NOTES ON THE BIRD-VOICED TREE FROG, *HYLA PHAEOCRYPTA*[1]

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From the time *Hyla phaeocrypta* Cope (then known as *Hyla avivoca* Viosca) was first reported in Tennessee (Parker, 1937; Endsley, 1937), I have attempted when opportunity arose to discover some details of the breeding, eggs, and larvae of this interesting tree frog. A measure of success was attained for the first time in 1949. As it seems unlikely that any additions to this information will be made in the near future, notes on the material and some random observations are presented. Conclusions regarding the life history are incomplete and tentative in nature.

It has never been very difficult to collect males at Reelfoot Lake, in Lake and Obion counties, Tennessee, and in Fulton County, Kentucky, but very few females were found, and none of them seemed to contain ova. Then, on July 30, 1949, at 11 P.M., two clasping pairs were found among calling males in the permanently flooded woods between Bayou du Chien and Reelfoot Lake, near Walnut Log, Tennessee. These frogs were in buttonbush thickets in sparse woods, mostly tall cypress, and the water at the spot was about two feet deep. Under the water was the customary six inches of soft mud. The first pair of frogs was about two feet above the water, on a buttonbush crotch. The second pair was in a mixed willow-shoot and buttonbush area near a patch of swamp mallow. This pair was about one and a half feet above the water, on the stem of a dead bush. No eggs were found in the vicinity of either clasping pair, although one female appeared partly spent. The clasping frogs were transferred in damp cotton bags to the laboratory nearby[2] and were then placed in one-gallon glass jars a third full of water. Twigs, sticks, and aquatic vegetation were also placed in the jars, but the frogs usually clung to the sides of the jars. Both pairs separated during the night and did not clasp again the next day. They were then taken to Memphis, Tennessee. The next morning the frogs were clasping again, and a number of eggs were found in one jar. The eggs were in small clusters, some floating, many on the bottom of the jar and partly covered with debris. While this is not considered an example of perfectly normal egg-laying, the appearance of the ova and the actions of the clasping frogs indicate two possibilities: either the eggs are deposited as a surface film that readily breaks up and perhaps sinks to the bottom, or they are deposited in small masses, perhaps along submerged vegetation. It was not possible to care ade-

[1]Contribution No. 3 from the Parker Museum.

[2]I wish to express my appreciation to Dr. C. L. Baker of Southwestern at Memphis, director of the Reelfoot Lake Biological Station, for permission to use the facilities of the station. Much of the earlier field work in this region was done under scholarships from the Tennessee Academy of Science.

quately for the eggs, consequently few developed beyond the neural groove stage and none hatched. Measurement of ten representative ova gave the following figures: Diameter of outer envelope 4.0-5.4 mm.; diameter of inner envelope 1.6-2.2 (mostly 1.6-1.8) mm.; diameter of vitellus 0.8-0.9 mm. If the eggs of *Hyla phaeocrypta* characteristically float, it will be necessary to distinguish them from *Hyla chrysoscelis*. My material differed from ova laid by *Hyla*

