The Natural News

Central North Field Naturalists Inc. (CNFN)
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Photo : Bush cricket (*Caedicia simplex*) eating exoskeleton

Why Crayfish? by Jim Nelson

I have always considered my interests in natural history to be fairly wide ranging. My early interests as a boy consisted mainly of trees, fish (and fishing), birds, turtles, snakes, mammals and insects. I was lucky enough to live along a section of the Fox River in Illinois, which is part of the Mississippi catchment. The centre of my existence as far as I was concerned was the river, and I spent much of my free time exploring its wooded islands, watching the birds (especially the water birds), learning where various animals lived such as musk rat and the odd beaver, catching snakes, and learning where the different species of fish hung out in order to have a better chance of catching them.

American Beaver

My interest in fishing led me to an appreciation of freshwater crayfish, initially because they were favoured by most fish as a food. One of my first important observations about crayfish occurred when I decided at the age of 12 to go into the bait business selling large earthworms called 'nightcrawlers' as well as "crawdads" (crayfish). The crayfish part of the enterprise failed when I discovered that they are very cannibalistic, and cannot be kept together. However this failure raised my curiosity, and I began to look more closely at crayfish habitat in order to discover the niches they retreated into, especially when they needed to moult safely. In the process, I found it fascinating to learn that many invertebrates have to moult (by shedding their old, hardened carapaces) in order to grow. Underneath is a new, soft carapace which can be "pumped up" before it hardens, thus allowing the animal to expand in size.

(I share Jim's fascination for moulting invertebrates and have been fortunate enough to catch them in the act. See photos below, front cover & page 7 Ed.)

Newly emerged shield bug with exoskeleton under leaf of *Correa lawrenciana*

I remember trying to enthuse about this to my friends, and receiving little more than puzzled looks, or a "who cares?", or "do you wanna play football?" responses. There was, however, a neighbour who was a fellow fisherman friend of my father's and who appreciated my interests. He had interesting bits of local knowledge and began to tell me fascinating things about many creatures living in or near the river. He also introduced me to a concept he called "conservation". He and my father were members of the Sportsmans Club, which was composed of hunters and fishers with an interest in preserving the environment for their enjoyment of these "sports". My father was encouraged to bring me along to the club, and over the years I was taught many lessons about their version of looking after the environment. I was even sent off to a conservation camp one summer where I learned lessons about clean water and clean air, and how a person could and should look after the environment - perhaps even if he didn't do so in order to hunt or fish.

When I was about 15, the area we were living in managed to attract a huge manufacturing company to establish locally. Suddenly, new housing started springing up everywhere as the town went into considerable expansion. The old sewage system couldn't cope with this expansion, so the city fathers in their wisdom agreed to divert the excess sewage into the storm drain system that emptied into the Fox River. My father objected vigorously to the city council and the mayor, but he was told this was "the price of progress". It seemed to us more like the terrible price of stupidity. I remember reading in the local paper (The Beacon News, but known as the "Be Confused") that there was really no problem because a river could "purify itself every hundred yards". As I walked along the river looking at the revolting flotsam, I failed to find any evidence of this "purification", and the dying fish helped confirm my suspicions of the lies told in the name of "progress".

Finally, as the river became little more than an open sewer, we moved away. Later, when I was at university, an environmental activist had started up in the area and called himself The Fox. He began to block up the various effluent pipes dumping filth into the rivers, and gained nationwide attention by doing so. I remember how we cheered for the Fox from the sidelines, and waited for the evening's TV news to hear and see his latest "action". He was one of the earliest and one of the most successful environmental activists, and the local County sheriff was so frustrated he ordered his deputies to "shoot to kill". But his deputies knew the sheriff was being paid as a "security advisor" by one of the factories involved in massive pollution of the river. The deputies were so outraged by their sheriff's order that they found out who the Fox actually was, and started giving him messages in a bottle hidden behind a certain tree whenever there was going to be either extra security or no security on that factory's effluent pipeline so he could plan his actions.

