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THE SECRET LIFE OF BOBTAIL LIZARDS

Ruth Haight

Years ago, bobtails (*Teliqua rugosa*) seemed to be everywhere; in the backyard, crossing the road or scaring the daylights out of us as we discovered them by accident while gardening. These monogamous sleepy lizards keep a low profile for most of the year, venturing out in spring to find their mate and disappearing as the days become hotter. Where do these sleepy lizards live and what are the threats they must overcome to survive in a rapidly changing landscape?

Bobtails are only found in the southern half of the state, from Shark Bay through to Kalgoorlie and over to Eucla and right through the southwest, with a smaller sub-species on Rottnest Island. Although they are best suited to drier climates they have adapted quite well to the hills along the Darling Range. The dark and light patchy body markings blend so well into the shadows and light sand of the coastal dunes. Further inland, bobtails are more orange and red to camouflage them in the pea gravel and iron rich soils.

Bobtails are reclusive and have very few defenses. When threatened, they hiss with mouth wide open showing that fierce blue tongue to frighten off predators. They curl their body and present the tail as a decoy, which is often injured in encounters with dogs. If you happen to be bitten by a bobtail you will appreciate the strength, as the tears roll down your face, of those large bulging jaw muscles on top of the head. These are used to crush snails and the hard berries and plants

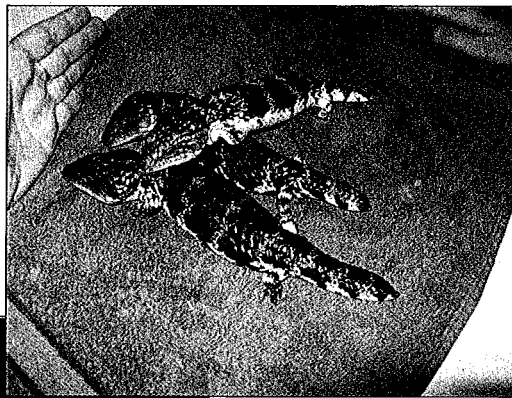
that bobtails eat. Fortunately the teeth are only short rounded stumps used for grasping and tearing, not for chewing or biting so they rarely draw blood. Folklore has it that a bobtail bite will never heal. Perhaps this is because reptiles can carry harmful bacteria that infect the wound and slow healing.

Small skinks that we see on the fence can drop their tails as a decoy but bobtails are large skinks and their

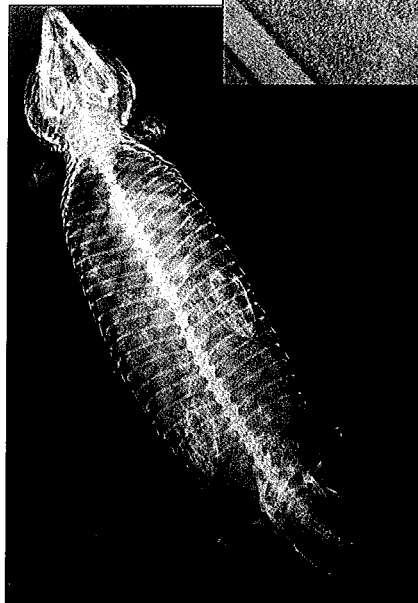
tail stays firmly attached. In fact it is used to store food and moisture, so a healthy bobtail has a plump rounded tail that will enable it to go for lengthy periods, of 6 months or more, without eating. Being a reptile,

food energy is not used to generate body heat instead heat energy is absorbed from the surrounding environment. When the air temperature drops below 15°C, production of digestive juices stops and they cannot digest food. This happens around mid to late autumn. Activity is slow during winter but on sunny days the lizards come out to soak up the warmth of the sun. The scales on their back act like solar cells and are very efficient in absorbing heat, raising the body temperature to match the surroundings in just 10 minutes.

In spring they actively seek out their



Newborn triplets



X ray of a bobtail pregnant with full term triplets

Greetings all!

We are very sorry to announce that Julia Boniface has decided to retire from her position as *LFWO* at Nannup. Her knowledge and enthusiasm have been an inspiration to many, and we wish her all the very best for the future. It is hoped soon to appoint a new person to cover the Middle Blackwood area. In the meantime, if you have any queries, please contact Cherie Kemp at Busselton.

One thing that we in *LFW* have consistently tried to do is put researchers directly in touch with landholders. It is great to hear back from the researcher with details of what they have found out, and the effort they had to go to find it. Look at the huge hole Terry Houston had to dig in a pasture paddock to study sandgropers!

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EDITORIAL

This issue contains a number of articles about wildflowers – appropriate as spring is the time of greatest wildflower splendour. WA doesn't have very many succulent plants but one group, the Calandrinias, can occur in huge numbers in inland woodlands and the mulga belt, often in association with everlastings. Most have magenta flowers and *en masse* they can be stunning. Some are perennials, dying back to a tuber each summer, and they were probably an important food for small mammals such as rufous hare-wallabies, and also for birds such as corellas and galahs. It is probable that some Aboriginal groups also ate these tubers. Frank Obbens' article will introduce you to these fascinating plants.

Broombush, which was mentioned last issue in relation to the Underground Orchid, used to be considered just one species – now it is 11. Turn to Margaret Byrne's article to find out which of them are on your property.

If you have a query about a plant or animal found in bushland, remember that your *LFWO* (or myself) may be able to identify it, or provide management notes, from a good quality photo. No guarantees, mind! And readers tell me they really enjoy photos with a story accompanying them – like the numbat in the last issue and the carpet python in this – so please keep these interesting observations coming!

Penny Hussey

WESTERN WILDLIFE ON THE WEB

Western Wildlife Volumes 1-8 (1997 – 2004) are now available in pdf format on the *LFW* website. Use the Index included with your January 2007 *Western Wildlife* to look up articles - on amphibians or ticks, soil crusts or ancient rivers - and then download them to store in your *LFW* file. This will probably be most useful for people who have joined *LFW* recently and so don't have a good collection of back issues.

Go to: www.naturebase.net then follow the links through off-reserve conservation to *Land for Wildlife*.

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Bobtails

mate, usually the same partner year after year, and stay close until feeding resumes in late October. What do bobtails eat? Just about anything they find that doesn't move too fast. In the wild they love yellow flowers-dandelions, acacia flowers, native berries (*Scaevola crassifolia* is a favourite) and fruit as well as snails, ants and occasionally carrion. In captivity or your backyard, they seem strongly attracted to strawberries, watermelon, hibiscus flowers and egg yolk. Unfortunately, snail bait will kill bobtails. By placing shallow saucers of beer in your garden you will kill the snails and not the bobtails that feast on them.

Bobtail monogamy is well documented by researchers in South Australia who have studied these animals for over 20 years. These studies have shown how a female actively seeks out her mate by smell in preference to other males. Courtship is quite long and only after replenishing their food stores, mating finally occurs in early December. The male stays long enough to ward off other suitors then goes off alone. When temperatures rise above 32°C, bobtails retreat to the cool shade in thick vegetation or in burrows. Death will occur if they are exposed to higher heat as they cool down a lot slower than they heat up.

Bobtails give birth to live young. Females need to be 3 years old to breed and usually produce 1 large baby until their own body grows to full size (22 – 30cm snout to vent length), then they can carry 2 or 3 young. Each baby will be about half its mother's body length at birth. Bobtails have well developed diffused placentas that nourish the young for 150 days gestation. A large yolk sac also provides nutrition throughout the pregnancy reducing

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in size towards the end. It will take 2 years for a female to store enough fat to ovulate so they don't usually breed every year.

In autumn, when the overnight temperatures begin to fall, the female contracts and delivers these huge babies within minutes of each other. She stays close by while the newborn eats the entire afterbirth, which may take up to 30 minutes. Although newborn bobtails are well equipped for an independent life they often stay with their mother for up to 2 years, for protection against ravens, kookaburras, cats and snakes.

Human impact is by far the greatest threat to bobtails. Land clearing has fragmented the bush land, with roads intersecting a bobtail's 1 square kilometer home range. Road trauma is often the outcome when they set out to find their mate. This results in reduced genetics in isolated islands of shrinking habitat. Introduced predators, mainly dogs, cats and foxes, make a quick meal of this slow moving reptile. As ground feeders, bobtails can ingest toxins used in agriculture and industry.

Disease has always been Nature's way of weeding out the weak but when a species is under threat a new disease such as the Bobtail Flu, can decimate a population. Over the last decade, this very contagious flu-like disease has swept through the entire southern half of the state killing hundreds of bobtails in its wake. The flu spreads in the warmer months when bobtails are in contact with each other. If untreated they become too sick to eat and fail to store enough energy to get through the winter. A flat tail, especially at the end of the feeding period, is a sure sign of impending death.

Sadly there have been fewer sightings of bobtails in the last 5

years. So far no one has identified the cause of the disease, which usually starts with bubbling clear fluid from the eyes and nose, sneezing and lethargy in warm weather. As the disease progresses, the eyes become glued shut when the sticky fluid dries, activity stops, body condition reduces through starvation, the tail flattens and the gums become very pale. In this very vulnerable state they are an easy meal for predators. Wildlife rehabilitators at Kanyana in the Perth Hills have developed a treatment protocol and invested in 12 reptile vivariums to cater for the huge influx of cases. Over 85% of flu cases are now released back into the wild.

