Central North Field Naturalists

CNFN

the

NATURAL NEWS

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Patron - Dennis Morris

— Memberships were Due March 1 2003 —

Contacts

Jim Nelson, Secretary & Editor
68 Dynans Bridge Rd
Weegena, 7304
ph. 6368 1313 email: jcnelson@southcom.com.au

Sarah Lloyd, Treasurer (Membership)
999 Denmans Rd
Birralee
ph. 6396 1380 email: sarahlloyd@ipmnet.com.au

Program and Events

June 28, 10.45 FLAG's (see p.4) 1st outing. Meet at the Meander Store for Meander Falls area

July 6, Weegena 10 am. Meet at Jim's studio at 68 Dynans Bridge Rd, Weegena. Helen Jones will show slides of Lord Howe Island. There will be a hot pot of soup on the stove for lunch, so bring what you want to go with it. If the day is suitable, we can take a walk in Weegena. If not, we will look at keying out Tassie's fantastic mosses.

August 3, Alum Cliffs State Reserve 10 am. Meet at the Alum Cliffs carpark (turnoff sign between Chudleigh and Mole Creek) We will inspect the new viewing platform and track work for this spectacular site. If weather is suitable, we can look at some of the flora in the reserve, and if not we can retreat again to Jim's studio at Weegena

Sept 7, Badger Head area 10 am. Travel North on A7 to Beaconsfield, and then take left fork on C720 to Yorktown. Just past Yorktown turn left onto C721 to Badger Head, and meet at the carpark

Oct 4 & 5, Weekend at Skemps with trip to Mt Barrow on Sunday. Arrivals after 10 am Sat for overnight stayers. Bring bedding and food. For Sunday, meet at 10 am at the turnoff to Mt Barrow from A3 onto C404

Colour in nature

by Saray Lloyd

Orange, red and Yellow.

Carotenoids, the yellow and orange pigments that are most conspicuous in carrots and pumpkins, in fact occur in all parts of plants. Although ever present, carotenoids are usually masked by the strong green photosynthetic pigment known as chlorophyll (literally "green leaf"). In autumn deciduous plants retrieve any remaining useful substances from their leaves before dropping them, chlorophyll breaks down faster than carotenoids and the orange and yellow pigments are revealed.

Carotenoids are important nutrients that stimulate the immune system and are used by both plants and animals as their source of vitamin A. Animals are unable to make their own carotenoids and must obtain them from their diet. They store excess amounts in their fat and other body tissues or eliminate them through normal bodily functions - the golden yellow colour of butter comes from the surplus carotenoids eaten by cows.

Similarly, the orange, red and yellow colours found in the beaks, feet and feathers of birds are derived from the carotenoids they ingest in their food. Thus, the substances in plants play an important role in the signaling behaviour of birds.

The droppings of herbivorous animals such as cattle, goats and sheep are full of carotenoids. Cow dung is particularly rich and recent research has found that the rare **Egyptian vulture** (*Neophron percnopterus*) obtains all its dietary requirements from this unusual source. As a consequence of ingested carotenoids it has a bright yellow head which

seems to have evolved into an important social signal in mating and dominance displays.

Closer to home, research has shown that the bare skin on the heads of **brown falcons** (*Falco berigora*) such as the cere (the area at the base of the upper beak containing the nostrils) and eye-ring contain more yellow and are brighter in adults than in younger birds. This is particularly visible in adult males, and as adult raptors are usually better breeders than younger birds these brighter colours gives females a visual clue to the age – and therefore quality – of potential mates.

REF:
Hickey, G. (2003) Nature Strips (Eat Dung and Dye). Nature Australia. Australian Museum Trust, Sydney.
King, J. (1997) Reaching for the Sun: How plants work. Cambridge University Press, Cambridge.
McDonald, P. G., (2003) Variable plumage and bare part colouration in the Brown Falcon, Falco berigora: the influence of age and sex. In Emu Austral Ornithology. CSIRO Publishing. Melbourne

Ultraviolet light

Colours are perceived differently by different species. Until recently, it was believed that birds perceived the same colours as humans, but it is now known that many birds see ultraviolet light and can see a much richer array of colours than most mammals.

