diameter collecting net and the captured insects were stored in 70% ethyl alcohol or pinned for later identification. Insects were also sampled by holding a 1 m^2 canvas beating tray beneath the foliage of the plant and collecting (by hand or with an aspirator) all insects dislodged by beating branches with five blows from a stick. Where sufficient plants of each species were available, beating was conducted on different individual plants to those sampled by sweeping; otherwise, the same plants were sampled by both methods. Prior to logging in the mature forests, only the lower foliage of mature trees and small trees beneath the canopy could be sampled, whereas in the newly regenerated forests all sections of the tree canopy could be accessed. The plant species sampled are listed in table 2. On each sampling occasion, all insect species collected from each plant species were recorded and insect/host plant associations noted where feeding was observed.

Light trapping was conducted on suitable nights at all plots throughout the sampling period. Initially, the light traps used were constructed from galvanised sheet metal and consisted of a rectangular killing box supporting a 15-watt UV fluorescent tube covered with a perspex roof. In the second year following logging, these traps were replaced by cylindrical plastic light traps supporting a vertically mounted, 15-watt fluorescent UV tube surrounded by three perspex vanes. Light traps were charged with dichlorvos in the form of Shell Pest Strips®.

Insect Identification

Insects were initially identified to family level and sent to taxonomic specialists for further identification. For families where taxonomic assistance was unavailable, lists of coded putative species were assembled by the authors. An extensive reference collection of named and coded insect species was maintained to assist with identifications throughout the study.

Data Set

Information collected from sampling the plots consisted of occurrences of insect species on plant species for each plot and sampling date, noting any feeding activity. No abundance data were collected. Data for the 522 sampling occasions were stored in DECODA (Minchin 1991), a data-handling package which allows basic statistics on species numbers and composition of the fauna to be calculated easily. It also presents the data in a format suitable for the input files used by several other programs which undertake multivariate analyses.

Nomenclature

Species nomenclature follows Naumann (1993) for insects and Buchanan (1999) for plants.

RESULTS

Composition of the Insect Fauna

In all, 1164 species (named and putative) representing 17 orders and 157 families were collected from plants and in light traps on the plots during the study. The level to which these species could be identified varied greatly depending on taxonomic problems in the groups and the availability of taxonomic expertise. One-third (388) of these species were identified at least to genus level. The total insect fauna collected during the study is listed by order and family in appendix 1.

The bulk of the insect fauna was contained in the orders Coleoptera (322 species), Hymenoptera (294 species), Hemiptera (209 species), Lepidoptera (169 species) and Diptera (112 species) (table 3). Over half the species of Coleoptera collected were leaf-eating beetles (Chrysomelidae) and stem-boring and leaf-feeding weevils (Curculionidae). The most species-rich families among the sap-feeders (Hemiptera) were the Psyllidae (79 species) and the Cicadellidae (40 species). Most of the Hymenoptera collected were parasitoids and gall formers in the superfamily Chalcidoidea (120 species) and the families Braconidae (50 species) and Ichneumonidae (28 species). Twenty-nine species of ants (Formicidae) were recorded during the study. Larvae of Lepidoptera were common defoliators of a wide range of host plants, although most species recorded were adult moths caught in light traps (table 4). Geometridae

TABLE 3
Summary of insect fauna by taxonomic group

Order	Number of families	Number of named species	Number of putative species	Total number of species	Percentage of total insect fauna
Coleoptera	29	86	236	322	28
Hymenoptera	22	31	263	294	25
Hemiptera	25	113	96	209	18
Lepidoptera	25	128	41	169	14
Diptera	31	-	112	112	10
Orthoptera	2	6	4	10	<1
Collembola	8	6	3	9	<1
Thysanoptera	1	-	9	9	<1
Psocoptera	4	6	1	7	<1
Blattodea	1	1	5	6	<1
Neuroptera	3	5		5	<1
Plecoptera	2	2	4	6	<1
Odonata	2	1	1	2	<1
Trichoptera	1	-	1	1	<1
Mecoptera	1	1	-	1	<1
Mantodea	1	1	-	1	<1
Dermaptera	1	-	1	1	<1
TOTAL	**159**	**387**	777	**1164**	

TABLE 4
Number of species in families of Lepidoptera recorded from light trap collections

Family	Number of species
Anthelidae	7
Arctiidae	8
Cossidae	1
Cosmopterygidae	1
Gelechiidae	1
Geometridae	59
Gracillariidae	2
Heliozelidae	2
Hepialidae	7
Lasiocampidae	5
Limacodidae	1
Lycaenidae	2
Lymantriidae	2
Noctuidae	24
Notodontidae	3
Nymphalidae	7
Oecophoridae	8
Pieridae	1
Psychidae	3
Pyralidae	4
Saturniidae	1
Sphingidae	1
Thaumetopoeidae	2
Tortricidae	5
Zygaenidae	1
TOTAL	**158**

(66 species) and Noctuidae (24 species) were the dominant families of Lepidoptera.

The 388 species named to at least genus level by specialist taxonomists included 21 named species which are not included in the list of Tasmanian insect fauna (Semmens *et al.* 1992) and a further 90 species yet to be formally described (see appendix 1). Over half of these 'new' species (63) were psyllids (Hemiptera: Psyllidae) with the remainder scattered among the other orders. Many more insects in the collection of 776 unidentified putative species are expected to be previously unrecorded in Tasmania.

The broad-striped ghost moth, *Fraus latistria* Walker (Lepidoptera: Hepialidae), one of the named species collected, is listed in *Tasmania's Threatened Fauna Manual* (Bryant & Jackson 1999) and has a status of 'rare' as defined by Tasmania's *Threatened Species Protection Act* 1995. This species was collected by light-trap sampling on 21 March 1978 in coupe SW 51, a new locality record for the species.

