

SYNOPSIS AND DESCRIPTION OF NORTH AMERICAN TADPOLES

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The material upon which the paper is based has been collected for the greater part by the author during many years of field work and study. A full and representative series is in the author's collection and another has been donated by him to the United States National Museum.

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1. SYNOPSIS OF THIRTY-EIGHT SPECIES OF TADPOLES, MOSTLY FROM EASTERN AND SOUTHERN UNITED STATES

The following synopsis is a summarized account of some of the tadpoles the author has collected (except *Ascaphus truei*). As indicated in the subtitle, the synopsis is not complete for all forms east of the Mississippi River, as the following eastern forms are not included:

Bufo quercicus.—
Bufo fowleri.—

{	Material at hand but not worked over until all Bufo species of United States of America are assembled. They are difficult.
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Pseudacris.—In addition to what is included we have eggs and tadpoles of *Pseudacris* from Texas and some studies on *Pseudacris ornata*. Their life histories are being assembled.

Hyla avivoca.—Mr. Percy Viosca, jr., its discoverer, knows this species well and doubtless will solve its life history.

Rana areolata.—Mr. George S. Myers and his previous associates (such as Hermann P. Wright) at the University of Indiana are supplying this gap in the series.

Rana cantabrigensis.—We have some of this material, but Mr. E. B. Shelley-Logier has the most on this species.

In addition, we have added to the synopsis 11 species of the Southwest, the results of our 1917 and 1925 trips. The discussion of the relationships of these tadpoles is reserved for a forthcoming paper.

Some may attempt to use this synopsis as a key. It may work and at times it will not. To any worker who has had much field experience it is apparent that tadpoles of closely related species like other animate things are no respecters of man-made keys. Variations in individuals will occur. This is a synopsis of mature larvae. Half-grown larvae or larvae close to transformation or almost transformed are often quite abnormal in the usual characters used in larval descriptions. For example, we raised *Rana virgatipes* larvae from eggs, but they did not attain a large enough size to get the labial teeth well developed. We had to secure another series of mature larvae to complete the description.

The tadpoles and eggs of most of the United States species are known. The Pacific coast forms have been thoroughly studied by Dr. Tracy I. Storer. We have collected in the field the tadpoles and eggs, or both, of over 40 of the species of the United States and are hopeful of seeing in life the eggs and tadpoles of the remaining forms before final summaries are undertaken. In this synopsis the only real presumptive identification is that of *Rana onca*, and a correction is made when *Scaphiopus hammondi* is given as having stalked eggs at times. In 1920¹ we published a figure of stalked eggs with the identification "Desert Tree Toad (?) Eggs," i. e. *Hyla arenicolor*. The question mark saves the situation. Later we found them to be *Scaphiopus hammondi* eggs, and Dr. A. I. Ortenburger had also independently come to the same judgment.

All the drawings of the mouth parts have been made by my wife, Mrs. Anna Allen Wright, who has also seen many of these tadpoles in life and who has helped to photograph most of them.

SYNOPSIS

- a¹. Mouth disk absent; no labial teeth; no papillae; no horny beaks; spiracle median near anus; nostril within edge of mouth fold; eye on a canthus; tadpoles (23-26.4 mm.) small; black or grayish olive tadpoles with a stripe on the middle of the tail musculature.....(*Brevicipitidae*).
- b¹. Tail tip always black; eyes just visible from ventral aspect; back of upper labial edge with black pointed excrescences; lower mandibular prolongation gray; general coloration citrine drab or grayish olive, with mid dorsal of dark grayish olive; venter with white or pale pinkish cinnamon spots; sides of body without striking longitudinal light bands; light band at base of tail musculature not prominent (in alcohol).

Outer egg envelope not truncate, mass seldom showing distinct outline of each egg envelope in a mosaic fashion.

Texas westward to Fort Davis Mountains. (Pl. 1, fig. 1.)

Gastrophryne texensis.

¹ U. S. Bur. of Fisheries, Doc. No. 838, 1920, pl. 17, fig. 2.

b¹. Tail sometimes with black tip; eyes plainly visible from ventral aspect; inner face of upper labial edge with no black pointed excrescences; lower mandibular prolongation light; general coloration black with purplish gray or hair brown dots; venter with white or yellowish bands and large blotches; sides of body with same coloration; light band at base of tail musculature prominent (even in alcohol).

Egg with truncate outer envelope, giving mass a mosaic appearance on water's surface.

Virginia—Florida—Texas, and up Mississippi River to Indiana. (Pl. 1, fig. 5.)

Gastrophryne carolinensis.

a². Mouth disk present; upper and lower labial teeth; labial papillae; at least the upper horny beak present; nostril free of mouth; eyes dorsal close together; tail tip rounded.

b¹. Spiracle median near insertion of hind legs than tip of snout; labial teeth $\frac{7}{8}$ — $\frac{2}{3}$ — $\frac{1}{5}$; upper labial teeth at least two rows to a ridge; no lower beak; many rows of papillae on edge of lower labium; mouth large and round; anus median; black or blackish brown tadpoles speckled with black; tail may be of body color or spotted with creamy white; upper tail crest not extending on to the body. (After Gaige.)

Washington—California. (Pl. 1, fig. 6.)-----*Ascaphus truei* (Discoglossidae).

b². Spiracle sinistral; upper labial teeth not with two close rows on each ridge; labial teeth $\frac{1}{3}$, $\frac{2}{2}$, $\frac{2}{3}$, $\frac{2}{4}$, $\frac{3}{3}$, $\frac{3}{4}$, $\frac{4}{4}$ to $\frac{6}{6}$; upper and lower horny beaks; papillae on lower edge of labium absent or in one or two rows.

c¹. Anus median; spiracle lateral below the lateral axis (of tail musculature projected) sometimes as much ventral as lateral; upper tail crest extends on to the body to a vertical nearer hind legs than the spiracle or only half way; viscera visible (in preserved specimens) through the skin of the belly.

d¹. Labial teeth $\frac{3}{4}$ to $\frac{6}{6}$; papillae extending completely around the border of the labium except for a short toothed median interval above (sometimes absent in one species); papillary border not emarginate on each side; eyes nearer mid-dorsal line than lateral outline, on lateral axis; tadpoles 24.5–65 mm. in length; spiracle a slit, very low on side, about on the level of the mouth; in general very bronzy tadpoles; myotomes of tail musculature well indicated.----- (Scaphiopodidae).

e¹. Teeth $\frac{6}{6}$, $\frac{5}{6}$, $\frac{5}{6}$, $\frac{5}{6}$; inner papillae present; spiracle equidistant between eye and base of hind legs or vent; eye 1.4–1.8 nearer tip of snout than to the spiracle, average 1.52; internasal space in interorbital space 1.2S–1.8S, average 1.56; depth of body 1.75–2.5 in body length, average 2.04; muscular part of tail in depth of tail 1.45–2.5, average 1.98; last lower row of teeth longer than horny beak. Last lower row of teeth 1.5 times in next to lowest row of teeth. Egg mass an irregular cylinder, at first bandlike.

Massachusetts—Florida—Texas, and Arkansas. (Pl. 1, fig. 4.)

Scaphiopus holbrookii.

e². Teeth $\frac{3}{4}$, $\frac{3}{4}$, $\frac{4}{4}$, $\frac{5}{5}$; inner papillae generally absent or scarce; spiracle nearer eye than hind legs or vent; eye 1.0–1.6 nearer tip of snout than to spiracle; depth of body 1.6–2.0 in body length, averages 1.79, 1.9; last lower (fourth) row of teeth less than or $\frac{1}{2}$ of the horny beak.

f¹. Tadpole large (65 mm.); teeth $\frac{3}{4}$, rarely $\frac{3}{4}$ or $\frac{3}{4}$; upper fringe of papillae broken in middle by a row of teeth; eye 1.1–1.3 nearer tip of snout than to the spiracle, average 1.2; muscular part of tail 2.25–2.66 in depth of tail, average 2.43; width of body in its own length 1.55–1.9, average 1.66; depth of body 1.05–1.15 in body width, average 1.09; spiracle 1.25–1.6 nearer eye than base of hind legs or vent, average 1.37; internasal space 2.5–2.75 in interorbital space, average 2.6; third lower labial row usually broken in

middle; median interval of second lower row broad; last lower row of teeth 1.75–2.0 times in next to last row of teeth; second upper row usually broken in middle. Egg mass, a loose cylinder, many eggs on stalks.

Montana–Texas and westward to Pacific Coast States. (Pl. 1, fig. 3.)

Scaphiopus hammondi.

- f*². Tadpole small (24.5 mm.); teeth usually $\frac{4}{1}$, rarely $\frac{5}{1}$, $\frac{3}{1}$, $\frac{5}{2}$ possible $\frac{2}{1}$; upper fringe of papillae inconspicuously broken in middle by a row of teeth or not so broken, and first row of teeth is absent; eye 1.0–1.6 nearer tip of snout than to the spiracle, average 1.3; muscular part of tail 2.2–3.33 in depth of tail, average 2.7; width of body in its own length 1.3–1.6, average 1.4; depth of body 1.25–1.55 in body width, average 1.35; spiracle 1.5–2.2 nearer eye than base of hind legs or vent, average 1.85; internasal space 1.45–2.3 in interorbital space, average 2.0; third lower labial row continuous; median interval of second lower row very narrow. Last lower row of 2.5–3.0 times in next to lower row of teeth; second upper row not or barely broken in middle; egg mass an irregular cylinder, at first handlike.

Texas–California, Mexico. (Pl. 1, fig. 2.)-----*Scaphiopus couchii*.

- d*². Labial teeth $\frac{2}{1}$; papillae confined to the sides of the labium (on lower half only in *Bufo punctatus*) upper and lower edges toothed; papillary border on each side emarginate; eyes slightly nearer lateral outline than mid dorsal line, above lateral axis; spiracle small, a porelike opening; tadpoles 24–28 mm in length-----*Bufo*idae.

- e*¹. Papillae only on lower half of lateral margin; or a slight marginal row of 4 to 6 papillae on upper half; no inner papillae normally; third lower row of teeth equal to the 1st row of lower labial teeth; median space between lateral parts of the 2nd row of upper labial teeth 2–3 times in either lateral row; horny beak 1.2–1.5 in third lower labial row; tadpoles to 25 mm.

One of the blackest *Bufo* tadpoles; tail musculature evenly dotted with black; venter with light grayish vinaceous spots; eggs single or film or scattered mass on bottom, not in files.

Central Texas–California, Utah, Lower California. (Pl. 5, fig. 5.)

Bufo punctatus.

- e*². Papillae on upper and lower halves of lateral labial margin; some inner papillae.

- f*¹. Bicolor tadpoles, light grayish olive, dark olive buff or clay color; the lightest of our toad tadpoles; in life intestine does not show through the skin of the belly (shows in spirits); third lower row of labial teeth short, 1.8–2.4 in first lower row; third lower row 1.5–2.0 times in the horny beak; median space between lateral parts of the 2nd row of upper labial teeth large, 1–2.0 times greater than either lateral part; depth of tail in length of tail 3.0–3.5; horny beak 1.3–1.4 in first or second lower row of teeth; lower loop of papillae to end of third lower row but not under it, usually not two rows; tail musculature with dark vinaceous drab band to tail tip; below this a pale vinaceous pink band; belly pale vinaceous pink; eggs in files or strings, brown or buffy brown above, cream or straw yellow below; no inner tube.

Texas–Mexico, Arizona. (Pl. 5, fig. 6.)-----*Bufo compactilis*.

- f*². Black or blackish tadpoles; in life intestine shows through the skin of the belly; third lower row of labial teeth long, 1.2–1.6 in first lower row; third lower row 1.0–1.5 in horny beak; median space between lateral parts of the 2nd row of upper labial teeth small, contained 2.0–4.9 times in either lateral half, not greater than lateral half.

- g*¹. Papillae very faint, minute, at times hard to see but present; third lower row of labial teeth not equal to 1st lower row of teeth, but equal to or greater than horny beak; horny beak in upper fringe 1.2–1.5 in upper fringe, 1.3–1.5

in 1st lower row; median space of second upper row 2-4 times in either lateral part of it; upper edge of tail musculature with 8-10 black bars with intervening pale olive buff areas; irregular black or brown band on tail with cartridge buff or tilleul buff on below it; tadpoles to 23 mm.

Eggs in files, inner tube, present, one or two rows of eggs.

Louisiana-Costa Rica. (Pl. 5, fig. 7.)-----*Bufo valliceps*.

*g*². Papillae plainly visible.

*h*¹. Tadpole to 24 mm.; horny beak in upper fringe 1.75, in first or second lower row 1.5; horny beak equal to or less than the 3rd lower row of teeth; median space between two parts of second upper row 1.4-2.1 in either lateral part; third lower row of teeth in first lower row 1.2-1.4; two or more rows of strong papillae from end of upper fringe to end of third lower row, sometimes 3-5 rows at side of labium; lower loop of papillae far below level of third row and with at least two rows of papillae; mouth in interorbital space 1.0-1.5, average 1.17; mouth larger than internasal space 1.2-1.6, average 1.36; depth of tail in tail length 2.4-4.5, average 3.27; eye nearer snout than spiracle 1.0-1.57, average 1.2; nostril nearer eye than snout 1.1-1.8, average 1.48. Egg mass long file, inner tube with no partitions.

North Carolina-Florida-Louisiana. (Pl. 1, fig. 9.)-----*Bufo terrestris*.

*h*². Tadpole to 27 mm.; horny beak in upper fringe 1.2-1.5, in first or second lower row of teeth 1.1-1.2 or 1.2-1.3; horny beak greater than 3rd row of lower labial teeth; median space 1.15-2.0, 1-4, or 1.3-3.0 in either lateral part; third lower row of teeth 1.3-1.5 or 1.4-1.5 in first lower row; one row of weak papillae from upper fringe to end of third lower row of teeth with a few scattering papillae at the side of the labium; lower loop with only two or three scattering papillae beside the outer row of weak papillae;

*i*¹. Mouth in interorbital distance 0.77-1.0, average 0.92; horny beak in upper fringe 1.2-1.4; horny beak in first or second row 1.1-1.2 times; third row in first lower row 1.3-1.5; depth of tail in tail length 1.25-2.7, average 1.97; spiracle nearer eye than vent 1.04-1.54, average 1.28; eye nearer snout than spiracle 1.0-1.27, average 1.16; mouth larger than internasal space 1.4-2.2, average 1.76; papillae of lower labial loop do not extend under the end of the end of the third row of labial teeth; tail musculature in tail depth 1.26-2.66, average 2.04; internasal space 1.2-1.8 in interorbital distance, average 1.6; spiracle 1.05-1.55 nearer eye than vent, average 1.28. Egg mass long file, partitions, inner tube present.

Eastern North America from Hudson Bay southwest. (Pl. 1, fig. 7.)

Bufo americanus.

*i*². Mouth in interorbital distance 1.07-1.5; horny beak in upper fringe 1.4-1.5; horny beak in first or second row 1.2-1.3; third lower row 1.3-1.6 in first lower row; depth of tail in tail length 2.88-3.83, average 3.33; spiracle nearer eye than vent 1.25-1.7, average 1.45; eye nearer snout than spiracle 1.0-1.6, average 1.16; mouth larger than internasal space 1.1-1.83, average 1.47; papillae of lower labial loop slightly extend or do not at all extend under the end of the third lower row; tail musculature in tail depth 1.6-2.3, average 1.85, internasal space 1.5-2.16 in interorbital space, average 1.86; spiracle 1.25-1.7 nearer eye than vent or base of hind legs, average 1.45. Egg mass long file, no inner tube, sometimes two rows of eggs.

(Raleigh). (Pl. 1, fig. 8.)-----*Bufo*.

*c*². Anus dextral; spiracle distinctly lateral on or near body axis;

*d*¹. Papillary border on side with an emargination; tadpoles 50-149 mm. in length; papillary fringe on upper labium extends not at all inward beyond the end of the upper fringe of teeth or only $\frac{1}{2}$ to $\frac{1}{8}$ of the length of the fringe; length of horny beak in upper fringe of teeth 1.0-1.5 times; labial teeth $\frac{2}{3}$ or $\frac{3}{4}$ or $\frac{1}{2}$ or more.-----*(Ranidae.)*

- e¹. Labial teeth $\frac{3}{4}$; tadpoles 49–72 mm. in length; dorsal crest very high extending to vertical of the spiracle (*Rana sylvatica*) or tail broader nearer its tip than at its body insertion, rounded, spatulate, or elliptical (*R. boylei sierrae*); upper fringe of teeth about 1.5 times the length of the horny beak.
- f¹. Tadpole to 49 mm.; dorsal crest very high, extends on to the body to vertical of the spiracle; tail tip acuminate; tail musculature begins to taper at once; dorsal crest higher in cephalic half; depth of tail in length of tail 1.9–3.1, average 2.5; spiracle 1.5–2.0 nearer base of hind legs or vent than tip of snout, average 1.75; nostril to snout equidistant to nostril to eye; internasal space in interorbital space 1.7–2.9, average 2.5; depth of body 1.08–1.23 in body width, average 1.14; depth of body 1.66–2.0 in body length, average 1.78; second upper lateral row about $\frac{2}{3}$ of the upper fringe of teeth; the median space between the lateral portions of this second row 0.4–0.8 times either lateral portion; the third upper row is $\frac{1}{4}$ to $\frac{3}{8}$ of the upper fringe; fourth lower row of teeth is $\frac{1}{11}$ to $\frac{1}{7}$ of the first lower row; spiracle 1.0–1.48 nearer eye (5.0–6.0 mm.) than base of hind legs or vent (5.4–7.6 mm.).

Egg mass submerged, globular.

Ontario–Nova Scotia, south to South Carolina. (Pl. 3, fig. 5.)

Rana sylvatica.

- f². Tadpole to 72 mm.; dorsal crest low extending on to body to a vertical twice nearer hind legs than spiracle; tail tip rounded, elliptical or spatulate; tail musculature for an inch or more does not taper; dorsal crest narrow in cephalic half; depth of tail in length of tail 2.5–5.7, average 4.0; depth of body 1.1–1.8 in body width, average 1.43; depth of body in body length 2.0–3.0, average 2.325; spiracle 1.0–1.33 nearer base of hind legs or vent than tip of snout, average 1.17; spiracle 1.45–2.375 nearer eye (4.0–8.0 mm.) than base of hind legs or vent (5.8–12.0 mm.), average 2.05; young tadpoles occasionally with teeth $\frac{2}{3}$ rarely $\frac{3}{4}$; nostril 1.0–1.75 nearer the eye than snout; internasal space 1.3–2.0 in interorbital space, average 1.5; second upper lateral row $\frac{1}{4}$ to $\frac{3}{8}$ of the upper fringe; median space between lateral portions of second upper row 1.0–2.3 times either lateral part; the third upper row is $\frac{1}{4}$ to $\frac{1}{2}$ of the upper fringe; the fourth lower row of teeth is $\frac{1}{4}$ to $\frac{1}{4}$ of the first lower row. (Pl. 3, fig. 4.)-----*Rana boylei sierrae*.
- e². Labial teeth $\frac{2}{3}$ occasionally $\frac{3}{4}$ rarely $\frac{1}{2}$; tadpoles 74–150 mm. in length; dorsal crest not extending to vertical of the spiracle, but usually just ahead of the buds of the hind legs; tail always elliptical not spatulate; upper fringe of teeth equal to or slightly larger (never 1.5 times) the horny beak.
- f¹. Tadpoles 74–84 mm.; tadpoles usually transform the same season they are born; transformation sizes 18–30 mm. average 24 mm. (except *R. aesopus*); tadpoles (except in *R. aesopus*) not strongly pigmented on belly, viscera plainly showing through skin (in spirit specimens).
- Egg mass globular or plinthlike beneath surface of water.
- g¹. Body in tail 2.15–2.85, average 2.6; depth of tail in length of tail 2.6–3.5, average 3.0; nostril 1.0–1.5 nearer eye than snout, average 1.25; eye 1.0–1.3 nearer spiracle than snout, average 1.12; median space between the second upper labial row 1.0–2.0 times the length of either lateral part of this row; third lower row 0.33–0.66 shorter than the first or second rows; tail covered with large prominent dark spots; belly strongly pigmented, in spirits it looks white, viscera not visible.
- South Carolina–Florida–Louisiana (Viosca). (Pl. 2, fig. 4.)--*Rana aesopus*.
- g². Body in tail 1.3–2.2, averages (1.53, 1.6, 1.7); depth of tail in length of tail 2.3–3.4, averages 2.7, 2.65, 3.0; belly not strongly pigmented, in spirits dark, viscera show through the skin.

*h*¹. Median space in second upper labial row 2-4 times the length of either lateral part; third row of lower labial teeth 0.33-0.66 shorter than the first or second rows, usually at least 0.50; eye nearer the snout than spiracle or equidistant; nostril nearer eye than tip of snout; depth of tail in length of tail 2.3-3.2, average 2.7; spiracle 1.5-1.8 nearer eye than snout, average 1.63.

Hudson Bay-Louisiana and Eastern States. (Pl. 2, fig. 3.)—*Rana palustris*.

*h*². Median space 0.5-1.0 or 1.0-1.5 times either lateral part of the second upper row; third row of labial teeth 0.22 or 0.285-0.33 shorter than the first lower row; depth of tail in length of tail 2.0-2.8 or 2.7-3.4.

*i*¹. Median space of second upper row 0.5-1.0 times either lateral part; third lower row of teeth 0.285-0.33 shorter than the first lower row; nostril to snout equal to nostril to eye; eye 1.15-1.3 nearer tip of snout than spiracle. average 1.2; body length in tail length 1.35-1.66, average 1.5; mouth 0.9-1.6 larger internasal space; depth of tail in length of tail 2.0-2.88, average 2.65; tail crest usually with white prominent dark spots; greatest length of tadpole 74 mm.; spiracle 1.1-1.86 nearer eye than snout, average 1.46.

Southeastern States-Louisiana. (Pl. 2, fig. 2.)—*Rana sphenoccephala*.

*i*². Median space 1.0-1.5 times either lateral part; third lower row 0.22 shorter than the first lower row; nostril 1.1-1.5 nearer the eye than snout; eye nearer spiracle than snout 1.1-1.3; body length in tail length 1.3-2.0, average 1.7; mouth larger than internasal space; depth of tail in length of tail 2.7-3.4, average 3.0; tail crest usually translucent with fine spots or pencilings; greatest length of tadpole 84 mm.; spiracle 1.4-1.86 nearer eye than snout, average 1.59.

North America east of Sierra Nevada southward into Mexico. (Pl. 2, fig. 5.)

Rana pipiens.

*f*². Tadpoles 84-142 mm.; tadpoles usually winter over at least one season; transformation sizes 28-59 mm. (except *R. virgatipes* 25-35 mm., possibly *R. onca*); tadpoles usually with strongly pigmented bellies, viscera not plainly showing through the skin (in spirit specimens).

*g*¹. Tadpole with prominent continuous black crest margins and a black musculature band; belly bluish; tadpoles to 95 mm.; young tadpoles black with transverse yellowish band on the body; spiracle 0.86-1.2 nearer vent or base of hind legs than snout, average 1.0; spiracle 0.85-1.2 nearer eye than base of hind legs or vent, i. e., usually equidistant; eye equidistant from spiracle and tip of snout; muciferous crypts very distinct; spiracle below lateral axis; tail tip acuminate; second upper labial row in upper fringe $\frac{1}{3}$ to $\frac{1}{4}$; upper fringe distinctly greater than horny beak; median space between two parts of second upper labial row 1 to $1\frac{1}{2}$ of either lateral part; third lower labial row equal to horny beak; third lower labial row longer than single row of lower papillae; third lower labial row $\frac{1}{4}$ to $\frac{1}{5}$ shorter than first lower row. Eggs unknown.

South Carolina-Florida. (Pl. 3, figs. 1, 2.)-----*Rana heckscheri*.

*g*². Tadpole without black crest margins or lateral band; belly white, cartridge buff, buff or yellow to maize yellows; no transverse yellow band in young tadpoles; spiracle nearer vent than snout 1.1-1.8; spiracle to eye rarely less than 1.25 greater than spiracle to vent; eye near tip of snout than spiracle 1-1.4; second upper labial row in upper fringe $\frac{1}{4}$ to $\frac{1}{5}$; upper fringe equal to or slightly greater than horny beak; median space in either lateral part $1\frac{1}{2}$ to 11; third lower labial row much less (about $1\frac{1}{2}$) than horny beak; third lower row much shorter or equal to single row of lower labial papillae.

*h*¹. Tadpoles to 140 mm.; eye well above lateral axis; muciferous crypts indistinct; spiracle just below lateral axis; spiracle 1.08-1.44 nearer base of hind legs or vent than tip of snout, average 1.26; depth of tail in tail length of tail

2.4-3.5, average 2.8; tail tip obtuse; second upper row in upper fringe $\frac{1}{4}$ to $\frac{2}{5}$; median space in second upper row $1\frac{1}{2}$ in either lateral part; third lower row in first lower row $\frac{1}{4}$ to $\frac{1}{5}$ shorter; teeth $\frac{2}{3}$ rarely $\frac{3}{5}$. Transformation size 43-59 mm.

Egg mass, surface film.

North America east of Rockies. (Pl. 2, fig. 1.)-----*Rana catesbeiana*.

*k*². Tadpoles to 84-100 mm.; eye on or just above lateral axis; tail tip acute or acuminate (rounded in *R. onca*) teeth $\frac{2}{3}$; second upper row in upper fringe $\frac{1}{5}$ to $\frac{1}{15}$; median space in second upper row 2.5-11 in either lateral part; third lower row in first lower row $\frac{1}{2}$ to $\frac{1}{3}$ shorter.

*i*¹. Depth of tail in length of tail 1.45-1.8, average 1.7; tail tip acuminate; dorsal crest equal or less than tail musculature; muciferous crypts indistinct; spiracle 1.08-1.44 nearer vent than snout; mouth in interorbital distance 1.5-2.37, average 1.94; internasal space in interorbital distance 1.8-2.6, average 2.16; second upper row $\frac{1}{5}$ to $\frac{1}{8}$ of the upper fringe; median space of second upper row $2\frac{1}{2}$ to $4\frac{1}{2}$ times either lateral row; third lower row 1.5 less than horny beak, much shorter than single row of lower labial papillae and $\frac{1}{3}$ shorter than first lower row of teeth; first row of lower teeth equal to horny beak. Transformation size 32 or 37-48 mm.; egg mass, a surface film.

Georgia, Florida-Louisiana. (Pl. 3, fig. 7.)-----*Rana grylio*.

*i*². Depth of tail in length of tail 2.5-4.7 averages 3.1-3.87; tail tip acute; dorsal crest less than tail musculature; muciferous crypts distinct; spiracle 1.07-1.8, nearer vent than snout; mouth in interorbital distance 1.3-1.8, average 1.5; internasal space in interorbital space 1.25-2.0 averages 1.6-1.75; second upper row $\frac{1}{5}$ to $\frac{1}{15}$ of the upper fringe; first lower row of teeth equal to or greater than horny beak; spiracle 1.1-1.8 nearer vent than snout.

*j*¹. Tadpoles to 99 mm.; transformation sizes at 29-38 mm.; depth of tail in length of tail 3.2-4.7, average 3.87; spiracle just touches lateral axis; eye just above lateral axis; spiracle 1.06-1.38 nearer eye than base of hind legs or vent, average 1.24; spiracle 1.25-1.6 nearer eye than vent, 1.45; mouth in interorbital distance 1.3-1.75, average 1.55; width of body in its own length 1.3-2.1, average 1.56; third lower labial row of teeth 1.25 less than horny beak, about equal to single row of lower labial papillae, $\frac{1}{3}$ shorter than first lower row; sometimes a row of inner papillae below the third lower row of teeth; median space in second upper labial row 3.5-4.5 times either lateral portion; second upper row $\frac{1}{5}$ to $\frac{2}{15}$ of the upper fringe; belly straw yellow, colonial buff or deep colonial buff; tail with round cartridge buff or pinkish cinnamon spots; no black line in dorsal crest as in *Rana grylio* or *R. virgatipes*.

