Faculty of Science and Engineering

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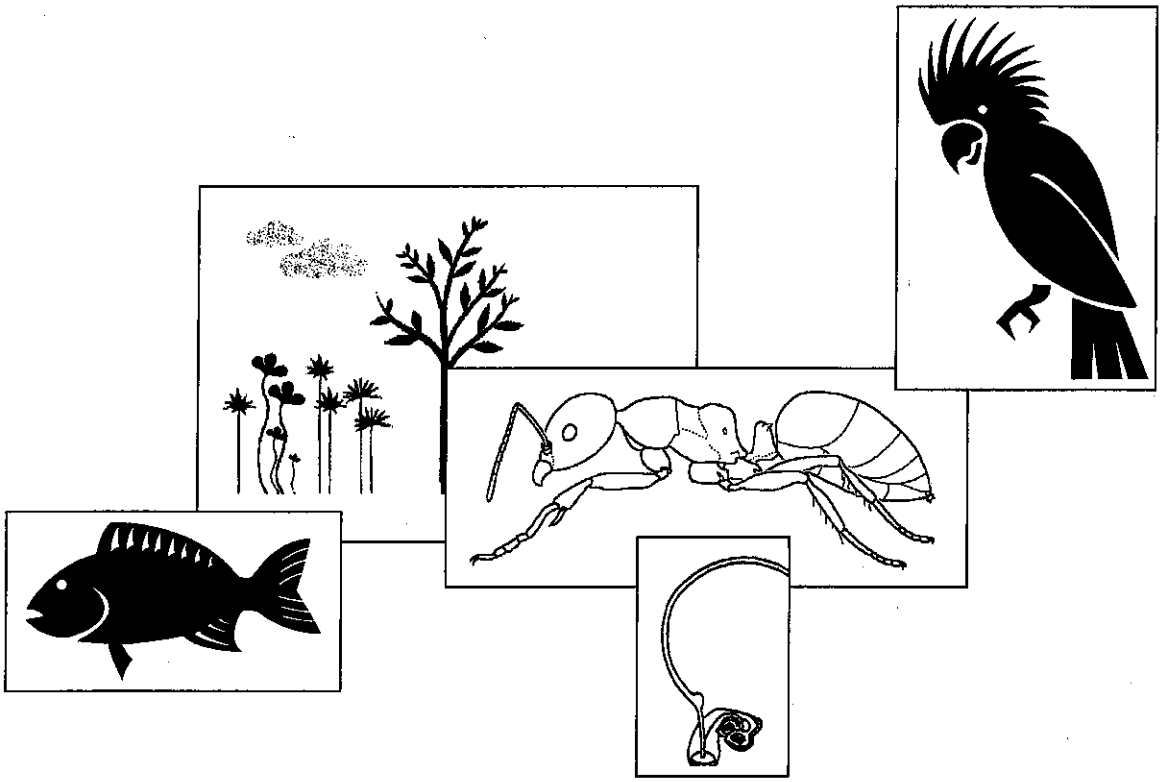
Biology Work Experience 301



