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Sexual Cannibalism in the Damselfly Species Ischnura graellsii (Odonata: Coenagrionidae)

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Two records of ♀♀ of *Ischnura* damselflies devouring mature conspecific ♂♂ have been so far reported. In *Ischnura graellsii* (Rambur 1842), 6 observations of ♀♀ devouring mature conspecific ♂♂ were made in natural populations. Furthermore, in the laboratory, ♀♀ devoured both mature and young conspecifics ♂♂ only preyed upon young individuals. All these observations suggest that mature ♀♀ (but not ♂♂) lack the appropriate response to threat display of conspecifics. This fact could explain the occurrence of sexual cannibalism.

Key words: Sexual cannibalism — predation — Odonata: Zygoptera — *Ischnura graellsii.*

1 Introduction

Cannibalism is a behavioural trait found in a wide variety of animals, and is a normal fenomenon in many natural populations [Fox 1975]. Cannibalism occurs in larval Odonata [Johnson 1991], but it seemed rather anecdotical in adults. Nevertheless, there is an increasing number of observations on ♀♀ of *Ischnura* sp devouring conspecific ♂♂ [Müller 1972, Martens 1978, Utzeri 1980, Robertson 1985, Fincke 1987, Dunkle 1990: 62, 67].

Sexual cannibalism occurs in some predatory Arthropoda, and usually is the ♀ who eats the ♂, the behaviour being explained in terms of the benefit in reproductive success for the cannibal [Birkhead et al 1988, Elgar & Nash 1988]. Utzeri [1990] reviews cases of cannibalism in adult damselflies. Most cases involve young and teneral preys, but at least one case exists of a mature ♀ of *Ischnura elegans* (Vander Linden 1820) devouring a conspecific mature ♂. Robertson [1985] reported a similar observation for *Ischnura ramburi* (Selys 1850). Unreceptive mature Zygoptera ♀♀ refuse mating by means of a threat display (movement of alae and abdomen), and a similar threat display is performed by ♂♂ if approached by other damselfly, with the function of preventing physical contact [Utzeri 1988]. Utzeri [1980] noted that no case is known of a mature ♂ preying upon a conspecific mature ♀♀. He hypothesized that cannibalism in the Zygoptera might be considered as an aspect of ordinary predation in which the prey is not recognized as conspecific, since it is either unable to perform a proper threat display (the case of young specimens), or the predator lacks the adaptation to respond to the display (the case of mature ♀♀). Since his hypothesis, mature ♀♀ would prey upon animals of any sex and age, but mature ♂♂ would prey only upon young specimens.

The aim of this paper is to test the ability of this hypothesis to explain the occurrence of sexual cannibalism in the damselfly *Ischnura graellsii* (Rambur 1842).

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2 Methods

During recent years I have observed the reproductive behaviour of adult *Ischnura graellsii*, a small non-territorial damselfly, in different field populations of Galicia (NW Spain) in more than 500 h of observation [Cordero 1987, 1989, 1990 and unpublished]. I report here all records of cannibalism observed during this field work. Additional data on cannibalism were obtained in the laboratory, maintaining adults in insectaries, as described in Cordero [1990].

3 Results and Discussion

Tab 1 presents the occurrence of cannibalism in the field. These observations are in total agreement with Utzeri's hypothesis: ♀♀ were observed 6× devouring mature conspecific ♂♂, but the opposite was never observed. Furthermore, ♀♀ preyed also more than ♂♂ on adults of other Coenagrionidae species. Robinson [1983] noted that cannibalism in *Ischnura posita* (Hagen 1861) occurred at maximum population density, the preys being allways tenerals, and Martens [1978] stated that cannibalism in *I. elegans* occurred at high population density. Nevertheless, the majority of my observations were made at a low density population, were food shortage is unlikely. This suggests that crowding was not the cause of cannibalism.

Tab 1: Records of cannibalism and predation in adults of *Ischnura graellsii* (Rambur 1842) [Odonata: Coenagrionidae]. With the exception of cases in brackets, all records were made during 286 h of observation in a low-density population at O Rosal [Pontevedra, Spain].

Predator	Prey	No of records
mature ♀	mature conspecific ♂	4 + (2)
	other mature male coenagrionidae	10
	other mature female coenagrionidae	1
	other young and teneral coenagrionidae	7
mature ♂	young conspecific ♂♂	1
	young conspecific ♀♀	(1)
	other teneral coenagrionidae	1

Note: other species preyed by *I. graellsii* are *Enallagma cyathigerum* (Charpentier 1840), *Cercion lindeni* (Selys 1848) and *Erythromma viridulum* (Charpentier 1840).

	Prey	
Predator	young (< 6 days)	mature
♀	20	19
♂	14	0

$X^2 = 10.63$, $p = 0.0011$

Tab 2: Incidence of cannibalism in adults of *Ischnura graellsii* (Rambur 1842) [Odonata: Coenagrionidae] in the laboratory. Since sexes were maintained in separate insectaries, preys were the same sex as predators.

Furthermore, in agreement with Utzeri's hypothesis, cannibalism occurred many more times among ♀ than ♂ in the laboratory, and ♂ never devoured mature individuals (Tab 2; both sexes were maintained in separate insectaries). Unfortunately, the behaviour of cannibal ♀ was not observed while capturing the ♂ Robertson [1985] reported a case where an unreceptive

♀ repeatedly harrassed and grasped by a ♂, finally devoured him during copula. Two of the ♀♀ observed devouring a ♂, accepted simultaneously a copulation with another ♂ (Fig 1), which suggests that they were receptive.

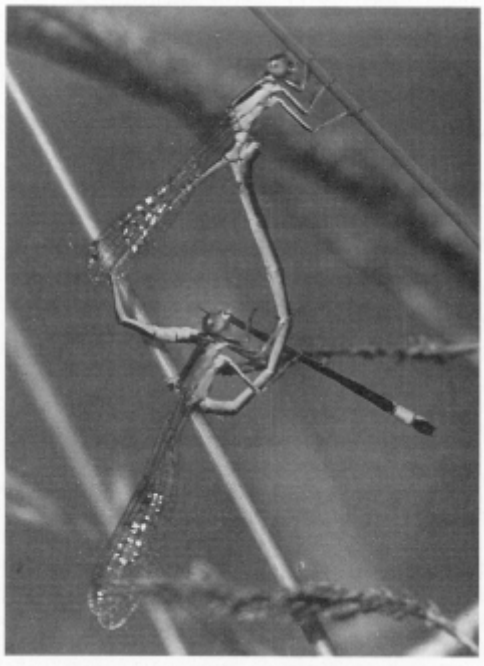

Fig 1: A very stange case of sexual cannibalism in adults of *Ischnura graellsii* (Rambur 1842) [Odonata: Coenagrionidae]. A ♀ devouring the abdomen of a mature ♂ and simultaneously copulating with another ♂.

Taking into account these results it is likely that Utzeri's [1980] hypothesis explains the occurrence of sexual cannibalism in mature Zygoptera: ♀♀ eat ♂♂ because they lack the proper response to male threat display. The greater reproductive success of these ♀♀ may be a by-product of this lack of intraspecific recognition.

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