

# JAMES RENNIE BEQUEST

## REPORT ON EXPEDITION/PROJECT/CONFERENCE

**Project:** How do preferences for Bower decorations Change over time in the Spotted Bowerbird, *Chlamydera maculata* ?

**Travel Dates:** 18<sup>th</sup> August 2007 – 16<sup>th</sup> September 2007

**Location:** Taunton National Park, Central Queensland, Australia

**Group Member(s):** Sarah Walker

---

### OUTCOME :-

#### Introduction

The Spotted Bowerbird (*Chlamydera maculata*) is native to the brigalow and eucalypt woodlands of eastern inland Australia. Both adult females and males are approximately 29cm with black, brown and cream markings which make them cryptic in their preferred environment. Females can sometimes be identified by the fact that the pink nuchal crest is small or absent (Frith and Frith 2004) although more often than not, males and females are indistinguishable from each other.

Bowerbirds are so called because of the elaborate structures that males build in attempt to attract females. They have a polygynous mating system where only the females give parental care. The females choose their mate on the basis of bower quality and male displays. Often a few males will enjoy a particularly high mating success whilst other males will have few if any matings.

The Spotted Bower is often built upon a traditional bower site and usually comprises of a platform and two parallel walls constructed from sticks and straw (Madden 2003). These are then decorated using a variety of ornaments which may be natural such as snail shells or *Solanum* berries or man made such as coloured glass and plastics. Preferences for decorations are extremely species specific. Spotted bower birds are known to favour green decorations with green *Solanum* berries being particularly frequent choices of decoration.

It is known that the decorations and quality of the bower may be indicators of male vigour and male quality and status. For instance Madden (2003) observed that owners of bowers displaying higher numbers of *Solanum* berries enjoyed a higher mating success rate. However where bowers are artificially manipulated success rate does not increase and an increase of bower damage from marauding males is observed. This suggests that number of *Solanum* berries is a form of honest signalling to females of male quality. Only the strongest males can afford the high costs associated with displaying high numbers of *Solanum* berries.

## Decoration Preferences

Endler and Day (2006) have shown that ornaments are chosen which increase contrast of the bower against background patterning and plumage coloration and pattern. This does not appear obvious until one realises that birds have tetrachromatic vision whereas humans only have trichromatic vision. This means that birds can see in the ultra violet whereas humans cannot detect these wavelengths. In short, two objects that appear to be the same colour to humans could appear greatly different to a bird. Madden (2003) observed that *Eremophila* berries are frequently used to decorate spotted bowers but even though these berries appeared to human eyes to be similar in appearance to *Solanum* berries they were not a good indicator of mating success. It is possible that *Eremophila* and *Solanum* berries appear very different through the eyes of a bowerbird.

Different types of decorations have been shown to serve different functions and are positioned in different locations (Borgia 1995). For instance, sheep vertebrae that have been bleached by the sun are placed on the peripheries and these may act as a long distance signal to attract females. Other decorations placed on or within the bower may provide stimulation for the female once she has arrived at the bower.

Many studies have focused on preferences for decorations but few have investigated how these change over time. This was of particular interest because of the drought that Taunton National Park experienced in 2007. It was anticipated that the drought would have great influence upon the surrounding vegetation and of course on the availability of the green *Solanum* berry which is one of the most frequently chosen bower decorations. Madden (2003b) observed that numbers of these *Solanum* berries were one of the most reliable predictors of mating success. As a result of the drought would the role of *Solanum* berries be replaced by other bower decorations?

## Methods

Observations were carried out over four weeks in Taunton national park 250km west of Rockhampton, Queensland. We located 20 spotted bowers in the area to observe. Some of these were the subject of previous studies and some were new to observation. Individuals were easily identifiable by their leg rings which were fitted as part of previous studies. Observations of each bower took place over half a day and bowers were to be revisited every 10 days. Following this rota it was expected that each bower would be visited at least three times. However wet weather prevented access to the park. Some areas of the park and some bowers remained inaccessible for some time. During observations all ornaments which could be labelled were marked with bower number using a permanent marker. This included marking new ornaments and remarking any old ornaments where the labels have faded. These labels allowed us to identify any decorations which had been removed and displayed upon neighbouring bowers. This was recorded as a theft.

Also numbers of each type of decoration were counted, numbers of snail shells were estimated and each bower was assessed for quality. The quality assessment was a very subjective measurement but it was intended to give some indication of mating success since it is believed that mating success is related to bower quality.

Lastly, on the first visit to each bower, five green glass chips were placed approximately five metres from the bower. It was hoped that these novel decorations would be included in the bower and also demonstrate some of the interactions between bower owners in the form of thefts.

## **Results**

In all 20 bowers were observed, many of these were also observed in previous studies although 5 bowers, 41-45, were found in 2007 and therefore new to observations. The owner of bower 44 was identified as 2003 auxiliary to bower 21.

The 2007 data was compared to previous data. The number of decorations displayed on a bower was expressed as a proportion of the maximum number of decorations found on a bower that year. This took into account annual fluctuations in decoration availability and made the data comparable between years. Proportion of Total decorations was compared to the number of years as bower owner using the spearman rank correlation. The correlation was insignificant ( $R_s=0.15$ ,  $P_{0.05} = 0.207$ .)

