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DANCES WITH WOLVES - AUSTRALIAN WOLF SPIDERS

Volker Framenau

"Wolf spiders? Aren't they all large, hairy and really dangerous?" This is a common question asked by many people when I tell them what I am doing for a living. Let's get some of these misconceptions straight!

Wolf spiders, scientifically known as the spider family Lycosidae, may be large, i.e. up to 30 mm body length or so (not counting the legs), but many are also much smaller when fully grown. In fact, one of the smallest wolf spiders known is the tiny *Zoica minuta* that was discovered on the Old Argyle Station in the Kimberley region of WA in the late 1970s. The body of these spiders is only up to 1.5 mm (!) long. Wolf spiders are only moderately hairy (in particular compared to other spiders) and often display striking colour patterns (e.g. Figs 3 and 4). They are not dangerous to humans, although bites of the larger species might hurt for a while (but not more than a bee sting).

What characterises a wolf spider? A number of features differentiate wolf spiders from all other spiders. Morphologically, wolf spiders have a unique eye pattern, with a single row of four small frontal eyes, and four additional large eyes, situated in almost a square, on top and in the frontal half of their carapace (Fig. 2 and 3). Some of the larger eyes have a highly reflective structure, the tapetum, that reflects light and allows nocturnal spotlighting of even the smallest

wolf spiders. The second character unique to wolf spiders is their mobile brood care. After mating, females will construct a spherical eggsac in which they lay their eggs; around 3-5 in the small *Zoica* species and up to and may be more than 1,000 in the largest spiders. The females then fix this eggsac to their spinnerets and will carry it everywhere they go (Fig.1). Often, in burrowing species, females will expose the eggsac to the sun, possibly to speed up the development of the eggs.



Fig. 1: *Arctoria mckayi*, female with eggsac (Avon River, Victoria). (V. Framenau)



Fig. 2: *Tetrallycosa alteripa*, juvenile (Lake Lefroy, Western Australia). (V. Framenau)

After the young spiderlings hatch from their eggs and leave the eggsac with the help of their mother, they do not immediately disperse. They climb onto the female's abdomen where special hairs allow them to hold on for another 2-4 weeks, piggybacking wherever mum goes to avoid hazardous situations. Often, there are so many spiderlings on a female, that they also cover the carapace of the mother which is barely visible underneath. This mobile brood care, in combination with their diversity in hunting strategies (vagrant to permanently burrowing; see below) and their efficient dispersal capabilities via ballooning (wind dispersal on a strand of silk), is

thought to be responsible for the huge ecological success of wolf spiders. With almost 2,400 scientifically described species worldwide, they are the fourth largest spider family. Around 160 species are currently described from

Greetings!

LFW celebrated reaching a significant milestone when the 2,000th property was registered. The Minister for the Environment presented a certificate to Glenn Dewhurst of the Black Cockatoo Rehabilitation Centre, surrounded by well-wishers and very noisy cockatoos. See page 3 for more details.

Just what is a 'biodiversity hotspot'?

We probably all know by now that the south-west of WA has been identified as a 'global biodiversity hotspot'. We tend to be really proud of this, as it celebrates our truly outstanding natural diversity, but we should not forget that the definition of these 'hotspots' does not just relate to the flora and fauna. The term refers to an area where "exceptional concentrations of endemic species are undergoing exceptional loss of

INDEX

Antics _____	12
A piebald cockie _____	13
A wambenger story _____	15
Biodiversity of an economic hotspot ____	6
Boodie rats _____	12
Bush detective _____	4
Celebration of the 2000th registration ____	3
Dances with wolves _____	1
Editorial _____	2
Looking through the phone book ____	14
Mystery animal 'droppings' are beetle 'push-ups' _____	16
Newly-naturalised bindweed _____	19
Pebble-mound mice _____	9
RabbitScan _____	19
Swan Weeds Database _____	19
The genus <i>Gompholobium</i> _____	10
The murdering animal _____	18
Western ground parrots distinct from eastern ground parrots _____	17
Wildflowers of the Great Southern ____	18
Wonderful Wongan Wildlife! _____	20

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EDITORIAL

habitat".* Certainly, let's celebrate the biodiversity, but how have we changed our land use activities to reverse the exceptional loss of habitat?

Why, for example, are we permitting the removal of huge old roadside or paddock trees whose hollows provide nesting sites and, if marris, whose blossom sustains nectar-feeding fauna including honeyeaters throughout the autumn feed gap? Isn't this somewhat short-sighted? In the WACentenary publication *The Story of a Hundred Years* (1929) the then Director of Agriculture, G. L. Sutton says "So great has been the desire of the settler to conquer the forest and produce crops that far too little timber has been left for the purposes of shade, shelter and firewood. This defect is recognised by many of the later settlers, who are leaving clumps of trees in the paddocks as well as strips of uncleared land, one chain or more wide, on the boundaries of their paddocks. This practice is most desirable and should become general. It adds alike to the usefulness and the attractiveness

of the holding". Eighty years on, it is these 'desirable' trees that are being removed.

As well as the international biodiversity hotspot list, Australia has also listed 15 sites that are national hotspots. The Pilbara is one of these. Read Stephen van Leeuwen's summary of findings from the recent Pilbara Biological Survey to see just why this area qualifies. From the same region, Stephen Davies reminisces about one of the region's interesting animals, the pebble mound mouse.

We continue to get fascinating stories from members, and in this issue you will read about boodies, phascogales (two species), leucistic cockies, ants and another snake tale. And note how the real-life bush detective led to information about a fascinating group of creatures. Have you got a story you would like to share? What about something botanical?

Penny Hussey

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A Celebration of the 2000th Registration!

In the years since LFW first started in 1997, over 2000 landholders have registered their properties with the scheme. It was decided to celebrate the 2000th at Kaarakin, the Black Cockatoo Rehabilitation Centre (BCRC).

The BCRC had recently moved from private property to a site vested in the City of Gosnells, formerly occupied by the Cohunu Wildlife Park. The 16 hectare site has some good bushland, but also areas of overgrazed kangaroo enclosures, so the LFW report concentrated on bushland rehabilitation techniques. Coincidentally, this location demonstrates how threatened species can unite all levels of the community in working to ensure their survival. State and local government, community groups, private landholders and volunteers are all involved in helping Kaarakin become established, and all were represented at the celebration, as well as a large number of LFW members.

The occasion began with a 'welcometocountry' from Nyoongar elder Trevor Walley. He also presented firesticks - smouldering banksia spikes - to both the BCRC representative and to the Minister for Environment, Donna Faragher,



The Minister with a symbolic firestick. (Maureen Griffiths)

as a symbol of the importance of fire in caring for country.

The Department of Environment and Conservation's Director General, Keiran McNamara, spoke on the department's role in conservation on private land.

We were very pleased to welcome Ms Faragher who emphasised the importance of biodiversity conservation in WA and congratulated all LFW members on their commitment. She then presented BCRC's Glenn Dewhurst with a framed certificate, the 2,000th sign, the property report and, as an extra, a cheque for a grant from the Minister's Community Conservation Grants.

Glenn responded with an outline of the future for the BCRC, and a huge vote of thanks to all volunteers.

The site is vested in the City of Gosnells, and the Mayor, Cr Olwen Searle JP, outlined the many initiatives that the City has undertaken to maintain biodiversity on its land. She, too, praised volunteers.

Refreshments were then served, and Kaarakin volunteers took groups of visitors around to see the facilities and get close to these beautiful birds.



Harmony was a great favourite! Here she is with Cr Julie Brown, Deputy Mayor, City of Gosnells. (Maureen Griffiths)



From L-R: Trevor Walley, Glenn Dewhurst, The Minister for Environment Donna Faragher, Penny Hussey, Keiran McNamara. (Catherine Jack)



Are these forest red-tails being a bit too friendly! (Catherine Jack)

It was a very enjoyable event, and I would personally like to thank all those who helped in the organisation, especially Zara Kivell and Claire Hall, who undertook most of the work.