Many parts of plants including some flowers and the waxy coat of fruits and seeds emit UV light, and experiments suggest that birds use this UV light to detect these foods.

Some carnivorous birds also use UV light to locate their prey. The main food items of **European kestrels** (*Falco tinnunculus*) are voles, a small Northern Hemisphere rodent. Voles construct runways through vegetation and mark these trails with urine and faeces that absorb more UV light than the surrounding vegetation. While this trail-marking strategy may deter other voles, the excrement provides the overhead predator with a guide to the most recent vole activity and therefore assists it to find its next meal.

UV light may also be used to deter predatory birds. To human eyes the caterpillar of a particular European butterfly (*Lithophane ornitopus*) is perfectly camouflaged when resting on its green food plant but when viewed through a UV sensitive camera the caterpillar literally glows. Despite being very visible to birds, for some unknown reason they leave it alone.

Ref:
Davis, W.J. (2003) Colour and ultraviolet vision in birds. In Interpretive Birding Bulletin. January/February 2003, Queensland. (IBB Vol. 4 no 1)

Structural Colours – playing with rainbows

Many of the colours in nature are pigments, the most common is melanin that is responsible for the browns and blacks found in insects and the dark hair and skin in humans. Other pigments, such as carotenoids come from the foodplant (see above), yet others are produced by the animals themselves.

Butterfly wings are made up of tiny scales that overlap like tiles on a roof. Like the pixels on computer generated images, each scale has a single colour, producing an overall effect like a fine mosaic. The colour of each scale is due to the presence of a pigment or a structural colour – or both.

The vibrant blues, violets and reds on many butterflies (and some birds) are structural colours. On each scale there are microscopic structures such as fine parallel ridges or tubular holes that scatter and deflect light and produce some of the most brilliant colours in nature.

Butterfly wing patterns

Butterflies are among the most beautifully coloured insects and many of their colours are permanent pigments that are retained long after death.

Almost all the food utilised by a butterfly is eaten during its larval stage – the adults only need to sip water and nectar. Very often the larvae will feed on only one group of plants - for example, the larvae of the familiar **cabbage white butterfly** (*Pieris rapae*) feeds only on brassica species. If the food plant contains toxins, these accumulate in the body of the grub making it distasteful and often poisonous to predators such as birds or reptiles.

In the vast majority of butterflies the colours and patterns on the upper wing surface have evolved independently from those on the lower surface. On the upper surface, they have a variety of functions including regulation of body temperature, attracting a potential mate or deterring rival males, or as a signal to potential predators that they contain toxins.

The lower wing surfaces have evolved independently and are coloured for different reasons. Those of the **ptunarra brown** (*Oreixenica ptunarra*) are cryptically coloured making them almost impossible to see when they rest with their wings closed amongst *Poa* grass tussocks on dewy mornings. The lower wings of **leprea brown** (*Neoxenica leprea*) are also drably coloured. This butterfly is closely associated with **myrtle beech** (*Nothofagus cunninghamii*), under which its larval foodplant grows. During cold and wet weather the adults settle on the twigs of the beech where the exposed patterns on the underside of its wings so closely resembles the lichens growing on the trees that they are difficult to see unless disturbed.

Pellets (or Casts)

by Sarah Lloyd

Although I have occasionally collected pellets at Black Sugarloaf, I have only once seen a bird in the act of regurgitation. I was sitting on the roof of our house with my niece and nephew who were being even noisier than usual as they were excitedly anticipating their return home to Melbourne. I have not seen an Australian Magpie at Black Sugarloaf before or since that day and it may have been attracted by their commotion. It landed on a solar panel barely a meter from where we were sitting, took on a slightly weird appearance and then proceeded to expel a pellet. My niece and nephew were not convinced by my story that the bird was so sickened by their boisterous behavior that it was driven to vomiting!