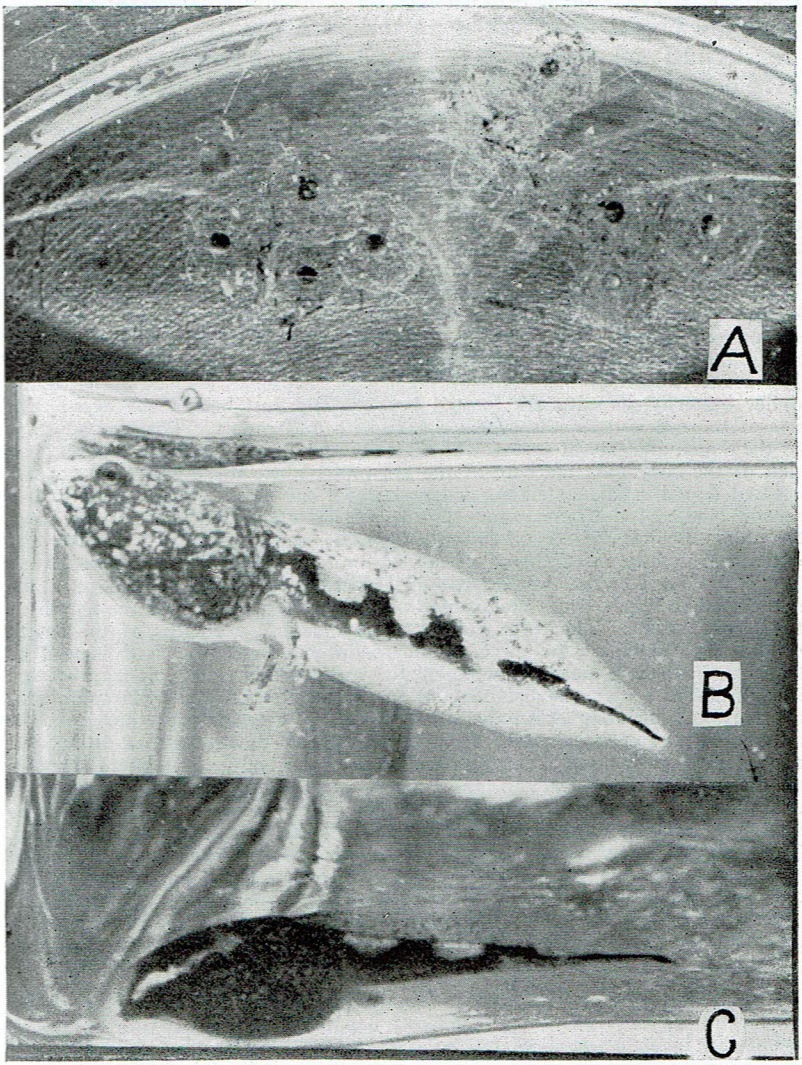

Fig. 1. The ova of *Hyla phaeocrypta phaeocrypta* and two larvae presumably of the same species. *A*. Ova. *B*. Larva. *C*. Another larva.

chrysoscelis (Marshall County, Mississippi) in having a smaller vitellus and fewer ova per packet (usually 6-15). If the eggs of *Hyla phaeocrypta* are characteristically submerged, they may be readily distinguished from those of *Pseudacris nigrita triseriata* by the greater distance between the envelopes, the slightly smaller vitellus, and usually by the smaller number of eggs per packet.

Three frog tadpoles collected on July 17, 1949, about thirty yards from the previously-mentioned site of collection of the two clasping pairs are presumed to belong to the same species. One specimen transformed and escaped while I was away from home; for this one I have only a few preliminary notes and photographs. The other two failed to transform and were preserved.

These tadpoles are conspicuously marked. The basic color is a blackish umber. The body is heavily pigmented, with some silver especially noticeable under the hand lens, and particularly on the belly. Dark flecks along the sides are aggregated to produce a mottled effect. The belly appears blackish to the naked eye, but under a lens, a fine mottling of black and pale green is visible. There is some iridescence, with a greenish tinge. The viscera are not visible in the living specimens, but are readily seen after a few months in formaldehyde. There is a well-defined bronzy-pink band, nearly the width of the eye, extending from the eye to the tip of the snout; the band on each side turns straight forward just short of the midline (Fig. 1 *C*). This leaves a midline gap about two-thirds the width of the bands themselves. There is a slightly duller butterfly-shaped mark located between and just behind the eyes. The iris of the eye is dark, the eye is ringed with dull copper. The ground color of the dorsal and lateral surfaces of the tail musculature is slightly lighter than that of the body. At the base of the tail musculature there is a vivid copper-colored dorsal saddle extending halfway down the side. Posterior to it is a second saddle of the same color, slightly smaller and extending halfway down the side. Behind the second is a third saddle, same color, still smaller, and extending slightly more than halfway down the side of the tail musculature. The interspace between the first two saddles is less than half the length of the second saddle; the second interspace is slightly wider, about half the length of the second saddle. The three saddles occupy about three-fifths of the length of the tail. (One of the three specimens differed in having four instead of three saddles; these markings were smaller and more irregular, as may be seen in figure 1, *B*.) The medial portions of the saddles are duller in color than the portions extending down the sides of the tail musculature; this gives the appearance of an interrupted, dirty brown streak down the mid-dorsal tail musculature, most conspicuous and widest near the body. The lateral borders of the saddles are a very bright copper color. The underside of the tail musculature has a narrow, irregular margin of flesh pink on either side of the fin. This is carried a short distance up on the sides as a fine, pinkish mottling. The tail fin is clear with fine dark flecks; these flecks are increased in size and number distally, but are not conspicuous. The general appearance is that of a blackish brown tadpole with mottled sides; vivid pinkish copper mouth; eye rings of the same color; and three coppery tail saddles, the lower borders matching the mouth color. No other North American hylid larva, known at present, presents this appearance.