Penny Hussey

Bush detective

Who made this?



This interesting structure was spotted in bushland. It is so bizarre that it might have been created as an entrant in the 'Snugglepote and Cuddlepie Exhibition of Bush Art'! Who constructed it? Jodi Wildy recounts the detective story ...

Not long ago, we were walking through some bushland that had long been fenced from grazing activities on a farm near Boyup Brook. Eric, the farmer/bush expert, was showing us a population of *Verticordia carinata*, a Declared Rare Flora species that is not known anywhere else but in the Stirling Range. While we were walking along, my husband spotted a woven twig structure sticking out amongst the leaf litter. The twigs were intricately placed and woven with leaves and webbing, and seemed to be the entrance for a burrow that had been dug in the sand.

Having not seen anything like this before, we all got quite excited so we took some pictures of the structure to send off to Penny Hussey, who we thought would know what it could be. Penny in turn replied that she

had never seen anything like this before, so sent our photos to various invertebrate experts to see if they knew what it could be. Dr Volker Framenau replied that it could be the turret for the burrow of a shuttlecock wolf spider (*Mainosa* sp.), and after reading his paper describing these spiders we became excited again, as the location of the turret we found was well outside the current known distribution for shuttlecock wolf spiders.

To confirm that the turret belonged to this particular spider we needed to get a specimen, so off we went spider hunting! Armed with small jars, methylated spirits (for preserving) and spade, we went back to the turret that we had found previously. After digging out the first burrow we were quite disappointed to find it empty! Not deterred, we thought there must be more around, so with eyes glued to the ground we searched, and found another five burrows within a six metre radius of the first one. Eric carefully dug another burrow out, and about 20 cm down, found a spider who quickly tried to scurry away! The chase was on, for another 30 cm, then we caught the spider and carefully placed it in the jar. The spiders that we found were immediately 'cured', and sent off to the WA Museum for verification.

The spiders were identified to belong to the *Dingosa* genus of Australian wolf spiders (we collected two species, *D. serrata* and *D. murata*) that are more commonly found within this area. The *Dingosa* and *Mainosa* spiders are the only two 'turret' building spiders in Australia, and there is no real evidence as yet as to why these turrets are built at the entrance to the burrow. It is suggested that the *Dingosa* uses the turret as a barricade whilst waiting for prey, and to stand on the walls of the barricade to look out for prey. Although the great spider chase did not end as hoped, we discovered how valuable being able to detect such creatures is in measuring the health of the bush. The fragile turrets built by these spiders are an indication of another layer of diversity present in this patch of bush that would not exist if not for excluding hard-hoofed livestock.

Jodi Wildy

continued from page 1

Wolf spiders

Australia, but an estimated 500+ species may exist. Much is there still to be learnt about Australian wolves!

Four main groups (subfamilies) of wolf spiders occur in Australia. These groups differ in morphology (in particular of the genitalia, which are important for spider identification), but members of these groups often share a similar biology. The smallest group is the

subfamily **Zoicinae**, to which the tiny, abovementioned *Zoica* belongs. Only one species is described from Australia, but there might be up to five unnamed species, all confined to the subtropical and tropical north of the country. These minute spiders do not build burrows but hunt freely amongst low vegetation where they maybe difficult to detect.

The second group, the subfamily **Venoniinae**, also includes fairly small species, maybe up to 5 mm body length. The seven members of

at least one of the genera in this group, *Venonia*, build small sheet-webs in low vegetation or depressions in the soil. Spiders hide in a small silk funnel of the sheet-web and wait for prey to land on the sheet. Two other genera, *Anomalosa* (two Australian species) and *Allotrochosina* (also two species) also belong to the Venoniinae which can be found in the wetter, generally coastal parts of Australia and are absent from the arid interior.

The third group is the subfamily

continued from page 1

Wolf spiders**FAUNA**

Fig. 3: *Hoggicosa bicolor*, penultimate male (Western Australia). (V. Framenau)

Artoriinae, which includes the species-rich genus *Artoria* (more than 20 species described, possibly 100+ unnamed species) (Fig. 1), the salt lake inhabiting *Tetrallycosa* (Fig. 2) and another five or so smaller genera. These spiders are small to medium-sized (3–20 mm body length) and generally have a lightly coloured, narrow central band on the abdomen. Similar to the Venoniinae, they occur more commonly in densely vegetated areas towards the coast. They typically include forest dwellers and often inhabit rural parks and gardens. The most extreme environmental adaptation of all Australian wolf spiders can certainly be found in the salt lake dwelling species of the genus *Tetrallycosa* (Fig. 2). Hidden in a burrow during the day, these species hunt on the dry surface of salt lakes during the night. How they survive prolonged inundations of the salt lakes is currently unknown. All other Artoriinae appear to be vagrant, i.e. they do not construct burrows.

The fourth group of wolf spiders, the subfamily **Lycosinae**, is the largest of the groups in number of species, but also includes the largest spiders. Many of these large spiders live permanently in self-excavated burrows (although burrow stealers have been reported),

which they rarely leave for hunting. The spiders most commonly sit at the entrance of the burrow to attack passing prey. Only males will leave the burrow after maturation to search for the burrow of a female. The construction of

a permanent burrow allowed the Lycosinae to colonise the arid interior of Australia with enormous success. Spiders will spend the hot days in the burrow and will generally only hunt at night. The burrow is often closed during the heat of the day. Overall, the Lycosinae are poorly known in Australia, although some recent work dealt with some spectacular groups. The genus *Hoggicosa* includes some of the most dramatically coloured wolf spiders known, such as the common inhabitant of arid regions, *Hoggicosa bicolor* (Fig. 3). The genus *Tasmanicosa* can easily be recognised by the ‘Union-Jack-pattern’ on the carapace (light and dark radial lines) and two of its representatives, *Tasmanicosa godeffroyi* and *Tasmanicosa leuckartii* belong to the most commonly collected wolf spiders throughout the southern half of the country.



Fig. 4: *Dingosa serrata*, male (Perth, Western Australia). (V. Framenau)

Burrow construction is fairly uniform in wolf spiders; most species live in open burrows that they may close with a loose layer of silk and substrate in adverse conditions or when they are inactive (e.g. during moulting). However, two remarkable burrow modifications occur. Some *Hoggicosa* species close their burrow with a solid trapdoor that is made of a plug of substrate or a pebble. These burrows are indistinguishable from the surrounding soil and spiders are difficult to detect for predators (or human scientists...).

The second adaptation, to my knowledge unique to wolf spiders, are palisades around the entrance of the burrow, made of pebbles or leaves. These palisades are known from two Australian lycosine genera, *Dingosa* (Fig. 4) and *Mainosa*, and both genera occur in WA. Due to the unique construction of the burrow, the latter spiders were aptly named ‘shuttlecock wolf spider’ by Barbara Main from the University of WA. The function of these palisades is currently unknown. They may provide an efficient barrier against debris that could otherwise fall into the burrow. They may also play an important role in foraging: prey may be attracted to the palisade as an elevated resting place and the turret also provides the spider with a vantage point; I have seen them sitting on the top of the turret during the day. Finally, palisades may have an important thermoregulatory function such as to avoid hot surface air penetrating the burrow.

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RESEARCH

BIODIVERSITY OF AN ECONOMIC HOTSPOT THE PILBARA BIOLOGICAL SURVEY

Stephen van Leeuwen

The Pilbara region in north-western Australia is unequivocally Australia's most important region with respect to the economic wealth and prosperity of the nation. In 2001 the Pilbara contributed over \$105 billion to the Australian economy or over 15% of GDP. The Pilbara is the leading resources sector region in WA, accounting for 63% of the value of mineral and energy production in the State in 2007. Despite the global financial crisis which has slowed the resources boom juggernaut somewhat, the importance of the region to the State's and nation's economic wellbeing cannot be understated. This economic hotspot is driven by the mineral and petroleum wealth of the Pilbara, particularly the region's endowment in iron ore, precious metals, natural gas and conditions suitable for solar salt production.

