SCHOOL OF BIOLOGY BULLETIN

INFORMATION FOR CONTRIBUTORS

Biologists who wish to publish the results of their investigations have access to a large number of journals. For a variety of reasons, however, the editors of most of these journals are unwilling to accept articles that are lengthy or contain information that is preliminary in nature. Nevertheless, some material of this type could be of immense interest and value to other scientists, and should be published. One avenue for dissemination of such material is the School of Biology Bulletin, a series of occasional papers published at Curtin University of Technology.

Intending contributors should contact a member of the Editorial Board listed below. All submitted papers will be considered by the Editorial Board and appropriate referees. Publication costs for papers that are accepted must be met by authors or their employers.

Dr B.G. Collins,
Head,
School of Biology

CURTIN UNIVERSITY OF TECHNOLOGY

SCHOOL OF BIOLOGY

Bulletin No. 15

UNDERGRADUATE RESEARCH WITHIN THE SCHOOL OF BIOLOGY

AT CURTIN UNIVERSITY OF TECHNOLOGY

1973 - 1981

Edited by B.G. Collins

1987

PREFACE

Since 1973, each student enrolled in the final year of the Bachelor of Applied Science (Biology) programme at Curtin University of Technology (formerly the Western Australian Institute of Technology) has been obliged to undertake a substantial research project. This component of the course has provided opportunities for students to specialise in areas of biology that are of special interest to them, and to develop personal qualities, such as initiative and independence, that should be of value in their later careers. Much of the research has been undertaken on the University campus in Perth, although many of the projects have involved field work at various sites in Western Australia. Private and governmental agencies have often supported our students by providing financial and logistic assistance, and by allowing their employees to act as project co-supervisors.

During the period from 1973 to 1986, 258 undergraduate research projects were completed. Some of these have formed the basis of scientific papers that have been published in local, national or international journals. However, much of the work has received little exposure since its completion. This is unfortunate, as considerable information that could be of value to other biologists has been generated. The School of Biology has decided to rectify this situation by publishing abstracts taken from student project reports.

The large number of projects completed since 1973 has made it necessary for abstracts to be presented in two volumes. Abstracts produced during the period 1973-1981 have been assembled in this volume. Those for 1982-1987 will appear in a later edition of the School of Biology Bulletin. Abstracts have been edited slightly, although they remain essentially as written by our students. We trust that you will be impressed by the diversity of interests shown by these students, and the quality of their work. More importantly, however, we hope that you will find something that they have done which is of value to you in your research or teaching. Should you require more information than is contained in the abstracts, the School of Biology would be happy to let you read the full reports.

Brian G. Collins,
Head,
School of Biology

STUDENT AND TOPIC INDEX

Abstracts have been grouped by year, from 1973 to 1981, with student names listed in alphabetical order within each group. Page locations are indicated in bold print. A separate index, based on major key words listed at the foot of each abstract, is provided on p. ix.

Year, student and topic

1975

1980

KEY WORD INDEX

Individual abstracts are referred to in this index by the number of the page upon which they appear. The majority of abstracts are cited twice, once in connection with the major sub-discipline involved, and secondly in terms of the major type of organism studied. For example, a listing of "23" under the heading "Ecology" means that an abstract of a project involving a study of Ecology appears on p. 23.

Sub-discipline

Organism

PROJECT ABSTRACTS

The distribution of Pinna bicolor in Cockburn Sound

Name: L. Brighton (1973)
Supervisor: G. Newland

An initial survey was carried out to determine the distribution of the razor clam (**Pinna bicolor** = **Pinna dolabrata**) along the mainland coast of Cockburn Sound, and the relationship of the distribution to possible environmental factors. This was prompted by suggestions that **P. bicolor** might be a suitable indicator for marine pollution. The numbers of **P. bicolor** per square metre were estimated at different locations. Other data collected included depth of the sample, population size structure and the nature of the benthic cover. The distribution observed appeared to correlate with a) the presence or absence of seagrass for attachment, b) the instability due to increased wave action in denuded areas, and c) the increased turbidity in denuded areas. It is considered in the light of the findings that **P. bicolor** satisfies sufficient criteria to make it useful as an indicator organism of marine pollution.

Publications: Not published

Key words: Ecology, marine pollution, pelecypods

Salinity tolerance and nutritional state of the copepod Sulcanus conflictus

Name: L. Mezger (1973)
Supervisor: R. Rippingale

The copepod **Sulcanus conflictus** occurs in estuaries and coastal low salinity water in the southern half of Australia. The animal occurs most abundantly in the range of salinities from 4-15%.. The ability of **Sulcanus** to survive exposure to salinities in the range 15% -35%. was studied. It was found that salinity tolerance was directly related to the nutritional state of **Sulcanus**. The metabolic rate of **Sulcanus** was measured over the salinity range 15-35%. Results showed no significant variations in metabolic rate over this range.

Publications: Not published

Key words: Physiology, salinity tolerance, crustaceans

Inoculation techniques for Phomopsis rossiana on lupins

Name: C. Robartson (1973)
Supervisor: M. Walker

Phomopsis rossiana (Sacc.) Sacc. et D. Sacc. has been established as the causal agent of ovine lupinosis, which occurs sporadically on lupin pastures or lupin stubble in Western Australia. Lupinosis in sheep is a mycotoxicosis characterised by liver damage and frequent jaundice. The fungus on lupins has two consequential effects: (i) an apparently minor one as a plant pathogen, and (ii) a major effect as the causal agent of ovine lupinosis. A series of experiments were carried out to determine the most effective methods for glasshouse culture of the lupins, and procedures for inoculating the plants with the fungus. Methods of spore inoculation on both seeds and young plants were examined. Spore inoculation methods were unsuccessful. The use of mycelium grown on wheat grain and introduced into the lupin stem, was found to be the most effective method of inoculation. Methods of inoculation were developed and compared with the wheat grain method.

Publications: Not published

Key words: Pathology, fungi, angiosperms

An investigation into the relationships between environment, temperature and the distribution of the Common Sheath-tailed Bat Tophozous georgianus (Microchiroptera: Emballonuridae)

Name: M. Thomas (1973)
Supervisor: B. Collins

This study was undertaken to investigate the role of temperature in relation to the distribution of **Taphozous georgianus**, a species that is restricted to areas north of 28°S in Western Australia. One of the most southerly breeding sites was selected for study. This was Wilgie Mia, near Cue. In Wilgie Mia, there exists a breeding colony living in a site that is protected from large fluctuations in temperature. Three trips were undertaken during the year,in April, May and August. Parameters measured in the field were environmental temperature and humidity, and bat rectal temperatures and weights. Roosting preferences and times of emergence from the site were also recorded. Rectal temperatures were also measured for bats at various ambient temperatures in the laboratory. Laboratory results showed that **T. georgianus** had a labile body temperature for the ambient temperature range 10°C-30°C, although it acted as a typical homeotherm in the field.

Publications: Not published

Key words: Physiology, temperature regulation, mammals

A study on the gastropod Monilea califera in Cockburn Sound and in the sub-recent fossil beds of the Swan River

Name: C. Barry (1974)
Supervisor: R. Rippingale

Monilea califera (Lamarck) exists as a fossil in the marine sub- recent fossil bed of the Swan River. It inhabitated the Swan River from approximately 7000 B.P. to 4000 B.P., when eustatic changes caused the Swan River to become a marine gulf. A hypothesis is put forward to explain the distribution of this species in the Swan marine gulf, and its living distribution in the south-west of Western Australia.

Publications: Not published

Key words: Biogeography, gastropods

Laboratory measurement of the components of the intrinsic rate of increase of the Light Brown Apple Moth (Epiphyas sp.) and some hybrids

Name: S. Bicknell (1974)
Supervisor: B. Springett/B. Collins

Epiphyas pulla and **E. postvittana** were bred in the laboratory at 22°C for four generations. Hybrids were established and maintained for three generations. Survivorship rates, development times, fertility and fecundity were recorded, and from these were calculated the intrinsic rates of decrease for each strain.

Publications: Not published

Key words: Genetics, reproduction, insects

Octopus repellent and behaviour

Name: D. Brindal (1974)
Supervisor: G. Newland

The economic effect of octopus predation on lobster catches and the need for control measures are discussed. Four possible repellents were tested: Moray Eel skin extract, sepia, dead octopus and Moray Eel shape. Negative results were obtained. These are discussed in terms of sensory input channels, and in the light of observations made on octopus behaviour in the laboratory over a three month period.

Publications: Not published

Key words: Behaviour, predation, cephalopods

Limiting nutrients of phytoplankton of the Swan River estuary, Western Australia

Name: S. Hancocks (1974)
Supervisor: R. Rippingale

In spring and summer, dense blooms of phytoplankton have been observed in the Swan River, an estuary on the south-west coast of Western Australia. The dependence of phytoplankton blooms on optimum light conditions, nutrient distribution, limiting nutrients and adequate residence time has been well investigated. Estuarine hydrography also plays a major role in the timing of phytoplankton blooms. A prolonged winter rainfall into spring 1974 delayed phytoplankton blooms in the Swan River estuary. Attempts were made to determine limiting nutrients for phytoplankton in surface waters, and to examine changes in species composition of a natural phytoplankton population. Most investigations into primary production and limiting nutrients have used the 14C technique to measure productivity over 24 hours or less. It was hoped to maintain a natural phytoplankton population over a period of 14 days to show the effect of limiting nutrients on the species composition. The source of nutrients for phytoplankton blooms is thought to be in nutrient sinks, i.e., in deep waters of high salinity which remain in situ during winter when fresh surface waters (less dense) are flowing. A nutrient turnover is thought to occur when fresh water ceases to flow into the estuary and denser sea water flows up the estuary.

Publications: Not published

Key words: Ecology, limiting nutrients, phytoplankton

Interbreeding of spatially separated populations of Gladioferens imparipes Thompson (Copepoda, Calanoida) in the laboratory

Name: H. Lipiec (1974)
Supervisor: R. Rippingale

The copepod **Gladioferens imparipes** was collected from five estuaries around the south-west of Western Australia. Laboratory cultures were maintained, keeping separate cultures from each estuary. To test the hypothesis that separate populations would show significant genetic divergence, interbreeding experiments were carried out. Viable F1 hybrids were produced from all of the experimental crosses, indicating that, if genetic divergence had occurred, it was not sufficient to restrict interbreeding.

Publications: Not published

Key words: Evolution, breeding, crustaceans

Some effects of water deprivation on water balance in Rattus rattus

Name: G. Martin (1974)
Supervisor: B. Collins

The **Rattus** family of rodents has members that occupy many different habitats in Australia. **R. rattus** has a wide distribution around the Australian coastline, and inland for several hundred miles following major river systems. Results obtained in this study showed that **R. rattus** was not well adapted to habitats in which water was in short supply, regardless of environmental temperature.

Publications: Not published

Key words: Physiology, water balance, mammals

Mutagenic effects of high temperature shock, 2,4- dichlorophenoxyacetic acid, colchicine, ionizing and non-ionizing radiation on root meristems of Vicia faba L.

Name: D. Morien (1974)
Supervisor: J. John

The effects of 2,4-dichlorophenoxacetic acid, colchicine, ionizing and non-ionizing radiation, and temperature shock, on cell division of root meristems of **Vicia faba** were investigated. High temperature shock inhibited spindle formation, and gave rise to diplo-chromosomes. No recovery from temperature shock was observed. The protein damage by high temperature was irreversible. The phyto-hormone analog, 2,4- dichlorophenoxyacetic acid, produced chromosomal aberrations as a result of disturbance to the metabolism of ribonucleic acid. Micronuclei, acentric fragments left out of the nuclear envelope after mitosis, were also formed. Micronuclei were found in all treatments (with the exception of colchicine), to a greater extent in X-ray radiated seeds and to a lesser extent in ultra- violet radiated seeds. Growth experiments involving seeds treated with 250R X-ray radiation produced a significant reduction in height and leaf form.

Publications: Not published

Key words: Genetics, mutagenic effect, angiosperms

Chemotaxonomic analysis of Hakea trifurcata

Name: K. Nagy (1974)
Supervisor: B. Lamont

The summary document for this project has been lost, although an appendix containing raw data is available for perusal.

Publications: Not published

Key words: Biochemistry, chemotaxonomy, angiosperms

A quantitative comparison and evaluation of eight indices of community structure analysis

Name: B. Oldfield (1974)
Supervisor: G. Newland

Following a biological and ecological evaluation of two samples of algal epiphytes of the seagrass **Posidonia ostenfeldii**, values for eight indices used in community structure analysis were calculated. Calculated values were quantitatively compared with those predicted following an analysis of the structure of the two samples studied. On the basis of this comparison, the failure of five of the indices to adequately display the variations and similarities between the samples was interpreted in terms of the effects of the random occurrence of rare species upon these index values.

Publications: Not published

Key words: Ecology, community structure, algae

A social survey of school children's attitudes towards skin cancer

Name: R. O'Meara (1974)
Supervisor: I. Gibson

A survey was carried out to determine school children's opinions and attitudes with respect to skin cancer. Secondary school children from city and country were surveyed. Seventy seven percent of students gave the sun as the main cause of skin cancer, with more female and British-born respondents agreeing. Fourth and fifth year students were more positive than first year students. With respect to susceptibility of body parts, the face was mentioned significantly more by both sexes. Forty five percent of all respondents had no knowledge of any treatments used. Seventy seven percent of all respondents believed that early diagnosis improved the chance of a cure. Nearly all respondents agreed that people did not know enough about skin cancer, but only 5% actually took precaution, with less males in this group.

Publications: Not published

Key words: Survey, skin cancer, humans

The relationship of clothing looseness to skin irradiance

Name: P. Sumpton (1974)
Supervisor: I. Gibson

Experimental work was carried out to evaluate the effectiveness of clothing "looseness" in insulating the skin from heat. Skin irradiance was measured on a model providing skin-to-clothing distances of 0-4cm. A 450W PIFCO IR lamp, model N/24/PI, was used to simulate heat flux on a moderately sunny day. Three cloth types were used: blue cotton shirt fabric, white towelling and aluminised cotton "Milium". The optimal spacing was 1cm, but a significant saving in heat gain was obtained with only 0.25cm spacing. Values for towelling and cotton were similar, but Milium had the highest thermal resistance. Some limitations of the model became evident, principally the absence of ventilation of the air gap, and evaporative cooling due to sweating, both of which occur signicantly in the real-life situation. These were possibly the cause of some inconsistencies in the data.

Publications: Not published

Key words: Physiology, heat insulation, humans

The effect of plant growth regulators on Cladophora sp.

Name: D. Backshall (1975)
Supervisor: J. John

The effects of plant growth regulators such as Indole Acetic Acid, Gibberellic Acid and Coumarin on cells of the filamentous alga **Cladophora** were investigated. Concentrations of regulators used ranged from 10-100 ppm. Cell morphology, dry weight, chlorophyll content and respiratory rate were the parameters measured. IAA had a stimulatory effect on dry weight. Elongation of cells as a result of using GA3 was reported. Coumarin inhibited cell elongation and dry weight production. All plant growth regulators used had a stimulatory effect on respiration.

Publications: Not published

Key words: Physiology, growth regulators, algae

The effect of current flow on the conservation of energy in the mussel Xerostrobus securis (Lam.)

Name: I. Carroll (1975)
Supervisor: R. Rippingale

The bivalve mussel **Xenostrobus securis** (Lam) occurs in the Swan River estuary. Three localities, in close proximity but differing in the extent of exposure to water currents, were used as collecting sites. Mussels from these localities differed in physical size. Warburg manometry was used to measure the rate of oxygen consumption by mussels from each locality. It was shown that strong positive correlations occurred between oxygen consumption and locality (exposure to current). A marked effect of current on mussel metabolism was concluded.