There are several ways you can help the bobtail to survive:

- Pressure local government to set aside wildlife corridors that link land for wildlife.
- Fence bush land with ring-lock mesh to allow bobtails to pass through but keep out dogs.
- Keep your dog under control when bobtails are on the move.
- Practice environmentally friendly gardening habits to reduce the level of toxins on plants and in the soil.
- Safely move bobtails off the road and place them into the bush in the direction they were heading.
- Take sick or injured bobtails to your local vet or call the WILDCARE HELPLINE 9474 9055 for a wildlife rehabilitator ASAP. Delays can be fatal.
- Keep flies away from injured bobtails, fly blown cavity wounds are impossible to treat.
- Visit www.kanyanawildlife.org.au for information.

Ruth Haight is a wildlife carer and volunteer at Kanyana Wildlife Rehabilitation Centre. Photos: Kanyana WRC.

FLORA

CALANDRINIAS - SPECTACULAR SUCCULENTS

Frank Obbens

Calandrinias occur throughout Australia and although fairly common in a variety of habitats they are often overlooked. They are commonly known as Parakeelyas or the Four o'clock plant because many species close their flowers each day in response to low light and cooler temperatures. Additionally, flowers often don't open till midmorning or not at all on heavily overcast days, which helps explain why they can be easily missed. However, in the drier regions they are usually more visible with large flowering patches (Fig. 1) vying for attention with other wildflower displays. Those who are lucky enough to observe these stunning displays may not realise that these plants are also succulents.

Plant features

Calandrinias are succulent or semi succulent plants ranging in size from tiny 1cm diameter buttons to plants approximately 1m diameter, but none are particularly tall and many are prostrate or decumbent. Therefore these plants comprise part of the lower understorey with many

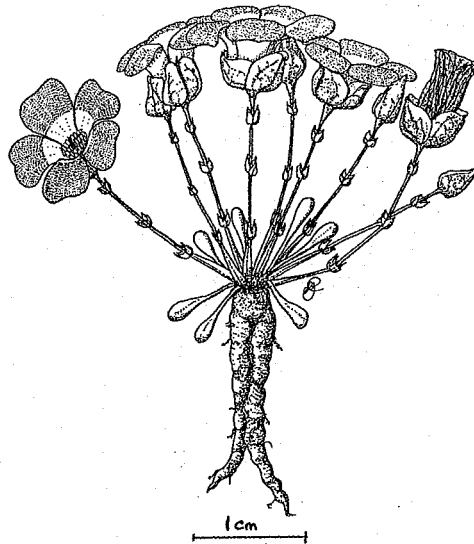


Fig 3: *C. crispisepala*

being annual herbs although several are short-lived perennials and another six are tuberous perennials. In the early part of their life cycle one might see a rosette of basal leaves on the soil surface. These basal leaves come in a variety of shapes including flat and spoon-like, round sectioned and elongated to bauble shaped. Some basal leaves are toothed or ribbed and some are quite large while others can be rather inconspicuous.

Stems eventually grow outwards from the centre of the rosette and can be either prostrate, semi erect to erect with some species displaying one or more habit types. Stems either have leaves scattered along their length or are leafless and may be branched. Basal leaves, stems and stem leaves can be green, grey-green, red-brown or a mix of other colours and sometimes these colours blend in uniquely with the substrate they grow upon. Flowers arise along the ends of stems and branches forming dense inflorescences for example as seen on *Calandrinia pumila* (Fig. 2) or can form solitary flowers on the ends of stems like *C. crispisepala* (Fig. 3).

The degree of succulence varies from species to species, most species having quite succulent basal leaves, stems or other parts, but members of the tuberous Calandrinias have twiggy stems and a couple also have fairly insignificant basal leaves. General plant shape varies enormously and some prostrate species can form unique patterns to anyone observing them from



Fig 1: *C. remota* patch. (This really does suffer from loss of colour! The paler dots are the bright magenta flowers, set off spectacularly by the red mulga soil. Ed.)



Fig 2: *C. pumila*. (These flowers, though small, are a beautiful magenta/purple. Ed.)

continued from page 4

FLORA

Calandrinias

above. However, the most striking feature for most people is the bright coloured flowers, usually shades of pink, purple, magenta, but some are also white and one is even yellow flowered. Again, flowers vary from species to species both in shape and size and also in the number of petals. For example, *C. granulifera* has small white flowers with 6 or 7 relatively sharply pointed petals while *C. polyandra* has large (ie 25-35mm diameter) bright pink flowers with 5 very broadly rounded petal tips.

Mature plants form capsules a short period after pollination which eventually open by means of valves to release the seeds held inside. Species are either 3 or 4 valved and this character is used to classify subgroups in the genus while the small seeds with their distinctive patterns and shapes (Fig. 4) are very useful to identify each individual species.

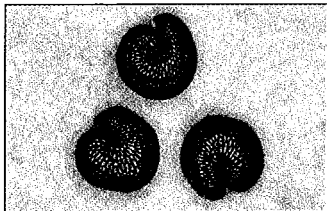


Fig. 4. *C. polyandra* seeds (magnified).

Naming rights

The genus *Calandrinia* is found in Australia and the Americas and belongs to the family Portulacaceae. This is a relatively large family world wide; Australia having only a few other members besides *Calandrinia*, including the common introduced weed, pigweed, *Portulaca oleracea*. Australian taxonomist Dr R Carolin's research from the early 1980s recognized that the Australian Calandrinias were quite different to the American species of the genus thus he suggested that our Calandrinias be renamed *Rumicastrum* as this appeared to be

an appropriate available name, but he did not publish new combinations. Strict taxonomic conventions rule that the name of a genus can only be designated to the first described species of a taxon and *Calandrinia* (named after Swiss botanist Jean Calandrini) was described by Kunth in 1816 from an American species. For many years Carolin's mooted name was just that and then an American author (M. Hershkovitz) published the name *Parakeelya* for the Australian Calandrinias. For a number of complex reasons this name has not been accepted in Australia yet. Therefore *Calandrinia* is still the generally accepted name, but that may change in the future.

How many species and where are they distributed?

Currently there are 64 species of *Calandrinia* recognized in Australia with 49 species recorded for WA and 23 species that have interstate or national distributions. Many species have broad regional preferences. For instance *C. uniflora* is distributed across northern Australia stretching from tropical QLD and NT to northern parts of the Kimberley. One of the most widely distributed species, *C. ptychosperma*, occurs in semiarid and arid regions throughout five mainland states while *C. balonensis* occurs in those same states, but in a narrower band of arid country. And there are also species with essentially southern distributions like *C. eremaea* or disjunct distributions like *C. granulifera* which occurs in the south west of WA, the south east of SA, in western VIC and eastern TAS. WA has the majority of species and a high percentage of those species are endemic to this state. It is important to realize that one third of the total number of species do not yet have published names and that ongoing revision and new discoveries will almost certainly increase this total.

There is still a lot of 'Calandrinia country' out there to explore.

Habitat preferences and ecology

Most Calandrinias prefer open habitats where competition from taller plants is avoided, but generally also like water gathering sites. Good places to look in the more arid zones include claypans, clay flats, salt lakes and associated lake dunettes, low open heathland or very open woodlands with sparse understorey, bottom of rocky slopes and riverbanks and beds. The coast has also a variety of open habitats that Calandrinias prefer like dunes and swales, spoil from limestone ridges and coastal wetlands. Other very prospective habitats include areas on and around granite whether or not these are located in arid areas or in the south west forests.

Generally little is known about the ecology of Calandrinias. Obviously succulence is a good survival mechanism for plants living in arid landscapes, but quite a number of Calandrinias do not live in arid areas. Likewise, little is known about their pollination with a good number thought to self-pollinate, although I have seen several species visited by ants, hoverflies and other smaller insects. Response to fire is also unknown although this may be a rare event in the open habitats where they live. Many species are still poorly known and a few species are currently included on the list of priority flora (such as *C. kalanniensis*) because of this reason, but may well be more numerous and widespread with further investigations. There are no rare species designated at this stage although that situation may also change with ongoing research.

Frank Obbens is a taxonomist and botanical consultant.

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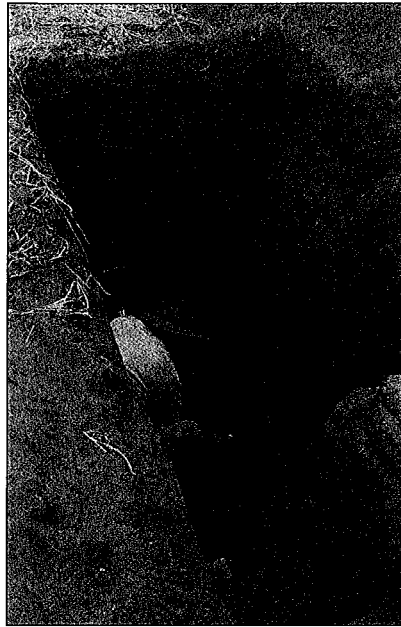
UNEARTHING THE SECRETS OF SANDGROPER

Terry Houston

Longer-term readers of *Western Wildlife* will remember that in April 2003 I contributed an article on sandgropers, the extraordinary burrowing insects that share their name with all Western Australians. I described what we knew about the animal at that time (which wasn't much!) and explained that I was hoping to study them for a few years and so learn more about their natural history. I finished by asking readers if they could tell me where they had seen the animals or, even better, send me specimens. Many people did contact me, and I have now found out a bit more about the secret lives of sandgropers.