It is believed that many species of birds including honeyeaters regularly eject pellets but the act is seldom witnessed and the pellets of most birds are so small that they are unlikely to be found. Also, the pellets consist of hard indigestible material such as bones, claws, beaks and invertebrate remains, surrounded by softer substances such as fur, feathers and vegetable matter, are not generally held together by digestive substances and therefore quickly break apart.

The ability of birds to bring up pellets is because of the structure of their stomach, which has two parts.

The first part is known as the glandular stomach or proventriculus that produces enzymes which begins the process of digestion. The food then passes to the second part of the stomach known as the muscular stomach or gizzard. The gizzard lacks digestive enzymes and varies in function according to species. In domestic fowl, the stomach contains small stones that the bird has swallowed which, assisted by the strong muscular action of the gizzard, grind food particles. In most raptors the gizzard acts like a filter allowing soluble material to pass but retaining insoluble substances like bone, teeth, and fur. This material is then compressed into a cast the shape of the gizzard, coated with mucus and regurgitated as a pellet.

The pellets of diurnal raptors and owls differ in several respects. In raptors the digestive enzymes are more acidic leading to a greater breakdown of food especially bone. Raptors also tend to ingest less pellet material because they generally pluck their prey before swallowing.

Unless the act of regurgitation is actually observed and a pellet immediately retrieved, the pellets most likely to be found are those of larger birds including diurnal and nocturnal birds of prey. The pellets I occasionally find near home are approximately 35mm long, contain the remains of beetles, European wasps and seeds and are presumably from Grey Currawongs. However it was the discovery of a pellet during our field trip to Reedy Marsh that prompted this article.

Helen Jones took the pellet to the Queen Victorian Museum where Judy Rainbird, who has done extensive work on the diet of Masked Owls and also illustrated the Skulls of the Mammals in Tasmania (1983) was able to identify the skeletal remains as belonging to a Sugar Glider that had fallen prey to a Masked Owl.

Masked Owls pellets are frequently found under favourite roosting or nesting sites. In Tasmania there are accumulations of excreta measuring over one cubic metre and it is believed that some sites may have been in use for as long as similar sites of Peregrine Falcons - calculated to be at least 19,000 years old. (Mooney 1993)

The study of pellets can give an insight both into the diet of the animal and the changing populations of fauna in an area. Masked Owls generally swallow prey whole or in large pieces so their pellets frequently contain large bones and whole skulls. Before the introduction of the black rat their diet contained a large proportion of broad-toothed rats and long-tailed mice, however in recent times their diet is mostly comprised of introduced species predominantly black rats, house mice and young rabbits. They occasionally eat bandicoot and quolls, less often take bats and cats and take a significant number of introduced passerines especially starlings.

Examination of the pellets of Sooty Owls at Jenolan, New South Wales by Tasmanian zoologist, Bill Brown revealed that the birds had preyed on a variety of species including the Rufous Bettong, that has not been reported alive in the district for almost 100 years, and a White-footed Rabbit-rat, now presumed extinct in Australia after an absence of reporting this century.

Nocturnal birds have developed three remarkable traits that enable them to function in darkness.

It is believed that owls' eyes are able to absorb 100 times more light than human eyes, so that for them the darkest night is like early dusk and dusk is like bright daylight.

Their hearing is equally acute. They have large ear openings situated near the facial discs and flaps of skin on each side of their head. These features help to direct sounds to the inner ears, which both amplifies the sound and enhances the birds' ability to determine the direction of the sound source.

Silent movement is achieved through slow flight and soft feathers. Owls have large broad wings in relation to their weight and can fly very slowly with a slow flapping rate. Their feathers are soft and velvety, and the flight feathers of their wings and tails have frayed trailing edges.

References:

Green, R.H. (1983) Skulls of the Mammals in Tasmania. Queen Victoria Museum and Art Gallery, Launceston.

Hollands, David, (1991) *Birds of the Night. Owls, Frogmouths and Nightjars of Australia.* Reed Books Pty Ltd, Sydney

Thomson, A.L. (Ed) (1964) *A New Dictionary of Birds.* The British Ornithologists' Union, London.