The composition of the insect fauna showed only minor variation across the study area. A variety of multivariate analyses were undertaken on the data beginning with detrended correspondence analysis using the program DECORANA (Hill 1979a). Because of limitations on the size of data sets with microcomputers, the more robust procedure for indirect gradient analysis, multidimensional scaling (see Minchin 1991), was used only on subsets of the data. It was performed with the program MDS (Minchin 1991), using global non-metric multidimensional scaling followed by hybrid non-metric multidimensional scaling as recommended by Kantvilas & Minchin (1989). The classificatory program TWINSPAN (Hill 1979b) was also used to examine the data. None of the analyses showed any separation of insect assemblages according to coupe of origin. The data do not appear to be well-suited to the techniques because of the low number of species in many samples and the high number of species recorded only a few times (over three-quarters of the species were collected on less than five sampling occasions). Many analyses were re-run with rare species and sample outliers were removed progressively but little improvement was achieved.

Species Richness

The numbers of species collected from each of the harvesting coupes were generally similar taking into account differences in altitude, rainfall, geology and vegetation. Species numbers collected per coupe over the sampling period ranged from 464 to 556 species, with the exception of SW 48 where the numbers were much lower (286 species).

Differences in species richness were more marked at the plot level. The total number of species per plot ranged from 180 to 308 except for SW 48. Again the total number of species was lower than in the other coupes, ranging from 118 to 140 species over the three plots. The lower figures for SW 48 at both the coupe and plot level are attributed, at least in part, to the smaller number of sampling occasions possible due to operational constraints. In all coupes and in all plots species numbers varied greatly on individual sampling occasions. Typical figures ranged from 5–20 species, the highest number on any single sampling occasion being 42 and the lowest being zero.

As expected, species richness varied markedly according to the season of collection when seasons were arbitrarily defined as follows: September to November (spring), December to February (summer), March to May (autumn) and June to August (winter). Analysis of the total collection on this basis showed that the numbers per collection (mean ± s.e.) for spring, summer, autumn and winter were 12.9 ± 0.7 (n = 131), 13.7 ± 0.7 (n = 157), 10.5 ± 0.6 (n = 129) and 5.5 ± 0.4 (n = 101) respectively. Seasonal occurrences of many of the main plant-feeding insects, particularly defoliators, were common to most plots. For example, in early spring, young eucalypt leaves were often eaten by the adults of small melolonthine scarab beetles, mainly *Heteronyx* spp. Several species of Lepidoptera larvae were collected during winter and spring and larvae of the fireblight beetle, *Acacicola orphana*, were common on *Acacia dealbata* and *A. mearnsii* in the same period where these tree species were present on the plots. In late spring, summer and autumn, leaf beetle (Chrysomelidae) eggs, larvae and adults were present on several species of eucalypts together with their common predators: adult soldier beetles (*Chauliognathus* spp.) and larval and adult ladybird beetles (Coccinellidae).

Insect/Host Plant Associations

A total of 132 insects named to genus or species level were recorded actually feeding on 22 of the 50 plant species sampled on the plots during the survey. An additional 39 insect species had known hosts (Bashford 1990) on the plots where they were collected but were not observed actually feeding at the time of collection. Most of these insects were recorded feeding on eucalypts (127 insect species) and acacias (38 species) with lower numbers recorded from *Banksia* (5 species), *Allocasuarina* (4), *Exocarpos* (4), *Leptospermum* (3), *Goodenia* (2) and *Pultenaea* (1). Twenty-five insect families contained eucalypt feeders, with most species recorded from Chrysomelidae (leaf beetles) and Psyllidae (lerps). Four of the six eucalypt-feeding sawflies (Pergidae) found in Tasmania (Elliott & Bashford 1996) were collected on the plots (appendix 1).

A listing of these 171 species by their host plants is shown in appendix 2. Eighty-five of these species were found feeding on only one host plant species during the study but host specificity is not well documented and cannot be assumed. The most polyphagous and commonly collected species were several well-known pests of eucalypts and acacias: eucalypt weevil *Gonipterus scutellatus* (Gyllenhal) (ten eucalypt hosts); gumleaf skeletonizer *Uraba lugens* Walker (nine eucalypt hosts); gumtree bug *Amorbus obscuricornis* (Westwood) and the chrysomelid beetle *Paropsis porosa* Erichson (each with eight eucalypt hosts); gumtree scale *Eriococcus coriaceous* Maskell, the machaerotid *Chaetophyes compacta* (Walker), the chrysomelid beetles *Trachymela rugosa* (Chapuis) and *Chrysophtharta nobilitata* (Erichson), and the psyllid *Glycaspis* sp. (each with seven eucalypt hosts).

Host plants in rank order supporting the richest insect fauna were *Eucalyptus amygdalina* (74 species), *E. obliqua* (64), *E. viminalis* (46), *Acacia dealbata* (35), *E. dalrympleana* (33), *E. sieberi* (31), *E.delegatensis* (30), *E. pulchella* (24) and *E. globulus* (19).

DISCUSSION

The 1164 insect species collected during this study, together with the host plant records for 171 insect species, represent a significant increase in our knowledge of the insect fauna in Tasmania's dry eucalypt forests. Among the 388 species identified at least to genus level, the collection of 21 named species not previously listed in the Tasmanian insect fauna (Semmens *et al.* 1992) and a further 90 yet to be described but apparently new species emphasise the low level of knowledge about the insect fauna in these forests. The high proportion of Psyllidae in this previously unlisted collection is in part due to the availability of specialist taxonomic expertise for that particular group. Further taxonomic investigation of other groups will undoubtedly result in many more previously unlisted species. The total number of species (identified and putative) collected in the study represents nearly 8% of the estimated 15 000 non-marine insect species in Tasmania (Greenslade 1985).

Although a large number of species was collected during the study reported here, total species numbers and composition of collections were obviously influenced by the extent and frequency of sampling at the study sites, climatic conditions at the time of sampling, stages of plant development present (e.g. flowering, new shoot extension) and many other factors. For much of the study, sampling of each plot occurred at quarterly intervals and was conducted regardless of weather conditions. Therefore, some collections may be biased towards species which are relatively sedentary feeders on their host plants and so less affected by rain, wind and cool conditions.