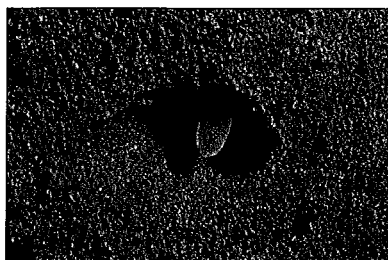
Just to recap quickly – sandgropers are related to short-horned grasshoppers, and are in their own family (Cylindrachetidae) with 16 species in 3 genera. Two of the genera and 14 of the species are restricted to Australia. The most common species in the south-west is *Cylindraustralia kochii*, but I also made some observations of *C. tindalei* and two unnamed species. They live an almost entirely subterranean existence and have adaptations that include loss of wings, reduced eyes and antennae and forelegs modified into powerful digging tools.

Originally I searched for animals by looking for their raised trails on bare sandy roads after rain but nearly all specimens found this way proved to be adult males. I needed females in order to learn more about the reproductive biology. This meant I would have to dig! Fortunately, some farmers in the Mid West had alerted me to large populations of sandgropers on their properties, and permitted me to excavate in their pasture paddocks.



One of the first questions I wanted to answer was “How deep do sandgropers burrow?” Some serious spadework on a property near Dandaragan found that they burrow to at least 1.9 metres. I also obtained up to 100 specimens per square metre of surface, a much larger population density that I had thought.

Dissecting some females showed that the eggs were large for an insect – up to 7.5mm long – and had an odd little appendage on one end. It wasn't long before I turned up eggs while excavating and the appendage proved to be for attaching the egg to the substrate. Each egg was hung in its own little chamber 40-190 cm below the ground surface. The eggs hatch into an odd little creature (termed the ‘larva’) that is enveloped



in a transparent membrane and neither moves nor feeds. After a while they shed this covering and become first stage nymphs, which are like miniature adults. They eat some of their eggshell, burrow out of their chambers and commence solitary lives of tunneling and feeding. Hatching occurs in mid to late summer, and it seems sandgropers must have a life cycle extending over several years.

The gut contents of 162 animals were analysed under the microscope to find out what they ate. Mostly they eat plants, but will also consume fungi and other invertebrates. The plant parts eaten included root, seed, leaf and flower material (the latter showing that presumably they do sometimes browse at the surface). A wide variety of insects and arachnids were also present in the gut contents – Tindale's sandgropers seemed particularly fond of eating worker termites. As expected, animals collected in summer had less food in their intestines.

I was surprised to find no insect parasites on or in the sandgropers. Perhaps their subterranean lifestyle protects them against such enemies. However, they are very prone to parasites known as gregarines (single-celled organisms that live passively in the lumen of the gut). Nematode worms were found frequently in the genital tracts of adults and mites were often found clinging to the outside of the insects, but both worms and mites were non-feeding dispersal stages just hitching rides, apparently.

The insects had a distinctive, somewhat pungent odour. I could not determine whether it was for defence or some other purpose. Certainly it did not deter ravens from

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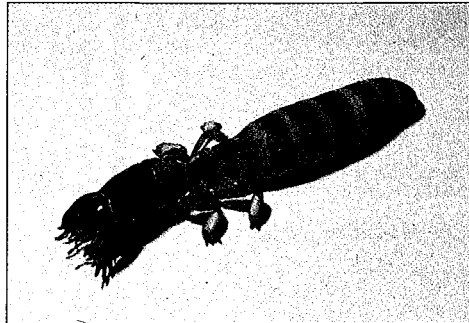
Sandgroppers

eating sandgroppers turned out of the soil during ploughing.

My study leaves several questions unanswered: how long is the complete life cycle? How long do adults survive? Where, when and how do sandgroppers mate? How many eggs do females produce in their lifetime? Are there any insect predators or parasites not discovered in my study? At what rate do sandgroppers burrow near the surface and at depth? Do they continually burrow into new soil or do they return to home burrows? Do they exhibit daily patterns of activity? These and other questions could provide a basis for university student projects.

Thank you to all the people who helped in this study by providing

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Tindale's Sandgropper

information and locations for collection. I am still very interested in any new observations that might be made. You can contact me by email at: Terry.Houston@museum.wa.gov.au

{This article is based on one which first appeared in the Newsletter of the WA Insect Study Society in June 2007, which in turn is based on the

publication: Houston T.F. (2007). Observations of the biology and immature stages of the sandgropper *Cylindro Australia kochii* (Saussure), with notes on some congeners (Orthoptera: Cylindrachetidae). Records of the Western Australian Museum **23**: 219-234.}

Terry Houston is Curator of Insects at the Western Australian Museum.

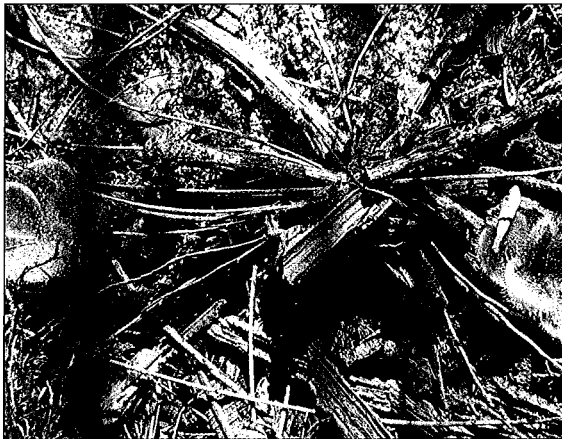
Please note:

back copies of Western Wildlife are now on the website, so if you would like to read Terry's earlier article, go to 7/2 page 1.

Go to www.naturebase.net and follow the links through 'off-reserve conservation' to Land for Wildlife.

Bush Detective

Patterns in the litter. random or by design?



Close scrutiny of a ground layer of leaf litter in some coastal woodland in Beecham Reserve, City of Mandurah, reveals a fan-like arrangement of some leaves and twigs. How has this pattern come about – was it just by accident, perhaps through the shift of wind or water – or has there been an architect manipulating the detritus?

Answer on p. 20

Baudin's cockatoo – an endangered pest!

Unfortunately, there are sometimes conflicts of interest between native species and primary production. One such example is Baudin's cockatoo, which has been considered a pest of apple and pear orchards since the 1900s. It is also an iconic species that is declining in numbers. In the past, birds have been killed to minimize damage to orchard crops, but when it was listed as a threatened species in 1996, this was no longer a legal option. However, some growers state that non-lethal deterrents (such as scary noises) are not effective. Tamra Chapman surveyed growers to assess their attitude toward the conservation status of the cockatoo and the cost of damage and damage control*.

When the responses were analysed, it showed, for example, that Pink Lady apple was the most commonly and severely damaged fruit variety. It also showed non-lethal scaring techniques are effective for protecting against damage from Baudin's cockatoo and that shooting to kill cannot be justified in terms of the damage the cockatoos cause or the costs of damage control incurred by the growers.

For deterrent methods, read: "Reducing fruit damage by Baudin's Cockatoo". T. Chapman & M. Massam. CALM Fauna Note 2/2005. Available on the DEC website.

* Chapman, T.F. 2007. An endangered species that is also a pest: a case study of Baudin's Cockatoo *Calyptorhynchus baudinii* and the pome fruit industry in south-west Western Australia. J. Royal Society of WA, **90**: 33-40.

FLORA

THE BROOMBUSH COMPLEX

Margaret Byrne

Broombush is widespread in the dry woodlands and shrublands of southern Australia. Formerly it was all called *Melaleuca uncinata*, but now it has been recognised that there are 11 species in the broombush complex, so it is important to know which is which when planting broombush for revegetation.

Recognition of these different species means that selection and development of appropriate plants for revegetation can be undertaken more effectively. When a species is planted it is important to know that it has the desired characteristics and will deliver the product and/or environmental benefits that are required. It is also important that the species is adapted to the conditions in which it is planted.

Each of the newly defined species has a specific geographic range (see map), but the ranges are not mutually exclusive, i.e. more than one species may occur at a given site. At most sites where more than more species occur there is no evidence of hybridisation between them. But hybrid plants have been seen at a few sites.

The species can generally be distinguished by their leaf shape and the distribution of oil glands, by the form of the infructescence (collection of fruit), and by the bark. Most species have circular (terete) shaped leaves but true *M. uncinata* has quadrate leaves (they won't 'roll' between your fingers) and two species have flat leaves. The leaves of *M. stereophloia* are flattened but dumbbell shaped in cross section. In most species the oil glands are scattered on the leaves, but in *M. uncinata* and *M. stereophloia* they are in rows

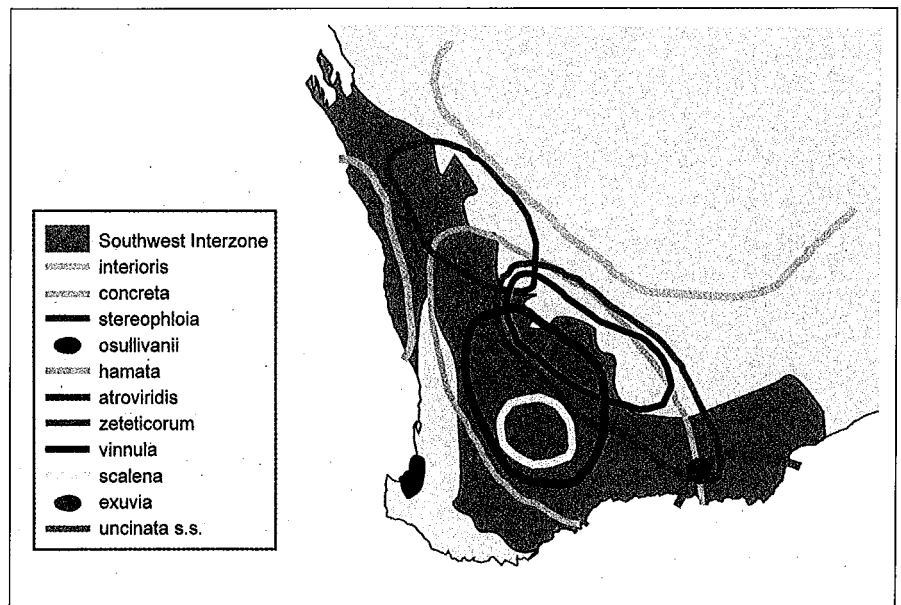
along the leaf margins. The cluster of fruits is generally globular-shaped around the stem but is elongated in *M. atroviridis*. The table summarises this information.

