Catalogue of American Amphibians and Reptiles.

UZZELL, THOMAS. 1967. *Ambystoma laterale*

Ambystoma laterale Hallowell
Blue-spotted salamander

Ambystoma laterale Hallowell, 1856: 6. Type locality, "Marquette, [Marquette County, Michigan], on the southern border of Lake Superior." Holotype Acad. Nat. Sci. Philadelphia No. 1377. Collector "Dr. John L. Le Conte." Date of collection unknown.

Amblystoma jeffersonianum var. *laterale*: Cope, 1867: 197. Emendation of generic name; varietal status proposed.

Amblystoma jeffersonianum: Stejneger and Barbour, 1917: 9 (in part).

Ambystoma laterale: Minton, 1954: 174; Uzzell, 1964: 292. Present usage.

• CONTENT. No subspecies are recognized.

• DEFINITION AND DIAGNOSIS. A bisexual, diploid species (2n = 28) of the *Ambystoma jeffersonianum* complex. Females are generally similar to females of *A. tremblayi*. During courtship, the male clasps the female in the axilla with his forelimbs. The digits are moderately long, but generally shorter than *A. jeffersonianum* and *A. platineum*. The plicae of the tongue radiate from the posterior margin of the tongue. The maxillary and premaxillary teeth form a single row posterior to the internal nares, usually separated into three groups by breaks behind the nares.

The dorsum of adults is black or grayish-black; the venter is a little lighter. There are numerous large bluish-white flecks, especially along the lower sides of the body but also on the venter and dorsum. The area around the vent is black. Mature males are 42 to 70 mm snout to vent, 71 to 129 mm total; mature females are 51 to 72 mm snout to vent, 84 to 129 mm total. Mature males have 2.7 to 3.5 mm between the external nares; mature females, 2.8 to 3.9 mm. The adpressed limbs of smaller, mature males overlap by as many as two costal folds; the adpressed limbs of larger males may be separated by as many as two costal folds. The enlarged ovarian eggs number 82 to 489.

• DESCRIPTIONS. Egg masses and deposition sites were described by Stille (1954). Clanton (1934) and Uzzell (1964) included brief notes. The eggs are deposited frequently as singles, often in twos, threes, and fours, attached to or under debris on the bottom of ponds, or on submerged sticks. The outer diameter of the egg mass is the diameter of the jellies of a single egg, 5 to 6 mm (unpublished). This is less than the outer diameter of jellies of *A. tremblayi*. The freshly dissected ovarian eggs average less in diameter (1.54 to 1.68 mm, mean 1.65) than eggs of *A. tremblayi* (Clanton, 1934).

Juveniles were described by Edgren (1949). Larvae have not been described. Adults were described by Breckenridge (1944), Clanton (1934), Minton (1954), and Uzzell (1964). Courtship was described by Kumpf and Yeaton (1932).

• ILLUSTRATIONS. Breckenridge (1944), Clanton (1934), Minton (1954), Conant (1958), and Uzzell (1964) all figured adults. Eggs, egg masses, larvae, and juveniles have not been illustrated.

• DISTRIBUTION. Except for records from the "driftless" area of Wisconsin and from the Great Swamp of New Jersey (Anderson & Giacosie, 1967), all records for this species are from north of the Wisconsin glacial border; all are from the eastern deciduous forest formation. *A. laterale* is found from northwestern Illinois north to Favourable Lake in the Kenora District of Ontario, east of northwestern Ohio, the northern half of New York (down the Hudson River Valley to Long Island and eastern New Jersey) to the coastal plain of Massachusetts and possibly Rhode Island, and north to Cape Breton (Cook & Rick, 1963) and Prince Edward islands, and southern Quebec along the north shore of the St. Lawrence River. A population, possibly isolated, has been reported (Bleakney, 1954) near Goose Bay, Labrador. At many localities in the southern half of its range, *A. laterale* occurs with the very similar triploid species *Ambystoma tremblayi*.

Localities on the map are based on males; many localities in the literature are based on preserved females, which are not certainly identifiable as *A. laterale* or *A. tremblayi*.

• FOSSIL RECORD. None. *Ambystoma minshalli* Tihen and Chantell (1963) from the Valentine formation (lowermost Pliocene) of north-central Nebraska, is a very small member of the *Ambystoma maculatum* group, to which the *Ambystoma jeffersonianum* complex has been referred (Tihen, 1958); the small size of *A. minshalli* is reminiscent of *A. laterale*.