Report

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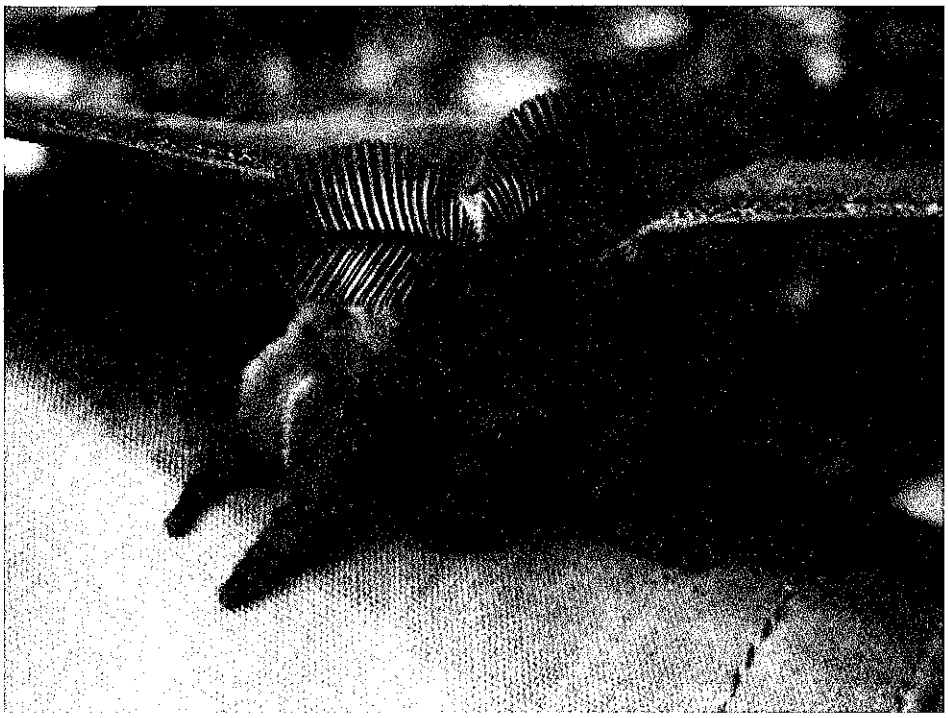

Gemma Grigg 13646248

Acknowledgements

I would like to thank my supervisor Janet Farr for her help and guidance, and for giving me a whole new understanding and appreciation of invertebrates. I would also like to thank Alan Wills and Paul Van Heurck for contributing to my work experience and adding to my understanding of the insect world.

Contents

DIARY

07/12/09

Simon, Daniel and I travelled to the Department of Environment and Conservation (DEC) in Manjimup where we met Janet Farr the team leader and were introduced to our other team members. We had a safety induction and were given a tour of the Manjimup Insect Laboratory before driving down to Peaceful Bay.

08/12/09

Janet, Kerry, Janine, Elisa and I went to three sites to do hand sampling. I was the beater. The other hand sampling methods include sweeping with a net, targeted pursuit (chasing insects with a net), coarse woody debris (searching under sticks and logs) and litter (searching among the leaf litter). I learnt to walk a few steps behind the person in front to minimise being hit by spiky vegetation that flings backwards. On the way back to the house we stopped at the Irwin Inlet and drove through the Peaceful Bay Settlement.

09/12/09

Paul, Mieke and I travelled to six sites to collect light traps. This involved dismantling the device and carrying it back to the car so we could take the 15kg batteries home to charge. We also recorded the minimum and maximum temperatures and took the thermometer back to the car with us. The bugs caught in each light trap were poured into a brown paper bag and labelled. The helena gum moths (*Opodiphthera helena*) and *Carthaea's* (*Carthaea saturnioides*) hanging around the light trap are counted and the number of each recorded on the bag for each site.

On plot 21 we recorded 322 helena gum moths which beat the previous record of 175. This indicates that the species is currently doing very well. At the end of the day we stopped at Peaceful Bay beach to look around.

10/12/09

Today we hand sampled three sites. I did beating in one of the forest sites and in the other I did coarse woody debris. I did not catch many insects but I found a tiny brown frog with orange patches on the underside of each leg. I did targeted pursuit in the caldyanup site. The film crew came down and had lunch with us and then filmed some flying invertebrates for a DVD which will hopefully be shown on Catalyst on the ABC channel.

11/12/09

Again we hand sampled three sites. I was the beater at two sites, one forest and one caldyanup and targeted pursuit at one forest site. On the way back home we saw a sick female kangaroo die.

12/12/09

Paul, Alan, Simon, Dan, Janine, Elisa, Neil and I travelled to Rame Head and I went swimming and had a bit of a surf. We all did a bit of fishing and several whiting and banded sweep were caught. In the afternoon we went to Greens Pool and Elephant Rocks to have a swim.