There were numerous rumours about the identity of the Fox, but many years later on a trip back to the U.S. I finally found out who he was. He was a school teacher, and he ended up writing a very thoughtful book about why he did his actions. He explained to me that his actions suited the times, but he encouraged people who were interested in conservation outcomes to find better methods than he had used. His methods were perhaps right for the times, but they were also polarising. He felt that wider education about the environment was the main answer. Nevertheless, his activities contributed significantly to a public awareness of the problems, and contributed to the momentum to have a Clean Streams Act

that was passed by Congress. He died not long after I interviewed him.

These days, Aurora, Illinois is trying to clean up the Fox River after many decades of abuse. In recent times they have found it necessary to get their drinking water from the river because they have largely used up the local aquifer. Now there are even articles in the same old ultra conservative newspaper about the need to look after the river and stop pollution.

Upon my arrival in Tasmania in the early 70's, my interest in freshwater crayfish was revived when I discovered the streams in my local environment in the Mersey River valley contained the largest freshwater crayfish, indeed, the largest freshwater invertebrate, in the world: *Astacopsis gouldi*, known locally as the Giant Freshwater Lobster. I also discovered the extra element of caution that is involved handling a crayfish capable of doing considerable damage if it manages to catch hold of you with a giant claw.

In the late 1980s noted Astacologists, Dr Pierre Horwitz, and Dr Premek Hamr declared *A. gouldi* to be in trouble from over fishing and habitat destruction. Our fledgling field naturalists group, then called the Deloraine Field Naturalists Inc., decided to apply for and carry out a Commonwealth funded study to determine any impacts of habitat destruction on the giant crayfish. This was an enormous commitment from the group, and involved around a dozen field nats doing weekend surveys over the summer season of 5 different streams in the Gog Range. These streams were graded from 'Pristine' to 'Severely Impacted' due to forestry operations. The published result was the Growns Report written by our supervisor in the field, Dr Ivor Growns, and it correlated the size of a stream's crayfish populations to the impacts on the streams from forestry operations. This report was of course denigrated and ignored by the Tasmanian State agencies, but led to Dr Horwitz successfully nominating *A. gouldi* on behalf of the Field Naturalists as a species Vulnerable to Extinction under the Commonwealth's Threatened Species Act.

(Thus does the CNFN have *A. gouldi* as its logo, which was retained after the DFNG metamorphosed into the present organisation.)

Around 20 years ago while Pierre Horwitz was in Weegena to give a public lecture we had organised, he informed me that since I was so keen on crayfish he wanted to show me something REALLY interesting. He introduced me to a group of crayfish called *Engaeus*, which are a genus of burrowing crayfish. This was like a re-visit from my boyhood; I once again encountered a burrowing crayfish, only this time it was in the enthusiastic company of the reigning expert, Pierre, who had carried out his PhD work on the genus *Engaeus*, and had named most of the species. He impressed upon me how there was a lifetime of work to be done just gathering and refining distribution information on this group, not to mention the possibilities of finding new species. He suggested that amateur enthusiasts like me were needed to carry out some of the work. I was hooked.

How could I resist? It was like going back to something that had been waiting for me for many years. Mind you, the learning curve was pretty steep because in order to identify species I had to learn quite a bit of crayfish anatomy to use Pierre's key for the various species. Meanwhile, Pierre had taken a position at Edith Cowan University in WA, so I seemed to spend a lot of time writing, phoning, sending emails and mailing specimens to him. To his credit, he always was willing to give me the time and advice I needed, and especially

to assist me with the taxonomy which I at first found impenetrable until I became more familiar with crayfish anatomy. Some key anatomical features such as the "exopodite of the third maxilliped", which (once found!) took considerable patience with my cheap, dissecting microscope to determine whether it might be multi-articulate or not, otherwise, I couldn't move any further along in the key.

