THE WASMANN JOURNAL OF BIOLOGY
VOL. 24, NO. 1 SPRING, 1966

Longevity of the Tadpole Stage in the Plains Spadefoot (Amphibia: Salientia)

ARTHUR N. BRAGG, *University of Oklahoma, Norman, Oklahoma.*

Tadpoles of the genus *Scaphiopus* (including *Spea)* have intrinsically faster developmental rates than most, if not all, other Salientia (Bragg, 1941, 1946, 1949, 1961). The fastest known to me is in *Scaphiopus holbrooki hurteri* Strecker—12–13 days from eggs to metamorphosis as juveniles. *Scaphiopus couchi* is sometimes essentially as fast—14–15 days (Bragg, 1964) and *S. bombifrons* under some conditions may be comparable—13–14 days (King, 1960), although usually slower, especially if not *predaceous* (Bragg, 1962).

It should be clear that the above are the minimum extremes which have been observed, not the usual or average condition. The developmental rate varies widely between different pools at the same time, at the same pool site at different times and with species, even if together in the same water (Bragg, 1964). Both temperatures and food supply are important factors, predatory activity tending to speed up the developmental rate under otherwise comparable conditions (Bragg, 1941, 1962, 1964). This effect is considered an evolutionary adaptive trend, obviously favorable in the rapidly evaporating temporary pools in xeric regions of the North American Southwest, the typical habitat of most spadefoots (Bragg, 1961a).

As implied above, in all former studies involving these matters the emphasis has been upon how *fast* these larvae may develop. Because of the great variation, however, it would seem that how *slowly* they might progress might also be well to know. Since types and/or quantity of food in part control the developmental rate, the following procedure was tried to determine how long spadefoot tadpoles might live and still metamorphose.

Non-cannibalistic tadpoles of *Scaphiopus bombifrons* from Tipton, Oklahoma, were available from a collection made on May 30, 1962 (Bragg, 1964). Ten of these were placed in a newly made culture as described earlier (tap water plus dried pool-bottom containing principally the bluegreen alga, *Anabaena* sp., known to be excellent food for them). Nothing more was done to this culture except (1) adding water from time to time and (2) twice, during the succeeding months, adding a small amount of the food material. The object was to give just enough food to maintain the animals in a reasonably healthy condition in a very warm room (air temperature attained 100°F. several times during the summer). From time to time, the rigor of these conditions killed a tadpole which then served as additional food for those remaining. But the growth of the alga was much too slow to give adequate food, even for those remaining.

These tadpoles had come from eggs laid on May 20 or 21 (as judged by rainfall data for Tipton, since adults breed only after rain). They were therefore 9 or 10 days old when collected on May 30. The culture was set up on or near June 15. On October 2, three tadpoles remained, all lean and inactive. I then put them into a newly made culture of the food mentioned. Within a half hour two of them were feeding vigorously. In 24 hours these were round-bodied, apparently healthy, and active. The third had died and was removed. The two remaining tadpoles metamorphosed normally, one on October 14, the other the next day. Therefore, I had maintained them for approximately 137 days and they were almost certainly 145–146 days from eggs. This observation, together with an earlier report (King, 1960), proves that *S. bombifrons* may remain as tadpoles from an observed minimum of 13–14 days to a maximum of at least 145–146 days from the eggs producing them, depending upon environmental conditions, especially food supply. This does not, of course, show what the natural limits may be. But a 132-day difference is quite unusual in such cases among other animals and again emphasizes the great adaptative potential of the spadefoots.

LITERATURE CITED

Bragg, A. N.

1941. Some observations on Amphibia at and near Las Vegas, New Mexico. Great Basin Naturalist, 2:109–117.

BRAGG, A. N. (Cont.)

1946. Some salientian adaptations. Great Basin Naturalist, 7: 11–15.

1949. Additional instances of social aggregations in tadpoles. Wasmann Collector 7:66–79.

1950. Observations on the ecology and natural history of Anura XVII. Adaptations and distribution in accordance with habits in Oklahoma. In *Researches on the Amphibia of Oklahoma*, Article VI:59–100. University of Oklahoma Press, Norman.

1961. The behavior and comparative developmental rates of a spadefoot, a toad, and a frog. Herpetologica, 17:73–84.

1961a. A theory of the origin of the spadefooted toads deduced principally by a study of their habits. Animal Behaviour, 9: 178–186.

1962. Predator-prey relationship in two species of spadefoot tadpoles with notes on other features of their behavior. Wasmann Journal of Biology, 20:81–97.

1964. Further study of predation and cannibalism in spadefoot tadpoles. Herpetologica 20:17–24.

KING, OTIS M.

1960. Notes on Oklahoma toads. Southwestern Naturalist, 5:102-103.