Publications: Not published

Key words: Ecology, energy, pelecypods

The Nikkonus II Camera. Shutter and Flash Characteristics

Name: A. Cody (1975)
Supervisor: G. Newland

The Nikkonus II amphibious 35mm camera (NIKON-NIPPON KOGAKU K.K.) was tested for shutter efficiency, and accuracy and shutter/flash synchronisation, for both flash bulb and electronic flash. The testing involved a simple circuit using a photodiode and cathode ray oscilloscope. The findings resulting were: a) shutter efficiency appeared best at an aperture setting of f11 at all shutter speeds, b) small-medium flash bulbs AGIB, of types IB and FBIB, performed satisfactorily in water paths less than three metres, and synchronised at shutter speeds up to 1/250 sec, and c) electronic flash synchronised at shutter speeds up to 1/125 sec. The experimentally-obtained results exceeded the manufacturer's specifications in all cases. An elementary text on "In Water Photography" was compiled as part of the project.

Publications: Not published

Key words: Photography, shutter, flash

An investigation of general motor abilities of students at a metropolitan high school

Name: A. Doropoulos (1975)
Supervisor: I. Gibson

In this paper, an attempt was made to obtain a correlation between motor abilities, age and sex of a sample of high school students from John Forrest Senior High School. A total of 162 subjects were tested, the males ranging from 12-17 years and the females from 13-16 years. The subjects were tested for dynamic flexibility, explosive strength, static strength, dynamic strength, gross body co-ordination, gross body equilibrium, endurance and speed. In most of the tests, the performance of the males and females increased with age, and the males achieved higher performances than the females. The one exception was the static equilibrium test, where scores decreased with age, and there was no difference between males and females. This is contrary to the usual findings, and may have been caused by the fact that variables such as i) prelearning or training, ii) motivation and iii) experimental error were not controlled for by the experimental set up.

Publications: Not published

Key words: Physiology, motor ability, humans

Effect of water deprivation on plasma sodium and potassium concentrations and on the mean preferred temperature of Tiliqua rugosus

Name: N. George (1975)
Supervisor: C. Taylor

Mean preferred body temperature (MPT), and plasma sodium and potassium concentrations, were measured in **Tiliqua rugosus**, the bob-tailed lizard. Measurements were taken under control conditions, and after 5 weeks of water deprivation with occasional salt loading. The experimental regime induced small but significant ($P < 0.05$) responses. The mean MPT decreased by 0.8oC and the mean value for plasma sodium concentration increased by 13.7 meq/l. Plasma potassium concentration did not change. No significant differences were recorded between male and female animals or between morning and afternoon measurements. Small sample sizes and high variability characterised the results of this study.

Publications: Not published

Key words: Physiology, preferred temperature, plasma electrolytes, reptiles

Water relations of some Western Australian amphibians from different climatic areas

Name: S. Green (1975)
Supervisor: C. Taylor

Four anuran species usually found in association with permanent water (**Hyla moorei**, 13.3g; **Hyla cyclorhynchus**, 26.3g; **Limnodynastes dorsalis**, 15.0g; and **Pseudophryne occidentalis**, 1.83g) were collected from climatically different areas. Rate of water loss at 20, 25, 30 and 35°C, rehydration rate, percentage body water lost at death and body water content were determined for each species. All animals were fully hydrated before each experiment, and there was a minimum of 1 week between experiments. The rate of water loss increased with increasing temperature for all species. **H. morei** (mesic) and **H. cyclorhynchus** (arid) showed no significant differences in either dehydration or rehydration rate. There were no significant differences in dehydration rate between individuals of **L. dorsalis** from the mesic or xeric environment, but those from the xeric area rehydrated significantly faster than those from the mesic area. The highest rates of water loss, slowest rates of rehydration and highest percent body weight loss at death (50%) was observed in **P. occidentalis** (arid).

Publications: Not published

Key words: Physiology, water relations, amphibians

The effect of physical fitness on personality

Name: P. Griffiths (1975)
Supervisors: M. Henderson/I. Gibson

The effects of physical fitness on self-concept were studied for a sample of nine young males aged 18-19 years, who were first year students at WAIT. They were divided into control and training groups. The latter carried out the 5BX fitness programme over a two month period, averaging five 10-minute sessions per week. Physical fitness was measured by sub-maximal work tests. Self-esteem was measured before and after by the Tennessee Self-Concept scale (T.S.C.S.). The exercise programme produced definite changes in fitness, as measured by an increased VO2 max and a decreased heart rate. No definite change occurred with the T.S.C.S. test over the two month period, for both control and training groups. However, a significant correlation was obtained between the Total Positive Score of the T.S.C.S. and the fitness parameters measured, indicating parallel changes between the two. Correlation analysis indicates that a relationship existed between fitness and self-esteem.

Publications: Not published

Key words: Physiology, physical fitness, humans

The skewed sex ratio of Gladioferens imparipes (Thompson) in the Swan River

Name: E. Harvey (1975)
Supervisor: R. Rippingale

The copepod **Gladiferens imparipes** occurs in estuaries of south- west Western Australia. The sex ratio of **Gladiferens** in plankton samples is frequently skewed, showing a preponderance of females. Laboratory studies on cultured **Gladiferens** confirmed a 1:1 sex ratio at hatching, but showed greater longevity of female animals. Field studies showed that sex differences in vertical migration behaviour, and in vulnerability to fish predators, could have some effect on the sex ratio of **Gladioferens** captured in plankton samples.

Publications: Not published

Key words: Ecology, sex ratios, crustaceans

An investigation of environmental factors affecting the germination of seeds of Albizia lophantha (Beard), and inhibitory effects produced by these seeds in general, soil micro-organisms and lettuce (Lactua sativa) seeds

Name: A. Keating (1975)
Supervisor: B. Lamont

There is no light requirement for germination of **Albizia lophantha**. Seeds germinate between temperatures 15-35oC, with an optimum at 25oC. There is a direct linear relationship between percentage imbibition and temperature. At the optimum temperature, all seeds which imbibe also germinate. Decrease in osmotic potential at 20oC causes a rapid decrease in percentage germination, which is explained by the seeds' inability to absorb sufficient water, even though the actual process of imbibition is not affected. Germinating **A. lophantha** seeds, or their associated bacteria, are able to inhibit growth of several soil microorganisms, including **Penicillium**, an actinomycete, and a wide range of bacteria. **A. lophantha** seeds cause initial inhibition of germination of lettuce seeds, but this effect either wears off or is overcome by the lettuce seeds. **A. lophantha** seeds also cause an inhibition of elongation of lettuce seed radicles in the absence of light.

Publications: Not published

Key words: Ecology, seed germination, angiosperms

A comparison of the thermoregulatory responses of wild Mus musculus and Mus musculus variety domesticus to temperature stress

Name: W. Leggett (1975)
Supervisor: B. Collins

The initial objective of this study was to compare the physiological responses to temperature stress of groups of wild **Mus musculus** from one population. Each group was to be acclimatized to different temperature conditions. This acclimatization was to be ensured by collecting the mice in three different seasons; namely, mid-Autumn, mid-Winter and mid-Spring. A paucity of animals at the collection site in mid-Winter resulted in a change of objectives. The data compiled on the first group, which were captured on 27th April, 1975, were eventually compared to similar data collected for laboratory mice, in order to determine whether years of being bred in captivity had caused a diminution in thermoregulatory efficiency under stressful conditions. No significant differences were detected.

Publications: Not published

Key words: Physiology, thermoregulation, mammals

An investigation of some factors affecting activity of the meat ant Iridomyrmex purpureus (Smith) (Hymenoptera: Formicidae)

Name: G. Livingstone (1975)
Supervisor: J. Majer

The foraging activity of **Iridomyrmex purpureus** was recorded in an apple orchard and under controlled environment conditions. The diurnal exogenous rhythm is initiated by the dark/light interchange, although further increases in light intensity have little influence on foraging. Activity, once initiated by light, is correlated with temperature. The greatest increase in foraging occurs between 15-20°C, although it is reduced when temperatures exceed the 25-30°C range.

Publications: Not published

Key words: Ecology, foraging, insects

Effects of Gibberellin A3 and Indole Acetic Acid on sex expression in the monoecious cultivar of cucumber (Cucumis satius L. (c.v. Superpickle))

Name: A. Louden (1975)
Supervisor: J. John

Various concentrations of Gibberellin A3 (GA3) and Indole Acetic Acid (IAA) were applied, separately and in combination, to the monoecious cucumber **Cucumis sativus** cultivar Superpickle. Plants were examined for induced changes in sex expression. The most marked changes observed occurred for 50ppm IAA, 100ppm IAA, 50ppm GA3 and 100ppm GA3 treatments. The IAA treatments caused a shift towards femaleness, and the GA3 treatments towards maleness. The changes generally agreed with those reported as a result of other research work.

Publications: Not published

Key words: Physiology, sex expression, angiosperms

Leaf dimorphism in Hakea trifurcata

Name: G. Manton (1975)
Supervisor: B. Lamont

The phenomenon of dimorphism in **Hakea trifurcata** leaves was studied, and the following conclusions made. Annual rainfall/effective rainfall does not seem to control the ratios of broad leaves to needle leaves per plant in **H. trifurcata**. Variations must be due to other environmental or physiological factors. In plants which produce both broad and needle leaves, broad leaves are always produced first on new season's branchlets, prior to needle leaves. Broad and terete leaves of **H. trifurcata** show no important anatomical differences.

Publications: Not published

Key words: Morphology, leaves, angiosperms

The effects of slow dehydration on the skin morphology and physiology of the Western Australian frog Heleoporus reyei

Name: L. Miller (1975)
Supervisor: C. Taylor

Skin response and electrolyte levels were monitored in **Heleoporus eyrei** individuals that had been in soil burrows in the laboratory for two, four, eight and thirteen weeks. The skin responses observed were varied (e.g. white mucous secretion, development of transparent layers, caked soil adhering to body, puffiness), but were not related to length of time in the burrows. Sodium and potassium concentrations in the plasma and urine also varied, but there were no consistent responses. Lipid was present in the muscle layers of the integument throughout the experiment. No changes occurred in the thickness of the keratin and epidermal layers of the dorsal or ventral integument. However, throughout the experiment, both of these layers were thicker on the ventral surface than on the dorsal surface. The lack of consistent change in the variables measured suggests that the experimental period was not long enough. The frogs did not appear to be under sufficient stress to utilise any major mechanisms for water conservation.

Publications: Not published

Key words: Physiology, dehydration, amphibians

Factors affecting the germination of the mistletoe Amyema preissii

Name: M. Perry (1975)
Supervisor: B. Lamont

The written report for this project has been mislaid.

Publications:

Lamont, B. and Perry, M. (1976). Polyembryony in the mistletoe **Amyema preissii**. **Search** 7, 316-317.

Lamont, B. and Perry, M. (1977). The effects of light, osmotic potential and atmospheric gases on germination of the mistletoe **Amyema preissii**. **Ann. Bot.** 41, 203-209.

Key words: Ecology, germination, angiosperms

Inter-species relationships occurring in Hyde Park Lake, with particular reference to food resources

Name: J. Smith (1975)
Supervisor: J. Osborne

The purpose of this study was to record variations in the population densities of invertebrates and phytoplankton in a freshwater pond (central Hyde Park Lake, Perth), and thus investigate any inter-specific relationships occurring. Relative population densities of **Daphnia, Sulcanus, Corixidae** (water boatmen) and the phytoplankton were recorded over a ten week field sampling period. Laboratory work investigated the feeding habits of the Corixidae, in terms of predation upon these organisms and **Aedes** larvae. **Daphnia** and **Sulcanus** appear to have shown some degree of competition for food resources. Results indicated that **Daphnia** were able to outcompete **Sulcanus** for food. It was found that the Corixidae do not depend upon **Daphnia** and **Sulcanus** as a source of food. Fluctuations occurring in the population densities of the invertebrates were possibly related to the phytoplankton population of the lake, which, in turn, seemed to be controlled by changing nutrient levels.

Publications: Not published

Key words: Ecology, food resources, crustaceans

An investigation into the absorption of glucose across the small intestine of the Rat (Rattus norvegicus) and Guinea Pig (Cavia porcellus)

Name: I. Sydney-Smith (1975)
Supervisor: L. Gibbney

In an attempt to study the absorption of glucose across the intestinal wall, a number of closed and open everted sacs of the small intestine of the rat (**Rattus norvegicus**) and guinea pig (**Cavia porcellus**) were prepared. The sacs were incubated in well oxygenated glucose/saline solution (5.56 mM glucose) for 30 and 45 minutes. Results from the closed sacs were not significant, but those from the open sacs incubated for 30 minutes were encouraging enough to suggest that this technique should be persisted with.

Publications: Not published

Key words: Physiology, glucose absorption, mammals

The chemotaxonomy of three closely related species Hakea glabella, H. prostrata and H. pritzelii

Name: J. Warren (1975)
Supervisor: B. Lamont

Chemical analysis of **Hakea glabella, H. prostrata** and **H. pritzelii** by paper chromatography indicated a closer relationship between **H. glabella** and **H. pritzelii** than between **H. glabella** and **H. prostrata**. However, environment seemed to alter the patterns significantly, such that the less similar the habitats, the greater the differences in phenotic composition between specimens of the same species.

Publications: Not published

Key words: Taxonomy, chemical analysis, angiosperms

The study of polychaete distribution in Peel Inlet and Harvey Estuary

Name: S. Bennison (1976)
Supervisor: R. Rippingale

Patterns of polychaete species distribution in the Peel Inlet and Harvey Estuary were analysed. A comparison was made between selected sampling stations. Polychaete species comprised up to one hundred percent of the benthic fauna at several stations, with variations in species densities. Samples consisted of five replicate, 25cm^2 cylindrical cores. **Haploscoloplos** sp. was the most ubiquitous species, followed by **Prionospio** sp. and **Ceratonereis erythraeensis**. **Australonereis** sp. occurred only at station 6, the most maritime station. Polychaete numbers were used in the comparative analysis between stations, which showed a significant difference between the total number of polychaetes at each station, and also the total number of each species over the nine stations, at $P<0.01$. Correlation coefficient values of organic matter versus polychaete numbers, percentage clay content versus polychaete numbers and organic matter versus percentage clay content, were not significant at $P<0.05$.

Publications: Not published

Key words: Ecology, estuary, polychaetes

Seed selection by some species of birds in the families Spermistidae, Columbidae and Psittacidae

Name: G. Chester (1976)
Supervisor: J. Osborne

Birds have characteristic preferences for the type of food they eat. These preferences differ between birds of the same family, as well as those of different families. This project examines the seed preferences of seventeen species of birds, in three families (Spermistidae, Columbidae and Psittacidae). Initial field work was discontinued due to practical considerations, and the study was continued on caged birds. Although caged birds were removed from their natural habitats, they were not held under controlled laboratory conditions. Troughs containing eight dishes of seed were placed in an aviary, and eaten seed was counted as it was manoeuvred into the bill and swallowed. Results obtained indicated that seed preferences differed between families, and between species within each family. Many factors, including learning, innate behaviour, ease of selection and nutritional value of the seed, may lead to these differences.

Publications: Not published

Key words: Ecology, seed selection, birds

Temperature and the upper limit of salinity tolerance of Calamoecia clitellata Bayly (Copepoda: Calanoida)

Name: C. Chubb (1976)
Supervisor: R. Rippingale

The effect of temperature on the upper limit of salinity tolerance of the halobient calanoid copepoid **Calamoecia clitellata** Bayly was investigated. Temperature, salinity and time were found to interact to affect the salinity tolerance of **C. clitellata**. The ecological implications of this interaction are discussed with respect to the species' seasonal occurrence in saline athalassic waters in south-western Australia. A preliminary study of the survival of **C. clitellata** in lake water and sea water was conducted. Survival was high in both. Possible reasons for the absence of the species from the estuaries in south-western Australia are proposed.