When we managed to get the Giant Freshwater Crayfish listed as a threatened species, it was one of the first invertebrates to be put on the list. Given that invertebrates make up most of the life on earth, it did open up a can of worms (sorry), and it almost goes without saying that invertebrates (or fungi - Ed.) don't exactly get equal billing with vertebrates or plants.

Working with endangered crayfish over the years has certainly had its challenges. For instance, our field nats contributed over eight years of voluntary work on the *Astacopsis* Recovery Plan once the species was listed, and in the end a bureaucrat in the lead agency simply watered down the plan according to what that department needed to do in order to not upset forestry interests.

This past year, I saw a news piece on the TV about how *Astacopsis gouldi* had now been "saved". It is true that since the halt of fishing due to its threatened listing, the species has recovered somewhat in places in the NW of Tasmania where there is still reasonable habitat. However, in the NE of Tassie (where hardly any work has been done), I believe the species teeters increasingly towards eventual extinction. The real threat is the trashing of habitat, especially in the headwater streams which are important nursery areas for the species. A REAL Recovery Plan remains something needed to address the needs of the species to survive wherever it currently occurs.

With some of the threatened *Engaeus* burrowing crayfish, things are also bleak. I was commissioned a few years ago by the Engaeus Recovery Team to do the distribution work for a Central North species, *Engaeus granulatus*, which led to the species being listed as Endangered. Since that listing, a number of colonies have been severely impacted or extinguished by developments.

ventral view of third maxilliped of: l-r *Engaeus disjunctus*, *E.granulatus* and *E. leptorhynchis*

Engaeus granulatus Photo: Peter Tonelli

and there appears to be no effective planning mechanism in place that works on behalf of the crayfish rather than the developer. I have wasted countless hours doing report writing for the Commonwealth concerning protection measures for various colonies of *E. granulatus*, only to then see my work simply ignored. If I could write a pop song, it would be about betrayal of my midnight toil.

In the north east there is a listed Endangered *Engaeus* species, *E. spinicaudatus*, which mainly occurs in a few buttongrass areas near the Forester River. There is a current proposal to dam the river, which would destroy much of this species' habitat. Given the current regime and policies in Canberra, I wouldn't bet on the crayfish winning that battle.

Our rock star credentialed Federal Minister for the Environment has also decided that Recovery Teams are no longer needed, and that we perhaps need to stop worrying about individual species. His record thus far should qualify him as an "endangering process" for species of concern.

Tasmania has one of the richest if not THE richest freshwater crayfish faunas in the world that includes five unique genera of mostly endemics. This includes the world's largest (*Astacopsis*), and arguably the world's most highly evolved (*Engaeus*). Observing and learning about many of these species has provided me with a great deal of pleasure over the years, while my growing awareness and admiration of their long history of evolution and adaptation has spurred a sense of purpose to work on their behalf. Trying to make a difference for them has proved to be an ever increasing challenge. In trying to meet that challenge, I was once confronted with the question: "But what GOOD are they?" Increasingly, that becomes a question difficult for me to answer for our own species.

References:

Horwitz, Pierre *The Systematics and Zoogeography of the Freshwater Crayfish Genus Engaeus*, Phd Thesis, University of Tasmania, Hobart 1986

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Nelson, J. (2003). *Unpublished Report to the Burrowing Crayfish Recovery Team on* Engaeus granulatus *survey work as of July 2003.* Threatened Species Unit, Tasmanian DPIWE

"Ray Fox" Raising Kane, The Fox Chronicles, The Kindred Spirits Press 1999

http:/chicagowildernessmag.org/issues/spring2002/fox.html

www.**fox**enviro.com.au/

The ventral views of the third millipeds (page 5) were drawn by Dr Pierre Horwitz. Used with permission.

