A Report on the Trapdoor Spider: *Aurecocrypta* sp. from the Chichester Range

by

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INTRODUCTION

In 1994, I (Raven, 1994) published a taxonomic monograph on the spiders of Australia and other Pacific species of the mygalomorph family Barychelidae. In that monograph, I worked on all of the barychelid material held by all Australian Museums, including the collections of the Western Australian Museum (WAM). The only group not treated at species level was the genus, *Idiommata*, which included approximately 20 new species from Australia. In south-western Western Australia, small spiders similar to *Idiommata* were placed in a new genus, *Aurecocrypta*. Two species were then included in the genus which included; *Aurecocrypta katersi* from Katers Island off the Kimberley coast, and *Aurecocrypta lugubris* from near the Pearce Airforce base at Chittering (40km north of Perth). Both species were known only from single female specimens and hence, the absence of male specimens has remained critical to completing a full taxonomic description of both species.

In 2004, I examined the WA museum material again and found a large bias in sampling at the southern end of WA and very few records in the north. Since this time, Short Range Endemic surveys have become an increasingly important part of the environmental impact assessment process for mining in remote areas of the Midwest and Pilbara Regions. This has led to an influx of new invertebrate specimens to the WA museum collection.

After examination of the collection in Sep 2008 I have found that *Aurecocrypta* is one of the most represented groups collected from pitfall trap surveys in WA.

SURVEY METHOD (FORAGING IN THE CHICHESTER RANGE)

IDENTIFYING THE SPECIES HABITAT

In late August 2008, I accompanied ecologia scientists on a fieldtrip to the Chichester Ranges to identify populations and the habitat of an *Aurecocrypta* species which had been found there in October 2007. Beginning with a preconceived idea about where to find spiders is a sure way to make sure you don't find them. So I checked many habitats and microhabitats within the Chichester Range. The spiders live within burrows in the soil which are covered with a trapdoor lid which makes them cryptic and therefore often difficult to locate. I used the technique of sweeping a 2m² area clear of leaf litter and soil to expose the burrow entrance ("soil-shaving"). In an hour, I could do 4-5 of such surveys. I examined under and around trees, under and around spinifex, on open unshaded sloping

ground, on open shaded ground, on flat ground and under rocks and logs. I looked around creek edges, on embankments, around Eucalypts and other trees with soil around the bases. I also broke open termite mounds on the ground and in wood. As I climbed up or across slopes I scanned soil for the tell-tale circular doors. I looked on top of mesas with soil & *Acacia*, around the *Acacia* on slopes and in the deep gullies. However, the primary focus was soil-shaving.

IDENTIFYING THE SPECIES MICROHABITAT

One of the more important features of many mygalomorph microhabitats is the presence of soil in which the spiders dig their burrows. One of the key issues in the Chichester Range was actually finding such suitable soil. This was generally indicated by the presence of Acacia's, but also occurred on rocky slopes. The slopes are typically steep and soil washing down the slope may pool in the flats at the base. Rain and flowing water may also wash the small light soil material between the cracks and crevices in the rocks, which thereby forms hollows, platforms and crevices between and under rocks of all sizes. These areas seem to be sealed against wind-heat and moisture loss and are reservoirs to species including spiders in time of high environmental stress.

I have observed this situation at the Great Basalt Wall, west of Townsville, which evidently formed a mere 12,000 years ago and yet has a highly diverse and endemic fauna not evident in normal day or night searches. Clearly, the small spiders and pseudoscorpions that are so common in this situation are following the cracks down into the cooler zones.

FINDINGS OF THE SURVEY

THE CHICHESTER RANGE SPECIES

The genus *Aurecocrypta* is most similar to the genus *Idiommata* with which it shares the black or unpatterned abdomen (at least in *A. lugubris*) and the presence of a sound-making organ (maxillary lyra) on the mouth parts from which it differs in the much weaker scopula (hair pads) on the legs of females. *Aurecocrypta* is readily distinguished from the more common genus, *Synothele,* by the presence of a well-developed second pairs of silk-spinning spinnerets. The second pair of spinnerets of *Synothele* are highly reduced or absent.

Due to examination of specimens from the Chichester Range (*ecologia* surveys) as well as new specimens occurring within the WA museum (added to the collection since 2004), it has now been determined that the *Aurecocrypta* species from the Chichester Range is an undescribed yet widespread species in northern Western Australia (Figure 3). Both male and

female specimens have now been collected and there is now potential to publish a complete species description.

The Chichester species differs from *A. lugubris* in lacking a lyra and differs from *A. katersi* by being larger, having a smaller second pair of spinnerets and a different eye group shape. These differences are stable, consistent, sufficient and necessary for the establishment of a new species. Differences also occur between *Aurecocrypta* and *Synothele*. *Aurecocrypta* has a well-developed second pair of spinnerets while most *Synothele* species have only one pair of spinnerets with the second pair being minute.