Levels of endemism for the insects collected are not known although Greenslade (1985) reported that the highest endemicity in the Tasmanian insect fauna occurred in the rainforest and alpine environments, and dry forests probably had low to medium levels, perhaps in the range 20–70%, varying widely between insect groups. For example, endemicity of 30% was reported for Coccinellidae (one of the most species-rich groups collected in our study) in eucalypt forests (Greenslade 1985).

The collection of the broad-striped ghost moth, *Fraus latistria*, at the unlogged SW 51 coupe in eastern Tasmania extends the distribution of this rare insect. This species has been previously recorded only from the Hobart and Launceston areas and Scotts Peak Dam in southwestern Tasmania (Bryant & Jackson 1999).

Although no similar studies have been previously reported from these forests in Tasmania, other studies in different forest types or in different habitats in dry eucalypt forests on mainland Australia are available for comparison of the size and composition of elements of the insect fauna. In a study by Neumann (1978) using systematic malaise trap sampling of mature dry peppermint-gum eucalypt forest (*E. dives–E. radiata–E. macrorhyncha*) in Victoria, the most abundant (in terms of number of specimens collected) were (in rank order): Diptera, Hymenoptera, Coleoptera, Hemiptera and Lepidoptera. These orders were also the most species-rich orders of insects recorded in our Tasmanian study although Diptera ranked lowest rather than highest as in the Victorian study.

In a study of beetle communities using periodic malaise trapping in the same forests in Victoria, Neumann (1979) recorded 199 species of Coleoptera (beetles) from 47 families. The most frequently collected families in this study were Chrysomelidae, Staphylinidae, Alleculidae, Coccinellidae, Scarabaeidae, Mordellidae, Curculionidae, Melyridae and Anisotomidae. In two studies of the species composition of the litter-inhabiting Coleoptera in Victorian dry eucalypt forests (*E. obliqua–E.radiata–E. rubida*), 109 species from 30 families (Neumann *et al.* 1995) and 105 species from 31 families (Collett & Neumann 1995) were collected. Undescribed species comprised 67% and 72% respectively of the collections from these studies. In our Tasmanian study, 322 named and putative species of Coleoptera from 29 families were collected on vegetation and the proportion of undescribed species (74%) was similar to that recorded for the Victorian fauna.

Ohmart *et al.* (1983) in a study of leaf-chewing insects in subalpine *E. delegatensis–E. dives–E. pauciflora* forest in the Australian Capital Territory (ACT), reported that the major taxa (expressed as numbers of insects per kilogram of foliage dry weight) were micro-Lepidoptera, Geometridae, Chrysomelidae and Curculionidae; Cercopidae, Cicadellidae and Fulgoroidea were the major families of sap feeders. Similarly, in the Tasmanian study, Chrysomelidae and Curculionidae were the most species-rich families of Coleoptera, and Geometridae was the most species-rich family of Lepidoptera even though the eucalypt forest types sampled were quite different from the subalpine forests of the ACT. Leafhoppers (Cicadellidae) and psyllids (Psyllidae) were the predominant families of sap-feeders collected in eastern Tasmania, but psyllids were rarely collected in the subalpine forests (Ohmart *et al.* 1983). Although there are some obvious similarities between the foliage-dwelling insect fauna of Tasmanian dry eucalypt forests and some mainland forests, definitive comparisons are difficult because of the different measures used (species richness, number of specimens, insects per weight of foliage) and habitats sampled.

As stated above, Geometridae was the most species-rich family of Lepidoptera recorded in this study. The larvae of many species are common defoliators in these dry forests, particularly of eucalypts and acacias. Nine of the geometrid species collected were also recorded by McQuillan *et al.* (1998) in dry eucalypt forest at Old Chum Dam in north-eastern Tasmania.

In a recent invertebrate survey of rainforest in Tasmania, 618 insect species from 22 orders were collected by sweeping and beating vegetation (the sampling technique used in the present study) and the most frequently collected families were Collembola and Diptera, with Coleoptera, Hymenoptera, Psocoptera and Lepidoptera reasonably abundant. Again, undescribed species made up some 75% of the total. Overall, using several sampling methods across many rainforest habitats, Coleoptera was the most diverse group containing 367 species from 44 families (Coy *et al.* 1993), a similar result to that obtained from our sampling of Tasmanian dry eucalypt forests.

The large number of insects feeding on eucalypts and acacias in the list of insect/host plant associations is not unexpected considering the domination of eucalypts, and to a lesser extent acacias, in these forests. In particular, the high number of eucalypt stems per hectare in the young regenerating forests (Elliott *et al.* 1991) in which the post-logging sampling was conducted, their fast growth rate and larger tree size compared to other plants would contribute to the high capture rate among eucalypt feeders compared to the general fauna. In addition to the dominance of eucalypts and acacias at the study sites, many of the insects feeding on these host genera are widely distributed and

polyphagous. They were therefore frequently collected on all plots, together with their predators and parasites. These are important contributing factors to the lack of separation of insect assemblages according to coupe of origin.

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APPENDIX 1
Total insect fauna collected from study plots

Order/Family/Species

Blattodea
- Blattidae
  - *Platyzosteria melanaria* (Erichson)
  - 5 unidentified species

