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AMPHIBIAN CHYTRID FUNGUS

A STUDY OF THE FROG POPULATION OF THE TREVALLYN NATURE RECREATION AREA, LAUNCESTON, TASMANIA

by LISA CLARKSON

BACKGROUND

In late 2004, several members of the CNFN formed an amphibian research group to conduct a survey for the presence of the chytrid fungus (*Batrachochytrium dendrobaditis* or *Bd*). Although declines in local frog populations and in the range and abundance of some species had been documented in Tasmania, at the time, *Bd* had not been reported.

The survey work of the CNFN amphibian group confirmed the presence of the fungus in several locations around Tasmania including our major cities and towns (Obendorf and Dalton, 2006). I was involved in surveying sites around Launceston and in particular conducted surveys of several water bodies in the Trevallyn Nature Recreation Area (TRNA) where *Bd* was confirmed in several ponds. As I reside in close proximity to the TRNA I decided to observe the local frog populations in the years subsequent to the survey in an attempt to understand the implications of the presence of the fungus in the Reserve. In addition, the original

survey work has left me concerned about the potential impact of *Bd* on Marsh frogs (Genus *Limnodynastes*). These frogs were revealed to be particularly susceptible to *chytridiomycosis* (the potentially fatal disease caused by *Bd*) manifesting all the symptoms of the disease and ultimately dying several weeks after metamorphosing. On the other hand, some frog species such as the Brown Tree Frog (*Litoria ewingii*) on exhibiting chytrid-induced depigmentation of the mouthparts as tadpoles did not succumb to the infection and survived for the duration of the survey (i.e. one year) in captivity.

METHODS

Bearing in mind the above concerns, my survey work has consisted of observing and documenting regularly (for the past 40 months) the frog species present in the proximity of the ponds tested in the TRNA (using call identification and sighting) and to record their abundance. It also included documenting timing of calling, reproductive evidence (spawning), timing and success of spawning and identification and abundance of tadpoles. Any unusual events such as spawning failure or mass mortality were recorded, along with observations concerning weather conditions (such as extreme events – heat waves, drought and unusual cold etc.), timing of ponds drying out and water quality. This last observation was limited to comments on the presence of algal blooms, turbidity etc. and was not measured quantitatively.