All species except for *M. atroviridis* (and possibly *M. exuvia*)

resprout. There are two variants in *M. atroviridis*, one grows in saline and winter-wet depressions and doesn't resprout, and the other one occurs on upland sites and does resprout.

To determine which species may occur in your area, you should first

Map showing distribution of species



(This map is very clear in colour! If you would like a colour copy, please contact me and request that one be sent to you by post or by email. - Ed.)

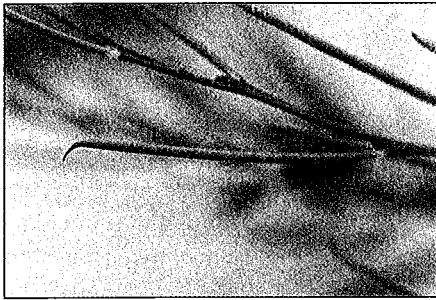
The main morphological characteristics of species in the *Melaleuca uncinata* complex.

species	leaf shape in cross section	oil glands	bark	infructescence
<i>M. uncinata</i>	quadrate	in rows	papery	globular
<i>M. interioris</i>	circular	scattered	papery	globular, open
<i>M. concreta</i>	linear, flat, thickened	scattered	papery	globular
<i>M. stereophloia</i>	dumbbell	in rows	fibrous	globular
<i>M. osullivanii</i>	circular, fine	scattered	papery	globular
<i>M. hamata</i>	circular, thick	scattered	papery	globular
<i>M. atroviridis</i>	circular	scattered	papery	cylindrical
<i>M. zeteticorum</i>	circular, short, hairy	scattered	papery/fibrous	globular
<i>M. vinnula</i>	linear, flat, thin	scattered	papery	globular
<i>M. scalena</i>	circular	scattered	papery	globular
<i>M. exuvia</i>	circular	scattered	papery	globular

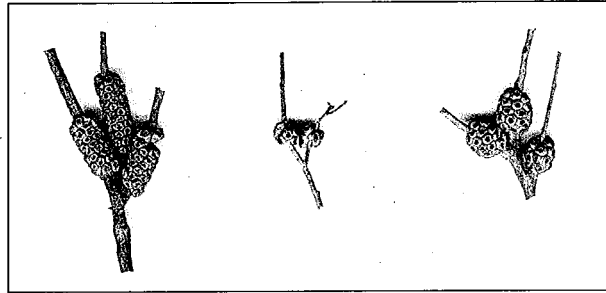
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Broombush

FLORA



M. hamata showing the 'typical' needle-shaped hooked leaf.



Fruit clusters, showing cylindrical, *M. atroviridis*; open, *M. interioris* and the globular clusters of most species.



M. stereophloia showing flat leaves and oil glands in rows

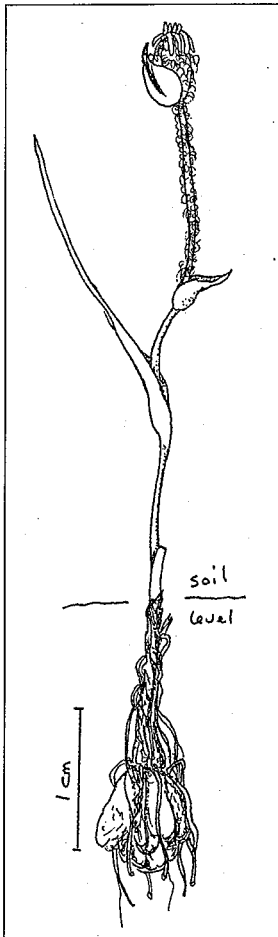
look at the map to see what is likely, then study the different combination of features as shown in the table. For those who would like to be really accurate, a botanical key to the Broombush complex is given in the reference below.

Craven LA, Lepschi BJ, Broadhurst L and Byrne M (2004) Taxonomic revision of the broombush complex in Western

Australia (Myrtaceae, *Melaleuca uncinata*s.l.). Australian Systematic Botany 17: 255-271.

Margaret Byrne is a Principal Research Scientist at DEC, Kensington, specialising in plant genetics. This article is based upon one which first appeared in the Buntine-Marchagee Catchment News.

A NEW SALT LAKE ENDEMIC WILDFLOWER



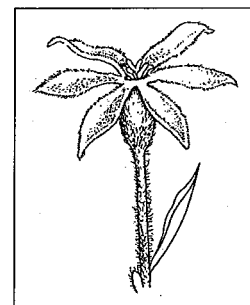
The recent biological survey of the Wheatbelt showed conclusively that the chains of natural salt lakes have their own unique suite of plants and animals. These 'paleodrainages' contain over 750 species of plants, many of which are endemic. A recently-named species is *Tribonanthes minor* *.

The genus *Tribonanthes* is confined to WA, and it has six species, all of which are found in damp lands such as lake edges or granite rock swards. They are often quite hairy and have six-petalled flowers, usually white. The plant dies back to a tuber each summer. This one is very tiny, 3-4 cm tall, with a single flower with the petals only 1-1.5 mm long. The most conspicuous feature is probably the purplish bract below the flower.

It occurs on seasonally wet, low sandy rises on the margins of salt lakes and flowers in August-September. So far it is only

known from the vicinity of Lake King and Lake Chinocup. If you have some good quality natural salt lake vegetation near you, why not look for this plant? It would be interesting to find out if it is truly rare, or just overlooked.

* Ref: M. Lyons & G. Keighery. 2006. A new species of *Tribonanthes* (Haemodoraceae) from saline wetland margins in Western Australia. Nuytsia 16: 77-80.



A more usual flower shape for the genus, this is *T. longipetala*.

MEMBERS PAGE

KITTO 50,000: NATURE 5,000,000!

Avril Baxter and Grantham Kitto

Johnson and Grantham Kitto spent many weekends and holidays on the family farm *Euretta* south of Kojonup. Their grandmother, now 104 years old, reminisces about the quality of the bushland and native animals around *Euretta* especially in the sheoak forest and around the creekline on the property. However when Johnson and Grantham took over running the property in 1998 things had changed for the worse.

Euretta is near the rim of the Blackwood and Gordon River catchments. Clearing of vegetation for agriculture has meant that not all of the incoming rainfall is utilized by the annual crops and pastures and is infiltrating down through the soil to become groundwater. Rock bars cross the creek, dividing the groundwater system up into small basins which are filling up with water. An additional problem is that as the groundwater rises it re-dissolves salts that are stored in the soil profile and when the groundwater gets to within 1-2 metres of the surface, surface tension draws the water up through gaps in the soil particles, just like a sponge

sitting on a wet draining board. As the water evaporates it leaves salt crystals on the surface which in winter wash downstream. This rise in the watertable has resulted in trees dying near the creekline and saline water flowing out of the property.

Thanks to their uncle Brian Warburton preserving large areas of native vegetation, the creekline bush is connected to sheoak forest on granite outcrops and eucalypt woodlands on laterite breakaways. This connectivity brought the bushland to the attention of the Blackwood Basin Group, when in 1999 they ranked remnant vegetation within the Catchment. Through a desktop analysis, bushland was ranked according to its size, its area to boundary ratio, the proportion of that type of vegetation remaining in the conservation estate, the proportion of the remnant exposed to increasing salinity, the distance to nearest nature reserve or national park and the number of remnants forming a link. As this patch of bush ranked highly, the Kittos were approached to verify its quality and to see if they needed any help with its

management. Funds were available for fencing, seeds and seedlings.

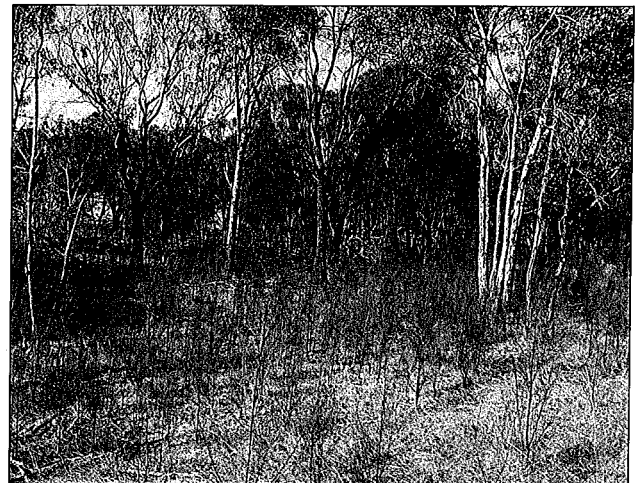
Johnson and Grantham jumped at the opportunity and looked further to see how best they could reverse the downward trend in their creekline in a short space of time.