Coleoptera
- Alleculidae
  - 2 unidentified species
- Anobiidae
  - 5 unidentified species
- Bostrychidae
  - *Xylion collaris* (Erichson)
- Buprestidae
  - *Cisseis acudata* (Kirby)
  - *Castiarina wilsoni* (Saunders)
  - *Ethon affine* (Laporte & Glory)
  - *Germarica lilliputana* (Thomson)
  - *Melobasis innocua* (Thomson)
  - *Melobasis sparsa* (Levy)
  - *Nascioides parryi* (Hope)
- Byrrhidae
  - 1 unidentified species
- Cantharidae
  - *Chauliognathus lugubris* (Fabricius)
  - *Chauliognathus nobilitatus* (Erichson)
  - 14 unidentified species
- Carabidae
  - 5 unidentified species
- Cerambycidae
  - *Ancita marginicollis* (Boisduval)
  - *Bethelium signiferum* (Newman)
  - *Coptocercus rubripes* (Boisduval)
  - *Pytheus erosus* (Macleay)
  - *Tessaromma sericans* (Erichson)
  - *Tessaromma undatum* Newman
  - *Toxeutes arcuatus* (Fabricius)
  - *Zoedia divisa* (Pascoe)
  - 2 unidentified species
- Chrysomelidae
  - *Acacicola hamadryas* Stal
  - *Acacicola orphana* (Erichson)
  - *Altica pagana* Blackburn
  - *Cadmus australis* Boisduval
  - *Cadmus crincicollis* Boisduval *
  - *Cadmus* sp.4#
  - *Cadmus strigillatus* Chapuis
  - *Chrysophtharta aurea* Blackburn
  - *Chrysophtharta bimaculata* (Olivier)
  - *Chrysophtharta crucata* (Boisduval) *
  - *Chrysophtharta decolorata* (Chapuis)
  - *Chrysophtharta nobilitata* (Erichson)
  - *Chrysophtharta philomela* Blackburn
  - *Chrysophtharta* sp.a#
  - *Chrysophtharta* sp.b#
  - *Chrysophtharta* sp.c#
  - *Chrysophtharta* sp.f#
  - *Chrysophtharta* sp.h#
  - *Paropsides umbrosa* Chapuis
  - *Paropsis aegrota* var. *elliotti* Selman*
  - *Paropsis deboeri* Selman
  - *Paropsis dilatata* Erichson
  - *Paropsis porosa* Erichson
  - *Paropsis* sp.a#
  - *Paropsis tasmanica* Baly
  - *Paropsisterna nucea* (Erichson)
  - *Platycolaspis australis* Jacoby
  - *Trachymela papulosa* (Chapuis)*
  - *Trachymela rugosa* (Chapuis)
  - 58 unidentified species
- Cleridae
  - *Blackburniella hilaris* (Westwood)
  - *Eleale* sp.
  - 4 unidentified species
- Coccinellidae
  - *Cleobora mellyi* Mulsant
  - *Coccinella repanda* Thunberg*
  - 21 unidentified species
- Colyiidae
  - 3 unidentified species
- Cucujoidea
  - 4 unidentified species
- Curculionidae
  - *Acalonoma pusilla* Blackburn*
  - *Autetobius* sp.#
  - *Belus bidentatus* (Donovan)
  - *Belus bimaculatus* Pascoe
  - *Euthyphasis acuta* Pascoe*
  - *Gonipterus gibberus* Boisduval
  - *Gonipterus lepidotus* Gyllenhal
  - *Gonipterus scutellatus* (Gyllenhal)
  - *Gonipterus* sp.
  - *Haplonyx* sp.
  - *Merimnetes* sp
  - *Pachyura australis* Hope
  - *Myllorhinus multidentatus* (Chevrolet)
  - *Myllorhinus bicaudatus* (Boisduval)
  - *Rhadinosomus lacordairei* Pascoe
  - *Scotasmus* sp.
  - *Syarbis alcyone* Lea
  - 65 unidentified species
- Elateridae
  - *Agrypnus pictipennis* (Candeze)
  - 11 unidentified species
- Lathridiidae
  - 2 unidentified species
- Lucanidae
  - *Syndesus cornutus* Fabricius
- Lycidae
  - *Metriorrhynchus* sp.a
  - *Metriorrhynchus* sp.b
- Melandryidae
  - 4 unidentified species
- Melyridae
  - 5 unidentified species
- Mordellidae
  - 5 unidentified species
- Nitidulidae
  - 7 unidentified species
- Oedemeridae
  - *Dohrnia miranda* Newman
  - 1 unidentified species
- Phalacridae
  - 1 unidentified species
- Ptinidae
  - 1 unidentified species
- Scarabaeidae
  - *Diphucephala colaspidoides* (Gyllenhal)
  - *Heteronyx crinitus* Blackburn
  - *Heteronyx* sp.a
  - *Heteronyx* sp.b
  - *Heteronyx* sp.c
  - *Liparetus atratus* Burmeister
  - *Liparetus convexus* Boisduval
  - *Phyllotocus erythropterus* Blanchard
  - *Xylonychus piliger* Blanchard
  - 4 unidentified species
- Scraptiidae
  - *Scraptia* sp.
  - 1 unidentified species

APPENDIX 1 cont.

Staphylinidae
8 unidentified species
Tenebrionidae
Lepispilus sulcicollis (Boisduval)
2 unidentified species

Collembola
Hypogastruridae
Hypogastrura purpurescens (Lubbock)
Entomobryidae
Australotomurus sp.#
Lepidocyrtoides sp.#
Sminthuridae
Rastriopes sp#.
Polykatianna sp.#
Tomoceridae
Lepidophorella sp.#
Paronellidae
3 unidentified species

Dermaptera
Forficulidae
1 unidentified species

Diptera
Agromyzidae
2 unidentified species
Anisopodidae
1 unidentifed species
Asilidae
6 unidentifed species
Bibionidae
3 unidentifed species
Bombyliidae
1 unidentified species
Calliphoridae
3 unidentifed species
Cecidomyiidae
3 unidentified species
Ceratopogonidae
3 unidentifed species
Chironomidae
14 unidentified species
Chloropidae
7 unidentified species
Clusiidae
1 unidentified species
Culicidae
1 unidentified species
Dolichopodidae
6 unidentified species
Empididae
8 unidentified species
Fergusoninidae
1 unidentified species
Heliomyzidae
2 unidentified species
Lauxaniidae
3 unidentified species
Muscidae
1 unidentified species
Mycetophilidae
5 unidentified species
Perissommatidae
1 unidentified species
Phoridae
4 unidentified species
Platystomatidae
2 unidentified species
Rhagionidae
3 unidentified species
Scatopsidae
1 unidentified species
Scenopinidae
1 unidentified species
Sciaridae
8 unidentified species
Stratiomyidae
3 unidentified species
Syrphidae
4 unidentified species
Tabanidae
3 unidentified species
Tachinidae
5 unidentified species
Tipulidae
6 unidentifed species