Mooney, Nick (1993) *Diet of the Masked Owl in Tasmania: past and present.* Australian Raptor Association, RAOU, Melbourne

The Thousand and First Cut

by John Hayward

Every time I drive to Hobart, passing the oncoming convoy of log trucks, I am tormented anew by the mystery: how much of Tasmania is being flattened this year? With the suppression on business confidentiality gounds of woodchip export totals in 2001, the only externally compiled indication of logging rate, the lights were turned off on the issue. At that time, Tasmania led not only Australia but the entire developed world in the rate of native forest destruction, solely on the efforts of our logging industry. We are now pulling away from the field.

With the horrendous woodchip figure out of the way, the industry appeared to waste no time in booking their own statistics in for cosmetic surgery. The Forest Practices Board's figure for area of native forest logged plummeted dramatically, by some 10,000 ha. for 2001-2. The improvement was rendered particularly remarkable for coming in the same year that the area declared as Private Timber Reserves more than tripled from the previous year, from 14,000 to 43,000 ha, and Gunns' profits also more than tripled. (Some of you who have read the 2001-2 FPB annual report may argue that it cites only 33,000 ha having been declared. But subtract the 334,000 ha PTR aggregate stated in the 2000-01 report from the 377,000 in the 2001-02 report and you get the figure I used. Even our professional forestry scientists make mistakes).

It was partly a desire to pin down this nagging question to rest that took me to the "Thousand Cuts" conference on land clearing organised by the Tas Conservation Trust on 23-4 May. Land clearing, after all, is an icon of the UN agenda to which even environmental rogues, such as ours truly, pay at least nominal respect. Who knows if some international protocol might winkle out the rate of our destruction.?

The conference was keynoted by prominent U of Queensland ecologist Hugh Possingham, who spoke with fervour of the ecological uniqueness of Tasmania, and of our losses and prospective losses from the web of life under our current mismanagement practices.

Possingham was followed by overviews of land clearing from Commonwealth, WWF, and TCT perspectives. Australia is the worst in the developed world on this count, and the world's fifth worst in the open category for gross area trashed. It was frustrating to hear forestry's own figures, which exclude coupes purportedly re-seeded by local seeds, cited as

Tasmania's land clearing total . One wonders what percentage of all species obliterated in a clearfell are painstakingly regenerated by our forestry. Probably a figure similar to the probability of being killed by a mealworm.

The first afternoon's addresses on flora and fauna tended to be somewhat academic, whether from scientific detachment, or an institutional organism's pragmatic avoidance of the f-word.

One speaker who caught my notice for both the implications of his subject and the urgency of his concern, was hydrologist Dr David Leaman, who spoke of the implications for groundwater and the base flow of waterways from the unchecked expansion of forestry. With three quarters of our forest vulnerable to forestry, the consequences to water will be severe. Sixty percent of the Meander Dam catchment, for example, is under forestry. I had tantalising visions of the Coalition of the Selfish being split with the TFGA's realisation that their forestry mates were doing them in too.

Leaman touched fleetingly on a potentially explosive aspect of the issue, groundwater contamination. Gunns continues to use Atrazine, which has been found to be so extraordinarily potent an endocrine disrupter and mutagen in amphibians that some researchers have theorised it may be one of the factors in the worldwide disappearance of frogs. It is now listed as a likely carcinogen for humans.

While it is banned or tightly restricted in most parts of the developed world, Tasmania permits a generous 20 ppb in our water, about 200 times the concentration needed to put paid to frogs.

It was revealed some month ago that Gunns samples the water in all its coupes . John Gay made the claim that none of its samples had ever revealed a trace of any chemical, and that the public was welcome to inspect the results at DPIWE. As this level of purity is not approached anywhere else on earth, I rang DPIWE.

It turned out that the results were the intellectual property of Gunns, to which DPIWE had no access. The pollution control official expressed hope that Gunns would inform him if they found anything untoward,, adding that it wasn't "an ideal situation".