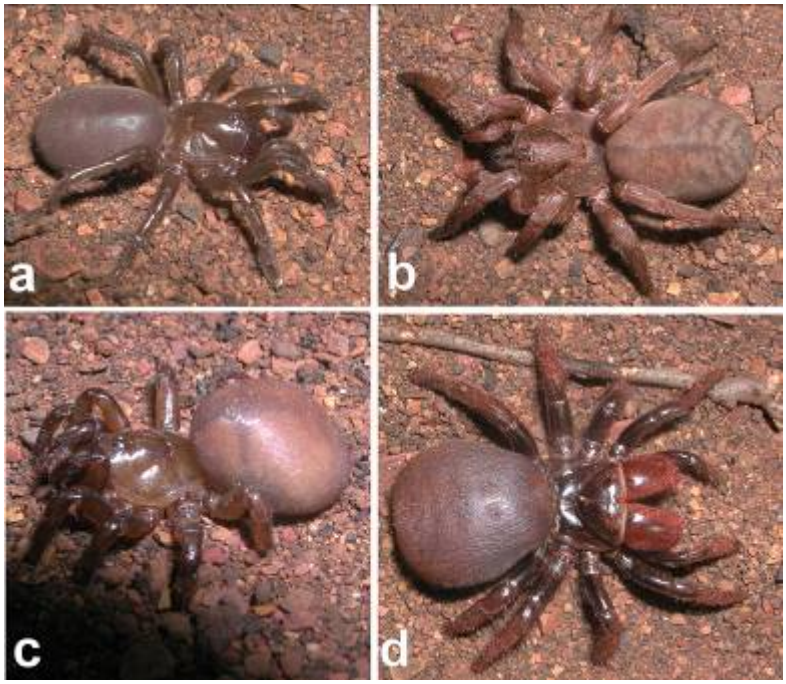

Figure 1 Mygalomorph spiders collected from within the Chichester Range. **a**, *Aurecocrypta* sp. female (Target Species), **b**, *Synothele* sp. female (sister Barychelid genus). Other mygalomorphae collected include: **c**; *Conothele* sp. female (Ctenizidae) and **d**, *Missulena* sp. female (Actinopodidae).

THE CHICHESTER RANGE POPULATION

Initial suggestions that these barychelid spiders (and other SRE's) are likely to be localised on south-facing slopes and in gullies is based upon experience of arachnologists in the south-west of the state where, even in summer, the sun is low and the habitats in these locations are far more mesic than on ridges and north-facing slopes. In contrast, in mid "Winter", in the Pilbara, the sun is very hot by 9am and the gullies are hot and dry.

From the viewpoint of an arachnologist, the habitats in the Pilbara are far more homogenous than in the south-west with variations occurring in flood-plains, flat-topped mesas and other

areas where soil can build up. The areas that I saw were grasslands (with spinifex) and scattered eucalypt or Acacia. The Acacia tended to be in areas where soil accumulated but was not flooded.

The areas in which spiders were pitfall trapped were dry rocky hillsides with limited soil on both south-facing (6A: (Fig. 2b) and north-facing slopes. Initially, my foraging was focussed on areas that were south-facing slopes and in gullies. However, seeing the conditions, I thought it best to follow leads gained through other barychelid collections. Foraging in one small area of Acacia on an east facing slope (Fig. 2a) yielded a female Aurecocrypta (Fig. 2d). The area occupied by the Acacia was very small (10 metre x 10 metre) and the portion in which soil had not washed away (and which the mygalomorphs were found) was maximally 1 square metre. Other barychelids were found in Acacia in soil on flat ground near a hillock.

Figure 2 a; unburnt area on east facing slope where an *Aurecocrypta* specimen was collected while foraging. b. Vegetation where original male specimens were collected using pitfall traps during the phase 1 survey effort. c. Vegetation (shaded acacia) where the *Aurecocrypta* specimen was collected while foraging. d, *Aurecocrypta* burrow with trapdoor lid.

THE EFFECTS OF FIRE ON SPIDER POPULATIONS

In areas where the leaf litter under trees and bushes has built up, decomposition is slow, neither termites nor fungi seem widely evident. Where fire went through those areas, the litter is burnt (to varying extents) for its entire depth to the rock. If spider burrows were in that litter and did not move during the fire, they would be cooked (observations at Cooktown showed that barychelid burrows had been subjected to hot fire on clay soil and almost all had died; the burrow door was damaged and lacked fresh silk). However, two mitigating behaviours must be allowed for. First, we know that with the first scent of smoke in the air, tarantulas in eastern Queensland emerge from their burrows and "frantically" search the surround vegetation for a large snail (alive or dead) which they pull into their burrow, point down. The shell remains there through the fire where it can be seen up to a day or so after the fire has passed. Given, that the Australian fauna is fire-adapted, I suggest that the barychelids probably have a similar kind of behaviour. Second, in light of my suggestion about the hollows under rocks, I suspect that, with any increase in heat from either sun or fire, the barychelids will follow the cracks down and survive. Indication of this was seen both with the *Synothele* taken just east of Auski Roadhouse; the spider was under a rock. Equally, the *Aurecocrypta* female was found among rocks where the spider would escape the heat of the fire to some extent.