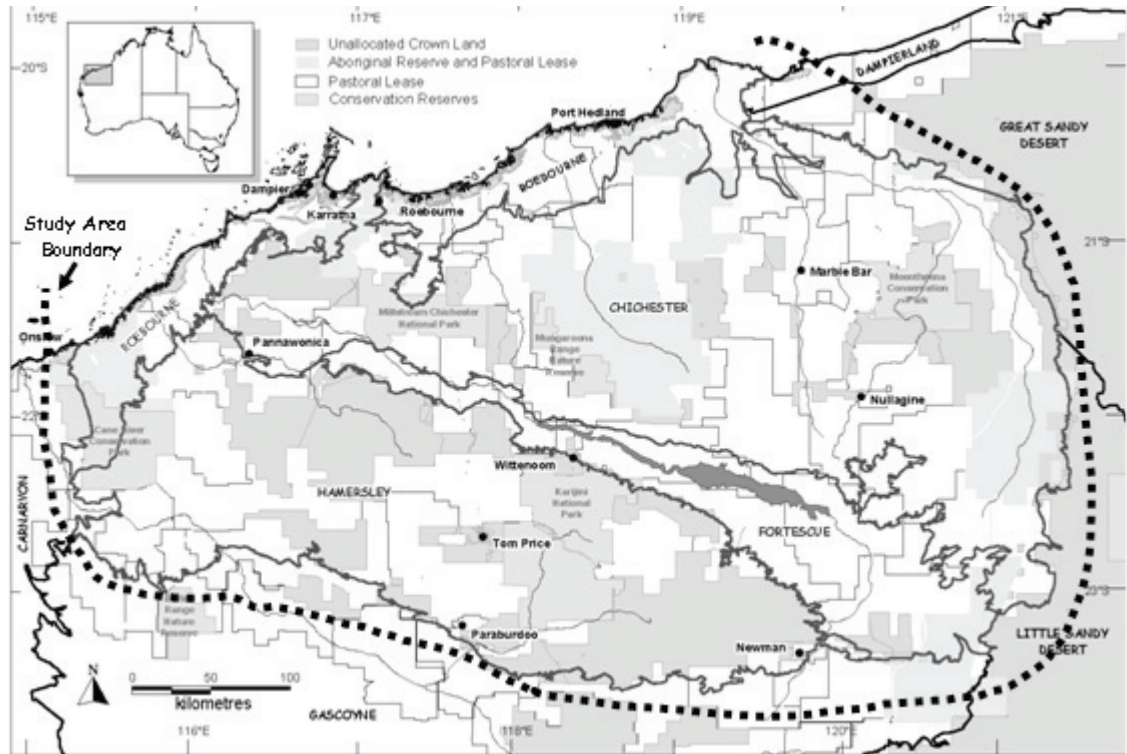
Commensurately, the Pilbara also has a wealth of biodiversity and has been recognised as one of the nation's 15 biodiversity hotspots. Documenting the Pilbara's biodiversity commenced when William Dampier collected several plants, including Sturt's desert pea, from the archipelago which now bears his name – Dampier

Archipelago - during his voyage along the coast of New Holland in 1699. Over the subsequent 300 odd years, research has continued to document the biodiversity of the Pilbara culminating in the region being recognised as one of the most extensively trapped and sampled parts of WA.

Nevertheless, despite a wealth of knowledge, no rigorous assessment has been undertaken of biodiversity across the entire 179,000 square kilometres of the Pilbara. Simple questions, critical for making informed nature conservation, sustainable land use and development decisions are hindered by a lack of regional perspective as to how biodiversity is distributed across the region, the condition of this biodiversity and the threats that impinge upon it. To address this shortcoming and

provide a framework on which to base future sustainable land use and biodiversity conservation decisions, the Department of Environment and Conservation (DEC) commissioned the Pilbara Biological Survey.

The Pilbara Biological Survey is a \$13.8 million project funded principally by DEC with contributions from the Federal Government (National Heritage Trust), WA Museum and several resource companies, in particular Rio Tinto, BHP-Billiton Iron Ore and Straits Resources. The survey, the largest of its kind to be undertaken in WA and arguably Australia, commenced in 2002 and is due for completion in 2009. It is a multidisciplinary project involving over 110 researchers who are documenting terrestrial and aquatic flora and fauna, including invertebrates, and the communities



continued from page 6

Pilbara survey

RESEARCH



Botanists recording plants in a quadrat. (Bob Bromilow)

into which they are arranged across the region. All field work for the survey is now complete with voucher sorting, specimen identification, data compilation and analysis underway.

The effort required to comprehensively survey an area as large as the Pilbara has been substantial as demonstrated by survey effort statistics for the botanical component of the project. In total the botanical survey team comprised a core of four DEC scientists supported admirably by three technical officers. This DEC team was in turn assisted in the field by another 32 collaborators who included DEC volunteers, other DEC scientists, technical and operational staff, employees of Rio Tinto Iron

Ore and, perhaps most notably, botanists and taxonomists from all the mainland State herbaria in Australia. This survey team sampled 412 sites on two or three occasions and in so doing collected over 80,000 vouchers.

The survey team travelled 128,000

km throughout the region over a three-year period during 14 collecting trips which culminated in a total of 1,260 person days (3.5 years) in the field.

During the overall survey, a total of 304 terrestrial, an additional 108 botanical, 90 aquatic and 550 stygofaunal biodiversity sites were sampled on at least two occasions. The location of sample sites across the region was designed to capture the major geological and landsystem units that characterise the Pilbara while also taking into consideration patterns in climatic variation and fire history which strongly influence the patterning of biodiversity. It must be stressed that these types of regional surveys are designed to sample the characteristic widespread

community of a region and not the rarer and often charismatic special habitats which are very important biologically. However, these surveys do not provide insight into how the biodiversity of the region

is distributed, the sustainability of current land use practices or the effectiveness of the existing conservation reserve network.

Preliminary results for the survey indicate that the Pilbara is a very biodiverse natural region. This diversity was unexpected for many of the targeted groups sampled but in hindsight can be attributed to a number of factors associated with the heterogeneous climate, geology, landforms and soils of the region, and the impacts of important processes such as tropical cyclones and fire. It is now clear that the Pilbara is indeed one of Australia's biodiversity hotspots, as supported by the facts below.



An example of Pilbara stygofauna. (Stuart Halse)

- Over 350 stygofaunal invertebrates, the majority of which are tiny crustaceans (ostracods and copepods) that are new to science. Most of these aquatic groundwater invertebrates are short range endemics (very restricted distributions) and over 90% are endemic to the Pilbara. The Pilbara is now recognised as the international hotspot for stygofauna. (Stygofauna are aquatic invertebrates that live in groundwater aquifers and never see the light of day.)

- 1,035 species of aquatic invertebrate of which 10% are new to science and 20% are only known from the region. Significant



Allan Burbidge checking a pitfall trap. (Jim Rolfe)

continued from page 7

Pilbara survey

RESEARCH

wetlands that support diverse invertebrate communities and restricted species include coastal claypans, some springs (Weeli Wolli, Millstream, Karijini gorges), deep permanent river pools, claypans on the Fortescue River and the nationally significant Fortescue Marsh.

- Recognition of the Pilbara as a centre of diversity for charophytes (stoneworts) with 36 species and varieties being identified in wetlands of which about 30% are undescribed and 20% are restricted to the region. The aquatic flora is also rich in diatoms with 283 species being collected, 26 of which are new to science.

- A diverse community of ground spiders with about 320 species being collected of which 80-90% are new to science. Species richness approaches 40 species per 0.25 ha site.

- A similarly diverse community of ground beetles with 600+ species of which about 80% are also new to science. Species richness for ground beetles approaches 65 per 0.25 ha site and many appear to have very short geographical ranges.



