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RESEARCH ARTICLE

Interspecific Relation in *Anax Immaculifrons* with Frog

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ABSTRACT

Some Anax immaculifrons larvae (Odonata: Aeshnidae) where found catching and eating small, living frogs, Rana perezi. The pond was surveyed on 16th September 2006 searching for adult odonates. At 10:15 hours (solar time), we heard the characteristics sound that frogs emit when they are eaten. Looking for the origin of that sound we found a small adult frog, Rana perezi, carrying out strange movements to escape from something that had caught it from underwater. After taking the frog out of the water we discovered that it was an Anax immaculifrons male larva, larger than the frog. The larva had severed the right hind tarsus of the frog and had also removed the flesh from the left hind femur. By damaging and severing the hind legs, the dragonfly larva prevented the frog from escaping, and thus could continue eating the frog alive.

Key words: *Anax immaculifrons, Rana perezi, Odonata*

INTRODUCTION

All Odonata larvae are predators, feeding on aquatic animals of slightly larger, similar or smaller size than themselves. Their prey can be protozoans, flatworms, oligochaetes, leeches, molluscs, crustaceans, insects (larvae and adults) or vertebrates (small fishes, tadpoles). Thus, virtually al taxa of freshwater invertebrates, as well as fish and amphibians, serve as prey of Odonata larvae (Corbet, 1999).

In most cases of trophic relationships between amphibians and dragonflies, tadpoles are eaten by dragonly larvae or adult amphibians eat dragonflies. Nevertheless, adult dragonflies eating small frogs (Corbet, 1999), and dragonly larvae eating amphibian eggs (ORIZAOLA & Brana, 2003) or even adult frogs (Torralba Burrial & Ortega Martinez, 1998) have also been observed. While the tadpole-dragonfly larvae relationship has been studied, showing changes in behaviour, growth rate, shape and colour of the tadpoles (Mc Collum & Leimberger, 1997; Van Buskirk & Relyea, 1998; Anholt & Werner, 1998), studies on the other amphibian-odonate relationships mentioned above are scarce. Observations carried out in the field are described to clarify the importance of these trophic relationships.

STUDY AREA AND SPECIES

Observatons were taken at a pond in Agra. It is a man-made, naturalized and semipermanent (it dries up some years) pond. It is fish-free and is used to water sheep. The water surface is sunny and the aquatic vegetation is composed mainly of *Typha* sp., *Potamogeton* sp. and several *Juncus* spp. individuals.

Anax immaculifrons Leach is a large species, characteristics of stagnant water bodies and slow streams. It is widely distributed in North India. It is a very frequent species in the India. Although large populations are not seen, partly due to the extreme territoriality of the adult males and their powerful flight, which make population size estimations difficult. Last stadium larvae reach body

sizes between 49 and 57mm (Heidemann & Seidenbusch, 2002) and complete their life cycle in one or two years, depending on the region (Askew, 1988).

RESULTS

The pond was surveyed on 16th September 2006 searching for adult odonates. At 10:15 hours (solar time), we heard the characteristics sound that frogs emit when they are eaten. Looking for the origin of that sound we found a small adult frog, *Rana perezi,* carrying out strange movements to escape from something that had caught it from underwater. After taking the frog out of the water we discovered that it was an *Anax immaculifrons* male larva, larger than the frog. The larva had severed the right hind tarsus of the frog and had also removed the flesh from the left hind femur (Fig.1). By damaging and severing the hind legs, the dragonfly larva prevented the frog from escaping, and thus could continue eating the frog alive.

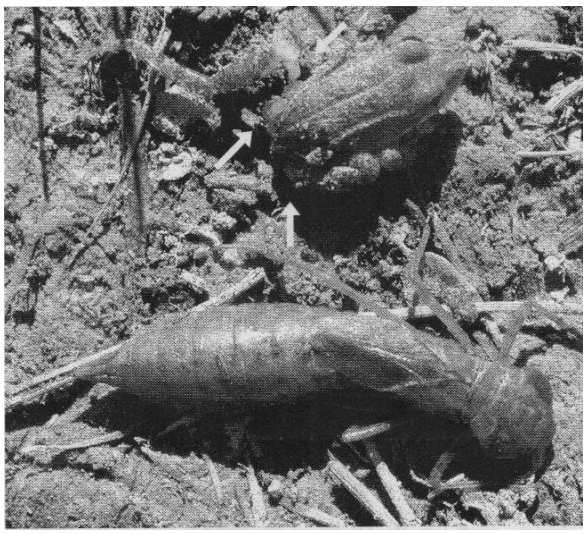

Fig.1: *A. immaculifrons* male larva and its pre, *R. perezi*. The forg's hind legs have been mutilated by the dragonfly larvae. Note the relative size differences between dragonfly larva and frog

Fig. 2: *Rana perezi* caught by its right hind leg.

After a detailed survey of the pond edge we found similar situations with other two *R. perezi* individuals of similar sizes to the injured one. Dragonfly larvae stayed amid vegetation and vegetable remains, and they caught frogs that are above the water surface by their hind legs (Fig.2).

DISCUSSION

Anax immaculifrons larvae exhibit great plasticity in the way they integrate diverse information before adopting a particular predatory sequence. Prey capture in this species is optimized in two ways; by choosing (energetically) profitable prey types, and by then adopting capture behavior appropriate to that prey type (Corbet, 1999). In our case, larvae were found attacking and consuming prey with high energy value, but also with a high handling time. This behaviour has not habitually been observed but it may not be strange. Torralba Burrial & Ortega Martinez (1998) reported that an Anax immaculifrons larva held by its hind leg a *R. perezi* frog larger than it. We now confirm that this was not an isolated occurrence, but rather that frogs could be habitual prey of the last stadium of large dragonfly larvae. This behaviour (catching relatively large prey, with high energy value and high handling time) is not exclusive to Aeshnidae; occasionally it has been seen in other large dragonfly larvae [i.e., larvae of the gomphid *megalogomphus sommeri* have been reported eating fishes larger than themselves (Wilson, 1995).

Observations of frogs with amputations of their fore or hind extremities are not uncommon. These amputations are usually attributed to birds, fish or crabs. Nevertheless, it is just possible that some of these amputations are the product of encounters between amphibians and some dragonfly larvae.

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