

JAMES RENNIE BEQUEST

REPORT ON EXPEDITION/PROJECT/CONFERENCE

Expedition/Project/Conference Title: How is mimicry in spotted bowerbirds related to other aspects of an individual's biology?

Travel Dates: 15th Sep- 16th November 2007

Location: Taunton National Park (Scientific) in Central Queensland, Australia

Group Member(s): Kirsten Wyness, Laura Kelley.....

Aims:

OUTCOME (not less than 300 words):-

Summary

Spotted bowerbirds (*Chlamydera maculata*) are a polygynous species within the Ptilonorhynchidae family, found in Central Queensland, Australia. Males have complex behaviours including the construction of elaborate bowers in which they display to females and mate. This species has been observed to use heterospecific mimicry in a variety of contexts, although the function of this behaviour remains unclear. During my project I observed spotted bowerbirds at their bowers, recorded their vocals, behaviour, and the quality and number of their decorations. My aim was to investigate whether there was a correlation between mimetic ability and other known indicators of mating success such as bower quality. The data collection and analysis regarding mimetic quality and function is currently ongoing and will continue in the next field season by Laura Kelley PhD student (data not shown). I collated information from 2 previous field studies on the same population of spotted bowerbirds, along with my own data to investigate a possible relationship between male age, bower ownership and bower decoration. I found that the total number of decorations per bower is highly variable over time. This could be because of annual changes in the availability of suitable decorations. We cannot determine from this data if there is an increase or decrease in valuable vs less valuable decorations compared to the total decoration count. This information would be useful to analyse a possible correlation with bower owner age and male fitness in the *Chlamydera maculata* species. Further fieldwork is needed to address these points.

Introduction

Taunton National Park (Scientific) in Central Queensland supports a large population of spotted bowerbirds (*Chlamydera maculata*). The males of this polygynous species build and maintain complex structures called bowers made of grass and twigs under low-lying vegetation such as Brigalow bushes (*Acacia harpophylla*) and *Carissa lanceolata*. The bowers consist of an avenue approximately 25cm tall and 50cm long, and are mainly decorated with white and green objects such as snail shells and *Solanum* berries (Fig.1). However, manmade objects such as glass, plastic and metal are often observed in bowers. The purpose of the bowers is for courtship. A female enters the avenue and the male commences a vigorous display involving species-specific vocalisations, posturing, and presenting the female with decorations. The number and type of decorations used by an individual bowerbird is a good predictor of mating success (Madden 2003). Females preferentially mate with males who construct larger, better quality and more highly decorated bowers (Madden 2003).

There are currently 24 active bowers under observation in the park, spaced approximately 1km apart. This number has been increasing over the past 9 years with the discovery and GPS mapping of more bowers. Male and female bowerbirds are sexually monomorphic, both are approximately 30cm long and weigh around 150grams. They are mottled brown with a pink nuchal crest, which is erected during alarm or excitement. Therefore, in order to identify individuals, birds are trapped and coloured rings attached to their legs. This enables a more accurate characterisation of their behaviour and description of interspecific and intraspecific interactions.



Fig.1. Decorated bower of a male spotted bowerbird in Taunton National Park (Scientific).

Chlamydera maculata, like other species in the Ptilonorhynchidae use vocal mimicry of other avian species ('models') and environmental noises for intraspecific and/or interspecific communication. Female satin bowerbirds (*Ptilonorhynchus violaceus*) judge the quality of a male's mimetic ability in order to choose a mate (Coleman, Patricelli et al. 2007). Older males of the satin bowerbird were shown to sing longer and higher quality bouts of mimicry than younger males, and their courtship song features were correlated with male mating success (Loffredo and Borgia 1986). However, spotted bowerbirds do not mimic during courtship displays and the function of mimicry in this species remains unclear. There has yet to be conclusive evidence for mimicry having an anti-predator or anti-competitor role, but the quality of mimicry may be correlated to the other known indicators of mating success such as bower maintenance and decoration.

Initially I wanted to investigate the relationship between male age, bower quality and mimetic ability. However, several factors arose during the fieldwork which limited the range of data that is available. One of the 2 DAT-recorders which were used to record the vocalisations of males at their bowers malfunctioned early in the fieldwork season and this greatly delayed the accumulation of mimicry data which could be used for analysis. Sound recordings and their coinciding observation data will be ongoing in the next field season to complete this aspect of the investigation. The mechanism by which male bowerbirds learn to mimic is not known, and this is another area of research which would be useful to characterise how mimetic ability changes with male age.

Aims

- To obtain bower owner and bower measurement data from 2 previous studies on the spotted bowerbirds in Taunton National Park (Scientific) spanning from 1998 to 2003.

- To obtain my own data through observations and measurements made in the same field site during October/November 2007.
- To collate and present these data to show how variables such as (1) the age of a male bowerbird, (2) the number of years he has owned and maintained a bower, (3) the quality of the bower and (4) the total number and type of decorations in the bower, may or may not be related to each other.
- To use the results to comment on how these variables interact to affect male fitness in the *Chlamydera maculata* species.

There were several factors which influenced my success in completing the aims of the project:

- Not all the birds in population are banded and spotted bowerbirds are sexually monomorphic. Therefore, the accurate interpretation of intraspecific behaviour during observations was sometimes difficult.
- Mimicry was very difficult to record and analyse due to problems experienced with DAT recording equipment in the field.
- The exact age of the birds included in this study cannot be determined, so the number of years as bower owner was used as an indicator of male age. This method is biased however, towards those birds that were banded during the first field season in 1998.
- Collating data from previous investigations was difficult due to slight differences in experimental design and the variation in data presentation within the spreadsheets.
- The level of detail about the type of decorations at each bower varied significantly between previous investigations, which prevented the comparison of more specific decoration data over time.