Thefts were also observed. In all, 7 theft events were recorded 6 of which were of the green glass chips.

Table 1 showing a summary of the decorations found at each bower in 2007

Bower number	Min no. years as owner	Number of shells	no.	no.	Clear glass	Green glass	Other
			<i>Solanum</i> berries	<i>Eremophila</i> berries			
2	8	100	57	2	5	2	2
3	10	150	63	2	9	9	1
5	6	140	61	0	17	3	6
9	*	500	54	80	5	12	20
11	6	330	135	5	34	1	21
13	5	200	7	6	2	20	9
18	*	200	38	0	0	1	1
19	*	300	43	0	43	0	16
21	8	120	1	51	10	4	19
23	8	500	222	4	6	9	19
31	8	240	156	69	1	2	29
35	*	350	21	0	0	1	1
37	5	130	68	11	16	0	7
41	1	150	45	0	0	0	9
42	1	70	88	0	7	3	48
43	1	70	11	0	8	5	3
44	1	290	56	1	6	0	1
45	1	40	3	17	10	1	56

\*further observation required to positively identify current bower owner

## Discussion

Consistent with other studies (Madden 2003) *Solanum* berries were the most frequently used decoration within the bower (snail shells decorate the bower entrances). During my time there, the area did receive some rain with rapid growth in vegetation in response. The drought was broken sufficiently to enable vegetation to recover and hence *Solanum* berries became far more abundant than anticipated this season.

This year's data and previous data were used to investigate how decorations change over time. Proportion of total decoration does not seem to be correlated with number of years as bower owner. This may be taken to suggest that other factors, such as quality and positioning of decorations, are more important than quantity of decorations. However this may also be an artefact of the observational method. Our observations are only able to detect the minimum number of years that a bird has been owner and this may add inaccuracies into our results. For example, if a bower is new to our observations, we can only say for certain that the owner was owner for one year. In reality that bower may have been owned by the same owner for many years. As more data becomes available it would be interesting to investigate how the status of the bower owner and

number of years as the bower owner are related. As previously mentioned Madden (2003b) observed *Solanum* berries indicate mating success of the bower owner. If the status of the bower owner improved with age or experience I would expect to find that the number of berries displayed on the bower increased with each consecutive year.

Male bower birds are known to steal decorations from neighbouring bowers, even to destroy the bowers however this behaviour is rare in the spotted bowerbird in comparison to other species (Frith and Frith 2004). It was thought that a decrease in the available decorations as a result of the drought may have led to an increase in the number of thefts. However, as discussed previously, the drought was sufficiently broken to allow growth of *Solanum* amongst other vegetation. Although thefts were observed these were few (7 in all). Most of which were of the green glass chips. Unfortunately it was not possible to mark any green berries. If a feasible method were derived to do this it would be interesting to investigate the number of thefts of *Solanum* berries since these decorations are the most accurate indicator of mating success (Madden 2003).

It is clear that further study is required to resolve these and other questions. For example, using the current data I was unable to explore whether bower owners change their preferences for different types of decorations each year. It has been suggested that because bower decoration is a behavioural trait rather than a morphological trait, there is more opportunity for the male to change his traits in response to changing female preferences, past experiences and learning (Endler and Day 2006). As study on this population continues perhaps more light will be shed upon these issues.

I would like to thank the James Rennie Bequest for allowing me the opportunity to take part in this study. I would not have been able to take up this opportunity without the support of the James Rennie Bequest. The skills and knowledge I have acquired will be carried with me throughout the rest of my studies and will no doubt prove invaluable. I would also like to extend my thanks to Dr Sue Healy for providing a letter in support of my application to the James Rennie Bequest, Phil and Margy Dowe for their hospitality, and Laura Kelley for the opportunity to assist with her research.

## References

- Borgia G. (1995) Complex male display and female choice in the spotted bowerbird: specialized functions for different bower decorations. *Animal Behaviour* **49**, 1291-1391.
- Endler J., Day L., (2006) Ornament colour selection, visual contrast and the shape of colour preference functions in the great bowerbirds *Chlamydera nuchalis*. *Animal Behaviour* **72**, 1405-1416
- Frith C., Frith D., *The Bowerbirds* (2004) Oxford University Press
- Madden J. (2002) Bower decorations attract females but provoke other male spotted bowerbirds: bower owners resolve this trade off. *Proceedings of the Royal Society of London B* **269**, 1347-1351
- Madden J. (2003) Male spotted bowerbirds preferentially choose, arrange and proffer objects that are good predictors of mating success. *Behavioural ecology and Sociobiology*. **53**, 263-268
- Madden J. (2003b) Bower decorations are good predictors of mating success in the spotted bowerbird. *Behavioural Ecology and socio-biology* **53**, 269-277
- Madden J., Lowe T., Fuller H., Dasmahapatra K., Coe R. (2004) Local traditions of bower decoration by spotted bowerbirds in a single population. *Animal Behaviour* **68**, 759-765
- Madden J., Tanner K., (2003) Preferences for coloured bower decorations can be explained in a nonsexual context. *Animal Behaviour* **65**, 1077-1083
- Wojcieszek J., Nicholls J., Marshall J., Goldisen A., (2006) Theft of bower decorations among male satin bowerbirds (*Ptilonorhynchus violaceus*): why are some decorations more popular than others? *Emu* **106**, 175-180