The second day included sessions on landclearing impacts on fauna and landclearing controls (which needed padding) but the highlight for me was the Special Interest Group session, particularly the presentation from Graham Green of Timberworkers for Forests. This wrenched the proceedings from the genteel pretence that the issue was a matter of science and reason, to its raw reality, institutionalised crime.

Graham had the first calculation I've seen of the stupendous waste in the industry. The diversion of just 25% of presently burned special species logs from state forests into sawn timber would produce value of $680 million per year. Amongst the eucalypts presently pulped, a diversion of 25% of the tonnage presently chipped into sawn timber at a modest 28% timber recovery rate would produce an additional $387 million for the Tasmanian economy. Graham , with some scientists and other timberworkers, calculated that there were 40,000 tonnes of myrtle awaiting burning in one coupe alone, enough to supply Tasmania's demands for 20 years. Our world ranking for stupidity must exceed even that for woodchip production.

The monstrous scale of the waste was complemented by the footage shown by beekeeper Simon Pigot of logging devastation in the rugged terrain around Lake Gordon . Whatever you think of exotic bees, they don't have the impact of skidders.

The conference's final session was a kind of summary forum, Three issues were to be discussed. I've forgotten the second and third, but it doesn't matter, because the first was whether we should define "landclearing". Cold sweat came with my inkling that we were giving birth to a quibble every bit as immortal as "old-growth forest".

People nonetheless leapt in with all manner of intricate formulations. The danger wasn't perceived even when FT's Mick Brown proposed that clearfells followed by reseeding should not fall into the landclearing category because in four hundred years," hey presto". The suggestion was received politely, except for a solitary guffaw. Heads turned in my direction. The conference closed, as will all future conferences, no doubt, without the issue being resolved.

I left wondering how things would have gone had it started off with the environmental blitzkrieg in the aerial footage taken by Simon Wearne and Chris Strong over the North East, which was seen by a handful of exhausted delegates after the close of the first day. Then Graham Green and Simon Pigot. Then let the others discuss things in their real context.

2nd FUNGIMAP Conference, May 2003

by Sarah Lloyd

Twenty conference participants met at the Melbourne Botanic Gardens, the headquarters of FUNGIMAP, to travel by bus to Rawson Village in the Victorian highlands. Here we joined approximately 70 other people to attend a series of lectures, field days and workshops beginning on Thursday 15th and returning to Melbourne on Tuesday 20th.

Fungi are fascinating organisms that attract the attention of an equally fascinating array of people! I met an entomologist, meteorologist, taxidermist, botanist, lichenologist, doctor, fabric artist, actuary, yoga teacher and of course many keen naturalists and mycologists.

UK mycologist, Dave Shorten entertained us on Thursday evening with a talk entitled "European Fungi Folklore" and close attention to some of the more obscure details in his talk were to pay off later at the fungi trivia night. (It's very important to know, for example, that according to folklore if you step inside a fairy ring you will get younger – unless you fall asleep and then you will age considerably).

Friday's timetable included more serious lectures, with topics such as Cortinariod Fungi, Some common Gymnopilus and How To Recognise them, The Use of Fungi for Textile Dyes and Paper, Successful Survey Techniques for Macrofungi in WA, Tasmanian Alpine Fungi and Distribution Patterns of Australian Fungi – based on the data collected thus far by FUNGIMAP participants.

[FUNGIMAP is a scheme to map the distribution of 100 species of Australian mushrooms, toadstools and other fungi using the information sent in by a network of volunteer recorders across Australia.]

During the next three days participants spent each morning in the field looking for fungi. Being close to the Victorian Highlands and Mt Baw Baw ensured that a variety of vegetation types ranging from wet Nothofagus forest to dry eucalypt forests were easily accessible. All had experienced recent rain so there were plenty of fruiting bodies to inspect in the field and many specimens were returned to the conference venue so participants could become familiar with the more unusual species as well as the fungimap targets.

Each afternoon was spent doing workshops on a variety of topics.

