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**FOUR SPECIES NEW TO THE IOWA HERPETOFAUNA,
WITH NOTES ON THEIR NATURAL HISTORIES¹**

REEVE M. BAILEY

In a survey of the amphibians and reptiles of Iowa a number of species have been collected for which there are apparently no state records. The localities here reported constitute extensions of the known geographic ranges of these species. None has a statewide distribution, but each of the three amphibians occupies a considerable area. The available data are believed adequate to permit relatively accurate delimitation of the ranges in Iowa. Original information on the life histories of these species is included.

Unless otherwise specified I have been a party to the collection of the specimens listed. I wish to acknowledge with thanks the aid and cooperation of my companions on various field trips: Marian K. Bailey, Robert Burton, Max E. Davis, Harry Harrison, Silas S. Sharp, and William Sigler.

SMALL-MOUTHED SALAMANDER
Ambystoma texanum (Matthes)

Because of the secretive, apparently fossorial, habits of this species during most of the year it is infrequently found except during the breeding season in early spring. Nevertheless, it appears to be common in the southern two rows of Iowa counties across the breadth of the state, and in the eastern portion extends north at least to the vicinity of Iowa City.

The records are as follows:

- ADAMS Co.—Near Middle Nodaway Riv., 10 mi. W. Corning, March 29, 1940: cat. no.² 1158 (5); adults in pond.
- APPANOOSE Co.—Bottoms of Chariton Riv., 3.5 mi. E. Centerville, Mar. 20, 1939: no. 351 (2); adults in pond. Bottoms of Chariton Riv., 4.6 mi. N. Centerville, May 18, 1940: no. 1524 (3); adults crossing road in rain at night.
- DAVIS Co.—Near Fox Riv., 4 mi. N. W. Bloomfield, Mar. 21, 1939: no. 350; adult in pond.
- JEFFERSON Co.—Near Cedar Cr., 8 mi. W. Fairfield, May 6, 1941, Malcolm McDonald: no. 1442; adult under log.
- JOHNSON Co.—Bottoms of Iowa Riv., 2.5 mi. S. Iowa City, Apr. 4, 1941: no. 247 (ad.), no. 562 (eggs and serial set of developing larvae). Same locality, Mar. 24, 1942: eggs only.
- LEE Co.—Artificial pond, 2.5 mi. E. Farmington, Mar. 22, 1941: no. 560 (field collected eggs and series of laboratory hatched larvae).
- LUCAS Co.—Bottoms of Whitebreast Cr., 1 mi. W. Lucas, Mar. 19, 1939: no 349 (40); adults in pond. Bottoms of Chariton Riv., 1 mi. S. Chariton, Mar. 12, 1942: no. 580; adult in pond.

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²All catalogue numbers refer to the Iowa State College collection; if more than one specimen was taken the number is given in parentheses.

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PAGE Co.—Roadside ditch near U. S. Highway 71, 7.5 mi. N.N.E. Clarinda, Mar. 29, 1940: no. 1553; adult in pond.

WASHINGTON Co.—Bottoms of Crooked Cr., 3 mi. N. Olds, Mar. 20, 1941: no. 238 (ad. in pond), no. 271 (eggs and laboratory hatched larvae).

WAYNE Co.—Bottoms of Jordan Cr., 6 mi. E. Corydon, Mar. 12, 1942: no. 579 (2); adults in pond.

Rainy weather is commonly associated with breeding activity, but, for *texanum*, cannot be considered a necessary stimulus since the entire reproductive sequence, from initiation of the breeding migration to oviposition, occurs following the advent of warm weather in the absence of early spring rains.

Breeding sites used by *texanum* includes oxbow ponds, overflow pools, and borrow pits located in heavily or partially wooded bottomlands. These are often shared by *Ambystoma t. tigrinum*, but ponds located in upland areas or well away from woods are utilized by *tigrinum* exclusively.

Nine of the twelve localities listed are based on adult collections in ponds. These are either known or believed to be breeding aggregations; the indicated breeding period is from March 12 to April 4 over the four years, but is much shorter in any season. Water temperatures, available for 5 collections, ranged from 44° to 55° F.; in one pond quiescent adults were taken during the afternoon when the temperature was 60° F., but by 9:30 p. m. when breeding was active it had dropped to 48° F. In another locality egg clusters were present although ice still covered much of the pond.

A. texanum egg clusters consist of a much smaller complement than do those of *tigrinum*. The accompanying frequency distribution of egg counts for *texanum* is based on field data taken at the Johnson County locality on April 4, 1941.