Engaeus disjunctieus

Engaeus leptorhynchis

People attending the Blue Tier excursion probably noticed the *Engaeus* burrows in the wet areas. This is a north east endemic *Engaeus leptorhynchis* (above). It occurs particularly (but not exclusively) at altitude, and is also the species occurring at Mt. Cameron. Several *engaeus* species such as *E. leptorhynchis* are not listed as threatened and therefore do not have to be taken into account during developments such as logging, dam building, clearing vegetation, etc. I believe fragmented populations of endemic species such as this should have a status such as "species of conservation significance" that protects them from activities that will move them ever closer to being threatened.

This bush cricket (*Caedicia simplex*) had just emerged from its exoskeleton when this photograph was taken. Five minutes later when I returned to take more photographs it was eating the exoskeleton. (see front cover) - Ed.

brittle star (*Ophionereis schayeri*)

Southern biscuit seastar (*Tosia australis*)

Blue-ringed octopus (*Hapalochlaena maculosa*)

Cushion seastar (*Patiriella calcar*)

sea urchin

Marine invertebrates at Penguin Shelf - S. Lloyd

In early March 2010 we had our annual excursion to Penguin shelf, an area that is reputed to be one of the richest sites for intertidal invertebrates in Tasmania. The high tide completely inundates the seaweed-covered basalt platform; at low tide the rocky shelf, blanketed in a rich variety of seaweeds, is revealed.

'Spiny-skinned' invertebrates in the Phylum Echinodermata (which includes brittle-stars, starfish, sea urchins, sea cucumbers and feather stars) are particularly well represented.

The name Echinodermata comes from the Greek *ekhinos* 'hedgehog' and *derma*, 'skin'. These animals are different from all other animals. Their bodies are radially symmetrical, often with pentameral (five sided) symmetry. They have an internal skeleton of calcite plates and a water-based vascular system consisting of fluid-containing tubes and bladders which pass through pores in the skeleton. These tubes, visible on the outside as tube feet, are used for movement, attachment, foraging, breathing and/or taste.

Echinoderms first appeared in the Lower Cambrian period. There were 20 classes known in the Palaeozoic, six of which survived into the Mesozoic and are still around today. This year we were fortunate enough to see a feather star, a member of the Crinoidea, the most primitive living class of the Echinoderms. Crinoids are known to have been around in the Lower Ordovician (505 – 438 million years ago) and were fully modern by the end of the Palaeozoic.

Thanks to Rod McQueen's experienced eye we saw the largest blue-ringed octopus (*Hapalochlaena maculosa*) we'd ever encountered at Penguin and found another fascinating animal that was immediately christened the 'elastic worm' because its 10 cm body stretched to almost a metre in length (one European species has been known to stretch to 30 metres!). It was a ribbon worm,

Ribbon worm (Nemertini) in a rock pool at Penguin Shelf

also called proboscis worm, in the phylum Nemertini. Nemerteas are unsegmented, non-parasitic worms that are bilaterally symmetrical and elongate. They resemble flatworms (Platyhelminthes), but unlike Platyhelminthes they have both a mouth and an anus which allows ingestion and egestion to occur simultaneously. Adults have a long tubular proboscis that may have piercing barbs. This can be thrust from the body and is used for capturing prey or in defence. They have a well developed mouth and brain.

Unlike the Echinoderms, which are entirely marine, there are some freshwater and terrestrial Nermertini. The first fossil forms occur in the Middle Cambrian Burgess Shales of British Columbia, Canada.

There are numerous crab species on the shelf and most have strong sharp claws to defend themselves. One of my all time favourite marine critters is the decorator crab (*Notomithrax ursus*). This crab camouflages itself with small pieces of algae, which it attaches to hooks on its carapace.

References:

Allaby, M. (1999) *A Dictionary of Zoology.* Oxford University Press. Oxford.

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Tasmanian Marine Naturalists Association Inc & Tasmanian Museum & Art Gallery (1999) *Between Tasmanian Tide Lines.* Hobart

Decorator crab (*Notomithrax ursus*)

Southern biscuit seastar (*Tosia australis*) & *Chiton* sp.