I chose basic microscopy, Keying Fungi to Genus (using a new interactive key) and a workshop on the genus Mycena concentrating on microscopic features.

The two workshops that involved the use of microscopes taught me, if nothing else, that the microscopic features of fungi can be incredibly difficult to see and require many, many hours of patient looking and lots of practice in order to know what to look for.

Bruce Fuhrer's talk on the Saturday night was a good indication of just how much we have to learn about fungi in Australia. Titled "My Favourite Hectare" Bruce talked about the amazing variety of fungi he has found at the Warrandyte State Park in Melbourne over a number of seasons. Even a room full of experts was unable to name many of the approximately 40 beautiful slides he showed us.

The fungi trivia quiz was a riotous success (especially as I was on the winning team). Adjudicators were shouted down when they made an unpopular decision and were heavily under the influence of several bottles of red – and therefore easily bribed! To win such a quiz, it is vitally important to know - amongst other things - that the literal translation of Lycoperdon (a genus of puff balls) is "wolf's fart".

FLAG i.e Fungi Lovers Adventure Group is a recently formed group that aims to learn more about fungi, the important roles they play in the environment and most importantly to have FUN!

Our first outing will be to the Meander Falls area on Saturday June 28th.... Meet at the Meander Store at 10.45.

If anyone wants more information about FLAG, or wants to be kept informed about future fungi events please contact Sarah - contact details on front page

A Journey Toward Respect

by Jim Nelson

In January this year I was carrying out a survey project to give us a clearer picture of the distribution and status of the crayfish, *Engaeus granulatus*. This species is unknown from any secure reserve, occurs within a rapidly developing area and is believed to be restricted to a relatively small geographical area.

Throughout this survey work, I became increasingly worried about impacts the species was having to cope with. Then, an event occurred which has put the trials of *E. granulatus* into an entirely different perspective. The Engaeus Project Officer, Joanna Lyle, asked me if I would be interested in checking out a burrowing crayfish site at Greens Beach. Since this was not too far from where I was working, I agreed to have a look. What I found was both exhilarating and disturbing.

I arrived at the Greens Beach site, and immediately wondered if I had the right place. But the front garden had a wet patch which was supposed to be the area where the burrows were, and sure enough, there were a handful of what looked to be Engaeus diggings. The soil was very wet, black and peaty, and after about an hour of digging through this I had reached the bottom of a burrow and was lying on the ground with my arm down the hole when I managed to grab the crayfish. After bringing it to the surface and giving it a dip in water to wash off the mud, I stared in disbelief at a different looking Engaeus than I had ever seen.

My first impression was that I might have found one of the Victorian species. Two of these have toeholds along our north coast where they were presumably stranded after retreating ahead of sea water inundation of the Bass Plain following a Glacial period. (See Peter Bamford's poem in this Bulletin)

However the crayfish didn't key out as anything known. There followed some correspondence with the taxonomist, Dr Pierre Horwitz in WA. Pierre wanted detailed information, and in the process of attempting to describe the various required characters, I decided to anaesthetise the animal. I had done this on several occasions in the past, and all that is required is to immerse the crayfish for a few minutes in some carbonated water. I happened to have some "Homebrand" soda water in the fridge and so I used that. I usually use carbonated Mineral Water, but I figured that any carbonated water should be all that is required. Unfortunately, the soda water killed the animal, and I can only surmise that a high sodium content may have been responsible. However, that accident did allow the specimen to be sent to Pierre, therefore receiving confirmation that we had something undescribed.

Pierre confirmed that the Greens Beach crayfish was at least closely related to the an undescribed find of Dr Niall Doran's (NCB Threatened Species Zoologist) from the Tunmers Marsh area, and could possibly even be a variant of that species. More information was needed, and another specimen was required, particularly because the one I caught was missing a claw which Pierre suggested was likely to be a large dimorphic one, and thus an important feature for describing the species.