Methodology

I obtained excel spreadsheets from 2 previous studies on the *Chlamydera maculata* population in Taunton belonging to Joah Madden and Rebecca Coe, detailing measurements of bowers and records of bower owners from the years 1998 to 2003. I located the same bowers in the field using GPS positioning, and included new bowers that were discovered during subsequent fieldwork. I recorded the coloured bands, the behaviour, and the vocalisations of the active owner of the bower during two separate 6hr observations at each bower. I scored bower quality by measuring the number and type of bower decorations, thickness and height of the bower walls and how symmetrical the walls were.

Results

Figure 2 shows that the total number of decorations varies greatly both between bowers and in a single bower over time. A particular male may collect fewer or more decorations than previous years.

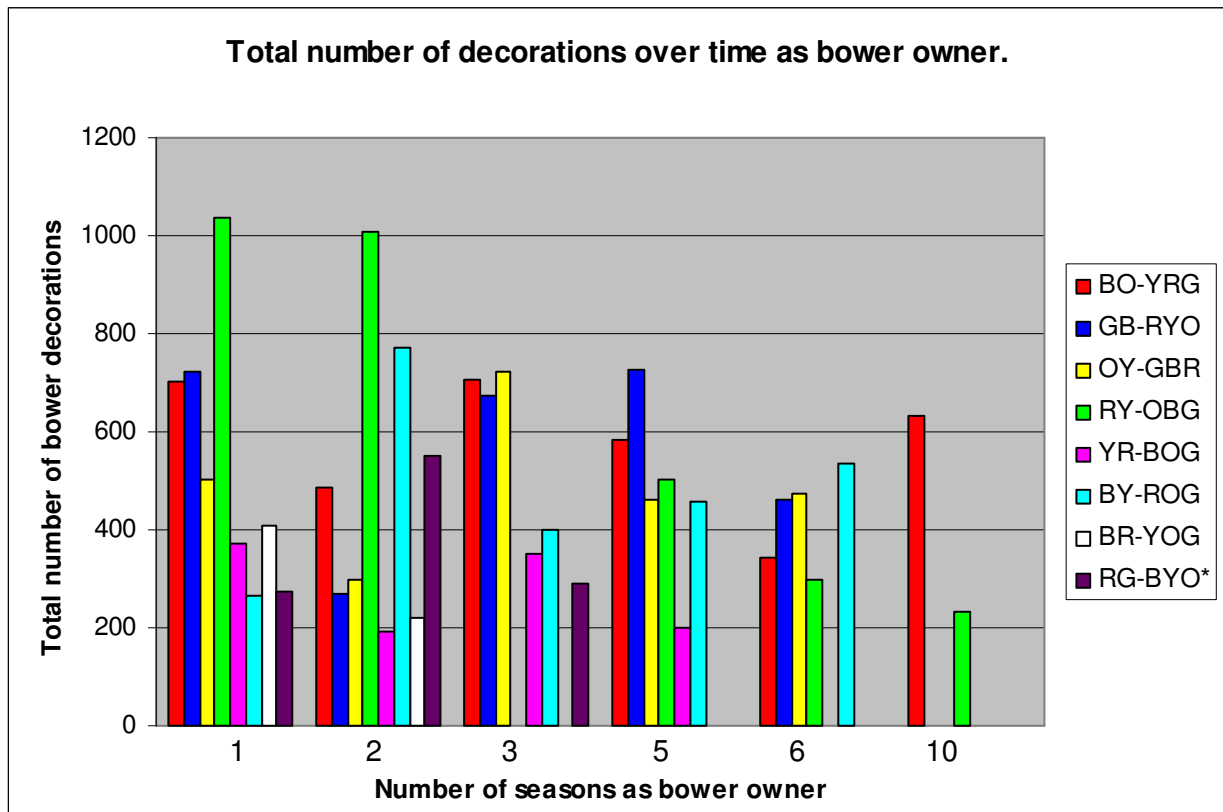


Fig.2. The relationship between the total number of decorations at a selection of bowers, and the number of years that a particular male has maintained that bower. 5-letter codes represent the coloured leg bands used to identify individuals.

Discussion

Previous studies on spotted bowerbirds have demonstrated that older males build and maintain higher quality bowers during the mating season. However, as shown in Figure 2, the total number of decorations per bower is highly variable over time. This could be because of changes in the availability of suitable decorations from year to year. We cannot determine from this data if there is an increase or decrease in specific high quality decorations compared to the total decoration count. This information would be useful to analyse a possible correlation with bower owner age and male fitness in the *Chlamydera maculata* species.

It is not known whether mimetic ability is related to male age; if so I would expect older males to have a larger repertoire of mimicry or mimic more accurately than younger males. Any increase in the quantity or quality of mimicry may be a signal directed at females, as in the satin bowerbird (Loffredo and Borgia 1986), or it may serve an intraspecific non-sexual function, where males with higher quality mimicry are better able to defend their bowers from other marauding males. There may also be a substantial difference in mimetic ability between bower owning male bowerbirds and younger non-bower owning males (auxillaries). Time

constraints of my project restricted the investigation of these hypotheses, but the ongoing research in Taunton carried out by Laura Kelley will address these questions. Relationships between mimetic ability and indicators of male success such as age, bower quality and status will be investigated.

Acknowledgments

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References

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