DEC cadets installing pitfall traps. (Jim Rolfe)



Botanists preparing and processing plants in the field. (Stephen van Leeuwen)

- Up to 248 species of ground dwelling ants of which 10 % are new to science.

- Over 100 reptiles including several new gecko species and species range extensions which represent new records for the Pilbara.

- Approximately 250 species of non-oceanic birds including several rare species like the grey falcon but unfortunately no night parrots which were recently reported to occur on the Fortescue Marsh.

- Eighteen species of terrestrial mammal including the nationally threatened (vulnerable) mulgara. It appears that soil type and rockiness play a very important role in the distribution of ground mammals across the region. Basically those mammals that live in burrows occur on sandy substrates as they need to dig, while those that seek refuge in fissures live on cracking clays, whereas those that shelter under rocks live on rocky substrates.

- The identification from sub-fossil deposits obtained from caves, owl pellets and bat roosts of evidence (teeth, skulls) that the pre-European (5000-200 years before present day) mammal fauna comprised over 57 species, 11 of which are now extinct.

- Eighteen species of bat with one nationally threatened species, the Pilbara leaf-nosed bat, appearing to have an ubiquitous but cryptic distribution across the entire region.

- More than 20 new species of vascular plant including several *Acacia* and *Eremophila* species and many new records of both Kimberley and desert species for the region.

The survey is now drawing to a close with researchers busily analysing, writing and submitting manuscripts for publication. Unfortunately the botanists are still identifying many of their 80,000 vouchers and thus are a little behind! It is envisaged that the entire project will be completed by December 2009 when the survey results will be published as a volume in the Records of the Western Australian Museum. Online electronic versions of already completed papers (ground mammals, bats) should soon be available, via the WA Museum's website, for distribution.

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FAUNA

PEBBLE-MOUND MICE

Stephen Davies

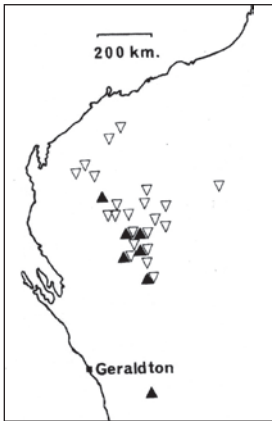


Fig. 1. Sites in WA in which pebble mounds surmised to have been made by *P. chapmanii* (hollow triangles) and an unknown murid (black triangles) were located.

For many years, pastoralists in the Pilbara have found neatly sorted collections of pebbles, all the same size, on the hillsides of their properties. Regarding these as 'gifts from God', they made good use of them as aggregate when mixing concrete for their various constructions. When I first drove across the divide between the Murchison and Gascoyne Rivers in 1959 I was intrigued by these mounds, photographed them and discussed them with David Ride, then Director of the WA Museum. He suggested that they might be made by a mouse, perhaps a *Leggadina* (then the name of the genus that is now *Pseudomys*). My photograph was published in the first edition of E.P Walker's (1964) book 'Genera of Living Mammals' in the section on *Leggadina*. As I travelled around the Murchison and Goldfields in those days I found many mounds, but none seemed to be actively in use. It was not until Andy Chapman found active ones in the Hamersley Ranges that living animals were caught and described, proving to belong to the rodent genus

Pseudomys. Subsequently three more species have been described, extending their distribution across northern Australia.

The little pebble-mound mouse (*Pseudomys chapmanii*) once lived on Mileura Station, where I did my most intensive work on emus. It does so no longer but still lives on the Hamersley Range. It characteristically builds a pebble mound, each pebble within a weight



A large old pebble mound - arrow indicates top edge. (Stephen Davies)



Pseudomys chapmanii. (Bert and Babs Wells/DEC)

range of 1.5-3.8 g and of a volume 0.6-1.7 cc. These mounds can be two metres across and one metre deep, the uniformity of their pebbles is such that they do, indeed, make

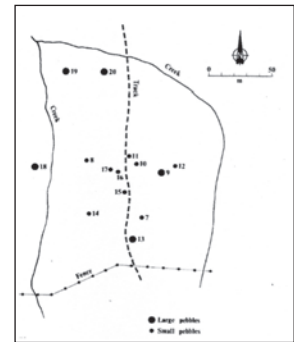


Fig. 2. A site on Erong Station, WA, showing the positions of pebble mounds surmised to have been built by *P. chapmanii* (small dots) and an unknown large murid (large dots) in a mixed colony.

admirable screenings for concrete-making by pastoralists.

No one has yet done experimental work to prove how the mounds are used but it is surmised that they act as dewponds, the pebbles cooling at night and heating more slowly than the surrounding air as the sun rises, so that water condenses onto them. In this way the mice could obtain water in places where the soil is too shallow to allow them to dig deeply to moist soil, usually about 60 cm below the surface. Such sites are often vegetated by *Senna* bushes that yield a large crop of seeds for the mice to eat.

In 1976 it was possible to survey the distribution of these pebble mounds in the Murchison and Pilbara. Figure 1 contains data from 1981* and 1986* showing the mounds to be widely distributed. At one site where we mapped the mounds, we found to our surprise that there were, intermingled with the small pebble mounds, mounds of large pebbles (weight range 15.5-26 g; volume range 6.5-12.0 cc). The distribution of the large pebble mounds differs from that of the small

FLORA

THE GENUS GOMPHOLOBIUM - GLORIOUS BUT LITTLE-STUDIED LEGUMES

Ann Smithson

Gompholobium is a relatively little-studied endemic Australasian genus of native legumes (pea plants), having around 44 species, all but one of which are endemic to Australia. They are sometimes more commonly known as glory peas or wedge peas, and are generally small to medium shrubs often forming a conspicuous component of the forest understorey and kwongan. *Gompholobium* species might be familiar to you through their characteristically large, inflated, globular pods that can be very conspicuous during fruiting, and their very colourful and often quite large flowers, which are typically-shaped for members of the pea family. They can also be distinguished from other similar genera by the calyx surrounding the corolla, which is very deeply divided into five lobes. While the well-known eastern states species *G. latifolium* is commonly called the golden glory pea due to its very bright yellow flowers, *Gompholobium* flowers can be yellow, orange, red, pink, blue or purple, depending on the species, and when flowering are often very showy. WA is the centre for *Gompholobium* diversity, with all but 14 of the 44 species predominantly or exclusively found here, and the combination of few studies together with the many species that have very restricted known distributions make this a particularly fascinating genus to study.

Native legumes in general are the most diverse plant family in Australia, comprising around 13% of known species. Legumes are such an important component of our vegetation, by species numbers and by biomass, because

of their role as nitrogen fixers. Australia has old and highly leached soils depauperate in nutrients essential for plant growth, particularly nitrogen and phosphorous, compared with the rest of the world. Legumes have a symbiotic relationship with nitrogen-fixing *Rhizobium* bacteria, which are contained in nodules on plant roots and fix atmospheric



Roots of *G. marginatum* from cultivated specimens at Kings Park with a typical root nodule (nodule is approx. 4 mm long). (Ann Smithson)



G. marginatum, *G. preissii* and *G. tomentosum*. (Illustration by Margaret Wilson from 'Flora of the Perth Region')

nitrogen to nitrate. This nitrate is subsequently utilised by the plant for growth and can be taken up by other plants or animals after decomposition or through consumption, hence legumes increase the availability of nitrogen in ecosystems. Indeed, adaptation to nutrient limitation may well be one of the key factors driving high plant diversity in the south-west WA biodiversity hotspot, and adaptation to different *Rhizobium* species is one mechanism that could drive divergence and speciation in legumes. In WA, flowering legumes, such as the 'eggs-and-bacon' peas (genera *Daviesia*, *Bossiaea*, *Gastrolobium* and *Chorizema*) and *Gompholobium*, attract substantial numbers of native insects as pollinators through production of nectar and pollen, and thus have an important ecosystem services function in the landscape. Research has suggested that some co-flowering legumes may mimic each other to increase pollinator attraction, and many flowering legumes including *Gompholobium* may in turn be mimicked by rare co-flowering orchids such as species of *Diuris***, indicating pollination may be another important mechanism driving species divergence and adaptation.