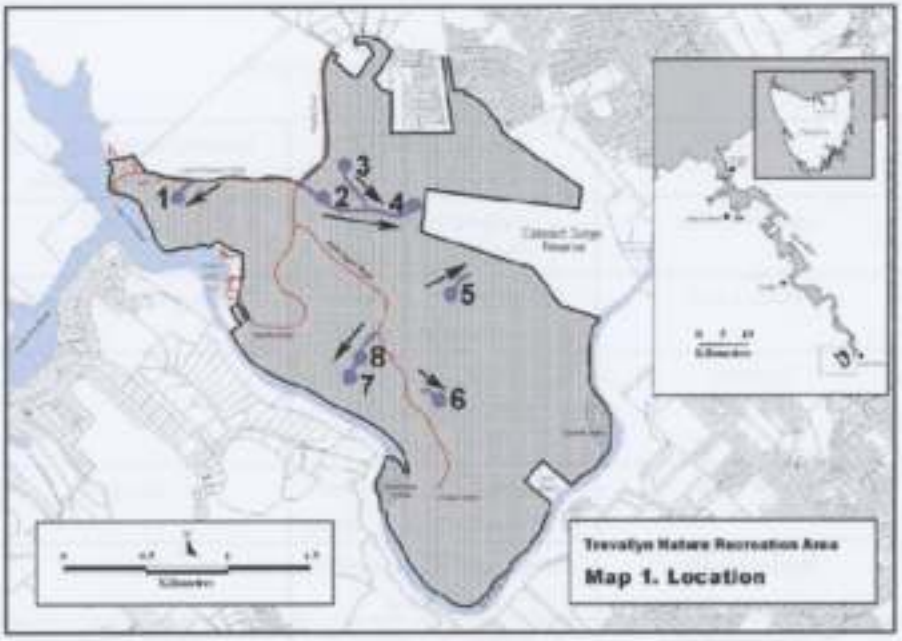
RESULTS

Map 1 shows the catchment system of the TRNA. It can be seen that the Pobblebonk pond (2) and Archery Pond (3) both overflow into the Reedy Gully pond (4) and that the South Esk satellite pond (8) overflows into the South Esk pond (7). In most cases, the source of water is predominantly rainfall run-off from roads and cleared or vegetated slopes. Of interest, the Horse paddock pond (6) is maintained artificially by overflow from a horse jump water obstacle upstream that is filled by tap water.

ABOVE: A Brown Tree Frog spends a few hours on a native cherry (*Exocarpos cupressiformis*).
PAGE 1: On one of the hottest days this year nine Brown Tree Frogs were seen basking on the fronds of a soft waterfern (*Blechnum nudum*). (Ed.)

Table 1 lists the ponds studied and their chytrid status at the time of the survey work (December 2004) along with other observations obtained since then (up until April 2008).

MAP 1
Location of ponds studied in theTRNA



(based on TNRA Draft Management Plan 2006, Parks and Wildlife Service)
Arrows indicate drainage flow

TABLE 1:
Summary of observations

Name of Pond#	Chytrid status Dec 2004	Ponds have dried up since surveying?	Unusual events
1 Aquatic Point	unknown*	No	No
2 Pobblebonk	positive	No	Yes, several
3 Archery	positive	Yes	No
4 Reedy Gully	unknown*	No	Yes
5 Snake Gully	positive	Yes	No
6 Horse paddock	negative	No	No
7 South Esk	negative	Yes	Yes
8 Satellite South Esk	unknown*	Yes	Yes

the pond names are my own used for ease of identification
*Status unknown because tadpoles were not present at the time of the survey work

There are currently six species of frogs in the Reserve namely, *Litoria ewingii, Lymnodynastes dumerilii, Crinia signifera, Geocrinia laevis, Pseudophryne semimarmorata* and recorded for the first time in 2007, *Crinia tasmaniensis*. Table 2 shows which species have been found associated with each pond.

Table 2 Frog species found in TNRA

Pond	Species present	Species confirmed as breeding in ponds
Aquatic Point	*Litoria ewingii, Crinia signifera#*	*L.ewingii*
Pobblebonk	*L. ewingii, C. signifera Lymnodynastes dumerilii*	*L ewingii, L. dumerilii*
Archery	*L.ewingii, L.dumerilii, Geocrinia laevis, C. signifera*	all
Reedy Gully	*L. ewingii, C. signifera, C. tasmaniensis, G. laevis*	*L. ewingii**
Snake Gully	*L. ewingii, L.dumerilii, C.signifera*	all
Horse paddock	*L ewingii, C. signifera*	*L. ewingii*
South Esk	*L.ewingii, C. signifera, L. dumerilii, G. laevis, Pseudophryne semimarmorata*	all but *P. semimarmorata* (suspected but not confirmed)
South Esk Satellite	*L.ewingii, C. signifera*	all

#It is my observation that *C. signifera* will preferentially breed in temporary pools, pond overflows and soaks associated with the ponds rather than ponds proper

*No tadpoles of any species seen over the study period until Jan 2008 when one *L. ewingii* tadpole was seen.

DISCUSSION

The last two years in Launceston have witnessed very dry conditions which have complicated the picture considerably by causing unseasonal drying of ponds and interrupting the normal breeding cycle of some of the frog species. However, it is known that *Bd* is an opportunistic pathogen that is more likely to impact on frog populations that are under stress (New Scientist, 2004). This discussion will be limited to those ponds that were tested for chytrid and/or those that revealed some interesting findings.