Meanwhile, I had been keeping the family who owned the Greens Beach property informed, and they were very interested in the unravelling of what had been a 50 year mystery of the burrows in the garden. When told they had something special, they were excited and concerned to do the right thing by their rare crayfish. When I accidentally killed the animal, I felt pretty inept when I had to confess to them what had happened.

Following on from the initial excitement, Niall and I began to feel uneasy as we considered just how critically endangered animals like this might be, having escaped detection up until now by existing in a tiny niche that no one would normally investigate. How many such niches are out there, and how would we ever find them? We decided that doing a news story might assist finding more of these niches at least around Greens Beach by appealing to people to supply us with information through contacting the Launceston Environment Centre or the Nature Conservation Branch DPIWE. The ABC and the EXAMINER covered the story, and we now have a number of sites to chase down.

A couple of days were spent around the Greens Beach area looking for further signs. So far, we haven't found anything. Another animal was dug up in the road drain at the original site for the news story, and we now have it as a live captive. We discussed the possibility that the Greens Beach site might contain the entire population of a very endangered species. We therefore decided we were ethically required to be as cautious as possible, and we decided to investigate whether the new captive we had could be kept alive while assisting the description process, and then returned home.

The proposal to describe the species using the live captive has generated considerable discussion in taxonomic circles. Dr Bob Mesibov of the QVM first supplied me with information from the taxonomic Code that might allow the description of a species to be done from an endangered live animal, and then this holotype is released. [The holotype is the (normally preserved) specimen from which the species was described that is (usually) lodged in a museum for reference] Such a scenario of holotype release presents problems in terms of having an example of the species which can be accessed for reference by researchers. However, there are precedents for not having holotype specimens such as species that have been described from fossils.

Taxonomy being an ever refining pursuit of nomenclature, with the definition of a species being a hypothesis (thus able to be disputed and disproved by future work), means that having a holotype released into the wild is not considered ideal. In this case, we do not quite face that situation because we do have the first specimen that I accidentally killed. It is not a good holotype because it is missing a major feature, the missing large claw, but otherwise it represents a specimen that can be lodged for reference. The live crayfish can be compared to the preserved specimen, the large claw can be described, photographed and illustrated, as can any other character variations, and then the animal can be returned home.

Dr Harold Brown is a friend and a researcher at Northern Illinois University in the area of the philosophy of science. When I asked his advice about the ethics of collecting rare specimens, he answered me with the following: *"I have long been intrigued by the interest of so many biologists in maintaining species while being quite indifferent to individuals - except as objects for them to study."*

It is certainly true that the practical conservation of species requires a focus on the species as a whole, and that perhaps too often the working biologists can become callous to individuals within the species through casual or needless collecting. Perhaps it is time to begin thinking of better ways forward.

Perhaps we need to start trying to collect species as electronic information, rather than persisting with extensive collecting. Our capacity to measure the sequences of nucleic acids from the DNA of living species may eventually lead to simply storing a drop of fluid. Electronically stored information such as high quality photos could greatly assist making character information of species more available.

More respect for the individuals of the species we study seems like a worthwhile goal to me.

Song of the Displaced Crayfish: *Engaeus laevis* & *E. cunicularius*

By Peter Bamford

Perhaps two, certainly a few, millenia ago,
We were safe on the Bassian plain;
Having done the hard yards from the North
With no thought of moving again.

Our burrows were snug.
We had well-rotted wood, and succulent roots, to eat;
An occasional worm for a hard-earned treat.
Our chimneys stood tall.
We had it all.

Simple creatures... how were we to know
The glacier had shrunk itself southwards?
Long ago.
Or that, ceaselessly, rising sea-levels
Were calling time upon our ancient revels.

We trekked again;
Generation upon generation.
Water-coursing.
Island-hopping.
Pushing through;
Seldom stopping, but for a century or two.

To find our last, safe place
Toe-holds, but secure enough, in Tasmania's North.
Survival proof our Darwinian worth.
Or so we've thought
In our slow, crustacean way.

A doubt remains.

We have escaped the rising sea
To where humans range
With all their purblind practices;
Sharing our latest haven
With another endangered species.