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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).

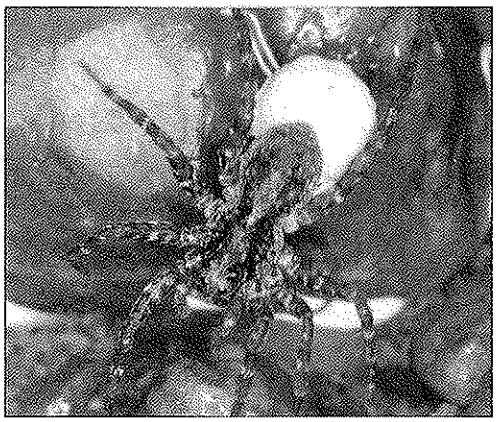

Fig. 1: Artoria mckayi, *female with eggsac (Avon River, Victoria). (V. Framenau)*

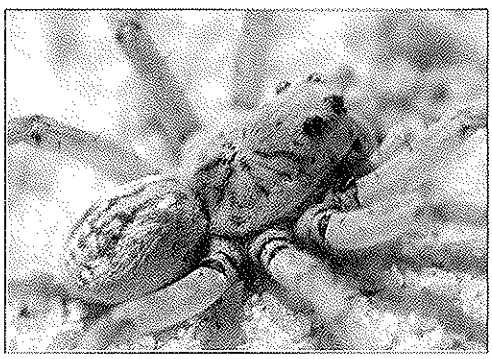

Fig. 2: Tetralycosa alteripa, *juvenile (Lake Lefroy, Western Australia). (V. Framenau)*

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.

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

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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 'Snugglepot 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 amongsthe 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

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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

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Wolf spiders

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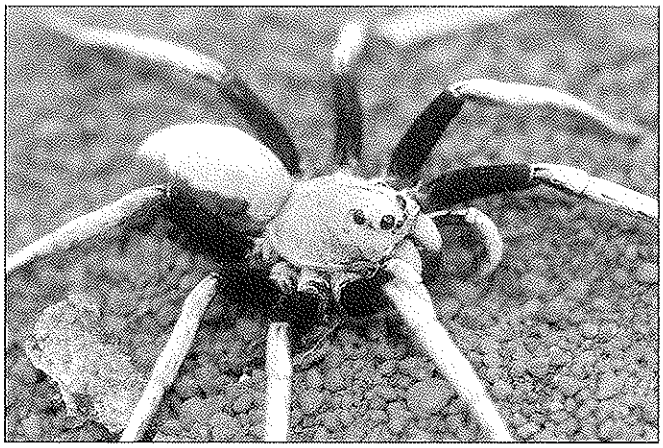

Fig. 3: Hoggicosa bicolor, *penultimate male (Western Australia). (V. Framenau)*

Artoriinae, which includes the species-rich genus *Artoria* (more than 20 species described, possibly 100+ unnamed species) (Fig. 1), the salt lake inhabiting *Tetralycosa* (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 *Tetralycosa* (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.

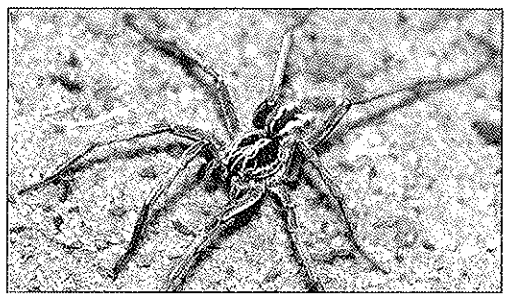

Fig. 4: Dingosa serrata, *male (Perth, Western Australia). (V. Framenau)*

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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