Pobblebonk Pond

This chytrid-positive pond is situated in close proximity to Duck Reach and Rearta Roads (both sealed) and the start of a major walking track. It is adjacent to a steep hill, is deep and frequently shaded and has yet to dry out. I have been unable to ascertain its water source, as it seems to be permanent but it is possible that it is maintained by a spring at the base of the steep hill (in the absence of precipitation and run-off). Because of its permanent nature, overwintering tadpoles are commonly found and it is a pond where *L. dumerilii* (pobblebonks or banjo frogs) are frequently heard calling. It also appears to be a pond in trouble as it has been suffering from high turbidity and recently algal blooms during summer/autumn. In August 2006, several sick and dying *L. dumerilii* tadpoles were found in this pond. An investigation of a dead tadpole revealed no obvious signs of disease or starvation but it presented with oral disc depigmentation – a sign of chytrid infection. Fellers et al (2001) reasoned that oral *chytridiomycosis* was the only cause of abnormal oral discs in tadpoles (in the absence of other abnormalities). At the same time, a noticeable decline in overwintering tadpoles became evident. It is known that *Bd* is more active in colder weather rather than warmer (Anon, 2006). A few *L. dumerilii* were heard calling from this pond at Christmas 2006, but no spawn or tadpoles were seen.

L. dumerilii (pobblebonk or banjo frog)

In the following year (August 2007), a small amount of *L. ewingii* spawn was evident, but in September 2007 a large spawning event of *L. ewingii* resulted in the mass failure of the eggs to produce tadpoles. Previously observed individual egg masses of this species (especially early in the breeding season) contained some eggs that failed to develop; in this case all the spawn (representing about 30-40 individual egg masses each containing approximately 15-30 eggs) produced only 1-2 tadpoles per mass. *Bd* is not known to infect spawn (as it infects keratin tissues associated with metamorphosing tadpoles) so it is unclear what caused this event. It is possible that some sort of contaminant in the water body prevented the development of nearly all the fertilised eggs. However, of interest the *L. ewingii* successfully bred in November 2007 but their tadpoles appeared to be in poor condition during that summer. A few *L. dumerilii* called again at Christmas time and continued to call through to February 2008 however, neither spawn nor tadpoles have been evident. In December 2004, there were enough *L. dumerilii* tadpoles to survey for *Bd* infection in this pond, but since August 2006 none have been seen here.

Archery Pond

The Archery Pond, also a stronghold of *L. dumerilii*, is found in close proximity to the Pobblebonk Pond. It too was found to be chytrid positive. It is a shallower pond that doesn't receive run-off from roads

and has dried out in March 2007 and 2008. Conversely in those years when the pond didn't dry up (in autumn 2005 and 2006) overwintering tadpoles were evident. It has been suggested that the chytrid fungus is curtailed somewhat in ephemeral water bodies and of course, being shallower, they are likely to warm up more quickly during summer, thus suppressing the activities of *Bd* (Anon, 2006). Despite its positive chytrid status, frogs have successfully bred in this pond and even with the severe drought event of 2006/07 all species bred again the moment rain returned and started to fill the pond at the end of March 2007. *Geocrinia laevis* tadpoles successfully overwintered in this pond last year. By very early September 2007, the *L. dumerilii* had bred again (spawn observed) and hatchlings became evident from November 2007 through until February 2008. Unfortunately, the pond dried out before any of these tadpoles could metamorphose. Unlike other species such as *L. ewingii* and *C. signifera* that seem to respond rapidly to changing environmental conditions, *L. dumerilii* tadpoles don't seem to be able to speed up their development in response to declining water level and/or temperature rise. This may have something to do with their preference for inhabiting the bottom of ponds.

Reedy Gully Pond

This deep, permanent steep-sided pond in a sheltered gully is an enigma for although frogs call from its vicinity, I have never seen any tadpoles in it until January 2008 when a lone *L. ewingii* was spotted. This pond is downstream of both the Archery and Pobblebonk ponds and therefore is probably chytrid positive as well.