Hemiptera
Acanthosomatidae
Anischys sp.
Alydidae
1 unidentified species
Aphididae
4 unidentified species
Cicadellidae
Alocephalus ianthe (Kirkaldy)*
Austrolopa brunensis Evans
Batracomorphus augustatus (Evans)*
Batracomorphus elegans (Evans)
Batracomorphus ?elegans
Batracomorphus sp.#
Euleimonios sp.nov.#
Haplodelphax iuncicola (Kirkaldy)*
Ipoella sp.#
Kahaono sp.
Neotartessus flavipes (Spanberg)
Paralimnus smithtoniensis Evans
Rosapaella evansi Webb
Rosopaella cuprea (Walker)
Rosopaella sp.
Rubria sp.
Rubria sp a.
Rubria sp b.
Stenocotis depressa (Walker)
Tenuitartessus blundellensis (Evans)
Trocnada sp.#
Vulturnus sp.#
Zygina evansi (Ross)
Zygina zealandica (Myers)
15 unidentified species
Cicadidae
Cicadetta torrida (Erichson)
Cixiidae
4 unidentified species
Coccidae
7 unidentified species
Coreidae
Amorbus obscuricornis (Westwood)
Gelonus tasmanicus (Le Guillou)
Eniocephalidae
1 unidentified species
Eriococcidae
Eriococcus coriaceus Maskell
Eurymelidae
Eurymeloides bicincta (Erichson)
3 unidentified species
Flatidae
Siphanta hebes (Walker)
Lygaeidae
Euander lacertosus (Erichson)
8 unidentified species

APPENDIX 1 cont.

Machaerotidae
- *Chaetophyes compacta* (Walker)
- 3 unidentified species

Membracidae
- *Naunus tasmaniae* (Fairmaire) *
- 4 unidentified species

Miridae
- 19 unidentified species

Nabidae
- *Nabis* sp.

Pentatomidae
- *Cermatulus nasalis* (Westwood)
- *Dictyotus caenosus* (Westwood)
- 16 unidentified species

Piesmidae
- 1 unidentified species

Pseudococcidae
- 5 unidentified species

Psyllidae
- *Aacanthocnema* sp.#
- *Aacanthocnema? dobsoni* (Fr.)*
- *Acizzia* ?sp.#
- *Acizzia* sp.#
- *Acizzia* sp.a#
- *Acizzia* sp.b#
- *Acizzia* sp.c#
- *Acizzia* sp.d#
- *Acizzia* sp.e#
- *Acizzia* sp.f#
- *Acizzia* sp.g#
- *Acizzia* sp.h#
- *Acizzia* sp.i#
- *Acizzia* sp.j#
- *Acizzia* sp.k#
- *Acizzia* sp.l#
- *Anoeconeossa copidiformis* Taylor
- *Australopsylla* ?(nr.)sp.a#
- *Australopsylla ?marmorata*
- *Australopsylla marmorata* (Froggatt)
- *Australopsylla* sp.a#
- *Australopsylla* sp.b#
- *Australopsylla* sp.c#
- *Australopsylla* sp.d#
- *Cardiaspina ?* sp.#
- *Cardiaspina ?spinifera* (Froggatt)
- *Creiis ?* sp.#
- *Creiis* sp. "tas"#
- *Creiis* sp.a#
- *Ctenarytaina* b1#
- *Ctenarytaina* l#
- *Ctenarytaina* k#
- *Ctenarytaina* sp.#
- *Ctenarytana* a3#
- *Ctenarytana* b#
- *Ctenarytana* c#
- *Ctenarytana* d#
- *Ctenarytana* d2#
- *Ctenarytana eucalypti* (Maskell)
- *Glycaspis dobsoni* Moore*
- *Glycaspis dreptodria* Moore
- *Glycaspis planitecta* Moore
- *Glycaspis* sp.#
- *Hyalinaspis ?rubra*
- *Hyalinaspis rubra* (Froggatt)
- *Hyalinaspis* sp.#
- *Phellopsylla* a#
- *Phellopsylla* b#
- *Phellopsylla* c#
- *Phellopsylla* d#
- *Phellopsylla* e#
- *Phellopsylla* n#
- *Phellopsylla* n2#
- *Phellopsylla* sp.#
- *Platylobria maddeni* Taylor
- Schedotrioza ?#
- *Schedotrioza* a#
- *Schedotrioza* b#
- *Schedotrioza* c#
- *Schedotrioza* d#
- *Schedotrioza* sp.#
- *Schedotrioza* sp.1#
- *Schedotrioza* sp.2#
- *Spondyliaspis?* gen. et sp. nov.#
- *Trioza ?* sp#
- *Trioza ?*b#
- *Trioza ?*c#
- *Trioza* a#
- *Trioza* b#
- *Trioza* d#
- *Trioza* e#
- *Trioza nr.*a#
- *Trioza nr.*b#

Reduviidae
- 5 unidentified species

Scutelleridae
- *Scutiphora pedicellata* (Kirby)

Thaumastocoridae
- *Baclozygum depressum* Bergroth

Tingidae
- *Epimixia* sp.

Hymenoptera

Apidae
- *Apis mellifera* Linnaeus

Bethylidae
- 8 unidentified species

Braconidae
- *Doryctes* sp.#
- *Syngaster* sp.#
- *Trichiohelcon rufoniger* (Turner)
- 47 unidentified species

Chalcidoidea
- 120 unidentified species

Chrysididae
- 3 unidentified species

Cleptidae
- 3 unidentified species

Colletidae
- 5 unidentified species

Cynipidae
- 6 unidentifed species

Eumenidae
- 2 unidentified species

Formicidae
- *Anonychomyrma* sp.a#
- *Anonychomyrma* sp.b#
- *Anonychomyrma* sp.c#
- *Anonychomyrma* sp.d#
- *Anonychomyrma* sp.e#
- *Anonychomyrma* sp.f#
- *Anonychomyrma* sp.g#
- *Anonychomyrma* sp.h#
- *Camponotus* sp.a
- *Camponotus* sp.b
- *Camponotus* sp.c
- *Camponotus* sp.d
- *Meranoplus* sp.
- *Myrmecia* sp.a
- *Myrmecorhynchus* sp.a
- *Myrmecorhynchus* sp.b
- *Notoncus* sp.
- *Prolasius* sp.a

APPENDIX 1 cont.

