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The Behavioural Ecology of Forced Copulation in the New Zealand Stitchbird (Hihi)

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“The breed is guileless and innocent of wile in a peculiar degree; the instinct of deception even in a good cause seems not to enter into their scheme of things... They are careless, too, of stranger birds who may happen to have wandered near the family abode... In October and early November, whilst still engaged in the search for nests, it was disheartening work, after believing we had tracked a male to his lair, to find two males engaged in parley – long, low, chattering, very friendly palavers. It seemed then so improbable that one male would tolerate the presence of another close to his breeding quarters... I have reason to believe, however, that although thus friendly, care is taken not to intrude on one another’s domains.”

H. Guthrie-Smith (1925) describing
the behaviour of the stitchbird in his
book *Bird Life on Island and Shore*



The stitchbird female (left) showing her distinctive white wing-bar and the male (right) displaying the characteristic ‘cocked’ tail position

‘Stitchbird’ is this species’ pakeha name, thus it is also known by the following Maori names:

hihi*, tihi, ihi, tihe, kotihe, tiora, tiheora, tioro, kotihe-wera (male only), hihi-paka (male only), hihi-matakiore (female only), mata-kiore (female only), tihe-kiore (female only)

* This is the most commonly used Maori name today

Abstract

Although many vertebrate species form stable breeding partnerships, extra-pair copulations are often common in these species, potentially leading to intersexual conflict. Forced copulation or rape is an extreme manifestation of this conflict, occurring when a female is forced to copulate with a male despite her resistance. In this thesis, I report research addressing several questions about forced copulation in stitchbirds (*Notiomystis cincta*), a species with frequent forced copulation attempts. I conducted this research over three years on Tiritiri Matangi Island, off New Zealand's northeast coast. Forced copulation was used opportunistically by all males in the population, and male age and morphometrics did not predict forced copulation success or the likelihood of female consent. A newly proposed hypothesis to explain the function of forced copulation in birds, the 'creation of a dangerous environment' hypothesis, was not supported empirically and in its current form appears to be theoretically unworkable. Male stitchbirds seem able to bypass female choice through adopting a face-to-face forced copulation position. This is effective because their cloacae become engorged with sperm, and act similarly to a penile erection to allow cloacal contact when copulating in this species' unique face-to-face position. Forced copulation attempts occurred mainly during females' fertile periods immediately before egg laying, and this was strongly correlated with an increase in female weight, suggesting that males use the weight of the female to judge her fertility status. Resident males also adjusted their behaviour at this time, switching from a territorial site-specific defence to a mate-guarding tactic localising on the position of the female. While costs associated with forced copulation have been previously documented for females, I show that the resident male also suffers a cost as measured by a 5% loss of bodyweight as a result of extra-pair male territorial intrusions on top of a 2.5% weight loss as a result of mate guarding. The resident male's uncertainty of paternity resulting from extra-pair forced copulation had little effect on provisioning by paired males. The key factors affecting male provisioning were brood size (males did not provision one-chick broods) and whether the male was monogamous or polygynous (males only fed the brood of their primary female). Cross-species comparisons can be useful in understanding the function of forced copulation if carefully undertaken, with previous criticism of this approach based on numerous misunderstandings.

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Note on text:

Each chapter is set out in the style of the journal to which it has been submitted.

Consequently there is some repetition, particularly in the Methods sections and there are minor stylistic differences between chapters. For the two submitted chapters that include other authors (Chapters 3 and 6), while my input was the greatest, I received assistance from my co-authors. I designed the research, undertook or coordinated the field work, analysed the data and wrote the manuscripts.