Snake Gully

This pond tested positive for chytrid but has dried out in March 2007 and again in April 2008. It is shallow like the Archery pond but larger. Like the Archery Pond, all frog species present have previously bred well producing an abundance of tadpoles. However, in Spring 2006 the *L. dumerilii*, although calling, did not produce spawn nor were their tadpoles seen (this was at the height of the El Nino drought). The pond dried out in Autumn 2007 but on refilling that winter/spring the *L. dumerilii* still didn't seem to respond well until a heavy rainfall event in late December 2007. This cohort of tadpoles has succumbed to the drying out of the pond in April 2008 and so this species has failed to reproduce successfully for 2 consecutive years.

Horse paddock

This pond is small and quite deep. Interestingly it is chytrid free probably due to the fact it is artificially maintained by tap water and it is isolated from the other ponds. Intriguingly, no *L. dumerilii* have been heard calling from this pond.

Crinia tasmaniensis (Tasmanian Froglet)

South Esk pond and its satellite pond

This pond exists on the other side of the road in a different catchment from the other water bodies and receives run-off from Duck Reach Rd via an upstream (satellite) pond when it overflows. At the time of surveying this water body was chytrid free and in the months subsequent it appeared to sustain perhaps the most robust and diverse population of frogs in the Reserve. In early spring 2006 an obvious and sudden reduction in overwintering *L. dumerilii* tadpoles occurred; it was not unlike the event in the Pobblebonk pond. In both ponds, dead *L. dumerilii* tadpoles presented with jaw sheath depigmentation. There was no evidence for *L. dumerilii* breeding that year (no calling, no spawn and no tadpoles of this species). The pond dried up in January 2007 but on filling in May 2007 was filled with many different cohorts of tadpoles from all species except *L. dumerilii*. One lone *L. dumerilii* was heard calling on the last day of September and spawn appeared in mid-November 2007 but the water level was dropping rapidly and the pond dried up in January 2008 and hasn't refilled yet.

CONCLUSION

It is impossible to make any definitive conclusions regarding these results based on just over three years of observation. Other factors such as the extended drought may be at play here and could have interrupted the reproductive cycle of the pobblebonk. However, of interest it appears that other species such as *L.ewingii*, *C.signifera* and *G. laevis* don't seem to have been greatly impacted by the extended dry, as going by the number of calling frogs, there are healthy populations of these species in the TRNA. But the event at the South Esk pond is suspicious and is reminiscent of the way chytrid causes a wave of mortality (in susceptible species) when it first appears in a previously uninfected population. It is also possible that environmental drying may be causing crowding of amphibians at water bodies thus leading to increased rates of transmission (Daszak, 2005). This may be relevant because the ubiquitous *L. ewingii* is suspected of carrying aclinical infections of *Bd*. Time and further observations may or may not reveal the true picture.

ABOVE *Litoria ewingii*

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THE FLY THAT FLEW TOO FAST

by SARAH LLOYD

Just as discovering the colourful abundance of fungi and their crucial ecological roles made me think differently about the ground beneath my feet, buying a 100 mm macro lens for my Canon digital SLR has changed my view of invertebrates and forest ecology. Not that I haven't had an interest before, but becoming more aware of their sheer abundance and diversity, and seeing the detail of their beautifully sculptured bodies, have kept me thoroughly occupied during the past few months.

My first exciting discovery was lacewing eggs (of *Chrysopa* sp.) attached to my printer. I had a moment of disappointment when I first downloaded the photo as the eggs seemed contaminated with dust. On closer inspection I noticed that the 'dust' was in fact newly hatched nymphs still clinging to the empty egg cases.

Some insect activity is relatively easy to figure out, but a potter wasp that returned repeatedly to a patch of ferns near the front door was intriguing. Looking through the macro lens is like looking through a magnifying glass and it enabled me to see that the wasp was cutting off small pieces of fern with its mandibles. After manipulating the pieces with its front legs, the wasp carried them high into the air, until, at about canopy height it disappeared from view, only to return minutes later to repeat the task.