The other program they chose was the Share Farming Scheme with the Forest Products Commission (FPC). Through this partnership with the FPC, radiata pine and biodiversity plantings were established in 2000. Under the agreement, the farmer fences to exclude stock from the plantation area and maintains the firebreaks, and the FPC establishes and manages the plantation to achieve commercial returns for the farmer and FPC. In 2000, incentives for farmers included planting 10% of the commercial area to biodiversity plantings or spending the equivalent money on fencing to protect remnant vegetation, plus a participation payment of \$200/ha and a 30% cropshare.

As the areas chosen for planting pines were sandy slopes at the top of the catchment on either side of the creekline, the Kittos saw that these



At the top of the catchment, young pine trees butt on to natural regeneration within the fenced off creekline.



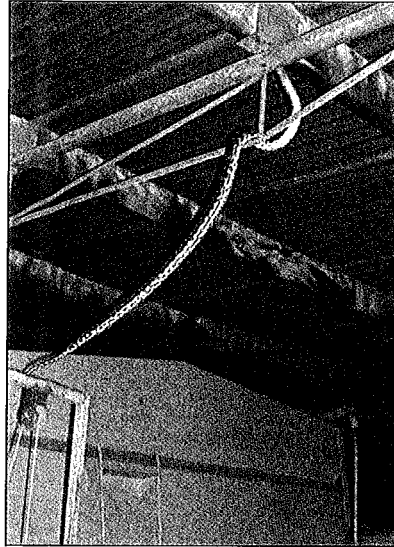
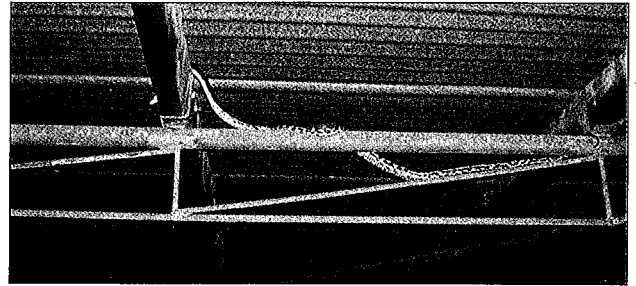
A field of regenerating sheoaks.

A PYTHON ON THE RAFTERS!

Tricia Sprigg

Our family farm, 12 kms north of Wagin, has always been shared with carpet pythons (*Morelia spilota imbricate*). Growing up as a child on the farm I can recall on several occasions when Dad would carry a python back to the hay shed after it was accidentally loaded onto the truck with a load of hay. One poor python wasn't so lucky. The python made its way into the house and was hiding in some clothes which were scheduled for mending. Mum, who to be quite frank is terrified of snakes, came across the python. Unidentifiable in the darkness, and panicked by the knowledge that a snake was in the house with the children, the python's fate was sealed with a lethal blow of the fire poker. Dad returning from the paddock had more sympathy for the deceased python than for my traumatised mother!

I often wondered how the python managed to get into the house. On a recent trip back to the farm, which is now in my brother's hands, part of the mystery was revealed. I was reversing the tractor into the shed when out of the corner of my eye I saw something fall to the ground. I lent over the side of the tractor and to my surprise there, lying on the ground less than a metre away from where I sat, was a python. I suspect the noise and fumes from the exhaust had frightened the python and caused it to fall from the rafters.



I climbed out of the tractor and joined my brother to watch the python as it scaled up a 1 metre frame of 3/4 inch square tubing suspending a pencil auger. There was nowhere for the python to go once it reached the top of the frame, so my brother wheeled the auger over to the lowest part of roof. I was even more amazed how the python managed to cling to the tubing while it stretched more than half of its body length through mid air towards the rafter. Once its snout was over the rafter it only took seconds before it was making its way along the rafter to a more secure spot near the iron.

My brother has been fencing off some remnant vegetation over the last few years so hopefully these beautiful pythons will soon be able to find safer areas to hibernate, although I suspect they will always find machinery and hay sheds attractive.

continued from page 10

Kittos'

two programs could merge and give them the quick result they were chasing.

Within a couple of years, 52.2 hectares of pines were planted on the sandy soils, 5 hectares of biodiversity plantings provided "infill" between bushland areas, salt tolerant plants were planted around scalds and the whole 150 hectares fenced from stock.

It was a lot of work, but with funding assistance from the Blackwood Basin Group and successful plantings undertaken by the Forest Products Commission, a significant area was covered, which the brothers admit they could never have done in such a short time by themselves.

And it paid off! The pines are growing successfully and have been used to protect stock in extreme weather conditions. The amount of recharge into the groundwater

has slowed dramatically and there has been a tremendous amount of regeneration in all vegetation associations along the creekline.

With revegetation and regeneration proving so successful Johnson and Grantham have measured an improvement in the quality of water in the creek and some previously salty dams within the treated area. As Grantham remarks "It is amazing how quickly natural regeneration has taken place along the creekline after the fences were put up, nature has been more successful than we would have been had we hand planted seedlings in these areas".

Johnson is now planning the next project - the protection of fauna still present in these bushlands and encouraging other native animals back into the area. Look out foxes, cats, and rabbits!

Avril Baxter is LFWO at Narrogin

PRACTICALITIES

When discussing weed control, we are often asked whether a wetter or a penetrant should be added to the herbicide – sometimes it is assumed that the two terms are interchangeable. DAFWA's Rod Randall explains:

WETTING AGENTS, PENETRANTS, AREN'T THEY THE SAME THING?

Rod Randall

No they're not, they have very separate jobs to do and do them in very different ways.

Penetrants

Essentially a penetrant is any component, or additive, of a herbicide mix that aids the movement of the herbicide into the plants' internal tissues. Some of the best penetrants are highly toxic in their own right and others are used by people all the time in a range of products such as summer spraying oils, kerosene and diesel fuel.

Penetrants are useful when plants have waxy leaves or the leaves are covered with some sort of resinous barrier that resists herbicide uptake, hence many common penetrants are organic solvents such as miscible light oils. They are commonly added to herbicides sprayed on cacti, succulents, many bulbous species and numerous other plants. The manufacturer's label would recommend when, and what type, of additives are required depending on the species being treated.

Used in insecticides there is a group of additives called adjuvants that increase the uptake of the toxin into insects. Like penetrants these adjuvants increase the efficacy of the toxin by improving the speed of the toxin moving into, and through, the insect's body. An adjuvant commonly increases an insect's physical activity making them buzz their wings fiercely or crawl frantically. This increased metabolic activity dramatically improves the movement of the toxin into the insect killing it much faster and with lower doses of the toxin required. Commercial insect sprays commonly contain these adjuvants. The reverse principle applies to a snake bite victim where the first aid is to keep the victim still to prevent movement of the toxin internally.

Wetting Agents

Wetting agents are essentially just concentrated detergents that reduce the surface tension of the water used in the herbicides allowing the spray droplets to disperse across the surface of the plant's leaves and stems. This increases the amount of the plant's surface area exposed to the herbicide and kills it more effectively.

Wetting agents are good for getting past plant defenses like hairy leaves where ordinarily the droplets might get stuck on the leaf hairs and harmlessly evaporate away never moving close enough to the leaf surface to

be absorbed. Wetting agents, or dispersants, allow the droplets to just slide down the hairs and move onto the leaf surface. They also work well with very shiny leaves allowing the droplets to disperse across, rather than roll off, the leaf surface.

The manufacturers label will generally advise if a wetting agent is required with certain herbicides to increase their efficacy. Because some herbicides may be ionic or non-ionic in nature (chemically charged at a molecular level) the manufacturer may recommend a particular type of ionic or non-ionic wetting agent. Be careful to always use the recommended type or your spray efforts may be all for nothing.

So the two are not the same. Wetting agents disperse the herbicide across the leaf material while penetrants aid in the movement of the herbicide into the plant tissue. Occasionally both processes may be needed to obtain good effects in a spray operation depending on the species being controlled. Some wetting agents will aid in penetration of the herbicide and the reverse can also be true but that's a bonus if it occurs. Always remember that when designing your spraying program you should always consider if a wetter and/or a penetrant is needed to do a good job.

Rod Randall is Weed Risk Assessor in the Department of Agriculture and Food. He can be contacted on: RP.Randall@agric.wa.gov.au

INVASIVE PLANTS AND CLIMATE CHANGE

The characteristics of the most successful weeds mean that they invade new areas rapidly after a major disturbance event. Climate change can be expected to favour invasive plants over established native vegetation, especially if accompanied by extreme conditions such as droughts alternating with very wet years. All invasive plants can be expected to demonstrate a southward range shift. Sleeper weeds may be favoured by changing climate.

For further information, find the Briefing Note on this on the Weeds CRC's website: www.weeds.crc.org.au

MEMBERS PAGE

THE GREAT ORCHID HUNT

Christel Schrank

Australian native orchids are small, delicate and elusive – unlike their flashy hothouse namesakes - and sometimes you need to get down on your hands and knees to fully appreciate their individual characteristics and beauty. It helps to have some experts around too, so the Friends of the Moora Woodlands invited members of the Western Australian Native Orchid Study and Conservation Group to help them search Candy's Bush Reserve in Moora for orchid gems. This reserve, which is registered with *LFW*, is in remarkably good condition for woodland within a township.



