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A survey for Jewel Beetles (Coleoptera: Buprestidae) during part of the 1987-1988 season.

CONFIDENTIAL REPORT

REPORT FOR THE DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT (WESTERN AUSTRALIA)

SURVEY CONDUCTED UNDER THE FOLLOWING :

National Parks/Nature Reserves/Marine Parks Permit for Research or Educational Excursion. Permit No. Fauna 87/97

Licence to Take Fauna for Scientific Purposes No. SF000007

A SURVEY FOR JEWEL BEETLES (COLEOPTERA : BUPRESTIDAE) DURING PART OF THE 1987-1988 SEASON

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BACKGROUND

During the 1987-1988 summer season the author made a privately-funded visit to areas of south-west Western Australia, including visiting some land presently under the control of the Department of Conservation and Land Management, Western Australia, as part of an open-ended continous survey of Coleoptera fauna in Australia with particular reference to the Family Buprestidae.

Such a survey necessarily involved a great deal of travel, time, effort and expense by the author, amounting to approximately $3000 for this particular survey. Considering the unpredictable cyclical nature of the appearance of the Australian Buprestid fauna, and the difficulty in locating many of the recorded species, it cannot be expected that one person alone can hope to discover all that there is to be known about the buprestid fauna of any particular area in any short space of time, if at all. This field of study is vastly undermanned and requires many more persons who would be interested and willing to become involved in any survey work. Unfortunately it is highly improbable that even professionally employed entomologists will be interested in undertaking such projects. As usual, the expensive and time-consuming tasks of recording new and monitoring existing distibutional data, discovering new species or subspecies, or making behavioural notes etc, is left to people such as the present author.

The practical realities of undertaking field work of this nature makes the effort not only expensive but often exhausting and frustrating. Weather conditions, access and vehicle problems can destroy plans with resultant loss of data. Warm, fine weather is crucial to successful field work as few specimens can be found in cool or wet conditions, and thus normally one needs the warmer weather to be successful in finding these insects. Conditions of extreme heat were encountered during six of the days whilst en-

route and made life unpleasant to say the least.

The efforts of the author on this occasion very fortunately coincided with an assumedly "better-than-average" season for the emergence of the January-emerging buprestidae in the areas visited, thus a valuable amount of data was in fact obtained. However this represents only a small part of what could have been obtained had there been many more people stationed in the field in many different areas throughout Australia for the duration of many consecutive seasons. Unfortunately there is neither the manpower nor funds available for such comprehensive survey work, even if sufficient people could be found and encouraged to carry out such tasks.

What the author has been able to gather during this brief survey represents a small but valuable "slice" of data in what turned out to be an important "good" season for these insects, and which would never had been gathered had he not made the visit, and this basic survey data is now available to be built upon either by the author in some future season, and/or for others to build upon and analyse and as they may wish.

ROUTE

The route the author took extended over 12 days in the field from the 16th January to the 27th January, and visited the following areas: Wubin, Paynes Find, thence Youanmi, Lake Barlee, Southern Cross, Coolgardie, Lake Cronin, Ravensthorpe, Albany, Denmark thence return to Perth. This route covered approximately 3000km.

National Parks visited were :Boorabbin National Park, Fitzgerald River National Park, Stirling Range National Park, Williams Bay National Park, Pemberton National Park.

National Parks buprestid beetles were located in were Boorabin National Park and Stirling Range National Park. A visit to Lake Cronin Nature Reserve was non-productive.

DATA

A listing of species successfully found in National Parks, and in areas outside National Parks is provided herein , as well as any relevant notes on habitats, any hostplants the species found were associated with, and more detailed imformation or analysis wherever warranted.

NEW DATA

Previously unknown important imformation discovered by the author is highlighted, but in effect, most data provided herein is previously unrecorded, due to the extreme paucity of biological and ecological data in print concerning the Buprestidae.

MEANS

Visits are made by land vehicle and then on foot. The data was recorded on audio tape. Privately-owned and operated computer facilities were used to compile and print this report.

SPECIMENS

Collection of specimens under permit for permanent retention by the author, as stated in the initial application, was made as was felt necessary, being essential for correct identification by myself in the great majority of cases, or another authority on Buprestidae, for substantiation of finds, and importantly for future research and reference purposes. In most cases only short series were collected, as can be seen in the database supplied further below, and this was in fact also limited by the difficult field conditions (e.g.: extremes of heat, difficulty of collecting from high crowns of trees). All specimens are retained in the authors collection however voucher specimens of a number of species found will be lodged in the Western Australian Museum gratis of the huge costs involved in obtaining them, the labour costs of preparing them, and the costs of pins and printing of labels attached. These specimens will be donated once this processing is complete. Some few specimens may be given to another authority for determination, who, by an internationally accepted understanding, may require the retention of part of the series sent to them.

NON-WA LICENCE WORK BY THE LICENCE HOLDER

The author has carried out much work in New South Wales National Parks and Wildlife Service estate areas, and other areas. In recent years, this has included the discovery of a number of new species, eight of which were recently described, including one named after the author as Stigmodera (Castiarina) sundholmi Barker 1987 in Transactions of the Royal Zoological Society of South Australia Vol III, Pt.3,pp.133-146

Recent collecting in the Sydney Region has resulted in yet another new species being found which will be described in due course (from Ourimbah, December 1987).

DATABASE AND SITE NOTES

Terms

"Estate" : refers to a CALM-controlled area of land.
"Site" : refers to any area selected whilst en-route to look for buprestid beetles.
"sp." : refers to a species as yet to be identified.

Hostplant abbreviations

Al	Acacia sp., leaves
Yl	Callytris sp., leaves
Ef	Eucalyptus sp., flowers
El	Eucalyptus sp., leaves
Gs	Grevillea sp., stems
Cl	Casuarina sp., leaves
Cc	Casuarina campestris, leaves and stems
Ml	Melaleuca sp., flowers
Jl	Jacksonia sp. leaves
Mf	Melaleuca sp. flowers
Df	Dryandra sp. flowers

Habitat Descriptions

All habitat descriptions are from J. S. Beard, "Vegetation Survey of Western Australia", University of Western Australia Press, 1976.

Specimen Headings

"O"	Observed
"C"	Collected
"H"	Hostplant

SITE 1

53 km NE of Wubin, 16th January 1988.

HABITAT

Casuarina thicket interspersed with areas of mallee and mulga.

Species	O	C	H
Stigmodera (Themognatha) heros	1	0	Ef
Stigmodera (Themognatha) tibialis	1	0	Ef
Stigmodera (Themognatha) martini	1	1	Ef
Stigmodera (Castiarina) septemspilota	1	1	Ef
Curis yalgooensis	1	1	Ef

NOTES

The records from this area important in that they are the first recent substantive buprestid records for the late-emerging species for the area in many years.

The records for Stigmodera (Themognatha) subgenus (being heros, tibialis and martini) were of considerable interest as such species had not been found in the area for many years. The presence of these members of this subgenus indicates strong environmental affinities with areas to the south-east where they are more frequently recorded from. However only a few of the species in this subgenus were found relative to those areas to the south-east where a large number occur in sympatry. Much further work is needed to determine whether any more species in this subgenus occur in this northerly area.

The records for S.(T.) heros and S.(T.) tibialis are confirmed visual sightings though unfortunately no specimens were able to be collected for reference purposes. Both of these species are seasonally (i.e. some seasons, not other seasons) common and widespread.

(S.(T.) heros is known as far east as Eucla in Western Australia, occurs in the south east of South Australia and the far west of Victoria, and the author has recently recorded it in central New South wales (1981) and near Baralnald, New South Wales (1980). One other recent record the author is aware of is Girilambone, New South Wales (1986).

S.(T.) tibialis is known from the south west of Western Australia and the south-east of South Australia.)

The record for S.(T.) martini, may represent a new range

extension, and collection data for this species will have to be investigated to determine this matter. It would appear that at least the species may not have been recorded in the district previously.