Tas Eco-Toxicology Research Fund

The **Tas Eco-Toxicology Research Fund** is a public fund set up to undertake quality research on the health of our environment. The fund was established in 2007 after a donation to Environment Tasmania Inc. Funds will be used to support independent, strategic eco-toxicology testing and research and will be used to raise public awareness about eco-toxicology threats to our environment and public health.

The fund will support public and occupational health, trade in food-based commodities, wildlife monitoring, and ecological sustainability. This will assist in independent eco-toxicology testing and research in Tasmania.

The Trust is managed by Environment Tasmania and donations are welcome. If you would like to make a donation please contact Environment Tasmania (03) 6224 6319

www.et.org.au

The paradoxical mammal - by Ron Nagorcka

(Originally written sometime in the 1980s. Rediscovered & revised 2010)

According to the platypus
Most things in life
Are quite satisfactorily
Contradictory

The platypus is perchance merely our dream
A fabulous fantasy
With its own useful electricity

Of its own dreams it reveals little
But no doubt regards our petty pursuits
As complete self-delusion

And surely we are indeed barking up the wrong tree

Maybe we should revise our dreaming
And conjure a schizophrenic spirit figure
Whose confusion over the demands of conformity
Turned him somehow into
The peaceful, playful creature
That forages in the quiet shallows

But watch out –
He retains his poisonous spurs

In *A field guide to the mosses & allied plants of Southern Australia* Meagher & Fuhrer (2003) omitted epiphyllous liverworts on the grounds of their 'rarity and cryptic nature'. (An epiphyte is a plant that uses another plant for its physical support. Ed) Given their minute size, the chances of finding them would be about as remote as that of finding the proverbial needle in the haystack.

Over the months I had made half-hearted attempts to look closely at hard waterfern *Blechnum wattsii* leaves (a preferred host) but given the sheer numbers of these ferns growing on the Blue Tier, this was more perfunctory than done with any great hopes of ever sighting the liverworts.

In December of 2009 I accompanied the Water Watch samplers to a roadside stream and upon crossing to the other side was rewarded with the sight of my first epiphyllous liverwort on the foremost fern leaf blocking my path. At this time the compound microscope was being repaired so I had to leave without taking samples. Just by coincidence I had visited this very site a fortnight earlier looking for this subject but had not crossed the stream and so missed it.

In mid February I visited the site again. I collected samples to photograph and tried to identify the liverwort which was enmeshed with a so far unidentified moss. I checked through Jarman & Fuhrer (1995) as well as the UTAS key, and excluded several of the recognized epiphylls for various reasons:

- not *Chiloscyphus muricatacus*, although the specimen has some hair-like projections on the older leaves they are nowhere as prominent as depicted in Meagher & Fuhrer (which lack lobules) and the underleaf has a different shape; the few Chiloscyphus examined so far have leaves opposite, not alternate as in this case

Lejeunea epiphylla on hard waterfern

- not *Cololejeunea laevigata* which lacks underleaves; however the presence of a 'tooth' on the lobule seems to point to this genus

- not *Colura saccophylla* which has inflated (sac-like) leaves

. . . . . .

On March 5th 2010 I posted a link to the CNFN website page to the Bryonet listserver asking for help.

(The bryonet listserver is the blog of the International Association of Bryologists (IAB). It aims to promote international cooperation and communication among bryologists, whether amateur or professional.)

I received the following response from New Zealand bryologist, Matt Renner, the next day:

"Your plant is a *Lejeunea* species.

There are not many *Lejeunea* with two-celled first lobule teeth. The three possibilities I am aware of include:

1 *Lejeunea helmsiana* Steph. (I don't think this species occurs in Australia.)

2 *Lejeunea epiphylla* Colenso (non. Mitten) (There are difficulties with *L. epiphylla*. Apart from being an illegitimate homonym of a Mitten name, the type is a mixture of two species, which the protologue (i.e.the publication that includes the first, valid description or diagnosis of a taxon) does not discriminate.)