THE EFFECTS OF THE RAIL AS A GEOGRAPHICAL BARRIER

First and most important, the rails are not a barrier. Only at the sleepers are the rails pressed flat and form a vertical wall. Elsewhere, the rails are sitting on loose rock and the quick look that I had indicated that there would be ample space for spiders to move through the rocks under the rail. But equally, these are small spiders with claw-tufts which can walk up glass walls so even a rail line is not an impediment, especially since they are ascending smooth rock faces in nature. Third, and this bears upon the issue of where the *Aurecocrypta* really occurs, males tend to walk uphill (less so across hill). Gene flow is likely to occur in the flats. The rail will not block movement of the spiders.

THE EFFECTS OF VIBRATIONS CAUSED BT PASSING TRAINS

We know that during the day, spiders, other arachnids and cockroaches are disturbed by vibration to the extent they are compelled to move toward it. This effect is most dramatic with stationary older 4 wheel drive diesel vehicles and tractors when left to idle for more than 5-7 minutes. The effect is poorly understood but it is known that the effect does not occur at night. Also, the topography of the surrounding slopes and indentations in the soil as

well as the soil type itself will strongly affect the response. The vibration attraction phenomenon (VAP) is minimized when the vibration source is on a ridge or side of a slope. It is maximized on flat ground as when the vibration source is in a valley or in a groove. It becomes less as the speed of the engine increases, so a generator has no effect. It is also maximized on hot sandy soil and is not evident on rock or wet soil.

I checked the vibration effect of a passing train at Redmont. I felt concrete sleepers stacked 6 high about 15 metres from the rail line as the train passes. The sleepers would have amplified the vibration but it was still minimal and had no effect on the fauna. There was no ground activity as the train was passing. Clearly, the train engine was revving too high and probably was too well-tuned to generate significant vibration. Recent studies in the Cape also found that when the vibration signal is not one wave but conflicting waves, such as generated by a long train, the spiders are unaffected. Equally, the tracks are comparatively new and showed no sign of movement as the carriages passed. Hence, I conclude that vibration from the trains either loaded or not is not a concern to the spiders.

However, blasting and heavy earthmoving equipment will generate the VAP. My suggestion, in that case, is to cut a trench at a safe distance from the earthworks and lay gauze on the side away from the earthworks. In that way, spiders and reptiles walking toward the trench will be trapped until they climb back out and hence get turned 180 degrees. More refined techniques may cause more damage that the animals saved.

CONSERVATION SIGNIFICANCE OF THE SPECIES

All of the indications are that *Aurecocrypta* Chichester around site 6a and 7 in the Chichester Range are secure. The spiders are not highly localised and the species is therefore not a short range endemic species (SRE). Museum records now show that *Aurecocrypta* occurs widely throughout the Pilbara at a number of localities (Table 2 & Figure 4).

The Chichester specimens show no significant morphological divergence from the other specimens that I have examined from else where in Western Australia.

Males have been taken between July and late September and dispersal of young probably occurs from September to early December on nights of rain. These would be issues to be managed to minimise the damage to the population.

Possibly, as result of the intensive surveying of the Pilbara since 2002, more is now known of the mating periods of *Aurecocrypta* species than of any other barychelid in Western Australia.

Table 1 GPS coordinates and collection details of all records of *Aurecocrypta* 'Chichester sp.' specimens in WA (from both ecologia surveys and WA Museum records)