The record of S.(C.) septemspilota was of interest as this species was not previously known from this area and thus represents a new range record.

Curis yalgooensis is a widespread species in the outer wheatbelt region of Western Australia and the record above confirms its continued existance in the district.

ACTIVITY

The activity, i.e. flight and feeding behaviour, of all specimens was low, as the site was visited in the late afternoon. It had been a hot day with a top temperature recorded by the author of 45 degrees, None were seen in flight, however feeding activity was taking place amongst the denser clusters of flowers where they were also probably going to stay overnight.

DIVERSITY

Diversity, being the number of different species found, was regarded as low. The area had suffered from fire within the past 5 years or so and few trees were mature.

WEATHER

Weather conditions were fine, extrfemely hot with a top temperature of 45, and a light wind. Some light rain appeared to have fallen in the area in the week prior to the visit, and which may have encouraged some of the species found to emerge. A great deal of further research in the field is necessary however to establish any firm relationship between rainfall and emergence.

LOCAL CONSERVATION RECOMMENDATIONS

It is strongly recommended that the natural areas remaining between Wubin and Mt. Singleton be investigated for inclusion in a future National Park or Nature Reserve. This is due to the severe loss of natural habitat in this area due to farming and the probability that any further extension of farming to the north-east of Wubin will eliminate important areas of habitat for these insects.

SITE 2

Wubin District : 83 - 83.5 km NE of Wubin, 17th January 1988. (Apx. 2km W of Mt Singleton)

HABITAT

Mallee woodlands, over spinifex, some casuarina thickets.

Species	O	C	H
Stigmodera (Themognatha) heros	2	0	Ef
Stigmodera (Themognatha) tibialis	1	0	Ef
Stigmodera (Castiarina) tincticauda	1	1	Ef

NOTES

This area further inland is slightly more arid than the above area and buprestids were very difficult to find, particularly considering the very hot daytime temperatures.

Records of Buprestidae form the area were few and far between and it appears that the above records are the first for the district for this time of the year, and thus probably represent new range extensions.

Of greatest interest was the record of S.(C.) tincticauda, which is not regarded as common. It was found on a young flowering mallee eucalypt only 2 metres high.

DIVERSITY

Though the area appears to have also received recent rains, the increased aridity of the area, being further inland, had decreased diversity slightly (compared to the previous site).Much further fieldwork is necessary however to confim such assesments. It is possible that other species of nectar-feeding genera will indeed be found at this time of year, and almost certainly species from other genera.

ACTIVITY

Activity was good with the specimens found being observed in flight visiting one flower cluster after another. Other insects were sighted here in good numbers, such as numerous flies and wasps. Usually, though not always, the presence of numbers of other insects visiting the same host-flowers is indicitive that buprestidae could be present, and probably indicates that good rains had fallen at the site within the past month or so. One fly which was collected, but which was destroyed through heat-rot, (rapid putrification of the internal organs caused by the extreme heat, to which these particular insects seem to be especially

susceptable) was Phellus pilifera (Asilidae).

WEATHER

The weather was fine and extremely hot with a top temperature of 46 and with a light wind.

LOCAL CONSERVATION RECOMMENDATIONS

This area is not considered safe from possible crop-farming of some advanced kind in the future, as it lies within the "mulga-eucalypt line". The locality is within sight of the scenically attractive Mt. Singleton, which should be the "centrepeice" of a future substantive National Park or Nature Reserve. The existance of S.(C.) tincticauda, a normally scarce species, should be supportive towards this end.

SITE 3

131-132 km NE of Wubin, 17th January 1988

HABITAT

Mallee-woodland thickets amongst casuarina and mulga.

Species	O	C	H
Stigmodera (Castiarina) septemspilota	9	9	Ef

NOTES

A much drier area than the previous two sites, but the sole species recorded was present in numbers such that it could be called "common" at this site.

DIVERSITY

Diversity was extremely low, and may have been due to poor or no recent rains.

LOCAL CONSERVATION RECOMMENDATIONS

The region is not under any immediate threat, except possibly from overgrazing. No specific recommendation is possible at this time.

SITE 4

11 - 13.5 km WSW of Paynes Find, 17th January 1988

HABITAT

Mallee-woodland thickets amongst casuarina and mulga.

Species	O	C	H
Neocuris duboulayi	2	2	Ef
Neocuris viridiaurea	1	1	Ef

NOTES

Neocuris duboulayi and Neocuris viridiaurea are small species which occur in the wheatbelt areas of Western Ausraila. Neocuris viridaurea was less frequently encountered than duboulayi during this survey. Any new distribution records helps to fill in gaps in their known ranges. Further research is required to determine if the above records are outside the previously known distribution ranges, though it is considered that this will prove to be the case.

DIVERSITY

Diversity was limited to these two species in the same genus, with no sign of any other species or genera being present. This is considered unusual in that at least one or two members of the genus Stigmodera were present at the previous sites. This may have been due the author simply not having "crossed paths" with such that may have well been in the area. Further field work is necessary to determine whether this site really is so depauperate in Stigmodera species or not, though it is expected that S.(C.) septemspilota and tincticauda will be found at least as they have both been found at several of the previous and the following sites.

Of interest was the prescence of a specimen of the Cetoninae Metallesthes metallescens, (i.e. a "Rosechafer" beetle, not a buprestid beetle), which is much more common in its known areas to the south. This may represent another new range extension. This species also visits the blossoms of Eucalypts for nectar.

WEATHER

Fine, very hot, 46 top temperature, light wind.

LOCAL CONSERVATION RECOMMENDATIONS

Generally as for site 4. However, it was noticed that there were a number of small areas of sandplain heath in the area which

doubtless are of considerable botanic interest and which should be investigated for inclusion in Nature Reserves at least until further threats become evident. Also, in September adults of the recently-described buprestid Astraeus robustus Barker occur on Casuarinas on the low ridge 17km SE of Paynes Find, and has not been found at any other locality.

SITE 5

102 km NE of Paynes Find, 17th January 1988

HABITAT

Predominately mulga; tall (usually 5 - 10 metres in height) eucalypts as isolates or in thinly populated thickets.

Species	O	C	H
Stigmodera (Castiarina) septemspilota	1	1	Ef
Stigmodera (Castiarina) tincticauda	3	3	Ef
Curis yalgooensis	1	1	Ef

NOTES

As indicated in the notes for the previous site, S.(C.) septemspilota and tincticauda were again found at this site. It is strongly believed that these records, and that for Curis yalgooensis, represent new substantive range extensions inland for both of these species.

DIVERSITY

Clearly low.

WEATHER

Fine, extremely hot with a top of 47 and a light wind.

LOCAL CONSERVATION RECOMMENDATIONS

The area is not under any immediate or forseeable threat, apart possibly from overgrazing. The effects of mining operations in the region are miniscule and do not threaten any of the recorded species at this time.

SITE 6

10 km NW of Lake Barlee, 17th January 1988.

HABITAT

Mallee eucalypts over spinifex (Triodia), heath.

Species	O	C	H
Stigmodera (Castiarina) goerlingi	1	1	Ef
Stigmodera (Themognatha) marginalis	40+	10	Ef
Stigmodera (Themognatha) pascoei (???)	1	0	Ef
Stigmodera (Themognatha) pictipes	1	1	Ef
Stigmodera (Themognatha) spp.	4	0	Ef
Curis yalgooensis	1	1	Ef

NOTES

This site was markedly different in habitat to those previously encountered during the survey in that it was the first area where Triodia sp. grasses were the dominant ground cover. In relation to the "mulga-eucalypt line", the mallee here was further inland than other areas of mallee surveyed, i.e. those in the Wubin district, and to those surveyed further south. At this site, the mallee was in a dense stand and which was unlikely to be encountered as such very much further inland.

Flowering was occurring on a majority of the mallee's and many were in quite profuse bloom (a subjective term, but means here that blossoms were so dense on the crowns that they dominated the crown with their colour).