13/12/09

We hand sampled only two sites today due to the heat. The first site was a caldyanup which had an air temperature of 40°C. I was doing targeted pursuit with vials not with a net. The second site we visited was a forest site but was 45°C. I was the sweeper on this site.

Prescribed burns from yesterday had reignited and by the afternoon there was smoke covering more than half of the sky. As the sun was setting it changed colours and brightness many times while passing through the smoke, this looked very beautiful and very interesting. While driving to Bow Bridge I nearly ran over a long necked turtle which I thought was a dead crow. Simon left in the afternoon for Albany.

14/12/09

Alan, Dan and I collected light traps from six sites. All the gum moths and *Carthaea's* were counted from around the trap. Other small moths hanging around the trap were killed and put in the sample bag for the site. The occy strap was taken off and the light taken out of the trap. The insecticide was taken out of the trap and the sample poured in. The battery was disconnected and everything was taken back to the car.

We also hand sampled one site. Dan and I shared beating duties and found an interesting insect.

15/12/09

Alan, Dan and I set six light traps. The insecticide is put in a bucket and the timer and light attached to the battery. The timer is set from 6.30pm to 6.00am and the lid and light are attached to the bucket. We also hand sampled site 13 and I successfully lead the way back to

the car! On the way to have lunch with the other two teams we got a flat tyre which Alan and Dan changed. At lunch Paul read some of a story to us called "The Kingdom of the Tingle".

16/12/09

We hand sampled two sites and got drizzled on at the first site. At the end of the day everyone helped unpack the three vehicles. To prepare for the collection of pitfall traps we divided and wrote on labels, and then packed the car with boxes of vials and the labels. Paul finished reading us "The Kingdom of the Tingle".

17/12/09

In the morning we had our weevil waddy presentation and everyone got an award. Kerry and Janet both left. Alan, Janine, Dan and I collected pitfall traps from six sites. The procedure for this was to take the pitfall cup out of the sleeve and empty contents into a tea strainer. The tea strainer is then placed over a funnel leading into a vial and ethylene glycol poured over it to empty all contents into a vial. A number of vertebrates were found in the traps including frogs, lizards and honey possums.

18/12/09

Today we had the day off and went to Rame Head again. The weather was nowhere near as good as our other day off but we still went swimming, body boarding and surfing. We also went to Bartholomew's Meadery and had a honey ice cream. After this we went to Greens Pool and Elephant Rocks to show Elisa's boyfriend Toby. Everyone had fish and chips for dinner at Bow Bridge and watched a nice sunset.

19/12/09

We were collecting pitfall traps again using the same procedure as on the 17/12/09. We also went to a beach near 'The Gap' and had a fish and a look around.

20/12/09

Dan and I went to Greens Pool early in the morning and I went for a quick snorkel in the freezing windy conditions before leaving for Perth.

01/02/10

Dan and I drove down to Manjimup and settled into Kingston house.

02/02/10

Today Alan, Janet, Asico, Dan, Simon and I started sorting the light trap samples. We learnt

how to record insects caught and slowly learnt where to look for each type of insect (mostly moths). I became familiar with the lab and some of the more common species for example helena gum moths are number 328 and hydrophilids are number 14. At morning tea time Neil Burrows had arranged a meeting to announce that he was stepping down from his position. It was very interesting to hear the topics discussed in this meeting and get a feel for how the department works.

03/02/10

Today we continued with the sorting of light trap samples. We had morning tea and lunch with the rest of the Manjimup DEC staff and got to talk to them a bit about what they all do there.

04/02/10

We continued with the light trap sorting. I became familiar with some more species numbers for example the tribal looking moths are number 321. Again we had morning tea with some of the other DEC staff.

05/02/10

Again we did light trap sorting. Today I pinned a number of insects that were primary vouchers (P1) meaning they are not yet in the Manjimup Entomology collections. I also pinned several secondary vouchers (P2). Invertebrates get pinned as secondary vouchers if there are less than 3 other secondary vouchers of that insect in the collection.