3 *Lejeunea c.f. tumida*

(There are two entities within *L. c.f. tumida* in New Zealand but I don't think either occurs in Australia.)

So your best bet is to confer the plant to *L. c.f. epiphylla* Colenso (non Mitt.). Both species occur in Tasmania, and should occur in NSW in suitably cool habitats along the Great Dividing Range.

Bear in mind that *Lejeunea* is a shambles. There has not been comprehensive regional treatment for Australia."

References:

Meagher, D. & Fuhrer, B.A. (2003) *A Field Guide to the mosses & allied plants of Southern Australia*, Australian Biological Resources Study, Canberra,

Jarman, S.J. & Fuhrer, B.A. (1995) *Mosses and Liverworts of rainforest in Tasmania*, CSIRO Publications

URL of the web page with images and links:

http://www.disjunctnaturalists.com/articles1/epiphyllous-liverwort.htm

http://internationalassociationofbryologists.blogspot.com/

The following is a brief description of the specimen: leaves entire, rounded without lobes, folded over at bottom to form lobules with 'teeth', leaf arrangement alternate and incobous; wide attachment to stem i.e. not just by a few cells; one underleaf per pair of regular leaves, divided to form two lobes.

Leaf shape and arrangement and presence of underleaves together with cell structure resemble those I have identified in the Lejeuneaceae family (31 genera at last count!).

leaves

underleaf

cells

lobule 'tooth'

leaf 'hair'

With mesmerising grace a flock of pelicans floats above the woodlands, all the while maintaining a V formation until they are no more than specks on the horizon.

What seems amazing about Australian Pelicans (*Pelecanus conspicillatus*) is not that they fly far from water, but that such bulky birds can fly at all. Like other birds, however, they are superbly adapted to their lifestyle with some fascinating internal structures and interesting adaptations for weight reduction.

Birds' bones, unlike the bones of mammals that are filled with marrow, must be light enough for flight. They are pneumatic (i.e. filled with air) and the lifestyle of the bird - how much it flies or dives - determines the degree of pneumatisation. Pelicans, therefore, are not nearly as heavy as they appear. Their skeleton is more pneumatic than that of other birds and weighs a mere 10% of their total body weight of around 5 kg. Relative to their size, pelicans are among the lightest birds. The Australian Pelican, although not the largest of the eight pelican species that occur worldwide, boasts the longest bill.

Australian Pelicans have huge wingspans of 2.4 metres. To conserve energy they sometimes glide low over water, taking advantage of the "ground effect" whereby extra lift is provided by air funnelled between wings and water. They are unable to sustain long periods of flapping flight, but can stay airborne for 24 hours, riding the thermals and reaching stunning heights of 3000 metres. From such elevations they can keep a lookout for productive waterways and suitable places to breed.

There are several breeding colonies on the Bass Strait Islands but they are miniscule compared with the massive ones that occur periodically on some of the ephemeral lakes and wetlands on the Australian mainland. In June 2000, for instance, 7500 Australian Pelicans were counted at the Mandora Marsh in Western Australia, a wetland that may flood only once a decade. For breeding to be successful pelicans must be assured of an undisturbed site that is rich enough to provide food for their growing chicks for at least three months. Unfortunately, the Bass Strait Island colonies are so close to the Tasmanian mainland that they are prone to disturbance from unwelcome visitors.

Pelicans sit high in the water. Their buoyancy is achieved by a special layer resembling bubble wrap that lies under the thin skin of most of their body. Because they float so high, they generally feed in shallow

Pelicans feeding in the shallow water at the Diamantina Billabong, Birdsville

water and often in cooperation with other pelicans. Gatherings of nearly 2000 birds have been observed herding fish, concentrating shoals into a small area before scooping them up with their massive pouches. They are opportunistic feeders and will eat fish, crustaceans, ducklings or gulls and even the occasional small dog!