Prolasius sp.b
Rhytidoponera sp.a
Stigmacros sp.a
Stigmacros sp.b#
7 unidentified species
Ichneumonidae
28 unidentified species
Megalyridae
1 unidentified species
Megastigmidae
13 unidentified species
Mutillidae
Ephutomorpha dorsigera (Westwood)
Pergidae
Lophyrotoma interrupta (Klug)
Perga affinis insularis Riek
Pergagrapta bella (Newman)
Pseudoperga lewisii (Westwood)
Platygasteridae
2 unidentified species
Pompilidae
2 unidentified species
Proctotrupidae
6 unidentified species
Scoliidae
1 unidentified species
Sphecidae
1 unidentified species
Tenthredinidae
1 unidentified species
Tiphiidae
7 unidentified species

Lepidoptera
Anthelidae
Anthela acuta (Walker)
Anthela nicothoe (Boisduval)
Anthela ocellata (Walker)
Anthela sp.a
Anthela sp.b
Pterolocera amplicornis Walker
Pterolocera sp.a
Arctiidae
Castulo doubledayi (Newman)
Nyctemera amica (White)
Palaeosia bicosta (Walker)
Phaeophlebosia furcifera Walker
Scoliacma bicolora Boisduval
Spilosoma glatignyi (Le Guillou)
Utetheisa pulchelloides Hampson
Cossidae
Culama australis Walker
Cosmopterigidae
Macrobathra sp.
Gelechiidae
Protolechia sp.
Geometridae
Boarmia lyciaria (Guenee)
Boarmia sp a
Boarmia sp.b
Capusa senilis Walker
Chlenias sp.
Chlorocoma dichloraria (Guenee)
Chlorodes boisduvalaria (Le Guillou)
*Chrysolarentia vicissat*a (Guenee)
Cleora bitaeniaria (Le Guillou)
"*Cidaria*" *subochraria* Doubleday*
Crypsiphona ocultaria (Donovan)
Dichromodes ainaria Guenee
Ectropis excursaria (Guenee)
Ectropis exsuperata (Walker)
Eucyclodes buprestaria Guenee
Euloxia meandraria (Guenee)
Gastrinodes bitaeniaria (Le Guillou)
Heliomystis electrica Meyrick
Hypobapta eugramma (Low.)*
Hypobapta percomptaria (Guenee)
Melanodes anthracitaria Guenee
Microdes squamulata Guenee
Mnesampela comarcha Meyrick
Mnesamplela privata (Guenee)
Monoctenia falernaria Guenee
Niceteria macrocosma (Low.)*
Paralaea beggaria Guenee
Plesanemma fucata (Felder & Rogenhofer)
Stathmorrhopa berberi (Turner)
Thalaina inscripta Walker
Thalaina selenaea Doubleday
36 unidentified species
Gracillariidae
Acrocercops laciniella (Meyrick)
1 unidentified species
Heliozelidae
Heliozela sp.
1 unidentified species
Hepialidae
Abantiades latipennis Tindale
Abantiades sp.a
Aenetus ligniveren (Lewin)
Fraus latistria Nielsen & Kristensen
Oncopera intricata Walker
Oxycanus sordidus Herrich-Schaffer
Trictena argentata Herrich-Schaffer
Hypertrophidae
Hypertropha tortriciformis (Guenee)
Lasiocampidae
Digglesia australasiae (Fabricius)
Digglesia sp.a
Entometa fervens (Walker)
Opsirhina albigutta (Walker)
Pernattia exposita (Lewin)
1 unidentified species
Limacodidae
Doratifera pinguis (Walker)
Lycaenidae
Neolucia hobartensis (Miskin)
Paralucia aurifer (Blanchard)
Lymantriidae
Acyphas leucomelas (Walker)
Teia anartoides Walker
Noctuidae
Agrotis infusa (Boisduval)
Agrotis porphyricollis Guenee
Amphipyra sanguinipuncta Guenee
Dasygaster nephelistis Hampson
Dasygaster padockina (Le Guillou)*
Diarsia intermixta (Guenee)
Euplexia sp.
Eutrichopidia latinus (Donovan)
Helicoverpa punctigera (Wallengren)
Heliothis rubrescens (Walker)
Neumichtis sepultrix (Guenee)
Nola aulacota Meyrick
Pantydia sparsa Guenee
Persectania ewingii (Westwood)
Praxis edwardsii Guenee
Praxis sp.
Rhapsa suscitalis (Walker)
Rictonis atra (Guenee)
*Rictonis gypsina**
Rictonis sp. nr.*flexirena* (Walker)
Rictonis sp.

APPENDIX 1 cont.

Sideridis costalis (Walker)*
Uraba lugens Walker
Notodontidae
Danima banksiae (Lewin)
Hylaeora inclyta (Walker)
Sorama bicolor Walker
Nymphalidae
Argynnina hobartia (Westwood)
Geitoneura klugi (Guerin-Meneville)
Heteronympha merope (Fabricius)
Heteronympha penelope Waterhouse
Junonia villida (Fabricius)
Vanessa kershawi (McCoy)
Oreixenica lathoniella (Westwood)
Oecophoridae
Agriophara sp.
Artiastis sp.
Cryptophasa albacosta Lewin
Garrha callianassa (Meyrick)
Machimia parthenopa (Meyrick)
Oenochroa sp.
Stathmopoda cephalaea Meyrick
Wingia lambertella (Wing)
Pieridae
Pieris rapae (Linnaeus)
Psychidae
Clania sp.
Lepidoscia arctiella Walker
Narycia sp.
Pyralidae
Gauna aegusalis (Walker)
Hednota sp.
Macalla sp.
Uresiphita ornithopteralis (Guenee)
Saturniidae
Opodiphthera helena (White)
Sphingidae
Hippotion scrofa (Boisduval)
Thaumetopoeidae
Epicoma melanospila (Wallengren)
Trichiocercus mesomelas (Walker)*
Tortricidae
Acropolitis ptychosema Turner
Epiphyas ashworthana (Newman)
Epiphyas plastica (Meyrick)
Epiphyas postvittana (Walker)
Epiphyas sp.
Palaeotoma styphelana Meyrick
2 unidentified species
Zygaenidae
Pollanisus viridipulverulentus Guerin-Meneville

