

1956

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### Recommended Citation

Bagnara, Joseph T. and Kollros, Jerry J. (1956) "Abbreviated Larval Period of *Rana Catesbeiana* in Iowa," *Proceedings of the Iowa Academy of Science*, 63(1), 729-731.

Available at: <https://scholarworks.uni.edu/pias/vol63/iss1/85>

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## Abbreviated Larval Period of *Rana Catesbeiana* in Iowa

By JOSEPH T. BAGNARA AND JERRY J. KOLLROS

It has long been reported that the larval period of *Rana catesbeiana* in the North lasts for two years (Pope, '47, Wright and Wright, '49, Smith, '50). Examination of tadpoles from such ponds indicates that two age classes are present. The two groups result from the fact that eggs are deposited every year while tadpoles transform only after their second winter. In the light of this information, we were quite surprised to find bullfrog tadpoles apparently of only one age group in Iowa City.<sup>1</sup> In view of this general information, it seems possible that bullfrog tadpoles in this vicinity undergo an abbreviated larval period. Premature metamorphosis of these tadpoles may occur in even more widely distributed areas since Klimstra ('47) reports similar observations on *Rana catesbeiana* from several farm ponds in southern Iowa. In these ponds which were newly constructed, transforming tadpoles were seen one year after adult bullfrogs first invaded them. Measurements of the tadpoles seemed to fall in one group, ranging in size from 4.1 - 5.9 inches. Unfortunately the number of tadpoles which were measured was not reported.

Since all these observations of abbreviated metamorphosis seem to be of such general nature, we decided to follow closely the life history of bullfrog tadpoles in two large ponds on the Rohner farm about five miles south of Iowa City.

### OBSERVATIONS

The ponds were first visited on June 6, 1954. At this time the bullfrog tadpoles were either in advanced stages of metamorphosis or were already completely transformed. Transformation continued at a rapid rate, so that by the first week in July scarcely a tadpole was seen. By July 8 tadpoles were no longer found, but the first egg masses began to appear. New egg masses were deposited until August 10, after which freshly deposited eggs were no longer found. By this time the tadpoles which had developed from the initially deposited egg masses were about 2 - 3 cm. long. Although no measurements were made during the next few weeks, the tadpoles grew rapidly.

During the first week in October, 328 tadpoles were collected from many sites in both ponds. They were brought to the laboratory and measured and staged according to the system of Taylor and

<sup>1</sup>Our own experience in 1947 and subsequently. Also, personal communication of Dr. David Barry for the summer of 1951.

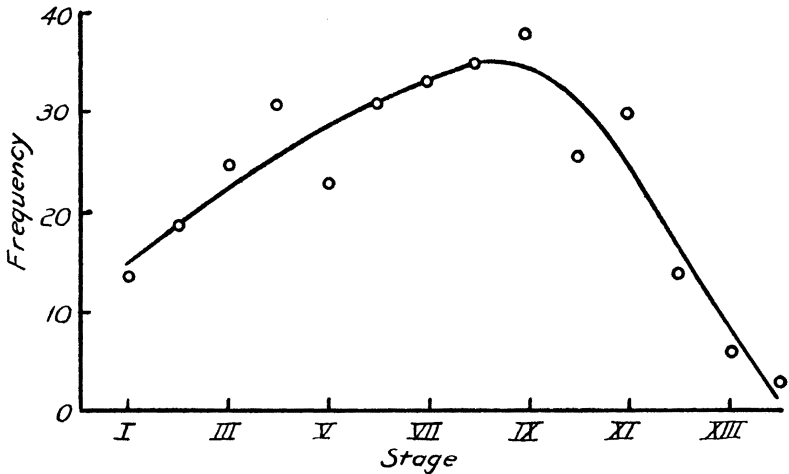


Figure 1. Distribution of tadpoles according to stage. October 1, 1954

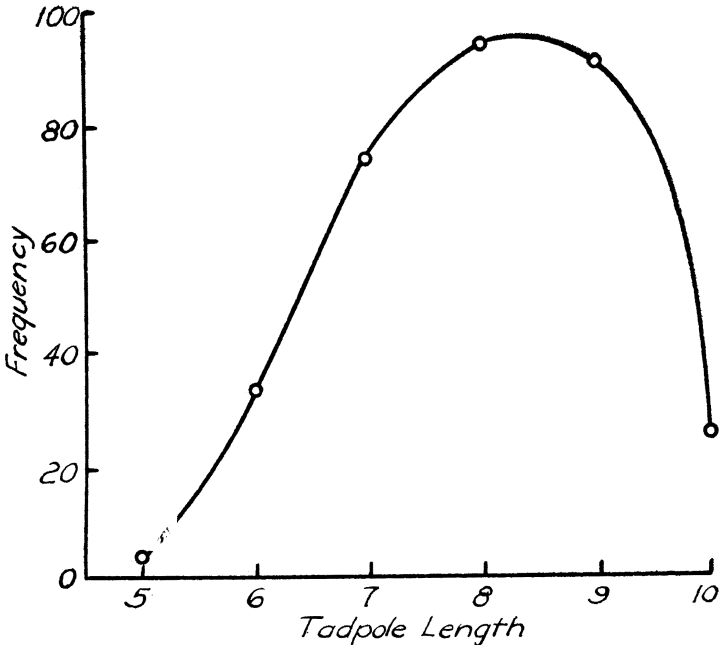


Figure 2. Distribution of tadpoles according to length. October 1, 1954

Kollros ('46). The tadpoles varied in length from 5 to 10 cm., while the developmental stages ranged from I to XIV. Figures 1 and 2 show the curves obtained by plotting body length or stage (abscissa) vs. frequency (ordinate). Both criteria, body length and stage, indicate that the distribution of the tadpoles is unimodal. This is the result anticipated on the basis of a larval period of one year's duration. If the larval period lasted two years, a bimodal distribution would have been expected, representing tadpoles of the first and second year.

In addition to these field observations, some tadpoles were reared in the laboratory from eggs obtained on July 8. It is realized, of course, that the laboratory aquaria do not duplicate the environmental conditions of natural ponds. It is of interest, however, to record that some of these tadpoles transformed near their first birthday.

#### DISCUSSION

The observations which have been recorded indicate that bullfrog tadpoles of this region pass a larval period of only one year, while in other localities in the North, at least two years are spent in the larval condition. It is difficult to account for this difference on the basis of environment alone. One would expect that in regions which experience long severe winters, the larval life span might be increased. Conversely, in more temperate regions the extended period of activity and feeding might lead to earlier metamorphosis. Great differences in temperature, however, do not exist between this part of Iowa and regions where two year larvae are reported.

Most of the literature regarding the duration of the larval period of *R. catesbeiana* is scattered. An effort should be made to collect this information from various parts of the country with the hope of explaining the variable duration of the larval period. Further, it would be of interest to cross members of this species from Iowa with bullfrogs which are known to have the longer larval period.

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