Measurements of two specimens: Total length 33.7, 22.0 mm.; body length (snout to end of vent) 14.2, 10.0 mm.; depth of tail musculature at second saddle 2.2, 1.8 mm.; depth of tail at base 5.9, 4.2 mm.; depth of tail at second saddle 6.7, 3.9 mm.; depth of body 6.6, 4.4 mm.; width of body 7.6, 5.2 mm.; diameter of eye 2.0, 1.4 mm.; snout to spiracle 7.8, 5.3 mm.; snout to center of eye 4.0, 3.0 mm.; eye to level of spiracle 3.9, 3.0 mm.; eye to vent 11.0, 10.0

mm.; eye to insertion hind legs 8.4, 8.9 mm.; spiracle to vent 8.4, 6.0 mm.; spiracle to insertion hind legs 3.6, 3.5 mm.; interocular distance 3.4, 3.0 mm.; nostril to center of eye 2.3, 2.1 mm.; nostril to snout 2.3, 2.0 mm.; width of mouth 2.0, 2.0 mm.

The anus is dextral, the spiracle sinistral. The teeth of the two specimens available are somewhat worn and irregular . . . the sketch reproduced in figure 2 may, therefore, not be typical. The mouthparts bear a close resemblance to those figured by Wright and Wright (1949) for *Hyla crucifer*, differing principally in the greater extent of papillae, the slightly wider horny beak, and one less lower tooth row. In these two specimens, at least, there are two upper and two lower rows of teeth. However, the irregularities shown in the sketch may possibly indicate a third row in either series.

It must be admitted that these larvae may not be *Hyla p. phaeocrypta*. However, they were found at the breeding site of that species; all other frogs of the region are known to have different larvae, and no other hylid, so far as I am aware, except *Acris c. crepitans* and *Hyla c. cinerea* breed in that particular area. Mittleman (1945)

Fig. 2. The mouthparts of a larva thought to be *Hyla phaeocrypta phaeocrypta*.

presumes that *Hyla phaeocrypta* and *Hyla versicolor*[3] breed together, but I have never found this to be so. At least in the middle and probably in the lower Mississippi Valley, the sharing of breeding water by the tree toad and the bird-voiced tree frog must be an exceptional case. While *Hyla phaeocrypta* is restricted to the deeper forests of permanent swamps, ponds, lakes, and rivers, *H. versicolor* and *H. chrysoscelis* breed in many types of permanent, semi-permanent, and transient ditches, pools, or ponds, usually in semi-open, bushy, or thinly-wooded areas. As the tree toad shows no preference for deep woods when breeding, it will only occasionally be near the breeding areas of *H. phaeocrypta*—when the latter breeds near openings or woods borders. At any rate, the tree toad larvae found in

[3]It is believed that *Hyla versicolor* and *Hyla chrysoscelis* are two distinct species; probably only the latter occurs at Reelfoot Lake. This matter will be considered in a forthcoming paper, but is not here considered relevant. The two forms have very similar breeding habits in the region.

semi-permanent pools and ditches of the Reelfoot Lake area differ from the above-described specimens. *Hyla c. crucifer* occurs in the region, and late-developing larvae might be present in early summer. Wright and Wright (1949) give the breeding season of the spring peeper as April 1 to June 15 and a tadpole stage of 90 to 100 days. However, I believe that this tree frog has usually finished breeding by the end of March in this region, and often breeds in February. According to Wright and Wright's description of the spring peeper larva, it may be distinguished by the large purplish blotches near the outer edges of the tail fin and, presumably, by the lack of coppery markings generally.