Specimen Details			GPS Data		
Sp no	Locality	Details	zone	longitude	latitude
1	Chichester Range	3 males collected by ecologia pitfall trapping in Sep 2007	50	708210.5	7549428.6
2	Chichester Range	1 male collected by ecologia pitfall trapping in Sep 2007	50	708339.9	7549410.0
3	Chichester Range	1 female collected by ecologia foraging in Jun 2008	50	661846.3	7554495.5
4	Chichester Range	1 female collected by R.Raven foraging in Aug 2008	50	707434.4	7548959.9
5	Robinson Range	1 male collected by ecologia pitfall trapping in Apr 08	50	261638.3	7394826.8
6	Jack Hills	1 male collected by ecologia pitfall trapping in July 08	50	523379.3	7117451.2
7	Weld Range	1 male collected by ecologia pitfall trapping in Aug 08	50	579575.6	7029279.2
8	Weld Range	1 male collected by ecologia pitfall trapping in Aug 08	50	562535.5	7019602.2
9	Hammersley Ranges	Collector Unknown, WAM Record	50	699231.7	7464475.8
10	22.1km west Pannawonica	Collector Unknown, WAM Record	50	408739.7	7600764.1
11	West Turner Syncline	Collector Unknown, WAM Record	50	549975.2	7486840.1
12	Sulphur Springs	Collector Unknown, WAM Record	50	728663.8	7658004.0
13	Sulphur Springs	Collector Unknown, WAM Record	50	731762.0	7660791.2
14	Sulphur Springs	Collector Unknown, WAM Record	50	731762.0	7660791.2
15	Sulphur Springs	Collector Unknown, WAM Record	50	729585.5	7662021.5
16	Sulphur Springs	Collector Unknown, WAM Record	50	728663.8	7658004.0
17	Sulphur Springs	Collector Unknown, WAM Record	50	728663.8	7658004.0
18	waramboo 50.5k W of Panna	Collector Unknown, WAM Record	50	379462.6	7603615.1
19	Barlee Ra Nat Reserve	Collector Unknown, WAM Record	50	371672.6	7444859.6
20	Tanami, 89k W of Tanami Dc	Collector Unknown, WAM Record	50	485345.1	7800746.6
21	Mesa J, 16.6km SW Pannaw	Collector Unknown, WAM Record	50	420126.4	7593599.2
22	Waramboo, 52.1 k W of Pani	Collector Unknown, WAM Record	50	377850.4	7603941.2

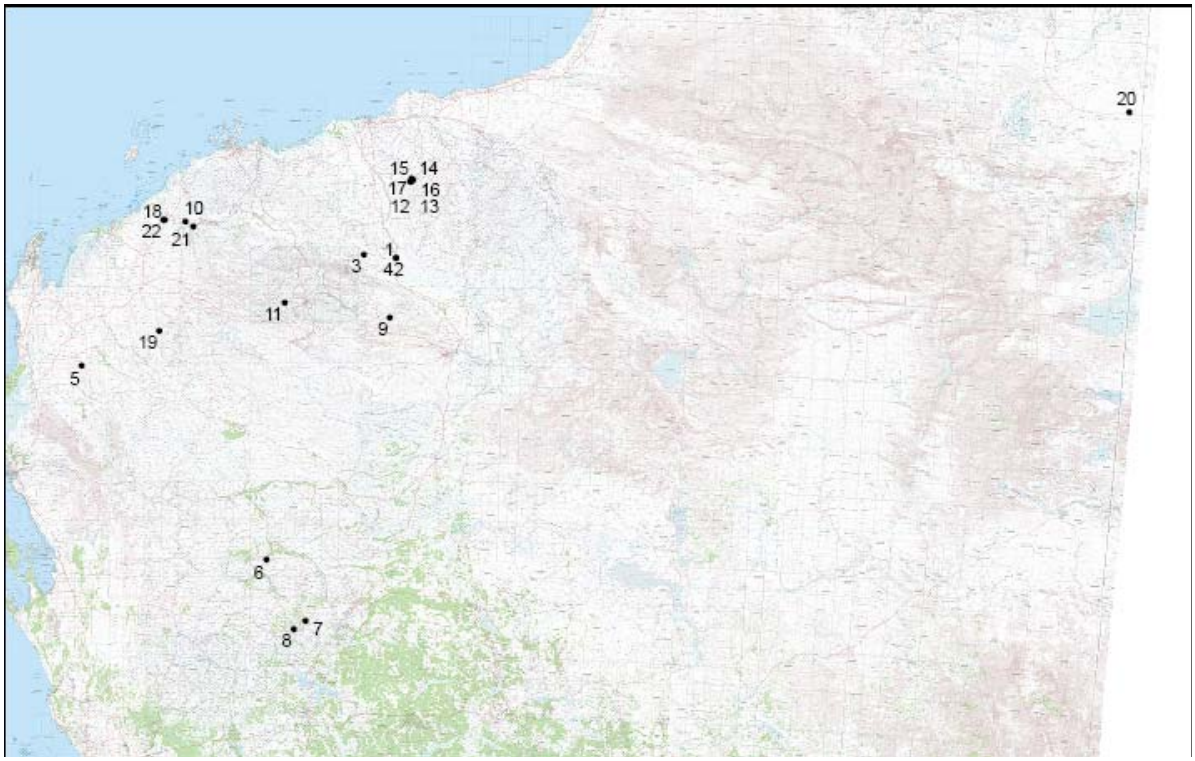

Figure 3 Localities of all records of *Aurecocrypta* 'Chichester sp.' specimens in WA (from both ecologia surveys and WA Museum records). Numbers correspond with Table 1.