Publications: Not published

Key words: Ecology, salinity tolerance, crustaceans

The feeding responses, probing time, frequency of drinking and fluid intake of the Western Spinebill (Acanthorynchus superciliosus) at different concentrations of nectar

Name: H. Clow (1976)
Supervisor: B. Collins

Acanthorhynchus superciliosis shows diurnal variations in body weight, with morning (dawn) values being significantly lower than evening (dusk) weights. These weights are stabilized by birds fed on 0.82M and 0.37M nectar, although some difficulty seems to be experienced by birds given 0.20M nectar. Regardless of nectar strength, birds exhibit temporal variations in feeding behaviour, with feeding times and rates of nectar intake being greater for the first 60-90 min of each day than later. The frequency of visits to the nectar source is higher in the morning and at midday than in the late afternoon. In general, **A. superciliosis** responds to a decrease in nectar concentration by accentuating the above variations and increasing its overall rate of nectar intake, frequency of visits to the nectar source and the time spent feeding.

Publications:

Collins, B.G. and Clow, H. (1978). Feeding behaviour and energetics of the Western Spinebill, **Acanthorhynchus superciliosis** (Aves: Meliphagidae). **Aust. J. Zool.** 26, 269-277.

Key words: Physiology, foraging, birds

The effects of prescribed burning in the forests of south west Australia on the invertebrate fauna and its possible relation to the delayed recovery in the population of Antechinus flavipes

Name: R. Hindmarsh (1976)
Supervisor: J. Majer

The effect of prescribed burning on the availability and abundance of forest invertebrates was investigated, to determine whether the changed status of food supply influenced the abundance of the mardo (**Antechinus flavipes**) following fire. Numerically predominant Araneae, Blattodea, Coleoptera and Hymenoptera were the principal food sources. There was no correlation between the abundance of the mardo and that of forest invertebrates during the post-fire succession, suggesting that food availability is not a major factor in mardo population changes.

Publications:

Hindmarsh, R. and Majer, J.D. (1977). Food requirements of mardo (**Antechinus flavipes** (Waterhouse)) and the effect of fire on mardo abundance. **W.A. Forests Department Research Paper** No. 31, 13 pp.

Key words: Ecology, invertebrates, mammals

Factors affecting establishment of Cakile maritima in Perth beach sands

Name: M. Hoy (1976)
Supervisor: B. Lamont

The relative importance of nitrogen, phosphorus, calcium, chloride, pH, heavy metals and soil water availability on the growth of the beach colonizer **Cakile maritima** was examined in relation to season and proximity to industrial activity in Cockburn Sound. Nitrogen availability was found to be the factor most affecting leaf production in soils collected in both summer and winter from all 20 locations. Variation in chloride levels, on the other hand, was largely responsible for differences in plant height and succulence in both seasons. High chloride levels could also account for general growth reduction in summer soils.

Publications:

Hoy, M., Lamont, B.B., Fox, J.E.D. and Craig, G.F. (1983). The importance of soil variables on establishment of **Cakile maritima** on Perth beaches. **Ann. Rep. Mulga Res. Cent.** 6, 13-22.

Key words: Ecology, soil nutrients, angiosperms

A comparison of avifaunas from habitats on the Bassendean dune system in and around Melaleuca park reserve, Western Australia

Name: K. Lance (1976)
Supervisor: J. Majer

Species richness and evenness of birds and plants were calculated for habitats in and around Melaleuca Park Reserve. Overall structural evenness was determined for each sample area, as was plant density in three vegetation layers. The relationships of bird data to plant indices then investigated. No consistent trend emerged except that the farmland was dissimilar from the other sites in terms of both bird and plant species composition. No relationship was found between bird species richness and plant species richness, bird species evenness and plant species evenness, or bird species evenness and overall structural evenness. A significant positive correlation between plant species evenness and plant density (0.5-2.0m level) was demonstrated. Bird species richness was not changed by disturbance, although the likelihood of encountering certain species after disturbance was markedly reduced. The extent of disturbance significantly affected the shrub layer, and this influenced the avi-fauna composition.

Publications: Not published

Key words: Ecology, birds

Composition and succession of Cyanophycean water blooms in Bibra Lake and North Lake

Name: F. Maso (1976)
Supervisor: J. John

Algal compositions and nutrient levels of Bibra and North Lakes were analysed over a three month period. In Bibra Lake, the blue-green algal blooms were composed of relatively few species, compared with North Lake, which had a larger species diversity. Bibra Lake experienced algal blooms of **Microcystis** and **Anabaena**, whereas no such blooms were observed in North Lake. **Mycrocystis** was the most prevalent species in Bibra Lake, and the major constituent of most blooms. Eutrophic levels of nitrogen and phosphate were mainly responsible for the development of water blooms in Bibra Lake. From laboratory culture experiments, it was apparent that **Microcystis aeruginosa** produced an inhibitory substance. Extracts from **Microcystis** inhabited **Dunaliella** cultures and also had an inhibitory effect on freshly- started **Microcystis** cultures.

Publications: Not published

Key words: Ecology, succession, algae

An ecological survey of forest vegetation twelve months after a trail bike event

Name: J. Simpson (1976)
Supervisor: B. Lamont

The effects of trail bikes on an area of State Forest in the Serpentine Dam catchment area, 12 months after a one day event, were examined. Four typical habitats along the bike circuit were studied with reference to biomass, floristics, litter, species diversity, similarity indices and soil water content. There were significant differences in biomass/m^2 between track and control (surrounding vegetation) quadrats at the laterite and creek crossing sites. There was no significant difference at the granite site. The relative abundance of species in the track and control quadrats were similar at all sites. No significant differences in litter and soil water content were noted betweens the track and control quadrats at any site. Species diversity of the track quadrats at the laterite site was higher than that of the control quadrats. At both creek crossing sites, the control quadrats had higher species diversity than their respective track quadrats. Species diversity at the granite site was low and similar for both the track and control quadrats.

Publications: Not published

Key words: Survey, angiosperms

The feel of things - the contribution of hardness and friction of materials to the assessment of smoothness

Name: M. Thair (1976)
Supervisor: I. Gibson

Subjects were required to make tactile assessments of a number of pairs of samples, and to make a decision as to which of each pair was smoother. In each series of experiments there were eight samples with individual combinations from two possible values of topography, two of friction, and two values of hardness; giving twenty-eight possible sample combinations. The first series of experiments comprised relatively large topography values. Analysis of the responses showed that topography was the only significant physical variable in the assessment of smoothness. Using the same friction values and values of hardness, the second series of experiments comprised two smaller topography values. Here, hardness, in addition to topography, was significant in the assessment of smoothness. This had the effect of making the soft sample in a pair, where these small topography values were the same, feel smoother.

Publications: Not published

Key words: Physiology, touch, humans

Reproductive responses of the wild rabbit Oryctolagus cuniculus (L.) to the autumn amelioration in a summer/drought climate

Name: A. Wirthensohn (1976)
Supervisor: G. Newland

Wild rabbits (**Oryctolagus cuniculus** L.) were sampled for approximately three months over the August break of season at Wanneroo, Western Australia. The reproductive responses to the break of season, as indicated by changes in percentage fertility and pregnancy in the does, and testis weight and fertility in the bucks, were examined, and found to be strongly linked to pasture conditions and also the incidence and persistence of rainfall. Older does (over 625 days) were observed to respond directly to the break of season rains in a highly anticipatory and seemingly learned manner. Younger females and males generally only responded to the availability of abundant, green pastures.

Publications: Not published

Key words: Physiology, reproduction, mammals

A study of zoo- and phyto-plankton of Peel Inlet and Harvey Estuary

Name: M. Anderson (1977)
Supervisor: R. Rippingale

The aims of this study were twofold. Firstly, to investigate differences in plankton distribution and abundance in Peel Inlet and Harvey Estuary. Secondly, to document plankton changes associated with a weather cycle. Zooplankton collections were made at four locations in the Peel/Harvey body of water. Samples were identified and converted to numbers per cubic meter. All species of zooplankton were collected at the four sites, with the exception of the calanoid copepod **Paracalanus** sp. Differences in relative numbers between sites occurred. Calanoid and cycloid copepods, the amphipod **Paracorophium** sp. and **Mysid** sp. were all substantially more numerous in the Harvey Estuary. Conversely, harpacticoid copepods were more abundant in Peel Inlet. **Caprella** sp., **Melita matilda** and **Corophium minor** were evenly distributed. Distribution was related to salinity. Filtered water samples were examined in a fresh state for debris and phytoplankton content. Identification of phytoplankton was later conducted. Total chlorophyll content of each sample was estimated. Phytoplankton distribution was found to be varied. **Cyclotella** sp. was collected in the Harvey Estuary and at the junction of the Peel and Harvey Estuaries. **Melosira, Rhizoselemia, Diploneis** and **Amphirora** sp. were found in both areas, but were restricted to lower salinities. **Cocconeis** and **Pleurosigma** sp. were collected at six of the seven sites, and in all salinity ranges. **Navicula** sp. was collected at two sites at high and low salinities. **Epithermia** and **Amphera** sp. were only found at the mouth of the Murray River, while **Striatella** and **Achnanthes** sp. were only collected at Robert Bay. Increased diversity and abundance was found in the Harvey Estuary. Weather cycle parameters, wind speed and direction, and air temperature were not found to be related to plankton distribution.

Publications: Not published

Key words: Ecology, phytoplankton, zooplankton

The effect of food availability and rapid alterations of salinity on a euryhaline, brackish-freshwater palamonoid shrimp, Palaemonetes australis, and some aspects of its ecology

Name: D. Cunningham (1977)
Supervisor: R. Rippingale

Palaemonetes australis (Decapoda, Palaemonidae) is a euryhaline shrimp from freshwater and estuarine habitats of south-west Australia. It has not been recorded from waters which have salinities that are permanently in excess of c 25%. Tests were carried out to determine the ability of **Palaemonetes** to survive rapid changes in salinity. It was discovered that **P. australis** was able to survive any rapid alterations of salinity it might encounter in the field and that the provision of food slightly increased its mean survival time. Data on the lower distribution and abundance of **P. australis**, with relation to the dominant macrophyte and salinity, is included. The effect of the density of the dominant macrophyte on the density of **P. australis** is presented for the Peel Inlet and the Swan River estuaries.

Publications: Not published

Key words: Ecology, salinity, crustaceans

The seasonality and variation of ant faunas in Kojonup Nature Reserves

Name: R. Emery (1977)
Supervisor: J. Majer

The ant faunas of the five major Kojonup Shire reserves were sampled using pitfall traps over the period December 15th-23rd, 1976. A comparative analysis of the ant faunas was undertaken to ascertain the similarity of the reserves. The survey revealed distinct grouping of the reserves with respect to ant fauna and various environmental parameters. Interactions between ant species, and the interactions between these and the environmental parameters, were investigated. Suggestions have been made for the formulation of future pilot studies. There appears to be a definite correlation between ant and plant species richness.

Publications:

Majer, J.D. (1980). Report on a study of invertebrates in relation to the Kojonup fire management plan. **WAIT Biology Department Bulletin** No. 2, 22 pp.

Key words: Ecology, insects

Variation of phyllodes in mulga (Acacia aneura F. Muell. ex Benth.)

Name: E. Emin (1977)
Supervisor: J. Fox

Morphological features of phyllodes of an arid zone pastoral species, **Acacia aneura**, were examined in relation to variation within individual trees and between trees. Comparisons of phyllode length and surface area at nine positions within the canopy showed significant variations, but no apparent consistency existed. Length and surface area were highly correlated within trees. Variation in anatomical structures were also dealt with. Changes in dimensions of phyllodes over a known age range were examined, as was surface structure.

Publications:

Fox, J.E.D. (1979). Variation in phyllodes within individuals of **Acacia aneura**. **Mulga Res. Cent. Ann. Rep.** 2, 19-29.

Fox, J.E.D. (1979). A general account of the Trifid site, Mileura. **Mulga Res. Cent. Ann. Rep.** 2, 41-57.

Key words: Morphology, phyllodes, angiosperms

A study of feeding and vertical migratory behaviour of gammaridean amphipods in Peel Inlet, Western Australia

Name: I. Fetwadjieff (1977)
Supervisor: R. Rippingale

A study was made of the feeding and vertical migration of the amphipoda **Paracorophium excavatum** and **Corophium minor** in Peel Inlet. Vertical migration was shown to occur, animals moving from the benthos into the water column in large numbers at dusk. Analysis of gut contents showed benthic flora to be the main food item.

Publications: Not published

Key words: Ecology, vertical migration, crustaceans

Some aspects of nitrogen fixation in native Casuarina species

Name: J. Galbraith (1977)
Supervisor: B. Lamont

In this project, a range of soils from areas differing in type, land use and presence of **Casuarina** species was tested, to assess the relative abundance of the **Casuarina** endophyte. Sterile plant tubes were used to study the initiation of nodulation and a study was made of nodulation in the field. Pot trials indicated that the endophyte was restricted to soils on which host trees were growing already. The growth of **Casuarina** species on artificial media proved unsuccessful, and nodules in the field hard to find. However, it was possible to establish a high positive correlation between soil moisture level and actinomycete populations. The production of rhizothamnia from two nodules of related **Casuarina** species was examined.

Publications:

Lamont, B. (1984). Specialized modes of nutrition. In: Pate, J.S. and Beard, J.S. (Eds.) **Kwongan: Plant Life of the Sandplain**. Pp. 126-145. Univ. W.A. Press, Nedlands.

Key words: Microbiology, nitrogen fixation, angiosperms

A report on the flora of the Kojonup Reserves

Name: K. Gibbons (1977)
Supervisors: J. Fox/B. Collins

A long term study of the effects of fire management has been conducted on fire reserves within the Kojonup Shire, Western Australia. This project reports on initial surveys undertaken before the programme commenced, in order to obtain plant species lists for each of the reserves. Twenty nine plots were established in various arbitrarily chosen habitat locations. The plots were studied with reference to plant heights, crown size and related parameters. Several analyses of these data were undertaken. Comparison of plots and reserves by ordination revealed three distinctive groupings of plots, and a uniformity of reserves apart from one exception. Several reserves showed specific communities.

Publications: Not published

Key words: Survey, angiosperms

The distribution and abundance of perennials in a mulga community, in terms of moisture availability and soil characteristics

Name: D. Hides (1977)
Supervisor: J. Fox

In this account a landscape feature at Mileura Station (Lat. 26o15'S, Long. 117o11'E) is described. The study area has three distinctive arms, two tributary creeks and an exit creek. A set of five transects was set out in December 1976. These straddled the area with three crossing the arms and two running along the tributary arms. All perennial shrubs were measured for height and crown diameter along the transects, and a number of soil samples were taken for examination. Eleven perennial species were encountered along the transects. These were **Acacia aneura, Acacia kempeana, Acacia tetragonophylla, Cassia helmsii, Eremophila fraseri, Eremophila longifolia, Eremophila spathulata, Grevillea striata, Pittosporum phillyraeoides, Santalum spicatum** and **Scaevola spinescens.**

Publications:

Fox, J.E.D. (1979). A general account of the Trifid site, Mileura. **Mulga Res. Cent. Ann. Rep.** 2, 41-57.

Key words: Ecology, soil characteristics, angiosperms

Effect of different lime amendments to jarrah and banksia seedlings in lateritic or coastal woodland sand soils on infection by Phytophthora cinnamomi

Name: W. Leppard (1977)
Supervisors: J. Titze/J. Osborne

The aim of this experiment was to evaluate the susceptibility of **Banksia grandis** and **Eucalyptus marginata** to **Phytophthora cinnamomi** infection at three levels of inoculum. The effect of addition of three lime types, at three concentrations in two representative soils, were also considered. Jarrah seeds sown in sand were found to germinate at different rates for gypsum applied at three levels. There was a decrease in germination rate as the level of application increased. The mortality of Jarrah seedlings, but not those of Banksia, was found to increase with the level of inoculum. The mortality of Banksia seedlings decreased with higher levels of lime added to both sand and laterite. Gypsum added to sandy soils produced a higher Banksia mortality rate than agricultural lime and dolomite.

