



BIPARENTAL CARE OF CHINSTRAP PENGUIN: MOLECULAR SEXING AND LIFE HISTORY IN THE SOUTH SHETLAND ISLANDS, ANTARCTICA



Jaqueline Brummelhaus, Victor Hugo Valiati, Maria Virginia Petry

Pós Graduação em Biologia, Laboratório de Ornitologia e Animais Marinhos, Laboratório de Biologia Molecular, Universidade do Vale do Rio dos Sinos, São Leopoldo, RS, Brazil



Figure 1: *Pygoscelis antarctica*

Introduction

Pygoscelis antarctica (Figure 1) breeds during the austral summer (Figure 2) in colonies on ice-free areas of coast (sub-Antarctic islands and Antarctic Peninsula). Is a monogamous species and fairly equal parental investment is made by both members of the pair^{1, 2, 3}.

We investigated tertiary sex ratio (adult stage) in breeding colonies during guard and creche stages of *P. antarctica* in King George and Elephant Islands in the 2010/2011 breeding season, by molecular sexing. Our goal was to gain a better insight into behavioral parameters of breeding success for the species.

Methods

Chinstrap penguin adults were sampled while away from their nests at Admiralty Bay (King George Island) (62°05'S; 58°23'W) and Stinker Point (Elephant Island) (61°08'S; 55°07'W), South Shetland Islands, Antarctic, in the 2010/2011 breeding season (Table I).

Genomic DNA was isolated from blood samples through standard phenol/chloroform technique and sex identification is determined by chromosomes Z and W (CHD-Z or CHD-W genes)⁴. For molecular sexing, the CHD gene region was amplified by polymerase chain reaction (PCR) using P2/P8 primers⁵ and analyzed by electrophoresis in 10% polyacrylamide gel and bands were visualized by ethidium bromide staining. Sex ratio was calculated for each date and breeding colony. The predicted hypothesis of existence of a balanced male/female sex ratio on different dates and separate breeding colonies was tested through chi-square (χ^2) analysis by Systat 13 software.

Results

We analyzed 52 samples (31 males and 21 females). The PCR amplification showed a single band of about 375 base pairs (pb) for males, while females showed two bands of about 375 and 390 pb. For guard and creche stages, sex ratio did not differ significantly from the expected ratio of males to females 1:1 (Table I).

Table I: Sample sites and sex ratio of *Pygoscelis antarctica* in different stages of breeding season, South Shetlands, Antarctica.

Island	Local collection	Colony	Day	Stage	Female	Male	Sex ratio	χ^2
King George	Admiralty Bay	Chabrier Rock	December 30, 2010	Guard	11	10	0.52	$\chi^2 = 0.05, p > 0.05$
		Uchakta Point	February 7, 2011	Creche	2	8	0.80	$\chi^2 = 3.60 p > 0.05$
Elephant	Stinker Point	Stinker Point	December 29, 2010	Guard	4	6	0.60	$\chi^2 = 0.40 p > 0.05$
			January 23, 2011		5	6	0.54	$\chi^2 = 0.09 p > 0.05$

Figura 3: *Pygoscelis antarctica* - Guard stage.

Discussion

Sex ratios did not deviate from the expected ratio of 1:1. Its confirms biparental care of offspring during guard stage (Figures 3 and 4), when adults alternate turns between foraging and chick care every ½ day to 1 day^{1, 2, 3}. During the creche stage, the sex ratio difference observed was larger, but not significant. This implies that at least one pair member spends more time in the colony, which explains the greater variation of sex ratio of adults sampled in our study in February 2011.

Quality of biparental care is essential for reproductive success, because successful rearing of offspring is subject to many factors (parents inexperience, prey availability, predation, thermal protection)^{1,2}. With molecular techniques was possible to examine possible relationships between adult sex ratios with the specie's life history and improve understanding of importance of contributions of both sexes in raising their offspring to achieve reproductive success.



Figura 4: *Pygoscelis antarctica* - Guard stage.



Figure 2: *Pygoscelis antarctica* breeding season in Antarctica^{1,2}.

References

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