Eggs in a compact submerged mass.

Hudson Bay-Minnesota, New York-New England. (Pl. 3, fig. 3.)

Rana septentrionalis.

*j*². Tadpoles to 92 mm.; transformation sizes at 25-38 mm.; depth of tail in length of tail 2.5-3.7, spiracle just below lateral axis; eye on lateral axis; third lower labial row of teeth 1.5-1.25 less than horny beak, much shorter than single row of lower labial papillae, almost $\frac{1}{2}$ shorter than first lower row; median space of second upper row 6-11 times the length of either lateral portion; second upper row $\frac{2}{15}$ to $\frac{1}{15}$ of the upper fringe.

*k*¹. Spiracle nearer vent than snout 1.35-1.8; mouth 1.3-1.8 times in interorbital distance, average 1.5; width of body in its own length 1.25-1.7, average 1.47; belly deep cream color; tail green mottled with brown and covered with fine yellow spots. Egg mass, surface film.

Canada-Louisiana-Florida-New England. (Pl. 3, fig. 6.)---*Rana clamitans*.

- k*². Spiracle nearer vent than snout 1.07–1.45, averages 1.23–1.3; mouth 1.0–1.37 in interorbital distance, average 1.12.
- l*¹. Teeth $\frac{2}{3}$ or $\frac{1}{2}$; no inner papillae or few inner papillae from end of the upper fringe to the end of lower labial row; no row of finer papillae below third lower row of teeth; spiracle nearer eye than vent 1.1–1.75, average 1.43; nostril nearer eye than snout, 1.1–1.9, average 1.5; tadpoles (our material 42 mm.) medium; width of body in body length 1.6–2.0, average 1.77; second upper row $\frac{1}{6}$ to $\frac{1}{8}$ of the upper fringe; belly pure white or pale cinnamon pink; tail musculature with black clusters outlining cartridge buff areas; upper tail crest sometimes reticulated with black dots. Lower crest except for caudal half free of spots. Eggs unknown. Transformation size unknown.

Utah and Nevada. (Pl. 5, fig. 2.)----- *Rana onca*.

- l*². Teeth $\frac{2}{3}$ or $\frac{1}{2}$; four to six rows of inner papillae from end of upper fringe to end of lower labial row; a row of heavy inner papillae below the third lower row of teeth; spiracle nearer eye than vent 1.42–1.82, average 1.62; nostril nearer eye than snout; 1.0–1.42, average 1.2; width of body in body length 1.45–1.86, average 1.6; tadpoles large (92 mm.); second upper row $\frac{2}{5}$ or $\frac{1}{5}$ of the upper fringe or second upper row absent; belly pale chalcedony yellow, sulphur yellow, vinaceous, pale grayish vinaceous or vinaceous buff; tail: *upper tail crest with a black line or row of large black spots, more prominent than in R. grylio; middle of musculature with another black line, tail dark with pale chalcedony yellow spots.* Transformation size 25–35 mm.

Eggs a submerged mass.

New Jersey—Okefinokee Swamp, Georgia. (Pl. 5, fig. 1.)-- *Rana virgatipes*.

- d*². Papillary border on side of labium without an emargination; tadpoles 23–50 mm. length; labial teeth $\frac{2}{3}$ or $\frac{2}{5}$ ----- (Hylidae.)
- e*¹. Labial teeth $\frac{2}{3}$; eye dorsal just inside the lateral outline in dorsal aspect (more like Ranids); eye 1.0–1.66 (av. 1.22), nearer tip of snout than spiracle; depth of tail in length of tail 3.25–5.0, average 4.0; suborbital region oblique not vertical; spiracle to eye usually equal distance from spiracle to vent or base of hind legs; spiracle plainly showing from dorsum; *spiracular tube in life stands out at an angle from the body and opening is apart from the body proper*; tail tip conspicuously black (at times lost); papillary border does not extend above the end of the upper fringe (like *Rana*); length of horny beak in upper fringe of teeth 1.2–1.35 times; eggs single, rarely a mass.

New York—Florida—Texas, up Mississippi Valley to Canadian Northwest.

(Pl. 1, fig. 10)----- *Acris*.

- e*². Labial teeth usually $\frac{2}{3}$ (rarely $\frac{2}{5}$); eye lateral, visible from ventral as well as the dorsal aspect; eye 1.0–1.75 nearer the spiracle than tip of snout; depth of tail in length of tail 1.6–4.4, average 2.1–3.55; suborbital region vertical; spiracular tube in life parallel with body and opening at inner edge closely connected with or near to body proper.

Hylidae exclusive of *Acris*.

- f*¹. Labial teeth $\frac{2}{3}$.

- g*¹. Teeth normally $\frac{2}{3}$; tadpole to 23 mm.; spiracle 1.4–1.9 nearer base of hind legs or vent than tip of snout, average 1.42; nostril to eye 1.37–2.0 in nostril to snout, average 1.6; tail crests very clear with fine elongate fleckings; *tail musculature with black brown lateral band with light area below*; single row of papillae on lower labial border below second lower row of teeth; upper fringe somewhat angulate in middle (like *H. femoralis*);

median space between the second upper rows of teeth $4\frac{1}{2}$ to 5 in either lateral row; ends of second lateral row extending not at all or only slightly above the end of the upper fringe; horny beak about 1.5 in upper fringe.

Eggs irregular mass. (Pl. 1, fig. 11.)-----Pseudacris (Buffalo).

- g*². Teeth occasionally $\frac{2}{3}$; tadpole to 33 mm.; spiracle 2.0-2.6 nearer base of hind legs than tip of snout, average 2.16; nostril to eye 2.0 in nostril to snout; tail crests clear, heavily pigmented with purplish black blotches on the outer edge; no prominent dark lateral band with a clear light band below; upper fringe not perceptibly angulate in the middle; two rows of papillae on lower labial border below second lower row of teeth; median space between second upper rows of teeth 2-3 in either lateral row; ends of second lateral row extending $\frac{1}{4}$ to $\frac{1}{2}$; horny beak 1.75-2.25 in length from one end of lateral row to end of the other lateral row.

Eggs, single, submerged.

Manitoba-New Brunswick, South Carolina, Louisiana. (Pl. 4, fig. 1.)

Hyla crucifer.

- f*². Labial teeth $\frac{2}{3}$.

*g*¹. Third row of labial teeth short, shorter than horny beak or 0.20-0.40 of the first lower row in length; upper fringe slightly or not angulate at all; no flagellum ordinarily present; tadpoles 23-50 mm.; light papillary development, lower labial corner not with 3 or 4 strong rows of papillae; one or two rows of papillae below third lower row of teeth; the papillae extend above and beyond the end of the upper fringe for about 0.14-0.285 of the length of the upper fringe.

*h*¹. Tadpoles 23-33 mm.; eye equidistant between spiracle and tip of snout; spiracle 1.4-2.6 nearer vent or base of hind legs than tip of snout; spiracle 1.0-1.6 nearer eye than vent; papillae extend above the fringe for 0.16-0.25 of the length of the fringe.

*i*¹. *Musculature with no distinct brown lateral band with light area below*; crests usually heavily pigmented with purplish black blotches on outer rim; nostril to eye in nostril to snout 2.0; depth of tail in tail length 2.4-3.15, average 2.7; spiracle 2.0-2.6 nearer vent than snout, average 2.16; *no papillae below third lower labial row of teeth, thus appearing as a goatee*; median space between second upper labial row 2-3 in either lateral portion; horny beak in upper fringe 1.75-2.25.

Eggs single, submerged. (Pl. 4, fig. 1.)-----Hyla crucifer.

*g*². *Musculature with a distinct brown lateral band with light area below*; crests usually clear with fine scattered fleckings, sometimes with fleckings gathered nearer outer rim; one or two rows of papillae below the third lower labial row of teeth; nostril to eye in nostril to snout 1.25-2.0; depth of tail in tail length 2.9-4.4, average 3.4, 3.55; spiracle 1.15-2.1 nearer vent than snout, average 1.5-1.875; median space between second upper labial row $2\frac{1}{2}$ or 3-7 in either lateral portion; horny beak in upper fringe 1.5-2.0.

*g*¹. Dorsal crest to vertical of spiracle; spiracle 1.0-1.66 (average 1.33) nearer eye than vent; spiracle 1.15-1.95 (average 1.5) nearer vent than snout; mouth 1.0-1.25 larger than internasal space; two rows of papillae below third lower row of teeth; third labial lower row 0.25-0.33 of the first lower row; first and second lower labial rows 1.25-1.6 greater than the horny beak; horny beak in upper fringe 1.5-1.75; median space between second row of upper row $2\frac{1}{2}$ or 3-7 in either lateral portion. (Pl. 1, fig. 12.)

Pseudacris (Raleigh).

*g*². Dorsal crest to vertical midway between spiracle and eye; spiracle equidistant between eye and vent; spiracle 1.7-2.1 (average 1.875) nearer vent than snout; mouth and internasal space equal; one row of papillae below the

third lower row of teeth; third lower labial row of teeth 0.33 of the first lower row; *dorsum of body in life with definite scattered black spots*; musculature with three bands, apricot buff (light) chestnut brown (dark) martius yellow (light); first and second lower labial rows 2.0 greater than the horny beak; horny beak in upper fringe 2.0; median space between second row of upper labial teeth 3-4 in either lateral portion.

Eggs single.

South Carolina-Florida-Louisiana (Viosca). (Pl. 1, fig. 13.)

Pseudacris ocularis.

*h*². Tadpoles 35-50 mm.; eye 1.0-1.75 nearer spiracle than snout; spiracle 1.0-1.6 nearer vent than the tip of the snout; spiracle 1.25-2.5 nearer eye than vent or base of hind legs; papillae extend above the upper fringe for 1.4-0.285 of the length of the fringe.

*i*¹. Tadpoles 50 mm. in length; body in tail 2.3-3.25, average 2.5; depth of body in width of body 0.83-1.0, average 0.9; depth of tail 10-14 mm.; beautiful green tadpoles; young tadpoles with a black saddle spot on the back of the musculature near its base and with a light line from eye to tail; one row of papillae below lower third labial row; papillae extending above upper fringe for 0.25-0.285 of the fringe's length; dorsal crest extending to a vertical half-way between eye and spiracle.

Eggs single, submerged.

South Carolina-Florida-Louisiana (Viosca). (Pl. 4, fig. 2.)—*Hyla gratiosa*.

*i*². Tadpoles 35-45 mm.; body in tail 1.1-2.0, average 1.6; depth of body in width of body 1.0-1.8; depth of tail 5-9 mm.; no black saddle spot in young tadpoles.

*j*¹. Tadpole small (35 mm.); dorsal crest extending to vertical halfway between spiracle and the base of the hind legs; depth of tail in tail length 2.5-3.5, average 3.0; nostril to eye 1.2-2.1 in nostril to snout; mouth in interorbital space 1.33-2.6; internasal space in interorbital distance 1.33-2.2; eye just touches lateral axis or is below it; horny beak in upper fringe, 1.5-1.7; papillae extending beyond the end of the upper fringe 0.25-0.285 of the length of the upper fringe; two rows of papillae below third lower labial row; median space between second upper labial row 1.25-2.0 in either lateral portion; third lower labial row 0.20-0.22 of the first lower row; first row of lower labial teeth 1.0-1.5 times the horny beak. Eggs strewn in water amongst sphagnum (Noble and Noble).

New Jersey-South Carolina. (Pl. 4, fig. 3.)-----*Hyla andersonii*.

*j*². Tadpole medium (40 and 45 mm.). Dorsal crest extends ahead of spiracle or to eye; depth of tail in tail length 1.5-3.2, average 2.75; nostril to eye 1.0-1.7 in nostril to snout; mouth in interorbital space 1.4-2.0; internasal in interorbital space 1.25-2.0; eye on lateral axis; papillae extending beyond end of upper fringe 1.4-2.5 of the length of the upper fringe; median space in second upper labial row 3-5 in either lateral portion; third labial row 0.25-0.40 of the first labial lower row; first row of lower labial teeth 1.0-1.3 greater than the horny beak.

*k*¹. Dorsal crest to the vertical halfway between spiracle and the eye; depth of body in body length 1.7-2.5; musculature of tail in depth of tail 1.75-2.4, average 1.9; spiracle 1.4-2.3 nearer eye than vent; mouth 1.0-1.4 larger than internasal space, average 1.25; two rows of papillae below the third lower row of labial teeth; papillae extend beyond the end of the upper fringe 0.22-0.25 of the length of the fringe; horny beak in upper fringe 2.0-2.3; third labial lower row 0.25-0.40 the length of the first lower row.

Eggs surface or submerged irregular mass.

Virginia-Florida-Texas-Illinois. (Pl. 4, fig. 4.)-----*Hyla cinerea*

- k*². Dorsal crest extending to the vertical of the posterior edge of the eye; depth of body in body width 1.5–2.0; musculature in depth of tail 2.3–2.8, average 2.5; spiracle 1.6–1.75 nearer eye than snout; mouth 1.0–1.2 larger than internasal space; one row of papillae below the third lower labial row of teeth; papillae extend beyond the end of the upper fringe 0.14–0.20 of the length of the upper fringe; horny beak in upper fringe 1.4–1.8; third labial lower row 0.25–0.33 the length of the first lower row.

Eggs loose irregular mass.

Vancouver–Lower California, Nevada. (Pl. 4, fig. 5.)-----*Hyla regilla*.

- g*². Third row of labial teeth long, longer than horny beak, or 0.75–1.00 of the first lower row in length; upper fringe very angulate in middle; flagellum on tail; tadpoles 32–50 mm.; heavy papillary development, lower labial corner with three or four rows of papillae; two more or less complete rows of papillae below third row of teeth (except in *Hyla arenicolor*); papillae extend above and beyond the end of the upper fringe for about 0.30–0.40 the length of the upper fringe.
- h*¹. Third lower labial row 0.80–1.00 of the length of the first lower row; dorsal crest extends to the vertical halfway from hind legs to spiracle, to spiracle or halfway from spiracle to eye; dorsal crest equal to, greater or less than depth of tail musculature; tadpoles 36–50 mm.; red may be present in the tail; tail crest distinctly or more or less clear of spots next the musculature; tail heavily blotched with dark blotches or spots.
- i*¹. Medium space between lateral upper rows 5.0–10.0 times in either lateral row; spiracle 1.44–2.5 nearer eye than vent; width of body in its own length 1.6–2.1; eye 1.0–1.7 nearer spiracle than tip of snout; tail sometimes suffused with coral red, coral pink, or “reddish” or “orange.”
- j*¹. Medium space between lateral upper rows of teeth contained 6.0–10.0 in either lateral row; 1st and 2nd lower rows of teeth 1.4–1.6 greater than horny beak; mouth equal to internasal space; depth of tail in length of tail 1.6–2.75, average 2.25; muscular part of tail in depth of tail 1.8–2.3, average 2.1; depth of body 1.33–2.2 in body length, average 1.68; dorsal crest usually equal to or greater than musculature depth; center of belly solid sulphur yellow; tail 3–5 banded; light lateral band bounded below and above by a brown band; flagellum clear of pigment; body olivaceous black.

Eggs a surface film.

North Carolina–Florida–Texas. (Pl. 4, figs. 7, 9.)-----*Hyla femoralis*.

- j*². Medium space between lateral upper rows contained 5.0–10.0 times in either lateral row; first and second lower rows of teeth 1.5–2.0 greater than horny beak; third lower row of teeth may be equal to or slightly shorter than the first lower row; no or few papillae beneath the third lower row of teeth, surely not a complete row; mouth in internasal space 0.83–1.7, average 1.3; depth of tail in length of tail 2.85–5.15, average 3.75; musculature of tail in depth of tail 1.28–1.76, average 1.6; depth of body in body length 1.75–2.3, average 2.0; dorsal crest half way to or to vertical of the spiracle; dorsal crest less than the musculature; flagellum or tail tip spotted; body greenish olive or deep olive; center of belly solid pale cinnamon pink.

Western Texas (Devil’s River, Fort Davis Mountains, etc.)–Utah, California, Mexico.

Eggs single, submerged (Atsatt and Storer). (Pl. 5, fig. 3.)--*Hyla arenicolor*.

- i*¹. Medium space between lateral upper rows contained 3.25–5.0 times in either lateral row; spiracle 1.12–1.5 nearer eye than vent; eye about equidistant between spiracle and tip of snout; internasal space in mouth 0.7–1.0; dorsal crest extends to vertical of spiracle or half way between eye and spiracle; dorsal crest equal to or greater than musculature depth; muscular part of

tail in depth of tail 1.72-1.9, average 1.8; depth of tail in length of tail 3.1-4.0; width of body in its own length 1.3-1.7; *no lateral bands in tail; tail more or less scarlet or orange vermillion with black blotches more prominent near the margins of the crests.* Bodies olive green; belly conspicuously white or very light cream.

Eggs a surface film.

Minnesota-Texas-Maine-Florida. (Pl. 4, fig. 8.)-----*Hyla versicolor.*

- h². Third labial lower row 0.75 of the length of first row; dorsal crest extends to the vertical of the posterior edge of the eye; dorsal crest usually less than depth of the musculature; tadpoles to 32 mm.; width of body in its own length 1.7-2.2, average 1.875; depth of tail in length of tail 2.2-3.3, average 2.8; third lower row of teeth not equal to first lower row; median space between lateral upper rows contained 3.25-5.0 times in length of either lateral row; papillae extends above and beyond the ends of the upper fringe for 0.3-0.33 of the upper fringe; horny beak in upper fringe 1.8-2.0; no bands nor red in tail; tail crest clear, *uniformly sprinkled with distinct black dots*; body greenish (like *H. cinerea* or *Hyla gratiosa*); belly testaceous, or chalcidony yellow.

Eggs single, submerged.

Texas-Indiana-Florida-Virginia. (Pl. 4, fig. 6.)-----*Hyla squirella.*

2. DESCRIPTION OF THIRTY-FOUR MATURE TADPOLES, MOSTLY FROM EASTERN AND SOUTHERN UNITED STATES

Each color description from life was made in the field. The topics of general appearance, mouth parts, relative measurements, and largest measurements are based on preserved material. Several species collected during the southwestern trips of 1917 and 1925, such as *Bufo compactilis*, *Bufo valliceps*, and *Bufo punctatus*, are not included.

GASTROPHRYNE TEXENSIS (Girard)

Plate 6, figure 3

Color description from life (May 27, 1925).—Dorsal parts citrine drab or grayish olive or light grayish olive or even deep grayish olive. In minute appearance the dorsum is smoke gray or a pale smoke gray. In fact, the tadpole sometimes in general looks drab. Hind legs, if developing, same colors as dorsum; with black or dark grayish olive cross bands on the toes; one or two bands on the tibia.

Belly.—Either side of middle for one-third to one-sixth inch is a clear line of pale grayish vinaceous or light vinaceous fawn. Between these lines the belly is light vinaceous purple. In chin region and lower belly pale pinkish cinnamon areolar areas more or less outlined by dots of black. Just ahead of the branchial pore two clear tulleil buff lines with considerable clear black between them.

Tail.—White or pale cinnamon pink band from body on musculature one-third inch or more in length, distinct, and in middle of musculature. Above and below tail musculature spotted smoke gray, or light grayish olive and black or citrine drab and black. Rest of

tail musculature almost clear citrine drab except for lower rim or edge. Most of dorsal crest and caudal tip at lower crest heavily spotted with large black spots and these on the outer half of the crest. Tail tip almost completely black. Space between black more or less colonial buff or sulphur yellow.

In *G. texensis*, tadpoles are grayish in cast, not so purplish or brownish as in *G. carolinensis*. Venter and side of belly with round light areas but not prominent stripes as in *G. carolinensis*. In alcohol, light bands on basal tail musculature on sides remain in *G. carolinensis*. There is no prominent bands of this sort or faintly so in *G. texensis* and in alcohol they are not apparent.

General appearance.—Tadpole small (23 mm.), flat, wide, less elliptical or round than that of *G. carolinensis*; snout less truncate than in *G. carolinensis*. Tail medium, obtuse or rounded, regularly with black tip. Dorsal or ventral crest not equal to musculature. The dorsal crest at least to the vertical of the developing hind legs. Spiracle median as in *G. carolinensis*. Anus median as in *G. carolinensis*. Eye on lateral axis but less so than in *G. carolinensis* and not so plainly visible from ventral aspect. Canthus more or less as in *G. carolinensis*. Muciferous crypts indistinct.

Mouth parts.—Teeth $\frac{0}{0}$. No horny mandibles; no labial teeth; no papillae; upper labial edge very black and emarginate in the middle. In *G. texensis* this edge is very much more black and prominent than in *G. carolinensis*. On the back of this edge appear little black excrescences or points not observed in *G. carolinensis*. In center of lower labium is a gray-colored median beaklike prolongation.

Measurements.—Length of body (10–11 mm.) in tail (12–15.4 mm.) 1.09–1.54, average 1.28. Width (6.0–7.5) of body in its own length 1.44–1.66, average 1.52. Depth (4.0–6.0) of body 1.25–1.75 in body width, average 1.49. Depth of body 1.83–2.47 in body length, average 2.26. Depth (3.6–4.4) of tail in length of tail 3.–3.5, average 3.3. Muscular part (2.8–3.4) 1.17–1.46 in depth of tail, average 1.29.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	25.0	Spiracle to vent.....	---
Body length.....	10.0	Spiracle to eye.....	---
Body depth.....	4.4	Eye to snout.....	3.0
Body width.....	6.0	Eye to nostril.....	---
Tail length.....	15.4	Nostril to snout.....	---
Tail depth.....	4.4	Mouth.....	4.0
Musculature of tail.....	3.0	Interorbital distance.....	4.0
Spiracle to snout.....	---	Internasal distance.....	---

GASTROPHRYNE CAROLINENSIS (Holbrook)

Plate 6, figure 1

Color description from life (July 7, 1921).—General color black, overlaid with very fine light purplish gray or quaker drab or hair-brown dots. Transverse stripe of belly divided in middle and apricot yellow or buff yellow in color. Along either side of belly a light buff stripe. Another such stripe on either side of the gill region. Sometimes whole venter with small light buff or pale orange yellow spots heaviest on belly and sides and lightest on throat. The interspaces are purplish gray, violet gray or plumbeous.

Tail with light buff or white stripe along middle or muscular part of tail. After the first one-half inch, the stripe breaks up into spots, which finally disappear caudally. Above and below this continuous stripe is clear black. Above this black is light purplish gray or quaker drab dots. Quaker drab not in lower crest. Lower and upper crests on caudal half with muscular part heavily blotched with black or rather light purplish gray or hair brown giving the tail tip almost a black appearance.

General appearance.—Tadpole small (26.4 mm.), flat, wide, elliptical, snout sometimes somewhat truncate. Tail medium, obtuse or rounded, sometimes with black tip. Dorsal and ventral crests not equal to depth of the musculature. The dorsal crest scarcely extends onto the body, reaching a vertical somewhat ahead of developing hind legs. Spiracle median, closely associated with anus, just ahead of it, not very apparent until hind legs begin to appear, when it becomes separated from the anus. Eye is on the lateral axis, distinctly lateral in position. From one eye to snout and around to the other eye the tadpole has a prominent canthus made by the flat ventral and dorsal sides of the head. Anus median at the end of the edge of the ventral crest. Muciferous crypts indistinct.

Mouth parts.—Teeth $\frac{0}{0}$. No horny mandibles; no labial teeth; no papillae; upper labial edge dark and quite emarginate in the middle; just below this emargination is a lower light-colored median beak like prolongation on the margin of the lower labium.

Measurements.—Length of body (9.2–10.8 mm.) in tail (9.8–16.4 mm.) 1.06–1.77, average 1.37. Width (6.8–8.0 mm.) of body in its own length 1.3–1.65, average 1.43. Depth (4.4–5.0 mm.) of body 1.35–1.65 in body width, average 1.5. Depth of body 2.0–2.3 in body length, average 2.15. Depth (3.2–5.0 mm.) of tail in length of tail 2.4–4.25, average 3.15. Muscular part (2.4–3.6 mm.) 1.16–1.66 in depth of tail, average 1.32. Spiracle just in front of vent. Nostril within lateral edge of mouth fold. Mouth (2.0–3.0 mm.) contained 1.5–2.25 (average 1.93) in interorbital distance (4.5–6.5 mm.).

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	26.4	Spiracle to vent.....	-----
Body length.....	10.0	Spiracle to eye.....	-----
Body depth.....	4.8	Eye to snout.....	4.4
Body width.....	7.0	Eye to nostril.....	-----
Tail length.....	16.4	Nostril to snout.....	-----
Tail depth.....	5.0	Mouth.....	2.4
Musculature of tail.....	3.0	Interorbital distance.....	4.8
Spiracle to snout.....	-----	Internasal distance.....	-----

SCAPHIOPUS HOLBROOKII (Harlan)

Plate 6, figure 6

Color description from life (June 23, 27, 1922).—General appearance bronzy. Upper parts brownish drab, benzo brown, vinaceous drab. Upper parts with many close set spots of apricot orange or vinaceous tawny which on the top of upper tail crest become merged into a conspicuous bittersweet orange ridge of color. Throat and gill region with little of the orange vinaceous spots of upper parts. Gills can be seen through the skin. Spots on belly clear yellow green in places.

Tail.—Muscular part brownish drab, benzo brown, vinaceous drab. Crests translucent. Upper crest with thin edge of dots and interlacing lines. This arrangement goes around the tip. Rest of under crest translucent—no edging. On the caudal half of lower edge of the muscular part the muscle segments are more or less outlined by the light color making emarginations between the black dots. The same arrangement for the dorsal third of the muscular part of the tail.

Iris and eye black, small; eyes close together.

General appearance.—Tadpole small (28.0 mm.), broad, and large bodied but not deep. Body has from dorsal aspect a *Limulus*-like appearance. Tail short, tip blunt rounded. Body unlike *Bufo*, broader nearer eye than vent. Dorsal crest and ventral crests not deep nor greater than depth of musculature. Dorsal crest extends on to the body to a vertical just ahead of the developing hind legs, is perceptibly nearer hind legs than spiracle. Spiracle sinistral, far below lateral axis, as much or more ventral than lateral, opening more rectangular or slitlike than in our tadpoles in general. Spiracle about on the level of the mouth. Eye on the lateral axis (of tail musculature projected) very dorsal in position. The eyes close together, nearer the mid-dorsal axis than the lateral outline, in fact nearer together than in *Bufo*. Anus median at the end of the edge of the ventral crest. Muciferous crypts in preserved specimens at least indistinct.

Mouth parts.—Teeth $\frac{6}{6}$, $\frac{6}{5}$, $\frac{5}{6}$, $\frac{5}{5}$. Whole labium (upper and lower) with continuous row of papillae except on the upper labium where a pronounced median interval is toothed. This median row is about equal to the first lower labial row of either side. From upper labial interval of teeth downward either side and across the lower labial border there is at least one row of inner papillae. Opposite the ends of the horny beaks are several rows of them filling in the space between upper and lower labia. The next series of teeth (the second) below the upper toothed interval is usually not continuous rarely continuous. Usually one median end slightly overlaps the end of its counterpart of the other side. The third series has a short median interval one-half the distance of the upper toothed interval or first series or slightly more than a similar interval in the third lower labial series. Either half of the upper third series is slightly less in length than the horny beak and about equal to either half of the lower third series. Either half of the fourth series is longer than a similar half of the first lower labial series or shorter than that of the second series. The interval of this fourth row is about two-thirds the length of the horny beak or contained one and one-third to one and one-half times in the interval of the first lower labial series. The fifth series is a short lateral row about equal to the lateral row of second lower labial series. Beneath the fifth series and very closely placed to it is a short row almost opposite the end of the horny beaks. On the lower labium are five series, the first three not continuous, the last two continuous. The median interval of the first lower labial series is about equal to the horny beak in length. The interval of the second series is usually about equal to or less than the interval of fourth upper series. The interval of the third lower series is very short indeed, shorter possibly than the interval of the third upper series. The fourth continuous lower row is 1.6–1.7 times the horny beak in length. The fifth continuous lower row is 1.4–1.5 times in the fourth continuous lower row.