Eggs per cluster 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Number

of clusters 1 3 7 9 17 20 17 22 17 12 11 7 6 7 2 1

The 159 clusters tabulated contain a mean of 10.95 eggs. Excluded from the above are a mass of 21, suspected of being a double cluster, and three of 20, 22, and 22 attached to the same submerged twig (obviously deposited by the same female) in which the eggs were slightly larger than the others; these may have been *tigrinum* eggs.

SPRING PEEPER
Hyla crucifer Wied

This abundant frog of the Eastern United States is restricted in Iowa to the wooded eastern edge of the state, being found nowhere more than two or three counties to the west of the Mississippi River. Even in this area it appears to be of localized and spotty occurrence except in Allamakee County, where it is abundant.

The records are as follows:

ALLAMAKEE Co.—Four mi. N.N.W. Marquette, Apr. 20, 1940: no. 1515

(19) One mi. S.W. New Albin, Apr. 3, 1942 (heard only). Two

to four mi. S.S.W. Lansing, Apr. 3, 1942: no. 1416 (38). Two mi. S. Dorchester, Apr. 20, 1940: no. 1517 (25).

CLAYTON Co.—One and one-fourth mi. E. Garnavillo, Mar. 25, 1939: no. 877 (6). Same locality, Apr. 20, 1940: no. 1518 (60).

JACKSON Co.—Maquoketa Caves State Park, 6.5 mi. N.W. Maquoketa, July 27, 1939: no. 1520.

JEFFERSON Co.—Two and one-half mi. S.W. Fairfield, Mar. 16, 1942, Malcolm McDonald: no. 1440. Same locality, Apr. 16, 1942: no. 1429 (2).

LEE Co.—Two and one-half mi. E. Farmington, Mar. 21, 1939: no. 1519 (31).

LINN Co.—Palisades-Kepler State Park, 4 mi. W. Mt. Vernon, Mar. 24, 1942: no. 1461 (44).

VAN BUREN Co.—Four mi. S. Keosauqua, Apr. 17, 1942: no. 1459.

WINNESHIEK Co.—One and one-half mi. S.W. Ft. Atkinson, Apr. 4, 1942: no. 1424 (13). Three mi. N.W. Decorah, Apr. 20, 1940: no. 1516 (5).

With the exception of a specimen taken during July on a moist forested hillside in Jackson County, all collections are from or near ponds just prior to or during the breeding season. Choruses have been heard from March 16 to April 20 at water temperatures ranging from 36° to 66° F. and air temperatures from 42° to 66° F. Amplexation has been observed from March 24 to April 20.

Breeding situations include spring seepage and marshy areas and ponds; none was found along flowing streams. Both bottomland and upland pools are freely utilized, but in each locality forest surrounded or was adjacent to the breeding pond.

NORTHERN CRAYFISH FROG

Rana areolata circulosa Rice and Davis

The range of *Rana areolata circulosa* west of the Mississippi River was indicated by Goin and Netting (1940: 157-8, fig. 1) as extending north to Johnson, Montgomery, and St. Charles counties in central Missouri and to Douglas County in east central Kansas. On the basis of the specimens at hand this should be extended to include south-eastern Iowa. In addition to the five counties listed below the species probably occurs in Des Moines, Henry and Lee, and perhaps other counties. It was not heard in Decatur, Monroe, and Wapello counties on the favorable nights preceding and following its capture in the five counties listed.

The records are as follows:

APPANOOSE Co.—Four and one-half mi. N. Centerville, May 18, 1940: no. 1031. Four and one-half mi. E. Centerville, Apr. 17, 1942: no. 1466 (3).

DAVIS Co.—Four mi. W.S.W. Bloomfield, May 18, 1940: D. O. R., not preserved.

JEFFERSON Co.—Two and one-half mi. S.W. Fairfield, Apr. 16, 1942: no. 1431 (21—7 ads. and 14 tadpoles). Same locality, Apr. 1942, Malcolm McDonald: no. 1436 (2).

- VAN BUREN Co.—Section 13, Union Twp., and Section 18, Cedar Twp., Stockport, May 6, 1942, Wilfred Crabb and George Wiseman: nos. 1327 and 1328 (4). Four mi. S. Keosauqua, Apr. 17, 1942: no. 1456. Two mi. W. Kilbourne, May 28, 1939: no. 1523. At Davis Co. line, 0.8 mi. W. Milton, Apr. 17, 1942: no. 1484 (14).
- WAYNE Co.—Section 24, Corydon Twp., 6 mi. E. Corydon, Mar. 12, 1942: no. 913 (10 tadpoles). Same locality, Apr. 18, 1942: no. 1448 (52 tadpoles; singing male heard but not collected).