Unlike the closely-related genus *Gastrolobium*, whose species produce the toxic compound fluoroacetate in their leaves giving rise to their popular name of poison-peas, the leaves of *Gompholobium* species are not toxic, and are often heavily grazed. In most *Gompholobium* species, female insects are also attracted to the developing seed pod while they are green and soft,

continued from page 10
Gompholobiums

FLORA



Bright red *G. polymorphum*. It can be recognised by its twining habit and trifoliate leaves. The flowers are 30mm across. (Ann Smithson)

and lay an egg inside. As the pod inflates, the seeds are consumed by the developing insect larva. The larva usually chews its way out of the now-empty seed pod, to pupate elsewhere. It is not uncommon to find up to 90% of *Gompholobium* seed pods in native bushland so attacked, with each pod bearing a characteristic hole on the outside - frustrating for seed-hunting botanists and plant alike! However, no-one yet knows which species of insects are involved, although they are likely to be specific, since *Gompholobium* seeds contain the amino acid canavanine, which is both an insect-feeding deterrent and a food source for the developing seed.



G. polymorphum showing the inflated pod and deeply five-lobed calyx typical of the genus. (Ann Smithson)

Renewed interest in *Gompholobium* has been recently stimulated by a comprehensive taxonomic revision of the genus, describing a number of new species.* Our research at the University of Western Australia and Kings Park shows how much there is still to do to understand about these fascinating species. We are focusing on studying local adaptation, in particular in jarrah forest understorey species, as an aid to determining optimal seed

sourcing zones for revegetation of native habitats and for conservation. *G. polymorphum* is for us a species of particular interest, and is a very characteristic species as it is the only member of the *Gompholobium* genus that can actively twine up surrounding understorey vegetation - most commonly *Xanthorrhoea* and *Acacia pulchella*. As the name suggests, *G. polymorphum* is also highly variable morphologically, particularly in having at least three distinctive flower colour forms - yellow, orange and crimson/pink - which usually do not co-occur in the same population. Our data so far suggest that these corolla colour forms are geographically restricted, with the yellow-flowered form being found in jarrah forest understorey from the Perth Hills south to Albany, the orange-flowered form from the Perth Hills to Serpentine often on more open sites, and the crimson/pink-flowered form on southern coastal sandplains and around the Stirling and Porongurup ranges. While genetic data generated so far show no consistent DNA sequence differences between forms, differences in physiological traits such as germination and growth rates are found. We therefore suspect that *G. polymorphum* is a mosaic of recently diverged forms locally adapted to specific environments within south-west WA. Additionally, the recently described *G. gairdnerianum*, which is restricted to very specific habitats in Mt Lesueur National Park, may well be a further northern form within the complex. Has local adaptation been driven by adaptation to soils and nutrient limitation, or to different pollinator types, or other factors? We hope to be able to answer these questions soon.

Has this article interested you in these glorious peas? If so, look out for *Gompholobium* at your local native plant nursery or at the Kings Park native plant sales - many species make a showy display when grown as a small group within a native plant garden and will germinate well from seeds that garden plants produce (lightly scarify the seeds with sandpaper, or pour boiling water over them and leave to soak, prior to germination on the surface of native plant potting mix). However, do check that the *Gompholobium* species you are buying suits your soil type. If you find the twining *G. polymorphum* in native bushland in the coming spring I'd be particularly interested to hear about the location from you, especially if you note the flower colour form that you find.

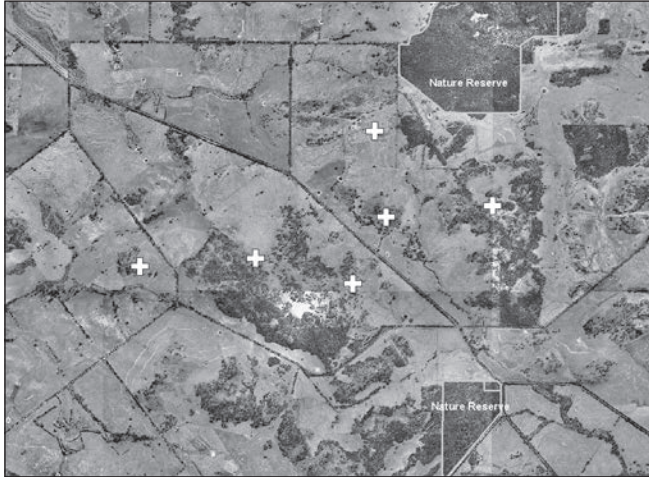
[* for ref, contact Ed. ** see WW 12/1, Jan 2008]

Ann Smithson is a Research Scientist in the School of Plant Biology, UWA, and at Kings Park and Botanic Gardens. Records of sites for *G. polymorphum* can be sent to her at: Ann.Smithson@bgpa.wa.gov.au

Members' Page

BOODIE RATS

Brian English



Another reason for us to support the 'Red Card for the Red Fox' programme is that the harmless boodie rats fell victim to the fox. My wife's grandfather, who took up land at Arthur River over 100 years ago, described the boodie rat to me at least 50 years ago. My recollection is not clear, but I think he said that they were bigger than a rat, but smaller than a rabbit. He also said that they were very numerous.

To this day we can still see the homes of these animals. I have farmed a property at Pingelly for the last 40 years and, as you can see from the crosses on this photo, have six sites the same as those described by the late pioneer of Arthur River. The boodies dug out many tonnes of earth from granite outcrops. Typically the site would be an aggregation of large boulders with all the soil removed from between them. The soil is mounded around the stones some three to five metres from the granite. It appears that they removed all the soil. Development of these sites would have taken many years. With the demise of the boodie, these premises were enjoyed by foxes particularly and to some degree by rabbits. The arrival of the rabbit as a competitor for food also had a serious influence on the population.

Today the boodie is known as the burrowing bettong and is being bred in protected environments such as the Francois Peron National Park at Shark Bay. The WA Museum website has comprehensive information on these and other native animals.

It is interesting that we don't value things till they are gone and nearly forgotten.

ANTICS

Fiona Falconer

In summer of 2007 we began to notice large numbers of little black ants that periodically invaded our kitchen, particularly during unsettled weather.

In January 2008, the invasions had become so bad that specimens were collected and dispatched to the Department of Agriculture and Food's Pest and Disease Information Service for identification. The ant was identified as an *Iridomyrex* species, a relative of the commonly encountered meat ant *Iridomyrex purpureus*.

Then, on 18 April 2008, a walk in the bush that surrounds our homestead led to the discovery of an open trapdoor spider burrow and a line of little black ants nearby led to the body of a shield-backed trapdoor spider *Idiosoma nigrum*. Identity of the spider was confirmed by the WA Museum. It was thought that the unfortunate spider was probably a juvenile that may have been forced to vacate its burrow because of invading ants. It did not get far before being overcome!

Talking to other landholders in the Waddy Forest area east of Coorow revealed that all had been having trouble with little black ants. Interestingly, the little black ants appear to have displaced their larger meat ant relative in garden and bush areas around homesteads.

A most disturbing account came from Alison Doley about live Carnaby's cockatoo chicks being adversely affected by the little black ants. These cockatoos breed on Alison's property, Koobabbie.

In the 2008 breeding season, monitoring revealed that live chicks in three out of 36 active nests had been invaded by little black ants. Previous observations suggested that ants only invaded nests when there was a dead chick.

This was the story provided by Alison from Carnaby's nest 24 and nest 59 .

In nest 24 on 4 December 2008, the chick had ants on it and was showing signs of distress. Around the opening of the cloaca the skin was reddened and scabby. Dejan Stojanovic, Conservation Officer for the Carnaby's Black Cockatoo Recovery Project, obtained some chlorpyrifos and sprayed the base of the salmon gum. By 15 December the chick had recovered completely and showed its good health and appreciation by hissing aggressively! By 15 January 2009 the chick had fledged.