Measurements.—Length of body (10–12.2 mm.) in tail (12.8–17.6 mm.) 1.1–1.7, average 1.34. Width (6.0–7.4 mm.) of body in its own length 1.4–1.8, average 1.64. Depth (4.0–6.8 mm.) of body 1.03–1.50 in body width, average 1.23. Depth of body 1.73–2.5 in body length, average 2.04. Depth (3.4–5.4 mm.) of tail in length of tail 2.5–4.0, average 3.14. Muscular part (2.0–3.0 mm.) 1.45–2.5 in depth of tail, average 1.98. Spiracle 1.24–1.66 nearer base of hind legs or vent region (4.4–6.0 mm.) than the tip of the snout (7.0–8.0 mm.), average 1.41. Spiracle equidistant between eye (1.44–5.8 mm.) and base of hind legs or vent (14.4–6.0 mm.), average 1.0. Eye 1.4–1.8 nearer to tip of snout (3.0–3.6 mm.) than to spiracle (4.4–5.8 mm.) average, 1.52. Nostril 1.5–2.25 nearer eye (1.0–1.8 mm.) than snout

(2.0–3.0 mm.), average 1.9. Mouth (3.0–4.0 mm.) usually 1.66–2.5 larger than internasal space (1.2–2.0 mm.), average 2.08. Mouth usually contained 1.0–1.66 larger (average 1.3) than in interorbital distance (2.0–3.2 mm.). Internasal space contained in interorbital space 1.28–1.83, average 1.56.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	28.0	Spiracle to vent.....	6.0
Body length.....	12.0	Spiracle to eye.....	5.2
Body depth.....	5.0	Eye to snout.....	3.6
Body width.....	6.4	Eye to nostril.....	1.8
Tail length.....	16.0	Nostril to snout.....	2.4
Tail depth.....	4.4	Mouth.....	3.0
Tail musculature of.....	3.0	Interorbital distance.....	3.0
Spiracle to snout.....	7.6	Internasal distance.....	2.0

SCAPHIOPUS HAMMONDII Baird

Plate 6, figures 4, 5

Color description from life (July 12, 1925).—Back olive lake in general appearance. The belly color with black of back gives the olive lake or buffy citrine color. Back marbled with bright green yellow or light green and black giving general color above. Ahead of eye old gold appearance.

Tail.—Lower part and tip of tail musculature black. Top of cephalic half of musculature colored as the dorsum of body. A solid line of bright green yellow or light yellow green on top of musculature. Tail fins clear with rufous or bittersweet orange suffusion in parts and on the edges. Iris above and below pupil with half moon of lemon yellow; black vertical bar in front and behind pupil. Rest of eye black with dottings of bright green yellow. The tadpoles sometimes appear clay colored, or of vinaceous or buffy tints or very pale to pale olive buff or tilleul buff.

General appearance.—Tadpole large (65.0 mm.), broad, and not deep. Body from dorsal aspect is sometimes almost round. Dorsal and ventral sides of the front part of the body flatten out to a canthus-like edge in which the mouth seems, when not open, to be a mere slit. Tail medium to short; tail tip rounded. Dorsal and ventral crests about equal to depth of the musculature or sometimes less than it. The dorsal crest extends on to the body to a vertical ahead of the hind legs but not beyond the midway vertical between the hind legs and the spiracle. Spiracle very low, almost ventral, far below lateral axis and about on a level with mouth parts. Spiracular opening a long oblique slit directed backward and upward. Eye dorsal but on the lateral axis. Eyes close together, much nearer mid-dorsal line than lateral outline. Anus median, at the end of the edge of the ventral

crest. Muciferous crypts indistinct in preserved specimens. Sometimes the tadpoles do not grow big before transformation.

Mouth parts.—Teeth $\frac{4}{4}$, $\frac{3}{4}$, rarely $\frac{5}{4}$. Whole labium (upper and lower) with a continuous row of papillae except on the upper labium where a short median interval is toothed. This median row, unlike the tadpole of *S. holbrookii* is not equal to the first lower labial row of teeth, but is contained 1.5–2.9 times or more in this row. There is no inner row of papillae. The next row of teeth below the toothed interval is interrupted, the inner ends of this row seldom extending much below the ends of the toothed intervals unlike *S. holbrookii*, i. e., the median interval in the second row about equals the first row, or is slightly less. The third row has a wide median interval two to three times the first papillary toothed row. Either half of the third row is 0.4–0.3 times of the mandibular beak and about equal to the second lower labial row. Either one part of the fourth row is equal or sometimes twice the median interval of the second upper row. The fifth may be present on each side or absent on one side and present on the other, but usually is absent on each side.

On the lower labium are four series, the first three not continuous in the middle, the last continuous. The median interval of the first row is considerably less than the horny beaks and greater than the fourth series of teeth. The interval of the second series is usually about or less than that of the third upper row. The third lower series has a very slight median interval, less than the first dorsal row or the median interval of the second upper row. The fourth and last row is about equal to either lateral half of the upper second row or one half the length of the horny beak. Last row of teeth 1.75–2.0 in next to last lower row of teeth.

Measurements.—Length of body (17–28.0 mm.) in tail (23–37.0 mm.) 1.32–1.66, average 1.49. Width (12.6–18.0 mm.) of body in its own length 1.55–1.9, average 1.66. Depth (12–15.5 mm.) of body 1.05–1.15 in body width, average 1.09. Depth of body 1.6–2.0 in body length, average 1.79. Depth (10.6–15.5 mm.) of tail in length of tail 2.05–2.9, average 2.44. Muscular part (4.4–6.5 mm.) 2.25–2.66 in depth of tail, average 2.43. Spiracle 1.25–1.35 nearer base of hind legs or vent region (10–13 mm.) than the tip of the snout (13.0–17.5 mm.), average 1.30. Spiracle 1.25–1.6 nearer eye (7.8–10.5 mm.) than base of hind legs or vent, average 1.37. Eye 1.1–1.3 nearer to tip of snout (6.0–9.0 mm.) than to spiracle (7.8–10.5 mm.) 1.1–1.3, average 1.2. Nostril 1.4–2.5 nearer eye (2.0–2.0 mm.) than snout (4.0–6.0 mm.), average 2.05. Mouth (4.8–5.5 mm.) usually 1.8–2.5 larger than internasal space (2.0–3.0 mm.), average 2.25. Mouth contained 1–1.16 (average 1.08) in interorbital distance (5.0–5.6 mm.). Internasal space contained in interorbital space 2.5–2.75, average 2.6.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	65.0	Spiracle to vent.....	13.0
Body length.....	28.0	Spiracle to eye.....	10.5
Body depth.....	15.5	Eye to snout.....	9.0
Body width.....	18.0	Eye to nostril.....	3.0
Tail length.....	37.0	Nostril to snout.....	6.0
Tail depth.....	15.5	Mouth.....	5.5
Musculature of tail.....	6.5	Interorbital distance.....	5.5
Spiracle to snout.....	17.5	Internasal distance.....	3.0

SCAPHIOPUS COUCHII Baird

Plate 6, figure 7

Color description from life (June 5, 1925).—General appearance bronzy. Black everywhere, finely dotted with old gold, or light grayish vinaceous or vinaceous fawn or orange cinnamon. Some times all these colors are seen in the different angles of view or bright green yellow be added. Spots sometimes adjoin and form a vermication on dorsum. Entire underparts are spotted except around the spiracle. Spots less thick on cephalic third of venter. On the caudal two thirds, same spottings as on dorsum, yet intestine shows through the skin.

Tail.—Upper half of musculature spotted, some of the lower half and tail tip free of spots. Upper and lower tail crests transparent.

Iris black with spots or dots of the above colors described for dorsum of body.

General appearance.—Tadpole small (24.5 mm.), broad, head possibly more pointed than tadpole of *S. holbrookii*. Tail shorter than in *S. holbrookii*, tip blunt, rounded. Dorsal and ventral crests as deep as or greater than musculature. Dorsal crest extends on to the body to a vertical as near spiracle as vent or nearer spiracle. Spiracle low, almost ventral, more lateral than in *S. holbrookii*. Eyes dorsal, close together, as near mid-dorsal line as lateral outline. Anus median at the end of the edge of the ventral crest. Muciferous crypts in preserved specimens at least indistinct.

Mouth parts.—Teeth, $\frac{2}{4}$, usually $\frac{4}{4}$, rarely $\frac{5}{4}$, $\frac{3}{6}$ or $\frac{5}{5}$. Whole labium with a continuous row of papillae or inconspicuously broken in the middle of upper labium; inner papillae scarce. First row of teeth very short, or absent; the second row of upper teeth continuous in middle some times barely broken in middle; the third upper row has a wide median interval 2-3 times the first papillary toothed row. A fifth upper row may be present on each side or only one side.

On the lower labium are usually four series of teeth, the first two not continuous in the middle, the last two continuous. The interval of second row is very short; last lower row of teeth 2.5-3 times in next to

last row. Sometimes above the normal first row may occur a fifth series.

Measurements.—Length of body (10–11 mm.) in tail (14–15.5 mm.) 1.3–1.5, average 1.4. Width (7.0–8.5 mm.) of body 1.3–1.6 in its own length (10–11 mm.), average 1.4. Depth (5.4–6.0) of body, 1.25–1.55 in body width, average 1.35. Depth of body 1.66–2.0 in body length, average 1.9. Depth (5.0–6.0) of tail in length of tail 2.5–2.9 average 2.65. Muscular part (1.8–2.5), 2.2–3.33 in depth of tail, average 2.7. Spiracle 1.16–1.6 nearer tip of snout (5.0–6.0) than base of hind legs or vent (6.0–8.0) average 1.3. Spiracle 1.5–2.2 nearer eye (3.2–4.5) than base of hind legs or vent (6.0–8.0), average 1.85. Eye 1.0–1.6 nearer to tip of snout (2.8–3.4) than to spiracle (3.2–4.5) average 1.3. Nostril 1.4–2.2 nearer eye (1.0–1.6) than snout (2.18–3.4) average 1.85. Mouth (2.4–2.8) usually 1.5–2.15 larger than internasal space (1.2–1.6) average 1.85. Mouth contained 1.0–1.33 average 1.12 in interorbital distance (2.0–3.2). Internasal space contained in interorbital space 1.45–2.3, average, 2.0.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	24.5	Spiracle to vent.....	6.0
Body length.....	11.0	Spiracle to eye.....	4.0
Body depth.....	5.5	Eye to snout.....	3.0
Body width.....	8.5	Eye to nostril.....	1.0
Tail length.....	14.5	Nostril of snout.....	2.2
Tail depth.....	5.0	Mouth.....	2.6
Musculature of tail.....	2.0	Interorbital distance.....	3.0
Spiracle to snout.....	6.0	Internasal distance.....	1.4

BUFO TERRESTRIS Bonnaterra

Color description from life (July 7, 1921).—General color is black with scattered dots, which are pale purplish vinaceous. Venter black with few scattered light purplish vinaceous spots, but not clustered to make one continuous mass of color as on the belly of *B. quercicus*.

Tail.—Upper crest spotted, but not so strongly as in *Bufo quercicus*. Lower crest almost clear of spots. Lower edge of muscular part white or light chalcedony yellow.

General appearance.—Body small (26 mm.), ovoid, broader nearer vent than eyes. Dorsal aspect shows body decidedly tapers ahead of the eyes. Dorsel crest low, extends but slightly on to the body to a vertical just ahead of the buds of the hind legs. Dorsal and ventral crests about equal and about equal to the depth of the musculature. Tail short, tip rounded. Spiracle sinistral, directed mainly backward, somewhat upward, below the lateral axis. Eye above lateral axis. Eyes dorsal, close together, slightly nearer lateral outline than mid-dorsal line. Anus median, opening in a level lower

than the lower edge of the ventral crest. Muciferous crypts indistinct.

Mouth parts.—Teeth $\frac{2}{3}$. Upper labium fringed with a continuous row of labial teeth, the papillae extending only to each end of this fringe. The end of the second upper row does not extend beyond the end of the upper fringe. The median space between the two parts of the second row is contained 1.4–2.1 times the lateral row. Horny beak about equal to or slightly less than the third lower labial row of teeth or contained 1.75 times in the upper fringe, or about 1.5 times the first or second row of lower labial teeth, which are about equal. The third row of lower labial teeth may be contained 1.2–1.4 times in the length of the second or first lower lateral row. Rows of papillae at least two, very prominent, sometimes 3–5 rows at corner of mouth. Lower loop of papillary border very prominent with at least two distinct rows of papillae. This loop sometimes extends slightly beneath the end of the third row of teeth. This loop decidedly lower in level than end of the third labial lower row.

Measurements.—Length of body (8.0–9.8 mm.) in tail (9.0–15.0 mm.) 1.05–1.66, average 1.3. Width (5.2–7.0 mm.) of body in its own length 1.36–1.74, average 1.51. Depth (3.6–5.0 mm.) of body 1.22–1.6 in body width, average 1.36. Depth of body 1.86–2.25 in body length, average 2.07. Depth of tail (2.4–5.0 mm.) in length of tail 2.4–4.5, average 3.27. Muscular part (1.4–2.2 mm.) 1.5–3.0 in depth of tail, average 2.11. Spiracle 1.0–2.0 nearer base of hind legs or vent region (3.6–6.0 mm.) than the tip of the snout (4.8–7.4 mm.), average 1.51. Spiracle 1.0–1.53 nearer eye (2.8–4.4 mm.) than base of hind legs or vent, average 1.26. Eye 1.0–1.57 nearer to tip of snout (2.6–3.8 mm.) than to spiracle (2.8–4.4 mm.), average 1.19. Nostril 1.1–1.8 nearer eye (1.0–1.8 mm.) than snout (1.6–2.6 mm.), average 1.48. Mouth (2.0–2.8 mm.) usually 1.2–1.6 larger than internasal space (1.6–2.4 mm.), average 1.36. Mouth contained 1.00–1.5 (average 1.17) in interorbital distance (2.0–3.4 mm.). Internasal space contained in interorbital space 1.1–2.1, average 1.56.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	24.0	Spiracle to vent.....	4.5
Body length.....	9.8	Spiracle to eye.....	4.0
Body depth.....	5.0	Eye to snout.....	3.0
Body width.....	7.0	Eye to nostril.....	1.4
Tail length.....	14.2	Nostril to snout.....	2.2
Tail depth.....	4.8	Mouth.....	2.8
Musculature of tail.....	1.6	Interorbital distance.....	3.4
Spiracle to snout.....	6.8	Internasal distance.....	2.0

BUFO AMERICANUS Holbrook

Plate 6, figure 12

*Color description from life (not Ridgway).—*The ground color is a very dark brown or black overlaid with many fine gold and silvery spots, these aggregated in a few places. The venter is like the back, but the aggregate of bright spots are more silvery and more or less iridescent (coppery). The muscular portion of the tail is dark, like the back, with a few gold-spotted areas. The crests are *cloudy transparent*.

*General appearance.—*Body small (27 mm.), ovoid, broader nearer vent than eyes. Dorsal aspect shows body decidedly tapers ahead of eyes. Dorsal crest low, extends but slightly on to the body to a vertical just ahead of the buds of the hind legs. Dorsal and ventral crests about equal to depth of the musculature. Tail short, tip rounded. Spiracle sinistral, directed mainly backward but slightly upward, considerably below the lateral axis. Eye above the lateral axis. Eye quite dorsal, more or less closely together slightly nearer lateral outline, but almost equidistant between lateral outline and mid-dorsal line. Anus median, opening on a level lower than the lower edge of the ventral crest.

*Mouth parts.—*Teeth $\frac{2}{3}$. Upper labium fringed with a continuous row of labial teeth, the papillae extending only to each end of this fringe. The end of the second upper row does not usually extend beyond the end of the upper fringe. The median space between these two lateral parts of the second row is contained in either lateral row of teeth 1.15–2 times normally (1.0 or 3–4 times). The horny beak is contained about 1.2–1.4 in upper fringe or almost as long as first or second lower labial row of teeth. First and second lower labial rows of teeth equal and about 1.1 to 1.2 times longer than horny beak. Third row of lower labial teeth is contained about 1.3–1.5 times in the first or second lower labial row. Papillary border of weak papillae (as compared with *B. terrestris*). Lower loop of papillae not pronounced as in *B. terrestris*. One row of papillae from upper fringe to lower third labial row except for a few scattering papillae.

*Measurements.—*Length of body (7.0–10.2 mm.) in tail (11.1–17.6 mm.) 1.3–1.7, average 1.49. Width (4.2–7.4 mm.) of body in its own length 1.25–1.7, average 1.52. Depth (3.2–5.6 mm.) of body 1.26–1.56 in body width (4.8–7.4 mm.), average 1.35. Depth 2.4–5.0 mm.) of tail in length of tail 1.25–2.7, average 1.97. Muscular part (1.4–2.6 mm.) 1.26–2.66 in depth of tail, average 2.04. Spiracle 1.3–1.8 nearer base of hind legs or vent region (2.8–5.4 mm.) than the tip of the snout (4.4–7.4 mm.), average 1.54. Spiracle 1.04–1.54 nearer eye (2.0–4.0 mm.) than base of hind legs or vent (2.8–5.4

mm.), average 1.28. Eye 1.0–1.27 nearer to tip of snout (2.2–3.4 mm.) than to spiracle (2.0–4.0 mm.), average 1.16. Nostril nearer eye than snout. Mouth (1.8–2.6 mm.) usually 1.4–2.2 larger than internasal space (1.0–1.5 mm.), average 1.76. Mouth contained 0.77–1.0 (average 0.92) in interorbital distance (1.8–2.4 mm.). Internasal space contained in interorbital space 1.3–1.8, average 1.6.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	27.8	Spiracle to vent.....	4.8
Body length.....	10.2	Spiracle to eye.....	4.0
Body depth.....	5.6	Eye to snout.....	3.4
Body width.....	7.4	Eye to nostril.....
Tail length.....	17.6	Nostril to snout.....
Tail depth.....	5.0	Mouth.....	2.4
Musculature of tail.....	2.4	Interorbital distance.....	2.4
Spiracle to snout.....	7.4	Internasal distance.....	1.4

BUFO from Raleigh, N. C.

Plate 1, figure 8

General appearance.—Body small (27 mm.), ovoid, greatest width nearer the vertical of the vent than that of the eyes. Dorsal crest low, extends onto the body slightly, to a vertical just ahead of the hind legs. Dorsal and ventral crests about equal, and about equal in depth to tail musculature. Spiracle sinistral, directed mainly backward, somewhat upward, below lateral axis. Eye just above lateral axis. Eyes dorsal close together slightly nearer lateral outline than mid-dorsal line. Anus median, opening on or slightly below the lower edge of lower crest. Muciferous crypts indistinct.

Mouth parts.—Teeth $\frac{2}{2}$. Upper labium fringed with a continuous row of labial teeth, the papillae extending only to each end of the upper fringe. The end of the second upper row of teeth does not extend beyond the end of the upper fringe. The median space between the two parts of the second row is contained 1.3–3.0 times in either lateral row. Horny beak contained 1.4–1.5 times in the upper fringe 1.2–1.3 times in first or second lower labial row of teeth and slightly larger than the third row. The third row is contained 1.3–1.6 times in the first lower row. One row of papillae from end of upper fringe to end of third lower row of teeth. On lower loop at end of third lower row only two or three scattering inner papillae. This loop of papillae extends slightly underneath the end of the third row as in *B. terrestris*. The papillary border in general is more like that of *B. americanus*.

Measurements.—Length of body (8.4–11.0 mm.) in tail (12.4–17 mm.) 1.2–1.7, average 1.43. Width (5.6–6.4 mm.) of body in its own length 1.4–1.77, average 1.62. Depth (4.0–5.0 mm.) of body 1.2–1.5 in body width, average 1.3. Depth of body 1.75–2.35 in

body length, average 2.12. Depth (4.0–6.0 mm.) of tail in length of tail 2.88–3.83, average 3.33. Muscular part (2.0–2.6 mm.) 1.60–2.30 in depth of tail, average 1.85. Spiracle 1.1–1.5 nearer base of hind legs or vent region (4.2–5.8 mm.) than the tip of the snout (6.0–7.0 mm.). Spiracle 1.25–1.7 nearer eye (3.2–3.8 mm.) than base of hind legs or vent, average 1.45. Eye 1.0–1.6 nearer to tip of snout (3.0–3.6 mm.) than to spiracle (3.2–3.8 mm.) average 1.16. Nostril 1.4–2.75 nearer eye (0.8–1.6 mm.) than snout (1.4–2.2 mm.) average 1.9, mouth (2.0–2.6 mm.), usually 1.1–1.83 larger than internasal space (1.2–2.0 mm.), average 1.47. Mouth contained 1.07–1.5 (average 1.07–1.5) in interorbital distance (2.6–3.6 mm.). Internasal space (1.4–2.0 mm.) contained in interorbital space 1.5–2.16 average 1.86.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	27.0	Spiracle to vent.....	5.4
Body length.....	10.0	Spiracle to eye.....	3.8
Body depth.....	4.8	Eye to snout.....	3.2
Body width.....	6.2	Eye to nostril.....	1.0
Tail length.....	17.0	Nostril to snout.....	2.0
Tail depth.....	6.0	Mouth.....	2.6
Musculature of tail.....	2.6	Interorbital distance.....	2.8
Spiracle to snout.....	6.8	Internasal distance.....	1.6

BUFO QUERCICUS Holbrook

Plate 6, figure 8

Color description from life (July 7, 1921).—General coloration of the body is grayish olive, olive lake, grape green, or ecru olive, produced by close set dots of lighter color over a blackish background. Very few small black spots on the back. In one two-legged specimen general color quaker drab or of the vinaceous group. There is a black spot over the nostril and one over each eye. The belly is pale purplish vinaceous; the throat and mentum with no bright color. Gill region with clusters of deep olive buff or the general colors above.

Tail.—The upper crest much more heavily marked than in *Bufo terrestris*. Lower crest is also more or less marked with black. Along the dorsum of the muscular part of the tail are six or seven black saddles. Along the ventral edge of muscular part are small black clusters but not so prominent as dorsal saddles. In a two-legged specimen alternation of dark and light on tail musculature for eight or nine spots. Along the back of body proper the characteristic paired spots (four or five of them) appear.

Iris black and general colors above.

RANA SYLVATICA LeConte

Plate 7, figure 4

Color description from life (not Ridgway).—Background of back and sides greenish black marked with fine gold and with a few orange spots; also with iridescent areas, particularly on the sides, giving the whole a greenish brown appearance. A cream line extends along the upper jaw. The venter has a cream ground; belly slightly pigmented at the sides; gill region quite heavily pigmented, but overlaid with silver spots; throat region a lavender gray with fine dark and silver spots, the whole venter iridescent, giving the belly a distinct pinkish bronze appearance. Iris of eye bronze. Tail somewhat lighter than body, the pigment graded evenly over the muscular portion and crests, but as a whole darker above; small gold spots are scattered over the surface, some of which become iridescent.

General appearance.—Tadpole medium (49.8 mm.), full, and deep bodied. Venter not strongly pigmented. Tail quite long, tip decidedly acuminate or attenuate. Dorsal crest very high, greater than width of musculature and extending on to body to the vertical through the spiracle, more in this respect like our *Hyla* tadpoles. Ventral crest as well developed as dorsal crest. Spiracle sinistral and directed upward and backward, distinctly below lateral axis. Eye on lateral axis, almost on the lateral outline in dorsal aspect and farther from mid-dorsal axis than any other eastern Ranid. Eyes just visible from venter. Anus dextral, opening on the level of the edge of the ventral crest. Muciferous crypts indistinct.

Mouth parts.—Teeth $\frac{3}{4}$. Upper labium with a fringe on its upper edge, this fringe much longer than the beak (about one and one-half times beak). The second row of lateral upper labial teeth is very long, is about two-fifths of the upper fringe. The median space is usually two-fifths to four-fifths of the length of one of the lateral rows. The end of the second lateral row often extends beyond the end of the upper fringe. The third upper labial row is usually about one-half of the length of the second row or one-fourth or two-ninths of the length of the upper fringe. The lower labium has four rows of teeth. The first three are of about equal length, and these are longer than the beak. The fourth row of labial teeth is about equal to the single row of lower labial papillae. The fourth row is six-elevenths to seven-elevenths of the first row of lower labial teeth. The labium on either side with inner papillae to the end of the four lower labial row.

Measurements.—Length of body (14.4–17.2 mm.) 1.5–2.2 in tail (23.8–33.2 mm.), average 1.8. Width (9.4–12.6 mm.) of body in its own length 1.3–1.58, average 1.41. Depth of body 1.08–1.23 in body width, average 1.14. Depth of body 1.66–2.0 in length of body,

average 1.78. Depth of tail 1.9–3.1 in length of tail, average 2.5. Muscular part (4.2–6.4 mm.) 1.75–2.8 in depth of tail (10.0–13.8 mm.), average 2.47, rarely below 2.0. Spiracle 1.5–2.0 nearer base of hind legs or vent region, (5.4–7.6 mm.) than the tip of the snout (10.4–12.4 mm.), average 1.73, rarely reaching 2.0 or under 1.7. Spiracle 1.0–1.48 nearer eye (5.0–6.0 mm.) than base of hind legs or vent (5.4–7.6 mm.), average 1.18. Eye equidistant, sometimes nearer to tip of snout (4.6–6.0 mm.) than spiracle (5.0–6.0 mm.). Nostril equidistant from snout and eye (2.8–3.6 mm.). Mouth (2.0–3.8 mm.) usually 1.1–1.9 larger than internasal space (1.8–3.0 mm.), average 1.72. Mouth contained 1.36–2.0 average 1.62 in interorbital distance (5.0–6.4 mm.). Internasal space contained in interorbital space 1.7–2.9, average 2.5, seldom under 2.0.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	49.8	Spiracle to vent.....	7.6
Body length.....	16.6	Spiracle to eye.....	5.4
Body depth.....	13.8	Eye to snout.....	5.4
Body width.....	12.6	Eye to nostril.....	2.8
Tail length.....	33.2	Nostril to snout.....	2.8
Tail depth.....	10.6	Mouth.....	3.4
Musculature of tail.....	5.0	Interorbital distance.....	5.0
Spiracle to snout.....	11.8	Internasal distance.....	2.0

RANA BOYLII SIERRAE Camp

General appearance.—Tadpole fairly large (72 mm.), body flatter than most Ranid tadpoles. It is distinctive in that the tail musculature is wide and keeps the same width for an inch or an inch and one quarter and then suddenly tapers off. Tail very long, tip very bluntly rounded. The crests are broader back near the tail tip than nearer the insertion on the body. The rear half of the tail might be termed elliptical in outline, or the tail tip might tend toward a spatulate tail. The broadest part of the tail comes where the musculature finally begins to taper. The dorsal crest is very narrow forward and extends on to the body to a vertical twice as near the buds of the hind legs as the spiracle. Spiracle sinistral, below lateral axis, decidedly upturned and somewhat backward in direction, with a prominent round or elliptical pore very evident.

Anus dextral, opening on a level with the edge of the ventral crest. Muciferous crypts distinct. In preserved material they look like brown or black pigment spots not white as in *R. hecksheri* or some other Ranid species. On either side of dorsal crest for a distance back of its body insertion there extends a row of crypts which go diagonally outward on the body and finally joins the main dorso-lateral series which starts from the mid-lateral insertion of the tail musculature on the body. This lateral series travels to back of the

eye where the supraorbital branch goes over eye and above nostril on to snout above the mouth. This same lateral branch sends off an infraorbital branch which in front of the eye swings far downward away from the nostril and ends near the corner of the tadpole mouth. Just back of the eye the infraorbital branch sends a loop upward and then abruptly downward to the venter where it goes forward as a mandibular branch to the mouth. Another lateral series low on the body runs evenly forward until it loops over the spiracle.