Mantodea
Mantidae
Orthodera ministralis (Fabricius)

Mecoptera
Bittacidae
Harpobittacus australis Klug

Neuroptera
Chrysopidae
Chrysopa edwardsi Banks
Hemerobiidae
Drepanacra binocula (Newman)
Mantispidae
Calomantispa venusta Lambkin
Campion australasiae (Guerin)
Campion callosus Lambkin

Odonata
Corduliidae
1 unidentified species
Gomphidae
Austrogomphus guerini (Rambur)

Orthoptera
Acrididae
Austroicetes sp.
Gastrimargus musicus (Fabricius)
Phaulacridium vittatum (Sjostedt)
Russalpia albertisi (Bolivar)
Tasmaniacris tasmaniensis (Bolivar)
3 unidentified species
Tettigoniidae
Acripeza reticulata Guerin
1 unidentified species

Plecoptera
Gripopterygidae
3 unidentified species
Notonemouridae
Kimminosperla sp.
Spaniocerca sp.
1 unidentified species

Psocoptera
Caeciliidae
Caecilius semifuscatus (Tillyard)
Caecilius sp.
Ectopsocidae
Ectopsocus briggsi McLachlan
Peripsocida*e*
Peripsocus sp.
Philotarsidae
Haplophallus paraguttatus (Tillyard)*
Haplophallus sp.
1 unidentified species

Thysanoptera
Phlaeothripidae
9 unidentified species

Trichoptera
Hydropsychidae
1 unidentified species

* Indicates species not listed in the Tasmanian insect fauna as listed by Semmens *et al.* 1992.
# Indicates undescribed 'new' species.

APPENDIX 2
Insect/host plant associations*

		Acacia dealbata	*Acacia melanoxylon*	*Acacia myrtifolia*	*Acacia terminalis*	*Acacia verticillata*	*Allocasuarina littoralis*	*Banksia marginata*	*Eucalyptus amygdalina*	*Eucalyptus dalrympleana*	*Eucalyptus delegatensis*	*Eucalyptus globulus*	*Eucalyptus obliqua*	*Eucalyptus ovata*	*Eucalyptus pulchella*	*Eucalyptus sieberi*	*Eucalyptus tenuiramis*	*Eucalyptus viminalis*	*Exocarpos cupressiformis*	*Goodenia ovata*	*Leptospermum scoparium*	*Pultenaea gunnii*	*Pultenaea juniperina*
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Acrididae	*Phaulacridium vittatum*										+		+*										
Anthelidae	*Anthela* sp. a	+																					
	Anthela sp. b																	+					
	Pterolocera sp.	+*																					
Bostrychidae	*Xylion collaris*							+*					+*					+*					
Cerambycidae	*Ancita marginicollis*	+																					
	Bethelium signiferum	+*																					
	Coptocercus rubripes								+*				+*			+*		+*					
	Epithora dorsalis								+*				+*			+*		+*					
	Pytheus erosus												+*										
	Toxeutes sp.												+*	+*									
	Zoedia divisa	+*																					
Chrysomelidae	*Acacicola hamadryas*	+																					
	Acacicola orphana	+				+																	
	Acacicola sp. b																					+	+
	Cadmus australis								+			+*	+*		+*								
	Cadmus crinicollis															+		+					
	Cadmus strigillatus														+*								
	Cadmus sp. 4								+	+					+	+		+					
	Cadmus sp. a								+														
	Chrysophtharta aurea								+							+*		+					
	Chrysophtharta bimaculata										+	+*	+*										
	Chrysophtharta crucata														+								
	Chrysophtharta decolorata								+						+		+*						
	Chrysophtharta nobilitata								+	+			+		+	+	+	+					
	Chrysophtharta philomela										+												
	Chrysophtharta variicollis								+		+		+	+	+			+					
	Chrysophtharta sp. a								+														

APPENDIX 2 cont.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	Chrysophtharta sp. c												+		+								
	Chrysophtharta sp. h								+														
	Haltica pagana	+																					
	Nascio parryi											+*											
	Paropsides umbrosa	+																					
	Paropsis aegrota elliottii								+		+		+			+							
	Paropsis deboeri								+				+				+	+					
	Paropsis dilatata								+				+*				+*						
	Paropsis porosa								+	+		+	+	+*		+	+	+					
	Paropsis tasmanica											+*	+					+					
	Paropsis sp. a																	+					
	Paropsisterna nucea									+			+*					+					
	Trachymela papulosa								+*		+*		+	+*									
	Trachymela rugosa								+	+	+*		+*		+	+		+					
Cicadidae	*Cicadetta torrida*	+										+*				+							
Cicadellidae	*Tenuitartessus blundellensis*								+*						+*								
Coreidae	*Amorbus obscuricornis*								+	+	+		+		+	+	+	+					
	Gelonus tasmanicus								+		+		+			+		+					
Curculionidae	*Acalonoma pusilla*																			+*			
	Belus bidentatus	+*																					
	Belus bimaculatus	+*																					
	Gonipterus gibberus															+		+					
	Gonipterus lepidotus								+														
	Gonipterus scutellatus								+	+	+	+	+	+	+	+	+	+					
	Merimnetes sp.								+	+								+					
	Rachiodes bicaudatus											+*						+					
	Rachiodes multidentatus								+		+	+											
	Rhadinosomus lacordairei									+													
	Syarbis alcyone												+			+							
Eriococcidae	*Eriococcus coriaceous*								+		+	+	+		+	+		+					
Eurymelidae	*Eurymeloides bicincta*								+*														
Gelechiidae	*Protolechia* sp.									+	+				+								
Geometridae	*Boarmia* sp.	+*																					
	Capusa senilis								+*									+*					
	Chlenias sp.	+							+		+									+			
	Chlorocoma dichloraria	+*																					
	Chlorodes boisduvalia																				+		
	Cleora bitaeniaria								+														
	Crypsiphona occultaria								+				+*										