These records represent the first known written records of buprestidae from this area.

The record for S.(C.) goerlingi was of interest in that it may represent a new distribution record for the species.

As regards S.(T.) marginalis, almost all the specimens found at the site were of this species, and in numbers that it was regarded as being "locally common". This is probably not an unusual population for this species for this area, where it has obviously become the dominant species present. This may occur because it is more suitably adapted to these marginal areas for stands of mallee than other species it is found with where it is known from further south. This species is much less common elsewhere in its known range (unpublished Museum specimen records). These records also represent the furthest-most inland records for the species. As the species was so common at this site, it is possible that the species occurs even further inland, but there are no such records as yet supporting this. Further

survey work is needed to determine this matter.

The record for S.(T.) pascoei is provisional as the observed specimen was not able to be captured, having been disturbed from its resting place amongst a flower cluster and having flown off. As it flew off it flew low to the ground at first, when the author was able to see its elytra was white with dark apices, indicative of this species, and of the right size for this species. Further fieldwork is need to confirm this record.

The record for S.(T.) pictipes is remarkably inland of previous records for the species and may represent close to its maximum penetration into the arid area of the continent, as most records are from areas further south.

The other "S.(T.) spp" were a number of other uncaptured unidentifiable species also disturbed from the flowers but which could not be identified as they flew off.

ACTIVITY

It was noted that only one of the buprestid species found were seen in flight. The species observed in flight was S.(C.) goerlingi, which was observed in flight late in the afternoon, around 1600 hours. However no others were observed actually in flight unless disturbed by the author. All specimens found were otherwise buried within clusters of flowers throughout the day, apparently inactive or slowly feeding on the nectar of the surrounding blossoms. This inactivity, particularly the unwillingness to fly, may possibly have been caused by the extreme heat combined with the lack of any breeze. However extremes of heat are not unusual elsewhere in the range of such species. This is purely speculative and further field work is necessary to determine the true cause of this behaviour. It might be noted that small numbers of a medium-sized Cetoninae, Hemichnoodes? sp. were observed in flight, though many more were at rest amongst the flowers.

On one view it may indicate the restrictive environmental limits to the distributional range of species such as S.(T.) marginalis and S.(T.) pictipes. Restrictions on flight caused by extreme heat would very definitely restrict the normal feeding and mating requirements for such otherwise active species. It must not be forgetten that there are numerous other means of restiction of a species distributional range.

DIVERSITY

The change in habitat was accompanied by a marked and obvious change in the species found and diversity as compared to the earlier-sampled sites. As this was only the second day of the survey, this was not the result of seasonal change. It was almost certainly due to habitat differences, the habitat being determined by markedly different botanic, (due to rainfall and temperature) conditions than those already encountered. Soil types affect species diversity in that they affect the type of hostplants present. Here the soils are a red sandy-loam.

The potential must exist for other species of buprestids to occur here.

WEATHER

Weather conditions were fine and extremely hot with a top temperature of apx 48 and no wind.

LOCAL CONSERVATION RECOMMENDATIONS

The entirety of Lake Barlee Station should be investigated for inclusion in a future National Park or Nature Reserve. The buprest fauna needs much further fieldwork as it highly likely that further species will be found in this area.

SITE 7

13 km SE of Diemals, 18th January 1988.

HABITAT

Mulga low woodland.

Species	O	C	H
Stigmodera (Themognatha) bonvolouri	3	1	Ef
Stigmodera (Themognatha) heros	1	0	Ef
Stigmodera (Themognatha) tibialis	1	0	Ef

NOTES

All the specimens of S.(T.) bonvolouri observed or collected were totally red on the elytra. It was found that with this species, the further south one progressed through the range of this species, the more area of blue-black there was on the elytra. The presence of absence of blue-black areas appears to be directly related to aridity. i.e. the more arid its habitat the more red on the elytra, and vice versa.

This particular species was not found any further north in this area though numerous possible sites were visited en-route. It is very possible that for this species in this area this site is the northernmost limit of its distribution range. Such data is rarely obtained. Only further and frequent visits can determine the truth of such a proposition.

Little can be said of the other two species found. Both had been found at Site 1, but their northernmost limits may not yet be determinable, though both appear to be reaching their limits. The few specimens found cannot at this time be classed as indicative of this.

ACTIVITY

It was noted that all specimens of S.(T.) bonvolouri were observed underneath the densest flower clusters of their adult hostplant, inactive whilst a strong and very hot wind was blowing. This behaviour may have been to escape the extreme heat of the wind, and it unlikely that the insects could fly effectively in the face of the strong wind in any case. of the day. Of the other two species found, these flew rarely when the wind died down, as if they too were reluctant to fly in such heat.

DIVERSITY

Low, perhaps unusually so considering the higher diversity at the

site further north and those further south, but such variations are common, or the rule, even in areas with a high diversity.

WEATHER

The weather was fine and extremely hot with a top temperature of 47, with a hot wind, occasionally gusting at about 30 knots.

LOCAL CONSERVATION RECOMMENDATIONS

No immediate threat to the habitats of this region is perceived apart from possible overgrazing. Nevertheless at some future date large areas should be included in National Parks or Reserves whenever possible. It is the only area the author knows of where all specimens of S.(T.) bonvolouri are wholly red.

SITE 8

130 km NNE of Southern Cross. Turnoff to Evanston Station.
18th & 19th January 1988

HABITAT

Mixed woodland, Acacia and Casuarina thickets.

Species	O	C	H
Stigmodera (Themognatha) brucki	5+	2	Ef
Stigmodera (Themognatha) bonvolouri	30+	2	Ef
Stigmodera (Themognatha) chalcodera	30+	2	Ef
Stigmodera (Themognatha) heros	20+	2	Ef
Stigmodera (themognatha) pictipes	2	0	Ef
Stigmodera (Themognatha) rectipennis	4	4	Ef
Stigmodera (Themognatha) tibialis	5+	2	Ef
Stigmodera (Themognatha) westwoodi	8+	2	Ef,El
Curis yalgooensis	5+	2	Ef

NOTES

All species were found on the blossoms of Eucalyptus trees, in Eucalyptus woodland with an understory dominated by Acacia and Casuarina. One species was also found on Eucalyptus leaves. All specimens were very actively flying about and to the blossoms, and feeding on the nectar.

Notably species diversity had increased dramatically in comparison to all previous sites visited, and apparent populations had also increased similarly. This area is probably close to northernmost distributional limits for S.(T.) brucki, S.(T.) chalcodera, S.(T.) rectipennis and westwoodi.

No Stigmodera (Castiarina) subgenus. were found, and this was considered to be unusual in the face of the high diversity of other members of the genus Stigmodera present.

For the first time the flight behaviour of S.(T.)westwoodi is now recorded:

> Adults flew rapidly,in a wildly gyrating pattern over a zig-zagged course. The specimens were observed to fly in such manner back and forth along a flight path, and would land on the higher leaves of nearby non-flowering Eucalypts for some time. The gyrating flight pattern is very distinct enabling provisional recognition of the species even whilst in flight. Such flight behaviour is unusual however occurs to a lesser degree in the closely related species S.(T.) imperialis and more less so in S.(T.) pictipes. All three also have similar elytral patterns.

Specimens of S.(T.) bonvolouri at this site varied from being entirely crimson on the elytra to those with several small dark patches on this red background. Specimens from further south are almost entirely dark with the only red being around the apical margins of the elytra. Thus specimens at this site, being further south than site 4 and with a slightly higher rainfall, as one may assume though records don't exist, now are showing colouration in about half the specimens. Further studies are required to fully demonstrate any relationship between elytral patterns and rainfall.

The two specimens of S.(T.) tibialis also showed this, having very light yellowy-brown elytra ("Major Chomatic Morph A", authors classification), whilst the other two had dark elytra with thin pale bands (Major Chromatic Morph B) . These specimens are representative of the two main colour morphs with S.(T.) tibialis (authors unpublished proposition) and within these basic colour morphs there is further wide variation. Complex genetic factors are most likely the cause of these variations, and these vary as a whole throughout its distributional range of the species.