06/02/10

Simon, Dan and I went to Greens Pool and I swam with a school of large fish who didn't mind me being a few metres away from them as long as I made no sudden movements. It was so awesome. We also had an ice cream from Bartholomew's Meadery.

07/02/10

Dan, Simon and I went to the Diamond Tree. We all climbed the tree and realised what an amazing view can be had from the top. It was an amazing experience.

08/02/10

Today we finished sorting light traps and started sorting the hand samples. Alan went through a paper on scorpion flies and talked me through the identification of individuals of the 3 species present in Western Australia. All voucher specimens were looked at and regrouped into their correct species.

09/02/10

Janet taught me how to indentify leaf beetles (*Chrysomelidae*) by looking at the lines of pores/dents in their back and the patterns/ formation in comparison to the veins. Alan taught me how to identify some native flies (*Syrphidae*) with his key, and also how to identify grasshoppers (*Acrididae*).

10/02/10

We sorted hand samples and found a number of new species.

After lunch we were shown how to use the photo montage program to photograph insects. We were also shown how to photograph insects using ultra macro. It is necessary to take one photo from above the insect and one from the side. I took some ultra macro photos of the newly pinned P2 insects and some of the "new" or previously not caught species. At night Dan and I went to Janet's house to have dinner with Janet, Ian, Simon and Alan. We were given a tour of the backyard and for dinner, had a lovely roast.

11/02/10

Today we sorted more hand samples. We were shown the new and the old way of taking photos under the microscope. In comparison the new photo montage way gives far better quality photos with higher detail, especially when photographing the smaller invertebrates.

12/02/10

We worked half the day and finished up all the hand samples. We packed up all our things and cleaned Kingston House. Before leaving Manjimup we stopped in at Janet's house and said goodbye and got a bag of plums. After this we drove back to Perth.

ACTIVITIES COMPLETED

Introduction

Invertebrates are very important as a group because they form the basis of a functional ecosystem. Higher ecosystem functions including, predation and species interactions are made possible by this basic functional group (Majer, 1997) however, there is very little known about them. Walpole Fire Mosaic (WFM) is an ongoing project investigating forest patches that are burnt at different intervals and the relationship this has with the other aspects of the environment including invertebrates. For two weeks in December 2009 WFM was hand sampled,

light/night sampled and pitfall sampled. Hand sampling on each site was carried out for one hour at a time. All hand samplers had small pouches to place the vials in. Insects are placed in vials which are labelled at the end of each site sample. Each site was light trapped twice at night and pitfall trapped once for a period of ten days. During our sorting of the insects we only sampled insects over 10mm in length (unless the species is a gondwanan relic).

Pitfall Traps

At each site there is a line of pitfall traps running diagonally across the plot. Each pitfall line consists of 10 pitfall traps placed at 10 metre intervals.

After arriving at each site the pitfalls were located by finding the plot centre and walk diagonally out along the pitfall line. We walked to the furthest trap and then set pitfall traps following this line to the other side of the plot. This ensured that no traps were accidentally missed. Setting the traps involved removing sticks from the trap sleeves and placing a plastic cup in the sleeve. The cups were filled with propylene glycol and left for 10 days.

Propylene glycol is used as an alternative to ethylene glycol in an effort to reduce the by-catch of vertebrates such as honey possums (*Tarsipes rostratus*). It is thought to be less attractive to these animals because it smells less sweet.

Collecting pitfalls involves walking to the furthest trap and then along the line, pulling the cups out of the trap sleeves and emptying the contents through a sieve. Sticks are positioned in the sleeve so any animal that falls in while sampling is not in progress can climb out. The contents of the cup are poured into a plastic vial with a screw top lid and the vial is filled with propylene glycol (the sieve is also rinsed with this to ensure all cup contents enter the vial).