Mouth parts.—Teeth $\frac{3}{4}$. The teeth are after the *R. sylvatica* type. Occasionally in some of the young forms it may be two-four or rarely two-three. The upper labium is fringed with a row of teeth much larger than the beak (about one and one-half times the beak). The second row of lateral teeth is of medium length, is about one-fourth to two-ninths of the length of the upper fringe. The median space between this second row of upper labial teeth is one to two and three-tenths times the length of either lateral row. The third upper labial row is about one-half of the length of the upper fringe. The lower labium has four rows of teeth, the first two about equal and sometimes the third also equal to the other two or slightly shorter. The first row often subdivided and sometimes the second row. The fourth row is equal to the single row of lower labial papillae, is one-third or one-half to four-ninths the length of the first lower row. Inner papillae on side of labium extend to the end of the fourth lower labial row of teeth.

Measurements of average tadpole.—Length of body (16–23.5 mm.) in tail (6.0–11.0 mm.) 1.36–2.05, average 1.60. Width (9.5–15.0 mm.) of body in its own length 1.45–1.85, average 1.63. Depth (7.0–11.0 mm.) of body 1.1–1.8 in body width, average 1.43. Depth of body 2.0–3.0 in body length, average 2.325. Depth (6.0–11.0) of tail in length of tail 2.5–5.7, average 3.93. Muscular part (3.5–6.0 mm.) 1.33–3.0 in depth of tail, average 2.0. Spiracle 1.0–1.33 nearer base of hind legs or vent region (9.0–12.0 mm.) than the tip of the snout (9.5–14.0 mm.), average 1.17. Spiracle 1.45–2.375 nearer eye (4.0–8.0 mm.) than base of hind legs or vent (5.8–12.0 mm.), average 2.05. Eye 1.875–1.33 nearer to tip of snout (30–6.0 mm.) than to spiracle (4.0–8.0 mm.), average 1.11. Nostril 1.0–1.75 nearer eye (2.0–3.0 mm.) than snout (3.0–4.0 mm.), average 1.32. Mouth (3.0–4.0 mm.) usually 1.08–1.75 larger than internasal space (2.0–3.5 mm.), average 1.33. Mouth contained 1.0–1.7 (average 1.17) in interorbital distance (3.0–6.0 mm.). Internasal space contained in interorbital space 1.3–2.0, average 1.53.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	72.0	Spiracle to vent.....	11.5
Body length.....	23.5	Spiracle to eye.....	8.0
Body depth.....	11.0	Eye to snout.....	6.0
Body width.....	15.0	Eye to nostril.....	2.6
Tail length.....	48.5	Nostril to snout.....	4.0
Tail depth.....	8.5	Mouth.....	3.8
Musculature of tail.....	5.6	Interorbital distance.....	4.5
Spiracle to snout.....	14.5	Internasal distance.....	3.5

RANA AESOPUS (Cope)

Plate 7, figure 1

Color description from life (August 1, 1922).—At times the tadpole has a very greenish cast. Color on top of the head olive yellow, olive yellow, olive lake or old gold ahead of level of eyes. Back of eye level yellowish citrine or olive citrine where there are no black spots.

About four irregular series of black spots between lateral line series of spots of either side. Lateral line pores closely set and lateral line canal distinct to the tip of the tail. A dark spot on each upper eyelid. A dark spot or spots in interorbital space. Top of head ahead of eye with several fairly large spots. Spots most distinct and numerous from nostril to base of muscular part of the tail, being on the sides interspersed with light pinkish cinnamon or pinkish buff. This color is present on muscular tail and slightly on upper and lower crests as small clusters. This light pinkish cinnamon or pinkish buff merges into the block color of the belly which is cream-buff, colonial buff, or naples yellow. This block color breaks up in gill or branchial region becoming clusters of fine dots or spots. Below eye to either side of branchial region is some light vinaceous cinnamon or vinaceous fawn. Middle of branchial region without this color. Mental region without these colors but with a slight fine dark specking of black lines.

Background color of the tail mignonette green. Upper crest and muscular part with large spots of black. Lower crest without large distinct spots except at the tip.

Iris rim around pupil orange or cadmium orange to light cadmium. Rest of iris black with mignonette green or apple green fine dots.

General appearance.—Tadpole large (84.0 mm.), full, and deep-bodied. Venter strongly pigmented so that viscera do not show through in life or in preserved condition. Tail long, tip obtuse or acute. Dorsal crest in depth sometimes equal to or greater than the depth of the musculature and extending on to body somewhat ahead of the vertical of the buds of the hind limbs. Spiracle sinistral, directed upward and backward. Spiracle distinctly below the lateral axis. Eye above or slightly on lateral axis, and near lateral outline

in dorsal aspect than mid dorsal line. Muciferous crypts distinct. The dorsal row from either side of the insertion of the dorsal crest extends obliquely forward and outward to join the principal lateral row which extends from above the middle of the tail musculature to back of the eye. Here it forks, sending a supraorbital branch far past the nostril to snout and an infraorbital branch also to the snout and quite far below the nostril in its course. Below the principal lateral series is a lower one on side around the spiracle but forward it is not very distinct.

Mouth parts.—Teeth $\frac{2}{3}$. Edge of upper labium slightly larger than beak and fringed with teeth. In either corner a row of teeth about one-third to one-fourth of the upper fringe. The outer end of this lateral row usually (abnormal in figure in this regard) does not extend beyond the end of the upper fringe. The median space between lateral rows is one to two times either row, nearer the condition in *R. pipiens*. The third lower row about equal or slightly larger than single row of lower labial papillae, one-third to two-sevenths shorter than first or second rows which are equal and larger than the beak. The tadpole is clearly of the *R. pipiens* or *R. sphenocephala* type.

Measurements.—Length of body (28–33.5 mm.) in tail (74–81 mm.) 2.15–2.85, average 2.62. Width (13.5–19 mm.) of body in its own length 1.6–2.07, average 1.8. Depth (12–15 mm.) of body 0.88–1.7 in body width, average 1.14. Depth of body 1.5–2.4 in body length, average 2.01. Depth (10–18.5 mm.) of tail in length of tail 2.6–3.5, average 3.05. Muscular part (6–9 mm.) 1.45–1.9 in depth of tail, average 1.75. Spiracle 1.1–1.7 nearer base of hind legs or vent region (14–16.5 mm.) than the tip of the snout, average 1.36. Spiracle 1.4–2.0 nearer eye than base of hind legs or vent, average 1.55. Eye 1.0–1.3 nearer to spiracle (5.0–7.0 mm.) than tip of snout (6–9 mm.), average 1.12. Nostril 1–1.5 nearer eye (2.5–5.0 mm.) than snout (3.0–6.0 mm.), average 1.25. Mouth (3.0–5.0 mm.) usually 0.84–1.26 larger than internasal space (2.8–5.0 mm.), average 1.06. Mouth contained 1.25–1.66 (average 1.5) in interorbital distance (4.5–8.0). Internasal space contained in interorbital space 1.3–1.9, average 1.57.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	81.0	Spiracle to vent.....	14.0
Body length.....	29.0	Spiracle to eye.....	7.0
Body depth.....	14.0	Eye to snout.....	9.0
Body width.....	15.0	Eye to nostril.....	4.0
Tail length.....	53.0	Nostril to snout.....	6.0
Tail depth.....	15.0	Mouth.....	5.0
Musculature of tail.....	8.0	Interorbital distance.....	8.0
Spiracle to snout.....	17.0	Internasal distance.....	4.2

RANA PALUSTRIS LeConte

Plate 7, figure 2

Color description from life (not Ridgway).—Background of body olive green, shading through yellowish on the sides and front of head to cream on the venter, the back being marked with fine black and yellow spots. The yellow is more marked at the base of the tail and in the region of the mouth. Blotches of white pigment occur on the belly. From the gill region forward, black as well as white pigment is prominent. The whole venter is conspicuously iridescent. The tail is very dark, particularly toward the tip the whole marked with fine black and golden-yellow punctulations, the yellow ones usually aggregate; these groups of yellow spots are more numerous toward the base of tail. In some specimens the dark punctulations are so numerous as to make the tail *purplish black*, a condition (when present) making these tadpoles almost as distinctive as the vermilion-tailed tadpoles of *Hyla versicolor* class.

General appearance.—Tadpole large (76 mm.), full, and deep bodied. Venter not strongly pigmented so that viscera show through, at least in preserved specimens. Tail medium, tip obtuse or acute. Dorsal crest not equal in depth to musculature depth, and extending on to body somewhat ahead of the vertical through the buds of the hind legs. Spiracle sinistral, directed upward and backward, slightly below the lateral axis. Eye on or just above the lateral axis and near the lateral outline in dorsal aspect than the mid dorsal line. Anus dextral, the opening on a level with the edge of the ventral crest. Muciferous crypts present.

Mouth parts.—Teeth $\frac{2}{3}$, rarely $\frac{1}{3}$. Edge of upper labium longer than beak and fringed with teeth. In either corner a row of teeth one-fifth to 1.7 of the upper fringe, the outer end of this lateral row not extending beyond the end of the upper fringe. The median space between lateral rows two to four times the length of the lateral row. The second upper labial row or the lateral one, so called, is sometimes absent or faint on both sides or on one side. The first lower labial row sometimes subdivided. The third lower row slightly shorter than the single row of lower papillae, two-thirds to one-third (usually about one-half) shorter than the first or second rows, which are about equal and which are about equal to or slightly larger than the beak.

Measurements.—Length of body (19.2–25.6 mm.) 1.4–1.9 in tail, average 1.6. Width (11.8–18.0 mm.) of body in its own length 1.4–1.85, average 1.6. Depth (10–14.2 mm.) of body 1.07–1.26 in body width, average 1.15. Depth of body 1.69–1.92 in length of body, average 1.83. Depth of tail in length of tail 2.3–3.2, average 2.7.

Muscular part 1.8–2.2 in depth of tail, average 2.0. Spiracle 1.2–1.9 nearer base of hind legs or vent region than the tip of the snout, average 1.6. Spiracle (5.2–6.4 mm.) nearer eye than 1.5–1.8 base of hind legs or vent (9–10.2 mm.), average 1.63. Eye equidistant, sometimes nearer to tip of snout than to spiracle. Nostril nearer eye than end of snout. Mouth usually 0.9–1.8 larger than internasal space, average 1.2. Mouth contained 0.85–2.1 in interorbital distance, average 1.45. Internasal space contained in interorbital space 1.5–2.1, average 1.8.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	75.8	Spiracle to vent.....	14.2
Body length.....	27.0	Spiracle to eye.....	8.2
Body depth.....	15.4	Eye to snout.....	8.0
Body width.....	17.8	Eye to nostril.....	4.2
Tail length.....	48.8	Nostril to snout.....	5.0
Tail depth.....	13.0	Mouth.....	5.0
Musculature of tail.....	8.0	Interorbital distance.....	7.0
Spiracle to snout.....	17.4	Internasal distance.....	3.8

RANA SPHENOCEPHALA (Cope)

Plate 7, figures 9, 10

Color description from life (June 23, 1921).—On sides of the body and over the back yellowish olive or oil green, warbler green, or olive green. The back and sides are with conspicuous black spots. On the sides and over the branchial and pectoral regions is a mottling of light brownish vinaceous or pale vinaceous drab, giving a bronzy appearance. The middle of the belly is a solid color pale cinnamon pink, light vinaceous cinnamon, or vinaceous cinnamon.

Tail.—The muscular part of the tail, upper and lower crests, are with larger black conspicuous spots than the body. The tail has some pale purplish gray, purple gray, pale violet-gray, or violet gray.

Iris black heavily punctate with greenish yellow dots; inner rim orange.

General appearance.—Tadpole large (74.5 mm.), full, and deep bodied. Venter (like that of *R. pipiens*) not strongly pigmented, so that viscera clearly show through in life or in preserved specimens. Tail medium in length, tip acute. Dorsal crest in width not equal to depth of musculature and extending on to body somewhat ahead of the vertical of the hind legs. Spiracle sinistral, decidedly upward and backward in direction, just below axis of the body. Eye on lateral axis and nearer lateral outline in dorsal aspect than mid dorsal line. Anus dextral, opening on level of the edge of the ventral crest. Spiracular opening round or elliptical. Muciferous crypts more or less distinct in mature tadpoles and sometimes quite distinct in half-grown tadpoles. The dorsal row of either side starting near the dorsal crest goes diagonally forward and outward to join the principal lateral

row, which goes from above the middle of the insertion of the tail musculature to back of the eye, where a supraorbital and an infraorbital branch goes forward.

Mouth parts.—Teeth $\frac{2}{3}$ or $\frac{3}{3}$. Upper labium edged by a fringe of teeth, the fringe longer than the beak. Below either end of this fringe is a long row of teeth about two-fifths to one-third the length of the upper fringe. The median space one-half to one time the length of the lateral row. Usually it is less than once the lateral row, while in *R. pipiens* it is almost invariably more than once the lateral row. In many tadpoles as they approach transformation there appear in either corner a short third row of labial teeth on both sides or sometimes on one side only. Also in mature tadpoles it not infrequently appears. For example, in 1912 we secured 23 tadpoles of this species, of which 6 had the third row on either side, this row 0.33–0.24 the length of the second row, and in 3 specimens the third row was present on only one side. On the lower labium are three rows of teeth. The third row is shorter than the single row of labial papillae, one-third to two-sevenths shorter than the second or first rows, or about one-sixth to one-fifth shorter than the horny beak. First and second lower labial rows about equal and slightly longer than beak. First one is sometimes subdivided in the middle.

Measurements.—Length of body (19.0–25.0 mm.) in tail (28.5–37.5 mm.) 1.35–1.66, average 1.53. Width (1.0–16.0 mm.) of body in its own length 1.56–2.1, average 1.77. Depth (9.0–15.0 mm.) of body 0.8–1.36 in body width, average 1.1. Depth of body 1.5–2.3 in body length, average 1.95. Depth (10.5–16.5 mm.) of tail in length of tail 2.0–2.88, average 2.65. Muscular part (6.0–9.5 mm.) 1.35–2.35 in depth of tail, average 1.80. Spiracle 1.2–1.7 nearer base of hind legs or vent region (8.0–14.0 mm.) than the tip of the snout (12.5–16.0 mm.), average 1.46. Spiracle 1.1–1.86 nearer eye (5.0–9.0 mm.) than base of hind legs or vent, average 1.46. Eye 1.15–1.3 nearer to tip of snout (5.0–7.0 mm.) than to spiracle (5.0–9.0 mm.), average 1.2. Nostril to snout equal to nostril to eye each 3.0–5.0 mm. Mouth (3.0–5.0 mm.) usually 0.9–1.6 larger than internasal space (2.2–5.0 mm.), average 1.25. Mouth contained 1.4–2.0 (average 1.68) in interorbital distance (5.5–7.5 mm.). Internasal space contained in interorbital space 1.4–2.3, average 1.95.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	62.5	Spiracle to vent.....	14.0
Body length.....	25.0	Spiracle to eye.....	7.5
Body depth.....	15.0	Eye to snout.....	6.5
Body width.....	16.0	Eye to nostril.....	4.5
Tail length.....	37.5	Nostril to snout.....	3.5
Tail depth.....	13.0	Mouth.....	4.5
Musculature of tail.....	9.5	Interorbital distance.....	7.0
Spiracle of snout.....	15.0	Internasal distance.....	5.0

RANA PIPIENS Schreber

Plate 7, figure 7

Color description from life (not Ridgway).—Background of back a dark brown, covered with fine gold spots and many aggregate ones on sides, the general appearance somewhat similar to that of the green frog but darker. Background on front of head rather orange. The belly is deep cream, covered with bronzelike iridescence. The gill region is pigmented with dark toward the sides, is covered all over with gold spots, and is iridescent. The throat area is translucent and more extensive than in the pickerel frog.

Tail.—Unlike the pickerel-frog tadpole, the tail is conspicuously lighter than the body, the crests being translucent and *marked* with scattered fine spots and pencilings. Gold spots occur toward the base of the tail. The eye is bronze.

General appearance.—Tadpole large (86 mm.), full, and deep bodied. Venter not strongly pigmented so that viscera clearly show through in life or preserved specimens. Tail medium in length and acute. Dorsal crest not equal in width to the musculature and extending on to body somewhat ahead of the vertical of the buds of the hind limbs. Spiracle sinistral, decidedly upward and backward in direction, below lateral axis of body. Spiracular opening plainly visible as an elliptical or round opening. Eye on lateral axis and nearer lateral outline in dorsal aspect than mid-dorsal line. Anus dextral, opening on level of edge of vertical crest. Muciferous crypts indistinct.

Mouth parts.—Teeth $\frac{2}{3}$. Edge of upper labium longer than beak and fringed with teeth. In either corner a rather long row of teeth about one-third to one-fourth the length of the upper fringe. The outer end of the lateral row about even with end of the upper fringe. The median space between lateral rows one to one and one-half times either lateral row. The third row of lower labial teeth shorter than single row of lower labial papillae, one-fourth to one-fifth shorter than horny beak, and about two-ninths shorter than first lower labial row which is longer somewhat than beak and often subdivided. The lower third row not relatively as short as in *R. palustris*, *R. clamitans*, *R. septentrionalis*, *R. grylio*, etc.

Measurements.—Length of body (19.6–28.2 mm.) 1.3–2.2 in tail length, average 1.7. Width (13–19.6 mm.) of body in its own length 1.4–1.7, average 1.5. Depth (10–14 mm.) of body 1.04–1.39 in body width, average 1.17. Depth of body 1.66–2.1 in length of body, average 1.91. Depth of tail (10.4–16.4 mm.) 2.7–3.4 in length of tail (34.2–56.2 mm.), average 3.0. Muscular part (5.2–8.8 mm.) 1.6–2.4 in depth of tail (10.4–16.4 mm.), average 1.9. Spiracle 1.25–1.7 nearer base of hind legs or vent region (9.2–12.6 mm.) than the tip of the snout (13.6–19.4 mm.), average 1.5, rarely reading 1.7 or under

1.35. Spiracle 1.40–1.86 nearer eye (5.8–8.6 mm.) than base of hind legs or vent (9.2–12.6 mm.), average 1.59. Eye 1.1–1.3 nearer spiracle (5.8–8.6 mm.) than to snout tip (6.6–8.6 mm.). Nostril 1.1–1.5 nearer eye (3.0–4.8 mm.) than snout (4.0–5.2 mm.), average 1.3. Mouth (4.2–5.0 mm.) usually 1.1–1.5 larger than internasal space (3.0–4.6 mm.), average 1.25. Mouth contained 1.3–1.8, average 1.48 in interorbital distance (5.8–8.0 mm). Internasal space contained in interorbital space 1.5–2.2, average 1.8, seldom over 2.0.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	84.0	Spiracle to vent.....	12.6
Body length.....	28.0	Spiracle to eye.....	8.0
Body depth.....	16.4	Eye to snout.....	8.0
Body width.....	18.8	Eye to nostril.....	4.0
Tail length.....	56.0	Nostril to snout.....	5.0
Tail depth.....	14.8	Mouth.....	5.2
Musculature of tail.....	8.0	Interorbital distance.....	7.0
Spiracle to snout.....	17.8	Internasal distance.....	3.8

RANA HECKSHERI Wright

Plate 8, figures 1, 3

Color description from life (July 21, 1922).—Body dark greenish olive or olive, finally covered with pale green-yellow or pale greenish-yellow flecks or spots on the dorsum. On venter they are vinaceous fawn, vinaceous cinnamon, or orange vinaceous. Just back of angle of mouth in a mature tadpole and on the venter is a clump of four to six much larger spots. Lower belly pale forget-me-not blue to upper belly and breast jay-blue, Chapman's blue, or grayish violaceous blue. Spots of back become thicker on lower belly and at times almost touch or make patches of color. Lateral line pores very prominent on the head and body.

Ventral half of muscular part of the tail light salmon orange or apricot buff or vinaceous cinnamon or ochraceous salmon. Upper half of the muscular part with a black band on caudal two-thirds and more or less merged into body color at its basal third. The black bandlike effect is produced by oblique bars of black where the muscle commas are. These overshadow the intervening body color. Whole rim of tail or edge of crests black, least just in front of the vent.

Iris rim above and below orange-cinnamon, tawny, vinaceous-tawny or orange-rufous or better vinaceous-rufous. Iris rim in front and behind pupil black.

General appearance.—Tadpole quite large (95 mm.), usually black of body, and the most striking of all our (U. S.) *Rana* tadpoles. Belly pigmented, so intestine does not show through in preserved specimens. Tail elongate, tip acuminate; dorsal crest not as wide

as musculature width; not much different from lower crest and not extending on body beyond the vertical through the buds of the hind limbs. Spiracle sinistral, just visible from dorsal aspect, divided backward and somewhat obliquely upward. Spiracle usually with a distinct semicircular impression on body and opening. Opening leaving exposed an elliptical or hemispherical patch on body. Spiracle clearly below lateral axis (musculature axis). Eye on or just above lateral axis but in dorsal aspect nearer lateral outline than mid-dorsal axis. Anus dextral, opening at edge of ventral crest.

Muciferous crypts distinct, white; a short dorsal row of a few pores on either side of middle line of the back from the dorsal crest forward; from above the middle line of insertion of tail musculature on body to a short distance behind eye a prominent dorsolateral row; apparently resumed behind eye after an interval and continued as supra-orbital and infraorbital lines to above and below the nostril; another lateral row from above insertion of hind legs to gill region where a ventral commissure goes across to the row of the other side. A third of the distance across the ventral branchial region, a branch from the commissure goes outward and forward along the jaw region almost to the mouth.

Mouth parts.—Teeth $\frac{2}{3}$ or $\frac{3}{3}$. Edge of upper labium greater than length of upper horny beak and fringed by a continuous row of teeth. Sometimes this fringe is broken up, as in figure. In either corner, beneath this fringe, is a short row of teeth about one-fourth to one-third of the length of the upper fringe. The outer end of this second row never reaches outward beyond the first fringe. Median space between these second-row teeth, one to one and one-half times the length of either lateral series of the second row. In some median-sized tadpoles the space may be greater and the second row much shorter or rarely absent. The third upper row very short, frequently absent in young and medium-aged tadpoles. From above the end of the first upper labial row of teeth to beneath the end of the third lower labial row are two or three irregular rows of papillae which are continued across lower labium's edge as one serrate row. The third labial row longer than this single row of papillae, equal to length of horny beak but one-fourth to one-fifth shorter than first and second rows, which extend beyond the ends of the horny beak. The first row is continuous or broken in the middle.

Measurements.—Length of body (32.0–41.5 mm.) in tail (50–57.5 mm.) 1.4–1.85, average 1.625. Width of body (15.0–22.5 mm.) in its own length 1.4–2.4, average 1.8. Depth (13–20 mm.) of body 0.9–1.6 in its own width, average 1.14, rarely greater than body. Depth of body 1.8–2.46 in body width, average 2.08. Depth of tail (14–18 mm.) in length of tail 2.6–4.6, average 3.2. Depth of tail

0.8–1.3 in body depth, average 1.02. Muscular part (9–11 mm.) of tail in its own tail depth 1.45–2.0, average 1.72. Spiracle 0.86–1.2 nearer vent than snout, average 1.0—i. e., about equidistant in general. Spiracle to snout (17–22 mm.) and spiracle to vent or base of hind legs (17–23 mm.). Spiracle to eye (8–12 mm.) in eye to snout (8–11 mm.) 0.85–1.2, average 0.99—i. e., eye to snout and spiracle to eye usually equidistant. Nostril to eye (4.0–6.0 mm.) equal the distance from nostril to snout (3.5–6.0 mm.). Mouth (3.0–7.0 mm.) usually 1.0–1.5 greater than the internasal space (3.0–6.5 mm.), average 1.2. Mouth contained 1.1–2.0 (average 1.46) in interorbital distance (5.0–10 mm.). Internasal space contained in interorbital space 1.4–2.0, average 1.75.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	95.0	Spiracle to vent	23.0
Body length.....	41.5	Spiracle to eye	11.5
Body depth.....	17.0	Eye to snout	10.0
Body width.....	17.0	Eye to nostril	6.0
Tail length.....	53.5	Nostril to snout	6.0
Tail depth.....	16.0	Mouth	6.5
Musculature of tail.....	11.0	Interorbital distance	10.0
Spiracle to snout.....	21.0	Internasal distance	5.0

RANA CATESBEIANA Shaw

Plate 8, figures 7, 8, 9

Color description from life (not Ridgway).—Background of back olive green, closely overlaid with fine yellow dots. Back conspicuously marked with dark spots, which become scanty on the slightly (bronzey) iridescent sides. Eye bronze. Venter is straw or maize yellow, with a few greenish spots toward the sides and sometimes in the region of the throat. It is not a distinct marbling, as in the green frog. Tail considerably lighter than back and quite regularly covered with small black spots (almost entirely lacking on the lower crest), some of which are dumb-bell shaped. The fine yellow dots are assembled in small groups.

General appearance.—Tadpole very large (145 mm.), round, and deep bodied. Some rarely reach 170 mm. Tail elongate, tip obtuse. Dorsal crest not as wide as musculature, extending forward on body slightly beyond the vertical of the buds of the hind legs or sometimes rarely to midway between these buds and the spiracle. Spiracle sinistral, just visible from dorsal aspect, directed backward and obliquely upward. Spiracle and its opening just below lateral axis of the musculature. Eye well above the lateral axis, but in dorsal aspect nearer the lateral outline than the mid dorsal axis. Anus dextral, opening on level with edge of ventral crest.

Mouth parts.—Teeth $\frac{2}{3}$ or $\frac{3}{3}$. The second upper row one-fourth to two-sevenths of the upper fringe in length. The median space

between these two lateral rows is usually one and one-half times the length of either row. The ends of these lateral rows may or may not extend to the end of the upper fringe. The upper fringe much longer than the horny beak. On lower labium three rows, the first and second about equal in length and about equal to upper fringe of teeth or slightly less and slightly longer than the horny beak. First row may be continuous or interrupted in the middle. The third row quite short for a Ranid tadpole, much shorter than the single row of lower labial papillae, one-fourth shorter than first or second lower labial rows. Labial papillae on side of labium little more than a single row, a few inner papillae usually not extending mesially beyond the end of the second row.

Hinckley (1882) gives a third small row of teeth in the lower corner of each upper lip; in 50 or more first season, second season and mature tadpoles, this occurred but once as the figures are. In two other cases, such a row was present, but it was at right or obtuse angles to the first or second rows and might have been a part of one or both of them. Sometimes the upper fringe is entirely absent, present on one side, or the teeth of it may occasionally leave the mouth and be carried back over the forehead. The second row may be missing.

Measurements.—Length of body (34–49 mm.) 1.56–2.15 in tail (62–97 mm.), average 1.8. Width (25.0–34.4 mm.) of body in its own length 1.1–1.6, average 1.3. Depth (24.4–28.6 mm.) of body 1.00–1.19 in body width (25–24.4 mm.), average 1.1. Depth of body 1.6–1.73 in length of body (34–49.0 mm.), average 1.66. Depth of tail (20–33 mm.) 2.4–3.5 in length of tail (62–97 mm.), average 2.8. Muscular part (12.5–19 mm.) 1.4–1.9 in depth of tail, average 1.8. Spiracle 1.08–1.44 nearer base of hind legs or vent region (17–24 mm.) than the tip of the snout (23–27.8 mm.), average 1.26. Spiracle 1.33–1.75 nearer eye (11.5–14 mm.) than base of hind legs or vent (17.0–24.0 mm.), average 1.55. Eye nearer to tip of snout (9.5–12.8 mm.) than to spiracle. Nostril equidistant between snout and eye. Mouth (5.5–8.0 mm.) usually 0.95–1.16 larger than internasal space (4.2–6.5 mm.), average 1.07. Mouth contained 1.3–2.1, average 1.73 in interorbital distance. Internasal space 1.75–2.2 in (9.2–14 mm.).