The author suspects that there is some reaction to increased aridity at its northernmost and easternmost extremities, though almost completely "overshadowed" by the above major colour morphs. Specimens from the Eucla district, Western Australia, typically have with very large light elytral bands, whereas specimens from further west have thinner darker bands. A variation of Major Chromatic Morph A has elytra which are wholly reddish. This Morph is sometimes a light brown. It is pale versions of this morph (Morph A) the author believes was found at this site. A sightly darker but still very pale specimen was found at 9. Much further work needs to be done on this aspect of this species throughout its entire remaining distributional range.

All specimens of S.(T.) rectipennis, were of a very light form. At the very least they represent the northernmost/most inland known record for the species.

ACTIVITY

An important point to note is that unlike most other sites visited so far, the activity of the insects was very high. That is to say, virtually all specimens observed were in constant motion, either flying from one flower cluster to another, or landed in flower clusters and walking about taking nectar from one blossom after another, then flying off to another flower cluster. This was in stark contrast to the generally low activity recorded in previous sites.

The reason for this may be twofold: firstly, temperatures were not so high as at the previous sites, allowing for apparently ideal flying and feeding conditions as these activities were dominant and continous. Secondly, but probably less importantly, diversity and the high population of emerged adults added to the general impression of high activity.

DIVERSITY

The large numbers of some species was indicative of the peak of a "good" season, if not as good as it could have been for this area. It also showed how common some species can become , whilst others appeared to be comparatively less commonly encountered. Of the known species found, none would yet be considered as "rare", though S.(T.) westwoodi may be considered as "uncommon". An assessment of the relative abundance of each species found throughout the tour will be provided in Section 2. The presence of the very large Cetoninae Hemichnoodes mniszechii in small numbers was noted, the furthest north this species was sighted during the survey, and may represent a new range extension for this species.

WEATHER

Fine, very hot with temperatures up to 38, with a light wind.

SITE 9

81km N of Bullfinch, 19th January 1988

HABITAT

Woodland, Acacia and Casuarina thickets.

Species	O	C	H
Stigmodera (Themognatha) brucki	5+	0	Ef
Stigmodera (Themognatha) bonvolouri	10+	1	Ef
Stigmodera (Themognatha) chalcodera	2+	0	Ef
Stigmodera (Themognatha) heros	4+	0	Ef
Stigmodera (Themognatha) tibialis	5+	1	Ef
Stigmodera (Themognatha) westwoodi	2+	1	Ef,El
Stigmodera (Themognatha) wimmerae	1	1	Ef

NOTES

Whilst the diversity was much the same as for Site 5, the addition of S.(T.) conspicillata and wimmerae was of interest. S.(T.) conspicillata is fairly widespread in south-western Western Australia but had not previously been found this far inland, and thus may represent a new range extension. Of the specimens found, two were females found at rest upside down underneath flowers, while the third was a male which flew a seemingly regular "flight path" from one flower cluster to another. It had no apparent interest in feeding, and was possibly searching for females of its species such as those found at rest. This behaviour has been observed by the author with buprestidae previously in other species (unpublished data) but not apparently previously so with this species.

The sole specimen of S.(T.) wimmerae was with plain light brown elytra and a dark metallic pronotum, and was the furtherstmost northly specimen of the species found during the survey.

The specimen of S.(T.) tibialis was again of the plain form but with strong redish suffusion towards the base of the elytra.

ACTIVITY

Activity, as with Site 5, was at a high level.

DIVERSITY

Moderate in comparison to other sites.

WEATHER

Fine, very hot with a top of 38, light wind.

LOCAL CONSERVATION RECOMMENDATIONS

No immediate threat is apparent. However as the region should be investigated for inclusions of very large areas in National Parks or Nature Reserves of over 200,000 ha in extent.

SITE 10

30 km E of Southern Cross, 19th & 20th January 1988.

HABITAT

Acacia and Casuarina thickets on sandplain with heath.

Species	O	C	H
Stigmodera (Themognatha) brucki	1	1	Cc
Stigmodera (Themognatha) heros	3	0	-
Stigmodera (Themognatha) miranda	See Notes		
Stigmodera (Themognatha) gigas	7+	2	El
Stigmodera (Themognatha) bonvolouri	30+	2	
Stigmodera (Themognatha) chalcodera	30+	1	Al,Yl,Cl
Agrilus sp.	15+	4	Al
Astraeus polli	6+	3	Cc
Neobubastes parvo	1	1	Al
Cisseis sp.	1	1	Cc

NOTES

S.(T.) brucki and bonvolouri were found early in the morning at rest amongst the upper leaves of Casuarina campestris. They were totally inert and covered in dew and had obviously spent the night in this position. A specimen of S.(T.) heros was similarly found on a low Acacia bush.

A single elytron (wing casing) of S.(T.) miranda was found, which appeared to have been from a specimen which may have died only a few days prior to the author's visit. No live adults of this species were found.

No likely host trees were in flower in the area, adults of all species found were thus seemingly not in need of nectar supplies during the visit.

As the temperature climbed above 28 the beetles became active and eventually were able to fly off and begin their activities for the day. Notably, none flew whilst any dew remained on their bodies. S.(T.) bonvolouri and heros appeared to spend the day flying at a low height over the casuarina-acacia thickets.

The high "flying temperature" required for flight probably indicated adaption for warmer weather. This is in marked contrast to seasonally earlier species or from cooler climates, where flight can occur at temperatures of 18-19.

A close association of S.(T.) bonvolouri with Casuarina campestris is probable. Despite the variety of possible "roosting" places selectable from the diverse flora of ther area,

only C. campestris was utilised. These species were also seen frequently flying from one C. campestris to another, as if searching for something. It may be that this is a larval hostplant.

It was observed that adults of S.(T.) miranda flew with a characteristic bend in their abdominal segments, which is bent upwards on the last few sternites. The insects fly with their heads and pronotums higher than the abdomen, so this bending back of the abdominal sternites may be to compensate for weight shift in flight. This behaviour does not seem to have been recorded previously.

S.(T.) gigas flew at a low height of about 1 to 2 metres above the ground and were flying from from one particular small species of Eucalyptus to another, none of which were in flower, and this behaviour seemed to be concentrated at low rises in the landscape.

S.(T.) chalcodera preferred to fly about the greener Acacia and Callytris bushes, where the author observed that other specimens were sometimes already on such bushes. Mating was taking place on the uppermost leaves of some of these plant species. It would appear that for this species that the richer green of some Acacias and the Callytris is used as an aid for locating mating partners. The author followed several adults of this species and the attraction to such plants was very specifically obvious. This behaviour with this species has not been previously recorded.

Agrilus australasiae were found on the upper leaves of a low thin-leaved Acacia and mating of several pairs on this host was observed.

The other species recorded were found at rest early in the morning.

ACTIVITY

Once the temperature warmed up activity was moderately high and as described above, being largely confined to flying low just above the tops of the plant species mentioned.

DIVERSITY

Interestingly, diversity was higher than one might have expected considering that there were no host-flowers seen in the area. However the possibility that at least Casuarina campestris, very prolific in the area, is the larval hostplant of several of the species recorded in the area could account for thie diversity.

WEATHER

Mostly fine with a top of 35, no wind.

LOCAL CONSERVATION RECOMMENDATIONS

Extreme urgency for immediate protection of all areas east of Southern Cross and southwards east of the Vermin Fence, involving apx 5 million ha. (See authors published material in initial application, and other available publications by other authors such as "Diversity or Dust", Australian Conservation Foundation.)

SITE 11

90 km E of Southern Cross, 20th January 1988.

HABITAT

Mixed shrubs and heathland, with mallee. On sandplain.

