

Subsection Zoology

**A Possible Stimulus for the Formation of Some Aggregations
in Tadpoles of *Scaphiopus bombifrons***

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During the spring and summer of 1968, adults of the plains spadefoot, *Scaphiopus bombifrons*, and Couch's spadefoot, *Scaphiopus couchi*, bred four times in the Tipton area of Tillman County, Oklahoma. The first breeding congresses occurred on 22 April 1968, the second on 9 May 1968, the third on 21 May 1968, and the fourth on 15 July 1968. Observations of the tadpoles after the first three breedings showed no aggregations of *S. bombifrons*, previously described by Bragg (1961, 1965, and numerous other papers).

After the fourth breeding of the year, tadpoles of both species were numerous in all temporary pools in the Tipton area. By 25 July 1968, most of the tadpoles of *S. couchi* had left the water and newly metamorphosed juveniles were found under leaves, cans, and other objects around the temporary pools. The tadpoles of *S. bombifrons* had not yet metamorphosed and were very numerous. Large aggregations of several hundred tadpoles were common in nearly all pools.

In most pools, structural dimorphism was present among the tadpoles of *S. bombifrons*. Three morphological types (types I, II, and III of Bragg and Bragg, 1959) were represented; most were of type I (not predaceously cannibalistic), many were of type II (intermediate) and a few of type III (predaceously cannibalistic). In the temporary pools where the different types of *S. bombifrons* tadpoles occurred, it was evident that their behavior was different. The noncannibalistic types were much more numerous and were feeding in aggregations. There was a striking tendency for all tadpoles in any aggregation to be oriented in the same direction. The cannibals, few in number compared to the noncannibals, did not occur in the aggregations. In all pools where feeding aggregations occurred, predaceously cannibalistic tadpoles were also present. In those pools where predaceously cannibalistic tadpoles were not present, feeding aggregations did not occur. The cannibals when present were moving freely outside such feeding aggregations, catching, killing, and eating other tadpoles of *S. bombifrons*. The cannibals were never observed to enter the feeding aggregations. It appeared that the feeding aggregations were functioning as protection for the tadpoles against attacks of the cannibalistic tadpoles as suggested by Bragg (1961) and Bragg and Bragg (1959).

Also present in pools where feeding aggregations occurred, were numerous hydrophilid beetle larvae (*Hyrus triangularis*). These beetle larvae were catching, killing, and eating numerous tadpoles of *S. bombifrons* and *S. couchi*. Frequently two or three beetle larvae would be observed fighting over a single tadpole. The beetle larvae never entered the feeding aggregations, even though they would follow and catch tadpoles at the posterior part of the aggregations. The feeding aggregations again appeared to act as protective devices for the tadpoles against the beetle larvae. This has been observed by Bragg (1961, 1965) in *Scaphiopus holbrooki hurteri*, but apparently not in *S. bombifrons*.

These observations could be summarized as follows: The feeding aggregations of *S. bombifrons* tadpoles appeared to occur only when predaceously cannibalistic tadpoles and/or beetle larvae were present. The cannibalistic tadpoles and/or beetle larvae were never observed to enter

the aggregations, even though both moved freely outside such aggregations and throughout the pool, catching, killing, and eating tadpoles not in the aggregations. The feeding aggregations appeared to act as protective devices for the tadpoles against attacks by the cannibalistic tadpoles and beetle larvae.

How an aggregation actually forms is not known, even though Bragg (1968) reported some observations on this phenomenon. On the basis of the above observations, I offer the hypothesis that the predaceous cannibalistic tadpoles of *S. bombifrons* and/or beetle larvae may act as the stimulus for the response of tadpoles of *S. bombifrons* to form aggregations. The stimulus presented by the cannibalistic tadpoles and/or beetle larvae could be chemical or visual in nature. Whatever the stimulus, the response is probably the formation of an aggregation that serves as a partial protective device, as well as a cooperative effort of individuals in the aggregation to procure nutritive benefit for all. Further observations are planned as opportunity presents itself.

LITERATURE CITED

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