In nest 59 on 21 December 2008 there was a one-week-old chick and a dead chick with some ants on it that was removed. On 23 December a light application of

Members' Page

A PIEBALD COCKIE!

Sheila Howat

Land for Wildlife member and bird enthusiast, Deb Perry, has been thrilled to have an albino-like leucistic Carnaby's black cockatoo regularly visit her Bridgetown farm this autumn.

Deb says that flocks of Carnaby's feast on the seeds of her stone pine trees every autumn. The cones are sometimes opened and eaten in the trees, but more often are opened by the birds on the ground after they have cut them off with their powerful beaks. They often leave them on the ground for a week or more before returning to open them.

In late March, Deb heard from intrigued friends that they had seen a white bird flying down to the Blackwood River at dusk with a flock of white-tailed black cockatoos.



continued from page 12

Antics

chlorpyrifos was sprayed around the base of the tree. On 15 January 2009 the chick was healthy. On 19 February at 7pm the chick was at the mouth of the nest, obviously troubled by ants. Eventually it glided to the ground. Little black ants were on its tongue and through its feathers. It did not have a full crop. The chick was placed in a York gum that was free of ants and the parent birds were observed feeding it. Next morning there was no sign of parents or chick. In the 2009 breeding season ant control on active nests will be given top priority.

Landholders have various theories in regard to the increasing numbers of 'little black ants'. Perhaps the adoption of minimum till in cropping systems has created favourable conditions for this species of ant, or maybe it is seasonal conditions experienced in recent times, particularly the dry years of 2006-07?

Then, on Easter Monday, a mid-air commotion turned out to be that unusual cockatoo under attack from a magpie as the flock flew towards Deb's pines to feed. She thought that perhaps the magpie thought that the cockatoo was a trespassing magpie due to its unusual coloration. The magpie and leucistic cockatoo almost hit the house as they tumbled through the air.

Deb says that the flock with this unusual bird comprises around 30 Carnaby's, including some young which she has seen and heard being fed by the adults. Her observations during the flock's regular visits over autumn suggests that the leucistic bird is simply treated as one of the 'gang', screeching, squawking and squabbling over pine nuts with the rest. Each evening they fly back down the gully towards the Blackwood River to roost for the night.

Carnaby's black cockatoo specialist, Dejan Stojanovic says that the leucistic mutation is an extremely rare and random genetic chance whereby both parents possess a recessive partial albino gene. He says that a similar bird has been sighted a few times in the last two years, and may in fact be the same bird.

Deb, who keeps a general nature diary and records bird observations on the farm on a monthly basis (she has 90 species on her list) will certainly be looking out for the extraordinary cockatoo next autumn.

PEBBLE MOUND MICE

continued from page 9

pebble mounds and is more southerly (Fig. 2). Andrew Burbidge has suggested to me that they may be relicts of the nests of the true stick-nest rat, rather than a giant dew-pond mouse, and I am inclined to agree.

The pebble-mound mouse has left behind a series of public works that must have taken years to build and been used by generations of mice. Perhaps all those at one site were not occupied at the same time? It is to be hoped that the population in the Hamersley Range is secure.

[For reference list, contact Ed.]*

Stephen Davies is a zoologist who has worked in CSIRO and Curtin University as well as being national President of Birds Australia. He currently works as a consulting ecologist.

Members' Page

LOOKING THROUGH THE PHONE BOOK

Jessie MacIver

It was a warm and sunny autumn Sunday in Denmark so I thought I'd have my morning tea out on the front verandah. As I was about to step outside I noticed the old king skink with a shortened tail and holes in its back where the kookaburras had been pecking at him lying on the mat, so, to leave him in peace, I went out another door but I was too close for the skink and it sauntered off to the pergola end of the house, leaving me to enjoy the day.



Shortly after, it came hurtling back towards me as fast as its little legs could carry it, closely followed by a huge dugite about 2.5 metres long. I leapt up and threw my cup of coffee at them and rushed to bring my old blind and deaf collie inside. She was very comfortable thank you lying outside in the sand next to her enclosure, so I had to lift her inside, shut the enclosure and close the doggy door into the house. So then I rang a friend, as you do!

The skink had bolted back to the pergola and that's where the snake caught up with him and coiled around him to try and sink his fangs in. Now I know I shouldn't interfere with nature but I'm quite fond of that old skink and his battle for survival. So we decided I should get some small rocks from outside to throw and try and distract the snake. Well,

I was throwing through the pergola door with my wrong hand so was making a poor job of it. So ended up throwing bird books, travel books, even the LANDSCOPE, spent ink cartridges, Denmark phone books until eventually the much more substantial south-west phone book which landed face down and open. This distracted the snake at last and the skink scurried under the book, followed by the snake, but into different pages. The skink made its escape but the snake looked and looked for ages, coming up to the door where I was standing, before it went around the other side of the house towards the front door. It started climbing up the flywire door so I was banging the wooden door shut to try and dislodge it. Eventually it glided off away from the house.

I scurried around spraying Shoo Snake in my dog's enclosure and outside doors. I went into the pergola to retrieve all my bits and pieces and there was blood so I was quite despondent about the skink's chances.

About an hour later the snake was back and inside the dog's enclosure – so much for the Shoo Snake! This was getting serious, so I rang Ranger Dick and he came really promptly, although it seemed an age to me. He checked the snake wasn't outside the front door for me to come outside. Around the corner lying next to the dog's enclosure was the snake, luckily with its tail towards us. Dick was most impressed with its size and not sure whether he could manage to catch it. As it started to slither towards the shrubbery he caught it about mid body with his metal catcher and put it into the wide-opening calico bag. He

reckoned it gave him enough of an adrenalin rush to last the week! As I was heading back to the front door I noticed the skink clinging for dear life to the very top of the flywire door. He got down a couple of hours later.

So thank you Ranger Dick for your wonderful service. I feel a bit sorry for the snake because it was his home too, so I hope you found him a place full of rats and mice to eat.

My only regret was that I broke my favourite coffee cup.

Photo: P. Hussey

CREATING BUSHLAND LINKS

Do you have wandoo growing on your property?

Would you like to create patches of wandoo bushland?

The Wandoo Recovery Group (WRG) is calling for interested landowners to create corridors of wandoo bushland on their property to link areas of native vegetation.

This project to restore wandoo bushland will utilise a range of options and techniques appropriate for specific locations. Guidelines for the project can be developed to assist landowners.

If you would like to become involved or want more information, please contact Liz Manning, WRG Executive Officer, by phone on (0427 441 482) or email Elizabeth.Manning@bigpond.com.

Members' Page

A WAMBENGER STORY

Peter Vickridge

Late in October last year Carol and I received four baby wambengers (brush-tailed phascogales, *Phascogale tapoatafa*) into care. They had been found by DEC staff who were falling a dangerous tree at Hester Block near Bridgetown.

There were three males and one female in the group, each weighing in at around 30 grams. The three males all had some injuries, assessed as not serious by the vet in Donnybrook, and the female was uninjured. They were all promptly given "W" names – Walter, Wayne, William and Winona. They were housed together in a covered rat cage with a heat pad, later into a re-wired rabbit hutch and lastly in an aviary. Although difficult to feed at first, they were quick to recognise a syringe and plastic tube as food and took their milk substitute, at first Divetelact and later Wombaroo. At first they sucked and chewed at the tube but quickly started lapping, which made feeding easier and definitely less messy. Although various insects and Wombaroo Insectivore was offered repeatedly, none of the wambengers showed any real interest until early December when daddy longlegs and huntsman spiders and mealworms were all



taken. From then on Wombaroo milk and mealworms, cockroaches, earwigs and spiders were included in their diet and water was taken regularly, particularly on hot days. The three males' injuries healed rapidly and all showed complete mobility and agility.

Weights were regularly measured with rapid increases recorded, in a period of only 57 days the average weight went from 32 grams to 113 grams, an amazing 253 per cent increase in weight, or 4.5 per cent per day!