Publications: Not published

Key words: Pathology, fungi, angiosperms

A study of Byblis gigantea (Lindl.), with special reference to heterotrophic nitrogen uptake, root structure, soil relations and gland morphology

Name: K. Loveridge (1977)
Supervisor: B. Lamont

Byblis gigantea was grown in sand cultures supplemented with inorganic nitrogen (as ammonium nitrate) and/or two levels of insect application. Application of **Drosophila melanogaster** and **Calliphora** spp. to the leaves of **B. gigantea**, raised in nitrogen- deficient soil, enhanced plant growth. High levels of nitrogen supplement enhanced growth with low levels of insect application. High levels of insect application at high inorganic nitrogen levels depressed the rate of growth. An antagonistic system appears to maintain a balance between soil and insect sources of nitrogen in **B. gigantea**, allowing the species to exist in soils of low nitrogen availability. Soils from two sites in which **Byblis gigantea** occurs were examined for colour, pH, field saturation capacity, wilting point and moisture levels, after the summer dry season. The nitrogen and organic matter content were also determined. High evapotranspiration over summer may be offset by the depth to which the root system of **B. gigantea** penetrates the soil. The glandular secretory system of **Byblis gigantea** consists of two types of glandular structure, capitate- stalked and capitate-sessile.

Publications:

Lamont, B. 1982. Mechanisms for enhancing nutrient uptake in plants with particular reference to mediterranean South Africa and Western Australia. **Bot. Rev.** 48, 597-689.

Key words: Physiology, nutrition, angiosperms

Seasonal variations in activities and abundance of waterbirds at Bibra Lake

Name: M. McCallum (1977)
Supervisor: J. Ford

This study involved an analysis of the seasonal abundance of waterbirds at Bibra Lake, and a review of the biology of water- associated birds present in the area.

Publications: Not published

Key words: Ecology, population abundance, birds

The distribution and structure of diatom communities in the Swan River

Name: I. Misich (1977)
Supervisor: J. John

A survey on the diatom communities of the Swan River was carried out over eight months, from March to October, 1977. Seasonal patterns in temperature and salinity were noted, and the effect these changes had on the diatom communities also observed. A total of 208 diatom species was documented, of which only a few were observed to be present at any one time, in any one place. It was found that diversity increased during the winter months. A definite seasonal pattern in distribution of diatom species was noted.

Publications: Not published

Key words: Survey, diatoms

The influence of nectar concentrations upon food intake, and its movement through the gut, for the singing honeyeater Meliphaga virescens

Name: P. Morellini (1977)
Supervisor: B. Collins

Meliphaga virescens drinks nectar at a greater rate in the morning and at midday than later in the afternoon. This trend is due primarily to similar variations in the time spent drinking, rather than changes in the rate of licking or frequency of visits to the nectar source. A progressive reduction in the amount of time spent flying throughout the day results in birds being able to accumulate excess energy at a relatively uniform rate. It has been suggested that this strategy helps birds in their attempt to stabilize body weights. When birds are switched from a 0.8M to a 0.4M nectar regime, they increase the rate of fluid intake and decrease the time spent flying. Compensation for calorific dilution is incomplete for birds switched to 0.4 M nectar in that the birds are unable to accumulate the same daily quantities of excess energy as before. This is probably the major reason for their apparent inability to stabilize morning and evening body weights.

Publications:

Collins, B.G. and Morellini, P.C. (1979). The influence of nectar concentration and time of day upon energy intake and expenditure by the Singing Honeyeater, **Meliphaga virescens**. **Physiol. Zool.** 52, 165-175.

Key words: Physiology, energetics, birds

Responses of the human stratum corneum to the Western Australian climate

Name: G. Offer (1977)
Supervisor: I. Gibson

Analysis of the stratum corneum using the cellophane tape stripping technique was carried out to see if parakeratosis was a consequence of climatic exposure. A three month survey conducted on nine young white males showed no incidence of parakeratosis on three sites: forehead, inner forearm and knuckles. However, the degree of squame distribution varied from site to site and from person to person. From the knuckle and forehead sites, the squames were irregularly shaped and fused together, and with increased exposure to the climate, the squame clumps became markedly thickened. In contrast, the inner forearm sites showed regular shaped squames with little fusion, but with increased climatic exposure, the squames tended to fuse together, and thickening occurred in small areas. Overall, a high incidence of squame loss is incurred, due to a reduction in cohesion between underlying squames. These results suggest that climate has an important effect on the barrier properties of the stratum corneum, since loss of squames in large clumps is likely to adversely affect barrier function.

Publications: Not published

Key words: Physiology, skin, humans

Systematics of the Hakea falcata group

Name: L. Penny (1977)
Supervisor: B. Lamont

Examination of specimens listed as **Hakea falcata** at the Perth Herbarium indicated the presence of two taxa, both of which were distinct from the type specimen of **H. falcata**. Investigations revealed that there were enough differences to separate the two taxa at the specific level. Descriptions of the two suggested new species, **Hakea cygnicarpa** and **Hakea erecta**, are given. A sub-species **Hakea cygnicarpa** sub-species **dimorpha**, is also recognized. Investigations of the type specimen for **H. falcata** revealed that it has close affinities with **H. ambigua**.

Publications:

Lamont, B., Keighery, B., Penny, L. and Wallace, J. (1987). A numeric, geographic and taxonomic analysis of the **Hakea falcata** group. **Bot. J. Linn. Soc.** (in press).

Key words: Taxonomy, morphology, angiosperms

Development of a biology group discussion source material portfolio

Name: G. Reed (1977)
Supervisor: J. Majer

The aim of this project was to develop a portfolio of stimulatory material from current newspaper articles, to aid school and tertiary student awareness of the environment and the concept of 'space-ship earth'. Two teacher/colleagues assisted as controls, teaching via the 'conventional' chalk and talk method, while the author taught the portfolio method, using student discussions and no writing. Pre-test/post-test results indicated that the portfolio method was more stimulatory. In the experimental class, the student-to-teacher ratio of talking (which was tape recorded) was initially high, but dropped dramatically, mainly because the initial main student talkers left at various times through the course. The average student-to-teacher ratio was 12:1. The control classes did not tape record any class verbalisations. A recommendation that this portfolio/discussion method of teaching be seriously investigated by the education profession is tempered by the suggestions that the students could become disinterested or de-stimulated by a too-concentrated session of these lessons.

Publications: Not published

Key words: Education, teaching methods

An anatomical investigation of the sartorius muscle of the toad, Bufo marinus

Name: J. Terni (1977)
Supervisor: L. Gibbney

An anatomical investigation was made on the sartorius muscle of the toad **Bufo marinus**. Gross external measurements were determined for the in vivo and in vitro muscle length, width, and muscle weight. Internal muscle structure was investigated and the following were determined: muscle fasciculi number, fibre content, fibre diameter, and fibre length and number per muscle. An investigation was also made on fibre types present within this muscle. From these studies, it was found that the mean muscle length and diameter was 3.89 ± 0.31cm and 0.39 ± 0.07cm, respectively in vivo, shortening about 25% on excision. Mean fibre complement was 820 per muscle. Two fibre types only were found: Type A and Type B, corresponding in histochemical and anatomical details with fast twitch and slow fibres. The ratio of the two was 58% Type A to 42% Type B. Individual fibres of both types appeared to extend the full length of the muscle.

Publications: Not published

Key words: Anatomy, histology, amphibians

A quantitative analysis of the benthic microfauna of Peel and Harvey estuaries

Name: H. Van der Weile (1977)
Supervisor: R. Rippingale

The results represent a quantitative study of the estuarine micro-fauna of Peel and Harvey Estuaries of Western Australia. Species diversity was found to be very low, as were the relative numbers of living molluscs. The distribution of particular fauna was found to correlate highly with environmental features. Polychaete worms were most abundant in sediments with organic matter. Molluscs were most abundant in sand substrates. The possibility of certain mollusc species serving as indicators of tidal salt water intrusion is discussed.

Publications: Not published

Key words: Ecology, estuary, gastropods, polychaetes

Short-term regulation of food intake by the brown honeyeater, Lichmera indistincta

Name: G. Cary (1978)
Supervisor: B. Collins

Regardless of nectar concentration, there are strong positive correlations between the durations of feeding bouts by **Lichmera indistincta** and subsequent inter-bout intervals, and energy intake during feeding bouts and energy expenditure during subsequent inter-bout intervals. Energy utilization by **L. indistincta** conforms to an accumulation-depletion model, with a portion of the energy acquired during each feeding bout contributing to the gradual diurnal storage of energy that is subseqiently used for maintenance during non-foraging periods. **L. indistincta** compensates for a decrease in nectar concentration by increasing the frequency of feeding bouts and decreasing the duration of inter-bout intervals. Changes in the duration of inter-bout intervals caused by alterations to the calorific value of nectar drunk can be explained in terms of the rate at which the stomach empties.

Publications:

Collins, B.G. and Cary, G. (1981). Short-term regulation of food intake by the Brown Honeyeater, **Lichmera indistincta**. **Comp. Biochem. Physiol.** 68A, 635-640.

Key words: Physiology, foraging, birds

Seasonal variations in the nutrient content of the Swan River estuary and related diatom blooms

Name: K. Elphick (1978)
Supervisor: J. John

Silicate, phosphate, nitrate, salinity and temperature were monitored in the Swan River estuary for a period of 8 months, from March to October, 1978. Two major diatom blooms were observed, one in autumn and the other in spring. These blooms were directly related to the build up of nutrients. Variations in nutrients closely followed the rainfall patterns. Nutrient values observed were much higher than those previously recorded from the Swan River and from many other temperate estuaries of the world.

Publications: Not published

Key words: Physiology, nutrients, diatoms

Directional sensitivity in the bush cricket Myglopsis orthoptera

Name: A. Hall (1978)
Supervisors: B. Oldfield/G. Newland

Hill and Boyan (1976) proposed that airborne vibrations act directly on the external surface of the auditory tympanum of gryllids, and by entering the tracheal system through the first spiracle on the thorax exert a force on the internal surface of the auditory tympana. Michelsen and Nocke (1974), however, stated that the auditory tympanum of the Tettigoniidae differs in structure from that of the Gryllidae. This project was designed to determine whether these differences were significant enough to render the Hill and Boyan model inapplicable to the Tettigoniidae. Data obtained suggests that the model does not apply, particularly at the angle perpendicular to the body axes on the ipsilateral side. Evidence from blocking and shielding experiments, as well as revision of Nocke's study into tympanal anatomy, supported the explanation that crosstalk between the ipsilateral and contralateral tracheas was responsible for this discrepancy.

Publications: Not published

Key words: Physiology, directional sensitivity, insects

The taxonomy and distribution of diatoms in selected waterbodies of the Perth metropolitan area

Name: D. Harvey (1978)
Supervisor: J. John

The diatom flora of selected lakes and reservoirs in the Perth Metropolitan area was investigated. Seventy species were taxonomically described. Variations in the structure of diatom communities were analysed, comparing diversity indices and chemical properties of the water bodies. Bibra Lake was found to be the most eutrophic and unique in diatom community structure. The water reservoirs were the least eutrophic, yet supported a wide variety of diatoms with some species different from those found in the lakes. An attempt was made to identify certain diatoms as possible indicators of water quality.

Publications: Not published

Key words: Taxonomy, water quality, diatoms

The effects of ebb tidal activity on the biomass and population dynamics of the Peel Inlet zooplankton population

Name: M. Hood (1978)
Supervisor: R. Rippingale

Zooplankton densities in Peel Inlet were shown to be highly variable, both long term (months) and short term (days). The density of plankton in ebb tide water was measured and estimates made of the total biomass of plankton that might be lost from the inlet during an ebb tide. Results support the hypothesis that changes in water residence time might be a major factor responsible for short term plankton variations. Long term variations can be explained in terms of the changing physical and chemical condition of the inlet (seasonal effects). These factors, however, do not account for short term changes. The hypothesis that "loss of zooplankton in ebb tidal water is a factor responsible for short term variations in the biomass and population structure of the Peel Inlet zooplankton population" is discussed.

Publications: Not published

Key words: Ecology, zooplankton

Capture of animal prey by an omnivorous copepod Sulcanus conflictus

Name: W. King (1978)
Supervisor: R. Rippingale

The copepod **Sulcanus conflictus** has been shown to be omnivorous. Experiments were carried out to determine whether **Sulcanus** actively pursued animal prey or whether they took them if they were encountered during filter feeding. No conclusive evidence was obtained which indicated that pursuit behaviour is used in predatory feeding. Its food comprises both phytoplankton and zooplankton. Phytoplankton are effectively filtered during swimming by a scoop net formed by the second maxillae and maxillipeds. Thoracic limbs beating in unison in an oar-like fashion create a jerky swimming motion. The first antennae are extended laterally between beats to prevent sinking. The distribution of **Sulcanus** within the estuaries of Western Australia is determined largely by salinity and the prevailing hydrology. Populations are restricted to waters of less than 20% salinity during summer months, when hydrology is most stable. A second species of copepod, **Gladioferens imparipes**, a herbivore tolerant to a wide range of salinities (0-60%), is also found in estuaries of south-west Western Australia. However, **Gladioferens** distribution within the estuarine environment during summer in lower salinity waters is determined by predation pressure exerted by **Sulcanus** on nauplii recruited into the zooplankton.

Publications: Not published

Key words: Ecology, estuaries, crustaceans

Seasonal variations in primary biomass of the Swan River estuary

Name: B. McDonald (1978)
Supervisor: J. John

Seasonal variations in primary biomass of the Swan River were investigated. In the upper estuary, two blooms were documented - one in autumn and one in spring. In the lower estuary, only the spring bloom was observed. Fluctuations in production can be explained in terms of hydrological changes within the river. Autumn blooms in the upper estuary could be explained by distinct local conditions. Early spring blooms occurred at all stations. It was found that the chlorophyll a count may be used as a possible parameter for determining primary biomass.

Publications: Not published

Key words: Ecology, biomass, phytoplankton

The influence of nectar concentration upon the pattern of energy expenditure and storage by the brown honeyeater (Lichmera indistincta)

Name: G. Packard (1978)
Supervisor: B. Collins

Brown honeyeaters (**Lichmera indistincta**), maintained in the laboratory on artificial nectar (sucrose solution) at an environmental temperature of 20 ± 1oC, drank nectar at a greater rate in the morning than later in the day. A small percentage of the total time between 0630 h (lights-on) and 1800 h (lights-out) was spent in flight, although birds flew more in the morning than during the afternoon. **Lichmera indistincta** accumulated energy at a relatively steady rate during the day, with the total energy stored approximating that which had been expended the previous night. When birds were switched from 1.6 M to 1.2 M or 0.8 M nectar, their rates of nectar intake increased. Despite variations in rates associated with different birds and times of day, **L. indistincta** compensated completely, for calorific dilution of nectar.

Publications:

Collins, B.G., Cary, G. and Packard, G. (1980). Energy assimilation, expenditure and storage by the Brown Honeyeater, **Lichmera indistincta**. **J. Comp. Physiol.** 137, 157-163.