Appreciating native orchids can appear to be a form of supplication; being small and delicate they are extremely vulnerable and need our protection for conservation.

These small reserves are an important part of the heritage of rural towns, but they do need looking after. The Friends Group had conducted a cleanup of the reserve in March, removing six truckloads of rubbish. Orchid hunters were invited to take a small bag with them while they were scouring the ground for flowers and pick up little pieces of rubbish. The hunt netted not only a large number of budding and flowering orchids, but also 10 bags of litter.

On the first Sunday of August, over 50 people from around the state converged on the site and local residents rubbed shoulders with people who had travelled from

Perth for the morning's activities. It was a very successful day, as participants shared their knowledge, experience and love of bushland plants. Everyone was very excited when a possible new variety of snail orchid was found, which was provisionally calling the 'Moora Snail Orchid' until final confirmation of identification is established.

Candy's Reserve has a wide range of native orchids – seventeen were found on the day. Native orchids flower throughout the year and so the reserve probably contains others as well. However, difficult questions such as how do we engage younger people in natural resource management and issues such as how do we effectively protect these valuable bushland remnants still remain to be addressed. Gone are the

days when we could pick a posy of native orchids to take home to our mothers - there just aren't enough orchids left! Perhaps we need more days like this, where we share knowledge and so raise enthusiasm and pride in our local bushland assets.

Christel Schrank arranged this field day when a NRMO with the Moore Catchment Council before commencing duties as a Targeted Investment Implementation Officer with Northern Agricultural Catchments Council.

Interstate *LFW* News

ALICE SPRINGS STARTS A 'GARDEN FOR WILDLIFE' SCHEME

LFW has been operating in the Alice Springs municipality since 2002 and is very popular with landholders. However, unlike us in WA, it does not have a guaranteed allocation of State funds to keep it operational, so unfortunately it has had some stop-start problems. Nevertheless, enthusiasm for the scheme continues unabated.

Because Alice Springs is essentially an urban community, a new scheme, 'Garden for Wildlife', was launched in March 2007. This programme will assist property owners create wildlife habitats in their back yards, hopefully enhancing existing wildlife corridors

and developing new ones for wildlife to move safely between town blocks. They are hoping soon to register whole streets as wildlife-friendly places!

For more information, contact the Coordinator, Heidi Groffen, on LFW@lowecol.com.au. And if you are visiting the Red Centre, why not see if you can arrange to meet some *LFWers* there?

(Readers, are you interested in notes about what is happening in LFW around the nation? Please let me know if you would like this news item to continue. – Ed.)

NEWS

WHAT ARE 'ECOSYSTEM SERVICES'?

The description of large projects often states that they will provide 'ecosystem services'. LFW has been asked – what are these services? Below is a very brief outline.

An ecosystem is a suite of living things (plants, animals, fungi, bacteria and others) that interact with one another and their surrounding non-living environment. These interactions perform functions and produce outcomes that are above and beyond what would come from the species separately – the whole is greater than the sum of the parts. We should never forget, for example, that the composition of the air and the temperature of the earth are maintained within the limits for human life by plants.

The concept of 'services' arose to acknowledge the reliance of people on ecosystems. The functioning of natural ecosystems provides things that are essential for human health and survival. Examples of the kinds of services we receive from nature are the filtration of the water we drink, the maintenance of soil fertility, flood mitigation, pollination, pest control and even spiritual uplift. And of course, ecosystems are where our food, fibre, pharmaceuticals and, on a world scale, most of our building materials come from.

Ecosystems take natural assets like soil, water, air and living species and produce products that people benefit from and value in many ways, including financially. But people are important in the delivery of ecosystem services too. For example, farmers manage ecosystems and so play a key role in sustaining and fulfilling human life. The role of land managers in providing food and fibre has always been recognised, but as our understanding of ecosystems has grown, this is now expanding so that their role in maintaining air and water quality, climate, flood protection, healthy rivers, pest control, pollination, biodiversity and cultural, spiritual and intellectual values is also being recognised.

So, instead of asking what we have to *give up* in order to have a healthy environment, we should ask the question, what do we have to *gain* by maintaining a healthy ecosystem? This includes asking – who benefits from the delivery of ecosystem services, and how can costs and benefits be fairly shared? One of the roles of the Natural Resource Management Councils is to provide and implement a strategy to answer these questions. It's a big task – but vital to our future.

GET PAID FOR STORING CARBON IN THE SOIL

A new financial incentive for sustainable land managers in the Northern Agricultural region.

Everyone who has ever done any gardening will know that humus is an important part of soil fertility. It is part of the nutrient recycling process and helps give structure to the soil, as well as providing substrate for the diverse community of soil animals – like the mites that were featured in the last issue of *Western Wildlife*. Humus develops from the decomposition of organic matter such as plant debris and animal faeces. Soils with plenty of humus will be healthy and productive, and all good land managers will be aiming to increase the humus levels in their soil, whether it be in garden, paddock or bushland.

Being organic matter, humus and the material that forms it, contain carbon. Therefore, if you build up this stuff in the soil, apart from being a good land manager, you are also 'sequestering carbon' and so fit into the great 'greenhouse gasses/carbon trading' funding scenario.

As an incentive to persuade farmers to plant and maintain perennial pastures, the Northern Agricultural Catchments Council (NACC) is developing an initiative under the 'Australian Soil Carbon Accreditation Scheme'. As an initial starter, it is necessary to measure the carbon storage under perennial pastures (it is minimal or, under conditions of wind erosion, negative under annual crops/pastures). In future, set payments would be made to the farmer, dependant on the quantity of carbon being stored, and a number of other conditions.

If you are in the NACC area, and have perennial pastures (or wish to establish some) that you think might be eligible for inclusion in the current pilot scheme, find out more from the NACC website: www.nacc.com.au

NACC hopes to expand the soil carbon measurements to take in other measurements on all sites where they are funding a change in land management. Re-sampling the same sites several years later will provide a clear indication of the amount of carbon sequestered under each of these activities, and provide farmers with the opportunity to sell carbon credits from these landcare activities.

The Avon Catchment Council (www.avonnm.org.au) is also considering a soil carbon trading scheme.

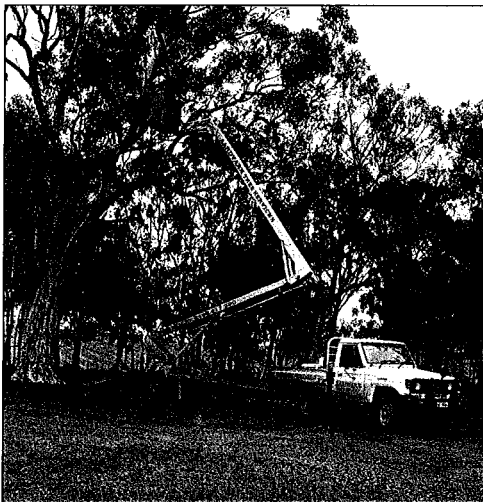
PRACTICALITIES

THE EVOLUTION OF CONSERVATION - "COCKATUBES"

Alan Elliott

I guess that I am no different from many others who have been drawn into wildlife protection. What started as an interest in a pretty flower or a different bird evolved into the study of its habitat and all the things that influence its survival. Before long I could have been accused of being a "greenie" or "tree hugger" but, what the hell at least I care.

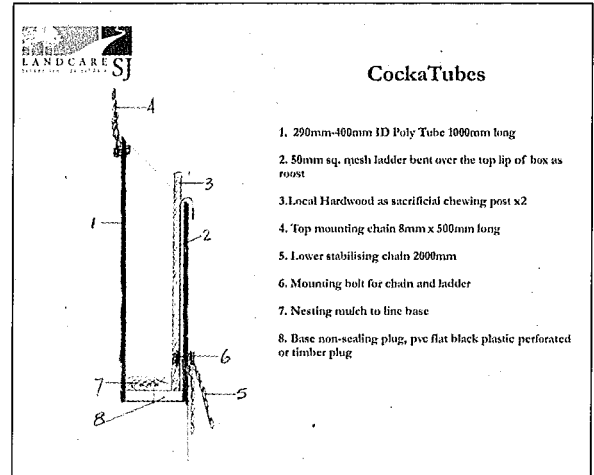
These transitions led me into an active roll in the local Landcare group in Serpentine Jarrahdale and among other activities I played a part in the Black Cockatoo Recovery Program. We started with a wish to help the Black Cockatoo Recovery Program and when we were offered the use of poly pipe from BHP Billiton's mining in Lenister the project was born. At the same time the WA Museum was engaged with the Water Corporation in the Cockatoo Care program and Ron Johnstone (Curator of Ornithology at the WA Museum) and Tony Kirkby, (Black Cockatoo Recovery Research Officer) became willing sources of information and inspiration to me.



Installation using a cherry picker.

Our first nest designs did not win any awards as faults in our design were pointed out before we managed to hoist one up a tree. We took on board all the criticisms and have now created the "Cockatube" which is, for want of a better term, a Cockatoo penthouse from Poly pipe. The evolved design has been used by the WA Museum in their projects and we gladly interpreted this as a design approval.