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	142.0	Spiracle to vent.....	22.5
Body length.....	45.0	Spiracle to eye.....	12.8
Body depth.....	38.0	Eye to snout.....	12.8
Body width.....	34.4	Eye to nostril.....	6.4
Tail length.....	97.0	Nostril to snout.....	7.0
Tail depth.....	31.8	Mouth.....	7.0
Musculature of tail.....	17.2	Interorbital distance.....	11.4
Spiracle to snout.....	26.8	Internasal distance.....	4.6

RANA GRYLLO Stejneger

Plate 8, figures 2, 4

Color description from life.—Belly is between citron yellow and pale lemon yellow or lemon yellow with a prominent reticulation of brownish black. On the sides the lemon yellow spots are surrounded sometimes by pinkish vinaceous or orange vinaceous, or coral pink. All the throat region back to the pectoral region is a clear black. Across the pectoral region is apple green or light bice green. On either side of the throat and below the eye and over the snout and in front of nostril are spots of belly color. Over the back overlaying black spots and between them is forest green or dark green or elm green. When a tadpole is young it has a pinkish vinaceous line of spots or stripe on the upper jaw to be.

Tail.—The lemon yellow spots of the sides are also on the base of the muscular part of the tail as more or less rounded spots with more prominent pinkish vinaceous. About an inch from the base of the muscular part the spotting goes along on to the middle of the muscular part for an inch or less as a long band of pinkish vinaceous or as a row of spots. Below this band are some rounded pinkish vinaceous spots like the band. These extend on to the lower crest. More or less of a long black line of spots above this pinkish vinaceous band. This black line starts in the middle of the muscular part but as it approaches the tip of the tail it bends down toward the muscular black line. Upper crest with no yellow or whitish spots. Lower crest with many spots for first 2 inches.

Pupil yellow or bronzy-rimmed. Iris flecked all over with bronzy. Background of iris purplish. One looked greenish like the body color.

General appearance.—Tadpole quite large (100 mm.), with black gular area and speckled belly which is so heavily pigmented the intestine does not show through in preserved specimens. Ventral contour narrower than in *R. catesbeiana* and more of the *R. clamitans* type. Tail elongate, tip sharply acuminate. Dorsal crest at widest part about equal or slightly less than width of musculature, and extending on to dorsum slightly ahead of the vertical through the buds of the hind legs. Spiracle sinistral, just visible from the dorsal aspect, obliquely directed upward and backward, opening elliptical, but little revealed from side. Spiracle opening just touches lateral axis (muscular axis). Eye on or just above lateral axis.

Anus dextral, opening at edge of ventral crest.

Muciferous crypts present, but rather indistinct; this species easily separated from *R. clamitans* in this regard.

Mouth parts.—Teeth $\frac{2}{3}$. Edge of upper labium about equal or slightly longer than the length of the upper horny beak, and fringed

by a continuous row of teeth. In either corner beneath this fringe is only one very short row about one-sixth to one-eighth of the length of the upper fringe. Median space between these two short rows is two and one-half to four and one-half times the length of either of these rows. The outer end of the second upper row does not extend beyond the end of the upper fringe of teeth. The third lower labial row of teeth much shorter than the single serrate row of papillae, much less than length of horny beak (contained one and one-half times in it) and one-third shorter than the second or first lower rows of teeth. These two rows about equal to horny beak in length and equal to each other. The first row may be continuous or interrupted in the middle. In mouth parts it is distinctly of the *R. clamitans* type and nearer this species than *R. catesbeiana*.

Measurements.—Length of body (31.0–35.6 mm.) in tail (55.0–70.5 mm.) 1.7–2.4, average 1.84. Width (17–22 mm.) of body in its own body length 1.5–2.15, average 1.8. Depth (14–20 mm.) of body equal to (1.0) or slightly less (0.8–0.9) than body width. Depth of body 1.5–2.55 in body length, average 1.98. Depth (17–23 mm.) of tail in length of tail 1.45–1.8, average 1.7. Depth of tail 1.05–1.5 deeper than depth of body, average 1.2. Muscular part (9.5–14.5 mm.) contained in depth of tail 1.3–1.7, average 1.5; in smaller specimens 1.75–2.1. Spiracle 1.1–1.6 nearer base of hind legs or vent region (13–19 mm.) than the tip of the snout. Spiracle 1.25–1.9 nearer eye than base of hind legs or vent, average 1.56. Eye 1–1.35 nearer to tip of snout (7–10 mm.) than to spiracle (8–12.5 mm.); in some younger tadpoles occasionally near (0.88–0.95) spiracle. Nostril 1.0–1.4 nearer snout than eye, rarely equidistant. Mouth (4–6 mm.) usually 1.0–1.6 larger than internasal space (3.6–5.5 mm.), average 1.15. Mouth contained 1.5–2.37 (average 1.94) in interorbital distance (7–12.0 mm.). Internasal space contained in interorbital space 1.8–2.6, average 2.16.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	100.0	Spiracle to vent.....	19.0
Body length.....	35.6	Spiracle to eye.....	10.0
Body depth.....	20.0	Eye to snout.....	9.8
Body width.....	22.0	Eye to nostril.....	5.0
Tail length.....	64.4	Nostril to snout.....	3.5
Tail depth.....	23.0	Mouth.....	5.5
Musculature of tail.....	13.5	Interorbital distance.....	11.0
Spiracle to snout.....	21.0	Internasal distance.....	5.5

RANA SEPTENTRIONALIS Baird

Plate 8, figure 6

Color description from life (July 11, 1923).—General coloration is citrine or yellowish olive to dark olive or olive in specimens where hind legs begin to develop well. On the back are small scattered dark spots

unlike *Rana clamitans*, which is more or less uniform. When a tadpole has hind legs well developed (forelegs not out) back becomes bluish black and the hind legs stand out by color contrast by being a prominent citrine, buffy citrine, dull citrine, or olive citrine. When it reaches the four-legged stage the spots of the posterior back are quite well outlined. The mental region is grayish olive and more or less clouded. The pectoral region has a little of greenish color. Where the sides join the belly the body is mottled. Belly straw yellow, colonial buff, or deep colonial buff.

Tail.—On the lower crest along its edge are many roundish cartridge buff or pinkish buff spots. On the base of the musculature of the tail these collect as pinkish cinnamon spots suggesting somewhat the light area in a similar place on *Rana grylio* tadpoles. On the rim of the dorsal crest some of the cartridge buff spots are almost whitish. There are very few black specks on the tail in mature tadpoles. A little later the crests have prominent black spots on posterior half of the tail. In two legged tadpoles a black blotch or blotches appear with pinkish cinnamon spots at the base of the tail and these are very prominent.

Iris black and pinkish cinnamon.

Some tadpoles one month old had on the dorsum three pairs of black or dark spots: One on each nostril; one on or near each eye; and one on each side of the middle of the back. The dark of each eye connected with the back spot by an arc or semicircle of light color. This is the general appearance without a lens.

General appearance.—Tadpole large (99 mm.) of the *R. grylio* or *R. clamitans* type, but without black gular area of *R. grylio*. Venter heavily pigmented with white so intestine do not show through in life or preserved specimens. Tail elongate, tip acute. Dorsal crest not as wide as musculature, not extending forward on body much beyond the level of the buds of the hind legs. Spiracle sinistral, directed backward and obliquely upward, just visible from dorsal aspect. Spiracular opening just touches lateral axis as in *R. grylio*. Eye just above or rarely on lateral axis. Anus dextral on level with lower edge of ventral crest. Muciferous crypts distinct. A short dorsal row of 8 to 10 pores on either side of middle line of back from the dorsal crest forward; from above the middle line of insertion of tail musculature on body to back of eye is a distinct line of pores. Just before it approaches the eye area it sends obliquely upward and backward toward dorsum a short line in the direction of the end of the first row described. When this main line reaches area just back of the eye, a blind short line starts transversely across occiput but is very short, another continues as supraorbital line to above nostril,

another behind eye and underneath as infraorbital to nostril. The portion behind the eye sends off an upward and backward loop which immediately swings downward parallel with the infraorbital for a short distance, then it descends directly downward to level of upper jaw to be, and turns at right angles forward toward the mouth. Another lateral row forms a loop around the tip of the spiracle.

Mouth parts.—Teeth $\frac{2}{3}$. Edge of upper labium fringed with teeth, the fringe about the length of the horny beak, or somewhat longer. In either corner, beneath this fringe is short row of teeth one-sixth to two-fifteenths the length of the upper fringe. The outer end of the lateral row does not reach beyond the edge of the upper fringe. The medium space between these two rows is three and one-half to four and one-half times the length of either row. From above the end of the first upper labial row down to the end of the third lower row are two or three irregular rows of papillae inside the outer row of papillae. These inner to the end of the third row and in one case where the third row is lost it is replaced by papillae inside the usual single row across lower labium. Third lower row therefore about equal to the single row of papillae on lower labium, much less than horny beak, and one-third shorter than the first row of lower labial teeth. The first and second rows are about equal to horny beak. The first one often subdivided. In general it is much like *R. grylio* and one adult tadpole has a black line of spots on dorsal crest much like *R. grylio* tadpoles.

Measurements.—Length of body (24–33 mm.) in tail (45–67 mm.) 1.66–2.1, average 1.88. Width (13.5–23.0 mm.) of body in its own length 1.3–2.1, average 1.56. Depth (11–19.5 mm.) of body 1.14–1.33 in body width, average 1.23. Depth of body 1.64–2.16 in body length, average 1.85. Depth (12.0–19.0 mm.) of tail in length of tail 3.2–4.7, average 3.87. Depth of tail 0.85–1.1 in body depth, average 0.97. Muscular part (8.5–13.0 mm.) 1.3–1.9 in depth of tail, average 1.48. Spiracle 1.2–1.8 nearer base of hind legs or vent region (9–18 mm.) than the tip of the snout (16.0–22.5 mm.), average 1.37. Spiracle 1.25–1.6 nearer eye (6.5–12.5 mm.) than base of hind legs or vent, average 1.45. Eye 1.–1.4 nearer tip of snout (8–11 mm.) than spiracle (8.0–12.5 mm.), average 1.14. Nostril 1.0–1.6 nearer eye (4.0–5.5 mm.) than snout (4.0–6.5 mm.), average 1.16. Mouth (4.5–6.5 mm.) usually 1.0–1.3 larger than internasal space (4.0–6.0 mm.), average 1.11. Mouth contained in interorbital distance (6.5–9 mm.) 1.3–1.75 times, average 1.55. Internasal space contained in interorbital space 1.4–1.9, average 1.7.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	99.0	Spiracle to vent.....	18.0
Body length.....	32.0	Spiracle to eye.....	12.0
Body depth.....	19.5	Eye to snout.....	11.0
Body width.....	23.0	Eye to nostril.....	5.5
Tail length.....	67.0	Nostril to snout.....	6.0
Tail depth.....	18.0	Mouth.....	6.0
Musculature of tail.....	13.0	Interorbital distance.....	9.0
Spiracle to snout.....	22.5	Internasal distance.....	5.0

RANA ONCA Cope (probably not mature tadpole)

Plate 7, figure 3

Color description from life (August 22, 1925).—General color of upper part of body dull citrine. Back of body in detail is really a background of buffy olive or citrine drab with pale green yellow clusters scattered over it and some black intermixed. The belly is pure white or pale cinnamon pink. The region just back of the labial parts and the side of the head below eye with pale green yellow. Two dark areas over the nostrils and a dark dusky area leading diagonally back from the eye and forward from eye inclosing a sort of pale green yellow area.

Tail.—General color of upper part of base of musculature of tail, oil yellow. Tail musculature in general with pale green yellow spots. The tail musculature is really with a whole lot of black clusters outlining cartridge buff areas. These cartridge buff patches strike one as one of the characteristic features of the coloration. Along the top of musculature is considerable pale green yellow and in general the tail has a pale green yellow cast. The upper tail crest with clusters of black dots which once in a while tend to become reticulated. Lower crest is in its cephalic half or two-thirds free of black clusters. The caudal half or one-third like upper crest.

Eye.—Iris rim light pinkish cinnamon or light vinaceous fawn. The iris rim broken below with a little bit of black. In front and behind pupil is quite a large black patch with a few light vinaceous fawn specks. The upper and lower parts of iris are largely light vinaceous fawn, vinaceous buff, or light pinkish cinnamon. In these upper and lower areas is a little patch of black.

General appearance.—Tadpole medium (42 mm.), of the *R. clamitans* type. Venter less pigmented than *R. clamitans*, but intestine does not show through the skin except in little area ahead of vent. Belly somewhat transversely corrugated. Tail elongate, tip rounded. Dorsal crest or ventral crest not as wide as the widest musculature, extending on dorsum ahead of vertical of hind legs (buds) and almost halfway to the vertical of the spiracle. Spiracle sinistral, directed obliquely and decidedly upward, visible from dorsal aspect. Spi-

racular opening just below lateral axis. Eye just above or barely touches lateral axis. Anus dextral, on level with lower edge of ventral crest. Muciferous crypts indistinct in our material (up to 42 mm.).

Mouth parts.—Teeth $\frac{2}{3}$. Edge of upper labium fringed with teeth, the fringe usually about one and one-fourth, sometimes one and one-half times greater than horny beak. In either corner beneath this fringe is a very short lateral row of teeth one-eighth to one-eleventh the upper fringe in length. Rarely this row is absent, or present only on one side. The median space between these lateral rows is six to eight or ten times the length of either lateral row. This second row does not extend to the end of the upper fringe. From end of upper fringe to end of first or second row is one or one and one-half rows of inner papillae, not well developed or with inner papillae almost absent. No row of inner papillae below the third lower labial row of teeth. The first and second lower labial row of teeth are equal, slightly larger than horny beak. The first is divided in the middle, sometimes so faintly or slightly that it appears as one. The third lower labial row much shorter than the single papillary border below it, slightly less than horny beak, and contained 1.5–1.8 in first or second lower labial row.

Measurements.—Length of body (10–15.2 mm.) in tail (17.2–27 mm.) 1.5–2.0, average 1.8. Width (6.2–9.0) of body in its own length 1.6–2.0, average 1.77. Depth of body (5.0–8.6) 1.04–1.26 in body width, average 1.14. Depth of body 1.6–2.0 in body length, average 1.75. Depth of tail (6.0–9.0) in tail length 2.68–3.43, average 3.14. Depth of tail in body depth 0.75–1.05, average 0.93. Muscular part (3.0–5.2 mm.) of tail 1.5–2.0 in depth of tail, average 1.8. Spiracle 1.07–1.45 nearer base of hind legs or vent region (4.8–8.0 mm.) than the tip of snout (7.0–10), average 1.3. Spiracle 1.1–1.75 nearer eye (3.8–6.0) than base of hind legs or vent region, average 1.43. Eye 1–1.2 near tip of snout (3–5.0) than spiracle (3.8–6.0), average 1.0+. Nostril 1.1–1.9 near eye (1.18–3.0) than snout (2.2–3.8), average 1.5. Mouth (2.4–3.6) 1.0–1.3 larger than internasal space (2.0–3.2), average 1.12. Mouth contained 1.3–1.66 in interorbital distance (3.4–6.0), average, 1.49. Internasal space (2.0–3.2) contained 1.5–2.0 in interorbital space, average 1.66. The tadpole must reach a larger size than our specimens.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	42.0	Spiracle to vent.....	7.4
Body length.....	15.2	Spiracle to eye.....	6.0
Body depth.....	8.6	Eye to snout.....	5.0
Body width.....	9.0	Eye to nostril.....	3.0
Tail length.....	27.0	Nostril to snout.....	3.6
Tail depth.....	9.0	Mouth.....	3.4
Musculature of tail.....	5.2	Interorbital distance.....	3.0
Spiracle to snout.....	10.0	Internasal distance.....	5.0

RANA CLAMITANS Latreille

Plate 7, figures 5, 6

Color description from life (not Ridgway).—Background of back very dark and covered with very fine yellow spots, the whole consequently having an olive green color with numerous distinct dark spots. Belly deep cream color without decided iridescence. The throat and sides are mottled with dark green. A slight coppery iridescence on the venter is more decided on the sides and on the tail. The tail appears green, mottled with brown; it is covered with fine yellow spots like the back.

General appearance.—Tadpole large, not deep bodied. Tail fairly elongate, tip acute. Dorsal crest not as wide as musculature, extending forward on body slightly ahead of the vertical of the buds of the hind legs. Spiracle sinistral, just visible from dorsal aspect, directed obliquely upward and backward. Spiracle below lateral axis. Spiracular opening elliptical and plainly visible as such. Muciferous crypts very distinct in life, indistinct in most preserved specimens. Eye on or above lateral axis and nearer lateral outline in dorsal aspect than mid-dorsal line. Anus dextral, opening on level with edge of ventral crest.

Mouth parts.—Teeth $\frac{2}{3}$ or $\frac{1}{3}$. Edge of upper labium fringed with teeth and about equal to upper horny beak in length as in *R. grylio*. In either corner beneath this fringe is a very short row (sometimes absent) which is from two-fifteenths to one-fifteenth the upper fringe. The ends of the lateral row not extending beyond end of upper fringe. Median space between lateral rows six to eleven times the length of either row. The first lower labial row slightly longer or equal to horny beaks in length, and sometimes divided in the middle. The second row almost equal to first. The third row quite short, not nearly as long as in *R. catesbeiana*, usually almost one-half of the first row, not three-fourths or four-fifths as in *R. catesbeiana*, or two-thirds as in *R. grylio*. It is contained one and one-half times in the horny beak and is much shorter than the single row of lower labial papillae. On the side of the labium the inner papillae (inside outer row) extend mesially beyond and beneath the second lower labial row of teeth, but not to third row (more like *R. grylio*).

Measurements.—Length of body (12.2–27.8 mm.) 1.5–2.1 in tail (18.4–57 mm.), average 1.75. Width (8.8–21 mm.) of body 1.25–1.7 in its own length (12.2–27.8 mm.), average 1.47. Depth of body 1.13–1.32 in body width, average 1.22. Depth of body 1.9–2.3 in length of body, average 2.14. Depth of tail (7.4–16.6 mm.) 2.5–3.7 in length of tail (18.4–57 mm.), average 3.1. Muscular part (3.8–10.4 mm.) 1.35–1.95 in depth of tail (7.4–16.6 mm.). Spiracle 1.35–1.8 nearer base of hind legs or vent region (5.4–12.4 mm.) than the

tip of the snout (8.2–19 mm.) Spiracle 1.06–1.38 nearer eye (4.4–9.4 mm.) than base of hind legs or vent (5.4–12.4 mm.), average 1.24. Eye distinctly nearer to tip of snout (3.6–7.8 mm.) than to spiracle (4.4–9.6 mm.). Nostril decidedly nearer eye (1.4–36 mm) than snout (2.2–4.8 mm.). Mouth (2.6–4.8 mm.) 0.9–1.35 larger than internasal space (2.8–4.8 mm.), average 1.06. Mouth contained 1.3–1.8, average 1.5 in interorbital distance (3.8–8.2 mm.). Internasal space contained in interorbital space 1.25–2.05, average 1.6.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	84.8	Spiracle to vent.....	12.2
Body length.....	27.8	Spiracle to eye.....	9.6
Body depth.....	17.2	Eye to snout.....	7.4
Body width.....	20.6	Eye to nostril.....	3.6
Tail length.....	57.0	Nostril to snout.....	4.0
Tail depth.....	15.6	Mouth.....	4.6
Musculature of tail.....	10.0	Interorbital distance.....	8.0
Spiracle to snout.....	19.0	Internasal distance.....	4.8

RANA VIRGATIPES Cope

Plate 8, figure 5

Color description from life (May 23, 1924).—One tadpole very large, brownish olive mummy brown or brownish olive. In general, dorsum very dark. A few large widely scattered black spots on the dorsum. The brownish olive on rear sides surrounds lemur yellow or greenish yellow spots, this yellowish color on either side of belly with a few small dark flecks. Middle of belly pale grayish vinaceous or vinaceous buff. Ventral pectoral and branchial region grayish violaceous blue or the body color with vinaceous buff and greenish yellow spots.

Tail.—In general a grayish color. Along the middle of the upper crest is row of large spots or these connected. This a much broader and more conspicuous row than in *R. grylio*, being about 2 inches long. In middle of musculature is a dark line or area to tip of tail paralleling the upper tail crest line of black. The upper tail crest is irregularly black-margined to tail tip. This black more or less outlines pale chalcedony yellow spots. The musculature has numerous pale grayish vinaceous or vinaceous buff spots. Lower tail crest narrow, with irregular black margin in tip region for 1 to 1½ inches, this crest with numerous pale chalcedony yellow or vinaceous buff spots. Iris largely black with ochraceous salmon or greenish yellow flecks.

Mouth parts.—Teeth $\frac{2}{3}$.

Measurements.—Length of body (25–30 mm.) in tail (48–63 mm.) 1.89–2.1, average 1.99. Width of body (14.5–20 mm.) in its own length 1.45–1.86, average 1.61. Depth of body (13–17 mm.) 1.1–1.2 in body width, average 1.14. Depth of body 1.66–2.07 in body

length, average 1.84. Depth of tail (16–21 mm.) in length of tail 2.9–3.6, average 3.12. Muscular part (8–11 mm.) 1.62–2.0 in depth of tail, average 1.84. Spiracle 1.17–1.33 nearer base of hind legs or vent region (14–17 mm.) than the tip of snout (17–20 mm.), average 1.23. Spiracle to eye (8–11 mm.) 1.42–1.82 nearer eye than spiracle to vent (13.5–20 mm.), average 1.62. Eye 1.0–1.22 nearer to tip of snout (7–9 mm.) than eye to spiracle (8–11 mm.), average 1.16. Nostril 1–1.42 nearer eye (4–4.5 mm.) than eye to snout (4.5–5.5 mm.), average 1.20. Mouth (5–5.5 mm.) usually 1–1.37 larger than internasal space (4–5 mm.), average 1.12. Mouth 1.36–1.8 in interorbital space (7–9 mm.), average 1.57. Internasal space (4.5–5 mm.) contained 1.55–1.87 in interorbital space, average 1.74.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	92.0	Spiracle to vent.....	16.0
Body length.....	30.0	Spiracle to eye.....	11.0
Body depth.....	15.0	Eye to snout.....	9.0
Body width.....	18.0	Eye to nostril.....	4.5
Tail length.....	63.0	Nostril to snout.....	5.5
Tail depth.....	21.0	Mouth.....	5.0
Musculature of tail.....	11.0	Interorbital distance.....	9.0
Spiracle to snout.....	20.0	Internasal distance.....	5.0

ACRIS GRYLLUS (LeConte)

Plate 6, figures 13, 14, 15

Color description from life (July 5, 1921).—General coloration dark olive buff or old gold or olive lake or sulphine yellow. Belly, especially on sides and on gill region, light vinaceous fawn or shell pink or pale salmon color. Belly with ivory yellow or cartridge buff clusters of spots. These clustered spots almost cover the top of the body. The region back of the labial mouth parts has no light vinaceous fawn nor ivory yellow. The clusters of spots become almost continuous and look a patch of french gray or lilac gray on the throat region.

Tail.—Tip of tail (upper and lower crests) conspicuously black (at times lost). Clusters of ivory yellow or cartridge buff spots on upper crest and upper part of musculature, less frequent on lower crest and lower musculature. These spots somewhat amongst black of tail tip. Tail crests almost transparent, certainly translucent, almost clear of marks except under lens, when the course of the blood vessels are marked by the body color (dark olive buff, etc.).

Iris ivory yellow above and below, behind and in front of pupil light coral red and black. Whole of iris more or less prettily marked with black interspersed with the two lighter colors mentioned.

General appearance.—Tadpole medium (42 mm.), full, and fairly deep bodied. Tail very long, tail tip very acuminate, with black flagellum.

Tail proportionally the longest and most narrow (depth of tail in length of tail) of any of the Hylids in the United States. Dorsal and ventral crests rather narrow, not equal to the tail musculature in depth. The dorsal crest extends on to the body to the vertical of the spiracle or just ahead of it but nearer spiracle than the eye. Spiracle sinistral, mainly directed backward, only slightly upward, and it stands out from body in life almost on the lateral axis. Eye on lateral axis, eye hardly if at all visible from the venter (more like a Ranid tadpole), suborbital region oblique, not vertical as in Hylids in general. Eye in dorsal aspect just inside the lateral outline. Anus dextral, opening on a level with the lower edge of the lower crest. Muciferous crypts not distinct.

Mouth parts.—Teeth $\frac{2}{2}$. Upper labium fringed with a continuous row of labial teeth; the papillary border does not extend above or inward beyond the end of the labial fringe (unlike all our Hylidae of the United States). The end of the second row of upper labial teeth extend beyond the end of the upper fringe for one-third or sometimes almost one-half of the length of this second upper labial row (in *H. crucifer* one-fourth to one-sixth the length of either lateral row). The median space between the second lateral upper labial rows of teeth long, contained 1.2–0.75 times in either lateral row, i. e., rarely greater, often equal to and more often greater than either lateral row. The horny beak is contained in upper fringe 1.2–1.35 times or 1.35–1.5 times in the distance from one end of lateral row to the end of the other lateral row. There are practically no inner papillae. The first row of lower labial teeth about equal to horny beak or slightly larger. The second row of lower labial usually perceptibly longer than the first row (the illustration is a little unusual in this respect).

Measurements.—Length of body (9.6–13 mm.) in tail (26.6–42.2 mm.) 2.5–3.25, average 2.9. Width (5.6–9.0 mm.) of body in its own length 1.44–1.9, average 1.66. Depth (4.8–8.0 mm.) of body 1.0–1.3 in body width, average 1.17. Depth of body 1.625–2.1 in length of body, average 2.0. Depth (4.2–7.8 mm.) of tail in length of tail 3.25–5.0, average 4.0. Muscular part (2.8–4.4 mm.) 1.3–2.15 in depth of tail, average 1.71. Spiracle 1.6–2.35 nearer base of hind legs or vent region (3.2–5.6 mm.) than the tip of the snout (7.0–10.0 mm.), average 1.92. Spiracle to eye usually equal to spiracle to base of hind legs or vent. Eye 1.0–1.66 nearer to tip of snout (3.0–4.2 mm.) than to spiracle (4.0–6.0 mm.), average 1.22. Nostril 1.0–1.33 nearer eye (1.4–2.4 mm.) than snout, (1.8–2.8 mm.). Mouth (1.8–2.4 mm.) usually 1.0–1.3 larger than internasal space (1.4–2.6 mm.), average 1.06, rarely less than internasal space. Mouth contained 1.3–2.2 (average 1.71) in interorbital distance (3.0–4.6 mm.). Internasal space contained in interorbital space 1.33–2.2, average 1.7.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	42. 2	Spiracle to vent.....	5. 0
Body length.....	13. 0	Spiracle to eye.....	5. 2
Body depth.....	6. 6	Eye to snout.....	4. 2
Body width.....	8. 2	Eye to nostril.....	2. 2
Tail length.....	29. 2	Nostril to snout.....	2. 4
Tail depth.....	7. 0	Mouth.....	2. 0
Musculature of tail.....	4. 0	Interorbital distance.....	4. 0
Spiracle to snout.....	10. 0	Internasal distance.....	2. 6

PSEUDACRIS from Hilton and Buffalo, New York

Plate 6, figure 17

Color description from life (June 12, 1923).—In general it is quite black, and bronzy in the belly and sides of the belly. The body in particular is black brown (3) or fuscous. Greenish yellow or olive yellow or citron yellow finely dots the entire upper parts. Area below the eye with dark spots. Belly solid vinaceous tawny or one of the three yellows above. Lower side of the embryonic hind legs clear while dorsum of them is with black dots.