Key words: Physiology, energetics, birds

Responses of the brown honeyeater, Lichmera indistincta, to heat stress

Name: S. Payne (1978)
Supervisor: B. Collins

The responses of **Meliphaga virescens** and **Lichmera indistincta** to short-term changes in ambient temperature in the laboratory were investigated. Both species remained normothermic at ambient temperatures between 12oC and 35oC during the day and at night. They achieved this by means of variations in metabolic rate, evaporative water loss and dry heat transfer. At ambient temperatures of less than 12oC, both species reduced heat loss by means of mild hypothermia. At temperatures in excess of 35oC, evaporative cooling increased markedly, although not sufficiently to dissipate all of the metabolic heat generated. At 41oC, open-mouthed panting was prevalent, and birds became slightly hyperthermic.

Publications:

Collins, B.G., Cary, G. and Payne, S. (1980). Metabolism, thermoregulation and evaporative water loss in two species of Australian nectar-feeding birds (Family Meliphagidae). **Comp. Biochem. Physiol.** 67, 629-635.

Key words: Physiology, thermoregulation, birds

Solid state fermentation

Name: S. Pekin (1978)
Supervisor: M. Walker

Excessive amount of artificial fertilizer and water are used in market gardens in the Carnarvon district. Organic fertilizer was considered in this project as an alternative to artificial fertilizers. Four compost mixes were produced via aerobic fermentation, from materials that are readily available in the district. The mixes were: i) seaweed, ii) seaweed + prawn heads, iii) grass + blood, and iv) grass + pigswill. In crop trials using **Lycopersicum esculentum** (Burnley Gem), these mixes were tested against an artificial, slow release fertilizer ("Osmocote 100"). Sixty plants were grown in each of the treatments, and the fruit produced measured for both number and size. In all cases, organic fertilizers produced a larger, and more consistent sized, crop than the artificial fertilizer. Those mixes containing seaweed produced a crop that ripened at approximately the same time. Mixes using grass as their main component produced a larger crop than the seaweed-based mixes, but fruits ripened over a longer period.

Publications: Not published

Key words: Horticulture, soil conditioners, compost

Ellis Brook - a rehabilitation study

Name: A. Romeo (1978)
Supervisor: B. Lamont

A management study was carried out on an area embracing the abandoned Barrington Quarry, Ellis Brook and the Sixty Foot Falls, located on the western edge of the Darling Scarp. Deterioration of this area is occurring rapidly, and the urgent need for a scheme of environmental management is stressed and outlined in this report. The Ellis Brook area has notable potential as a nature reserve, and reasons for this view are given. Physical and chemical analyses of soils requiring rehabilitation were analyzed in detail. **Acacia saligna**, indigenous to the area, grew well in most soils in a pot trial. It is concluded that rehabilitation of the Ellis Brook area is possible, subject to certain biological constraints.

Publications: Not published

Key words: Rehabilitation, management, angiosperms

The ecology of the seed-feeding ant Rhytidoponera violacea

Name: P. Searle (1978)
Supervisor: J. Majer

Due to the desirable effect of native legumes in preventing the spread of **Phytophthora cinnamomi**, the ecology of the seed-feeding ant **Rhytidoponera violacea** was studied to discover its effects on legume seed and seedling distribution. The study was carried out in the Darling Range, several km east of Perth. Nest distribution was studied in a 45 x 25m plot near an old gravel quarry. Colony composition and nest structure showed there were 1.6 ants m-2 in the plot, present in ten nests. Diel activity was influenced by both physical factors such as temperature and solar radiation, and biotic factors such as food availability. The contents of three middens revealed that **R. violacea** appears to feed mainly on insects, primarily ground-dwelling beetles and ants. **R. violacea** is a legume seed predator, but the extent of this is not known, as midden sampling is biased towards insect fragments. More work is necessary to determine what portion of the diet of **R. violacea** consists of legume seeds.

Publications: Not published

Key words: Ecology, insects

The ecology of the seed-feeding ant Rhytidoponera inornata

Name: S. Sochacki (1978)
Supervisor: J. Majer

Rhytidoponera inornata is a seed-feeding omnivorous ant which occurs in aggregated colonies. Distribution of nests is thought to be related to nest propagation. Diel activity is determined principally by temperature. Relative humidity, canopy cover and understorey exert an influence on temperature by altering microclimatic regimes experienced by foraging ants. Summer daily activity is nocturnal, in response to high daily temperatures; winter daily activity is diurnal, activity at night being limited by low temperatures. Seasonal temperature variation results in a decrease in winter of foraging by individuals and in the number of nests active. A decrease in activity in winter is a response to decrease in food resources. Resource use indicates that **R. inornata** is a non-specialist feeder, and shows some predatory and scavenging behaviour.

Publications:

Majer, J.D., Portlock, C.C. and Sochacki, S.J. (1979). Ant-seed interactions in the northern jarrah forest. In: **Abstracts of Symposium on the Biology of Native Australian Plants**, Perth, 6-10th August, 1979, p. 25.

Key words: Ecology, diet, insects

Aspects of the relationship between the mistletoe Amyema preissii and its major host Acacia acuminata

Name. K. Southall (1978)
Supervisor: B. Lamont

Amyema preissii was found to be restricted to the wattles **Acacia acuminata** and **Acacia saligna** at Clackline, Western Australia. Attempts to increase the host range artificially were unsuccessful, indicating host specificity rather than perching preferences of the dispersal agent, **Dicaeum hirundinaceum**. The oldest and tallest trees were shown to be the most heavily infested with **A. preissii**. **Amyema preissii** was shown to have a greater concentration of K, Na, Ca and Mg in its tissues than the host **A. acuminata** but concentration of N, Cu, Zn and Fe showed no distinct gradients. Water loss per unit area was greater for **A. preissii** than **A. acuminata**.

Publications:

Lamont, B.B. and Southall, K.J. (1982). Biology of the mistletoe **Amyema preissii** on road verges and undisturbed vegetation. **Search** 13, 87-88.

Lamont, B.B. and Southall, K.J. (1982). Distribution of mineral nutrients between the mistletoe **Amyema preissii** and its host **Acacia acuminata**. **Ann. Bot.** 49, 721-725.

Key words: Physiology, nutrition, angiosperms

A comparative study of feeding and other aspects of the biology of two sympatric species of Gobies, Psuedogobius olorum Sauvage (1880) and Favinogobius lateralis Macleay (1881) (Pisces:Gobiidae) in the Swan and Canning Rivers of Western Australia

Name: K. Brain (1979)
Supervisor: C. Grant

Aspects of the biology of two sympatric species of goby **Favinogobius lateralis** Macleay (1881) and **Psuedogobius olorum** Sauvage (1880) (Pisces:Gobiidae), which inhabit the Swan River, were studied to determine how the two species compete for resources. Dietary analysis indicated that the diet of **F. lateralis** consisted of polychaetes and crustacea, and that of **P. olorum** comprised crustacea, algae and detritus. Both species were found to have a one year life cycle, and were found to breed at different seasons. Habitat preference tended to separate the two species spatially, with some overlap, thus reducing interspecific competition for space.

Publications: Not published

Key words: Ecology, resource partitioning, fish

Responses of the singing honeyeater (Meliphaga virescens) and the brown honeyeater (Lichmera indistincta) to low temperatures and energy shortage

Name: P. Briffa (1979)
Supervisor: B. Collins

Honeyeaters exhibit diurnal variations in body temperature and metabolic rate, with lowest values consistently occurring at night. Deprivation of nectar prior to dusk results in increased nocturnal hypothermia and decreased metabolic rates. Regardless of whether nectar deprivation occurs or not, total nocturnal energy expenditure closely approximates the amount of energy stored as lipid during each preceding day. Under the experimental conditions imposed, birds do not increase total diurnal energy storage significantly in anticipation that nectar availability will be curtailed.

Publications:

Collins, B.G. and Briffa, P. (1984). Nocturnal energy expenditure by honeyeaters experiencing food shortage and low environmental temperatures. **Comp. Biochem. Physiol.** 78A, 77-81.

Key words: Physiology, energetics, birds

The solid state fermentation of Eucalyptus bark

Name: J. Cary (1979)
Supervisors: M. Walker/J. Fox

The aim of this study was to ascertain how karri/marri bark can best be biologically modified by the solid state fermentation process to produce a soil conditioner. Untreated karri/marri bark showed no toxic effects on germination. Wheat dust, fowl manure and raw sewage sludge plus karri/marri bark composted successfully. Treated sewage sludge plus bark was unsuccessful. Wheat dust and bark had the fastest solid state fermentation rate. The high starch content in the wheat dust was more readily available for decomposition than the cellulose. A low C/N ratio also increased the solid state fermentation rate. The karri/marri bark had a maximum water holding capacity of 65 percent. Optimum aeration occurred between aerating every day and aerating every three days. The compost tumbler system did not provide optimum conditions for the solid state fermentation process of these products. The compost had a higher water content at field capacity and a lower bulk density compared to other soil conditioners.

Publications: Not published

Key words: Horticulture, soil conditioners, compost

Differences in temperature regulation between Aborigines and Caucasians when exposed to cold

Name: D. Casey (1979)
Supervisor: G. Newland

The thermal and metabolic responses to cold of six caucasians and five aboriginals were measured in an environmental chamber. Results showed a number of trends, which included a smaller elevation in metabolic rate for aboriginals (10% significance), a tendency for heart rate to decrease with cold in aboriginals (not significant) as against an increase in the case of caucasians, and a tendency for a stable diastolic blood pressure with aboriginals as against a tendency for an increase in the case of caucasians. Mean skin temperature while cooling was shown to be similar for both aboriginals and caucasians.

Publications: Not published

Key words: Physiology, temperature regulation, humans

Zooplankton in Perth Water

Name: G. Craig (1979)
Supervisor: R. Rippingale

A study of the plankton fauna in Perth water was carried out during the autumn-winter phase of the Swan Estuary's annual hydrological cycle. Species diversity was moderately low, but high abundances of a few species, particularly the calanoid copepods **Acartia clausi** and **Oithona nana**, were recorded. The flow regime, seasonally based temperature changes, and water movements influenced by tidal and barometric pressures were major factors affecting the distribution of plankton fauna. Changes in population size of **A. clausi** were closely related to salinity fluctuations. The optimal water salinity for **A. clausi** was 25- 30%, with numbers declining in salinities less than 20%. Most of the zooplankton was "flushed out" of Perth water when run-off first commenced in mid-June. It is suggested that **A. clausi** are dominant in this section of the river, because either there is no significant predation on the population, or they prey on other zooplankton, thereby reducing the abundance of that species in the area.

Publications: Not published

Key words: Ecology, estuaries, zooplankton

A study of recolonisation by ants in bauxite mines rehabilitated by a number of different methods

Name: J. Day (1979)
Supervisor: J. Majer

A standardised programme of sampling the total ant fauna and the physical, botanical and microclimate attributes was performed in twenty eight rehabilitated bauxite mine pits subjected to varying rehabilitation regimes, and in three natural jarrah forest plots. All ants collected were identified to species level. Data analysis was carried out by principal component ordination analysis, in conjunction with correlation coefficient determination between all variables. Details of ordination component identification are presented, and related to constellation diagrams of variables based upon the correlation matrix. Whilst the most significant influences on ant populations in rehabilitated mine pits are identified, it is considered that further detailed studies of the ecology of the ant species found will be necessary before valid assessment can be made of the success of specific rehabilitated treatments.

Publications:

Majer, J.D., Day, J.E., Kabay, E.D. and Perriman, W.J. (1984). Recolonization by ants in bauxite mines rehabilitated by a number of different methods. **J. App. Ecol.** 21, 255-375.

Key words: Ecology, rehabilitation, insects

Some ecological aspects of a seagrass meadow, Mullaloo Point, Western Australia

Name: P. Downes (1979)
Supervisor: H. Kirkman

A single underwater transect study of a seagrass meadow during five winter months is reported. Eight species of seagrass are represented in the area, dominated by **Posidonia sinuosa** Cambridge et Kuo. Biomass of seagrasses varies slightly, and the quantity of seagrass detritus is mutable, with its distribution being affected by weather conditions. Some correlation of depth with species type and density is suggested. There is no discernable migration of perturbed substrate structures called "blowouts", during winter months, along the transect. The monospecific community of **P. sinuosa** is reasonably stable, and fluctuating diversity is attributed mainly to the highly dynamic colonisation of denuded substrates such as "blowouts".

Publications: Not published

Key words: Ecology, biomass, angiosperms

Change of lung volume with posture in man

Name: E. Dzieciol (1979)
Supervisor: G. Newland

The effects of postural change on total lung volume and its subdivisions have been reported, also the variability of replicate readings. Twenty healthy subjects, ten males and ten females, between the age of 18 and 25 years, had their lung volumes measured in the lying and standing positions by the Helium Dilution technique. It was shown that replicate determinations made on the same subject did not vary significantly. Changes in lung volumes associated with posture were of the same magnitude for both males and females, except in the case of RV. On changing posture from lying to standing, the FRC increased by 39 percent and ERV by 98 percent, both changes being statistically significant. VC increased, TLC increased and IC decreased by 6.1, 4.7 and 15.1 percent, respectively. However, these changes were not statistically significant. The RV increased by 13.1 percent in females and 1.4 percent in males, this change not being statistically significant. Some variation was found between the results in this investigation and previously published work.

Publications: Not published

Key words: Physiology, lung volume, humans

The effect of four diets on the growth rate of marron Cherax tenuimanus (Smith) (Decapoda:Parastacidae)

Name: D. Marchioro (1979)
Supervisor: R. Rippingale

Marron (**Cherax tenuimanus**) have potential for commercial exploitation. The success of such a venture depends partly on an appropriate diet to obtain optimum growth. A ten week experiment is reported on the cultivation of marron under intensive laboratory conditions. Four diets were investigated under ideal environmental conditions: (i) gelled chicken pellets, (ii) **Gambusia affinis**, (iii) gelled liver/crayfish mix, and (iv) combination of (i), (ii) and (iii). The artificial liver/crayfish mix proved significantly beneficial to marron growth ($P < 0.05$). The cost of such a diet is minimal compared to overall cost of marron cultivation.

Publications: Not published

Key words: Physiology, aquaculture, crustaceans

Suppression of vegetation in a Eucalyptus wandoo woodland

Name: B. Piercey (1979)
Supervisor: B. Lamont

Observations of a **Eucalyptus wandoo** stand at Wongamine showed that some, though not all, species beneath its canopy are suppressed compared with the surrounding scrub vegetation. This pattern was not explained by competition for light or nutrients. Inhibitory chemicals (phenols) were found in both soil and litter of both zones, yet under laboratory conditions neither zone was found to inhibit germination or seedling growth. Though soils beneath the Wandoo were drier than the scrub soils, similar water stress was experienced by understorey vegetation in both zones. The alteration of soil structure by roots of **E. wandoo** serves to reduce water and nutrient availability to the understorey and may cause possible allelopathic effects by the concentration of suppressive chemicals (phenols) in the soil.

Publications:

Lamont, B. (1985). Gradient and zonal analysis of understorey suppression by **Eucalyptus wandoo**. **Vegetatio** 63, 49-66.

Key words: Ecology, communities, angiosperms

Comparison of coastal plain and Darling Scarp ant faunas

Name: M. Rossbach (1979)
Supervisor: J. Majer

Sixty-eight ant species in 22 genera were collected by pitfall traps and hand sampling along 2 transects, one north and one south of Perth, running across the Coastal Plain and on to the Darling Plateau. Six vegetation associations were represented along each transect. There were no trends in species richness, diversity or evenness across the transects, although overall species composition differed between certain vegetation associations. These differences are discussed in terms of soil type and vegetation association, and the results are compared with those from a similar study in the Queensland sub-tropics.

Publications:

Rossbach, M.H., and Majer, J.D. (1983). A preliminary survey of the ant fauna of the Darling Plateau and Swan Coastal Plain near Perth, Western Australia. **J. Roy. Soc. W.A.** 66, 85-90.