With additional support from Lottery West, the Serpentine Jarrahdale Land Conservation District Committee (SJ LCDC) recently installed 30 Cockatubes within the Peel – Harvey Region. The SJ LCDC have also partnered with the Southern Gateway Alliance on the Bunbury Bypass project to install an additional 7 Cockatubes. The Shire of Serpentine Jarrahdale have recently been awarded funding from the South West Biodiversity Project to install 30 Cockatubes on Shire vested reserves. So, we now have a total of 67 Cockatubes installed thus far and will become part of an ongoing monitoring program spanning the entire Peel – Harvey Catchment. It is early days but there are already residents in some of the poly nests and a lot of birds investigating and climbing in and out of others—we presume in the act of house hunting.



The advantages of the Cockatube that we have identified are that they are very durable and UV resistant, they don't get eaten by the birds themselves, they are weather-proof and, due to their wall thickness, their thermal dynamics are similar to that of wood. However, the most significant result for the Cockatubes design we have seen so far is that it deters feral bees from claiming the hollow, one of the major reasons why the survival of black cockatoos is under threat. It would be nice to replant a natural habitat but while the food trees can be grown in a relatively short time period a tree takes around 250 years to produce a hollow large enough for a bird to nest in. Neither I nor the cockatoos have the capacity to wait that long.

We provide (at a cost) the "Cockatubes" to people that have had to clear an area that has potential nest hollows or to anyone that has just decided to help the cockatoo to survive. If you have any queries please contact Alan Elliott on (08) 9525 2005 or Glen Byleveld at the SJ Landcare Centre (08) 9526 0012.

FLORA

SURVIVING THE DINOSAURS - THE DASYPOGONACEAE

Penny Hussey



Xanthorrhoea thomtonii, Cundeelee, WA

Recent advances in the techniques for handling genetic sequences in living things have led to an enormous amount of new knowledge about the relationships between different groups. The data can also be analysed to infer when the groups separated from each other, and this gives an approximate age for that lineage. A recent paper * looked at this for the Monocots, getting some surprising results.

Flowering plants appeared and started to diversify in the early Cretaceous (approx 140 million years ago). At that time, dinosaurs still dominated the Earth, and their extinction marks the end of the Cretaceous (66 mya). Monocots are a very distinct group of flowering plants, characterized by having only one seed leaf (the 'monocotyledon' of their name) and they, too, diversified at this time. Early monocots included palms, arums and orchids, while others such as grasses, bananas, yams and boryas came much later.

Early taxonomists depended



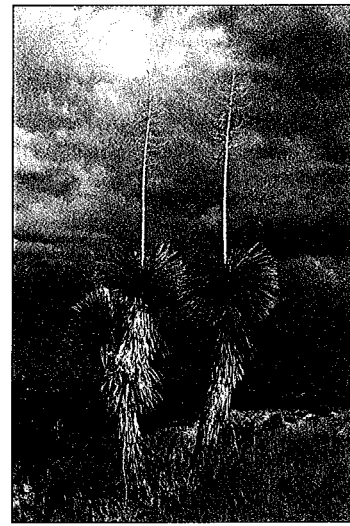
Kingia australis, Stirling Range, WA

on visual appearance for deciding whether one plant was related to another, but sometimes this can be deceptive as 'convergent evolution' can cause unrelated groups to have similar life forms. In WA, grasstrees and kingias have similar growth habits, a single trunk with a tuft of leaves on top, as do some yuccas in North America (see photos) and it was always thought that the Australian two were closely related. Indeed, Flora of Australia (1996) puts them all in the same family, Xanthorrhoeaceae.

It turns out that this is not so. Grasstrees are more closely related to onions, irises, orchids and even yuccas than they are to the kingia!

Kingias are in the Dasypogonaceae, a distinct family with 8 genera and 64 species found mostly in Australia, but a few are also in New Caledonia and New Guinea. It is amazingly old, and has no close relatives at all.

The family first appeared 119 mya in the Middle Cretaceous and has persisted ever since. It is named



Yucca eliator, Tombstone, Arizona, USA

after the WA endemic pineapple bushes, *Dasypogon*, that have coarse tufts of leaves and drumstick-like flower spikes. *D. bromeliifolius* is widespread from the Moore River to the Fitzgerald River National Park, but the tall, grasstree-like *D. hookeri* is only found in the high rainfall extreme south-west.



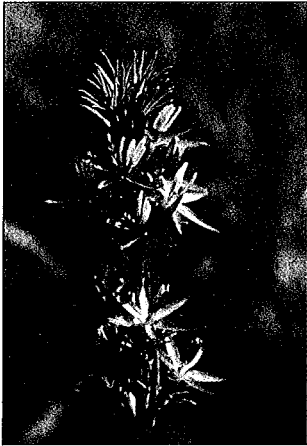
Dasypogon hookeri, Meelup, WA

Apart from the kingia, another well-known member of this family is *Calectasia*, the blue tinsel lilies. They are low shrubs, covered in

continued from page 16

Dasyopogonaceae

FLORA



Calectasia cyanea, Yanchep, WA

spring with starry blue/purple flowers having huge, bright yellow anthers. Coastal visitors will know the prickly lily, *Acanthocarpus preissii*, an undistinguished-looking plant, often most obvious when covered with knobby yellow fruit capsules in early summer. Then there are the mat rushes, *Lomandra*, reedy tussocks that sprout small flowers in spring – males and females on separate plants. The other south-west genera, *Baxteria*, *Chamaexeros* and *Xerolirion* are less well known. (Note, some botanists believe that Dasyopogonaceae should be divided into several families - eg Calectasiaceae - and the current family would then become an Order, Dasyopogonales.)

The survival of this ancient plant lineage in the south west of WA once again confirms our biodiversity hot spot status.

* Jansen, T. and K. Bremer. The age of major monocot groups inferred from 800+ rbcL sequences. Botanical Journal of the Linnean Society, 2004, 146, 385-398.

THE NEXT HERBICIDE-RESISTANT WEEDS?

Farmers will be well aware of the problems caused when weeds develop resistance to commonly used herbicides. It is of particular concern where an agricultural practice that relies on herbicides, such as minimum till or no-till cropping, is used. In WA at the moment, only annual ryegrass, *Lolium rigidum*, is known to have developed glyphosate (Roundup®) resistant populations, however work in Qld and NSW has identified one definite and several possible problem weed species.

Glyphosate-resistant populations of awnless barnyard grass, *Echinochloa colona*, have been found. In addition, wild oats, *Avena* spp.; sowthistle, *Sonchus oleraceus*; flaxleaf fleabane, *Conyza bonariensis* and liverseed grass, *Urochloa panicoides*, have possibly done so. It is possible that testing in WA would reveal more possible problem species.

The Weeds Cooperative Research Centre has put together a manual with information on preventing and managing herbicide resistant weeds – primarily for farmers, but all concerned with weed management will find it interesting. **Farmers using minimum- or no-till, should find it most informative.**

www.weeds.crc.org.au/publications/iwm_manual_flyer.html

Did you know ...

“... that 18% of global carbon emissions are due to deforestation and altered land use – more than due to the world’s transport systems? Consequently, a global moratorium on further destruction of wild vegetation is urgently needed. Moreover, repair and restoration of damaged wild plant communities needs to be expanded where there is a will to do so. The use of locally and culturally appropriate plant species in agricultural, urban and suburban lands is a third key strategy if we wish to develop new landscape ethics and are willing to change long-standing behaviours. This combination of strategies will improve the amount of atmospheric carbon absorbed by plants in coming decades, and also help mitigate the coming plant extinction crisis should the world persist with a ‘business as usual’ approach.”

Steve Hopper, Director, Kew Gardens, UK, speaking at a public lecture in Perth on 4th September 2007.

THE DARLING RANGE WILDLIFE SHELTER NEEDS HELP!

The Darling Range Wildlife Shelter is a not for profit and totally volunteer organisation. Our aim is rehabilitate and release sick, injured, orphaned and displaced Australian native wildlife. Volunteers are looking for wildlife-friendly release sites for creatures unable to return to their home-range. Wildlife species we are frequently seeking ‘homes’ for include – parrots, waterbirds, shingleback skinks, bandicoots/quenda and kangaroos. There are some specific requirements for different species. If you might be interested, or able to assist, we would appreciate your contact.

Please contact Michelle on 9362 6272 or michelleh@darlingrangewildlife.com.au.

You can find out more about DRWS at:

www.darlingrangewildlife.com.au

The Way We Were

THE WAGYL - REALITY IN THE MYTH?

Nyoongar people believe that the landscape of the south-west of WA was shaped by the Wagyl, a Dreamtime serpent of truly heroic proportions. He altered the landscape as he moved across it, forming the hills, rivers and lakes. You can hear about the role of the Wagyl in Noel Nannup's CD "The Carers of Everything" obtainable from the Swan Catchment Centre. Other Aboriginal language groups also have giant serpent myths, like the rainbow serpent Bremurer of the Ord River, so evocatively illustrated by Elizabeth Durack in the children's book "The Way of the Whirlwind".

But why a giant serpent? Did one ever exist? Did the earliest humans to arrive on this continent

actually encounter one? The answer is probably, yes, and very awesome it must have been too.

At Riversleigh in Queensland is the most wonderful collection of fossils about 20 million years old. The countryside was a tropical rainforest, with a lot more water around than there is now. Some of the bones are from giant pythons. One of these snakes was 7 metres long and 20 cm wide – pace it out, to get an idea! It has been named *Montypythonoides riversleighensis* (yes, truly!). There's another big python in the east too, called *Wanambi naracoortensis*. This one was 'only' 6 metres long. Similar fossils have been found in WA.