Tail.—Blackish brown (3) or fuscous; lower edge of muscular part free of dots, once in a while a few dots in special areas. The dark color is densest just above the lower clear margin and appears as a longitudinal band. At base of muscular part there is a slight suggestion of a short light line along the middle of the side for a very short distance (as in *H. femoralis*, where better developed). On base of the musculature of the tail just where the dorsal crest joins the body are two or three saddle spots, greenish yellow, citron yellow or olive yellow. These spots are made up of a collection of dots which are more scattered along the dorsum toward the tip of the tail musculature. Dorsal crest is with elongate fleckings. The fleckings on ventral crest less frequent.

Eye blackish brown (3) or fuscous with vinaceous tawny or one of the three yellows of the body color.

General appearance.—Tadpole quite small (23 mm.), full, and deep bodied. Tail quite long, tip acute or acuminate. The dorsal and ventral crests about equal. The dorsal crest as deep as the tail musculature and extending on to the body to the vertical of the spiracle. Spiracle sinistral, directed almost straight backward, only slightly upward, far below the lateral axis near venter, the opening plainly visible, elliptical or round. Eye on the lateral axis, in dorsal aspect on the lateral outline and consequently visible from the venter. Anus dextral, opening on a level with lower edge of the ventral crest. Muciferous crypts not distinct.

Mouth parts.—Teeth $\frac{2}{2}$. Upper labium fringed with a continuous row of labial teeth: The papillae extend above and inward beyond the end of the labial fringe for about one-fourth of the length of the

upper fringe. The horny beak is contained 1.5 times in upper fringe. The median space between the second lateral upper labial rows of teeth short contained four and a half to five times in either lateral row. Upper fringe somewhat angulate in the middle. The outer ends of the second row of upper labial teeth not extending beyond the end of the upper fringe or only slightly. Inner papillae scarce, a few at either outer corner of the lower labium. The first and second row of lower labial teeth about equal, about 1.4–1.5 times the horny beak in length. There is no third row as in *Pseudacris ocellaris*. The single row of papillae across the lower labial border about equal to the second lower labial row of teeth.

Measurements.—Length of body (7.0–8.8 mm.) in tail (11.0–14.2 mm.) 1.4–1.9, average 1.67. Width (4.2–5.4 mm.) of body in its own length 1.4–1.75, average 1.58. Depth (3.4–5.0 mm.) of body 1.04–1.4 in body width, average 1.14. Depth of body 1.59–2.25 in body length, average 1.77. Depth (3.4–5.0 mm.) of tail in length of tail 2.5–3.15, average 2.95. Muscular part (1.8–3.0 mm.) 1.4–2.5 in depth of tail, average 1.9. Spiracle 1.4–1.9 nearer base of hind legs or vent region (3.0–4.4 mm.) than the tip of the snout (5.0–6.0 mm.), average 1.42. Spiracle 1.15–1.7 nearer eye (2.4–3.0 mm.) than base of hind legs or vent (5.0–6.0 mm.), average 1.37. Eye 1.0–1.36 nearer spiracle (2.2–3.0 mm.) than tip of snout (2.8–3.0 mm.), average 1.15. Nostril nearer eye (1.12–1.16 mm.) than snout (2.0–2.6 mm.) 1.37–2.0, average 1.6. Mouth (1.6–2.0 mm.) usually equal to internasal space (1.6–2.0 mm.) or slightly larger. Mouth contained 1.5–2.1 (average 1.67) in interorbital distance (2.8–2.6 mm.). Internasal space contained in interorbital space 1.5–2.0, average 1.22.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	23.0	Spiracle to vent.....	3.8
Body length.....	8.8	Spiracle to eye.....	3.0
Body depth.....	5.0	Eye to snout.....	3.0
Body width.....	5.2	Eye to nostril.....	1.6
Tail length.....	14.2	Nostril to snout.....	2.6
Tail depth.....	5.0	Mouth.....	2.0
Musculature of tail.....	2.6	Interorbital distance.....	3.6
Spiracle to snout.....	5.4	Internasal distance.....	2.0

PSEUDACRIS from Raleigh, N. C.

Plate 1, figure 12

General appearance.—Tadpole small (33 mm.), full, and fairly deep of body. Tail medium in length, tail tip acuminate. Dorsal crest extends on to body about to the vertical of the spiracle. Spiracle sinistral, below lateral axis, directed backward and upward, opening round or elliptical and plainly visible. Eye on the lateral axis, in dorsal aspect on the lateral outline. Anus dextral, opening about on the level of the edge of the ventral crest. Muciferous crypts indistinct.

Mouth parts.—Teeth $\frac{2}{3}$. Upper labium fringed with a continuous row of labial teeth; the papillae extend above and inward beyond the end of the upper fringe for one-fourth to one-fifth of the length of the upper fringe. The horny beak is contained 1.5–1.75 times in the upper fringe. The median space between the second lateral upper labial rows of teeth very short, contained 2.5 or 3.7 times in the length of either row. Upper fringe somewhat angulate in the middle. Inner papillae quite numerous, two or three rows on either end of two lower labial rows, and inside the lower labial border, even beneath the third labial row. Third lower labial row about one-third of the second or first lower labial row. The lower first and second row about 1.25–1.6 times the horny beak.

Measurements.—Length of body (9.2–11.0 mm.) in tail (15.8–22.4 mm.) 1.55–2.25, average 1.8. Width (5.6–7.4 mm.) of body in its own length 1.43–1.75, average 1.69. Depth (4.8–6.6 mm.) of body 1.03–1.32 in body width, average 1.14. Depth of body 1.6–2.1 in body length, average 1.8. Depth (4.6–6.6 mm.) of tail in length of tail 2.9–4.0, average 3.4. Muscular part (2.8–4.4 mm.) 1.2–2.1 in depth of tail, average 1.64. Spiracle 1.15–1.95 nearer base of hind legs or vent region (3.6–6.0 mm.) than the tip of the snout (5.8–8.0 mm.), average 1.5. Spiracle 1.0–1.66 nearer eye (3.0–4.6 mm.) than base of hind legs or vent, average 1.33. Eye to tip of snout (3.0–4.4 mm.) about equal to eye to spiracle (3.0–4.6 mm.), occasionally larger or smaller. Nostril 1.25–1.875 nearer eye (1.4–2.2 mm.) than snout (2.0–3.2 mm.), average 1.5. Mouth (2.0–3.0 mm.) usually equal to or slightly larger 1.25 than internasal space (2.2–3.0 mm.). Mouth contained 1.33–2.2 (average 1.71) in interorbital distance (3.2–5.0 mm.). Internasal space contained in interorbital space 1.3–2.2, average 1.78.

The dimensions of the largest tadpole are:

Total length	Mm. 33.0	Spiracle to vent	Mm. 5.0
Body length	10.6	Spiracle to eye	3.8
Body depth	6.6	Eye to snout	4.4
Body width	7.4	Eye to nostril	2.0
Tail length	22.4	Nostril to snout	3.0
Tail depth	6.6	Mouth	2.8
Musculature of tail	4.4	Interorbital distance	4.8
Spiracle to snout	7.5	Internasal distance	2.8

PSEUDACRIS OCULARIS (Holbrook)

Plate 6, figure 16

Color description from life (June 30, July 8, 1922).—Dorsal color citrine drab or deep olive. Over the dorsum of the body are definitely scattered *distinct black spots*. Lower belly a block of orient pink or orange pink. Sometimes this is broken into a mottled arrange-

ment when the gill region and sides are reached. Area around the mouth and an extension backward on each side martius yellow. Heavily speckled on under side of developing hind legs or femur when two legged stage is well started.

Tail.—Lower edge of muscular part for the basal one-half a line of martius yellow. The upper edge or rim of muscular part apricot buff to apricot orange or rufous to ferruginous. This color extends on to the top of the body and gives it the same color dorsally as upper musculature. The middle of the muscular part is with a prominent sharply defined band of chestnut brown or black at the basal half or two-fifths of the tail and hazel or cinnamon rufous onward to tip. This dark middle tail stripe extends onto the body in transforming individuals, becomes the dark stripe either side of the median dorsal stripe. From mature tadpole to transformation the three striped (light, dark, light) arrangement obtains, the lower stripe being least conspicuous. The rim of the tail crests is with large blotches. The interval between the crest rim and the musculature is translucent and without spots or dots.

Iris black, citrine drab, or deep olive, finely speckled with empire yellow or bittersweet orange.

In alcohol the broad brown tail band follows on to body to back of the eye. Above brown band is a clear white edge which extends on to the body and around the eye and then forward. Below brown band is a light band.

General appearance.—Tadpole quite small (23 mm.), full, and deep bodied (in general appearance somewhat like *H. crucifer*). Tail quite long, tail tip sharply acute or even acuminate. The dorsal and ventral crests about equal. The dorsal crest not deeper than tail musculature and extending on to the body to the vertical half-way between eye and the spiracle. Spiracles sinistral, directed backward and upward, far below lateral axis, the spiracular opening prominent, elliptical, or round. Eye on the lateral axis, in dorsal aspect on the outline and therefore visible in the ventral aspect as well. Anus dextral, opening on a level with the lower edge of the ventral crest. Muciferous crypts not distinct.

Mouth parts.—Teeth $\frac{2}{3}$. Upper labium fringed with a continuous row of labial teeth; the papillae extend above and inwards beyond the end of the labial fringe for about two-ninths to one-fourth of the length of the upper fringe. The horny beak is contained in upper fringe 2.0 times in the upper fringe. The median space between the second lateral upper labial rows of teeth long, three to four times the length of either lateral row. Inner papillae sparse or absent on upper labium and opposite the ends of horny beak. At ends of the second lower labial tooth row two or three rows. Sometimes on sides two rows of labial papillae from upper fringe down. The papillae do

not extend under second row to the end of the third row of labial teeth as in *H. crucifer*. The second row of papillae across the lower labial border is about equal to the second row of labial teeth. The third labial row of teeth is short, one-fourth to one-third the length of the first or second row of lower labial teeth. The first and second rows about equal and about two times the horny beak in length, upper fringe somewhat angulate in the middle.

Measurements.—Length of body (7.8–9.0 mm.) in tail (12–14.4 mm.) 1.33–2.0, average 1.58. Width (4.0–5.8 mm.) of body in its own length 1.3–2.1, average 1.65. Depth (3.8–5.0 mm.) of body 1.0–1.4 in body width, average 1.17. Depth of body 1.72–2.2 in length of body, average 1.90. Depth (3.2–4.0 mm.) of tail in length of tail 3.1–4.4, average 3.55. Muscular part (2.0–2.2 mm.) 1.7–2.2 in depth of tail, average 1.88. Spiracle 1.7–2.1 nearer base of hind legs or vent region (2.8–3.8 mm.) than the tip of the snout (4.8–6.8 mm.), average 1.875. Spiracle to eye (3.0–3.4 mm.) equals spiracle to base of hind legs or vent. Eye to tip of snout (2.6–3.8 mm.) about equal to eye to spiracle. Nostril 1.25–2.0 nearer eye (1.2–1.6 mm.) than snout (2.0–2.4 mm.), average 1.5. Mouth (2.0–2.8 mm.) usually equals internasal space (2.0–2.8 mm.). Mouth contained 1.5–1.9 (average 1.66) in interorbital distance (3.0–4.2 mm.). Internasal space contained in interorbital space 1.3–2.1, average 1.63.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	23.0	Spiracle to vent.....	3.8
Body length.....	8.8	Spiracle to eye.....	3.0
Body depth.....	5.0	Eye to snout.....	3.0
Body width.....	5.2	Eye to nostril.....	1.2
Tail length.....	14.2	Nostril to snout.....	2.2
Tail depth.....	3.2	Mouth.....	2.2
Musculature of tail.....	2.0	Interorbital distance.....	3.4
Spiracle to snout.....	6.8	Internasal distance.....	2.2

HYLA CRUCIFER Wied

Plate 9, figure 3

Color description from life (not Ridgway).—The background of the back is orange, heavily pigmented with dark (almost black) spots, the general tone being greenish; these dark spots are interspersed with very small shining goldlike ones. The venter is with a cream ground, pigmented with dark toward the sides and more decidedly from the gill region forward. The latter region is conspicuously marked with gold and silver. The whole is iridescent. The muscular part of the tail has an orange background at the base, becoming lighter and almost clean at the tip, the whole pigmented with small spots slightly coalesced. The crests are clear, heavily pigmented with purplish black blotches on the outer edge, particularly toward the

tip; but occasionally these blotches are absent. Small gold spots are sparsely scattered over the whole surface.

General appearance.—Tadpole small (33.0 mm.), full, and deep bodied. Tail medium in length, tip acute, no flagellum. The dorsal crest not exceeding musculature in depth and extending on to the body not beyond the vertical of the spiracle. The tail in general about medium in depth. Spiracle sinistral, more directed backwards than upwards, far below lateral axis. Eye on the lateral axis, in dorsal aspect on the lateral outline, therefore just visible from below. Anus dextral, opening above the level of the lower edge of the ventral crest. Muciferous crypts not distinct.

Mouth parts.—Teeth $\frac{2}{3}$ or $\frac{2}{2}$. Upper labium fringed with a continuous row of teeth; the papillae extend above and inward beyond the end of upper fringe one-sixth to one-fourth (usually one-sixth or more) of the length of the fringe. The end of second upper labial row extending beyond the end of the upper fringe for about one-fourth to one-sixth of the length of either upper lateral row. The horny beak contained in length from one end of lateral row to end of other lateral row 1.75–2.25 times. Median space between these lateral rows contained two to three times in the length of either lateral row. Inner papillae on sides of labium sparse and one row between second row of lower labial teeth and lower labial papillae to end of short third row. The first and second rows about equal, from 1.4–1.5 times the length of the horny beak. The third row no longer the single row of lower labial papillae. Sometimes this row of papillae is absent when this row enters the labial border, making the third row of teeth look like a lower labial goatee. This third row one-fifth to one-third the length of the first or second row of lower labial teeth.

Measurements.—Length of body (7.0–11.4) in tail (10–22 mm.) 1.4–2.1, average 1.65. Width of body (4.4–8.0) in its own length (10.0–11.4) 1.3–1.65, average 1.46. Depth (5.6–6.6) of body 1.06–1.25 in body width, average 1.125. Depth of body in body length 1.51–1.96, average 1.78. Depth of tail (4.4–7 mm.) in length of tail 2.4–3.15, average 2.72. Muscular part (1.8–4.0 mm.) of the tail in its depth 1.75–2.6, average 2.15. Spiracle 2.0–2.6 near the base of the hind legs or vent region (2.5–4.25 mm.) than the tip of the snout (5–9 mm.), average 2.16. Spiracle to eye (2.5–4.0 mm.) 1.0–1.4 nearer than to vent, average 1.1. Eye equidistant from spiracle and tip of snout ($2\frac{1}{2}$ –4 mm.). Nostril 2.0 nearer eye (1–2 mm.) than tip of snout (2–3.5 mm.). Mouth (1.8–2.5 mm.) 0.8–1.25 greater than internasal space (1.8–2.5 mm.), average 0.92. Mouth contained 1.2–2.6 in interorbital distance (2.2–5.0 mm.), usually above 1.5. Internasal space (1.8–2.5 mm.) contained 1.2–2.4 in interorbital distance, average 1.75.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	33.0	Spiracle to vent.....	4.0
Body length.....	11.0	Spiracle to eye.....	3.5
Body depth.....	6.2	Eye to snout.....	3.5
Body width.....	8.0	Eye to nostril.....	1.5
Tail length.....	22.0	Nostril to snout.....	3.0
Tail depth.....	7.0	Mouth.....	2.5
Musculature of tail.....	3.5	Interorbital distance.....	4.0
Spiracle to snout.....	8.0	Internasal distance.....	2.0

HYLA GRATIOSA LeConte

Plate 9, figures 9, 10, 11

Color description from life (June 23, 27, August 21, 1922).—They have considerable greenish, greenish yellow or yellowish in the tail and body and are beautiful tadpoles. Halfgrown tadpoles have a striking black saddle spot on the back of the muscular part of the tail and two prominent light areas from each eye to the vent.

On the side, a patch just ahead of developing hind legs light greenish yellow. Black stripe from between the eye, along the base of the upper crest on either side half way to tip of the tail. Light area beneath this black area and around nostril, over eye, along side to base of muscular part of the tail ivory yellow, tilleul buff, or pale pinkish buff. Another short line of the same color at the very base of the upper crest and above the black stripe. Muscular part of the tail and crest yellowish citrine, light yellowish olive, mignonette green or cource green. Belly pale vinaceous pink. Either side of gill region congo pink, throat clear. Lower lip like muscular tail, yellowish citrine or cource green.

Iris vinaceous pink.

General appearance.—Tadpole medium (50 mm.) largest of Hylid tadpoles of the eastern United States. Tail long. Tip acuminate, with flagellum. Dorsal and ventral crests about equal, either depth equal to the tail musculature. Dorsal crest extending on body to a vertical about half way between the spiracle and the eye. Spiracle sinistral, far below lateral axis, directed upward and backward. Eye on lateral axis, in dorsal aspect in the lateral outline and in consequence visible from the venter. Anus dextral, on a level with the lower edge of the ventral crest. Muciferous crypts indistinct.

Mouth parts.—Teeth $\frac{2}{3}$. Upper labium fringed with row of teeth; the papillae extend above and inward beyond the end of this fringe two-sevenths to one-fourth (usually at least one-fourth) of the length of the fringe. The end of the second row about even with the end of the fringe. Sometimes the ends unite. The horny beak contained in the length of the upper fringe 1.5–1.75 times. Median space

between the two lateral parts of the second rows contained 1.5-3. times either lateral row. Inner papillae on either side from end of lateral upper row one or two rows to end of lower third labial row. The lower third labial row with one row of papillae below it, rarely with none, and about equal to this single row of papillae, or two and five-eighths to three and one-half times in the length of the first or second rows. The first or second lower labial rows about equal or about one and one-third longer than horny beaks. Some of the teeth rows have tendency to be curved on ends or united at other rows or be quite irregular, more so than in any other United States Hyliid.

Measurements.—Length of body (13.5-20 mm.) in tail (27-32 mm.) 2.3-3.25, average 2.5. Width (9-13 mm.) of body in its own length 1.5-2.0, average 1.71. Depth (9.5-13.5 mm.) of body 0.8-1.0 in body width, average 0.9. Depth of body 1.4-1.9 in body length, average 1.62. Depth (10-14 mm.) of tail in length of tail 2.0-2.8, average 2.34. Muscular part (4.5-8.5 mm.) 1.5-2.9 in depth of tail, average 2.0. Spiracle 1.0-1.375 nearer base of hind legs or vent region (8.0-10.0 mm.) than the tip of the snout (10-12 mm.), average 1.2. Spiracle 1.6-2.5 nearer eye than base of hind legs or vent, average 1.9. Eye 1.07-1.75 nearer to spiracle (4.0-5.6 mm.) than to tip of snout (6.0-7.0 mm.), average 1.3. Nostril 1.0-1.8 nearer eye (2.5-4.0 mm.) than snout (3.5-4.5 mm.). Mouth (3.5-4.5 mm.) usually 1-1.5 larger than internasal space (3.0-4.0 mm.), average 1.075. Mouth contained 1.33-2.4 (average 1.88) in interorbital distance (6.5-8.5 mm.). Internasal space contained in interorbital space 1.62-2.33, average 2.15.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	50.0	Spiracle to vent.....	10.0
Body length.....	19.0	Spiracle to eye.....	5.5
Body depth.....	12.0	Eye to snout.....	7.0
Body width.....	10.5	Eye to nostril.....	4.0
Tail length.....	31.0	Nostril to snout.....	4.0
Tail depth.....	11.0	Mouth.....	4.5
Musculature of tail.....	7.0	Interorbital distance.....	7.0
Spiracle to snout.....	11.5	Internasal distance.....	3.5

HYLA ANDERSONII Baird

Plate 9, figures 7, 8

Color description from life (May 23, 1924).—General coloration of body olive, brownish olive, or dark olive. Back with scattered black spots. Gill region with a sheen of ochraceous salmon or vinaceous tawny or vinaceous salmon. Interspersed with this color is some black. The mental region is clear of color. Below eye blotched with black, bronze (or one of three gill region colors) and green yellow.

Over the belly in younger specimens is a full block of ochraceous salmon or vinaceous tawny or vinaceous cinnamon. In older specimens green-yellow or citron yellow or sometimes sea-foam yellow across the belly or on the gill region.

Tail.—Starting from the base of the tail there is a longitudinal irregular blackish band along the musculature of the tail to its top one-half of an inch or more from the tip of the tail. This band is more or less interrupted, not a clearly defined band as in *Hyla femoralis* or is *Pseudacrisocularis* or other *Pseudacris* species. Below the band is a clear area of warm buff or cream color or cartridge buff or sea-foam yellow. In some specimens there is a similarly colored area one-eighth to one-fourth inch long above the dark band. The very lower edge of the musculature is with a fine purplish line. Just above this edge are a few scattered collections of black dots. Upper and lower crests heavily clouded with blackish dots, which in places assemble in clusters. In younger tadpoles quite a prominent irregular margin of blackish on the crests and the musculature band of black more regular and not so interrupted.

Eye with pupil rim prominent ochraceous salmon or vinaceous tawny or vinaceous cinnamon. Rest of iris spotted with this color and black. All in all it is a prominently colored eye.

General appearance.—Tadpole small (35 mm.), full, and deep-bodied. Tail medium to fairly long, tail tip acuminate or sharply acute. The dorsal and ventral crests about equal. The dorsal crest is less than the depth of the musculature and extends on to the body to the vertical midway between hind legs and the spiracle. Spiracle sinistral directed upward and backward, far below lateral axis, the spiracular opening plainly visible and elliptical or round. Eye just touches or is below the lateral axis, is in dorsal aspect on the lateral outline and in consequence visible from the venter. Anus dextral, opening at or only slightly above the lower edge of the ventral crest. Muciferous crypts not distinct.

Mouth parts.—Teeth $\frac{2}{3}$. Upper labium fringed with a continuous row of labial teeth; the papillae extend above and inward beyond the end of the upper fringe for about two-sevenths to one-fourth of the length of the upper fringe. The end of the second upper labial row may be even or beyond the end of the fringe. The horny beak is contained in upper fringe 1.5–1.7 times. Median space between the lateral second upper labial row 1.25–2 in the length of either lateral row. The lateral row is contained about two and one-half times in the upper fringe. The inner papillae extend beneath the third lower labial row of teeth, giving a two-rowed appearance of papillae below it, like *Hyla cinerea*. The third row of labial teeth is short (in one specimen subdivided) and is two-ninths to one-third times (usually two-fifths, rarely as small as one-fifth) in the length of

the first or second rows. The first and second rows about equal or one and one-half greater than the horny beaks.

Measurements.—Length of body (10.0–12.0 mm.) in tail (11.5–23.0 mm.) 1.1–2.0, average 1.67. Width (6.0–7.2 mm.) of body in its own length 1.5–1.85, average 1.65. Depth (5.0–6.5 mm.) of body 1.0–1.85 mm. in body width, average 1.2. Depth of body 1.61–2.18 in body length, average 1.86. Depth (5.0–7.0 mm.) of tail in length of tail 2.5–3.5, average 3.0. Muscular part (2.0–3.0 mm.) 1.9–2.5 in depth of tail, average 2.1. Spiracle 1.0–1.5 nearer base of hind legs or vent region (5.0–7.0 mm.) than the tip of the snout (6.0–9.0 mm.), average 1.22. Spiracle 1.25–2.3 nearer eye (2.5–4.8 mm.) than base of hind legs or vent, average 1.86. Eye 1.0–1.6 nearer to spiracle (2.5–3.5 mm.) than to tip of snout (3.0–4.2 mm.), average 1.25. Nostril 1.2–2.1 nearer eye (1.2–2.5 mm.) than snout (2.5–3.0 mm.), average 1.5. Internasal space (2.2–3.2 mm.) usually 0.75–1.6 larger than mouth (2.0–3.0 mm.), average 1.25. Mouth contained 1.33–2.5 (average 1.85) in interorbital distance (4.0–5.5 mm.). Internasal space contained in interorbital distance 1.33–2.2, average 1.8.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	35.0	Spiracle to vent.....	6.0
Body length.....	12.0	Spiracle to eye.....	4.8
Body depth.....	5.5	Eye to snout.....	4.2
Body width.....	7.2	Eye to nostril.....	2.5
Tail length.....	23.0	Nostril to snout.....	3.0
Tail depth.....	6.5	Mouth.....	3.0
Musculature of tail.....	3.0	Interorbital distance.....	5.0
Spiracle to snout.....	9.0	Internasal distance.....	2.8

HYLA CINEREA (Schneider)

Plate 9, figure 12

Color description from life (July 26, 1921).—Top of body generally citrine to olive green or oil green, sometimes a bright spinach green or forest green. Stripe on side of head from snout to eye sulphur yellow and ivory yellow. Belly solid cartridge buff or ivory yellow. Breast and lower throat light vinaceous fawn. Mental region and upper throat dusky slate-blue with scattered spinach green spots. Sides of the body in branchial region and under eye spotted dusky slate blue, or slate-blue, light vinaceous fawn, cartridge buff, sulphur yellow.

General color of tail sulphine yellow to citrine. Base of muscular part of tail with some light vinaceous fawn spots along the middle of it for 1 centimeter or more. In almost mature tadpoles not black spots on the crests. About time hind legs begin to grow, upper and lower crests with prominent blackish spots. Fine spinach green

flecks over tail except near the edges of the tail crests. In the younger tadpoles without blackish spots the black is in specks all over the tail and these faintly appear on the tail crests as dark edges.

Iris light cadmium to buffy yellow with dusky in front and behind the pupil.

General appearance.—Tadpole medium (40 mm.), full, and deep bodied. Tail acuminate; tip acuminate, sometimes acute. Tail long. The dorsal and ventral crests about equal and about equal to musculature in depth. The dorsal crest extending on to the body to the vertical about midway between the eye and spiracle. Spiracle sinistral, directed upward and backward, far below lateral axis, the spiracular opening very visible as a round or elliptical opening. Eye on lateral axis, in dorsal aspect on the lateral outline and in consequence visible from the venter. Anus dextral, at or only slightly above the lower edge of the ventral crest. Muciferous crypts not distinct. As they approach transformation the whole tail becomes spotted with conspicuously dark and light spots.

Mouth parts.—Teeth $\frac{2}{3}$. Upper labium fringed with a continuous row of labial teeth; the papillae extend above and inward beyond the end of the fringe for about one-fourth to two-ninths of the length of the upper fringe. The end of the second row is usually even with the end of the upper fringe. The horny beak is contained in the upper fringe 2-2.3. Median space between the lateral second upper labial row three or four times in the length of the lateral row. The latter row about two and one-half times in the upper fringe. Inner papillae extend beneath the third lower labial row of teeth after giving a two-rowed appearance below it, like *H. andersonii*, *H. femoralis*, *H. versicolor* or *H. squirella*. The third lower row of teeth, however, is not like this group, but shorter, like *H. gratiosa* or *H. crucifer*. In one specimen it was absent, with the papillae below also absent. This third row is contained two-fifths to one-fourth in the length of the first or second row of lower labial teeth. The first and second rows (lower labial) about equal or one and one-third greater in length than horny beaks. Sometimes fringes are united by their ends as in *H. gratiosa*.

