

Observations on the feeding habits of larvae, juvenile and adult stages of the African clawed frog, *Xenopus laevis*, in impoundments in Transkei

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Abstract

The feeding habits of tadpoles, juvenile and adult stages of the African clawed frog or platanna, *Xenopus laevis* (Daudin) in small impoundments in Transkei were investigated. An analysis of the stomach contents of developmental stages of the larvae showed that the initial diet is mainly phytophagous, consisting predominantly of unicellular algae and diatoms. A change in the diet of the larvae coincides with the transformation of the tadpole during the climax stage of metamorphosis when its head-shape assumes that of a juvenile frog. At this stage food of animal origin begins to appear in its diet.

The stomach contents of the frogs analysed showed that they feed mainly on benthic macro-invertebrate fauna which occur in or on the substrate of the impoundments as well as amongst the submerged and marginal vegetation. The results also confirmed that *X. laevis* can be cannibalistic, taking its own eggs and larvae as food.

Introduction

In recent years much progress has been made in South Africa towards the large-scale spawning and larval rearing of a number of warm-water fish species intended for use in aquaculture (Schoonbee et al., 1978; 1980; Brandt and Schoonbee, 1980; Hecht, 1981, 1982; Hecht and Viljoen, 1982; Hecht et al., 1982; Prinsloo and Schoonbee, 1986; Schoonbee and Prinsloo, 1984; Uys and Hecht, 1985; Polling et al., 1987; 1988). In most cases the necessary steps are usually taken to eradicate parasites and diseases from spawners and juvenile fish (Schoonbee et al., 1978; Brandt et al., 1981; Polling et al., 1987). However, when it comes to the nursing of juvenile fish in outside ponds at hatcheries, substantial losses may occur due to predation by the clawed frog, or platanna, *Xenopus laevis* (Daudin) (Hey, 1945; Jubb, 1980; Prinsloo et al., 1981; Schramm, 1987). Schoonbee et al. (1979) also found that the nektonic larval stages of *X. laevis* may compete for food with fish such as the Chinese grass carp, *Hypophthalmichthys molitrix* (Val.), affecting its growth in fish ponds (Nxiweni, 1982; Schramm, 1987). This information indicates that this frog, which commonly occurs in rivers and impoundments throughout Southern Africa (MacNae et al., 1973; Passmore and Carruthers, 1979), may pose a serious threat to warm-water pond fish culture in the areas where it occurs naturally.

Although research workers like McCoid and Fritts (1980a, b) have described the diet of a feral population of *X. laevis* in Californian waters, where it has been present since 1968 (Fritts and McCoid, 1976; Zacuto, 1975), little work has been done on the feeding ecology of the various developmental stages of this frog in Southern Africa where it naturally occurs (Hey, 1945; Jubb, 1980). It was therefore decided to investigate the dietary habits of *X. laevis* and that of its larvae in five small cattle watering ponds near Umtata, Transkei where this frog is usually found in large numbers. The ponds investigated were all less than

0,5 ha in size and on average less than 1 m deep. Fringing vegetation largely consisted of grass and other terrestrial plants bordering the impoundments. The impoundments investigated contained no fish life.

The investigation which was done on a monthly basis over a period of six months, commenced in March 1981 (autumn) when water temperatures were still comparatively high, continued throughout winter when the feeding intensity was expected to be at its lowest, and was terminated in September 1981 (spring) when water temperatures were on the increase and when the feeding intensity of the platanna was expected to have already taken place. Owing to severe drought conditions which prevailed at that time, three of the five ponds used in the investigation dried out, while the shallow water in the other ponds became so turbid because of cattle watering activities, that the investigation had to be prematurely terminated before a summer survey could also be undertaken. Sufficient data were, however, obtained to merit the publication of the findings of this study.

Materials and methods

Physical and chemical conditions of the impoundments investigated

A Hach model Dr-EL/2, single-beam spectrophotometer, designed to provide direct read-outs of the values of the various chemical substances, was used for the analysis of nitrate, ammonia, orthophosphate, total alkalinity, calcium hardness and total hardness. Analysis of the water was done according to *Standard Methods* (1980).

Collection and analysis of the benthic macroinvertebrate and marginal vegetation fauna of the ponds

In order to determine the frogs' food preferences, it was necessary to compare these data with information on the availability of organisms in the ponds. One set of macro-invertebrate fauna, sampled from the bottom sediments, as well as marginal vegetation during spring, was collected during the same period when frogs and tadpoles were sampled for analysis.

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