Key words: Ecology, insects

Evolutionary convergence in plant structure and function at Sullivan Rock

Name: R. Ryan (1979)
Supervisor: B. Lamont

The structural and functional features of the trees, shrubs and herbs at Sullivan Rock and surrounds were studied for their potential in describing relationships between vegetation and environment. Synusial and non-synusial approaches were adopted. Analysis of 22 structural-functional features showed a differentiation in strategies for both herbs and shrubs in response to variations in environmental parameters. The non- synusial approach illustrated 9 groups derived by ordination, ranging along a gradient from a quasi-mesic to an euxeric environment. The synusial approach illustrated the same gradient with 11 groups in the shrub synusium and 10 groups with features not highlighted by the non-synusial approach. Both approaches were found to be valuable. The non-synusial approach was found to identify critical features, particularly in the most stressful environments. Three evolutionary models were devised from the groups of critical features defined by ordination. The critical features included a variety of leaf characteristics, evergreens, protective barbs, nitrogen fixation, fire adaptations, and drought avoiding and drought tolerating strategies. Medium deep, granite and laterite, seasonally waterlogged soils, were found to be ecologically analogous in their structural-functional features. Such a group of micro-habitats do not pose as serious a threat to survival as shallow, seasonally waterlogged granite soils where an extended drought occurs. The latter possess the most xeromorphic features of all groups defined. Permanently waterlogged areas are characterised by quasi-mesic features. Evolutionary convergence for particular features was demonstrated, and occurred regardless of the taxonomic composition of the flora of the groups. This investigation showed that evolutionary convergence in plant structure and function, as opposed to a purely descriptive approach, is a valuable method for evaluating the principal form-environment relationships at the microhabitat level.

Publications: Not published

Key words: Ecology, communities, angiosperms

Monitoring exposure of people to ultra-violet radiation under various conditions

Name: M. Stephenson (1979)
Supervisor: I. Gibson

Personal monitoring of ultra violet radiation (UVR) levels using polysulphone film, which is sensitive to UVR has been achieved on a daily basis, using West Australian subjects. Using a new method of badge attachment involving double-stick discs, the monitor badges have been successfully worn under a wide range of physical and occupational conditions. Subjects engaged in five occupations and six outdoor activities were monitored on six different body sites. The UVR levels recorded by different regions on the body were related to the levels recorded by the vertex (head of the subject) and the horizontal (total UVR available). Results indicated that the position on the body, and occupation or activity, are important factors to be considered in any ultra violet radiation study. Climatic conditions, particularly cloud cover, were shown to significantly affect the level of ultra violet radiation energy reaching the body surface.

Publications: Not published

Key words: Physiology, UV radiation, humans

A study of recolonisation by invertebrates in bauxite mines rehabilitated by a number of different methods

Name: F. van der Linden (1979)
Supervisor: J. Majer

Four methods of collecting invertebrates were used to sample animals in rehabilitated bauxite mine sites. Vegetation and physical characteristics of each site were also measured. The numbers of each taxa of invertebrates are related to the physical and vegetation characters of each site, using an ordination analysis incorporating Orlocis' weighted similarity coefficient. Data are presented on ordination figures, maps and in tabular form. Associations were found to exist, particularly with time, plant species richness and invertebrate taxa richness. Since a broad invertebrate taxa classification was used, it may be possible to obtain clearer correlations if the animals are further classified to species level.

Publications: Not published

Key words: Ecology, rehabilitation, insects

Numerical analysis of the Hakea falcata group

Name: J. Wallace (1979)
Supervisor: B. Lamont

Data from thirty-three morphological characters was taken from eighty-two specimens housed under **Hakea falcata** R. Br. and **H. ambigua** Meisn. at the Perth herbarium. Additional data were collected from photographs of ten type specimens obtained from herbaria at Kew, the British Museum and New York. The data were prepared for analysis by converting raw data into ranks, with ratios used to represent shape, and some characters rejected on the basis of correlation studies. A second method of data preparation using raw data and residuals to illustrate shape, was also employed. Subsets of the data were used to produce dissimilarity matrices employing a specially-written computer program INTDIS. Matrices were entered into a Multidimensional Scaling MDS(X) program package to produce ordinations by Metric Scaling (MRSCAL) and classifications by Hierarchical Clustering (HICLUS). The presence of two new species distinct from the type specimen of **H. falcata**, viz **H. cygna** Penny sp.nov. and **H. erecta** Penny sp.nov. is confirmed. Analysis revealed that some of the specimens housed under **H. ambigua** were different in form to the types of **H. ambigua** but have affinities with the type specimen of **H. falcata**. The results suggest that **H. ambigua** and **H. falcata** are separate taxa, probably at the species level. The type specimens of **H. trinervis** Meisn. are shown to have close affinities with **H. ambigua**, confirming that **H. trinervis** is a taxonomic synonym of **H. ambigua**.

Publications:

Lamont, B., Keighery, B., Penny, L. and Wallace, J. (1987). A numeric, geographic and taxonomic analysis of the **Hakea falcata** group. **Bot. J. Linn. Soc.** (in press).

Key words: Taxonomy, morphology, angiosperms

Bird recolonisation of Alcoa's rehabilitated bauxite pits, at Jarrahdale's No. 1 and 2 minesites

Name: L. Brown (1980)
Supervisor: B. Collins

The abundance and diversity of birds were studied in several rehabilitated bauxite pits (plots). It would appear that birds are coming back into these plots, but in slightly different proportions. The types of plot which contain the greatest populations of birds are those with thick middle and understorey layers. Many birds of the jarrah forest can utilize this middle layer, and hence these plots get a greater cross-section of the jarrah avifaunal populations. The thick shrub layers also provide protection and a large community of invertebrates on which the birds can feed. Many of the larger birds, especially those which search amongst bark and dead timber, and the hawking variety, are absent from the plots. Hopefully, as the plots get older and ecualypts grow, some of these birds will utilize the plots.

Publications:

Wykes, B., Brown, L. and Collins, B.G. (1980). Bird recolonisation of rehabilitated bauxite mine pits. Report to Alcoa of Australia Limited. 28 pp.

Key words: Rehabilitation, jarrah forest, birds

The association of vesicular-arbuscular mycorrhizal fungi and Phytophthora cinnamomi in Western Australian native forest vegetation

Student: P. Cordina (1980)
Supervisor: J. Osborne

Root systems of native ground flora of the jarrah forest were excavated from a dieback-free area, and a **Phytophthora cinnamomi** infected area, at Byford. The study was designed to: (i) investigate the extent and presence of vesicular-arbuscular mycorrhizae associations in the two areas, and (ii) compare the presence, absence and frequency of VA mycorrhizae from plant species of known resistance and susceptibility to **P. cinnamomi**. Low VA mycorrhizal fungal infection was recorded from plant species of both study areas. There was no overall relationship between VA mycorrhizal presence and a plant's susceptibility to **P. cinnamomi**. However, for 11 of the 27 plant species examined, the occurrence of VA mycorrhizal fungi varied between the die- back free collection area and **P. cinnamomi** infected area.

Publications: Not published

Key words: Pathology, fungi, angiosperms

Regeneration of jarrah forest after bauxite mining: A pot trial at the Western Australian Institute of Technology

Student: G. Dornan (1980)
Supervisor: J. Osborne

The bauxite mining rehabilitation programme practised by Alcoa involves returning topsoil to completed pits by stripping soil from new pits. Seed is buried in this returned soil. From an economic viewpoint, information is required about the optimum depth for seed germination and seedling establishment. This study set out to investigate the optimum depth for regeneration of twelve different native plant species: **Acacia drummondii, A. pulchella, A. myrtifolia, A. extensa, A. saligna, Albizia lophantha, Eucalyptus calophylla, E. marginata, Kennedia prostrata, K. coccinea, Hardenbergia comptoniana** and **Trymalium ledifolium**. The findings from this study show that for the plant species investigated: (i) maximum germination rates were achieved within 2.5cm depth of planting, and (ii) all species established best at planting depths of between 1cm and 5cm. It can be concluded that, for large-scale seed planting, best germination and establishment figures will be obtained with below-surface planting not exceeding 5cm in depth.

Publications: Not published

Key words: Rehabilitation, germination, angiosperms

Ultrastructure and cytochemical properties of the melanoblast in mice

Name: M. Faithfull (1980)
Supervisor: I. Gibson

A modification of Becker's (1935) DOPA reaction technique at a light microscopic level was used to study the progression of the formation of active melanocytes in neonatal mice. The process was shown to vary between the sites examined. The ear became pigmented first, then the skin of the torso, and finally the tail, with its tip remaining unpigmented for some time.

Publications: Not published

Key words: Physiology, skin, mammals

Comparative thermoregulatory responses in resting young men and women

Name: G. Foster (1980)
Supervisor: G. Newland

The thermal and metabolic responses to heat and cold exposure were investigated in an environmental chamber for seven young men, aged 17-20, and seven young women, aged 18-20. All subjects were Caucasian in ethnic origin. Measurements were made of metabolic rate, heart rate, blood pressure, rectal and skin temperature, toe temperature, and sweat response. Each subject was exposed to variations of temperature in a climatic chamber, covering a temperature range from zero to fifty degrees Celcius. Results showed a number of trends, which included: a larger elevation in systolic blood pressure by men in the heat, a greater elevation in heart rate by women in the cold, a tendency for toe temperatures in women to be slightly higher in the cold, and a greater sweat response by men in the heat.

Publications: Not published

Key words: Physiology, thermoregulation, humans

The influence of hypnosis and lignocaine digital block on the perception of thermally induced pain in humans

Name: R. Goonewardene (1980)
Supervisor: G. Newland

The gate control theory proposes that interaction of large and small nerve fibres influences the perception of pain. In a group of 20 subjects, first and second pain response times related to A-delta and C fibre activity, were examined under control conditions. Ten subjects were under hypnosis (without suggested analgesia), and all under lignocaine digital block. For both treatments, increases in the reaction times of both pains were observed, quite contrary to expectations. Also, the dissociation of first and second pain differed from expected results. A predominance of second pain loss before first pain loss was recorded. Inferences of these results can in some cases by explained by the gate control theory, in other cases not. A heavy emphasis on elucidating summation mechanisms was implicated for further investigation.

Publications: Not published

Key words: Physiology, pain, humans

Trophic relations of fish: aspects of the feeding ecology of the Sea Mullet, Mugil cephalus, with special reference to the calanoid copepod, Gladioferens imparipes

Name: R. Holt (1980)
Supervisor: R. Rippingale

This project on the feeding ecology of the sea mullet, **Mugil cephalus**, was undertaken to gain an understanding of the importance of animal food in its diet, and its manner of selecting this food. The calanoid copepod, **Gladioferens imparipes**, was used as a convenient food source, being readily available and occurring in the habitats occupied by the **M. cephalus**. **Mugil** were shown to select copepod prey visually. When choices of prey were offered, they took stationary rather than moving prey, and female copepods carrying eggs rather than males or females without eggs. These observations are consistent with the hypothesis that visual cues are used by the predator.

Publications: Not published

Key words: Ecology, diet, fish

Reproduction in the female White-striped Mastiff Bat, Tadarida australis (Gray 1839) (Molossidae) in Western Australia

Name: C. Hudson (1980)
Supervisor: D. Kitchener

The reproductive cycle of female **Tadarida australis** was deduced, using histological techniques on museum specimens collected over the last 21 years. **T. australis** is monoestrus, with ovulation and fertilization occurring around late August. There is a marked asymmetry of the reproductive organs, with only the right ovary and uterine horn functional. A single young is born between mid-December and late January. A single corpus luteum is deeply embedded, occupying up to 60% of the ovary. **T. australis** has a short lactation anoestrus, followed by a relatively long pro-oestrus.

Publications: Not published

Key words: Histology, reproduction, mammals

Aspects of the physiology of the toad sartorius muscle

Name: A. Jenkins (1980)
Supervisor: L. Gibbney

Sartorius muscles of the Queensland Cane Toad (**Bufo marinus**) were used to investigate aspects of muscle physiology. Isometric length-tension relationships were of the expected form, but very variable from point to point. Expressing muscle length in terms of in-situ length did not remove the fluctuations. Isotonic force-velocity relationship approximated straight lines when plotted on log-linear paper, with departures at extreme ends of the graph. Information on the number and nature of the motor units present was sought by stimulating muscles with gradually increasing stimulus strengths. No potentially useful data was obtained. The theoretical lifetime of a muscle kept in cold Ringer's solution is approximately 17 hrs, although the actual useful lifetime is 4-8 hrs. Tension declines experimentally with repeated stimulation, with a half-time of approximately 200 twitches.

Publications: Not published

Key words: Physiology, muscle, amphibians

Agnew Mining Dewatering Study

Name: D. Kaljuste (1980)
Supervisor: J. Fox

A field study conducted at Leinster showed that mine water affects species in different ways. **Acacia aneura** was most affected, with mortality higher, whereas **Acacia tetragonophylla** and **Eremophila serrulata** grew profusely and reproductivity of plants was more prominent in water sites. With the advent of high rainfall, there was no significant difference between the different study sites and reproductivity of **Acacia aneura**. Galls were more frequent in water site areas than the control sites. In glasshouse experiments, it was found that high mortality rates in **Acacia aneura, Acacia craspedocarpa** and **Eucalyptus camuldulensis** ocurred when grown in soil influenced by mine water. Some ground flora species were apparently killed by salts. Higher levels of sodium were recorded in the soil collected from the water site, compared to soil analysed from control sites. It is suggested that salinity and waterlogging combine together to create stressful conditions.

Publications:

Fox, J.E.D. and Kaljuste, D.K. (1980). Soil moisture status in relation to **Acacia aneura** and associates at Leinster Downs. **Mulga Res. Cent. Ann. Rep.** 3, 35-41.

Key words: Ecology, waterlogging, angiosperms

A comparative study of feeding strategies of three sympatric species of Wrasse, Corius auricularis, Ophthalnolepis lepans and Pseudolabrus parilus (Pisces:Labridae), on Five Fathom Bank in Western Australia

Name: L. Laurenson (1980)
Supervisor: C. Grant

Three species of Wrasse, **Coris auricularis, Ophthalnolepis lepans** and **Pseudolabrus parilus,** were examined for food preferences. Molluscs and crustacea constituted a major portion of their diets; polychaeta and echinodermata were found in lesser quantities. The fish species demonstrated partitioning of habitat, **O. lepans** was found in reef areas at mid-level depths; **C. auricularis** in sandy and weed areas living in the benthic environment and **P. parilus** in reef and weed areas in the benthic environment. Partitioning of food resources occurred as a consequence of the partitioning of habitat.

Publications: Not published

Key words: Ecology, diet, fish

Copepod behaviour and related anatomy: observations in behaviour, descriptions and experimentation on related anatomy in Gladioferens imparipes

Name: M. Lehman (1980)
Supervisor: R. Rippingale

An investigation into the attaching behaviour exhibited by Gladioferens imparipes was carried out. The aim of this investigation was to determine how the animal attached to surfaces. The anatomical structure believed to be involved in attaching the animal to a surface is fine setae on the dorsal metasome. Attaching behaviour is important for the survival of populations in estuaries as it prevents the copepod from being "flushed out" of the estuary into the river basin and ocean. The ability to attach to surfaces is also important in maintaining the bentho-pelagic distribution pattern. The results of investigations carried out show the dorsal setae are the anatomical structures instrumental in attaching the body to surfaces. Detailed examination of the setae showed they are extremely fine, delicate structures similar to sensory setae on other areas of the body.