Hand Sampling

Beating

Beating entails holding a square white cloth on a frame under vegetation while forcefully hitting the foliage with a stick. This method is simple and allows effective capture of falling insects which reside/feed on the vegetation. Using a white cloth makes it is easy to see the insects that fall. This was found to be very successful with weevils (*Curculionidae*) and leaf beetles (*Chrysomelidae*) which tend to drop off the vegetation easily. In forest sites there

were many ants (*Formicidae*) and stink bugs (*Pentatomidae*) in the forest sites and particularly off *Acacia* species. In caldyanup sites there tend to be more grasshoppers/crickets (*Orthoptera*) caught from beating.

Sweeping

Sweeping involves using a hand net and swinging it side to side in a swift motion while walking along. The net should brush past, and over the top of vegetation as well as through open spaces. Every 15 seconds or so of sweeping the net should be held closed and looked through to check if any insects had been caught. If there are insects over 10mm in the net they are placed in vials. The sweeping motion allows the capture of flying insects as well as quick insects. Often some inactive insects will also be caught by sweeping. This method of hand sampling proved to be more successful on caldyanp than the forest sites. This was most likely due to the openness of the caldyanup sites.

Targeted Pursuit

As the name suggests, this method enables capture of specific targets. It involves searching among the vegetation and on the ground for insects and "chasing" or "pursuing" them. This method, when done with a net produces a capture of grasshoppers, spiders (arachnids), mantids and some moths (usually little grey ones). When doing targeted pursuit with a vial the catch is ganarally smaller and the slower moving insects such as ants, mantids and beetles are usually caught.

Coarse Woody Debris and Litter

These two methods are similar to each other in that coarse woody debris (CWD) entails searching under logs and sticks for invertebrates, and litter consists of searching among the leaf litter. Both methods produce similar catches including cockroaches (*Coleoptera*), spiders, centipedes (*Chilopoda*), ants, amphipods and isopods.

Light Traps

Before setting up a light trap, the light and battery should be checked to make sure they work. To set up a light trap, take all the equipment into the middle of the site. The bucket should be set up on a flat and stable part of the ground and the insecticide patch put into the bucket. The lid (resembling a funnel) should be put on and the light should be fixed on top using an occy strap. The next step is to connect the light up to the timer and set timer to have the light on

from 6pm to 6am. The thermometer should be left in a shady spot to record the minimum temperature.

To collect the light trap the timer, battery and light should be disconnected. The content of each bucket is poured into paper bag, which has site number, date and minimum temperature written on it. The number of *Carthaeas* and helena gum moths hanging around the trap are also recorded.

The Sort

Once insects are tipped out of a sample bag or vial, the ones smaller than 10mm should be put in a separate pile and disregarded (unless they are Gondwanan relics). Each specimen should be matched with an already existing voucher, and then species number recorded aswell as the abundance.

If there is no matching specimen in the boxes, a new number on the recording sheet is created. The new specimen is then either pinned and becomes the primary voucher (P1) or placed in alcohol (A1) and will be used for future comparisons between specimens.

Pinning and Micro Pinning

To pin a new voucher or secondary voucher a label must be written to go with the specimen. Depending on the type of insect it will be pinned in a fashion that will minimise damage to the specimen for example scarab beetles are pinned in the right wing rather than between the wings in order to keep the wing covers in their correct position.

Micro pinning is done with the smaller insects. A label is written and a small piece of foam is pinned to the label with a normal pin. A micro pin is then carefully pinned through the insect and then into the piece of foam.

Counting Hydrophilids

The sample is split into one large and one small segment. The large segment is weighed, then the small segment is weighed and counted. The following equation is used to approximate the total number.

(total weight of sample in grams/weight of small segment in grams) x the number in small segment.

CONCLUSION

Due to time and money restraints we could only sample the Walpole Fire Mosaic for two weeks. While sorting insects just caught in those two weeks we labelled 71 species that had not previously been caught. This indicates that there are still potentially thousands of invertebrate species out there that have not been caught before or have not been properly described. By sampling the WFM more frequently each year and perhaps at different times of day (for example light trapping during the day, or hand sampling in the evening) many more species may be found and a better understanding and knowledge of invertebrates would be gained.

