Subsection Zoology

Further Notes on Predation by Tadpoles of the Plains Spadefoot

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PART 1

Earlier it was emphasized that predaceous cannibalism had not been found among tadpoles of *Scaphiopus bombifrons* Cope in central Oklahoma, although common in the western part of the state (Bragg and Bragg, 1958; Bragg, 1961, 1965). It has now been seen under the following conditions:

In April, 1964, and in April and again in May, 1965, breeding congresses occurred at a single pool site in the southern part of Norman, Cleveland County, Oklahoma. Tadpoles from each breeding were studied in both the laboratory and the field. No evidence of predaceous cannibalism was observed among the tadpoles resulting from the first and third of these congresses, nor in the natal pool at any time. We are, therefore, concerned principally with tadpoles from the May, 1965, breeding when these were placed in a special situation.

Prior to this congress, several depressions were prepared in sandy loam on the bank of Little River about 5 miles northeast of Norman. To avoid seepage, a large sheet of clear plastic was placed on the bottom and bent up along the sides and ends of one of the depressions and the flat portion of this covered by about one inch of soil. The structure was then about one-half filled with river water.

Tadpoles were collected from the breeding site while very young (3 days after hatching) and placed in this artificial pool. Since in laboratory cultures it had been found that tadpoles of *S. bombifrons* thrive on a diet of blue-green algae, chiefly *Anabaena* sp., collected in western Oklahoma (Bragg, 1964), enough of this was added from time to time to suffice for the nutritional needs of the tadpoles.

These animals developed normally. But in early May one of us (Nelson) first observed some of them attacking, killing and eating others. His investigation showed not only that differential behavior was manifested, but also that structural dimorphism was present in the group. Three morphological types (types I, II, and III of Bragg and Bragg, 1958) were represented exactly as is common in western Oklahoma, i.e., most were of type I (not predaceously cannibalistic), many were of type II (intermediate) and a few of type III (predaceously cannibalistic). This was confirmed by Bragg using the techniques earlier described (Bragg, 1964).

The importance of these observations is reflected in the following questions: (a) Why should tadpoles of *S. bombifrons* in central Oklahoma suddenly develop dimorphism with cannibalism? (b) Why did tadpoles from only one of these breeding congresses at a single site show it? The second question is the more important. Bragg (1964) emphasized probable genetic factors in these matters but the observations reported here indicate another possibility, instead of or working with, genetic factors. Did type of food have anything to do with it? Further observations are planned as opportunity presents itself.

PART 2

Earlier, tadpoles of *Scaphiopus bombifrons* Cope failed to attack those of *Bufo compactilis speciosus* Baird when these were placed together in a laboratory culture (Bragg, 1960). Because these spadefoot larvae do attack tadpoles of another toad, *Bufo cognatus* Say (Bragg, 1940), it was suggested that some tadpoles may be protected from predation by *Scaphiopus* through having evolved some quality avoided by the spadefoots.

Recently we had opportunity to make further observations. Tadpoles of these species were collected, each from a different pool in Comanche County, Oklahoma by Mr. Joe Stie, biology teacher at Sterling (Okla.) High School, to whom we are indebted. The spadefoots were about half way toward metamorphosis as judged by size whereas the toads, except a few, were in various early stages of metamorphosis, some with hind legs well developed, a few with one or both forelegs.

When these tadpoles (all spadefoots morphologically of Type I) were placed together in a glass culture dish of tap water, the spadefoot immediately attacked the toads, killed and ate them. In a half hour only three toads remained, each of them being among the youngest in developmental stages of the orginal group.

How may we interpret the different spadefoot behavior in the two instances? One possibility needs mention: Tadpoles of several spadefoot species (Bragg 1961) become cannibalistic on metamorphosing individuals which they do not attack before emergence of the victims from the water. In *Scaphiopus holbrooki hurteri* and *S. bombifrons* at least, this may occur among tadpoles which have spent many hours together in metamorphic aggregations with none attacking others (Bragg, 1965). It is therefore possible (but by no means proved) that Type I *S. bombifrons* attack tadpoles of *B. c. speciosus* only after these are in metamorphic stages. That the three survivors in the present instance were all in younger development stages than those attacked clearly suggests this. Further observations will be made as opportunity affords.

LITERATURE CITED

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