Publications: Not published

Key words: Ecology, anatomy, crustaceans

Responses of the hopping house (Notomys alexis) and the house mouse (Mus musculus) to energy shortage

Name: J. Lewis (1980)
Supervisor: B. Collins

Notomys alexis and **Mus musculus** were tested for the occurrence of torpor when maintained on ad lib and restricted food rations at an ambient temperature of 15°C. None of the animals showed significant decreases in metabolic rate when food supply was restricted by one third, suggesting that either these animals are incapable of becoming torpid at 15°C or that the restriction was not harsh enough to induce torpor.

Publications: Not published

Key words: Physiology, energetics, mammals

Growth, reproduction and dietary preference of the Jewfish, Glaucosoma lebraicum

Name: F. Marr (1980)
Supervisor: C. Grant

The report for this project has been lost.

Publications: Not published

Key words: Ecology, reproduction, fish

A study of nitrate assimilation enzyme capacity in Ulva lactica

Name: M. Mathie (1980)
Supervisor: C. Crossland

Light and exogenous nitrate induces nitrate reductase activity in **Ulva lactica**, but other factors such as inducer substances, pyridine nucleotides and nitrite reductase may also be involved. An induction period of 15-24 hrs maximises nitrate reductase activity. A concentration of 5 x 10^{-1}M KNO_3 in the induction solution maximises nitrate reductase activity. The optimum pH range of **U. lactica**'s nitrate reductase enzyme is 7.87 to 8.52. Molybdenum and I.A.D. increase nitrate reductase activity. N.A.D.H. is the preferred electron donor for **U. lactica**. **U. lactica** can be used as an indicator species for nitrate.

Publications: Not published

Key words: Biochemistry, assimilation, algae

Investigation of the effects of exposure on sublittoral macro-algae which aggregate in the littoral zone

Name: S. Pedrick (1980)
Supervisors: C. Crossland/T. Crossland

No abstract was written for this project, although the full report is available for perusal.

Publications: Not published

Key words: Ecology, algae

The role of indigenous, vesicular-arbuscular mycorrhizae as a deterrent against infection of Jarrah forest understorey species by Phytopthora cinnamomi

Name: M. Sampson (1980)
Supervisor: J. Titze/J. Osborne

This study investigated the role of vesicular-arbuscular mycorrhizae as a possible biological control agent to limit or inhibit the spread of **Phytophthora cinnamomi** in the forests around Perth. A range of plant species from the understorey of the jarrah forest were infected with vesicular-arbuscular mycorrhizae, and two levels of **Phytophthora cinnamomi**. An air-conditioned glasshouse environment was utilized for pot trials.

Publications: Not published

Key words: Pathology, fungi, angiosperms

A study into the importance of invertebrate fauna in relation to the success of the rehabilitation programme at Allied Eneabba Ltd, Western Australia

Name: M. Sartori (1980)
Supervisor: J. Majer

This project describes an investigation of invertebrates, and particularly ants, colonising sand-mined areas at Eneabba, Western Australia. This is in a relatively dry zone, so the data provide an interesting comparison with similar studies already performed in rehabilitated bauxite mines situated in moister areas south of Perth. Six sand mines and two heath controls were investigated. The mines represented areas rehabilitated 1, 2 or 3 years previously. In comparison with the heath, the mined areas were generally characterised by having soil with high bulk density which is difficult to penetrate, a low summer but high winter soil moisture, a low plant species richness and biomass, and a low density of soil invertebrates. Fifty-seven species of ants were collected during the study, of which 13 had colonised the mined areas. The mean ant species richness values for the 1- , 2- and 3-year old areas were 2.2, 5.2 and 6.0 respectively. Certain ant species were exclusive to the mined areas, or considerably more abundant there than in the heath. Ant species richness in the mined areas was significantly positively associated with plant species richness and time since rehabilitation. The ant diversity index, which took into account the relative abundance of individual species, was positively associated with total plant biomass in the mined areas.

Publications:

Majer, J.D., Sartori, M., Stone, R. and Perriman, W.S. (1981). Colonization by ants and other invertebrates in rehabilitated mineral sand mines near Eneabba, Western Australia. **Bull. Ecol. Soc. Aust.** 11, 3.

Majer, J.D., Sartori, M., Stone, R. and Perriman, W.S. (1982). Colonization by ants and other invertebrates in rehabilitated mineral sand mines near Eneabba, Western Australia. **Reclam. and Reveg. Res.** 1, 63-81.

Key words: Ecology, rehabilitation, insects

The role of worms in soils associated with red mud deposit

Name: L. Southwell (1980)
Supervisor: J. Majer

Laboratory and field experiments were performed to investigate the growth and survival of the worm **Eisenia foetida**, in the soil of alkaline residue areas associated with a bauxite refinery at Kwinana, Western Australia. Worms survived in the first 50cm of red mud although caustic soda or its derivatives were limiting at greater depths. The soil nutrient status was greatly increased where worms were introduced and had survived. The field release experiments suggest that earthworms will survive in residue area soils if these are cultivated and contain organic material. The implications of worm release in residue areas or in soils ameliorated by residue are discussed.

Publications:

Southwell, L.T. and Majer, J.D. (1982). The survival and growth of **Eisenia foetida** (Savigny) (Lumbricidae:Oligochaeta) in alkaline red mud soils associated with the bauxite refining process. **Pedobiol.** 23, 42-52.

Key words: Ecology, red mud, oligochaetes

Physical factors affecting zonation patterns in six species of molluscs in Princess Royal Harbour, Albany, Western Australia

Name: R. Steckis (1980)
Supervisor: F. Wells

The distribution of six selected mollusc species was studied in Princess Royal Harbour, Albany. Five physical factors (salinity, temperature, sediment particle size, exposure time and tide level) were recorded and related to the distribution of the molluscs. While no single physical factor related closely to mollusc distribution, it was shown that exposure time is probably important in determining the faunal assemblage.

Publications: Not published

Key words: Ecology, zonation, gastropods

Colonisation of invertebrates in rehabilitated sand mines at Eneabba

Name: R. Stone (1980)
Supervisor: J. Majer

This project describes an investigation of invertebrates, and particularly ants, colonising sand-mined areas at Eneabba, Western Australia. This is in a relatively dry zone, so the data provide an interesting comparison with similar studies already performed in rehabilitated bauxite mines situated in moister areas south of Perth. Six sand mines and two heath controls were investigated. The mines represented areas rehabilitated 1, 2 or 3 years previously. In comparison with the heath, the mined areas were generally characterised by having soil with high bulk density which is difficult to penetrate, a low summer but high winter soil moisture, a low plant species richness and biomass, and a low density of soil invertebrates. Fifty-seven species of ants were collected during the study, of which 13 had colonised the mined areas. The mean ant species richness values for the 1-, 2- and 3-year old areas were 2.2, 5.2 and 6.0 respectively. Certain ant species were exclusive to the mined areas, or considerably more abundant there than in the heath. Ant species richness in the mined areas was significantly positively associated with plant species richness and time since rehabilitation. The ant diversity index, which took into account the relative abundance of individual species, was positively associated with total plant biomass in the mined areas.

Publications:

Majer, J.D., M. Sartori, R. Stone and W.S. Perriman. (1981). Colonization by ants and other invertebrates in rehabilitated mineral sand mines near Eneabba, Western Australia. **Bull. Ecol. Soc. Aust.** 11, 3.

Majer, J.D., M. Sartori, R. Stone and W.S. Perriman. (1982). Colonization by ants and other invertebrates in rehabilitated mineral sand mines near Eneabba, Western Australia. **Reclam. and Reveg. Res.** 1, 63-81.

Key words: Ecology, rehabilitation, insects

A study of the mediterranean snail Theba pisana in the Woodman Point area

Name: F. Swerissen (1980)
Supervisor: J. Majer

A study of the seasonal variation of distribution and density of the Mediterranean Snail **Theba pisana**, in an undisturbed area of coastal bushland, showed that dispersal and colonisation of new habitats was related to temperature, moisture, calcium level of the soil and nutrition.

Publications: Not published

Key words: Ecology, gastropods

The comparative innervation of the mouse uterus in the pregnant and non-pregnant states

Name: B. Wyatt (1980)
Supervisor: L. Gibbney

The comparative innervation of the mouse uterus in the pregnant and non-pregnant states was studied using van Gieson's stain, fluoromicroscopy and silver impregnation techniques. Observations were also made on the rat uterus and guinea pig ovary. In the mouse uterus, a greater density of blood vessels and autonomic nerves was found in the cervical region, confirming Marshall's (1969) observations of similar regional variation in the human uterus. Not all adrenergic nerves were paravascular in position, suggesting that a neural element is involved in motor or local stretch reflex control. In the rat uterus, most of the fibres observed were not paravascular, in contrast to Marshall's (1969) observations for the same tissues. In the guinea pig ovary, adrenergic fibres were found both in the stroma and adjacent to follicles, confirming Burden's (1972) suggestion that adrenegic nerves may facilitate ovulation.

Publications: Not published

Key words: Histology, uterus, mammals

Water balance in the Australian Hopping mouse, Notomys alexis

Name: S. Young (1980)
Supervisor: B. Collins

Water gain and loss were measured for **Notomys alexis** at three different temperatures, with and without drinking water. The ability of **N. alexis** to maintain an adequate water balance at each regime was observed. In a laboratory situation, where **N. alexis** is not able to utilize behavioural responses to temperature and water stress, it cannot maintain an adequate water balance unless drinking water is provided. The physiological control of water balance by **N. alexis**, under various temperature and water regimes, is through a reduction in total water loss, rather than an increase in total water gain.

Publications: Not published

Key words: Physiology, water balance, mammals

Post-fire survival of Phytophthora cinnamomi rands, with special reference to soil carbon content and carbon/nitrogen ratios

Name: R. Burrows (1981)
Supervisor: J. Titze/B. Lamont

Current fire management of the jarrah forest based on low intensity fires does not appear to have any effect on the post- fire survival of **Phytophthora cinnamomi**. However, **P. cinnamomi** activity was shown to be related to certain variables that can be controlled by prescription burning. The extent to which these contribute to the activity of **P. cinnamomi** changes as a result of fire. **P. cinnamomi** activity was shown to be correlated with carbon content of the soil. The expression of the C/N ratios in the soil was primarily influenced by carbon in the unburnt sites, and by nitrogen in the burnt soils. Burning in areas of dieback resulted in decreased pH, carbon content, C/N ratios and canopy cover. There were increases in soil moisture content and species diversity.

Publications: Not published

Key words: Pathology, soil characteristics, fungi

Plant-water relations of terrestrial plants

Name: T. Collins (1981)
Supervisor: B. Lamont

Three literature review essays were undertaken: (i) sclerophylly as an adaptation to drought, (ii) the location of the greatest resistance to water flow in plants, and (iii) the relationship between plant pathology and seasonality of rainfall.

Publications: Not published

Key words: Physiology, water balance, angiosperms

The relative impact of three types of granivores: ants, birds and mammals, and the effects of seasonal variables, in the jarrah (Eucalyptus marginata Donn. ex Sm.) forest of south-west Western Australia

Name: C. Conway (1981)
Supervisor: J. Majer

This report records a field study on granivores in the jarrah (**Eucalyptus marginata** Donn ex Sm.) forest of south-west Western Australia. The study was designed to reveal the relative impact of three main granivore types: ants, birds, mammals, and the effects of seasonal variables in the jarrah forest. Dishes of two types (one for access by ants only and one for access by vertebrates only), containing a premeasured seed weight, were left for forty eight hours at a time in the forest. The remaining seed was used to calculate the relative impact of the granivore types. It was shown that ants were the most abundant and consistent granivores, and generally had the greatest impact on seed resources. However, when large mammals were present, they consumed more seed than ants. Other invertebrates consumed significant amounts of seed, and seasonal variables affected seed removal rates. The results in this report should not be considered as reliable for assessing seed predation by small mammals, because Orthoptera and Blattodea probably ate seed during the study.

Publications: Not published

Key words: Ecology, birds, mammals, insects

Salinity tolerance of Eucalyptus wandoo Blakely

Name: L. Darlington (1981)
Supervisor: B. Lamont

Salinisation of agricultural land and water supplies is a major problem in Western Australia. One method of reducing this problem is to revegetate saline or salt prone areas with salt resistant species. Experiments undertaken in this project demonstrated that **Eucalyptus wandoo** is one suitable tree species, due to its high evapo-transpiration rate, salt tolerance at germination, response to additional nutrients, and its ability to tolerate soil salts as an established plant.

Publications:

Darlington, L. and Lamont, B. (1982). 1. Sodium in soils and leaves of **Eucalyptus wandoo** seedlings. 2. Effect of salt and fertilizer on establishment of **Eucalyptus wandoo**. **Aust. Sal. Newsl.** 10, 39-42.

Key words: Physiology, salt tolerance, angiosperms

On the causes and consequences of abnormal insulin secretion in diabetes mellitus

Name: P. Dimitrakos (1981)
Supervisor: L. Gibbney

The relationship between rat size, sex and blood glucose level was studied. Blood glucose level increased with the weight of the animal, but no sex difference was found. This is in keeping with the known relationship between obesity and the incidence of diabetes. The effects of alloxan-induced diabetes in the rat included decreased urine flow and pH, and increased clotting time. Behavioural changes were also noted, including increased appetite, aggression and sensitivity to cold. Insulin-induced hypoglycemia was compared across three animal species; rat, rabbit and goldfish. Effects were proportional to dose and to body size, increasing with dose and decreasing with body size. Both onset of symptoms and recovery were affected, the larger animals taking longer to show symptoms and to recover. The effect of body size was also shown when a glucose tolerance test was administered to rats and rabbits, the larger animals taking longer to reach peak glucose levels, but recovering faster.

Publications: Not published

Key words: Physiology, diabetes, mammals

The rate of plant litter decomposition in Eucalyptus forests

Name: D. Fraser (1981)
Supervisor: J. Majer

Rate of decomposition of jarrah (**Eucalyptus marginata**) forest litter was investigated during 1981. The aim of the project was twofold. Firstly, to evaluate the effects of different soil characteristics (dieback conducive and suppressive soils) on the decomposition rate, and secondly, the influence of season on the decomposition rate. Naturally-shed jarrah leaves were used and the litter bag technique was employed. Soil type was found to have no effect on decomposition rate. The effect of season associated with increased rainfall and a drop in temperatures was found to have an important effect. The overall rate of decomposition was found to be slow, relative to the rate quoted for tropical and temperate forests. From January to October, the period in which the study was conducted, only 35-38 percent of the leaf tissue had decomposed. The stages of leaf litter break- down and the role of Zygomycetes is discussed.

Publications: Not published

Key words: Mycology, fungi

Dark mycelial infections in native plants

Name: P. Frisina (1981)
Supervisor: J. Osborne

The presentation of this report is the culmination of a twelve month study conducted at the Kelmscott branch of CSIRO and the Western Australian Institute of Technology. The study investigated the extent of field infection of dark mycelial fungi in native plants from the jarrah forest. Following excavations of 130 plants, roots were examined. Isolation, staining, and identification confirmed the presence of the dark mycelial genus **Aurobasidium**. In a quantitative trial, dark mycelial fungal species were cross-plated against the die-back species **Phytophthora cinnamomi**. The results of the inoculation trials revealed that plant roots were most adversely affected in the presence of both **P. cinnamomi** and dark mycelial fungi. **Aureobasidium** fungi had a pathogenic effect on the plants, and when both dark mycelial fungi and **P. cinnamomi** were present, the deleterious effect was very marked.

Publications: Not published

Key words: Pathology, fungi, angiosperms

Seasonality of large leaf litter invertebrates

Name: M. Geneve (1981)
Supervisor: J. Majer

Large invertebrates (> 2.0mm) were randomly sampled by monthly litter collections from two study sites near Dwellingup. The study, which was performed over a 10 month period, found that decomposer organisms exhibited an abundance peak in winter, in contrast to predators, whose numbers fell in winter. A seasonal trend in relation to elevation on a slope was also detected. The differences in individual and species abundance are discussed in relation to environmental conditions prevailing at the time. The relationship between invertebrates, decomposition rate, nutrient cycling, soil fertility and **Phytophthora cinnamomi** activity are also discussed.