ABOVE: Lacewings place their eggs on the end of a long thread to provide protection from ants. INSET: A recently hatched (1mm) lacewing nymph still clings to the empty egg case.

ABOVE: A potter wasp cuts off a small section of fern. It carries it to the canopy where it will construct its nest from the fibrous material.

On April 22nd a katydid nymph (*Caedicia simplex*) was spotted in a *Correa lawrenciana* (native fuschia) near the front door. Most other insects are all but inactive now that the weather has cooled, so the cold-tolerant katydid has been the subject of close photographic scrutiny.

Unlike their terrestrial relatives, the grasshoppers, katydids spend most of their time in trees or shrubs. As they ingest material from their food plant their colours develop to match the plant on which they feed and rest.

The peregrinations of this particular katydid nymph are fairly limited. Some evenings it ventures 7 cm to the top of the *Correa*, but most of the time it stands, head downwards, on a leaf.

There was a moment of high excitement on May 3rd when it shed its exoskeleton! Nymphs (depending on the species) take weeks or months to reach full size and will shed their exoskeletons several times while they grow. Eventually wing buds, then wings, develop. I am expecting that an adult, fully winged katydid will venture further than the *Correa*...

ABOVE: On May 3rd the katydid (body length 15mm) shed then consumed its exoskeleton.

Male katydids 'sing' to attract females; they stridulate by rubbing together specialized veins on their wings. The vigour of their singing is dependent on temperature. To attain the necessary thoracic temperature for stridulation male katydids (most females are silent) shiver.

A 74mm katydid species that lives in the forests of North America, *Neoconocephalus robustus*, must get its flight muscles to 30 degrees before it can belt out its apparently ear piercing call. The females seem to prefer the loudest (and hottest) males.

LEFT: Katydids "hear" with their tympanum: a small slit in their tibia covered by a pressure-sensitive membrane.

Some insects can be difficult to photograph because they take evasive action. Weevils (amongst others) will simply fall off a log (or other substrate) and remain hidden in the litter layer.

LEFT First seen walking on the husk of a sweet chestnut, this weevil played dead for a while (a strategy to evade capture) in the midst of the spiny jungle, until, with gentle persuasion, it climbed to the summit.

RIGHT a tiny jumping spider peeps from behind a small branch.

LEFT This spider, clothed in a fungal overcoat resembling icing sugar (*Beauveria* sp.?), remained still while being photographed. It was dead.

RIGHT Luck can certainly play a part in getting a good photograph. This wonderfully hairy blue-eyed robber fly (Asilidae) landed at about waist height approximately a metre from where I was standing AND it stayed still long enough to focus. Other flies are not as obliging. One species that I often see on a particular log flies in the split second between the flash flashing and the picture being taken. Many a photograph depicts a lichen encrusted log with a blurry fly on the edge of the frame. I doubt a complaint to Canon would be taken seriously!

Wings: a review by Sarah Lloyd

Wings an introduction to Tasmania's winged insects by Elizabeth Daley

Published by Riffles Pty Ltd

C/0 PO Buckland Tas 7190 $49.95 r.r.p.

I had a fleeting moment of disappointment that a book entitled Wings didn't feature any birds. But this book is a great new resource and adds to the growing body of reference works that focus on Tasmania's fauna and flora.

Ecologist, consultant, writer and research associate, Dr Elizabeth Daley, has produced an attractive book with over 600 photographs depicting 350 species of insects in their natural habitats.

The book is arranged alphabetically by groups, (ants, bees, beetles, bugs etc) rather than by the more usual taxonomic order (starting with the more 'primitive' insects and ending with the supposedly more advanced) found in similar field guides. While this may make Wings more accessible to some, taxonomic order, whereby all animals in an order are placed together (e.g. all Orthopterans, i.e. katydids, grasshoppers and crickets, are placed together rather than being separated) is surely something most people interested enough to purchase such a book could grapple with. It also helps the serious user to learn the taxonomy. My other minor quibble is with the page layout. In most cases only one or two species are depicted on each page. On those pages with several species, placing the caption as close to the corresponding image as possible avoids any confusion.

