THE FEEDING BEHAVIOUR OF A SIT-AND-WAIT PREDATOR, RANATRA DISPAR, (HETEROPTERA: NEPIDAE): DESCRIPTION OF BEHAVIOURAL COMPONENTS OF PREY CAPTURE, AND THE EFFECT OF FOOD DEPRIVATION ON PREDATOR AROUSAL AND CAPTURE DYNAMICS¹)

by

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(With 10 Figures)
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Introduction

A vast array of methods have evolved to exploit available sources of food. Predation is one such method enabling the animal to maintain a steady body state, grow and reproduce. Predators evolve more efficient modes of prey capture, and prey species counter with defensive adaptations—the so called co-evolutionary ‘arms race’ of DAWKINS & KREBS (1979). Examination and identification of mechanisms of prey capture are fundamental to an understanding of predator-prey complexes for once identified they may be assimilated into ecological models which will almost certainly gain realism, precision and perhaps generality (CURIO, 1976). At present the extent of our knowledge on predatory behaviour is heavily biased towards those predators that actively search and/or pursue their

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prey. (For reviews see Curio, 1976; Whitfield, 1978; Chinery, 1979; Owen, 1980; Peckarsky, 1982).

Relatively few workers have examined the components of prey capture by sit-and-wait predators (e.g. Mittelstaedt, 1957; Roeder, 1958; Holling, 1966; Eberhard, 1967; Robinson, 1975; Lubin, 1980). This is unfortunate as these predators constitute an extremely important component in virtually all ecosystems (Bailey, 1984). In addition, because pursuit searching components of predation are minimal in such predators, it is the act of prey capture itself which has been acted upon intensely by selection processes and which, accordingly, can be studied in many aspects in these species.

Some aspects of the prey-capturing behaviour of the large, aquatic, bug, Ranatra linearis (Heteroptera: Nepidae) a common European species, have been studied by Cloarec (1971, 1974, 1976), who showed a correlation between foreleg posture, position and amount of food in the alimentary canal and responsiveness to an 'alimentary stimulus'. Cloarec (1976) also showed an interaction between vision and mechanoreception in prey capture and that the high correct estimation of prey distance could be characterized by two components: reactivity and strike efficiency (Cloarec, 1979, 1980). Earlier work showed that R. linearis responded to a model prey moving in an irregular fashion vertically downwards and that the space for successful capture lies above and in front of (Cloarec, 1969). Ranatra dispar Montandon is commonly found in farm dams or ponds in the hills surrounding Adelaide, South Australia. It preys on a wide variety of aquatic organisms ranging from Daphnia spp. and ostracods, through various insect groups to tadpoles and small fish (Bailey, 1984).

The aim of this study was to describe and classify the behavioural components of prey capture and feeding behavior by R. dispar, to map its arousal and capture spaces and examine the effect of food deprivation.

I. Capture and feeding behaviour

Materials and methods.

Adult R. dispar were collected from local farm dams or ponds and maintained in large plastic tanks (60 x 36 x 52 cm deep) filled to a depth of 50 cm with aged, dechlorinated tap water. Each tank had many stems of Phragmites sp. suspended from the side walls onto which the Ranatra settled. Prey were adult Anisops deanei (Heteroptera; Notonectidae), a common natural prey of R. dispar (unpublished data), collected from the same locations as R. dispar. Both groups of animals were provided with prey ad libitum, consisting of small notonectids, corixids, and mosquito larvae.

For the experiments, individual R. dispar were placed in either a plastic tank (25 cm diameter x 20 cm deep) or a large glass aquarium (30 x 35 x 20 cm) for observation (Fig.