Species	O	C	H
Stigmodera (Themognatha) gigas	30+	10	El
Stigmodera (Themognatha) heros	5	1	E-

NOTES

These species were seen in flight over mallee/ heath on sandplain at a low rise in the landscape. Whilst S.(T.) heros seemed to prefer flying near the taller mallees alone, S.(T.) gigas flew amongst the outer trees of a mallee thicket and much more so over the very low sandplain heath (0.5 - 1m high) nearby, and all specimens observed were flying in a south or slightly sout-easterly to north or slightly north-easterly direction. Several were found at rest on various plants. They flew at heights form 1 to 2 metres above the ground, and many would inspect low mallee eucalypts in particular, but also other shrubs, as they progressed.

It was noted that if a specimen was chased for some distance and one approached to within a metre or so less, it would fold up its wings and elytra and fall to the ground. This may be a defence mechanism against attack by birds during flight. Whatever the reason, this unexpected reaction deserves much more investigation, and similarly for the apparent "migration" behaviour of nearly all species observed.

None of the above behavioural notes has been previously recorded.

ACTIVITY

High, as described.

DIVERSITY

Clearly very low, and dominated by the one species common at the site. There was a marked absence of Casuarina which may account for the low diversity encountered.

WEATHER

Hazy, with top of 38. However the effect of the sun reflecting off the sand made the actual temperature recieved on the skin at around 45. No wind. Distinctly humid.

CONSERVATION RECOMMENDATIONS

As for Site 10.

SITE 12

Boorabin, Boorabin National Park, 20th January 1988

HABITAT

Woodland thicket in Casuarina and Acacia thickets with heath on sandplain.

Species	O	C	H
Stigmodera (Themognatha) brucki	2000+	3	Ef
Stigmodera (Themognatha) miranda	1500+	5	Ef
Stigmodera (Themognatha) chalcodera	200+	2	Ef
Stigmodera (Themognatha) martini	2	1	Ef
Stigmodera (Themognatha) bonvolouri	10+	1	Ef
Stigmodera (Themognatha) murrayi	50+	2	Ef
Stigmodera (Themognatha) chevrolati	6+	1	Ef
Stigmodera (Themognatha) oleata	3	2	Ef
Stigmodera (Themognatha) heros	60+	1	Ef
Stigmodera (Themognatha) yarrelli	10+	3	Ef
Stigmodera (Themognatha) pictipes	10+	0	Ef
Stigmodera (Themognatha) wimmerae	5+	1	EF
Stigmodera (Castiarina) subnotata	4	1	Ef
Stigmodera (Castiarina) mustelamajor	3	3	Ef
Stigmodera (Castiarina) sexnotata	1	1	Ef
Neocuris viridimicans	3	3	Ef
Neocuris sp. 2 (black in colour)	1	1	Ef

NOTES

At this site of about 5 hectares literally thousands of specimens were observed, all feeding at nectar and flying about the host trees in bloom. Diversity was also at a high level, and would not be so observed again at any other site during the survey. Here, a total of 17 species occurred in close ecological sympatry, in the classic "irruption" of numbers reportedly observed in the past.

The host trees were in peak and profuse flower. It may be that where such trees in flower are relatively far apart, say a few kilometres or so, the insects fly in from the surrounding areas and concentrate in such patches of flowering trees. A great deal of further research is required on othis point alone.

Unfortunately in situations such as occurred here, the great majority of specimens seem singularly intent on consuming as much nectar as possible, and on a continous basis. This meant that with individual specimens being virtually impossible to follow amongst the numerous beetles of like kind present as they went about this activity, new observations were minimal.
However it was noted that:

The few specimens of S.(T.) chevrolati found were all observed flying about the same small flowering eucalypt. This species was in low numbers whereas it is reportedly normally more common.

Specimens of S.(T.) yarrelli were found on scattered low trees away from a main taller group where most of the specimens were flying.

All the S.(Castiarina) subgenera and the two Neocuris species were similarly found on the lower trees away from the taller trees where most of the S.(Themognatha) subgenus were flying.

It has recently been found by Dr B. Moore that Stigmodera carry alkaloids in their bodies thus would be distasteful or poisonous to predators. This recent finding goes a long way toward explaining why some members of this genus are so "flamboyant" in their colourations. However other members such as S.(T.) brucki, yarrelli and some chromatic morphs of wimmerae etc are coloured very similarly to the mallee blossoms. This field of study is in great need of further research.

ACTIVITY

As indicated, very high.

DIVERSITY

An impressive total of 17 species was found at this one site. The reason why this site should be so rich is probably several-fold:

the habitat is particularly rich being sandplain heath with plenty of various Casuarinas, Acacias, Protacacea and other plant families and genera being possible larval hosts;

this latitude may have virtually ideal climatic conditions for the subgenus Thgemognatha;

areas of suitable flowering hostplants are not frequent in this precise area and thus any groups of trees that do flower may be a very powerful attaction;

WEATHER

Fine, very hot with temp of 35, no wind.

LOCAL CONSERVATION RECOMMENDATIONS

Though the site is protected within Boorabin National Park, the recommendation stated in Site 10 applies.

SITE 13

128 km E of Southern Cross, 20th January, 1988

HABITAT

Woodland (Salmon Gum, Mallees)

Species	O	C	H
Stigmodera (Themognatha) murrayi	40+	2	Ef
Stigmodera (Themognatha) brucki	50+	0	Ef
Stigmodera (Themognatha) wimmerae	20+	5	Ef
Stigmodera (Themognatha) oleata	30+	4	Ef
Stigmodera (Themognatha) pictipes	20+	1	Ef
Stigmodera (Castiarina) subtincta	1	1	Ef

NOTES

Of note at this site and at the following site was that specimens of S.(T.) wimmerae, a chromatically highly variable species, was becoming commoner eastwards. S.(T.) wimmerae has two basic colour extremes (authors unpublished research) within which there are wide parameters of possible colours. This can be illustrated as follows:

BODY WHOLLY DARK RED < > BODY ENTIRELY TESTACEOUS

PRONOTUM METALLIC ELYTRA DARK RED < > PRONOTUM METALLIC ELYTRA TESTACEOUS

Specimens can be any combination within these limitations. Specimens may also have dark bands on the elytra which are not related to either Major Colour Morph.

However, it was noted that most specimens found from this site and the next were predominately testaceous. Why this was the case during this survey, and other questions such as why the wide variety of colour morphs, requires much further field work.

At this site S.(T.) oleata was common, and was found similarly so at sites further east in the Bullabulling district. The species is widespread but may be more common in this particular region and possibly a little to the north as well, say, up to 50 km further north. Several of the specimens from this site exhibited a second elytral orang-red band, not unknown with specimens from the more inland parts of the range of this species, possibily being a reaction to the increased aridity or temperatures, or both.

ACTIVITY

Specimens were very active as for the previous few sites, flew right up to as late as 1843 hours WST, primarily due to the still-warm temperatures.

DIVERSITY

Within this region there were many areas hosting large numbers of jewel beetles. Survey work at this site showed that diversity was very much decreased and population makeup was different.

Diversity being poor at one particular site may not mean that it will always be poor at that site. The diversity may alter during the course of a few days, and from nearby-site to nearby-site, and from season to season. A great deal of further field work is necessary to determine the true diversity of any site at all.

WEATHER

Fine, very hot with top of 35. No wind.

CONSERVATION RECOMMENDATIONS

As for Site 10.

SITE 14

Dedari, 21st January 1988.

HABITAT

Mixed woodland, Acacia-Casuarina heath.