Publications: Not published

Key words: Ecology, insects

An investigation into Plectrachne pungens and Triodia pungens

Name: D. James (1981)
Supervisor: T. Crossland

Large, potentially harvestable stands of **Triodia pungens** occur on Mt Anderson station. Large harvestable stands of **Plechtrachne pungens** do not, but may exist on other land systems. Resin is produced by glandular hairs on **T. pungens**. Glandular hairs were not observed on sections of **P. pungens**, but may be present in the adaxial grooves, or the adaxial surfaces of the ligule. The amount of resin on plants varies more with season than it does with age of plants. It is unlikely that three-year-old, natural stands of **T. pungens** will produce more than 140kg. ha-1 saturated in n alkanes. Preliminary indications are that **P. pungens** produces less potential oil. **Triodia pungens** is quite likely to produce 800kg. ha-1 resin every three years from natural stands. Both species were grown from seed. **Plechtrachne pungens** showed poor post-germination vigour. **Triodia pungens** seed had very low viability.

Publications: Not published

Key words: Agriculture, resin, angiosperms

The relationship between the Western Spinebill, Acanthorhynchus superciliosus, and Adenanthos barbigera

Name: C. Newland (1981)
Supervisor: B. Wykes

The Western Spinebill, **Acanthorhynchus superciliosis**, has a specific relationship with **Adenanthos barbigera**, a common proteaceous plant in the Jarrah forest at Lesmurdie. The honeyeater community in general, and major nectar producers in the study area, were monitored between May and October. It was confirmed that i) the Western Spinebill, with its long decurved bill, is the main pollinator of **A. barbigera**, and ii) other honeyeaters had restricted floral access to **A. barbigera**, due to the long recurved perianth which is constricted in the middle. A pollination experiment confirmed that **A. barbigera** cannot spontaneously self, and so requires a pollen vector. Seed set increased with i) outcrossing, and ii) hand pollination, indicating that this species requires xenogamous pollen transfer and is pollinator limited.

Publications: Not published

Key words: Ecology, pollination, birds

The effect of using pelletised seed on germination and establishment of native legumes in a reclaimed bauxite pit and in an unburnt natural jarrah forest

Name: D. O'Dea (1981)
Supervisor: J. Osborne

Following bauxite mining, re-establishment of native understorey leguminous vegetation is an important feature of successful rehabilitation. For direct seeding, pelletising small seed provides even germination, uses less seed, and may lead to more reliable seedling establishment. This study investigated the usefulness of a number of pelletising materials, e.g. dry lime, jarrahdale clay, organic material, dried paper, Weipa rock phosphate, yellow sand and sawdust, and binding agents such as methyl cellulose. Pelletised and unpelletised Acacia pulchella seed was sown in the jarrah forest and in a former bauxite minesite. Seed of three plant species, Acacia pulchella, Hardenbergia comptoniana and Kennedia coccinea was incorporated into a glasshouse pot trial. Emerging germinants were counted and root nodulation assessed. Good root nodulation and germinations were recorded from seed pelletised with Weipa rock phosphate and kilne dried paper.

Publications: Not published

Key words: Rehabilitation, germination, angiosperms

Rehabilitation of surface mined lands: a review

Name: J. Omar (1981)
Supervisor: J. Osborne

Recent developments in research and methods of rehabilitation of surface-mined lands are reviewed. Manual and computer searches gave listings of relevant literature. The review provides only orientation and entry into the vast amount of literature on mine rehabilitation. The problems encountered in rehabilitation of surface-mined lands vary regionally, and no one solution can be applied for all cases. The use of topsoil and selection of desirable plants are discussed. Research and refinement of rehabilitation techniques are still evolving, to keep up with developments in the mining industry.

Publications: Not published

Key words: Rehabilitation, mining, literature review

The regeneration of Eucalyptus resinifera (Red Mahogany) in rehabilitated bauxite mined areas

Name: V. Patroni (1981)
Supervisor: J. Osborne

Following bauxite mining in the Western Australian jarrah forest, the overall aim of rehabilitation is to produce a stable, self- regenerating ecosystem. **Eucalyptus resinifera** (Red Mahogany) is one introduced Eastern States species currently used in Alcoa's Jarrahdale rehabilitation programme. This study considered reasons for variations in **E. resinifera** seedling regeneration on former mined land. Two rehabilitated areas were compared, one showing considerable regeneration of **E. resinifera**, the other minimal regeneration of this species. Environmental parameters, e.g. slope, shade cover, ground cover, soil moisture, soil acidity and soil nutrients, were recorded. Simultaneously, germination studies and growth trials were completed under controlled laboratory conditions and in the field. From the two rehabilitated areas, different germination values and seed viabilities were recorded. Using this information, combined with morphological evidence, it was deduced that a varietal difference existed. Additionally, soil in the rehabilitated site with **E. resinifera** regeneration had greater bicarbonate phosphate and nitrogen levels, and was more acid. There was less competition from understorey growth, and seed capsules were densely distributed.

Publications: Not published

Key words: Rehabilitation, mining, angiosperms

The effect of salinity on diatom communities of the upper reaches of Canning River

Name: T. Pitcher (1981)
Supervisor: J. John

Epiphytic, planktonic and benthic diatom communities at sites above and below the Kent Street Weir in the Canning River were investigated for a period of 8 months, from March, 1981 to October, 1981. Major physico-chemical environmental factors such as temperature, salinity, nitrogen, phosphorus and silica concentrations were also studied. Seventy seven taxa of diatoms were identified, and their distributions analysed in relation to physico-chemical factors. The diatom communities above and below the Kent Street Weir showed a distinct distribution pattern when analysed by the halobien system. Salinity was the predominant environmental factor distinguishing the two sites.

Publications: Not published

Key words: Ecology, distribution, diatoms

Diving bradycardia: is it a unitary phenomenon?

Name: M. Poole (1981)
Supervisor: G. Newland

Twenty volunteers (ten male and ten female) of similar age and physical fitness were used to investigate the effects of apnea, facial cooling and immersion on the bradycardial response, using all combinations of the stimuli. Stepwise reduction of heart rate suggested an additive principle was obtained as follows. Female heart rate reduction was: dry facial cooling 10%, apnea 8%, apnea-immersion 10%, immersion 11%, and apnea-dry facial cooling 11%. Male heart rate reduction was: dry facial cooling 10%, immersion 15%, apnea-dry facial cooling 18%, apnea-immersion 20%, and apnea 21%. These results were all different from a resting control (0%) level, although they were not statistically different from each other. The reasons for this are discussed in the text. Other differences from published works were also found, e.g. a suppressed heart rate in both sexes in the post- manouvre period of the dry facial cooling manoeuvre, instead of just the female heart rate being suppressed. Other effects noted which have not been previously commented on in published work included a post manoeuvre tachycardia and an apparent escape of the heart rate from the vagal influence towards the end of some manoeuvres.

Publications: Not published

Key words: Physiology, diving, humans

Time and energy budgets of honeyeaters at Wongamine (Toodyay), Western Australia

Name: M. Richardson (1981)
Supervisor: B. Collins

Time and energy budgets of honeyeaters were studied at Wongamine Western Australia. Nectar availability was also monitored on a daily basis, with most nectar present early in the day. Daily periods of bird activity coincided with peak abundance of nectar. Seasonal variations in energy expenditure and acquisition rates were related to nectar availability, duration of photoperiod and temperature. As photoperiod and temperature decreased, acquisition rates increased and honeyeaters spent a greater proportion of time flying.

Publications: Not published

Key words: Ecology, energetics, birds

The germination and nutrition of sandalwood, Santalum spicatum (R.Br.) D.C.

Name: A. Sawyer (1981)
Supervisors: T. Crossland/J. Fox

A study of the root hemi-parasite sandalwood (**Santalum spicatum**), including seed dimensions and germination, response to different nutrient sources and water relations, was undertaken. The seed of **S. spicatum** is variable in both size and weight. Seed germination is affected by dormancy mechanisms. The temperature for optimum percentage germination of seed is 25°C. Best growth of **S. spicatum** was achieved by the application of fertilizer, containing iron and nitrogen. The responses to calcium and potassium indicated their importance in the nutrition of this root hemiparasite. Other fertilizers also exerted a positive influence in various individual growth parameters of **S. spicatum**. There was no definite indication that nitrogen and phosphorus were important nutrients for growth when supplied in fertilizer form.

Publications:

Barrett, D.R, Wijesuriya, S.R. and Fox, J.E.D. (1985). Observations on foliar nutrient content of sandalwood (**Santalum spicatum** R.Br. DC.). **Mulga Res. Cent. J.** No. 8, 81-91.

Key words: Physiology, germination, parasitism, angiosperms

A study of the herpetofaunal community of Woodman Point

Name: G. Solomon (1981)
Supervisor: J. Ford

The herpetofaunal community of relatively undisturbed tuart woodland, **Acacia** scrub, foredunes, **Callitrus** low woodland and scrub on sandy soils was assessed at Woodman Point, mainly by pitfall trapping over a 12 month period. The community comprised 13 lizard species (Scincidae, Agamidae, Gekkonidae, Pygopodidae), two snake species (Elapidae), one frog species (Leptodactylidae) and one pelagic sea-snake species (Hydrophilidae). The five most abundant species were from the family Scincidae. Activity began in September, with numbers of most species increasing to a peak in February/March. Hibernation occurred in June to August. The reciprocal population trends for **Menetia greyii** and **Ctenotus** juveniles tended to indicate competition between these species. **Lymnodynastes dorsalis** was most common in winter, especially during periods of rain. Peak species diversity and richness occurred during summer and autumn. Overall, species within the community showed no habitat preferences.

Publications: Not published

Key words: Survey, reptiles

The regeneration of muscle spindles

Name: K. Thorbjornsen (1981)
Supervisor: D. Bird

The regeneration capacity of the mammalian muscle spindle was studied following a crushed lesion. Two spindles in the distal third of the first lumbrical muscle in the hindpaw of the rat were crushed. At intervals of 6, 8 and 10 weeks after injury, the fibres were in an advanced stage of regeneration. At 6 weeks, the spindles possessed a well developed outer capsule, and intrafusal fibres contained many myofilaments and satellite cells. At 8 weeks, the regenerating fibres were classifiable into bag and chain fibres, according to their myofibrillar arrangement. At week 10, the spindle morphologically resembled normal spindles at the light microscope level. It had fewer fibres than the spindles examined at weeks 6 and 8, and was also more compact and had a well developed outer capsule.

Publications: Not published

Key words: Physiology, muscle, mammals

Variation in Acacia saligna

Name: P. Tubb (1981)
Supervisor: J. Fox

Large variations in phyllode morphology of **Acacia saligna** were observed within single trees, between trees of the same population and between trees of different populations. Different watering and nitrogen regimes of the soil in which trees grew appeared to affect phyllode morphology. Within single trees, phyllode length varied with the position on the tree. Phyllodes measured from the middle of a tree were not as long as those taken from the top and bottom of the same tree. There was an insignificant difference in length of phyllodes measured from the bottom and top of single trees. There were no differences in phyllode surface area within single trees. Pot trials showed that phyllode length (but not area) was affected by the level of nitrogen present in the soil.

Publications: Not published

Key words: Morphology, phyllodes, nutrition, angiosperms

Seed harvesting ants: their role in grassland ecology and ryegrass toxicity in south-eastern Western Australia

Name: L. Twigg (1981)
Supervisor: J. Majer

The ecology of ryegrass pasture ants was studied to determine their role in the epidemiology of the disease known as annual ryegrass toxicity. Over one year nineteen species of ants were detected in ryegrass pastures. All of these foraged maximally between December-March, the period corresponding to that when most seeds and galls were shed. Artificial depots of ryegrass seeds placed in pastures were reduced by 22-30% within 24 h. Seed/bacteria-gall/nematode-gall choice experiments indicated that ants were unselective harvesters of these items. Most seeds were stored around nest entrances, although lesser amounts were retained beneath the soil.

Publications:

Twigg, L.E. (1982). The influence of seed harvesting ants in annual ryegrass pastures and their possible effects on the epidermiology of ryegrass toxicity. **WAIT Biology Department Bulletin** No. 5, 27 pp.

Twigg, L., Majer, J.D. and Stynes, B.A. (1982). Influence of seed harvesting ants in annual ryegrass and their possible effects on the epidemiology of ryegrass toxicity. In: **Proc. 3rd Aust. Conf. Grassl. Invert. Ecol.** (K.E. Lee, Ed.). S.A. Govt Printer, Adelaide.

Key words: Ecology, seed harvesting, insects

Bacteria associated with proteoid roots of Banksia grandis and their effect on Phytophthora cinnamomi

Name: I. Vecchio (1981)
Supervisors: B. Lamont/A. Barton/J. Titze

The purpose of this project was: (i) to determine which microbes were responsible for the stimulation of proteoid roots in **Banksia grandis**, and (ii) to assess the effect of such microbes upon the stimulation of **Phytophthora cinnamomi** fungal propagules. Four bacterial isolates were recovered from the roots of **B. grandis** in the field, and used as inocula for the treatments. Statistical tests revealed that there were definite interactions between **P. cinnamomi** and the bacterial isolates. The microbes seemed to act as physical barriers, inhibiting the fungus and conferring temporary immunity to the plants. Those seedling treatments with bacterial isolates 1 and 3 (the latter identified as belonging to the genus **Bacillus**), formed a larger number of proteoid roots.

Publications: Not published

Key words: Microbiology, proteoid roots, bacteria

Behavioural and physiological mechanisms utilised by reptiles to regulate body temperature: a critical review

Name: S. Woodroff (1981)
Supervisor: B.G. Collins

Lizards and other reptiles can physiologically and behaviourally thermoregulate. This study examined investigations into thermoregulation of lizards that had been conducted over the period 1944 to 1979. For convenience, the review has been divided up into three periods. The first period, from 1944 to 1970, was when a major portion of the research on behavioural thermoregulation was conducted. Towards the end of this period, as techniques improved, more research was carried out on physiological thermoregulation, especially cutaneous vascular changes in blood flow. Research in Australia and America at this time developed rapidly. In the second period, from 1971 to 1974, there was a move away from research involving lizards in America, and other reptiles, such as turtles and snakes, were studied. The shift was also observed in Australian research, with a move towards snakes. The third period saw a swing back to research involving lizards, although other reptiles were still being examined. The use of computers allowed researchers to predict body postures and temperatures of lizards. Research in Australia seemed to decline in this period, with fewer workers involved in studies of reptilian thermoregulation.

Publications: Not published

Key words: Behaviour, physiology, thermoregulation, reptiles

Effects of steroids and oestrogens on multinucleate giant cells in rats (R. norvegicus)

Name: S. Zappia (1981)
Supervisor: G. Newland

Multinucleate giant cells were collected from rats by the subcutaneous implantation of melenex coverslips, glass coverslips, and cotton wool pellets. The effects of steroids and oestrogens on the production of multinucleate giant cells were studied. The results obtained from the cotton wool implants gave the degree of penetration by the cells and also the amount of cells in dry weight. The mean area covered by cells on the glass coverslips for each group showed the degree of leucocytic response. The cells on the melenex implants were counted and the degree of fusion was calculated. The results obtained from the glass coverslips showed no significant difference between each treatment. No conclusion could be drawn from the cotton wool implants due to an infection in the rats treated with oestrogen. From the melenex implants, the cell counts showed that the number of nuclei within the giant cells, from animals receiving steroid, was reduced. Therefore the data suggest that macrophage fusion is inhibited by the use of steroid (Triamcinolone acetonide).

Publications: Not published

Key words: Physiology, steroids, mammals