Pelicans have yet another strategy for weight reduction: if disturbance requires a rapid getaway, they can completely disgorge their stomachs which shrink to walnut size. Then they slowly flap their wings and with their totipalmate feet (i.e. with all four toes connected by webs) treading in unison on the water, they laboriously take off, before once again achieving mastery of the air.

References:

http://www.amonline.net.au/birds/factsheets/pelican.htm

http://www.parks.tas.gov.au/publications/tech/bassstrait/bassstrait.pdf

Halse, S.A., Pearson, G.B., Hassell, C., Collins, P., Scanlon, M.D. Minton, C.D.T. (2005) *Mandora Marsh, north-western Australia, an arid zone wetland maintaining continental populations of waterbirds.* In Emu Vol. 105 No 2. CSIRO Publishing on behalf of RAOU.

Milewski, A.V. (2006) *Give dues to our world-record bin-bird.* In Wingspan Vol. 16 No.2 June 2006 Birds Australia (Royal Australasian Ornithologists Union), Melbourne.

This article first appeared in TASMANIA 40°SOUTH Issue 53

Three pelicans at Birdsville

Walks and other events

Hidden treasures: discovering the fungi of the Blue Tier

On Friday 21st, Saturday 22nd and Sunday 23rd May CNFN Inc. is hosting the federation of field naturalists weekend at Weldborough.

Numbers are limited and registration is essential

A registration form and timetable of events can be found on the CNFN website:

http://www.disjunctnaturalists.com/fungimap/

April 4th: (Easter Sunday) Meander

Meet at the Meander store at 10.00

May 2nd: Bells Parade, Latrobe

Meet at the car park at Bells Parade at 10.00

June 6th: Hoggs Creek Falls, Arboretum Annex, Barrington

Meet at at 10.00 at Lower Barrington at the junction of Lower Barrington Rd (C145) and Sheffield Road (B14). We will then drive to the arboretum annex on Lake Paloona Rd.

July 4th: Dynans Bridge Road, Weegena

Our annual gathering at Jim's Studio. Jim will make dough and have the pizza oven going. Please bring your favourite pizza topping!

August 1st Narawntapu National Park

Meet at the visitors centre at 10.00

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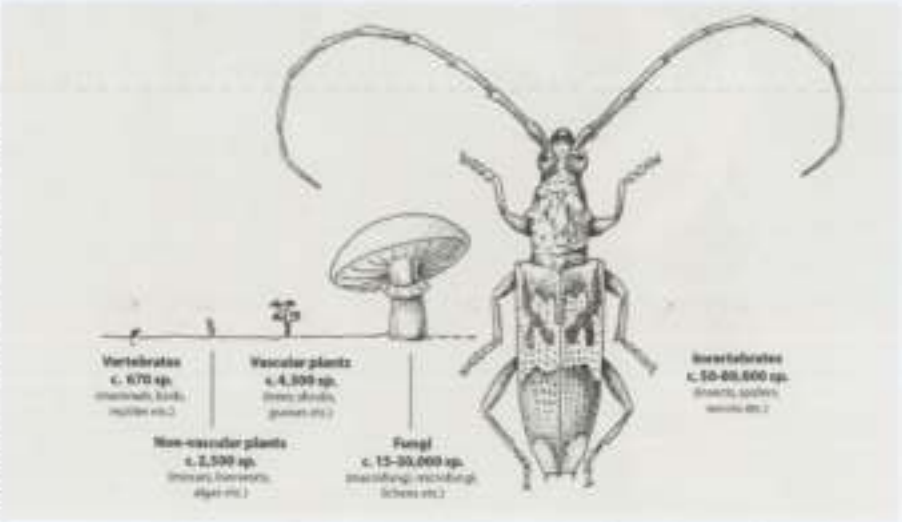

Size approximates relative numbers of native species in a hypothetial population of around 100,000