Measurements.—Length of body (11-15 mm.) in tail (16-25 mm.) 1.25-2.0, average 1.6. Width (6-7.5 mm.) of body in its own length 1.8-2.2, average 1.9. Depth of body (6.0-7.0 mm.) equals body width. Depth of body 1.69-2.5 in body length, average 1.95. Depth (7.0-8.0 mm.) of tail in length of tail 2.0-3.125, average 2.75. Muscular part (4.0 mm.) 1.75-2.4 in depth of tail, average 1.925. Spiracle 1.15-1.6 nearer base of hind legs or vent region (5.0-7.0 mm.) than the tip of the snout (8.0-9.0 mm.), average 1.375. Spiracle 1.4-2.3 nearer eye (3.0-3.5 mm.) than base of hind legs or vent, average 1.88. Eye 1.1-1.66 nearer spiracle (3.0-3.5 mm.) than to

tip of snout (3.8–5.0 mm.), average 1.38. Nostril 1.0–1.5 nearer eye (1.8–2.5 mm.) than snout (2.0–3.5 mm.), average 1.35. Mouth (2.0–3.5 mm.) 1.0–1.4 in internasal space (3.0–4.0 mm.), average 1.25. Mouth contained 1.6–2.0 (average 1.83) in interorbital distance (5.0–6.0 mm.). Internasal space contained in interorbital space 1.25–1.8, average 1.48.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	40.0	Spiracle to vent.....	7.0
Body length.....	15.0	Spiracle to eye.....	3.0
Body depth.....	6.0	Eye to snout.....	5.0
Body width.....	7.0	Eye to nostril.....	2.5
Tail length.....	25.0	Nostril to snout.....	3.5
Tail depth.....	8.0	Mouth.....	3.0
Musculature of tail.....	4.0	Interorbital distance.....	6.0
Spiracle to snout.....	9.0	Internasal distance.....	4.0

HYLA REGILLA Baird and Girard

Plate 4, figure 5

General appearance.—Tadpole medium (45 mm.), full, and deep bodied. Tail medium or fairly long, tip acute or obtuse. No flagellum. The dorsal crest not exceeding the musculature in depth, extending on to body to the vertical through the posterior edge of the eye. Tail in general quite deep. Spiracle sinistral, more directed backward than upward, opening plainly visible as a round or elliptical opening. Spiracle far below lateral axis. Eye on the lateral axis, in dorsal aspect on the lateral outline, therefore just visible from venter. Anus dextral, opening just above the level of the lower edge of the ventral crest. Muciferous crypts not distinct.

Mouth parts.—Teeth $\frac{2}{3}$. Upper labium fringed with a continuous row of teeth; the papillae extend above and inward beyond the end of upper fringe one-seventh to one-fifth (usually one-fifth) of the length of the upper fringe. The end of the second upper labial row may extend beyond the end of the upper fringe or be even with it. The horny beak may be contained in horny fringe or combined upper lateral rows 1.8–1.4 times. Median space between these lateral rows contained usually three (sometimes 2.5–5.0 times) times the length of the lateral rows. Usually a well-formed inner row of papillae on side of labium down almost to the end of the lower labial row. The third row of lower labial teeth with only a single row of papillae below it as in *H. crucifer* or *H. gratiosa* and unlike the other five or six species studied. Third row usually contained about three times in length of first or second lower labial teeth rows (sometimes 2.5–3). The first and second lower labial teeth longer than beak.

Measurements.—Length of body (13.0–16.0 mm.) in tail (20–30 mm.) 1.46–1.875, average 1.68. Width of body (6.2–9.4 mm.) in its own length 1.6–2.1, average 1.74. Depth of body (5.0–9.8 mm.)

in body width, average 1.12. Depth of body 1.5–2.0 in body length, average 1.8. Depth of tail (7.5–9.0 mm.) in length of tail 1.5–3.21. Muscular part of tail (3.0–3.6 mm.) 2.3–2.8 in depth of tail, average 2.56. Spiracle 1.05–1.4 nearer base of hind legs (5.8–9.0 mm.) than snout (8–10.0 mm.), average 1.25. Spiracle 1.6–1.75 nearer eye (3.0–4.6 mm.) than base of the hind legs or vent, average 1.65. Eye 1–1.4 nearer spiracle (3.0–4.6 mm.) than tip of snout (4.2–5.4), average 1.19. Nostril 1–1.7 nearer eye (2.0–2.2 mm.) than tip of snout (2.2–3.8 mm.), average 1.4. Mouth (2.4–3.4 mm.) usually 1.06–1.2 larger than internasal space (2.0–3.2 mm). Mouth contained 1.4–1.7 times (average) in interorbital distance (4.0–5.4 mm). Internasal space contained in interorbital space 1.5–2.0, average 1.72.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	46.6	Spiracle to vent.....	9.0
Body length.....	16.0	Spiracle to eye.....	3.0
Body depth.....	8.0	Eye to snout.....	4.2
Body width.....	9.2	Eye to nostril.....	2.2
Tail length.....	30.0	Nostril to snout.....	3.6
Tail depth.....	9.0	Mouth.....	3.0
Musculature of tail.....	3.2	Interorbital distance.....	3.0
Spiracle to snout.....	9.6	Internasal distance.....	4.6

HYLA FEMORALIS Latreille

Plate 9, figure 6

Color description from life (July 8, July 26, 1921).—Upper parts of body olivaceous black to dull greenish black. Throat on either side below eye pomegranate purple. Belly on sides and across breast light vinaceous purple; center of belly solid sulphur-yellow. Chin clear with very little or no black dots. In younger tadpoles general color light yellowish olive or grayish olive. All over upper parts are fine grayish vinaceous or light vinaceous fawn dots and on the muscular part of tail but not on the crests. These dots become larger on dark upper eyelid and give a conspicuous arrangement. In half-grown tadpoles a cream-colored ring under the eye and extending backward on either side of back for a distance. In very young tadpoles the ring is almost complete about eye but not on the back. This ring faintly present in mature tadpoles and extends backward on to the base of the musculature of the tail. Under the eye it is warm buff, on body buffy brown, cartridge buff, or tiller buff.

Tail.—Beginning at body there runs along musculature for one-half or more of its length a white, cartridge buff or pale cinnamon pink stripe, marked off by the dark brown or black ground color of the upper half of the musculature and the lower half of the same part. Upper and lower crests with prominent large spots, black in younger specimens and clusters of mouse gray on mature tadpoles. The

tip of tail (both upper and lower crests) clear of spots. Area of crest next to musculature clear in upper and lower crests. Light area of tail crests more or less suffused with light coral red or coral red, suggestive of *H. versicolor* tadpoles.

Iris, the outer part olivaceous black to dull greenish black, inner circle and part of rest light vinaceous fawn, buff pink or light ochraceous salmon.

General appearance.—Tadpole small (36 mm.), full, and deep bodied. Tail medium to fairly long, tip acuminate and very pointed. Tail with a prominent flagellum, the dorsal and ventral crests of which are usually colorless. Tail deep and dorsal and ventral crests well developed. The dorsal crest may exceed the musculature in depth and extends on to the body to the vertical of the spiracle or halfway between spiracle and eye. Spiracle sinistral, directed more backward than upward, far below the lateral axis and visible as an elliptical opening. Eye on the lateral axis, in dorsal aspect on the lateral outline and in consequence visible from the venter. Anus dextral, very near the level of the edge of the lower crest. Muciferous crypts indistinct.

Mouth parts.—Teeth $\frac{2}{3}$. Upper labium fringed with a continuous row of labial teeth; the papillae extend above and inward beyond the end of the upper fringe for about four-elevenths to two-fifths of the length of the upper fringe. The end of the second row usually is even with the end of the upper fringe. The horny beak is contained about 2.0 times in the upper fringe. The median space between the lateral second upper labial very short, six to ten times the length of either lateral row. The inner papillae extend under the third row of lower labial teeth making at least two rows of papillae across the lower labial border. In the lower labial corner there is a heavy papillary series of four or five rows like *H. versicolor* or *H. squirella*. The lower third labial is long and is usually about 1.10–1.2 in the first or second row, longer than in *H. squirella* and is larger than the horny beak. The first and second rows are about equal and 1.4–1.6 greater than the horny beak. This species, like *Hyla versicolor* and *Hyla squirella* has a very angulate upper fringe at its middle.

Measurements.—Length of body (8.0–12.0 mm.) in tail (13.5–2.40 mm.) 1.3–2.8, average 1.75. Width (4.5–6.5 mm.) of body in its own length 1.6–2.1, average 1.8. Depth (4.5–7.0 mm.) of body usually slightly greater than body width (4.5–6.5 mm.). Depth of body 1.33–2.2 in body length, average 1.68. Depth (4.5–10 mm.) of tail in length of tail 1.6–2.75, average 2.25. Muscular part (2.5–4.5 mm.) 1.8–2.3 in depth of tail, average 2.1. Spiracle 1.1–1.4 nearer base of hind legs or vent region (5.0–6.0 mm.) than the tip of the snout (5.5–8.0 mm.), average 1.24. Spiracle 1.5–2.5 nearer eye (2.0–

4.0 mm.) than base of hind legs or vent (5.0–6.0 mm.), average 1.87. Eye 1.0–1.75 nearer to spiracle (2.0–4.0 mm.) than to tip of snout (3.2–4.5 mm.), average 1.25. Nostril 1.2–2.3 nearer eye (1.2–2.5 mm.) than snout (2.0–3.0 mm.), average 1.85. Mouth (2.0–3.5 mm.) equal to the internasal space (2.0–3.5 mm.). Mouth contained 1.4–2.0 (average 1.65) in interorbital distance (3.5–6.0 mm.). Internasal space (2.0–3.5 mm.) contained in interorbital space 1.3–2.0, average 1.7.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	33.0	Spiracle to vent.....	6.0
Body length.....	10.0	Spiracle to eye.....	4.0
Body depth.....	5.0	Eye to snout.....	3.2
Body width.....	6.5	Eye to nostril.....	1.5
Tail length.....	22.5	Nostril to snout.....	3.0
Tail depth.....	7.5	Mouth.....	3.0
Musculature of tail.....	3.5	Interorbital distance.....	5.0
Spiracle to snout.....	8.0	Internasal distance.....	3.5

HYLA ARENICOLOR Cope

Plate 9, figure 2

Color description from life (July 11, 1925).—Upper parts of body dark greenish olive, dark olive, or deep olive. Back dotted with fine light yellowish olive specks. Pectoral and branchial regions of venter light vinaceous fawn. Belly a solid pale cinnamon pink, on sides of belly light vinaceous fawn or light vinaceous cinnamon or white.

Tail.—Heavily blotched with black on outer or upper half of upper crest and on outer or lower half of the caudal half of lower crest. The area next to the musculature free of black. In some tadpoles tail fins suffused with some “reddish” orange pink, coral pink, or coral red, as in *H. versicolor*. Some spots of light vinaceous fawn on the lower side of the musculature for the first inch or more. Also some bright green yellow with it. Some black more or less in the middle line of the musculature. Caudal half of tail musculature with many large black spots.

Iris dark greenish olive or dark olive heavily dotted with greenish yellow specks above and below the pupil; a clear dark greenish olive or black area behind and ahead of the pupil. Pupil rim with greenish yellow ring. Pupil rim with small emargination below.

General appearance.—Tadpole medium (50.0 mm.), not so deep bodied as *H. versicolor*. Tail long or very long, rather narrow for a Hyliid of *H. versicolor* group, quite attenuated, but tail tip rounded. Dorsal and ventral crest each less deep than the musculature. Dorsal crest reaching the vertical of spiracle or not reaching it. Spiracle

sinistral, directed obliquely backward, the opening elliptical. Spiracle low, exactly on edge of ventral outline. Eye on lateral axis in dorsal aspect just inside the lateral outline and not visible from the venter. Anus dextral, very near or at edge of lower tail crest. Muciferous crypts indistinct.

Mouth parts.—Teeth $\frac{2}{3}$. Upper labium fringed with a continuous row of labial teeth; the papillae extend above and inward beyond the end of the upper fringe for about one-fourth to one-seventh of the length of the upper fringe. The end of the second row usually is even with the end of the upper fringe of teeth; the horny beak is contained 1.8–2.0 times in upper fringe. The median space of second upper row very short, eight to ten times in the length of either half. The inner papillae poorly developed, two to three rows at end of three series of lower teeth, not as well developed as in *H. femoralis*, *H. squirella*, or *H. versicolor*. Beneath the third lower labial row no inner papillae or very scarce. The third lower labial row equal to or slightly shorter than the first lower row. The first and second rows of lower teeth are about equal or the second row the longer and 1.5–2.0 greater than horny beak. This species has the longest second lower row of its group (*H. versicolor*, *H. femoralis*, *H. arenicolor*, *H. squirella*).

Measurements.—Length of body (11.4–15.4 mm.) in tail (2.0–3.3 mm.) 1.7–2.2, average 1.83. Width (6.4–9.0 mm.) of body in its own length 1.6–2.0, average 1.76. Depth (5.0–7.6 mm.) of body 0.95–1.4 in body width, average 1.14. Depth of body 1.75–2.3 in body length, average 2.02. Depth (6.0–8.0 mm.) of tail in length of tail (20–33 mm.) 2.85–5.15, average 3.73. Muscular part (4.0–5.0 mm.) 1.28–1.76 in depth of tail, average 1.62. Spiracle 1.13–1.55 nearer base of hind legs or vent region (5.8–7.2 mm.) than the tip of the snout (7.8–10.4 mm.), average 1.37. Spiracle 1.44–2.42 nearer eye (2.8–5.0 mm.) than base of hind legs or vent, average 1.78. Eye 1.0–1.7 nearer spiracle (2.8–5.0 mm.) than to tip of snout (4.6–6.0 mm.), average 1.36. Nostril nearer eye (2.0–3.0 mm.) than snout (3.6–5.0 mm.), average 2.08. Mouth (3.0–5.0 mm.) usually 0.83–1.7 larger than internasal space 2.2–4.0, average 1.3. Mouth contained 1.15–1.95 (average 1.46) in interorbital distance (5.0–7.0 mm.). Internasal space (2.2–4.0 mm.) contained in interorbital space 1.3–2.33, average 1.95.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	50.0	Spiracle to vent.....	7.0
Body length.....	15.4	Spiracle to eye.....	4.2
Body depth.....	7.0	Eye to snout.....	6.0
Body width.....	9.0	Eye to nostril.....	2.6
Tail length.....	33.0	Nostril to snout.....	5.0
Tail depth.....	6.4	Mouth.....	5.0
Tail, musculature of.....	5.0	Interorbital distance.....	7.0
Spiracle to snout.....	10.4	Internasal distance.....	4.0

HYLA VERSICOLOR (LeConte)

Plate 9, figures 4, 5

Color description from life (not Ridgway).—General color of back olive green. Background of back yellowish, covered with many fine hairlike black markings and golden and black spots, becoming orange in the head region and sometimes almost vermilion about the eye; the golden and black spots are more pronounced toward the tail; on the sides is a decided iridescence. The eye is slightly bronzy. The venter in general is conspicuously white or light cream and slightly iridescent. The belly is covered with fine golden spots. From the gill region forward the venter is greenish, a coloration produced by black and golden spots. The background of all the tail except the base is scarlet or orange-vermilion. The base of the tail is like the body. The tail is covered with black blotches, more prominent around the edges of the crests. These blotches become much more numerous as the hind legs develop.

General appearance.—Tadpole medium (46.6 mm.), full, and deep bodied. Tail very long, deep, tip very acuminate with a prominent flagellum. The dorsal crest is as deep as the musculature and extends on to the body to the vertical between the spiracle and the eye or to the spiracle. Spiracle sinistral, directed more backward than upward, far below the lateral axis and visible as an elliptical opening. Eye on lateral axis, in dorsal aspect on the lateral outline and in consequence visible from the venter. Anus dextral, very near or at the level of the edge of the lower tail crest. Muciferous crypts indistinct.

Mouth parts.—Teeth $\frac{2}{3}$. Upper labium fringed with a continuous row of labial teeth; the papillae extend above and inward beyond the end of the upper fringe for about one-third of the length of the upper fringe. The end of the second row usually is even with the end of the upper fringe. The horny beak is contained about two times in the upper fringe. The median space between the lateral second upper labial rows quite short, 3.25–5 times the length of either lateral row. The inner papillae extends under the third row of lower labial teeth, making at least two rows of papillae across the lower labial border. In the lower labial corner there is a heavy papillary series of two or three rows, not so pronounced as in *Hyla squirella* or *Hyla femoralis*. The lower third labial teeth is long and is contained usually about 1.10–1.25 times in the first or second row. The first or second rows about equal and 1.8–2.0 greater than the horny beak. This species like *Hyla femoralis* and *H. squirella* has an angulate upper fringe at its middle.

Measurements.—(Okefinokee specimens). Length of body (14.8–16.0 mm.) in tail (27.4–31.2 mm.) 1.75–2.1 average, 1.92. Width

(9.6–11.4 mm.) of body in its own length 1.38–1.6, average 1.5. Depth (8.2–10.0 mm.) of body 1.0–1.2 in body width, average 1.08. Depth of body 1.5–1.8 in body length, average 1.64. Depth (8.6–9.0 mm.) of tail in length of tail 3.1–4.0, average 3.6. Muscular part (4.6–5.0 mm.) 1.72–1.9 in depth of tail, average 1.8. Spiracle 1.3–1.6 nearer base of hind legs or vent region (6.6–9.0 mm.) than the tip of the snout (9.8–11.4 mm.). Spiracle 1.12–1.5 nearer eye than base of hind legs or vent, average 1.33. Eye to spiracle (5.0–6.0 mm.) about equal to eye (5.0–6.0 mm.). Nostril 1.36–1.8 nearer eye than snout. Mouth (3.4–4.0 mm.) in 1.1–1.35 internasal space (4.2–4.8 mm.), average 1.25. Mouth contained 1.65–2.05 (average 1.8) in interorbital distance (6.0–7.6 mm.). Internasal space contained in interorbital space 1.35–1.6, average 1.45.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	46.6	Spiracle to vent.....	7.6
Body length.....	15.8	Spiracle to eye.....	6.0
Body depth.....	10.0	Eye to snout.....	5.0
Body width.....	11.4	Eye to nostril.....	2.2
Tail length.....	30.8	Nostril to snout.....	3.0
Tail depth.....	8.8	Mouth.....	3.6
Musculature of tail.....	5.0	Interorbital distance.....	4.2
Spiracle to snout.....	10.0	Internasal distance.....	6.0

HYLA SQUIRELLA Latreille

Plate 9, figure 1

Color description from life (June 23, 1922).—General color of body citrine drab. In general it has a greenish cast like tadpoles of *Hyla cinerea* and *H. gratiosa*. Developing ventral flap between hind legs ecru-olive; throat from line of eye to eye to mouth same color. Area behind gill area ochre red. Belly pigmented testaceous and chalc-edony yellow. These make a solid iridescence which on the sides and across the middle venter becomes replaced with black.

Tail.—Muscular part of tail dark olive buff. Muscular part without prominent clusters of blackish spots. The dots are uniformly scattered over the muscular part but slightly thicker near the tip. The tail reminds one more of a *Ramid* tadpole tail in coloration. *

Iris more or less black with a rim of testaceous or light coral red and chalc-edony yellow spots amongst the black.

General appearance.—Tadpole small (32 mm.), full, and fairly deep bodied. Tail long, tail tip acuminate, a flagellum present. Dorsal and ventral crests well developed and tail in general deep. Dorsal crest not as deep as the tail musculature. Dorsal crest extends on to the body about to the vertical of the spiracle. Spiracle sinistral directed upward and backward, well below the lateral axis, the spiracular opening prominent elliptical lateral axis, is in dorsal

aspect on the lateral outline and in consequence is visible from the venter. Anus dextral, opening at the level of the edge of the ventral crest. Muciferous crypts indistinct.

Mouth parts.—Teeth $\frac{2}{3}$. Upper labium fringed with a continuous row of labial teeth; the papillae extend above and inward beyond the end of the upper fringe for about one-third to three-tenths of upper fringe. The end of the second upper labial row is usually even with the end of the upper fringe. The horny beak is contained about 1.8–2.0 times in the upper fringe. The median space between the lateral second upper labial rows of short teeth, 3.25–5 in the length of either lateral row sometimes very narrow (six in lateral row). The inner papillae extend under the third row of lower labial teeth, making at least two rows across the lower labial border. In the lower labial corner there is a heavy papillary series sometimes three or four rows wide like *H. versicolor* or *H. femoralis*. The lower third labial row is long and is usually about the length of the first or second lower labial rows and longer than the horny beak. The first and second rows are about equal and one and one-half to one and three-fourths greater than the horny beak. This species, like *H. versicolor* and *H. femoralis*, has the upper fringe very angulate at the middle.

Measurements.—Length of body (10–12 mm.) in tail (16–20 mm.) 1.55–2.05, average 1.75. Width (5.0–6.6 mm.) of body in its own length 1.7–2.2, average 1.875. Depth (5.0–7.0 mm.) of body equals body width or slightly greater. Depth of body 1.5–2.2 in body length, average 1.81. Depth (6.0–8.0 mm.) of tail in length of tail 2.3–3.3, average 2.8. Muscular part (3.0–4.2 mm.) 1.5–2.33 in depth of tail, average 1.87. Spiracle 1.15–1.75 nearer base of hind legs or vent region (4.0–6.5 mm.) than the tip of the snout (6.5–8.0 mm.), average 1.47. Spiracle 1.4–2.2 nearer eye (2.8–3.5 mm.) than base of hind legs or vent, average 1.7. Eye 1.1–1.6 nearer to spiracle (2.8–3.5 mm.) than to snout (4.0–5.0 mm.), average 1.38. Nostril 1.5–2.4 nearer eye (1.2–2.0 mm.) than snout (2.8–3.5 mm.), average 1.8. Mouth (2.0–3.5 mm.) usually equal to internasal space (2.5–3.5 mm.). Mouth contained 1.1–1.8 (average 1.50) in interorbital distance (4.0–5.5 mm.). Internasal space contained in interorbital space 1.33–2.0, average 1.58.

The dimensions of the largest tadpole are:

	Mm.		Mm.
Total length.....	32.0	Spiracle to vent.....	6.5
Body length.....	12.0	Spiracle to eye.....	3.0
Body depth.....	6.5	Eye to snout.....	4.0
Body width.....	6.0	Eye to nostril.....	1.2
Tail length.....	20.0	Nostril to snout.....	3.0
Tail depth.....	6.0	Mouth.....	3.2
Masculature of tail.....	4.0	Interorbital distance.....	5.0
Spiracle to snout.....	7.5	Internasal distance.....	3.5

EXPLANATION OF PLATES

Figure 4 of Plate 5, figures 2, 9, 10, 11, and 18 of Plate 6, and figure 8 of Plate 7 are added for comparison and are not referred to in the text.

PLATE 1. MISCELLANEOUS

- FIG. 1. *Gastrophryne texensis*.
 2. *Scaphiopus couchii*.
 3. *Scaphiopus hammondii*.
 4. *Scaphiopus holbrookii*.
 5. *Gastrophryne carolinensis*.
 6. *Ascaphus truei* (after Gaige).
 7. *Bufo americanus*.
 8. *Bufo* (Raleigh, N. C.).
 9. *Bufo terrestris*.
 10. *Acris gryllus*.
 11. *Pseudacris* (Buffalo, Rochester, N. Y.).
 12. *Pseudacris* (Raleigh, N. C.).
 13. *Pseudacris ocularis*.

PLATE 2. RANA

- FIG. 1. *Rana catesbeiana*.
 2. *Rana sphenocephala*.
 3. *Rana palustris*.
 4. *Rana aesopus*.
 5. *Rana pipiens*.

PLATE 3. RANA

- FIG. 1. *Rana heckscheri*.
 2. *Rana heckscheri* (young tadpole).
 3. *Rana septentrionalis*.
 4. *Rana boylii sierrae*.
 5. *Rana sylvatica*.
 6. *Rana clamitans*.
 7. *Rana grylio*.

PLATE 4. HYLA

- FIG. 1. *Hyla crucifer*.
 2. *Hyla gratiosa*.
 3. *Hyla andersonii*.
 4. *Hyla cinerea*.
 5. *Hyla regilla*.
 6. *Hyla squirella*.
 7. *Hyla femoralis*.
 8. *Hyla versicolor*.
 9. *Hyla femoralis*.

PLATE 5. SUPPLEMENTARY

- FIG. 1. *Rana virgatipes*.
 2. *Rana onca*.
 3. *Hyla arenicolor*.
 4. *Pseudacris* (San Benito, Tex.).
 5. *Bufo punctatus*.
 6. *Bufo compactilis*.
 7. *Bufo valliceps*.

MATURE TADPOLES (ABOUT NATURAL SIZE)

PLATE 6. GASTROPHRYNE, HYPOPACHUS, SCAPHIOPUS, BUFO, ACRIS,
PSEUDACRIS. $\times 1$

- FIG. 1. *Gastrophryne carolinensis*. Trader's Hill, Ga., June 24, 1922.
 2. *Hypopachus cuneus*. San Benito, Tex., April 22, 1925. Dorsal aspect.
 3. *Gastrophryne texensis*. Beeville, Tex., April 16, 1925.
 4. *Scaphiopus hammondi*. Deming, N. Mex., July 24, 1925. $\times \frac{3}{4}$.
 5. *Scaphiopus hammondi*. Alamogordo, N. Mex., July 21, 1925. Dorsal aspect.
 6. *Scaphiopus holbrookii*. Camp Pinckney near Folkston, Ga., June 22, 1922.
 7. *Scaphiopus couchii*. Comfort, Tex., June 5, 1925.
 8. *Bufo quercicus*. Chesser's Island, Folkston, Ga., August 10, 1922.
 9. *Bufo compactilis*. Leon Creek, San Antonio, Tex., May 26, 1925.
 10. *Bufo punctatus*. Helotes, Tex., June 5, 1925.
 11. *Bufo valliceps*. Lee Branch, Helotes Creek, Tex., May 26, 1925.
 12. *Bufo americanus*. Ithaca, N. Y.
 13. *Acris gryllus*. Near Chesser's Island, Folkston, Ga., July 24, 1922.
 14. *Acris*. Beeville, Tex., May 14, 1925.
 15. *Acris*. Helotes, Tex., May 26, 1925.
 16. *Pseudacris ocularis*. Folkston, Ga., June 30, 1922.
 17. *Pseudacris* ———. Hilton, N. Y., June 11, 1923.
 18. *Pseudacris* ———. San Antonio, Tex., May 29, 1925.

Photograph: Nos. 2, 3, 4, 5, 7, 9, 10, 11, 12, 14, 15, 17, 18, by A. A. Wright and A. H. Wright; Nos. 1, 6, 8, 13, 16 by F. Harper and A. A. Wright.

PLATE 7. RANA. $\times 1$

- FIG. 1. *Rana aesopus*. Chessers Island, Ga., August 10, 1922.
 2. *Rana palustris*. Ithaca, N. Y.
 3. *Rana onca*. Las Vegas, Nev.
 4. *Rana sylvatica*. Ithaca, N. Y.
 5. *Rana clamitans*. Ithaca, N. Y.
 6. *Rana clamitans*. Spanish Creek, Ga., July 17, 1922.
 7. *Rana pipiens*. Ithaca, N. Y.
 8. *Rana* ———. Bandera Creek, Tex., March 11, 1925.
 9. *Rana sphenoccephala*. Folkston, Ga., July 25, 1922.
 10. *Rana sphenoccephala*. Folkston, Ga., July 10, 1922.

Photographs: Nos. 2, 3, 4, 5, 7, 8, by A. A. Wright and A. H. Wright; Nos. 1, 6, 9, 10, by F. Harper and A. A. Wright.