For each group there is a description of life cycle, food, natural predators and a 'where to see' section. There is also a list of reference books and websites.

Each species photographed has basic information about its size, distribution, habitat, food and flight period.

I have only recently bought a camera lens capable of capturing the detail of invertebrates. Many an hour has been spent in the field quietly watching flies fly past and not land or silently imploring an ant to stop, or at least to slow down. I know how difficult it is to

This wasp, the orange caterpillar parasite (*Netelia* sp.), is often seen foraging near understorey plants. One cool afternoon in summer this insect spent several hours clinging to the underside of a leaf.

get a sharp image and can appreciate fully the patience and countless hours involved in assembling this impressive array of photographs. The inclusion of some blurry pictures is offset by the value of having so many species in the book.

Dr Daley has undertaken the sometimes difficult task of naming as many species as possible by consulting numerous experts and accessing the insect collections of Forestry Tasmania, the University of Tasmania and the Tasmanian Museum and Art Gallery.

Dr Peter McQuillan writes in the foreword: '*The Tasmanian bush is stitched together by the activity of thousands of species of insects engaged in pollinating plants, dispersing seeds and recycling plants and each other.*'

As the title states WINGS is an introduction to Tasmania's insect fauna. It has helped me to name some of the species I have been photographing. Furthermore, based on information in the book and my own observations I now have a better idea of where to look for insects. Many a warm afternoon is now spent loitering around old logs, perchance to see a small wasp searching for the host of its next generation.

This book is a must for field naturalists, as is good quality camera equipment.

ABOVE: 20mm long parasitic wasp oviposits into a log.

PLANT MORE PINES!

by Bob Mesibov
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I first learned that native litter invertebrates were in pine plantations by reading a scientific paper. Forester H.J. Elliott (1971) reported that needle litter in ACT plantations was being eaten by native millipedes. When I looked for myself in the needle litter in a plantation near Wynyard about 20 years ago, I found abundant native millipedes, as well as snails, landhoppers, slaters and other litter invertebrates.

In 1998 I found velvet worms in a young pine plantation near Penguin. I knew from aerial photos that the plantation had been established about 15 years earlier in a grass paddock. The inference was that the young pine plantation had been colonised from a tiny adjoining remnant of native scrub.

Kevin Bonham followed up this finding in 1999 with a systematic comparison of NW Tasmanian plantations and nearby native forest (Bonham et al. 2002). He found native velvet worms, land snails, millipedes and carabid beetles in the plantations. Abundance and diversity were lower than in native forest, but the length of the species list from plantations was remarkable, and the list included some rare species.

In 2003 I did quantitative sampling of needle litter millipedes in Stoodley Plantation near Railton (Mesibov 2005). The sites I looked at had been under pine for 60 years: two rotations, with a clearfall-and-burn between crops. I collected ca. 75 millipedes per square metre, of which an extraordinary 83% were native species.

These aren't, of course, just Tasmanian results. In a paper on a new species of Victorian velvet worm, Reid (2000) writes:

"All type specimens were found in decomposing logs in dry sclerophyll forest... The non-type specimens were all found (within a very short space of time) in and under logs in a pine plantation. Given the amount of decomposing timber pieces on the ground, it is likely that many hundreds of specimens probably occur in this plantation."

PHOTO: B. Mesibov

Velvet worm *Ooperipatellus cryptus*

More recently, I've been surveying the Victorian millipede fauna. My field experience has been that older pine plantations aren't just good places to sample - they're often much more productive than nearby native forest. A colleague at Charles Sturt University tested this notion herself near Wagga Wagga, New South Wales, in 2007. Millipedes were hunted over a fixed plot area for a fixed period of time equally in pines and in adjacent native forest. Pine plots yielded 99 native millipede specimens, native forest plots only 13.