The size dimorphism of the adult *Hyla phaeocrypta* has been noted by Harper (1933); and, with the description of *Hyla phaeocrypta ogechiensis,* Neill (1948) summarized this difference. He gave the maximum length of *H. p. ogechiensis* females as 52.5 mm. and males as 38.5 mm., but also stated that the females (up to 43 mm.) of *Hyla p. phaeocrypta* scarcely exceed the males (up to 40 mm.) in size. Regarding the two clasping pairs collected at Reelfoot Lake, one female was just within the upper size limit set by Neill, while the other female measured a trifle more than 50 mm. in length. Probably other large females will turn up in the Mississippi Valley in the course of time. The average head-body length of 34 male specimens of *Hyla p. phaeocrypta* in my collection is 35.5 mm., extremes are 32.0 and 42.8 mm. Neill's measurements for the male differed only slightly: 33.9 (29.0-40.0) mm.

The breeding call of *Hyla phaeocrypta* has been described or mentioned several times in the literature, but the following notes may be of interest. At Reelfoot Lake, Tennessee, calls came in groups of 10 to 14 as a rule, and occupied 2 1/2 to 3 1/2, rarely 5, minutes. The number of notes per call ranged from 8 to 22, and each call lasted from 3 1/2 to 4 seconds. At the time these observations were made, the air temperature was 18° C. With the aid of an harmonic pitch pipe (key of F), I placed the note at D. A later comparison of a whistled imitation of the call with a piano indicated a note of high C. It is regretted that oscilloscope, recorders, and other instruments are not at present available for study of frog calls, and much also needs to be done in the elaboration and standardization of descriptions of the calls. No difference was noted in the breeding call of *Hyla phaeocrypta* in the Hatchie River bottoms of northern Hardeman and southern Haywood counties, Tennessee; at West Lake, Tunica County, Mississippi; the river bottoms near Mandeville, St. Tammany Parish, Louisiana; and in Washington County, Florida. Specimens were collected at all of these localities except the last one.

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ACCIDENT DEATHS

One of the sorriest symbols of our times is America's automobile accident record.

The summing up for 1950 has just reached us from The Travelers Insurance Companies who each year publish an almanac of crash data. Of all the facts about auto accidents in their booklet, the most significant, it seems to us, is that almost 500,000 casualties in 1950 were the direct result of speeding. One out of every three Americans who lost their lives in last year's wrecks met death because someone was driving too fast.

Speed has been causing a greater percentage of accidents year after year. In 1950, speed was a greater factor in traffic casualties than at any time in history.

Traffic laws and law enforcement are part of the answer. Engineering will help some. But with perfect roads and perfect police work, the man behind the wheel can continue to exceed the speed limit if he wants to or if he isn't thinking.

Keep this in mind when you drive. Stay within speed limits and you'll be doing your full part in a crusade to reduce automobile accidents by one-third.

* * *

Last year 35,500 Americans were killed in traffic accidents.

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In 1950, 1,799,800 Americans were injured in traffic accidents.

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There were 235,800 more persons injured in U. S. motor vehicle accidents last year than in 1949.

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Speeding on U. S. streets and highways last year killed 13,300 men, women, and children.

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Speeding on U. S. streets and highways last year injured 475,500 men, women, and children.

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In 1950, 9,400 pedestrians were killed in the United States.

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Last year 299,500 pedestrians were injured in the United States.

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Twenty-four percent of all drivers involved in fatal automobile accidents in the U. S. last year were between the ages of 18 and 24.

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Ninety-eight percent of drivers involved in fatal automobile accidents in the U. S. last year had at least one year's driving experience.