APPENDIX 2 cont.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	Dichromodes ainaria	+*																					
	Ectropis excursaria																		+*				
	Euloxia meandraria								+*														
	Hypobapta percomptaria								+														
	Microdes squamulata	+*																					
	Mnesampela comarcha									+*			+*					+*					
	Mnesampela privata									+	+	+					+						
	Monoctenia falernaria												+*										
	Stathmorrhopa berberi								+*														
	Thalaina inscripta	+*																					
	Thalaina selenaea		+*																				
Gracillariidae	*Acrocercops* sp.								+	+	+		+			+		+					
Heliozelidae	*Heliozela prodela*												+										
Hepialidae	*Aenetus ligniveren*												+*										
Lasiocampidae	*Pernattia exposita*						+																
Limacodidae	*Doratifera pinguis*								+*		+					+		+*					
Lymantriidae	*Acyphas leucomelas*	+	+						+		+								+*				
	Teia anartoides	+*							+*				+*						+				
Lyonetiidae	*Stegommata sufuratella*							+															
Machaerotidae	*Chaetophyes compacta*								+	+	+		+			+	+	+					
Membracidae	*Daunus tasmaniae*	+*																					
Noctuidae	*Leucania eugrapha*								+*														
	Uraba lugens								+	+	+	+	+		+	+	+	+					
Notodontidae	*Danima banksiae*							+*															
	Hylaeora inclyta									+*													
	Sorama bicolor												+*										
	Trichocerus mesomelas								+*				+*										
Oecophoridae	*Garrha callianassa*							+															
	Hypertropha tortriciformis										+		+					+					
	Machimia parthenopa								+*			+*											
	Oenochroa sp.								+														
Pergidae	*Lophyrotoma interrupta*															+							
	Perga affinis insularis											+*	+										
	Pergagrapta bella								+														
	Pseudoperga lewisii								+									+					
Psychidae	*Clania* sp.								+														
	Lepidoscia arctiella	+							+														
	Narycia sp.												+			+							
Psyllidae	*Acizzia acaciaedealbata*	+																					

APPENDIX 2 cont.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	Acizzia sp. a	+																					
	Acizzia sp. b	+																					
	Acizzia sp. c	+																					
	Acizzia sp. d	+																					
	Acizzia sp. e	+				+																	
	Acizzia sp. g	+																					
	Acizzia sp. i			+																			
	Acizzia sp. j				+																		
	Acizzia sp. k	+																					
	Acizzia sp. L			+																			
	Anoeconeossa copidiformis								+		+		+			+		+					
	Anoeconeossa sp.								+		+		+		+	+		+					
	Australopsylla marmorata								+							+							
	Australopsylla sp. B																	+					
	Australopsylla sp. c									+													
	Australopsylla sp. d								+														
	Cardiaspina spinifera																	+					
	Cardiaspina sp. nov.								+														
	Cardiaspina sp. nov. a								+				+										
	Creiis 'Tas' sp.								+	+			+			+		+					
	Ctenarytaina eucalypti									+		+	+										
	Ctenarytaina sp.								+	+			+										
	Ctenarytaina sp. b								+				+		+	+							
	Ctenarytaina sp. c									+													
	Ctenarytaina sp. d											+											
	Glycaspis dobsoni										+												
	Glycaspis dreptodria									+			+		+								
	Glycaspis planitecta												+										
	Glycaspis sp.								+	+	+		+		+	+		+					
	Hyalinaspis rubra								+	+	+							+					
	Hyalinaspis sp.								+				+		+			+					
	Hyalinaspis sp. a											+											
	Phellopsylla sp.										+												
	Phellopsylla sp. a												+		+								
	Phellopsylla sp. b	+						+	+	+			+		+								
	Phellopsylla sp. c								+							+							
	Phellopsylla sp. e									+													
	Phellopsylla sp. g								+														
	Schedotrioza sp.								+				+										

APPENDIX 2 cont.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
	Schedotrioza sp. a								+														
	Schedotrioza sp. b									+													
	Schedotrioza sp. c									+			+										
	Schedotrioza sp. i								+									+					
	Trioza sp. b						+																
	Trioza sp. c						+																
	Trioza sp. d						+												+				
Pyralidae	*Gauna aegusalis*	+*																					
	Macalla sp.																				+		
Saturniidae	*Opodiphthera helena*								+	+			+*					+*					
Scarabaeidae	*Diphucephala colaspidoides*	+*																					
	Heteronyx crinitus								+		+												
	Heteronyx sp. a								+	+	+		+					+					
	Heteronyx sp. b																	+					
	Heteronyx sp. c								+				+			+							
	Liparetus atratus												+					+					
	Liparetus convexus									+*			+		+								
	Phyllotocus erythropterus																				+		
	Xylonychus pilifer								+*							+							
Stenomatidae	*Agriophara* sp.												+										
Thaumetopoeidae	*Epicoma melanospila*								+				+*		+*			+*					
Tingidae	*Epimixia* sp.	+							+	+			+										
Tortricidae	*Acropolitis ptychosema*								+*		+*		+										
	Epiphyas ashworthana	+*										+*											
	Epiphyas postvittana												+*										
	Palaeotoma styphelana								+*			+	+*					+					
TOTALS		35	2	2	1	2	4	5	74	33	30	19	64	5	24	31	10	46	4	2	3	1	1

* Species with known hosts as indicated but not actually feeding when collected.