REFERENCES

Majer, J.D. (1997) Invertebrates assist the restoration process: an Australian perspective. In: *Restoration Ecology and Sustainable Development.* (eds K.M. Urbanska, N.R. Webb & P.J. Edwards), pp. 212–37. Cambridge University Press, London.

APPENDIX

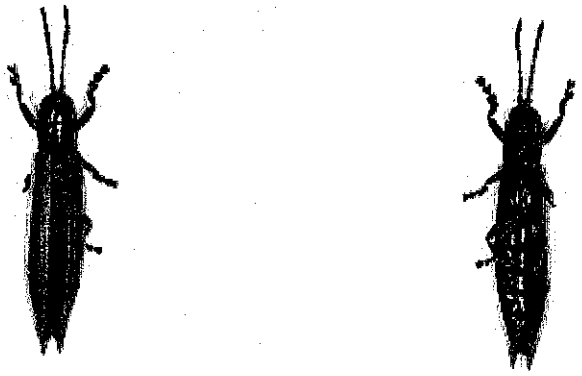

Figure 1. Small Chrysomelid photographed with photo montage program

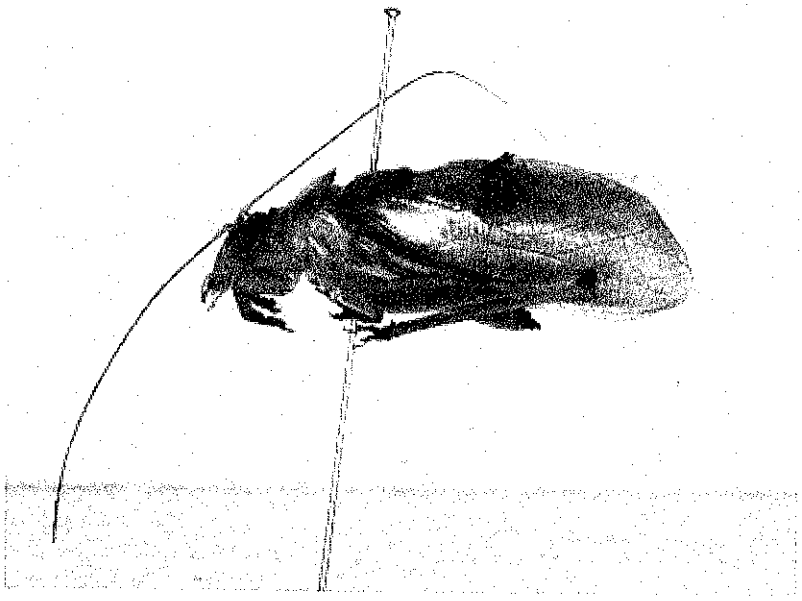

Figure 2. Acridid photographed with macro camera.

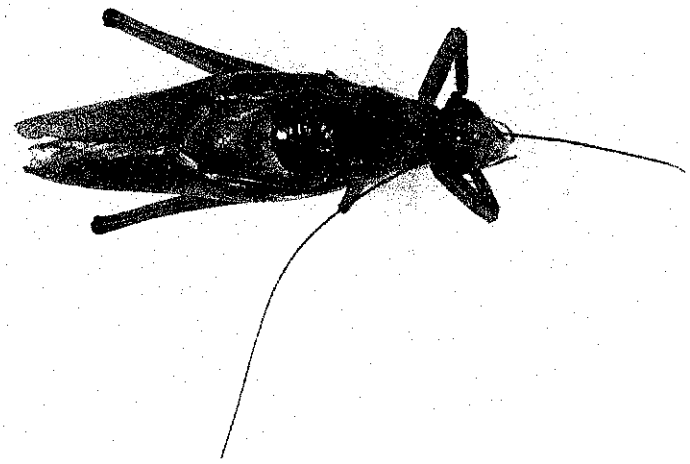

Figure 3. Acridid photographed with macro camera.