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## TADPOLE BEHAVIOR IN POOLS AND STREAMS

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As is well known, standard descriptions of tadpoles are usually based upon larvae well along in development since only by this means is it possible in many cases to delimit characteristics sufficiently invariable to be used successfully in keys. At that, some tadpoles so closely resemble others that some doubt often remains even with the best of keys based upon tadpoles nearing metamorphosis. Young tadpoles often cannot be determined at all and older ones, especially after some time in alcohol or formalin, are at best difficult to identify.

I have noted, as might be expected, that the behavior of species in natural waters is often as distinctive in the tadpole stage as in the adult. Behavior, therefore, can be used as an aid in identification, especially when supplemented by expectations based upon understanding of easily seen structural characters, type of breeding sites used by the adults, geographic and ecological distribution, etc. Some tadpoles are easily identified to species by such means alone; in other cases, only the genus or family can be determined. In all cases of doubt the animals, of course, should be run down in keys in the regular manner. Even though this may need to be done, noting characteristics of behavior may later serve to distinguish be-

tween two closely similar alternatives in a key and thus actually be the "key" to the situation.

I list below a combination of characteristics which I have used successfully for several years. I wish to emphasize that these are not always infallible (colors and coloration may vary in different waters; behavior, especially movements, is influenced by temperature, amount of water, and food and oxygen supply). Nor are they complete, some tadpoles behave so much like others. But they are sufficiently reliable so that I have found them at least ninety-five percent successful when checked by use of conventional keys. In some groups, they have been one-hundred-percent successful by such checks.

The statements apply specifically to Oklahoma where most observations have been made, and only to groups present in this State. Some differences may be expected in other regions but the principles should apply, with details often slightly different, in other regions.

1. Large brownish or mottled tadpoles in shallow warm water; rush out en masse to deeper water when approached.—*Rana* or *Bufo* (exclusive of *B. terrestris americanus*).
  - a. Tadpoles bicolored and in general light. Movements very quick. Swim fast along bottom and suddenly come to rest, colors blending them with background. Western Oklahoma only.—*Bufo compactilis* Wiegmann.
  - b. In shallow buffalo wallows.—Probably *Bufo cognatus* Say.
  - c. In deep permanent lakes or tanks, or deep pools in creeks or rivers; very large greenish tadpoles with mottling or spotting on tail.—*Rana catesbeiana* Shaw.
2. Eyes near or on lateral axis, tail tips attenuated, body rounded or superficially "squarish" when small.—*Hylidae*.
3. Medium-sized tadpoles which float near surface and disappear very fast on disturbance.
  - a. Flat bodied, "fry-pan" like; eyes at sides of head; often with black tail tip. In temporary water only.—*Microhyla* (*M. carolinensis carolinensis* (Holbrook) in extreme eastern Oklahoma; *M. c. olivacea* (Hallowell) in most of the remainder of State).
  - b. Round bodied with eyes set well to the sides; tail long, ruffled, attenuated, mottled with black, and distinctly red tipped.—*Hyla versicolor* LeConte.
  - c. Similar to (b) but with only black mottling (no red).—Younger *H. versicolor* or (in extreme east only) other species of *Hyla*.
  - d. Similar to (b) but with almost no mottling on tail.—*Pseudacris* or (in extreme east only) certain species of *Hyla*.
4. In eastern half of Oklahoma, small very dark (often black) tadpoles; weak swimmers with a tendency to cluster on bottom in shallows.—*Bufo terrestris americanus* Holbrook.
5. Small very heavily and coarsely mottled tadpoles in shades of brown, with a tendency to cluster on bottom near shore and to "hug" the bottom when disturbed. Weak swimmers. Eastern Oklahoma only.—*Bufo woodhousi fowleri* Hinckley.
6. Small broadly ovoid tadpoles, greenish with prominent rounded yellow or cream-colored spots on dorsal surface. Among the shyest of tadpoles, continuously hiding in aquatic vegetation or bottom mud; movements fast. Larger individuals often with intensely black tail tips.—*Acris crepitans* Baird.

7. Medium-sized tadpoles with eyes nearer sides than midline of head, tail long and attenuated. Habit of working up plant stems, nibbling algae while waving tail continuously. Very shy and very fast in movement. Often a shadow passing over the water sends them to hide at bottom (the only tadpoles known to me which constantly manifest this habit).—*Pseudacris streckeri* Wright and Wright.

8. Almost continuously moving tadpoles in temporary pools (or semipermanent tanks in the west), often pausing to nibble at food materials (sometimes in groups) with slowly moving tails. Not shy—apparently unconscious of presence of persons on the bank. Eyes closer together than in most tadpoles. General appearance superficially "mouse-like."—*Scaphiopus*.

- a. Body *light* colored (brown, grey, cream, or almost white) with iridescence or a sheen over whole body. Grow to large size but look much the same when small. In clear water usually darker than in turbid pools. Iridescent specimens more common in the west.
    - (1) In or east of Caddo County, common.—*Scaphiopus bombifrons* Cope.
    - (2) West of Caddo County, rare.—*S. bombifrons* or *S. hammondi* Baird.
  - b. Body *dark* colored (very dark grey to almost black) sometimes with coppery or golden sheen; never grow to large size.
    - (1) In savannah or wooded areas only (including flood-plain forests). Two curved whitish areas on back and (*in clear water*) a small yellow, whitish, or cream-colored angular spot common at tail base.—*Scaphiopus hurterii* Strecker.
    - (2) Occurs in southern and western Oklahoma only; no whitish areas on dorsum; no spot at tail base. Coppery or golden sheen characteristic of larger individuals.—*Scaphiopus couchii* Baird.
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