They must have been fearsome predators, lurking in ambush to

catch and coil around their prey. Either would easily have dealt with an unwary human. Equally, they were possibly rather slow-moving, especially after a large meal, and could be dealt with by a determined band of human hunters. Apparently snake is quite good eating, and there'd be enough tucker on one of these to keep a family going for a week.

But did they survive to encounter humans? There's no fossil evidence of these snakes' remains alongside human ones (unlike Diprotodons, hippo-sized wombats, whose bones have been found scarred by stone butchering knives). But there must have been *something* to come down to us today as these Dreamtime stories!

A BIG TREE ON THE BANKS OF THE SWAN RIVER IN 1697

In 1696-97, an expedition was sent from Holland to the west coast of the land we now call Australia. Three ships, under the command of Willem de Vlamingh, were to explore and chart the coast, as well as to search for exploitable wealth and for wrecked Dutch ships.

The task was meticulously performed, and an excellent chart produced, from Rottnest (called after the large 'rats' they saw there) to the Exmouth Gulf. While principally charting the coast, they did occasionally explore inland, but they found dense scrub, little fresh water and no wealth. All they saw of the Aboriginal inhabitants were footprints, campfire smoke and the remains of huts.

Their journals record little detail, apart from matters concerning marine navigation. However, on 5th January 1697, a party explored the Swan River (where they commented on the abundant



black swans) and had reached, probably, around Freshwater Bay. The account continues: "Marched into the country along the river which flows inland, came to a bluff, could not walk the beach any longer, ascended a height where we took a rest, saw there a big tree, three fathoms in thickness and full of notches by which people could ascend till the top of the tree".

An English fathom is six feet in length, presumably the Dutch

measurement is similar. That would make the tree 18 feet (± 6 metres) across! Wow! There are three species it could have been, tuart, jarrah or perhaps marri. Probably, since they were not far from the coast, it was a tuart. A tree that old would have had generations of Aboriginal people climbing it to harvest possums or eggs from the various birds that would have used the hollows for nesting – hence the notches.

The explorers were not at all impressed by what they saw in WA, and left on 21st Feb 1697, firing three shots "as a signal of farewell to the miserable South-land". De Vlamingh's superiors in Batavia were not impressed either, accusing him of failing to explore properly. Surely no part of the world could be so barren and inhospitable and so devoid of the means to acquire riches?

Sketch: F. Valentijn, 1726

NEW BOOKS

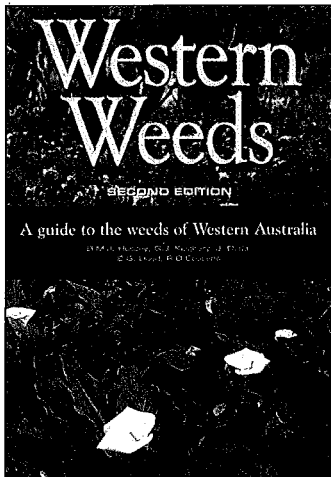
Western Weeds: a guide to the weeds of Western Australia (Second Edition)

BMJ Hussey, GJ Keighery, SG Lloyd, J Dodd & RD Cousens

pub: Weeds Society of WA. 2007.

Cost \$35.00 (+ \$5.50 p&h in WA)

Obtainable from DAFWA, phone: (08) 9368 3710 or email: jbrown@agric.wa.gov.au



First published in 1997, reprinted twice and now out of print, this new edition of a popular reference book has been revised and brought up to date. It has 312 pages and describes about 1,050 weeds, with 625 illustrated in colour. There are diagrams to explain plant structures and to help you identify weed species. 'Western Weeds' also has a comprehensive index with both common and scientific names of weeds. A plain English

glossary of botanical terms is included. The first edition tended to fall apart with heavy use, so this one has a long-lasting stitched binding.

The original edition prompted many people to take an interest in the State's weed flora, and as a result, there has been an increase in community concern about the effect of weeds on both natural and man-made ecosystems. Since that first edition, some 100 more introduced species have been found naturalised in WA, there have been over 100 name changes and we have gained much better knowledge of weed distribution.

'Western Weeds' is a comprehensive guide to weeds from all types of land use and from all parts of Western Australia. It is an essential reference book for all people concerned with managing land.

At the book launch



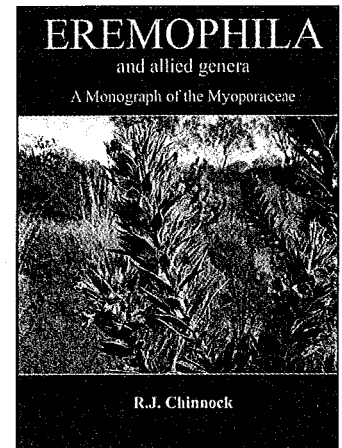
The book was launched by The Hon. Kim Chance, Minister for Agriculture and Food, shown here with three of the authors, Sandy Lloyd, Jon Dodd and Penny Hussey. Of the other two authors, Roger Cousens now lives in Melbourne, while Greg Keighery was surveying flora on Pilbara islands. (Returns from sales of the book go to The Weeds Society and the price is calculated to return just enough for a reprint if needed.)

Eremophila and Allied Genera: a Monograph of the Myoporaceae

R.J. Chinnock

pub: Rosenberg. 2007

Cost: \$99.00



When Bob Chinnock wrote about Eremophilas in WW 6/4, we were aware that he was compiling a book. Well, here it is, a vast labour of love containing all he has learnt about the plants since he first began his study of them in 1975! If you are really keen on your botany, and like the more arid vegetation of the South-west and inland, you will find "Eremophilas" a mine of information.

This massive tome (672 pages) is a detailed botanical treatment of all seven genera and 253 species (not to mention the subspecies and varieties) in this family. One genus is found only in the Caribbean, another in China and Japan, the rest are Australian. Until this taxonomic treatment, it was thought that there were just two other genera, Myoporum (found also on Pacific or Indian Ocean islands) and Eremophila (in Australia only) but this book defines three new genera, Glycocystis, Calamophoreus and Diocirea, all endemic to WA, which is the centre of diversity for the family.

The book has introductory chapters on topics such as taxonomic history, morphology, distribution, cultivation and human use. Then come keys to the family and to genera. Each species is described and illustrated by photographs, excellent, very clear line drawings and a distribution map.

Eremophilas, the focus of most of the book, are a characteristic shrub species of inland woodlands and mulga. They prefer clay soils, and only very few are found on sand. They would have been an important component of the understorey in Wheatbelt woodlands, as they still are in Goldfields woodlands, and this book should help with compiling information for revegetation projects.

WA State of the Environment Report 2007

Now available from the Environmental Protection Authority: www.soe.wa.gov.au download or request a hard copy.

The document reveals trends and concerns and recommends actions – mostly by Government. It is a fascinating (and sometimes scary) compilation of the condition of our State. Some of the conclusions may be overly optimistic, but for a summary of where we are heading, and what the end results of our actions (or inactions) might be, it is a very valuable resource and well worth having on hand for reference.

COMING EVENTS

Blackberry Identification Workshops

Nov 2007 - Jan 2008

The CRC for Australian Weed Management is planning to conduct a series of one-day workshops to enhance the use of the CD-ROM "Blackberry - An identification tool to introduced and native Rubus in Australia". Workshops will be held from November 2007 to January 2008 as the best time to identify blackberries is when they are flowering.

If you are interested in attending a workshop in WA, please contact:

Annette Beer, Education Officer Weeds CRC, (NSW DPI Wagga Wagga,)

E: annette.beer@dpi.nsw.gov.au

Ph: (02) 6938 1671

Fax: (02) 6938 1861

State NRM Conference

March/April 2008

Don't forget the next WA Natural Resource Management Conference which will be held on 31st March to 1st April 2008 at Bridgetown and Boyup Brook, hosted by the Blackwood Basin Group. The theme is 'Regional NRM - Bridging the Barriers to Better NRM'.

To find out more, visit the website at: www.nrmconferencewa2008.com.au

Bush Detective answer:



A closer look and it is apparent that the fan of twigs half surrounds a circular centre of fused litter fragments. A few deft touches with a finger or twig around the centre-piece exposes a hinged door and by gently lifting one edge of the trapdoor a hole is revealed. Almost certainly the structure is the entrance of a burrow of the trapdoor spider *Idiosomasigillatum* which still occurs widely (but less commonly than formerly) along the Perth Coastal Plain including

bushland in some of the newer suburbs. *Idiosoma* and many species of related genera attach with silk, twigs, leaves, branchlets of sheoaks and phyllodes of Acacias, by their ends in a radial fashion, to the rim of a burrow. While this may appear to be camouflage, the main function is as a foraging device. When feeding, the spider sits below the slightly ajar door, and with its tarsal claws on the inner, attached ends of the twiglines detects insect movements in the litter and hey-presto it lunges out and seizes the prey!

Thank you to Heather Adamson for the photos, and to Barbara York Main for the answer to this puzzle.

Have you got twig-lines around a trap-door spider burrow in your bushland? Send us a photo of your example. If we get enough examples we could put them together to show the range of form in different locations - and, quite probably, made by different species. Trap-door spider burrows are usually indicative of good to excellent condition in bushland remnants.

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.

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