Species	O	C	H
Stigmodera (Themognatha) wimerae	10+	2	Ef
Stigmodera (Themognatha) murrayi	10+	0	Ef
Stigmodera (Themognatha) brucki	20+	1	Ef
Stigmodera (Themognatha) miranda	50+	1	Ef
Stigmodera (Themognatha) martini	1	0	Ef
Stigmodera (Themognatha) bonvolouri	50+	0	Ef
Stigmodera (Themognatha) chalcodera	30+	0	Ef
Stigmodera (Themognatha) tibialis	50+	1	Ef
Stigmodera (Themognatha) yarrelli	4	4	Ef
Stigmodera (Themognatha) heros	20+	1	Ef
Stigmodera (Castiarina) subtincta	1	1	Ef
Stigmodera (Castiarina) subnotata	2	2	Ef
Stigmodera (Castiarina) metallica	1	1	EF
Stigmodera (Castiarina) pallidipennis	1	1	Ef
Neobubastes parvo	6+	4	Al

NOTES AND DIVERSITY

Though populations at this site were not as high as for Boorabin, this was probably due to the higher number of mallee eucalypts in flower in the site area and in the surrounding district. Conversely, despite the abundance of blossom, populations and diversity was still remarkably high.

Once again the species make-up was a little different than similar areas, possibly due to differing habitats and climate. The species of mallee flowering at this site were different as well to those at previous sites (though none were readily identifiable).

ACTIVITY

Generally moderate, with many specimens content to rest on the blossoms.

WEATHER

Hot, top of 35, hazy, a little humid.

CONSERVATION RECOMMENDATIONS

As for Site 10.

SITE 15

3.1 km E of Dedari, 21st January 1988

HABITAT

Mallee woodland

Species	O	C	H
Stigmodera (Themognatha) heros	5+	0	Ef
Stigmodera (Themognatha) brucki	20+	0	Ef
Stigmodera (Themognatha) murrayi	30+	1	Ef
Stigmodera (Themognatha) miranda	10+	1	Ef
Stigmodera (Themognatha) chevrolati	6+	1	Ef

NOTES AND DIVERSITY

The area had taller trees than those at Sites 10 to 14. A great many more trees were observed in flower, as well as many more groups of these trees. There may have been more than a few other species present on these higher trees and in other groups of flowering trees which could not be reached. Otherwise diversity was low in comparison to other sites in the district.

It was noted that S.(T.) murrayi was apparently more common the further east the site.

ACTIVITY

All specimens were very active and singularly intent on feeding at the blossoms of the host trees.

WEATHER

Fine and very hot with a top of 38.

CONSERVATION RECOMENDATIONS

As for Site 10.

SITE 16

6km W of Bullabulling, 21st January 1988

HABITAT

As for Site 15

Species	O	C	H
Stigmodera (Themognatha) murrayi	20+	2	Ef
Stigmodera (Themognatha) brucki	10+	2	Ef
Stigmodera (Themognatha) chalcodera	5+	2	Ef

NOTES, DIVERSITY etc.

As for Site 15.

CONSERVATION RECOMENDATIONS

As for Site 10.

SITE 17

6.5 km N of Bullabulling, 21st January 1988.

HABITAT

Eucalypt woodland.

Species	O	C	H
Stigmodera (Themognatha) heros	10+	2	Ef
Stigmodera (Themognatha) conspicillata	2	1	Ef
Stigmodera (Themognatha) imperialis	1	1	Ef
Stigmodera (Themognatha) brucki	10+	1	Ef
Stigmodera (Themognatha) tibialis	10+	1	Ef
Stigmodera (Themognatha) wimmerae	5+	2	Ef
Stigmodera (Themognatha) westwoodi	2	1	Ef
Stigmodera (Themognatha) rectipennis	1	0	Ef
Stigmodera (Themognatha) bonvolouri	10+	2	Ef
Stigmodera (Themognatha) chalcodera	5+	0	Ef
Neocuris viridiaurea	1	1	Ef
Neocuris sp.	1	1	Ef
Curis yalgooensis	1	1	Ef

NOTES, DIVERSITY etc.

Same climatic conditions as for the previous sites this date. Diversity was fairly high in comparison to other survey sites. Once again a male of S.(T.) conspicillata was observed flying from one flower cluster to another, without landin, and following the same course at intervals, presumably searching for females of its kind at rest.

S.(T.) rectipennis was noted to be very fast flying at this site, as was S.(T.) imperialis, which flew as noted a little similarly to S.(T.) westwoodi.

ACTIVITY

Very high, with behavioural patterns for some species clearly evident as noted above.

WEATHER

Fine, very hot with a top of 37.

CONSERVATION RECOMMENDATIONS

As for Site 10.

SITE 18

11.1 km N of Bullabulling, 21st January 1988

HABITAT

Species		O	C	H
Stigmodera (Themognatha)	oleata	20+	1	Ef
Stigmodera (Themognatha)	heros	20+	0	Ef
Stigmodera (Themognatha)	wimmerae	10+	2	Ef
Neocuris viridimicans		1	1	Ef

NOTES, DIVERSITY etc.

This was an area where the trees were regenerating after a localised fire of some years previously, and many trees were in profuse bloom. S.(T.) oleata was commonest at this site anywhere in the survey. Otherwise diversity was quite poor.

ACTIVITY

All specimens were of low activity slowly feeding on blossom as it was late in the day and temperatures were cooling.

WEATHER

Fine, cooling.

CONSERVATION RECOMMENDATIONS

As for Site 10.

SITE 19

16.1 km N of Bullabulling, 21st January 1988.

HABITAT

Eucalypt woodland.

Species	O	C	H
Stigmodera (Themognatha) oleata	5+	0	Ef
Stigmodera (Themognatha) pictipes	2	0	Ef
Stigmodera (Themognatha) heros	5+	0	Ef
Stigmodera (Themognatha) chalcodera	2	0	Ef
Stigmodera (Themognatha) rectipennis	1	0	Ef
Stigmodera (Themognatha) wimmerae	5+	0	Ef
Stigmodera (Castiarina) subtincta	1	0	Ef
Neocuris viridimicans	1	1	Ef

NOTES

Diversity was relatively good, though it was very late in the day so more species may have been present.

ACTIVITY

Virtually nil, with all specimens being fairly inactive amongst the blossoms of the host trees.

WEATHER

Mild, fine.

CONSERVATION RECOMMENDATIONS

As for Site 10.

SITE 20

11km S of Coolgardie, 22nd January 1988.

HABITAT

Open Eucalypt woodland, possibly affected in part by wood-cutting for mining operations of the past.

Species	O	C	H
Stigmodera (Themognatha) conspicillata	1	1	Ef
Stigmodera (Castiarina) subnotata	1	1	Ef
Curis yalgooensis	1	1	Ef

NOTES

In very hot and dry conditions, in this very open woodland, results were very poor as regards diversity and populations. The road was dusty and frequently used by mining vehicles, and as stated timber cover is reduced in areas. Understorey was sparse. Most of the flowering trees did not host a single beetle.

This was in stark contrast to relatively undisturbed areas nearby in the Bullabulling district.

CONSERVATION RECOMMENDATIONS

In dire need of restitution, then as in Site 10.

SITE 21

35 km s of Coolgardie, 22nd January 1988.

HABITAT

Casuarina thickets (dense) with eucalypt woodland.

Species	O	C	H
Stigmodera (Themognatha) chevrolati	8+	1	Ef
Stigmodera (Themognatha) tibialis	2	0	Ef
Stigmodera (Themognatha) chalcodera	5+	1	Ef
Stigmodera (Themognatha) murrayi	5+	1	Ef
Stigmodera (Themognatha) mniszechi	3+	1	Ef

NOTES

The area's habitat was a vast area of dense Casuarina heath, probably Casuarina campestris, which was almost impossible to walk into. A few 2 - 3 metre high eucalypts were in bloom in the heath attracting the above species. S.(T.) mniszechi is recorded for the first time during the survey. This species was unusually uncommon during this survey though it is regarded as normally common.

DIVERSITY

Though diversity is still low populations have improved once the mining areas and the buprestid-depauperate woodlands to the immediate south of Coolgardie were left behind. Flowering eucalypts were now successfully attracting buprestid beetles.

ACTIVITY

High.

WEATHER

Fine, hot, top of 35.

CONSERVATION RECOMMENDATIONS

As for Site 10.

SITE 22

36km S of Coolgardie, 22nd January 1988

HABITAT

Casuarina thickets with eucalypt woodland.