PLATE 8. RANA. $\times \frac{3}{4}$

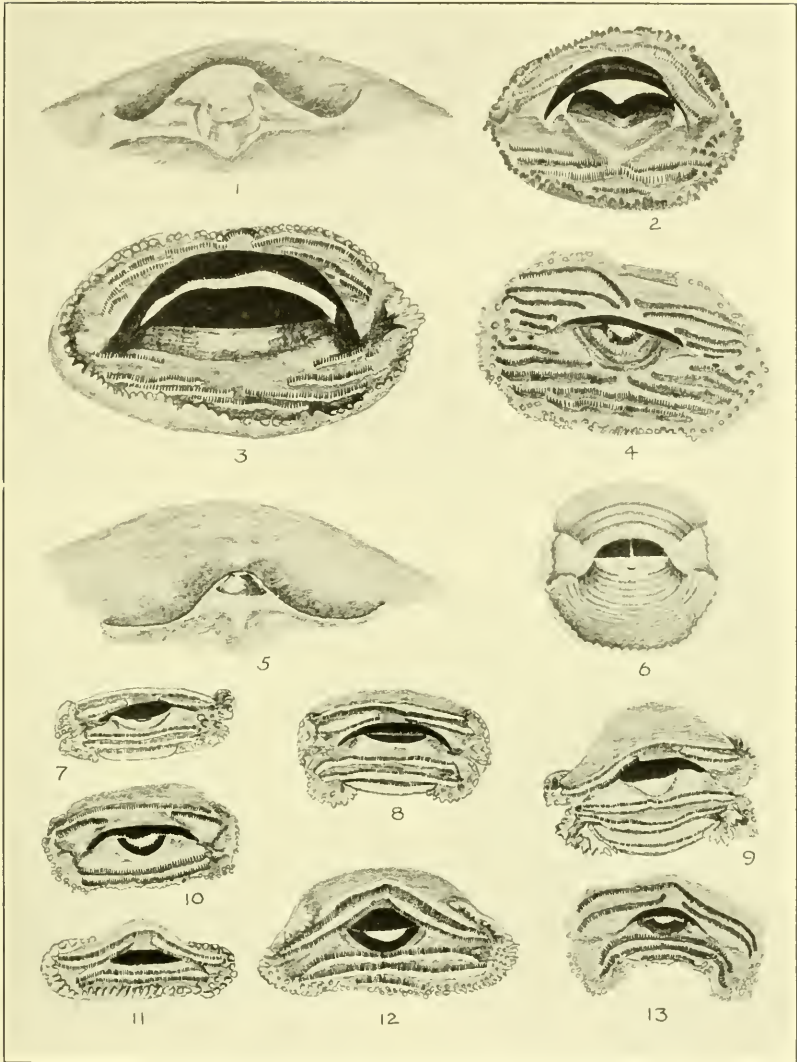
- FIG. 1. *Rana heckscheri*. Callahan, Fla., July 20, 1922.
 2. *Rana grylio*. Okefinokee Swamp, Billys Island, Ga., August 5, 1922.
 3. *Rana heckscheri*, young tadpole. Thompsons Landing, St. Marys River, Ga., July 17, 1922.
 4. *Rana grylio*. Billys Island, Ga., May 11, 1921.
 5. *Rana virgatipes*. Lakehurst, N. J., May 26, 1924.
 6. *Rana septentrionalis*. Onekio, N. Y., July 14, 1923.
 7. *Rana catesbeiana*. Ithaca, N. Y. $\times \frac{3}{4}$.
 8. *Rana catesbeiana*. 1-year old tadpole. Ithaca, N. Y.
 9. *Rana catesbeiana*. 3-5 months old. Ithaca, N. Y.

Photographs: Nos. 5, 6, 7, 8, 9, by A. A. Wright and A. H. Wright; Nos. 1, 2, 3, 4, by F. Harper and A. A. Wright.

PLATE 9. HYLA. $\times 1$

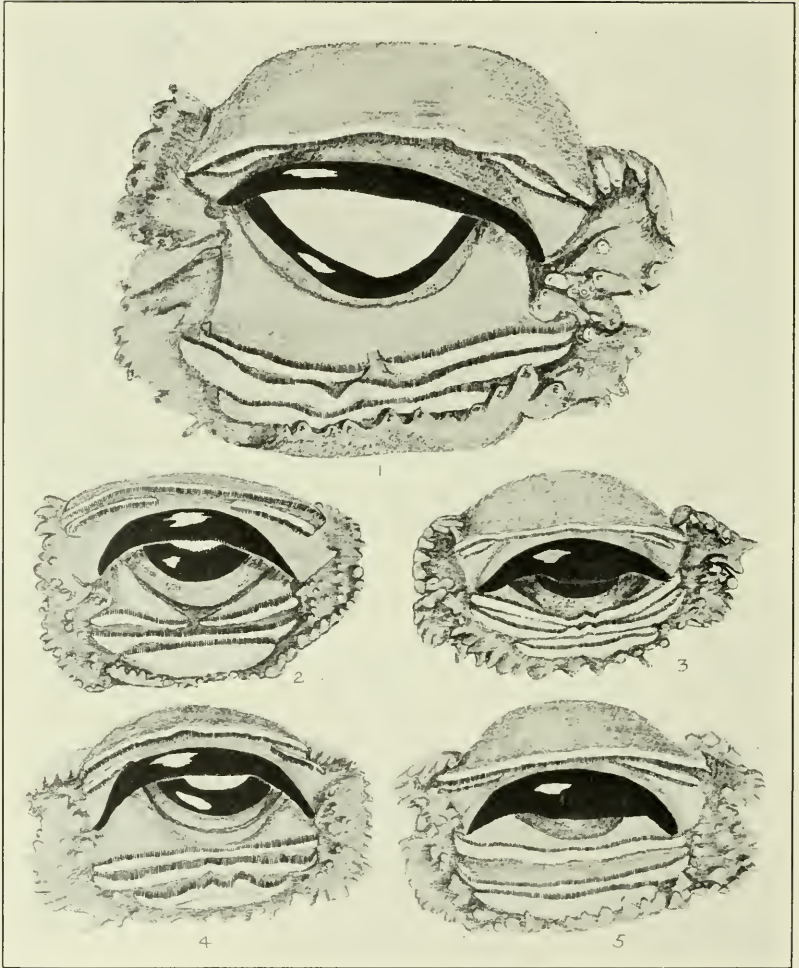
- FIG. 1. *Hyla squirella*. Anna's Pond, Folkston, Ga., June 27, 1922.
2. *Hyla arenicolor*. Fern Canyon, Alpine, Tex., July 6, 1925.
3. *Hyla crucifer*. Ithaca, N. Y.
4. *Hyla versicolor*. Ithaca, N. Y.
5. *Hyla versicolor*. Camp Pinckney, Folkston, Ga., June 22, 1922.
6. *Hyla femoralis*. Folkston, Ga., June 27, 1922.
7, 8. *Hyla andersonii*. Lakehurst, N. Y., June 28, 1923.
9. *Hyla gratiosa*. Petty Pond, Folkston, Ga., July 31, 1922. $\times 1.2$.
10. *Hyla gratiosa*. Young tadpoles. Traders Hill, Ga., June 24, 1922.
11. *Hyla gratiosa*. Forked tail.
12. *Hyla cinerea*. Camp Pinckney, Folkston, Ga., August 12, 1922.
- Photographs: Nos. 2, 3, 4, 7, 8, by A. A. Wright and A. H. Wright; Nos. 1, 5, 6, 9, 10, 11, 12, by F. Harper and A. A. Wright.





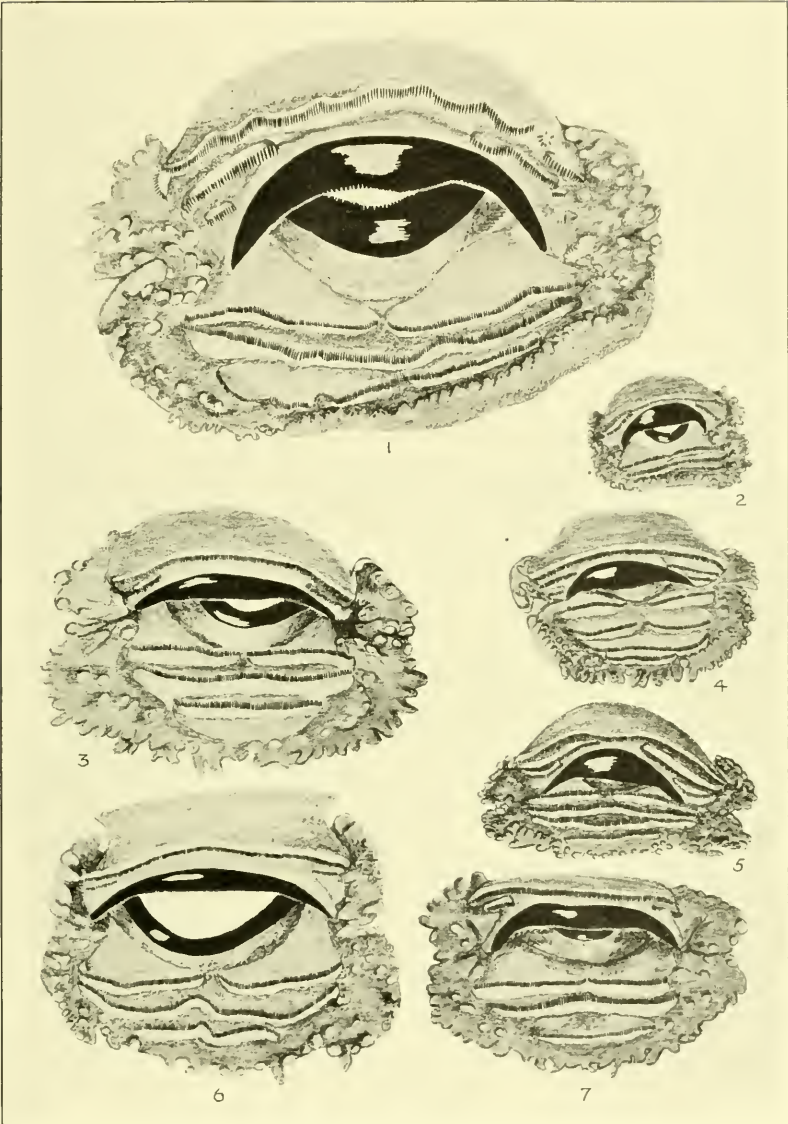
MOUTH PARTS OF NORTH AMERICAN TADPOLES

FOR EXPLANATION OF PLATE SEE PAGE 68



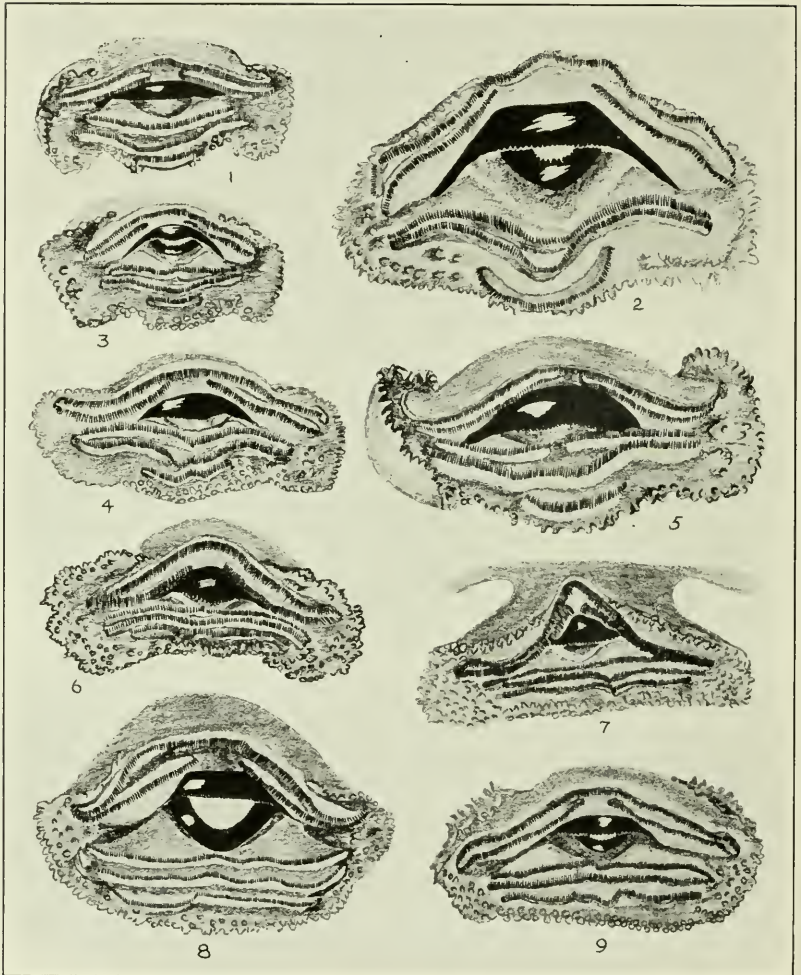
MOUTH PARTS OF NORTH AMERICAN TADPOLES

FOR EXPLANATION OF PLATE SEE PAGE 68



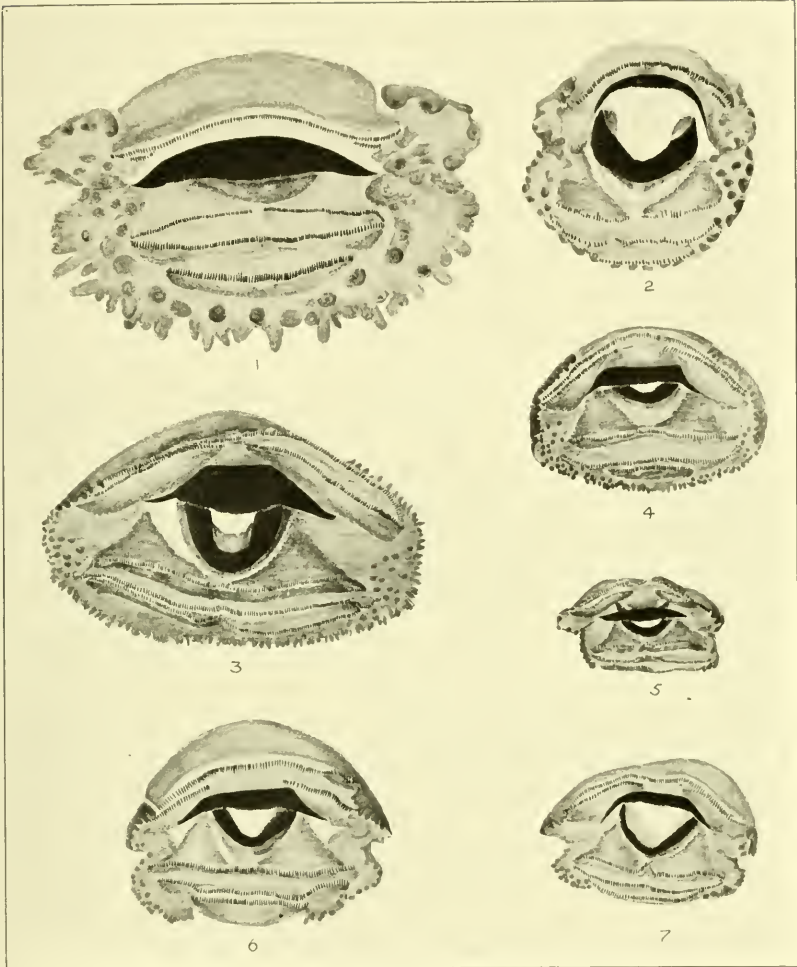
MOUTH PARTS OF NORTH AMERICAN TADPOLES

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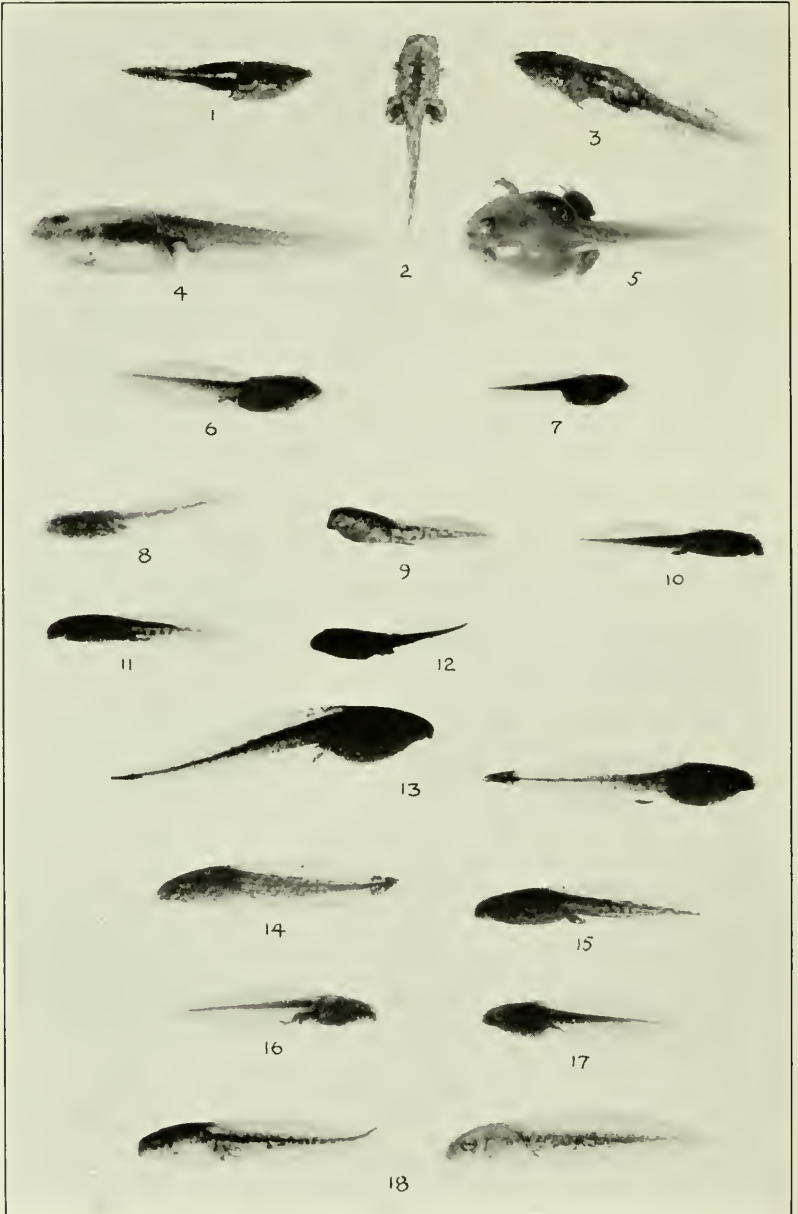
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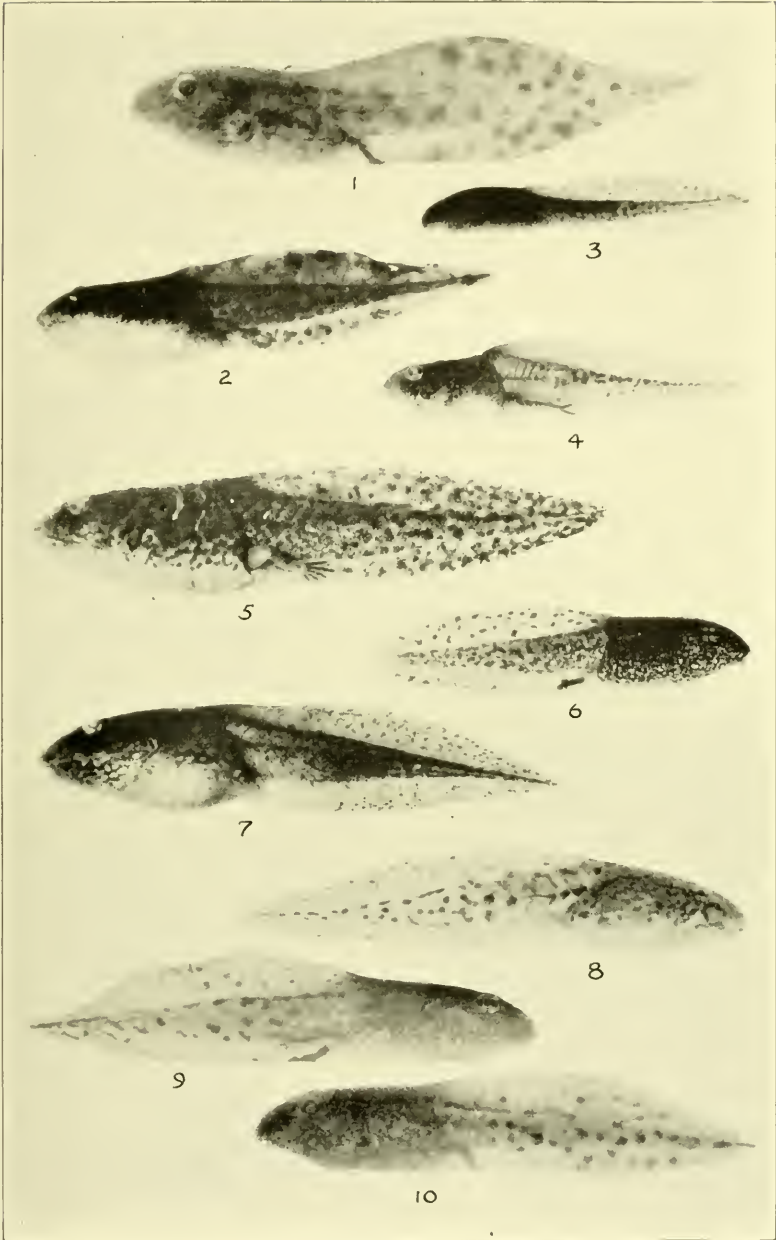
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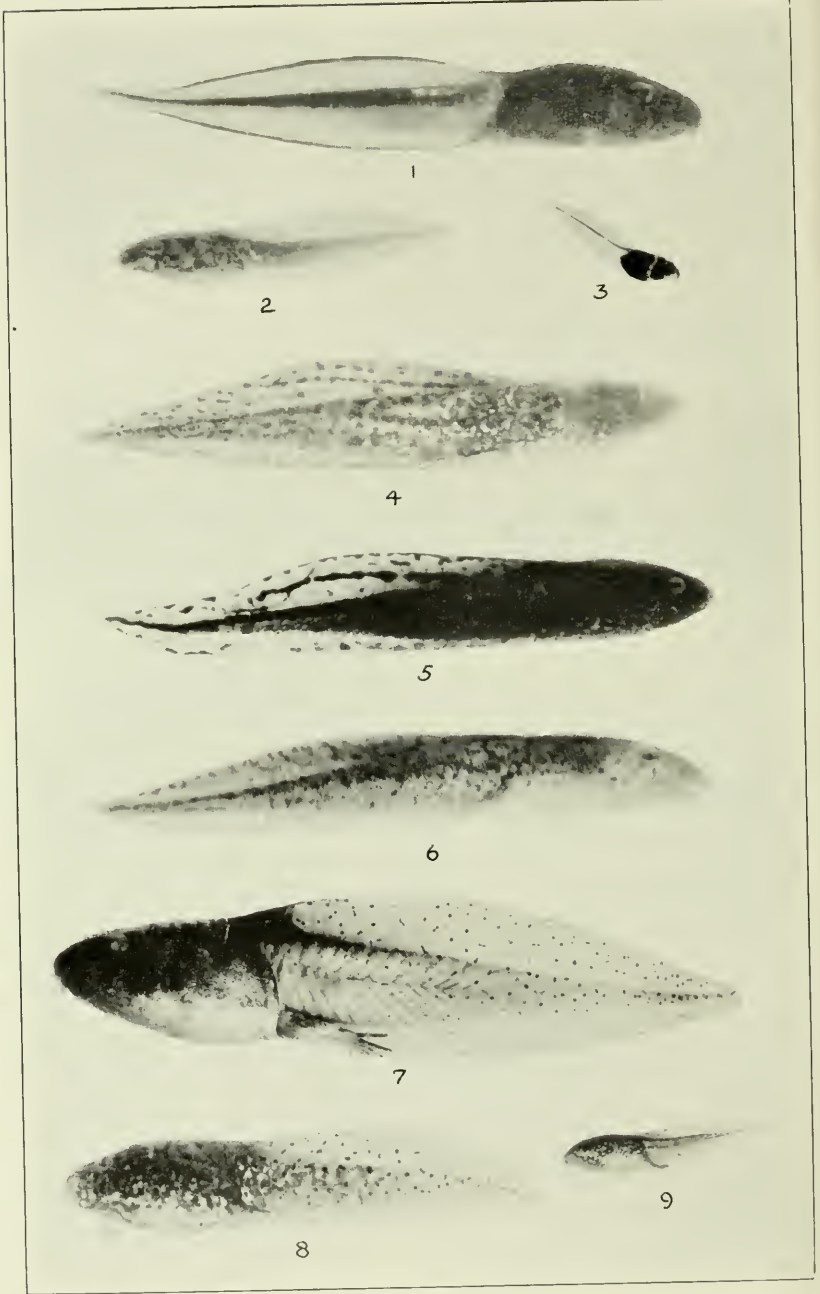
LATERAL ASPECTS OF LIVE TADPOLES

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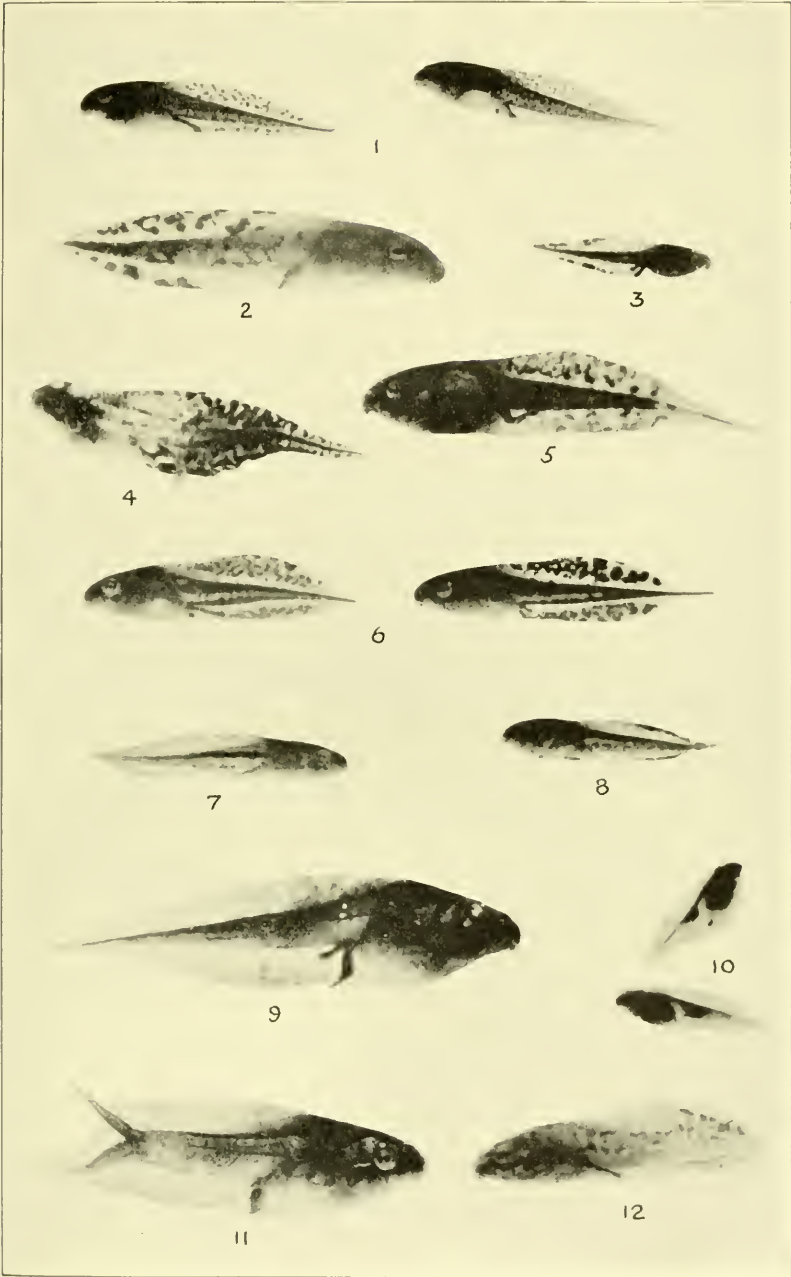
LATERAL ASPECTS OF LIVE TADPOLES

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LATERAL ASPECTS OF LIVE TADPOLES

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LATERAL ASPECTS OF LIVE TADPOLES

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