I haven't done quantitative sampling of this kind on the mainland, but I had a similar experience last September in central Victoria. After two days of millipede-hunting in the moister parts of Tallarook and Mt Disappointment State Forests, I had only a few specimens of the local *Lissodesmus* species, *L. martini*. This species, like others in its genus, cannot tolerate dry conditions. It shelters in moist patches of soil and leaf litter, and in moist rotting logs. On my way out of the study area, I stopped by a pine plantation at Kinglake West. There were literally hundreds of *L. martini* everywhere in the needle litter.

Regardless of what Australian litter invertebrates think about plantations, many Australian humans don't like *Pinus radiata*. That's partly because native forest has been cleared in some areas to make room for pines. However, there's also a feeling that since pines aren't native, they're out of place in the Australian landscape. Many people, furthermore, regard pine plantations as biological deserts. Others say that pines ruin the soil for any future crops, including native forest.

Nevertheless, by the early 1990s, with hundreds of thousands of hectares under pine and most new plantations going onto already cleared farmland, there was growing scientific interest in the value of plantations for Australian native wildlife. And when researchers looked for value, they found it. A good summary of the results was published last year by Lindenmayer and Hobbs (2007). While pine plantations don't support the diversity of wildlife found in native forest, they provide good-quality forest habitat for many birds, mammals and insects in otherwise open, farmed landscapes. They also serve to connect remnant patches of native forest.

My own feeling is that pine plantations are critically important habitat in southern Australia for many hundreds of litter invertebrate species. These typically have very small ranges. The species lucky enough to have ranges largely within nature reserves are doing just fine, thanks. The species whose ranges were in forest cleared

for agriculture, largely in the 19th and early 20th centuries, are either extinct or headed that way, since forest litter invertebrates don't survive in open paddocks.

For 'relict' species like these, just hanging on in scrappy bush remnants, a new pine plantation next door is a gift. Dense canopy cover means shade, higher humidity and cooler temperatures in the macrohabitat. Dense needle litter means food and extensive microhabitat choices. Over a typical rotation of 20-25 years, there's freedom from litter-destroying fire and at least some predators, such as lyrebirds. Twenty years is 20 generations for many litter species, meaning populations can build up to levels which greatly reduce the risk of local extinction.

There are now roughly a million hectares (10 000 sq. km) of softwood plantation in Australia (Parsons & Gavran 2007). About half of that area is *P. radiata* in New South Wales and Victoria. (South Australia may be famous for having a large pine resource, but SA only accounts for one-eighth of the Australian total.)

In recent years most plantation investment hasn't been going into pine. Instead, the money has gone into hardwood plantations for pulpwood on cleared land, including former *P. radiata* sites. Rotations and returns are quick with eucalypt but there's no harvest of high-value roundwood for posts, poles and sawtimber, and the biological benefits of hardwood plantations are minimal. In my opinion, this is truly stupid forestry.

Truly smart forestry, from the point of view of native litter invertebrates, is to plant pines on longer (sawlog) rotations in farmed landscapes where remnants are few and far between. Plant within a few metres of the remnant edges, don't disturb the remnants, and let the litter invertebrates vote with their feet.

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LUCY BIRD

by YVONNE MAHER

A week before Christmas I noticed what I presumed to be a dead baby bird on the footpath near my home in Adelaide. As I stooped to pick it up, two bright eyes looked up at me, and I realized that it was a 'swallow' nestling.

I brought the tiny, terrified bird home, and made a home for it in a shoe box, covered by a tea towel.

The next 24 hours were filled with acute frustration and concern, as I tried to prise open the baby beak to force in some nourishment in the form of squashed worm and egg yolk!

photo: Y.Maher

On day two, as I again hopefully held the squirming meal worm in front of the baby, the tiny beak shot open! I was elated, at last we were on our way, and I knew that my baby would live! I named her Lucy.