Wambengers are clearly intelligent and masters of escape and learn quickly how things work. Incredibly, they worked out how to turn the swivel toggle on the rabbit hutch door by tapping with their forelegs on the toggle through the

wire on the hutch door to release themselves. The first time we discovered them roaming the house we thought the toggle had been left down, but on returning them to their cage they quickly repeated their escape.

In early January the chest scent glands on all three males became noticeable with staining, so the decision was made to move their rabbit hutch outdoors into an aviary fitted out with hollow logs and branches, to permit a soft release.

At the end of January a panel in the cage was opened to allow the wambengers to leave when they were ready. The males all left fairly quickly and did not return, but the female continued to return to the cage by morning for over a week before finally moving on.

The three months we had with these four wambengers in our care was extremely rewarding, and made us realise what an exquisite little animal they really are. It is a shame that so few Australians are even aware of their existence in our forests.

Peter Vickridge has a property at Kirup.

Did you know ...?

that a nesting pair of swallows consume some 900 insects a day to feed their young? That's 27,000 insects in a month! Swallows are especially efficient at collecting mosquitoes at dusk. Considering the number of human diseases such as Ross River virus (and now Dengue fever in Queensland) that are spread



Welcome swallow at nest (M. Thompson)
From: *Western Australian Birds: Vol II.*
Johnstone & Storr. WA Museum.

by mosquitoes, it may well be worth adding a small wooden ledge in the eaves for the birds to build on, especially if you live near a wetland where mosquitos breed. Sure, a swallow's nest under the eaves of a house or shed is a bit messy, but think of the enormous natural pest control they are contributing to your environment.

FAUNA

MYSTERY ANIMAL 'DROPPINGS' ARE BEETLE 'PUSH-UPS'

Terry Houston



Have you ever seen a pile of what looks like animal droppings only to find that the lumps are composed entirely of sand? Such piles appear on the ground after heavy rain and are most commonly seen in bushlands with sandy soils (although they sometimes appear on harder soils as well). They are not the product of a large animal but rather the work of some remarkable scarab-like beetles known as 'earth-borers'. Mainly

nocturnal in habits, the earth-borers fly after heavy rain and excavate fresh burrows before sun-up. After burrowing downwards for a time, a beetle will 'bull-doze' a load of loosened, damp sand towards the burrow entrance, forcing it out like tooth paste from a tube.

Earth-borers belong to the family Geotrupidae and range in length from 5-30 mm. They resemble dung beetles in having a domed body form, spiny digging legs and a variety of horns or spines on the head and thorax in males. They can be distinguished from dung beetles in their brown (rather than black) colouration and in having prominent rounded knobs on the ends of the antennae. Australia has 166 species and 100 are represented in WA.

The beetles burrow in search of underground fungi, including native truffles, on

which they themselves feed. Some, if not all, of the fungi eaten are mycorrhizal fungi (i.e. they form close attachments to plant roots and provide the plants with essential nutrients). This makes the beetles of special interest as they may play an important role in the ecology of the fungi by helping to disperse their spores. This has been the focus of a study I have recently undertaken in collaboration with Dr Neale Bougher of the WA Herbarium.

The beetles' life-histories are still very incompletely known. Females of at least some species lay just one relatively gigantic egg (more than half their own weight) at a time. In order to lay enough eggs to sustain the population, the beetles must be long-lived. It has been reported that some earth-borers deposit their eggs in large brood cells provisioned with humus (much as dung beetles provision brood cells with dung). However, my observations indicate that this is not common to all species and ongoing research at the WA Museum aims to document the life-histories of more species.

Your best chance of encountering these fascinating beetles is to sit by a lantern in the bush just after dark one to several days after a soaking rain. One or more specimens may come circling in noisily and crash land somewhere close to you. Listen for their peculiar 'huffing' or squeaking sound produced by stridulation. It is as if they are complaining – "What hit me?"

Terry Houston is Curator of Insects at the Western Australian Museum



Photos: T. Houston

FAUNA

WESTERN GROUND PARROTS DISTINCT FROM EASTERN GROUND PARROTS

Allan Burbidge

The western ground parrot is a Critically Endangered, cryptic, ground-dwelling parrot that lives in near-coastal heaths on the south coast. Recent survey and research have shown that population numbers are now reduced to about 110 individuals, with the majority in one population, in Cape Arid National Park.

Western ground parrots disappeared from the Manypeaks – Waychinicup area near Albany about five years ago and, more recently, they have declined drastically in the Fitzgerald River National Park, which was once thought to be their stronghold. The South Coast Threatened Birds Recovery Team believes that the situation is dire, and the deployment of integrated predator management on the south coast (for cats as well as foxes) and establishment of a captive breeding program are urgent and important priorities for conservation and recovery of this critically endangered bird. Because ground parrots are susceptible to large wildfires, on-going careful fire management is also important.

The urgency of this situation has recently been highlighted by the preliminary results of genetic research that suggest that the western ground parrot is a separate species from the eastern ground parrot. This work was instigated by the WASouth Coast Threatened Birds Recovery Team as a collaborative project between DEC, Steve Murphy of the Australian Wildlife Conservancy, and Leo Joseph of CSIRO.

Preliminary data suggest that western ground parrots may be quite distinct genetically from ground

parrots in Tasmania and down the east coast. This work has been steadily progressing, with important developments in the last couple of months.

One specimen that was always of interest was a bird collected at the Reedbeds, near Adelaide, in the early days of European settlement. The species became locally extinct long ago in the Adelaide region, but this population was the one geographically closest to the ones in WA. They were, therefore, the ones that might be expected to be similar genetically to the WA birds. However, because the specimen was so old, it was proving very difficult to extract DNA from it.

After a bit of frustration, the team running the genetics program decided to recruit the assistance of Dr Jeremy Austin, of the Australian Centre for Ancient DNA, at the University of Adelaide. Jeremy is an expert at extracting DNA from difficult sources, and rose to the challenge – he was able to extract DNA from this important specimen, and has confirmed that the test sequence matches closely the sequences from Victoria and Tasmania.

We now know that all the eastern birds, from south-eastern Queensland to Victoria and Tasmania, are very similar to each other genetically. The WA birds tested from the Fitzgerald area and Cape Arid National Park are also very similar to each other, but differ significantly from all the eastern birds. The result from the Reedbeds specimen was important because it demonstrated clearly that there is no gradual change from east to west – all ground parrot DNA

tested falls clearly into either the eastern group or the western group. This confirms that the two sets of birds have been clearly separate for a very long time, and have diverged in isolation. The extent of that difference is very similar to the genetic difference between buff-rumped and western thornbills, which everyone agrees are clearly differentiated species.

Whether the eastern and western ground parrots are confirmed as separate species awaits confirmation by acceptance in the scientific literature. However, what is certain is that the eastern and western birds are separate evolutionary lineages that have been diverging over a very long time. This adds even more urgency to efforts to conserve the western ground parrot, as it is one of the most endangered parrots in the world.

We urgently need help to conserve the western ground parrot. If you would like to volunteer with survey work, or help out in any other way, please contact the project officer, Abby Berryman (phone (08) 9842 4513; email abby.berryman@dec.wa.gov.au) or the Friends of the Western Ground Parrot (Brenda Newbey phone (08) 9337 5673; email wgparrot@exetel.com.au or Anne Bondin phone (08) 9844 1793; email wgparrot@exetel.com.au). The Friends group has just held a meeting to formalise its association. **If you can't help in person, they would be very pleased to accept any donations, however large or small!**

Allan Burbidge is a Senior Research Scientist at DEC, Woodvale.

Members' Page

THE MURDERING ANIMAL - OR, A CASE OF BITING OFF MORE THAN YOU CAN CHEW

Avril Baxter

The red-tail phascogale, which was once found throughout southern and central regions of WA, has now retreated to an area largely bordered by Boddington, Kondinin, Kojonup and Jerramungup. It has become an icon for groups such as the Wagin/Woodanilling Landcare Zone (WWLZ), in which individuals can take action to preserve an endangered species.