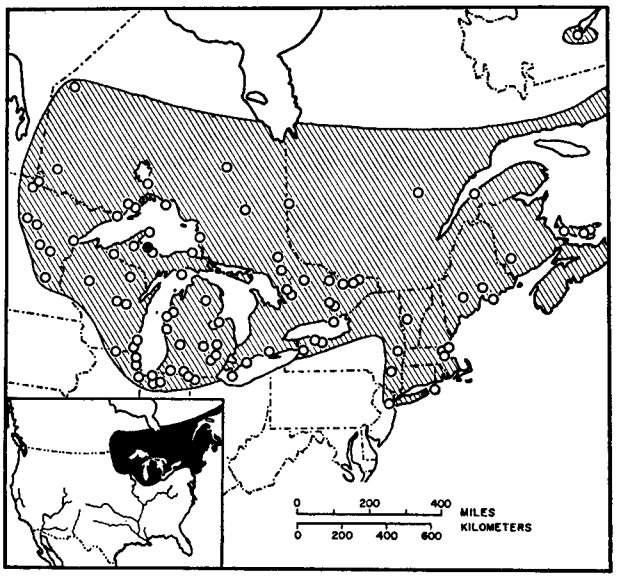
• PERTINENT LITERATURE. Few papers deal explicitly with this species, although many referring to *Ambystoma jeffersonianum* probably were partly based on this species (see REMARKS). Most of the recent information on the biology of this group is included in the following: Bleakney (1952) reported that the larvae occasionally overwinter. Clanton (1934) provided morphological data distinguishing this species from the triploid *A. tremblayi*; Clanton also noted the sex ratio among progeny. Edgren (1949) described an autumnal aggregation in this species. Kumpf & Yeaton (1932) described the courtship. Minton (1954) distinguished this species from *A. jeffersonianum*. Uzzell (1963) noted the chromosome number. Uzzell (1964) discussed morphological features, sex ratios in populations, migration dates of sexes, sex ratio of progeny, triploid hybrids between this species and *A. jeffersonianum* (*A. platineum*, *A. tremblayi*), courtship, cell size, and spermatophore production. Uzzell & Goldblatt (1967) discussed certain serum proteins, the origin of the triploid hybrids between this species and *A. jeffersonianum*, and the role of mating preferences in the *Ambystoma jeffersonianum* complex. Other references are cited in the remainder of the text.

• REMARKS. Erythrocytes and erythrocyte nuclei probably have about two-thirds the volume of erythrocytes and erythrocyte nuclei of the two triploid species of the complex, *A. tremblayi* and *A. platineum*, and approximate the volume of those of *A. jeffersonianum* (Uzzell, 1964). Ova have about half the volume of ova of *A. tremblayi* (Clanton, 1934).

Cells of gastrulae of this species have 2n = 28 chromosomes; a count on liver tissue also had 2n = 28 (Uzzell, 1963). In early diplotene of the first meiotic division, the lampbrush chromosomes of the oocytes have about half the number of chiasmata per bivalent for each bivalent as the corresponding bivalents of *A. tremblayi* (Macgregor & Uzzell, 1964). Erythrocyte nuclei of adults have about two-thirds as much DNA as nuclei of *A. tremblayi*. The nucleoli of oocytes average about 1150, about one-third as many as are found in the triploid *A. tremblayi* (Macgregor, 1965).

In the laboratory, progeny of this species included about 60 per cent females (Clanton, 1934).

Males of this species produce a small number of spermatophores each breeding season (Clanton, 1934; Uzzell, 1964).



MAP. The solid circle marks the type-locality. Hollow symbols indicate other localities.

In breeding migrations, the males arrive at the pond relatively sooner than the females, although there is some overlap (Uzzell, 1964). In populations that include only *A. laterale*, the males outnumber the females (Cook County, Illinois; unpublished). In this population, the success of egg development is quite high, in contrast to populations that contain females of *A. tremblayi*.

Mating preference has been tested by confining, as bisexual pairs, various combinations of the two kinds of males and four kinds of females of the *Ambystoma jeffersonianum* complex in breeding cages; measured by frequency of deposition of eggs that develop, *A. laterale* males mate preferentially with *A. laterale* females, but they will also court females of *A. tremblayi* fairly readily (Uzzell & Goldblatt, 1967).

Courtship of *A. laterale* has been described by Kumpf & Yeaton (1932) and by Uzzell (1964). The most striking features are clasping of the female in the axillary region by the male using his forelimbs. The period of clasp varies in length. As courtship approaches a climax, the male relaxes his grasp slightly and moves forward, moving his head to right and left, thus rubbing the top of the head and the snout of the female with his chin. At the climax of these activities, the male moves ahead of the female and deposits one or two spermatophores usually relatively close to her snout. Outside the *A. jeffersonianum* complex, clasping by the male as part of courtship is also known in *Ambystoma gracile* and *A. macrodactylum* (Knudsen, 1960; Anderson, 1961), but is unknown in other species of the genus.

Stable triploid hybrids of this species and *Ambystoma jeffersonianum* have been described. See accounts of *A. tremblayi* and *A. platineum* for details.

The defense display reported by Rand (1954), undulation of the elevated tail, was possibly observed in this species; certainly the species shows this behavior, as do all members of the *Ambystoma jeffersonianum* complex.

• Etymology. The name is derived from the Latin *lateralis*, of the side, in reference to the blue spotting along the sides.

Comment

The application of the name *Ambystoma laterale* is largely a matter of convenience. An earlier suggestion (Uzzell, 1964) that the triploid species that resembles this species, *Ambystoma tremblayi*, was not found at the type locality of *A. laterale* seems less convincing, since a specimen of *A. tremblayi* has been collected at Washburn Point, Bayfield County, Wisconsin. The holotype of *Ambystoma laterale* Hallowell consists of soft pieces. It cannot be identified as the species for which the name is used here.

Among preserved specimens that resemble *A. laterale*, males can almost certainly be assigned to *A. laterale* rather than *A. tremblayi*. Some females can tentatively be identified because they come from localities probably outside the range of *A. tremblayi*. In the range of *A. tremblayi*, egg number relative to body length offers a possible means of identification (cf. Uzzell, 1964, Fig. 23).

Living individuals are more readily identified. The ploidy can be determined by examination of the erythrocytes. Erythrocytes of *A. laterale*, suspended in isotonic saline, are two-thirds the area, in optical section through the two longer axes, of erythrocytes of *A. tremblayi*.

Many specimens of *A. laterale* identified by cell size are preserved in the University of Michigan Museum of Zoology, Ann Arbor.

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