The next six days were among the most rewarding days of my life, as the tiny tyrant led her willing slave down a path of constant attention to her growing needs.

She slept in her box in front of my bed, and woke me as dawn broke, with a gentle reminder that it was breakfast time. I willingly complied, cleaning the soiled tissues out of her box, and providing her with a small branch on which to perch.

Her box sat on the table by my window, allowing her to look out at the garden and the birds that came for their early morning ablutions in the bird bath in front of the window. Soon she was responding to their calls, and after a day or two of learning to perch on her stick, she began to preen and stretch a wing and leg sideways, ballerina style, while becoming ever-more steady on the perched leg.

She was eating ravenously. Meal worms, crickets and slaters, initially thought to be too large for her little beak, were grabbed avidly and swallowed with some difficulty and great satisfaction! She became the star of the neighbourhood, and sweetly tolerated all expressions of 'Ooh and Aah', before returning her gaze to the birds in the garden.

We wandered daily to where her siblings could be heard calling from their nest in the cross bars of power poles. (Tiny holes in metal posts, in a succession of days that rose above 40 degrees!) Lucy, in her covered box would respond desperately to their calls, hopping up and down in the hope of a response. (Was there communication that my human ears could not detect?)

A week to the day after Lucy entered my life, while on my way to catch a bus, I noticed that Lucy's siblings were emerging from the tiny holes in the power pole cross bars. The small babies came out uncertainly, settled on the power lines for a short spell, then suddenly launched into the air, and with amazing agility headed higher, ever higher. I knew that I had half an hour to decide whether to allow Lucy to fledge with her siblings, or to keep her until she had lost the remaining clumps of down and emerged an adult bird.

Sadly for me I knew what she would want, and taking her box to the base of the poles, I lifted the tea towel and bade her

farewell. She jumped on to the side of the box, looked around a couple of times, and headed for the sky with her siblings, leaving me with a sudden hole in my life.

My association with Lucy stimulated a new interest in the 'swallows' in our inner city area, and I realized that while there were some welcome swallows, the majority of the birds were in fact tree martins, of which my little companion was one (Hence the tiny hole in the pole for a nest)

I have not been able to find much in the literature about the habits of tree martins, but as a parent keenly scanning the skies for my fledged offspring, it appears that tree martin babies, once fledged, no longer depend on the parent bird to feed them. I did not once see the begging behaviour of other birds, instead the birds formed a flock and circled high, landing on the wire only to preen or rest. I would appreciate it if anyone who knows more about the behaviour of these wonderful little birds could respond to this theory.

I now develop a rather interesting gait every day when I walk past the power lines. My gaze turns skyward, and often I can be heard calling 'are you there Lucy?'

I shamelessly anthropomorphize that the one little bird that frequently detaches from the group to sit alone and call is Lucy. (Or could it be Lucius?)

ABOVE: A recently fledged Welcome Swallow.

EDITOR: As Yvonne discovered there is very little information about parental care in Tree Martins. In The Handbook of New Zealand and Antarctic Birds [HANZAB Vol 7] three lines are devoted to this subject. This contrasts with half a page written about 'fledgling to independence' in Welcome Swallows and probably has something to do with where they nest.

Tree Martins usually nest in large trees that are old enough to have formed a multitude of hollows to accommodate their colonial nesting preference. Both parents feed nestlings; fledglings return to the nest, but there is no further information about parental care.

Welcome Swallows attach their mud nests to a vertical surface beneath and close to overhead cover. Sunny verandahs are favourite locations, but they will nest in just about any human-made construction as long as there is suitable nesting material nearby. They feed their fledglings (either on the wing, on the ground or perched) for up to two weeks.

Yvonne's casual observations and Lisa's more detailed study add to our limited knowledge of some relatively common species and demonstrate just how little we know about our native fauna. The valuable contribution made by amateur naturalists and keen observers (called 'citizen scientists' in the USA) should not be underrated.

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