The red-tail phascogale lives happily alongside human beings as testified by the WWLZ's call for sightings, which pictures an animal crawling up the security door of a house. And cute and cuddly as they appear to be, LFW members Rob and Anne Battley whose home is 30 metres from the edge of Dryandra woodland, have another story to tell.

These animals are blood-thirsty!

Rob and Anne love all animals and have an aviary in which over the years they had gradually bred up a population of 42 Gouldian finches and canaries. One morning they went out to the aviary and wondered why they didn't see any birds flying around. On further investigation they found all the birds were dead, many had their bellies eaten out, others' heads were chewed. What had happened? They were used to an occasional carpet python getting into the aviary, but the destruction

was never like this, it looked like "a fox had gone mad in a hen house".

They kept looking in the nests to see if anything was alive, only to find a very fat little red-tail phascogale curled up and sound asleep. They realised that it had been two days since they had visited the aviary and during that time a single red-tail phascogale had killed their precious breeding stock.



It is a testament to their concern for the native animals they live alongside that the Battleys relocated the partied-out red-tail phascogale to the nearest balga.

Illustration: Louise Burch

WILDFLOWERS OF THE GREAT SOUTHERN

When late rains in 2008 led to a profusion of wildflowers, LFW decided to make a photography competition the focus of our display at this year's Woolorama.

The call went out to LFW members in the Great Southern to send in their best wildflower photos, which made the daily checking of emails a joy for LFW officer Avril Baxter as nearly 30 excellent photographs were received.

The three most popular photos were enlarged, framed and given back to their owners as prizes.

Our thanks go to prize winners:

Robyn Morris:
"White spider on a white spider orchid"

Bernie Masters: "A rare calectasia"

Jeremy Mitchell:
"The morning dew."



Avril Baxter presenting the first prize to Naomi White, who is accepting it on behalf of her sister, Robyn Morris, who took the photograph.

Weeds and Ferals

RABBITSCAN

To coincide with the 150th anniversary of the wild rabbit being introduced into Australia, the national Rabbit Management Advisory Group has requested assistance from around Australia with the implementation of their new initiative – RabbitScan.

RabbitScan is a nation-wide challenge for community and schools to help scientists map where rabbits are, by asking people to ‘scan’ their landscape (school, farm, parkland, roadside reserves, ovals etc.) for signs of rabbits and their damage, and to register and load their results online. Registration is available now and results can be loaded from the beginning of RabbitScan Month in May 2009.

It is important for planning, implementing and assessing the effectiveness of management of invasive species over time that land managers and government authorities have up to date information on the distribution and abundance of rabbits within Australia. It is also very important to record where rabbits are *not* found to understand the full extent of their distribution and factors that may influence this.

For background and further information on RabbitScan and to register, please refer to the RabbitScan web site at www.rabbitscan.net.au or go to the link on the DEC website at www.dec.wa.gov.au/animals/rabbits/index.html



Morea fugax.

(Kate Brown)

THE SWAN WEEDS DATABASE

Swan Weeds is a new database that has been developed by DEC Swan Region to provide easily accessible information on the most problematic environmental weeds in WA, with particular emphasis on those species occurring on the Swan Coastal Plain and Darling Scarp and Plateau.

Swan Weeds aims to provide web-based delivery of up-to-date information on the biology and management of environmental weeds.

This is delivered via the State Herbarium’s website FloraBase, where it supplements existing descriptions, images and distribution information with additional details of a weed’s origin, biology, suggested methods of management and control and a management calendar. It is designed to help individuals, land managers and community groups understand and manage their most threatening bushland weeds.

Information is now available for 58 geophyte (bulbous, cormous and tuberous) species. The aim is to expand this to over 300 weed taxa, covering grasses, other herbs, trees and shrubs.

Information has been collated from a large number of sources.

How to access Swan Weeds

Example pages and further information on the project is available on the FloraBase website, via the ‘Themes’ menu or directly at florabase.dec.wa.gov.au/weeds/swanweeds/. Individual species’ information is available by searching FloraBase directly.

A NEWLY-NATURALISED BINDWEED FOUND IN A WETLAND AT BUSSELTON

The morning glory family consists mostly of twining vines with trumpet-shaped flowers. They can be beautiful and are often grown in gardens, but many are hard to get rid of and become a problem in paddock or bushland.



Great bindweed (*Calystegia sylvatica*) has large white or pink-and-white striped flowers, and can be found twining up supporting vegetation in hedgerows and waste places from southern Europe through into Britain. It has been discovered going wild and smothering native vegetation in a wetland near Busselton, presumably originating from dumped garden rubbish*. The Busselton population is being targeted for eradication.

This raises two matters of concern – firstly please use all the influence you have to stop people dumping garden rubbish in bushland, and secondly, if you see a suspicious-looking twiner, check it with a DAFWA weed officer, or your LFWO. This life form is not very common in WA, so it could be that you have located something weedy.

[* for ref, contact Ed.]

NEWS

WONDERFUL WONGAN WILDLIFE!

Thirty years ago, members of the WA Naturalists' Club conducted a three-year survey of the Wongan Hills, culminating in the book *The Natural History of the Wongan Hills**. It confirmed this extraordinary location as a biodiversity hotspot – long before the word 'biodiversity' had even been invented! LFW collaborated with the Avon Catchment Council's Ecoscape project to arrange a field day to see what the surveyed sites look like now.



Looking out from *The Speaker's Chair* towards Lake Hinds. Note how these greenstone hills rear out of a very flat, largely cleared landscape. (Penny Hussey)

About 40 people attended, some locals and some from further afield, including people who had been on the original survey team. Unfortunately the survey's leader, Kevin Kenneally, was called away at the last minute and so was unable to attend, but Stephen Davies' talk on the recent malleefowl survey was fascinating, and shows that the Wongan Hills are still a stronghold for the bird.

The bushwalks were in private property, with woodlands and thicket in excellent condition, having almost no weeds evident. But it was very dry – the plants were under drought stress and few animals were visible. Plans were made to return in spring, when the wildflowers will be out, for a proper botanizing walk.



A highlight was finding a hatchling thorny devil. Thorny devils feed only on ants and are found in woodlands, shrubland, mulga, mallee and grassland, across the arid zone of WA and the drier wheatbelt, South Australia, the Northern Territory and far western Queensland. It lays a small clutch of up to 10 eggs in Nov/Dec, hatching in early autumn. (Lee Francis)

It was a very pleasant day, fuelled by some excellent food, and our thanks go to Fiona Falconer and to Margaret Redfern, the Ecoscape Coordinator, for their superb organisation.

Penny Hussey

* The book is available from the WA Naturalists' Club, email; wanats@inet.net.au

The Land for Wildlife team

The LFW team, 2009. Back row, L-R: Phil Worts, Wayne Gill, Zara Kivell, Avril Baxter, Sheila Howat, Dorothy Redreau, Cherie Kemp, Mal Harper, Penny Hussey; front row, L-R: Claire Hall, Sylvia Leighton, Heather Adamson, Fiona Falconer.

Do you know ...?

how to calculate the age of a jarrah tree in forest? Measure the trunk diameter over the bark (the DOB) at 1.3m above the ground surface. (This should be recorded in centimeters, ie 1.3m is 130cm.) Then do the following calculation:

$$\text{age} = 2.345 \times \text{DOB} + 6.968$$

This formula assumes that the site has been subjected to neither fertiliser application nor clearing, both of which would alter the growth rate.

Kim Whitford DEC

This newsletter is a compendium of articles written by many different people. The views expressed are those of the authors, not necessarily those of the Department of Environment and Conservation. Published by the Department of Environment and Conservation, Perth. All correspondence should be addressed to: The Editor 'Western Wildlife', Department of Environment and Conservation, Species and Communities Branch, Locked Bag 104, Bentley Delivery Centre, WA 6983.