Species	O	C	H
Stigmodera (Themognatha) brucki	20+	0	Ef
Stigmodera (Themognatha) mniszechi	2	0	Ef
Stigmodera (Themognatha) chalcodera	10+	0	Ef
Stigmodera (Themognatha) heros	5+	0	Ef
Stigmodera (Themognatha) murrayi	30+	2	Ef
Stigmodera (Themognatha) chevrolati	4	0	Ef
Stigmodera (Themognatha) miranda	10+	2	Ef

NOTES

Numbers had improved as well as diversity. Throughout this district many more areas of flowering mallee could be seen but which were unable to be visited, but which doubtless also had numerous jewel beetles in attendance. The commenest species appear to be S.(T.) murrayi followed by miranda, brucki and chalcodera.

DIVERSITY

Obviously an improvement, probably due to the virtually undisturbed pristine and ideal environment, rich in heath and mallee communities and species.

WEATHER

Fine, hot, top of 35.

CONSERVATION RECOMMENDATIONS

As for Site 10.

SITE 23

37km S of Coolgardie, 22nd January 1988

HABITAT

Casuarina thickets with eucalypt woodland.

Species	O	C	H
Stigmodera (Themognatha) chalcodera	10+	0	Ef
Stigmodera (Themognatha) heros	5+	0	Ef
Stigmodera (Themognatha) murrayi	30+	2	Ef
Stigmodera (Themognatha) tibialis	5+	0	Ef

NOTES

As for Site 22. S.(T.) murrayi seems to be the predominate species in this district.

CONSERVATION RECOMMENDATIONS

As for Site 10.

SITE 24

39km S of Coolgardie, 22nd January 1988

HABITAT

Casuarina thickets with eucalypt woodland, some heath.

Species	O	C	H
Stigmodera (Themognatha) murrayi	10+	0	Ef
Stigmodera (Themognatha) miranda	10+	0	Ef

NOTES

As the edge of the casuarina thicket belt was reached, entering taller eucalypt woodland, the diversity dropped away to two of the commonest species.

CONSERVATION RECOMMENDATIONS

As for Site 10.

SITE 25

3 km S of Queen Victoria Rock, 22nd January 1988.

HABITAT

Mallee heath.

Species	O	C	H
Stigmodera (Themognatha) murrayi	50+	0	Ef
Stigmodera (Themognatha) martini	1	1	Ef
Stigmodera (Themognatha) pictipes	5+	1	Ef
Stigmodrea (Themognatha) mniszechi	6+	1	Ef
Stigmodera (Themognatha) heros	10+	0	Ef
Stigmodera (Themognatha) brucki	20+	0	Ef

NOTES

Here a change in populations and species make-up was evident, with an increase in diversity. The habitat was now less open with smaller areas of heath with denser stands of low mallee.

DIVERSITY

As indicated above, diversity had improved with several species not found since Bullabulling and Boorabin (S.(T.) pictipes, martini).

ACTIVITY

Very high, all specimens actively flying to and feeding from blossom.

WEATHER

Fine, hot, top of 34.

CONSERVATION RECOMMENDATIONS

As for Site 10.

SITE 26

16 km S of Queen Victoria Rock, 22nd January 1988.

HABITAT

Mallee heath.

Species	O	C	H
Stigmodera (Themognatha) murrayi	10+	0	Ef
Stigmodera (Themognatha) tibialis	5+	0	Ef

SITE 27

17 km S of Queen Victoria Rock, 22nd January 1988.

HABITAT

Mallee heath.

Species	O	C	H
Stigmodera (Themognatha) murrayi	20+	0	Ef
Stigmodera (Themognatha) brucki	10+	0	Ef
Stigmodera (Themognatha) tibialis	5+	0	Ef
Stigmodera (Themognatha) chalcodera	5+	0	Ef

SITE 28

22 km S of Queen Victoria Rock, 22nd January 1988.

HABITAT

Mallee heath.

Species	O	C	H
Stigmodera (Themognatha) chalcodera	5+	0	Ef
Stigmodrea (Themognatha) tibialis	5+	0	Ef
Stigmodera (Themognatha) heros	5+	0	Ef
Stigmodera (Themognatha) brucki	5+	0	Ef

NOTES

The previous three sites were all small areas of mallee which had low buprestid diversity.

ACTIVITY

High.

WEATHER

Fine, hot, top of 34.

CONSERVATION RECOMMENDATIONS

As for Site 10.

SITE 29

39 km S of Queen Victoria Rock, 22nd January 1988.

HABITAT

Mallee heath.

Species	O	C	H
Stigmodera (Themognatha) murrayi	10+	0	Ef
Stigmodera (Themognatha) wimmerae	1	1	Ef
Stigmodera (Themognatha) pictipes	2	1	Ef
Stigmodrea (Themognatha) chalcodera	5+	1	Ef
Stigmodera (Themognatha) heros	5+	0	Ef
Stigmodera (Themognatha) brucki	10+	0	Ef
Stigmodera (Castiarina) mustelamajor	1	1	Ef
Neocuris viridimicans	1	1	Ef

NOTES

As the south of the State was being approached, numbers and population began to decline as it was now "early" in the season for these late-emerging species. This site however was indicative that as the season starts in an area diversity increases dramatically where environmental conditions for such diversity are suitable. At the following sites a stark contrast can be sen where flowering has just begun and diversity is very low.

ACTIVITY

High.

WEATHER

Fine, hot, 32 top.

SITE 30

9 km SW of McDermid Rock, 23rd January 1988.

HABITAT

Mallee woodland & heath.

Species	O	C	H
Stigmodrea (Themognatha) chalcodera	2	0	Ef
Stigmodera (Castiarina) subnotata	1	0	Ef

NOTES

Results were now quite poor with much of the mallee that was going to flower having yet to bloom. It was considered that it was very early in the season for late-emerging buprestid species favouring nectar. It also demonstrated a remarkable drop in diversity due to the latitude/longitude change towards the cooler southerly region of the State, as was also demonstrated by the cooler daytime temperatures, there not having been any front moving through. Whilst camped in the area the morning sky was blocked out by humidity clouds which had derived their moisture form the southern ocean. These evaporated as the day warmed up.

ACTIVITY

Low.

WEATHER

Fine, mild, top of 28.

CONSERVATION RECOMMENDATIONS

As for Site 10.

SITE 31

16 km W of Forrestania, 23rd January 1988.

HABITAT

Mallee heath.

Species	O	C	H
Stigmodera (Castiarina) subnotata	1	0	Ef

NOTES

Here 95% of the mallee that was going to flower had yet to flower, so only a few trees had yet bloomed. Consequently it was too early in the season at this latitude this year with appropiately poor results.

WEATHER

Fine, top of 32.

CONSERVATION RECOMMENDATIONS

As for Site 10. However this is one area that should be of topmost priority for immediate protection, especially considering the current mining activities taking place. The area is extremely rich botanically and has a known rich buprestid fauna, and is considered as suitable farming country by those who wish farming to expand into the area. An illegally bulldozed road through the area was noted. (See the authors Article in "Habitat" magazine, February 1982 issue.)

SITE 32

21 km S of Ravensthorpe, 24th January 1988.

HABITAT

Scrubby heath.

Species	O	C	H
Astraeus flavopictus	1	1	J1
Melobasis sp.	1	1	A1

NOTES

An usual record for Astraeus flavopictus, being possibly a new range extension for the species. The other species found has yet to be identified.

ACTIVITY

The Astraeus was inactive on the stems of the hostplant, whilst the Melobasis was very active and fast-flying, landing on the upper leaves of its hostplant.

WEATHER

Fine, warm, top of 28.

CONSERVATION RECOMMENDATIONS

Though a large are of the regions habitat is protected within the Fitzgerald River National Park (where not a single buprestid could be found!), all remaining substantive areas of the natural vegetation should be preserved.

SITE 33

Summit Area of Bluff Knoll, Stirling Range National Park, 26th January 1988

HABITAT

Low montane heath.