Although anticipated, live specimens of this species were not collected during the period 1939-1941. Dead specimens were found on highways three times during May, but no specimens could be located in adjacent waters. Their song was not heard during late March or in May. On the nights of April 16 and 17, 1942, the sonorous, resonant song of *circulosa* was heard repeatedly, and specimens were readily captured in the breeding ponds. With one exception the ponds utilized were in stream valleys.

During the postbreeding season *circulosa* resorts to crayfish burrows and, therefore, is not found in the streams or ponds. Dr. Wilfred Crabb and Mr. George Wiseman collected four specimens on May 6, 1942, at Stockport, Van Buren County. The following habitat description is quoted from their field notes: "The frogs were found sitting near the openings of holes into which they retreated when disturbed. They were extricated by fish hooks attached to the ends of slender sticks. The holes were apparently vacated crayfish burrows. One was three feet deep with 18 inches of water in the bottom, another was 28 inches deep with 14 inches of water. Two frogs were usually present in the same burrow, although the large one [adult male; snout to vent length, 67 mm.] was alone. There were about 12 holes within a radius of 50 feet and all contained frogs. They were located on a short-grazed bluegrass pasture with a slope of about 7 percent. The day was cloudy and cool (about 40°F.) with a fresh west wind." Another specimen taken in a similar situation the same day in an adjoining section was an adult female 101 mm. in length.

Sexual maturity is apparently attained at an age of not less than three years. Three early spring collections of overwintering tadpoles show no sign of approaching metamorphosis, but since a unimodal size dispersion is evident (see Table I), transformation may be assumed to occur during the ensuing summer. Three frogs taken by Crabb and Wiseman on May 6 were immature; they have snout to vent lengths of 48 (♀), 49 (♀), and 51 (♂) mm., and are judged to be two years old, having transformed during the preceding summer. The adult male 67 mm. in length taken with them is presumably a year older; it is possible, however, that he transformed early in the summer of his first year and was mature at two years of age. Since this is easily the smallest adult taken it is believed the bulk of breeding specimens are at least four years old.

TABLE I.

Frequency Distribution of the Total Lengths
of Overwintering Tadpoles of *Rana areolata circumlosa*.

Length class mm.	Jefferson Co.	Wayne Co.	
	ISC 1431 IV:16:42	ISC 913 III:12:42	ISC 1448 IV:18:42
31-33		2	
34-36		2	
37-39			4
40-42			2
43-45		1	7
46-48		2	10
49-51		2	7
52-54	3		5
55-57	6	1	1
58-60	2		1
61-63	2		
Number	13	10	37
Mean length	56.1	42.7	47.3

SONORAN SKINK*Eumeces obsoletus* (Baird and Girard)

Two specimens (nos. 1513 and 1514) of the Sonoran skink were collected by Mr. Louis Strohmman in Waubonsie State Park (T. 68 N., R. 42 W., sec. 29), 5 miles northwest of Hamburg, Fremont County, Iowa, on June 20 and July 12, 1941, respectively. This locality is only 8 miles from the southwestern corner of the state, and represents the northeastern extremity of the known range of the species. It has only recently been reported from Missouri, near Kansas City, in Cass and Jackson counties (Anderson, 1942: 208-209), and Hudson (1942: 43-44) found it in Morrill and Thayer counties in western and southern Nebraska.

One of the specimens was found under a board near the custodian's house on the oak wooded loess bluff (Knox silt loam) of the Missouri River. The other was taken about one-half mile to the south during construction work on a road which parallels the base of the bluff. This individual (no. 1513, 113 mm. in snout to vent length and 204 mm. in total length—tail largely regenerated) deposited seven eggs in the peat of her cage sometime between July 10 and 14. These were turgid, with the greatest diameter at the center; the shells were white, smooth, and rather soft and pliable. None hatched. On July 15 they had the following dimensions:

Length	Diameter
17.0 mm.	x 11.8 mm.
16.0 mm.	x 11.3 mm.
15.4 mm.	x 11.6 mm.

16.8 mm.	x	10.6 mm.
15.7 mm.	x	11.5 mm.
16.8 mm.	x	11.5 mm.
13.8 mm.	x	9.8 mm.

Mean 15.9 mm. x 11.2 mm.

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