SPECIES	O	C	H
Stigmodera (Themognatha) chalcodera	1	1	Df
Stigmodera (Castiarina) sanguinolenta	15+	8	?f
Stigmodera (Castiarina) subtrifasciata	1	1	?f

NOTES

The summit area proved host to several species of buprestid, including surprisingly S.(T.) chalcodera. This species was "way out of it expected range" and raises the question as to where it may have come from. It may indeed be breeding at the site, or come from the plains a thousand metres below, or from further afield. It certainly was an odd record for the species.

The other two species are species which it is believed are out earlier in the season, however almost certainly breed on-site and due to the altitude emerge much later than elsewhere in its range. Both were found on a Mytaceous flowering plant with small pink flowers, similar to the Baekea-Thryptomene-Micromyrtus genera.

The potential for more species being found at this site must be considered to be high.

ACTIVITY

Due to the hot weather the specimens were all very actively feeding on the flowers of their hostplants.

WEATHER

Fine, hot, summit temperature of 32. (This compares with the plains beneath where it was 45.)

CONSERVATION RECOMMENDATIONS

Already protected within the Stirling Range National Park area.

SITE 34

29 km E of Denmark, 27th January 1988.

HABITAT

Melaleuca lowland amongst Eucalypt woodland.

Species	O	C	H
Stigmodera (Castiarina) placida	1	1	Mf

NOTES

The specimen was on a "Paperbark" species of Melaleuca which was in a grove of this species. Most of the trees were in bloom but only a few were in peak, with the others just past peak. The area was infested badly with the introduced honey bee, and which may have seriously affected the native insect population, to the extent that only a single specimen of the above species could be found during the survey.

The species is well known in the south-west and is regarded as common, though its prescence here indicated it emerges much later than elsewhere in its range due to the site being in the south of its range.

ACTIVITY

Unknown, the insect was gathered by opportunistic sweeping of the blossoms.

WEATHER

Warm, humid, top of 28.

CONSERVATION RECOMMENDATIONS

Action should possibly be taken to reduce the populations of the introduced honey bee in Western Australia. There do not appear to be any substantive representative areas of the habitat type in the area in reserves.

SITE 35

10 km E of Bow Bridge, 27th January 1988.

HABITAT

Melaleuca - eucalypt woodland.

Species	O	C	H
Stigmodera (Castiarina) rufipennis	2	2	?f

NOTES

Found on low Thryptomene - Baekea type plants in flower. The species is quite common in parts of southern Australia where it extends eastwards to the east coast of the continent.

ACTIVITY

The beetles were actively feeding on the nector of the blossoms of the hostplant.

WEATHER

Fine, occasional cloud, warm, humid. Top of 28.

CONSERVATION RECOMMENDATIONS

There do not appear to be any substantive areas of the districts habitats protected in parks or reserves, apart from coastal parks which do not sample the habitats further inland.

END OF DATABASE

SPECIES LISTINGS FOR NATIONAL PARKS SURVEYED

Boorabin National Park

Stigmodera (Themognatha) brucki
Stigmodera (Themognatha) miranda
Stigmodera (Themognatha) chalcodera
Stigmodera (Themognatha) martini
Stigmodera (Themognatha) bonvolouri
Stigmodera (Themognatha) murrayi
Stigmodera (Themognatha) chevrolati
Stigmodera (Themognatha) oleata
Stigmodera (Themognatha) heros
Stigmodera (Themognatha) yarrelli
Stigmodera (Themognatha) pictipes
Stigmodera (Themognatha) wimmerae
Stigmodera (Castiarina) subnotata
Stigmodera (Castiarina) mustelamajor
Stigmodera (Castiarina) sexnotata
Neocuris viridimicans
Neocuris sp. 2 (black in colour)

Stirling Range National Park

Stigmodera (Themognatha) chalcodera
Stigmodera (Castiarina) sanguinolenta
Stigmodera (Castiarina) subtrifasciata

DIVERSITY

Overall the survey found a total of 18 species in the subgenus Themognatha and 12 species in the subgenus Castiarina, making a total of 30 species in the genus Stigmodera. A further 12 species of buprestidae from other genera were also found, bring the final total to 42 different species found. Diversity varied from site to site but was richest in the Sites 10 to 29, being from Southern Cross through to just east of McDermid Rock

This is considered to be a high diversity for the peak of summer. Further surveys should increase the overall species count and the diversity at the Sites surveyed, and certainly from new Sites selected.

SEASONALITY

It was considered that areas in the north and central areas of the surveyed region were visited on-peak or very close to peak time for the highest number of specimens that could be observed. Areas further south-west of McDermid Rock proved to be visited too early in the season for the late-emerging species, but nevertheless encountered species that were still out which would have finished in the ranges further north. The entire "deep south" amongst other areas of Western Australia is very poorly collected for buprestids thus the data gathered herein was very valuable towards understanding how the season is so much later there than elsewhere.

The strongly defined "cutoff" or sharp drop in late-emerging species in the vicinity of McDermid Rock showed how closely tied to the flowering of the hostplants the late-emerging species apparently are. With no flowering, there are simply no beetles of this group to speak of present. It also showed that the season for the late-emerging species had not yet "penetrated" any further south probably due to latitude and geographical conditions. It is considered that future surveys at later times in the season, say later in January through to March will see the late-emerging species on the wing the, provided a "good" season is encountered during the year of the survey.

POPULATIONS

Numbers were extremely high in many areas surveyed. Survey work was confined to one or a few groves of trees at each site, or no more than a few hectares in extent, as that is all there was time for, and it was considered that any further investigation would add few or no species for the extra time and effort expended. Nevertheless, from the numbers of these insects seen in the field throughout the survey, the total population in the entire region of adult buprestids would easily number in the many millions.

CONSERVATION ASSESSMENT

Without a doubt none of the species surveyed deserved specific

protection on the grounds of being endangered. None are under any threat apart from habitat clearance, but certainly there are many areas where possible clearing at a future date could well threaten some species. In such cases the only valid protection for those species would be to protect the habitats involved.

These semi-arid regions are very complex in their vegetation makeup and the protection of a small area (eg up to 10,000ha) could not possibly guarantee the adequate long-term protection of the buprest fauna within, particularly from fire. Large areas of at least 150,000ha, but preferably the entirity of the remaining natural habitats at least out to the "mulga-eucalypt line" should now be protected. the loss of any further substantive parts of the natural vegetation of the region will be a serious loss to the buprestid fauna of the region. Each site has differing diversity and it may well be that such a large area as is left remaining between the wheatbelt and the mulga is virtually necessary for the continued survival of many of the species found.

Certainly the loss of areas of Casuarina would cause a serious loss to the populations of several species, and correspondingly so with the loss of adult hostplants. It is not yet certain just how far individuals of the larger species will fly, but is it possible that distances of several kilometres or even much further may be involved where the adult emerges from the larval host and flies off to look for flowering hostplants.(e.g. Site 10, where adults of several species were present and at least one was mating, as opposed to feeding on nectar, and no suitable hostplants were sighted in the district.

HOSTPLANT SPECIFICITY

Clearly each species preferred to utilise particular hostplants. For Stigmodera this was primarily Eucalyptus, particularly the mallee eucalypts with very profuse crown flowering. Though the species could not be identified to species level, in the mallee and sandplain regions they were species such as E. redunca or foecunda - type species. Further survey work is required to identify precisely which species were utilised.

In the more arid areas taller species of Eucalypts were the only species available but nevertheless provided the same abundance of blossom. An interesting question is raised as to whether there is any co-evolutionary connection between these types of Eucalypts and the attendent buprestids, and which has yet to be investigated.

NEW DATA

As stated in the text accompanying the database, a great deal of useful and new data was obtained. The probability exists for many new range extensions being recorded. Much of this data would be very suitable for publication by the author or in conjunction with others, once there has been time to do the background research involved.

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A. Sundholm, May 1988